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Host modes and host mode options

The host modes and host mode options (HMOs) must be set on the Fibre Channel ports before the hosts are connected. The host modes and HMOs differ depending on your Hitachi storage system model.

Host modes and HMOs for VSP 5000 series

Host modes for VSP 5000 series

Host mode	When to select this host mode
00 Standard	When registering Red Hat Linux server hosts or IRIX server hosts in the host group.* HMOs specific to this host mode: 68, 88, 91, 122, 131 HMOs available to this host mode: 2, 7, 13, 22, 39, 51, 71, 78, 80, 96, 97, 113
01 (Deprecated) VMware	Do not select this host mode. Select host mode 21 VMware Extension instead. HMOs specific to this host mode: 40, 54, 63, 68, 88, 110, 114, 122 HMOs available to this host mode: 2, 7, 13, 22, 39, 51, 71, 78, 80, 96, 97, 113
03 HP	When registering HP-UX server hosts in the host group. HMOs specific to this host mode: 12, 33, 43, 88 HMOs available to this host mode: 2, 7, 13, 22, 39, 51, 71, 78, 80, 96, 97, 113
05 OpenVMS	When registering OpenVMS server hosts in the host group. HMO specific to this host mode: 33 HMOs available to this host mode: 2, 7, 13, 22, 39, 51, 71, 78, 80, 96, 97, 113
07 Tru64	When registering Tru64 server hosts in the host group. HMO specific to this host mode: 14 HMOs available to this host mode: 2, 7, 13, 22, 39, 51, 71, 78, 80, 96, 97, 113
09 Solaris	When registering Solaris server hosts in the host group.

Host mode	When to select this host mode
	HMO specific to this host mode: 88 HMOs available to this host mode: 2, 7, 13, 22, 39, 51, 71, 78, 80, 96, 97, 113
0A NetWare	When registering NetWare server hosts in the host group. HMO specific to this host mode: 81 HMOs available to this host mode: 2, 7, 13, 22, 39, 51, 71, 78, 80, 96, 97, 113
0C (Deprecated) Windows	Do not select this host mode. Select host mode 2C Windows Extension instead. HMOs specific to this host mode: 6, 25, 40, 73, 88, 105, 110, 122 HMOs available to this host mode: 2, 7, 13, 22, 39, 51, 71, 78, 80, 96, 97, 113
0F AIX	When registering AIX ® server hosts in the host group. HMOs specific to this host mode: 15, 88 HMOs available to this host mode: 2, 7, 13, 22, 39, 51, 71, 78, 80, 96, 97, 113 When host mode 0F AIX ® is set, NACA (Normal Auto Contingent Allegiance) is enabled automatically. To ensure that the host responds correctly to a port with host mode 0F AIX enabled: 1. Shut down the host to be connected to the port. 2. Set the host mode on the port to 0F AIX, and enable the desired HMOs. 3. Connect the cables from the host to the port. 4. Boot the host. **Caution:** If the host mode of a port is changed to 0F AIX and the host had already recognized the Inquiry response for an LDEV on the port before host mode 0F AIX was set, the host might experience loss of device access (LDEV or LU). The host must be rebooted after the host mode is changed to 0F AIX to recognize the change in the response to the standard inquiry.
21 VMware Extension	When registering VMware server hosts in the host group.* HMOs specific to this host mode: 40, 54, 63, 68, 82, 83, 88, 110, 114, 122 HMOs available to this host mode: 2, 7, 13, 22, 39, 51, 71, 78, 80, 96, 97, 113
2C Windows	When registering Windows server hosts in the host group.*

Host mode	When to select this host mode
Extension	HMOs specific to this host mode: 6, 25, 40, 73, 88, 105, 110, 122 HMOs available to this host mode: 2, 7, 13, 22, 39, 51, 71, 78, 80, 96, 97, 113

* You can add the following types of server hosts to one host group:

- VMware server hosts, including when the (Linux-based OS or Windows) virtual host recognizes LUs by RDM (Raw Device Mapping), and also including when the virtual host is using VMFS of VMware
- Linux-based OS (such as Red Hat Linux) server hosts
- Windows server hosts

If you want to add these hosts to one host group, you must set this host mode and these HMOs for the host group:

- Host mode: 21 VMware Extension
- Host mode options: 2, 22, 25, 40, 54, 63, 68, and 110 (for details, contact customer support)

Restrictions for VMware server hosts added to the host group: If the OS of the virtual host on VMware is Windows, these functions that are supported by Windows cannot be used:

- Thin Provisioning
- Offloaded Data Transfer (ODX)

Restrictions for Windows server hosts added to the host group: In this environment, the Thin Provisioning function supported by the Windows host cannot be used. Therefore, you must not set HMO 73. If you set HMO 73, the thin provisioning function for the Linux server host does not work. If you want to use the Windows Thin Provisioning function, set host mode 2C Windows Extension and HMO 73 on the host group, and then add only Windows server hosts to the host group.

Host mode options for VSP 5000 series

HMO	Function	Host mode	Description
2	Test Unit Ready (TUR) response	Any	Purpose: By default, Reservation Conflict is returned for Test Unit Ready run from host without key setting. In the following conditions, Good Status is expected. When this HMO is enabled, the storage system will switch Test Unit Ready response to Good Status from Reservation Conflict. Use this HMO when any of the following conditions is met: • Windows Server Failover Clustering (WSFC) is used.

HMO	Function	Host mode	Description
			• Microsoft Failover Cluster (MSFC) is used. • Linux with cluster configuration is used. • Symantec Cluster Server (previously known as Veritas Cluster Server (VCS)) is used. • The response for SPC-3 (Good Status) is required.
6	TPRLO	0C [(Deprecated) Windows] or 2C [Windows Extension]	Use this HMO when all of these conditions are satisfied: • An Emulex host bus adapter is used in a Windows environment. • The mini-port driver is used. • TPRLO=2 is specified for the mini-port driver parameter of the host bus adapter.
7	Automatic recognition function of LUN	Any	Purpose: By default, Unit Attention response is not returned when adding a LUN using a host group. However, in some cases, the host may expect Unit Attention. When this HMO is enabled, the storage system will return the Unit Attention response. Use this HMO when you want the Unit Attention (UA) response to be returned at SCSI path change (sense code: REPORTED LUNS DATA HAS CHANGED). **Note:** If the UA response occurs frequently and the load on the host becomes high, the data transfer cannot be started on the host side and timeout might occur.
12	No display for ghost LUN	03 [HP]	Use this HMO when you want to suppress creation of device files for devices to which paths are not defined.
13	SIM report at link failure	Any	Use this HMO when you want SIMs (SIM=2194XX) to be issued when the number of link failures detected between FC ports (such as SSB=B65C and DDA1) exceeds the threshold. **Note:** Enable HMO 13 only when requested to do so.
14	TruCluster option for TrueCopy	07 [Tru64]	Use this HMO when you want to use TruCluster to set a cluster to each of primary volume and secondary volume

HMO	Function	Host mode	Description
			for TrueCopy or Universal Replicator.
15	HACMP/PowerHA®	0F [AIX]	Use this HMO when HACMP* or PowerHA® is used. * HACMP 4.5 version 4.5.0.13 or later, HACMP 5.1 version 5.1.0.4 or later, or HACMP 5.2 or later.
22	Veritas Cluster Server Oracle Solaris Cluster (Sun Cluster)	Any	Purpose: By default, Reservation Conflict is returned to the Mode Sense command. In the following condition, Normal Response is expected when a reserved volume receives the Mode Sense command from a node that is not reserving this volume. When this HMO is enabled, the storage system will switch the Mode Sense command response to Good status from Reservation Conflict. Use this HMO when Veritas Cluster Server is used, or an OS or middleware that supports SPC-4 is used. **Notes:** 1. By applying HMO 22, the volume status (reserved / non-reserved) will be checked more frequently. 2. By applying HMO 22, the host OS will not be receiving warning messages when the Mode Select command is being issued to a reserved volume.
25	Support SPC-3 behavior on Persistent Reservation	0C [(Deprecated) Windows] or 2C [Windows Extension]	Purpose: By default, Reservation Conflict is returned for PERSISTENT RESERVE OUT (Service Action = REGISTER AND IGNORE EXISTING KEY) command if there is no registered key to be deleted. In the following conditions, Good Status (SPC-3 response) is expected. When this HMO is enabled, the storage system will switch this command response to Good Status from Reservation Conflict. Use this HMO when one of these conditions is satisfied: • Windows Server Failover Clustering (WSFC) is used.

HMO	Function	Host mode	Description
			• Microsoft Failover Cluster (MSFC) is used. • Symantec Cluster Server (previously known as Veritas Cluster Server (VCS)) is used. • There is no registered key to be deleted when running the PERSISTENT RESERVE OUT command. **Note:** Host types other than above listed in Special Direction expect the response when the option is set to OFF.
33	Set/Report Device Identifier enable	03 [HP] or 05 [OpenVMS]	Use this HMO when all of these conditions are satisfied: • You want to enable commands to assign nicknames to the devices. • You want to set UUIDs to identify logical volumes from the host. **Note:** When host mode 05 [OpenVMS] is used and HMO 13 is enabled, you must set the UUID to all LUs.
39	Change the nexus specified in the SCSI Target Reset	Any	Use this HMO when you want to control these ranges per host group when receiving Target Reset: • Range of job resetting. • Range of UAs (Unit Attentions) defined.
40	V-VOL expansion	01 [(Deprecated) VMware], 0C [(Deprecated) Windows], 21 [VMware Extension], or 2C [Windows Extension]	Purpose: This HMO is used to control whether UA is returned to the host when a command from the host is received for the LU whose capacity has been expanded. Use this HMO when you want to automate recognition of the DP-VOL capacity after increasing the DP-VOL capacity. **Note:** This option is applied when UA returning to the host is required after the DP-VOL capacity is expanded.
43	Queue Full Response	03 [HP]	Use this HMO when the command queue is full in your storage system connected to an HP-UX host, and you want to respond `Queue Full` (instead of `Busy`) from the storage system to the host.
51	Round Trip Set Up Option	Any	Use this HMO if you want to adjust the response time of the host I/O, for example when the distance between the primary and secondary storage systems in the TrueCopy or global-active device pair is long (approximately 100 km)

HMO	Function	Host mode	Description
			and point-to-point topology is used.
54	(VAAI) Support Option for the EXTENDED COPY command	01 [(Deprecated) VMware] or 21 [VMware Extension]	Purpose: This HMO enables the XCOPY command to be used. Use this HMO when the VAAI (vStorage API for Array Integration) function of VMware ESX/ESXi 4.1 or later is used. **Notes:** 1. The HMO is set to ON only when a VMware server of ESX/ESXi 4.1 or later using the VAAI (vStorage API for Array Integration) function is connected. 2. If the HMO is not applied, the VMWare support function, Cloning file blocks, cannot be used. 3. When the ESX 4.x server is connected, set HMO 54 to ON. HMO 63 is not necessary. 4. When the ESXi 5.x or ESXi 6.x server is connected, set both HMO 54 and HMO 63 to ON. 5. After setting HMO 54 to ON, perform an operation (such as a server reboot) leading to reissuing the Inquiry command from the host.
60	LUN0 Change Guard	03 [HP]	Use this HMO when HP-UX 11.31 is used, and you want to suppress the addition or deletion of LUN 0.
63	(VAAI) Support Option for vStorage APIs based on T10 standards	01 [(Deprecated) VMware] or 21 [VMware Extension]	Purpose: This HMO enables the use of VAAI, which complies with SCSI T10. Use this HMO when you connect the storage system to VMware ESXi 5.0 or later and use the VAAI function for iSCSI T10. **Notes:** 1. After setting this HMO, perform the operation, such as the server reboot that reissues the Inquiry command on the host side. 2. When ESXi 5.x or later is connected, set both HMO 54 and HMO 63 to ON.
68	Support Page Reclamation for Linux	00 [Standard], 01 [(Deprecated) VMware], or 21	Purpose: When this HMO is enabled, the storage system will change the response that Linux OS can issue the WriteSame command to use the Page Reclamation

HMO	Function	Host mode	Description
		[VMware Extension]	function. Use this HMO when using the Page Reclamation function with a Linux host. **Notes:** 1. The option is applied when Dynamic Provisioning is used by Linux 2.6.33 or higher. 2. After setting HMO 68 to ON, perform the operation (such as a server reboot) that reissues the Inquiry command from the host.
71	Change the Unit Attention for Blocked Pool-VOLs	Any	Purpose: There is a possibility to prevent a device file from being blocked while a DP pool is blocked. Use this HMO when a device file is blocked while a DP pool is blocked. **Note:** This option is applied if switching sense key/sense code returned as a response to Check Condition when a read/write I/O is received while a DP pool is blocked can prevent a device file from being blocked, and therefore the extent of impact can be reduced on host side.
73	Support Option for WS2012		Purpose: When this HMO is enabled, the storage system enables Dynamic Provisioning function and Offloaded Data Transfer (ODX) of Windows Server 2012 or later: Use this HMO if all of the following functions provided by Windows Server 2012 (WS2012) or later are used: • Dynamic Provisioning function • ODX function **Notes:** 1. This option is applied when Dynamic Provisioning and ODX are used with Windows Server 2012. 2. After setting HMO 73 to ON, perform an operation (such as a server reboot) that reissues the Inquiry command on the host side.

HMO	Function	Host mode	Description
78	The non-preferred path option	Any	Purpose: To prevent the decrease of the response time of the host I/O using Hitachi Dynamic Link Manager (HDLM). Use this HMO if the following conditions are met: • Global-active device is used in the configuration with the data centers (Metro configuration). • HDLM is used as the alternative path software. **Notes:** 1. The option is applied when GAD is used in HDLM environment built between long distance data centers. The option is only set to host groups of cross paths. 2. If the option setting is wrong, load balance of the path with the option set works incorrectly, which may cause a performance issue.
80	Multi Text OFF	Any	By using the iSCSI interface, if the storage system connects with the host of which OS is not supported of the Multi Text function. For instance, connecting the storage system and the host of RHEL5.0 which does not support the Multi Text-function.
81	NOP-In Suppress Mode	0A [NetWare]	In the environment by iSCSI connection, the delay replying of the Delayed Acknowledgment function which is located on the upper layer is restrained by sending NOP-IN of executing of sense commands such as Inquiry, Test unit ready, or Mode sense. However, select this option when connecting the storage system and the host which is not necessary of the NOP-IN sending. However, when connecting the storage system and the host which does not need of the NOP-IN sending, select this option. For instance, use this HMO: • When connecting the storage system and the Open Enterprise Server of Novell Co., Ltd. • When connecting the storage system and winBoot/i of emBoot Co., Ltd..
82	Discovery CHAP Mode	21 [VMware Extension]	Select this option when the CHAP authentication is performed at the time of the discovery login in the iSCSI connection environment. For instance: When the CHAP authentication is performed

HMO	Function	Host mode	Description
			at the time of the discovery login in the iSCSI environment of the VMware host and storage system
83	Report iSCSI Full Portal List Mode	21 [VMware Extension]	Use this HMO when all of these conditions are met: • Configuring alternate paths between the VMware host and storage system. • Waiting for replying of the target information from the ports other than ports of discovery login.
88	Nondisruptive migration (NDM) and global-active device (GAD)	00 [Linux], 01 [(Deprecated) Vmware], 03 [HP], 09 [Solaris], 0C [(Deprecated) Windows], 0F [AIX], 21 [VMware extension], 2C [Windows extension]	Use this HMO when converging multiple host-target ports used in the migration source storage system on one host group of the migration target storage system by enabling path definition from the host group to LDEVs of multiple virtual storage machines. • Enabled: LUN path definition is enabled. • Disabled: LUN path definition is disabled. This HMO setting is not supported when the HDLM or VxVM DMP multipath software is used. **Notes:** 1. Apply this HMO when all the following conditions are met: - You are using the NDM or GAD function to migrate volumes in multiple migration source storage systems that use the same server. - You need to converge target ports used on the migration target storage system. - Host mode 00, 01 03, 09, 0C, 0F, 21, or 2C is used. 2. Do not apply this HMO to host groups without the specified host modes enabled. Applying this HMO to host groups with other host modes can cause the following problems: - Path addition from the server to the migration target storage system might fail.

HMO	Function	Host mode	Description
			- Display of devices that the server recognizes might be invalid. 3. When using VMware NMP, use the same LUN# for the migration source and migration target. 4. If a LUN path is defined from the host group to an LDEV defined in a virtual storage machine different from the one to which the host group belongs, this HMO cannot be set to OFF.
91	Disable I/O wait for OpenStack Option	00 [Standard]	Use this HMO when manually creating host groups or iSCSI targets that are used as the I/O data paths for OpenStack.
96	Change the nexus specified in the SCSI Logical Unit Reset	Any	Use this HMO when you want to control these ranges per host group when receiving LU Reset: • Range of job resetting. • Range of UAs (Unit Attentions) defined.
97	Proprietary ANCHOR command support	00 [Standard]	Do not enable HMO 97 when connecting with Hitachi NAS Platform (HNAS). This setting does not enable any HNAS functionality at this time. **Note:** This HMO was intended to be used only for NAS but was never implemented in NAS software, and therefore it is currently not supported by NAS and should not be used.
105	Task Set Full response in the event of I/O overload	0C [(Deprecated) Windows] or 2C [Windows Extension]	Use this HMO when you want to return Task Set Full response from the storage system to the host when an overload of I/Os occurs on the storage system.
110	ODX support for WS2012	0C [(Deprecated) Windows] or 2C [Windows Extension]	Purpose: This HMO is used to enable the Windows Server 2012 Offloaded Data Transfer (ODX) function to work. Use this HMO when ODX provided by Windows Server 2012 or later is used, in the environment with which the WS2012 or later host connects. **Notes:** 1. After setting HMO 110 to ON, perform an operation (such as a server reboot) leading to reissuing the

HMO	Function	Host mode	Description
			Inquiry command from the host. 2. When VMware and Linux servers, or VMware and Windows servers are added to the same host group, select VMware Extension for the host mode and then set the option to ON. 3. This HMO is related to HMO 73. For behaviors when both of the two options are set to ON, contact customer support. When both options are set to ON, the setting of HMO 73 is prioritized over that of HMO 110.
113	iSCSI CHAP Authentication Log	Any	Use this HMO when the result of the CHAP authentication is output to the audit log (DKC). **Note:** The setting of this HMO applies to all iSCSI targets on the port. Therefore, set this HMO only in iSCSI target 00 of the port.
114	Automatic asynchronous reclamation on ESXi 6.5 or later	01 [(Deprecated) [VMware] or 21 [VMware Extension]	Purpose: This option is used to change the value of OPTIMAL UNMAP GRANULARITY in Inquiry Page B0h Byte[28-31] as follows. Use this HMO when connecting to VMware ESXi 6.5 or later, and when using the zero data page reclamation function which is performed automatically if files on the VMFS (Virtual Machine File System) are deleted. **Notes:** 1. The option is applied to use Auto UNMAP with ESXi6.5 or later. 2. To enable the function, HMO 63 must be set to ON. 3. After setting HMO 114 to ON, perform an operation (such as a server reboot) leading to reissuing the Inquiry command from the host.
122	TASK SET FULL response after reaching QoS upper limit	01 [(Deprecated) VMware], 21 [VMware Extension], 0C [(Deprecated) Windows], 2C	Use this HMO when a Windows/Linux/VMWare host is connected, and when the QoS upper limit is reached, if you want to return a TASK SET FULL response to the host in order not to retain an I/O inside the storage system, enable this option.

HMO	Function	Host mode	Description
		[Windows Extension], or 00 [Standard]	**Note:** If this option is set for a host other than a Windows/ Linux/VMWare host, an I/O might not be issued from the host.
131	WCE bit OFF mode	00 [Standard]	Purpose: This HMO is used to change the WCE (Write Cache Enable) bit in Cache Mode page (08h) of the Mode Sense command to OFF "Write Cache Disabled", which is returned to the host. Use this HMO when an I/O performance problem occurs while Oracle ASM is used in Linux environment. **Notes:** 1. The option is applied when an I/O performance issue occurs while Oracle ASM is used in a Linux environment. In other environments than Linux, the behavior when the option is used is not guaranteed. 2. This option is related to system option mode (SOM) 779. 3. After setting this HMO to ON, perform an operation (such as server reboot) by which the Inquiry command is run again on the host side. 4. With the support for this HMO, only the outside I/F is changed, but there is no change in cache used internally in the storage system. (because the cache in the storage system is equal to non-volatile memory by battery).