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You can read the recommendations in the user guide, the technical guide or the installation guide for MAXTOR SCSI. You'll find the answers to all your questions on the MAXTOR SCSI in the user manual (information, specifications, safety advice, size, accessories, etc.). Detailed instructions for use are in the User's Guide.

User manual MAXTOR SCSI
User guide MAXTOR SCSI
Operating instructions MAXTOR SCSI
Instructions for use MAXTOR SCSI
Instruction manual MAXTOR SCSI



SCSI Commands Reference Manual

Parallel SCSI
Fibre Channel (FC)
Serial Attached SCSI (SAS)

Rev. A



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Manual abstract:

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Rev. A 1 1.1 Definitions Access control list (ACL) The data used by a SCSI target device to configure access rights for initiator ports according to the access controls state of the SCSI target device. Access control list entry (ACE) One entry in the access control list.

Access controls An optional SCSI target device feature that restricts initiator port access to specific logical units and modifies the information about logical units in the parameter data of the INQUIRY and REPORT LUNS commands. Access controls coordinator The entity within a SCSI target device that coordinates the management and enforcement of access controls for all logical units within the SCSI target device. The access controls coordinator is always addressable through the ACCESS CONTROLS well known logical unit and LUN 0. active power condition When a device server is capable of responding to all of its supported commands, including media access requests, without delay. additional sense code A combination of the ADDITIONAL SENSE CODE and ADDITIONAL SENSE CODE QUALIFIER fields in the sense data.

Alias list A list of alias values and their associated designations maintained by the device server and managed by the CHANGE ALIASES command and REPORT ALIASES command. Alias value A numeric value associated to a designation in the alias list and used in command or parameter data to reference a SCSI target device or SCSI target port. Application client An object that is the source of SCSI commands. Further definition of an application client may be found in SAM-3. Attached medium changer A medium changer that is attached to and accessed through some other type of SCSI device.

Attribute A single unit of MAM information. Auto contingent allegiance (ACA) The task set condition established following the return of a CHECK CONDITION status when the NACA bit is set to one in the CONTROL byte. A detailed definition of ACA may be found in SAM-3. Blocked task A task that is in the blocked state. Tasks become blocked when an ACA condition occurs. The blocked state ends when the ACA condition is cleared. A detailed definition of the blocked task state may be found in SAM-3. Byte A sequence of eight contiguous bits considered as a unit. Cache See cache memory. 2 SCSI Commands Reference Manual, Rev.

A Cache memory A temporary and often volatile data storage area outside the area accessible by application clients that may contain a subset of the data stored in the non-volatile data storage area. Check data Information contained within a redundancy group that may allow lost or destroyed XOR-protected data to be recreated. Command A request describing a unit of work to be performed by a device server. A detailed definition of a command may be found in SAM-3. Command descriptor block (CDB) The structure used to communicate commands from an application client to a device server. A CDB may have a fixed length of up to 16 bytes or a variable length of between 12 and 260 bytes. Command standard A SCSI standard that defines the model, commands, and parameter data for a device type (e.g., SBC-2, SSC-2, SMC-2, MMC-4, or SES-2). Company_id Synonym for OUI.

Control mode page A mode page that provides controls over SCSI features (e.g., task set management and error logging) that are applicable to all device types. Control Extension mode page A mode page that provides controls over SCSI features that are applicable to all device types. Copy manager The device server that receives an EXTENDED COPY command and performs the operation requested.

Copy target device The name given by the EXTENDED COPY command to a source or destination logical unit (i.e., a copy target device is a logical unit, not a SCSI target device). Cyclic redundancy check (CRC) An error checking mechanism that checks data integrity by computing a polynomial algorithm based checksum.



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Data defect list (DLIST) A list of defects sent by the application client to the device server during a **FORMAT UNIT** command.

Data-in buffer The buffer specified by the application client to receive data from the device server during the processing of a command. *Data-out buffer* The buffer specified by the application client to supply data that is sent from the application client to the device server during the processing of a command. *Default protection information* Values placed into protection information fields if an application client does not specify specific protection information values. *Deferred error* A **CHECK CONDITION** status and sense data that is returned as the result of an error or exception condition that occurred during processing of a previous command for which **GOOD**, **CONDITION MET**, **INTERMEDIATE**, and **INTERMEDIATE-CONDITION MET** status has already been returned. *SCSI Commands Reference Manual, Rev. A 3 Designation* When used in reference to access controls, a name and optional identifier information that specifies a SCSI target device or SCSI target port for association with an alias value in the alias list. Otherwise, a distinguishing name, identifier, or title. *Device Identification VPD page* A VPD page that provides the means to retrieve identification information about the SCSI device, logical unit, and SCSI port. *Device server* An object within a logical unit that processes SCSI tasks according to the rules of task management. A detailed definition of a device server may be found in SAM-3.

Device service request A request, submitted by an application client, conveying a SCSI command to a device server. A detailed definition of a device service request may be found in SAM-3. *Device service response* The response returned to an application client by a device server on completion of a SCSI command. A detailed definition of a device service response may be found in SAM-3. *Device type* The type of peripheral device (i.e., device model) implemented by the device server and indicated by the contents of the **PERIPHERAL DEVICE TYPE** field in the standard **INQUIRY** data. *Direct-access block device* A device that is capable of containing data stored in blocks that each have a unique logical block address. *Disconnect-Reconnect mode page* A mode page that provides the application client the means to tune the performance of the service delivery subsystem. *Domain* An I/O system consisting of a set of SCSI devices that interact with one another by means of a service delivery subsystem.

Element An addressable physical component of a medium changer SCSI device that may serve as the location of a removable unit of data storage medium. A detailed definition of an element may be found in SMC-2. *Enabled task state* The only task state in which a task may make progress towards completion. A detailed definition of the enabled task state may be found in SAM-3. *Error correcting code (ECC)* An error checking mechanism that checks data integrity and enables some errors in the data to be corrected.

Exclusive-or (XOR) A Boolean arithmetic function on two binary input values that results in an output value of 1 if one and only one of the input values is 1. *Extended Unique Identifier, a 48-bit globally unique identifier (EUI-48)* The IEEE maintains a tutorial describing EUI-48 at <http://standards.ieee.org/regauth/oui/tutorials/EUI48.html>. *Extended Unique Identifier, a 64-bit globally unique identifier (EUI-64)* The IEEE maintains a tutorial describing EUI-64 at <http://standards.ieee.org/regauth/oui/tutorials/EUI64.html>. *4 SCSI Commands Reference Manual, Rev. A Extent* A fixed set of logical blocks occupying contiguous logical block addresses on a single logical unit. *Faulted I_T nexus* The I_T nexus on which a **CHECK CONDITION** status was returned that resulted in the establishment of an ACA. The faulted I_T nexus condition is cleared when the ACA condition is cleared. *Field* A group of one or more contiguous bits, a part of a larger structure such as a CDB or sense data. *Format corrupt* a vendor-specific condition in which the application client may not be able to perform read operations, write operations, or verify operations.

Grown defect list (GLIST) All defects sent by the application client to the device server. *Hard reset* A condition resulting from the events defined by SAM-3 in which the SCSI device performs the hard reset operations described in SAM-3, the standard, and the applicable command standards. *Host* A SCSI device with the characteristics of a primary computing device, typically a personal computer, workstation, server, minicomputer, mainframe computer, or auxiliary computing device. A host includes one or more SCSI initiator devices. *IEEE company_id* Synonym for **OUI**. *I_T nexus* A nexus between a SCSI initiator port and a SCSI target port. *I_T nexus loss* A condition resulting from the events defined by SAM-3 in which the SCSI device performs the I_T nexus loss operations described in SAM-3, the standard, and the applicable command standards. *I_T_L nexus* A nexus between a SCSI initiator port, a SCSI target port, and a logical unit. *I_T_L_Q nexus transaction* The information transferred between SCSI ports in a single data structure with defined boundaries (e.g., an information unit). *Idle power condition* When a device server is capable of responding to all of its supported commands, including media access requests, but commands may take longer to complete than when in the active power condition. *Implicit head of queue* An optional processing model for specified commands wherein the specified commands may be treated as if they had been received with a **HEAD OF QUEUE** task attribute. *Initiator device name* A SCSI device name of a SCSI initiator device or of a SCSI target/initiator device when operating as a SCSI initiator device. *Initiator port* Synonymous with SCSI initiator port.

SCSI Commands Reference Manual, Rev. A 5 Initiator port identifier A value by which a SCSI initiator port is referenced within a SCSI domain. *Initiator port name* A SCSI port name of a SCSI initiator port or of a SCSI target/initiator port when operating as a SCSI initiator port. *Internet protocol domain name* The name of a computer or hierarchy of computers within the domain name system defined by the IETF (see RFC 1035 and RFC 1591). The Internet Assigned Numbers Authority maintains a list of domain name assignments at <http://www.iana.org/assignments/domain-names>.

Internet protocol number A coded value assigned to identify protocols that layer on the Internet protocol (see RFC 791). The Internet protocol number assigned to the transmission control protocol (TCP, see RFC 793) is six. The Internet Assigned Numbers Authority maintains a list of Internet protocol number assignments at <http://www.iana.org/assignments/protocol-numbers>. *Linked command* One in a series of SCSI commands processed by a single task that collectively make up a discrete I/O operation. A detailed definition of a linked command may be found in SAM-3. *Least significant bit (LSB)* In a binary code, the bit or bit position with the smallest numerical weighting in a group of bits that, when taken as a whole, represent a numerical value (e).



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g., in the number 0001b, the bit that is set to one). Left-aligned A type of field containing ASCII data in which unused bytes are placed at the end of the field (highest offset) and are filled with ASCII space (20h) characters. Logical block A set of data bytes accessed and referenced as a unit. Logical block address (LBA) The value used to reference a logical block. Logical unit An externally addressable entity within a SCSI target device that implements a SCSI device model and contains a device server. A detailed definition of a logical unit may be found in SAM-3. Logical unit access control descriptor (LUACD) The structure within an ACE that identifies a logical unit to which access is allowed and specifies the LUN by which the logical unit is to be accessed. Logical unit certification list (CLIST) Defects detected by the device server during an optional certification process performed during the FORMAT UNIT command.

Logical unit inventory The list of the logical unit numbers reported by a REPORT LUNS command.

Logical unit number (LUN) An encoded 64-bit identifier for a logical unit. A detailed definition of a logical unit number may be found in SAM-3. Logical unit reset A condition resulting from the events defined by SAM-3 in which the logical unit performs the logical unit reset operations described in SAM-3, the standard, and the applicable command standards. 6 SCSI Commands Reference Manual, Rev. A Media Plural of Medium Medium A physical entity that stores data in a nonvolatile manner (i.e., retained through a power cycle) in accordance with commands processed by the device server. Medium auxiliary memory (MAM) An auxiliary memory residing on a medium that is accessible to the device server (e.g., a tape cartridge).

Medium auxiliary memory may be nonvolatile and independent of the main function of the device server. Medium changer A device that mechanizes the movement of media to and from the SCSI device that records on or reads from the media. A detailed definition of a medium changer may be found in SMC-2.

Most significant bit (MSB) In a binary code, the bit or bit position with the largest numerical weighting in a group of bits that, when taken as a whole, represent a numerical value (e.g., in the number 1000b, the bit that is set to one). Name A label of an object that is unique within a specified context and should never change (e.g., the term name and worldwide identifier (WWID) may be interchangeable). Network address authority (NAA) A field within a name that specifies the format and length of that name.

See FC-FS. Nexus A relationship between two SCSI devices, and the SCSI initiator port and SCSI target port objects within those SCSI devices. Non-volatile cache Cache that retains data through power cycles. Non-volatile cache memory Cache memory that retains data through power cycles. Non-volatile medium A physical storage medium that retains data written to it for subsequent read operations through power cycles (e.g., a disk within a device that stores data as magnetic field changes that do not require device power to exist). Null-padded A type of field in which unused bytes are placed at the end of the field (i.e., highest offset) and are filled with ASCII null (00h) characters.

Null-terminated A type of field in which the last used byte (i.e., highest offset) is required to contain an ASCII null (00h) character. One The logical true condition of a variable. Operation Code The first byte of a SCSI CDB shall contain an operation code identifying the operation being requested by the CDB. Organizationally unique identifier (OUI) A numeric identifier that is assigned by the IEEE such that no assigned identifiers are identical. OUI is equivalent to company_id or IEEE company_id. The IEEE prefers OUI for EUI-48 identifiers and company_id for EUI-64 identifiers. However, the numeric identifier is called an OUI when it is assigned by the IEEE. The IEEE maintains a tutorial describing the OUI at <http://standards.ieee.org/regauth/oui/>. SCSI Commands Reference Manual, Rev. A 7 Page A regular parameter structure (or format) used by several commands. These pages are identified with a value known as a page code. Persist through power loss An optional capability associated with some features that allows an application client to request that a device server maintain information regarding that feature across power failures. Persistent reservation holder The I_T nexus(es) that are allowed to release or change a persistent reservation without preempting it. Power cycle Power being removed from and later applied to a SCSI device. Power on A condition resulting from the events defined by SAM-3 in which the SCSI device performs the power on operations described in SAM-3, the standard, and the applicable command standards. Primary defect list (PLIST) The list of defects that are considered permanent defects.

Protection information Fields appended to each logical block that contain a cyclic redundancy check (CRC), an application tag, and a reference tag. Protocol identifier A coded value used in various fields to identify the protocol to which other fields apply. Protocol specific A requirement that is defined by a SCSI transport protocol standard. A detailed definition of protocol specific may be found in SAM-3. Protocol standard A SCSI standard that defines SCSI transport protocol (e.g., SAS, SPI-5, SBP-3, or FCP-2). Proxy token An identifier for a logical unit that may be used to gain temporary access to that logical unit in the presence of access controls. Redundancy group A grouping of XOR-protected data and associated check data into a single type of data redundancy (see SCC-2). the standard only supports the XOR type of redundancy.

Request for comment (RFC) The name given to standards developed by the Internet Engineering Task Force. Registered The condition that exists for an I_T nexus following the successful completion of a PERSISTENT RESERVE OUT command with a REGISTER service action, REGISTER AND IGNORE EXISTING KEY service action, or REGISTER AND MOVE service action and lasting until the registration is removed. Registrant An I_T nexus that is registered. Right-aligned A type of field containing ASCII data in which unused bytes are placed at the start of the field (i.e., lowest offset) and are filled with ASCII space (20h) characters. 8 SCSI Commands Reference Manual, Rev. A Relative port identifier An identifier for a SCSI port that is unique within a SCSI device. Application clients may use the SCSI Ports VPD page to determine relative port identifier values. Relative initiator port identifier A relative port identifier for a SCSI initiator port.

Relative target port identifier A relative port identifier for a SCSI target port. SCSI device A device that contains one or more SCSI ports that are connected to a service delivery subsystem and supports a SCSI application protocol. SCSI device name A name of a SCSI device that is world wide unique within the protocol of a SCSI domain in which the SCSI device has SCSI ports.



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The SCSI device name may be made available to other SCSI devices or SCSI ports in protocol specific ways. SCSI domain The interconnection of two or more SCSI devices and a service delivery subsystem. A detailed definition of a SCSI Domain may be found in SAM-3. SCSI initiator device A SCSI device containing application clients and SCSI initiator ports that originate device service and task management requests to be processed by a SCSI target device and receives device service and task management responses from SCSI target devices. SCSI initiator port A SCSI initiator device object acts as the connection between application clients and the service delivery subsystem through which requests and responses are routed. SCSI port A port of a SCSI device that connects the application client, device server or task manager to the service delivery subsystem. SCSI port identifier A value by which a SCSI port is referenced within a domain.

The SCSI port identifier is either an initiator port identifier or a target port identifier. SCSI port name A name of a SCSI port that is world wide unique within the protocol of the SCSI domain of that SCSI port. The name may be made available to other SCSI devices or SCSI ports in that SCSI domain in protocol specific ways. SCSI Ports VPD page A VPD page that allows retrieval of information about all the SCSI ports in a SCSI target device or SCSI target/initiator device. SCSI target device A SCSI device containing logical units and SCSI target ports that receives device service and task management requests for processing and sends device service and task management responses to SCSI initiator devices. SCSI target port A SCSI target device object that acts as the connection between device servers and task managers and the service delivery subsystem through which requests and responses are routed. SCSI transport protocol standard A SCSI standard that defines a SCSI transport protocol (e.g., FCP-2, SAS, SRP, or SBP-3). SCSI Commands Reference Manual, Rev. A 9 Sense data Data describing an error or exceptional condition that a device server delivers to an application client in the same I_T_L_Q nexus transaction as a CHECK CONDITION status or in response to a REQUEST SENSE command. The format of sense data is defined in SPC-4. Sense key The contents of the SENSE KEY field in the sense data. Service action A request describing a unit of work to be performed by a device server. A service action is an extension of a command.

Service delivery subsystem That part of a SCSI I/O system that transmits service requests to a logical unit or SCSI target device and returns logical unit or SCSI target device responses to a SCSI initiator device. Standby power condition When a device server is capable of accepting commands, but not capable of processing media access commands. Status One byte of response information sent from a device server to an application client upon completion of each command. Storage array controller Any combination of an initiator and application clients (see SAM-3) that originates SCSI commands, converts input LUNs to output LUNs, and converts input LBAs to output LBAs. A storage array controller organizes a group of direct-access block devices into various objects (e.g., redundancy groups and volume sets). See SCC-2. System One or more SCSI domains operating as a single configuration. Target device name A SCSI device name of a SCSI target device or of a SCSI target/initiator device when operating as a SCSI target device. Target port Synonymous with SCSI target port. Target port asymmetric access state The characteristic that defines the behavior of a target port and the allowable command set for a logical unit when commands and task management functions are routed through the target port maintaining that state. Target port group A set of target ports that are in the same target port asymmetric access state at all times. Target port group asymmetric access state The target port asymmetric access state common to the set of target ports in a target port group. Target port identifier A value by which a SCSI target port is referenced within a SCSI domain.

Target port name A SCSI port name of a SCSI target port or of a SCSI target/initiator port when operating as a SCSI target port. 10 SCSI Commands Reference Manual, Rev. A Task An object within a logical unit that represents the work associated with a command or a group of linked commands. A detailed definition of a task may be found in SAM-3. Task set A group of tasks within a logical unit, whose interaction is dependent on the task management (queuing) and ACA rules. See SAM-3 and the Control mode page. TCP port numbers One of the data needed to establish a TCP connection. TCP port numbers may be assigned to protocols that layer on TCP by the Internet Assigned Numbers Authority. The Internet Assigned Numbers Authority maintains a list of TCP port number assignments at <http://www.iana.org/assignments/port-numbers>.

Third-party command A command sent to one SCSI device requesting that an operation be performed involving two other SCSI devices (e.g., the EXTENDED COPY command may perform copy operations between two or more SCSI devices none of which are the SCSI device to which the EXTENDED COPY command was sent). Unit attention condition A state that a logical unit maintains while it has asynchronous status information to report to the initiator ports associated with one or more I_T nexuses.

See SAM-3. Universal time (UT) The time at longitude zero, colloquially known as Greenwich Mean Time. See <http://aa.usno.navy.mil/faq/docs/UT.html>. URI Schemes The Internet Assigned Numbers Authority maintains a list of schemes for URI and URL names at <http://www.iana.org/assignments/uri-schemes>. User data Data contained in logical blocks that is not protection information. UTF-8 A character set that is a transformation format of the character set defined by ISO 10646. See RFC 2279. Vendor specific (VS) Something (e.g.

, a bit, field, or code value) that is not defined by the standard and may be vendor defined. Volatile cache memory or Volatile cache Cache memory that does not retain data through power cycles. Volatile medium Medium that does not retain data written to it for a subsequent read operation through power cycles (e.g., a silicon memory device that loses data written to it if device power is lost). Well known logical unit A logical unit that only does specific functions. Well known logical units allow an application client to issue requests to receive and manage specific information usually relating to a SCSI target device. Well known logical unit number (W-LUN) The logical unit number that identifies a well known logical unit. XOR operation Performing an XOR bitwise on two identical-sized multiple-bit input values (e.g. , the current value of a logical block and the new value for that logical block). In a storage array implementing a redundancy group, the XOR operation is used in error correction algorithms and may be performed by the storage array controller or by the direct-access block devices.



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SCSI Commands Reference Manual, Rev. A 11 XOR-protected data Logical blocks, including user data and protection information, if any, that are part of a redundancy group. Zero The logical false condition of a variable.

Zero-padded A type of field in which unused bytes are placed at the end of the field (i.e., highest offset) and are filled with zeros. 1.2 Symbols and abbreviations See Table 1 for abbreviations of standards bodies (e.

g., ISO). Additional symbols and abbreviations used in the manual include: Abbreviation < > ACE ACL ACA ADC ADT ASC ASCII ASCQ ATA ATAPI CDB CRC CLIST D_ID DLIST ECC EUI-48 EUI-64 FC-FS FCP-2 GLIST HTTP I/O ID IEC IEEE IETF IP IPv4 IPv6 iSCSI ISO LBA Meaning less than greater than Access Control list Entry Access Control List Auto Contingent Allegiance Automation/Drive Interface - Commands Automation/Drive Interface - Transport Protocol Additional Sense Code American Standard Code for Information Interchange Additional Sense Code Qualifier AT Attachment (see www.t13.org) AT Attachment with Packet Interface (see www.t13.org) Command Descriptor Block Cyclic Redundancy Check logical unit certification list Destination Identifier (defined in FC-FS) data defect list error correcting code Extended Unique Identifier, a 48-bit globally unique identifier Extended Unique Identifier, a 64-bit globally unique identifier Fibre Channel Framing and Signaling Interface Fibre Channel Protocol for SCSI -2 grown defect list Hypertext Transfer Protocol (see RFC 2616) input/output Identifier or Identification International Electrotechnical Commission Institute of Electrical and Electronics Engineers Internet Engineering Task Force Internet Protocol Internet Protocol version 4 Internet Protocol version 6 Internet SCSI Organization for International Standards Logical Block Address 12 SCSI Commands Reference Manual, Rev. A LSB LUACD LUN MAM MMC-4 MSB NAA n/a INCITS OCRW OSD OUI PLIST RAID RBC RDMA RFC RMC SAM-2 SAM-3 SAM-4 SAT SBC-2 SBC-3 SBP-3 SCC-2 SCC-3 SCSI SES SES-2 SMC-2 SMC-3 SPC SPC-2 SPC-3 SPC-4 SPI-5 SRP SSC-2 TCP URI URL UT USB VPD VS W-LUN Least Significant Bit Logical Unit Access Control Descriptor Logical Unit Number Medium Auxiliary Memory SCSI Multi-Media Commands -4 Most Significant Bit Network Address Authority not applicable InterNational Committee for Information Technology Standards SCSI Specification for Optical Card Reader/Writer Object-based Storage Devices Commands Organizationally Unique Identifier primary defect list Redundant Array of Independent Disks SCSI Reduced Block Commands Remote Direct Memory Access (see SRP) Request For Comments SCSI Reduced Multi-Media Commands SCSI Architecture Model -2 SCSI Architecture Model -3 SCSI Architecture Model -4 SCSI / ATA Translation SCSI Block Commands -2 SCSI Block Commands -3 Serial Bus Protocol -3 SCSI Controller Commands -2 SCSI Controller Commands -3 The architecture defined by the family of standards described in clause 1 SCSI-3 Enclosure Services SCSI Enclosure Services -2 SCSI Media Changer Commands -2 SCSI Media Changer Commands -3 SCSI-3 Primary Commands (ANSI INCITS 301-1997) SCSI Primary Commands -2 SCSI Block Commands - 3 SCSI Primary Commands -4 SCSI Parallel Interface -5 SCSI RDMA Protocol SCSI Stream Commands -2 Transmission Control Protocol (see RFC 793) Uniform Resource Identifier (see RFC 2396 and RFC 3305) Uniform Resource Locator (see RFC 2396 and RFC 3305) Universal time Universal Serial Bus (see www.usb.org) Vital Product Data Vendor Specific Well known logical unit number SCSI Commands Reference Manual, Rev.

A 13 1.3 Keywords Expected A keyword used to describe the behavior of the hardware or software in the design models assumed by the standard. Other hardware and software design models may also be implemented. Ignored A keyword used to describe an unused bit, byte, word, field or code value. The contents or value of an ignored bit, byte, word, field or code value shall not be examined by the receiving SCSI device and may be set to any value by the transmitting SCSI device. Invalid A keyword used to describe an illegal or unsupported bit, byte, word, field or code value. Receipt of an invalid bit, byte, word, field or code value shall be reported as an error. Mandatory A keyword indicating an item that is required to be implemented as defined in this standard. May A keyword that indicates flexibility of choice with no implied preference (equivalent to "may or may not"). May not Keywords that indicate flexibility of choice with no implied preference (equivalent to "may or may not").

Need not Keywords indicating a feature that is not required to be implemented (equivalent to "is not required to"). Obsolete A keyword indicating that an item was defined in prior SCSI standards but has been removed from the standard. Optional A keyword that describes features that are not required to be implemented by the standard. However, if any optional feature defined in the standard is implemented, then it shall be implemented as defined in the standard.

Reserved A keyword referring to bits, bytes, words, fields and code values that are set aside for future standardization.

A reserved bit, byte, word or field shall be set to zero, or in accordance with a future extension to the standard. Recipients are not required to check reserved bits, bytes, words or fields for zero values. Receipt of reserved code values in defined fields shall be reported as an error. Restricted A keyword referring to bits, bytes, words, and fields that are set aside for use in other SCSI standards. A restricted bit, byte, word, or field shall be treated as a reserved bit, byte, word or field for the purposes of the requirements defined in the standard.

Shall A keyword indicating a mandatory requirement. Designers are required to implement all such mandatory requirements to ensure interoperability with other products that conform to the standard. Should A keyword indicating flexibility of choice with a strongly preferred alternative; equivalent to the phrase "it is strongly recommended." Vendor-specific Something (e.g., a bit, field, or code value) that is not defined by the standard and may be used differently in various implementations. 14 SCSI Commands Reference Manual, Rev. A 1.4 Conventions Certain words and terms used in the standard have a specific meaning beyond the normal English meaning. These words and terms are defined either in this clause or in the text where they first appear.

Names of commands, status codes, sense keys, and additional sense codes are in all uppercase (e.g., REQUEST SENSE). If there is more than one CDB length for a particular command (e.g., MODE SENSE(6) and MODE SENSE(10)) and the name of the command is used in a sentence without any CDB length descriptor (e.g., MODE SENSE), then the condition specified in the sentence applies to all CDB lengths for that command. Names of fields and state variables are in uppercase (e.g.

NAME). When a field or state variable name contains acronyms, uppercase letters may be used for readability.



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Normal case is used when the contents of a field or state variable are being discussed. Fields or state variables containing only one bit are usually referred to as the NAME bit instead of the NAME field. Normal case is used for words having the normal English meaning.

A binary number is represented in the standard by any sequence of digits comprised of only the Western-Arabic numerals 0 and 1 immediately followed by a lower-case b (e.g., 0101b). Underscores or spaces may be included between characters in binary number representations to increase readability or delineate field boundaries (e.g.,

, 0 0101 1010b or 0_0101_1010b). A hexadecimal number is represented in the standard by any sequence of digits comprised of only the Western-Arabic numerals 0 through 9 and/or the upper-case English letters A through F immediately followed by a lower-case h (e.g., FA23h). Underscores or spaces may be included in hexadecimal number representations to increase readability or delineate field boundaries (e.g., B FD8CFA23h or B_FD8C_FA23h). A decimal number is represented in the standard by any sequence of digits comprised of only the Western-Arabic numerals 0 through 9 not immediately followed by a lower-case b or lower-case h (e.g., 25).

When the value of the bit or field is not relevant, x or xx appears in place of a specific value. The standard uses the ISO convention for representing decimal numbers (e.g., the thousands and higher multiples are separated by a space and a comma is used as the decimal point). Table 1 shows some examples of decimal numbers represented using the ISO and American conventions. Table 1 -- ISO v American Numbering Conventions

ISO American 0,6 3,141 592 65 1 000 1 323 462 0.6 3.14159265 1,000 1,323,462.95 Lists sequenced by letters (e.g., a) red, b) blue, c) green) show no ordering relationship between the listed items. Lists sequenced by numbers (e.g., 1) red, 2) blue, 3) green) show an ordering relationship between the listed items. If a conflict arises between text, tables or figures, the order of precedence to resolve the conflicts is text, then tables, and finally figures.

Not all tables or figures are fully described in the text. Tables show data format and values. Notes do not constitute any requirements for implementors. SCSI Commands Reference Manual, Rev. A 15 16 SCSI Commands Reference Manual, Rev.

A 2.0 General Concepts This manual defines behaviors that are common to all Seagate SCSI device models. This manual defines the SCSI commands that are basic to more than one disc drive model and the SCSI commands that may apply to any SCSI Interface, including Parallel, Fibre Channel, and Serial Attached SCSI (SAS). SCSI Commands Reference Manual, Rev. A 17 2.1 2.1.1 Command Descriptor Block (CDB) CDB usage and structure A command is communicated by sending a command descriptor block (CDB) to the device server. For several commands, the CDB is accompanied by a list of parameters in the Data-Out Buffer. See the specific commands for detailed information.

If a logical unit validates reserved CDB fields and receives a reserved field within the CDB that is not zero, then the logical unit shall terminate the command with CHECK CONDITION status, with the sense key set to ILLEGAL REQUEST, and the additional sense code set to INVALID FIELD IN CDB. If a logical unit receives a reserved CDB code value in a field other than the OPERATION CODE field, then the logical unit shall terminate the command with CHECK CONDITION status, with the sense key set to ILLEGAL REQUEST, and the additional sense code set to INVALID FIELD IN CDB. The fixed length CDB formats are described in 2.1.2. The variable length CDB formats are described in 2.1.4. The CDB fields that are common to most commands are described in 2.1.

5. The fields shown in 2.1.2 and 2.1.

3 and described in 2.1.4 are used consistently by most commands. However, the actual usage of any field (except OPERATION CODE and CONTROL) is described in the subclause defining that command. If a device server receives a CDB containing an operation code that is invalid or not supported, the command shall be terminated with CHECK CONDITION status, with the sense key set to ILLEGAL REQUEST, and the additional sense code set to INVALID COMMAND OPERATION CODE.

For all commands, if there is an invalid parameter in the CDB, the device server shall terminate the command without altering the medium. 2.1.2 The fixed length CDB formats All fixed length CDBs shall have an OPERATION CODE field as their first byte and a CONTROL byte as their last byte. Table 2 shows the typical format of a 6-byte CDB. Table 3 shows the typical format of a 10-byte CDB. Table 4 shows the typical format of a 12-byte CDB. Table 5 shows the typical format of a 16-byte CDB. Table 6 shows the format of a 16-byte CDB for commands that provide for a long LBA. Table 2 -- Typical CDB for 6-byte commands Bit Byte 0 1 2 3 4 5 TRANSFER LENGTH (if required) PARAMETER LIST LENGTH (if required) ALLOCATION LENGTH (if required) CONTROL Miscellaneous CDB information 7 6 5 4 3 2 1 0 OPERATION CODE (MSB) LOGICAL BLOCK ADDRESS (if required) (LSB) 18 SCSI Commands Reference Manual, Rev.

A Table 3 -- Typical CDB for 10-byte commands Bit Byte 0 1 2 3 4 5 6 7 8 9 (MSB) Miscellaneous CDB information TRANSFER LENGTH (if required) PARAMETER LIST LENGTH (if required) ALLOCATION LENGTH (if required) CONTROL (LSB) Miscellaneous CDB information (MSB) 7 6 5 4 3 2 1 0 OPERATION CODE SERVICE ACTION (if required) LOGICAL BLOCK ADDRESS (if required) (LSB) Table 4 -- Typical CDB for 12-byte commands Bit Byte 0 1 2 3 4 5 6 7 8 9 10 11 Miscellaneous CDB information CONTROL (LSB) (MSB) TRANSFER LENGTH (If required) PARAMETER LIST LENGTH (if required) ALLOCATION LENGTH (if required) (LSB) Miscellaneous CDB information (MSB) 7 6 5 4 3 2 1 0 OPERATION CODE SERVICE ACTION (if required) LOGICAL BLOCK ADDRESS (if required) 20 SCSI Commands Reference Manual, Rev.

A Table 6 -- Typical CDB for long LBA 16-byte commands Bit Byte 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 Miscellaneous CDB information Control (LSB) (MSB) TRANSFER LENGTH (If required) PARAMETER LIST LENGTH (if required) ALLOCATION LENGTH (if required) (LSB) (MSB) LOGICAL BLOCK ADDRESS 7 6 5 4 3 2 1 0 OPERATION CODE Miscellaneous CDB information SCSI Commands Reference Manual, Rev. A 21 2.1.3 The variable length CDB formats The first byte of a variable length CDB shall contain the operation code 7Fh. The CONTROL byte is the second byte in the variable length CDB (see table 7) Table 7 -- Typical variable length CDB Bit Byte 0 1 2 3 4 5 6 7 8 9 10 : n ADDITIONAL CDB LENGTH field The ADDITIONAL CDB LENGTH field specifies the number of additional CDB bytes.



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