

Virtual Storage Device Emulator

Technical Description

Version 1.3

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1. Introduction

Virtual Storage Device Emulator emulates virtual storage controller, virtual storage devices, and virtual media on Windows operating system platforms. Virtual Storage Device Emulator supports iSCSI interface through external and local network interfaces in SCSI target mode. Virtual Storage Device Emulator supports Parallel SCSI interface in SCSI target mode.

Virtual Storage Device Emulator emulates the Direct Access Block (Disk) devices, Sequential Access (Tape Drive) devices, Processor devices, Multi-Media (CD/DVD/BD) devices, Optical Memory (Magneto-optical) devices, and Media Changer (jukebox) devices. Virtual devices store the data in the files located in local file system. Virtual devices can be configured as having either fixed or removable medium. Virtual media can be loaded to and unloaded from virtual devices manually or in automated way.

Virtual Storage Device Emulator emulates the virtual storage controller device for the operating system and other software to access the virtual storage devices. The virtual storage devices that are emulated through virtual storage controller are visible only on the local computer system the Virtual Storage Device Emulator is running on.

Virtual Storage Device Emulator supports iSCSI interface in SCSI target mode. Virtual storage devices that are emulated through iSCSI interface are visible to external initiators running on the other computer systems connected through the network. Local computer system can access virtual devices through iSCSI interface as well.

Virtual Storage Device Emulator emulates virtual storage devices and media through Parallel SCSI interface. Virtual storage devices and media are visible to external initiators and computer systems that are connected to the local computer system through SCSI cable.

Virtual Storage Device Emulator provides management console with graphical user interface (GUI) for managing the virtual hardware and virtual media configuration.

Virtual Storage Device Emulator provides command line interface (CLI) for automation of virtual hardware and virtual media management procedures. CLI module can be invoked either manually or by the other application or script.

Virtual Storage Device Emulator is intended for being used in the following scenarios.

- Development and testing of storage management solutions. Virtual Storage Device Emulator allows the user to configure large number of storage devices and media of different models, types, and capacities.
- Emulation of the storage type that is required for particular application client – disk storage, tape storage, multi-media storage, optical memory storage, and automated storage.

- Emulation of old storage devices that are no longer manufactured.

2. Supported operating system platforms

The following Windows operating system platforms are supported:

- Windows Server 2019
- Windows Server 2016
- Windows 10 32-bit and 64-bit
- Windows 8.1 32-bit and 64-bit
- Windows Server 2012 64-bit
- Windows 8 32-bit and 64-bit
- Windows 7 32-bit and 64-bit
- Windows Server 2008 32-bit and 64-bit
- Windows Vista 32-bit and 64-bit

NOTE: 64-bit operating system platforms are supported only for AMD64 (x64) processor architecture.

NOTE: Service Pack 1 or higher should be installed on Windows Vista OS platform.

3. System requirements

Hardware requirements:

- Computer system must meet the minimal hardware requirements for supported Windows operating system.
- Sufficient disk space for virtual media storage.

Software requirements:

- Supported Windows operating system with the necessary service pack installed.

NOTE: It is recommended to install all system patches from Windows Update site.

4. Principal architecture

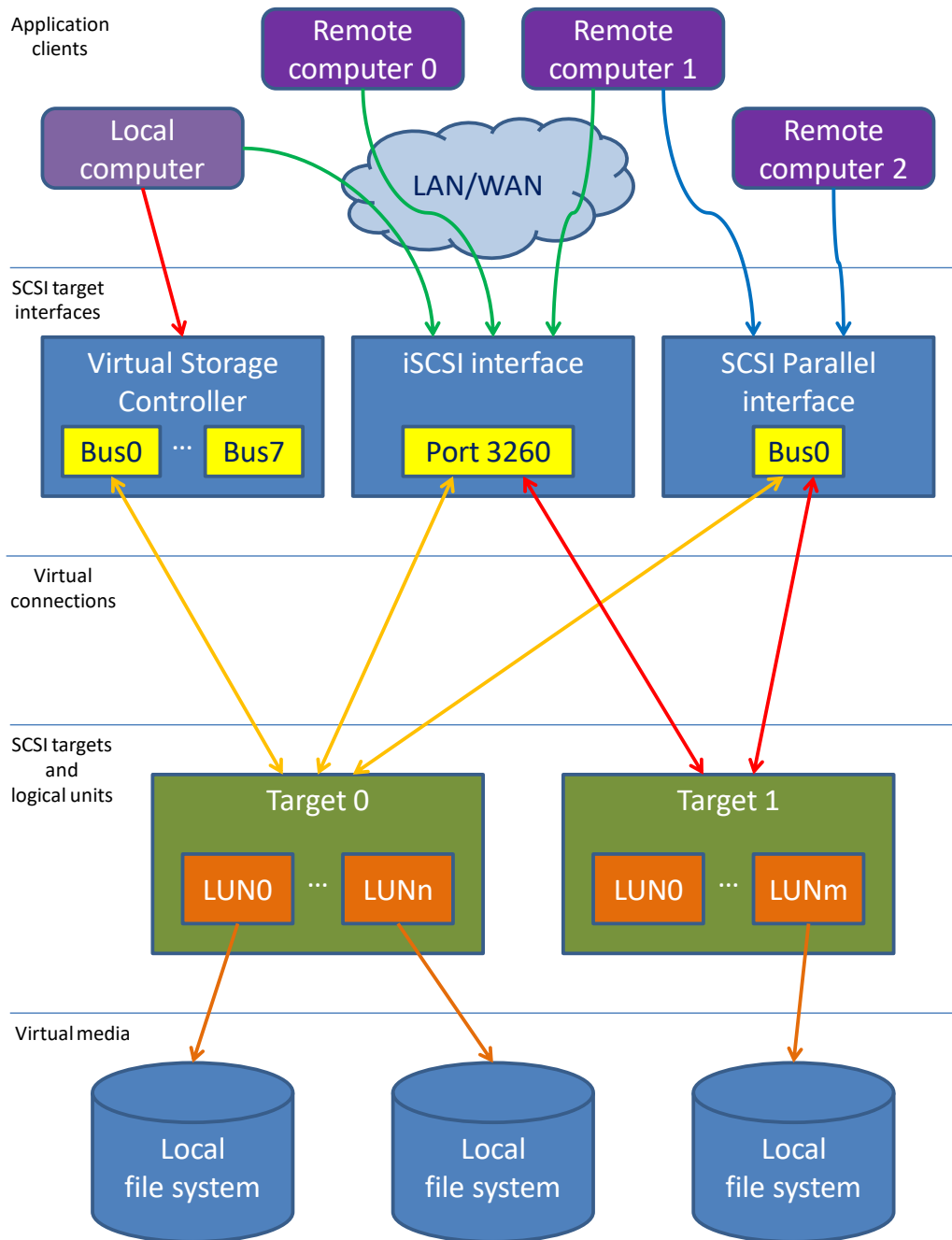


Figure 1. Principal architecture of possible interface/hardware configuration

Local computer system has connections to Virtual Storage Controller (red arrow) and network connection to iSCSI interface (green arrows). Remote computers 0 and 1 have network connection to iSCSI interface (green arrows) through LAN/WAN. Remote computers 1 and 2 have SCSI connection to SCSI parallel interface (blue arrows) through SCSI cable.

Virtual Storage Controller supports buses from 0 to 7. iSCSI interface supports single standard TCP port 3260 defined for iSCSI protocol. SCSI parallel interface supports single SCSI port.

Target 0 has multiple logical units from LUN0 to LUNn. Target 1 has multiple logical units from LUN0 to LUNm.

Target 0 has virtual connections (orange bidirectional arrows) to bus 0 of Virtual Storage Controller, standard TCP port of iSCSI interface, and single SCSI port of SCSI parallel interface. Target 0 and all its logical units (LUN0, LUN1, ..., LUNn) are visible to local computer and to remote computers 0, 1, and 2. Local computer can access Target 0 and its logical units through multiple paths – Virtual Storage Controller and local network connection to iSCSI interface. Remote computer 1 can access Target 0 and all its logical units through multiple paths - LAN/WAN connection to iSCSI interface and SCSI port on SCSI parallel interface.

Target 1 has virtual connections (red bidirectional arrows) to standard TCP port of iSCSI interface and single SCSI port of SCSI parallel interface. Target 1 and all its logical units (LUN0, LUN1, ..., LUNm) are visible to remote computers 1 and 2. Remote computer 1 can access Target 1 and all its logical units through multiple paths – LAN/WAN connection to iSCSI interface and SCSI port on SCSI parallel interface.

Logical units LUN0 and LUNn on Target 0 and LUNm on Target 1 are configured as having fixed or removable medium and are accessing virtual media data files on local file system (brown arrows). Other logical units on both targets do not have medium.

5. Product features

5.1. Virtual storage controller emulation

The virtual storage controller is the communication endpoint for the operating system and other software to access the virtual storage devices and media.

Virtual storage controller accepts the commands and other requests from the system and passes them to core Virtual Storage Device Emulator component for processing. Virtual storage controller handles requests for multiple virtual devices in parallel.

Virtual storage controller is handled by proprietary kernel-mode WDM driver that is implemented according to Virtual Storport model. Virtual storage controller has maximum transfer length 2 MiB.

Multiple instances of virtual storage controller may be installed in the system. Virtual Storage Device Emulator handles first 256 instances of virtual storage controller. Each instance of virtual storage controller has 8 storage buses. For each storage bus the virtual storage controller supports up to 255 SCSI targets. For each SCSI target the virtual storage controller supports up to 255 logical units.

Virtual storage controller is supported only on 32-bit Windows operating system platforms.

5.2. iSCSI interface support

Virtual Storage Device Emulator supports iSCSI interface in SCSI target mode. Virtual storage devices that are emulated through iSCSI interface are visible to external initiators running on the other computer systems connected through the network. Local computer system can access virtual devices through iSCSI interface as well.

The iSCSI interface implementation supports Internet Protocol version 4 (IPv4). Standard TCP port number 3260 is used. Virtual Storage Device Emulator has proprietary implementation of iSCSI protocol.

The iSCSI interface is supported for all available network interfaces including local host network interface. For each network interface up to 255 SCSI targets are supported. For each SCSI target up to 256 logical units are supported.

5.3. SCSI Parallel interface support

Virtual Storage Device Emulator supports SCSI Parallel interface in SCSI target mode for LSI Logic SCSI host adapters or adapters from the other manufacturers that are based on supported LSI53C8xx SCSI controllers. The following SCSI controllers are supported:

- LSI53C860
- LSI53C875
- LSI53C895

SCSI controller is handled by proprietary kernel-mode WDM driver. The driver switches the controller into SCSI target mode so the local computer system is visible as set of SCSI targets and logical units to external initiators connected through SCSI cable. Such controller cannot be used in SCSI initiator mode.

Virtual Storage Device Emulator handles first 256 instances of supported SCSI controllers. Single storage bus is supported for the controller. If controller has narrow SCSI bus up to 7 SCSI targets are supported for such controller. If controller has wide SCSI bus up to 15 SCSI targets are supported for such controller. For each SCSI target up to 8 logical units are supported.

SCSI parallel interface is supported only on 32-bit Windows operating system platforms.

5.4. Direct access block device emulation

Virtual Storage Device Emulator emulates the direct access block (disks) devices according to SCSI Block Commands (SBC) standard. Direct access device provides randomly accessible block storage.

The virtual direct access device supports the following major features:

- The following block sizes are supported: 512 B, 1 KiB, 2 KiB, 4 KiB, 8 KiB, 16 KiB, and 32 KiB.
- Virtual direct access devices can be configured as having either fixed or removable medium. If virtual direct access device is configured as having removable storage the virtual media can be inserted into the device either manually or in automated way using media changer device.

5.5. Sequential access device emulation

Virtual Storage Device Emulator emulates the sequential access (tape drive) devices according to SCSI Stream Commands (SSC) standard. Sequential access device provides sequentially accessible logical object storage.

The virtual sequential access device supports the following major features:

- Reading and writing of logical objects of fixed and variable length.
- Logical object length can vary from 1 to 0xFFFFFFFF (16 777 215) bytes. The upper logical block length limit is also determined by maximum transfer length of SCSI target interface and initiator capabilities.
- The tape can be formatted with up to 4 partitions. Virtual tape is capable for storing the Linear Tape File System (LTFS).
- Medium auxiliary memory (MAM) attributes support for virtual tape medium.
- Virtual sequential access devices always have removable medium. The virtual media can be inserted into the device either manually or in automated way using media changer device.
- Emulation of cleaning tape medium.
- Emulation of read/write SCSI errors.

5.6. Processor device emulation

Virtual Storage Device Emulator emulates the processor devices according to SCSI Primary Commands – 2 (SPC-2) standard.

On Send (0Ah) command the virtual processor device receives the data without any processing.

On Receive (08h) command the virtual processor device sends data filled by zeros.

5.7. Multi-media device emulation

Virtual Storage Device Emulator emulates the Multi-Media (CD/DVD/BD) devices according to Multi-Media Commands (MMC) standard.

The virtual multi-media device supports the following major features:

- Read only media profile (CD-ROM, DVD-ROM, and BD-ROM) support. Read only media can only be loaded manually from image file (e.g. ISO).
- Writable CD media profile (CD-R) support for virtual CD media. Both digital audio and data CD can be written.
- Writable BD media profile (BD-R SRM) support for virtual BD media.
- Virtual multi-media devices always have removable medium. The virtual media can be inserted into the device either manually or in automated way using media changer device.
- Emulation of read/write SCSI errors.

5.8. Optical memory device emulation

Virtual Storage Device Emulator emulates the optical memory (magneto optical disks) devices according to SCSI Block Commands (SBC) standard.

The virtual optical memory device supports the following major features in addition to direct access device functionality:

- Erasing of optical memory medium.
- Virtual optical memory devices can be configured as having only removable medium. The virtual media can be inserted into the device either manually or in automated way using media changer device.

5.9. Media changer device emulation

Virtual Storage Device Emulator emulates the media changer (jukebox) devices according to SCSI Media Changer Commands (SMC) standard. Virtual media changer devices can be configured as having only removable medium.

The virtual media changer device supports the following major features:

- It is possible to configure the media changer device with any supported general media type (disk, tape, CD/DVD/BD, and optical memory).
- It is possible to configure start addresses and number of medium transport, storage, import/export, and data transfer elements. Up to 15 medium transport elements can be configured. Up to 61440 storage elements can be configured. Up to 128 import/export elements can be configured. Up to 256 data transfer elements can be configured.
- Data transfer elements can be dynamically assigned to or unassigned from drive devices.
- Insertion and removal of virtual media to/from media changer device with automatic element status update. Virtual media can be inserted into storage, import/export, and data transfer elements.

- Emulation of import/export door opening and closing.
- Settable timing for media movement and element status initialization operations.
- Emulation of media movement SCSI errors.

5.10. Interface enabling and disabling

If SCSI target interface is in enabled state all connected SCSI targets and logical units are visible to initiators. If SCSI target interface is in disabled state the initiator does not see the SCSI targets and logical units connected to interface buses.

Enabled/disabled SCSI target interface state is persistent and is kept between system restarts. By default the initial state of SCSI target interface state is disabled for security reasons.

5.11. Virtual device enabling and disabling

Enabling and disabling virtual devices emulates the physical powering on and off of the devices. If virtual device is enabled, it is visible to the host and is available for command processing. If virtual device is disabled, it is not visible to the host and is not available for command processing.

Disabled virtual device state remains in virtual hardware configuration. It is possible to enable/disable virtual devices on the fly. Enabled/disabled device state is persistent and is kept between system restarts. By default the device is enabled right after creation.

5.12. Removable device medium

Virtual Storage Device Emulator emulates removable device medium. The virtual media are located in media pool. The GUI management console and command line interface utility provide the means for managing the virtual media.

All virtual media have the following parameters:

- General medium type like disk, tape, CD/DVD/BD, and optical memory.
- Capacity.
- Volume tag.
- Vendor identification.
- Serial number.
- Medium type specific parameters: MAM support, values of some MAM attributes, mode medium type, etc.

Virtual medium data files are being kept in the special folder. It is possible to view and change path to the folder in management console.

The virtual media can be inserted and removed to/from virtual devices on the fly either manually or in automated way. If virtual medium has been inserted to the device, it remains in permanent inserted/loaded state through the system reboot cycles until it is removed from the device.

Maximum possible number of virtual media is 16382.

5.13. Virtual hardware management console

Virtual Storage Device Emulator provides management console with graphical user interface (GUI) for managing SCSI target interfaces, virtual hardware configuration, virtual media, and pseudo SCSI analyzer.

Management console is implemented as Win32 GDI application with graphical user interface.

Using management console the user can perform the following operations:

- Manage SCSI target interface state.
- Add new virtual hardware objects and media.
- Remove existing virtual hardware objects and media.
- View and change the properties and state of existing virtual hardware.
- Perform the operations specific to device type.
- Control pseudo SCSI analyzer.

5.14. Command line interface

Virtual Storage Device Emulator provides command line interface (CLI) for automation of virtual hardware configuration procedures. Command line interface can be invoked either manually or by the other application or script.

Command line interface is implemented as executable module. The module is Win32 console application.

More detailed description can be found in Virtual Storage Device Emulator Command Line Interface Specification document.

5.15. Large CDB support

Virtual Storage Device Emulator supports 32-byte commands for direct block and optical memory devices on Windows 8/2012 and later operating system platforms. Applications and drivers can execute large commands by means of storage request block request or extended SCSI pass through request.

5.16. SCSI-3 command and parameter support

Virtual Storage Device Emulator supports the SCSI commands and the device parameters as described in the SCSI-3 standards documents. The implementation is based on the following standards documents.

- SCSI Architecture Model - 3 (SAM-3)
- SCSI Primary Commands - 3 (SPC-3)
- SCSI Block Commands - 3 (SBC-3)
- SCSI Stream Commands - 4 (SSC-4)
- Multi-Media Commands – 6 (MMC-6)
- SCSI Media Changer Commands - 3 (SMC-3)

Some features from the latest standards documents are also implemented. Virtual Storage Device Emulator supports mandatory SCSI commands and device parameters, and subset of optional commands and device parameters.

5.17. Primary commands and parameters support

The following commands from the primary command set are supported.

- Inquiry (12h)
- Log Select (4Ch)
- Log Sense (4Dh)
- Mode Select (6) (15h)
- Mode Select (10) (55h)
- Mode Sense (6) (1Ah)
- Mode Sense (10) (5Ah)
- Persistent Reserve In (5Eh)
- Persistent Reserve Out (5Fh)
- Read Attribute (8Ch)
- Read Buffer (10) (3Ch)
- Release (6) (17h)
- Release (10) (57h)
- Report LUNs (A0h)
- Request Sense (03h)
- Reserve (6) (16h)
- Reserve (10) (56h)
- Security Protocol In (A2h)
- Security Protocol Out (B5h)
- Send Diagnostic (1Dh)

- Test Unit Ready (00h)
- Write Attribute (8Dh)
- Write Buffer (3Bh)

The following shared vital product data parameters are supported.

- Device Identification (83h)
- Supported VPD Pages (00h)
- Unit Serial Number (80h)

The following shared log parameters are supported.

- Read Error Counter (03h)
- Supported Log Pages (00h)
- Write Error Counter (02h)

The following shared mode parameters are supported.

- Control (0Ah)
- Power Condition (1Ah)

5.18. Block commands and parameters support

The following commands from the SCSI block command set are supported.

- Format Unit (04h)
- Pre-Fetch (10) (34h)
- Pre-Fetch (16) (90h)
- Prevent Allow Medium Removal (1Eh)
- Read (6) (08h)
- Read (10) (28h)
- Read (12) (A8h)
- Read (16) (88h)
- Read (32) (7Fh/0009h)
- Read Capacity (10) (25h)
- Read Capacity (16) (9Eh/10h)
- Read Defect Data (10) (37h)
- Read Defect Data (12) (B7h)
- Start Stop Unit (1Bh)
- Synchronize Cache (10) (35h)
- Synchronize Cache (16) (91h)
- Verify (10) (2Fh)
- Verify (12) (AFh)

- Verify (16) (8Fh)
- Verify (32) (7Fh/000Ah)
- Write (6) (0Ah)
- Write (10) (2Ah)
- Write (12) (AAh)
- Write (16) (8Ah)
- Write (32) (7Fh/000Bh)

The following additional commands for the optical memory devices are supported.

- Erase (10) (2Ch)
- Erase (12) (ACh)

The following mode parameters from SCSI block command set are supported.

- Caching (08h)
- Flexible Disk (05h)
- Format Device (03h)
- Rigid Disk Device Geometry (04h)

5.19. Stream commands and parameters support

The following commands from the SCSI stream command set are supported.

- Erase (6) (19h)
- Erase (16) (93h)
- Format Medium (04h)
- Load Unload (1Bh)
- Locate (10) (2Bh)
- Locate (16) (92h)
- Prevent Allow Medium Removal (1Eh)
- Read (6) (08h)
- Read (16) (88h)
- Read Block Limits (05h)
- Read Position (34h)
- Report Density Support (44h)
- Rewind (01h)
- Space (6) (11h)
- Space (16) (91h)
- Write (6) (0Ah)
- Write (16) (8Ah)

- Write Filemarks (6) (10h)
- Write Filemarks (16) (80h)

The following vital product data parameters from SCSI stream command set are supported.

- Automation Device Serial Number (B3h)
- Data Transfer Device Element Address (B4h)
- Logical Block Protection VPD page (B5h)
- Manufacturer-assigned Serial Number (B1h)
- Sequential-access Device Capabilities (B0h)
- TapeAlert Supported Flags (B2h)

The following log parameters from SCSI stream command set are supported.

- Device Statistics (14h)
- Sequential-Access Device (0Ch)
- Volume Statistics (17h)
- TapeAlert (2Eh)

The following mode parameters from SCSI stream command set are supported.

- Control Data Protection (0Ah/F0h)
- Data Compression (0Fh/00h)
- Device Configuration (10h)
- Device Configuration Extension (10h/01h)
- Informational Exceptions Control (1Ch)
- Medium Configuration (1Dh)
- Medium Partition (11h)
- Read-Write Error Recovery (01h)

5.20. Processor commands and parameters support

The following commands from the processor device command set are supported.

- Receive (08h)
- Send (0Ah)

5.21. Multi-media commands and parameters support

The following commands from the multi-media device command set are supported.

- Blank (A1h)
- Close Track Session (5Bh)
- Format Unit (04h)
- Get Configuration (46h)

- Get Event Status Notification (4Ah)
- Get Performance (ACh)
- Load/Unload Medium (A6h)
- Mechanism Status (BDh)
- Prevent Allow Medium Removal (1Eh)
- Read (10) (28h)
- Read (12) (A8h)
- Read Buffer Capacity (5Ch)
- Read Capacity (25h)
- Read CD (BEh)
- Read Disc Information (51h)
- Read Disc Structure (ADh)
- Read Format Capacities (23h)
- Read TOC/PMA/ATIP (43h)
- Read Track Information (52h)
- Send Cue Sheet (5Dh)
- Set Streaming (B6h)
- Start Stop Unit (1Bh)
- Synchronize Cache (35h)
- Write (10) (2Ah)
- Write (12) (AAh)
- Write And Verify (10) (2Eh)

The following mode parameters from the multi-media device command set are supported.

- Read-Write Error Recovery (01h)
- Write Parameters (05h)
- Caching (08h)
- Timeout and Protect (1Dh)

5.22. Media changer commands and parameters support

The following commands from the media changer device command set are supported.

- Exchange Medium (A6h)
- Initialize Element Status (07h)
- Move Medium (A5h)
- Prevent Allow Medium Removal (1Eh)
- Read Element Status (B8h)

The following media changer device vital product data parameters are supported.

- TapeAlert Supported Flags (B2h)

The following media changer device log parameters are supported.

- Element Statistics (15h)
- Media Changer Diagnostics Data (16h)
- Media Changer Statistics (14h)
- Tape Alert (2Eh)

The following media changer device mode parameters are supported.

- Device Capabilities (1Fh)
- Element Address Assignment (1Dh)
- Extended Device Capabilities (1Fh/41h)
- Transport Geometry Descriptor (1Eh)

5.23. Multiple targets and multiple logical units per target

Virtual Storage Device Emulator supports multiple SCSI targets. Virtual Storage Device Emulator supports multiple logical units per single SCSI target. Logical unit objects are always assigned to the parent SCSI target object.

The configuration of SCSI targets and logical units can be changed dynamically on the fly.

5.24. Pseudo SCSI analyzer

Pseudo SCSI analyzer provides indication of various events that occur in SCSI subsystem and during SCSI command processing. The typical example is arrival of SCSI command from initiator, command processing in target and logical unit, and command completion with SCSI status and sense data.

Pseudo SCSI analyzer allows individual selection of SCSI target interfaces, virtual hardware objects, and events for monitoring. All changes in selection for monitoring are dynamic and take effect immediately.

The content of pseudo SCSI analyzer view can be saved to the text file for later analysis.

5.25. Virtual connections

Virtual connections between interface buses and SCSI targets specify the path of SCSI command routing. When SCSI target is connected to interface bus the SCSI target and assigned logical units are visible to initiators through the interface bus.

Only one virtual connection is allowed between any particular SCSI target and SCSI interface bus. Single SCSI interface bus can be connected up to 256 SCSI targets. Single SCSI target can be connected up to 256 SCSI interface buses. When SCSI target is connected to multiple

SCSI interface buses the so-called multi path I/O (MPIO) configuration is used. In MPIO configuration the SCSI target and all assigned logical units are visible to the initiator in multiple instances.

The configuration of virtual connections can be changed dynamically on the fly.

5.26. Artificial not ready device state

Artificial not ready device state provides the means for checking of device state handling in application client software. If not ready device state is enabled all media access commands will be completed with specified error codes.

User can specify additional sense code and additional sense code qualifier values.

5.27. SCSI error emulation

SCSI error emulation provides the means for checking the error handling in application client software. When emulation of SCSI error is enabled the specified SCSI commands are completed with specified error codes.

User can specify SCSI error emulation mode, SCSI commands and operations to fail, SCSI sense data values (sense key, additional sense code, and additional sense code qualifier), and additional error actions that are specific to device type and error type.

The following SCSI errors are supported:

Device type	Operation	SCSI commands
Sequential access	Read	Read (6) (08h), Read (16) (88h)
Sequential access	Write	Write (6) (0Ah), Write (16) (8Ah), Write Filemarks (6) (10h), Write Filemarks (16) (80h)
CD/DVD/BD	Read	Read (10) (28h), Read (12) (A8h)
CD/DVD/BD	Write	Write (10) (2Ah), Write (12) (AAh), Write And Verify (10) (2Eh)
Media changer	Move	Move Medium (A5h), Exchange Medium (A6h)

5.28. TapeAlert flags emulation

Virtual Storage Device Emulator provides the means for emulation of TapeAlert flags. The TapeAlert flags are supported for sequential access and media changer devices.

The user can manage the current values of TapeAlert flags.

5.29. Unit attention condition emulation

Unit attention condition emulation provides the means for generation of any number of unit attentions with specified parameters.

User can specify additional sense code, additional sense code qualifier, and additional sense bytes values.

5.30. Device temperature emulation

Virtual Storage Device Emulator provides the means for emulation of device temperature.

Device temperature is reported in Temperature (0Dh) log page by Log Sense (4Dh) SCSI command. User can specify the values for Temperature (0000h) and Reference Temperature (0001h) log parameters.

5.31. Import/export door emulation for media changer device

Virtual Storage Device Emulator emulates the opening and closing of import/export door for media changer device.

If import/export door is closed all import/export elements are marked as accessible and media changer device is able to move the media to/from import/export elements. If import/export door is open all import/export elements are marked as not accessible and media movement commands to/from import/export elements will fail.

5.32. Operation timing emulation for media changer device

Virtual Storage Device Emulator emulates the operation timing for media changer device in order to imitate the delays in operations of real devices. It is possible to set in device parameters the duration of media movement and element status initialization operations. If operation timing parameter has non-zero value the corresponding delay will be made during SCSI command execution.

Media movement operation timing specifies the delay in Move Medium (A5h) and Exchange Medium (A6h) SCSI commands. Element status initialization operation timing specifies the delay for single element for Initialize Element Status (07h) and Initialize Element Status With Range (37h) SCSI commands.

5.33. Device extension module

Device extension module handles non-standard commands, parameters, and behavior that are specific to certain device models. Single device extension module can be assigned to virtual device.

The device extension module is implemented as Windows DLL-module. Proprietary programmatic interface is used for interaction between device extension module and Virtual Storage Device Emulator core.

Device extension modules can only be developed on request according to commands and parameters specification.