

DESIGN and CONFIGURATION GUIDE

For

HDS G1000

Storage and Backup Engineering CSBE

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1 Document Purpose

This document provides detailed installation and configuration instructions for use by all operational and regional engineering teams for Hitachi Data Systems (HDS) Virtual Storage Platform G1000 Array (G1000) deployment within Citi's global storage environment, to ensure adherence to configuration, support, and management standards as well as compliance to Citigroup Information Security Standards.

2 Owner of Standard

CSBE (CATE Storage and Backup Engineering) is the owner of this standard and the related documents. Citi Architecture & Technology Engineering (CATE) is the custodial organization. CitiStorage Platform Engineering technologists will drive and generate content.

3 Intended Audience

The intended audience is Global and Regional Operations and Engineering personnel responsible for designing, building, supporting, and managing Citi corporate storage environments.

4 Revision History

Version	Description	Date	Author/Organization
1.0	Initial release of CG	04-03-2015	Gary Johnson / CSBE
1.0.1	Updated release to include HTnM AFR, TMEA, Firewall Rules, HTnM reports	04-06-2015	Gary Johnson / CSBE
1.0.2	Updated release to include Functional IDs, updated power specs, 400TB array, Port Flap, misc updates	04-15-2015	Gary Johnson / CSBE
1.0.3	Updated SOMs, Changed role for Admins, Added HM and HMOs	04-18-2015	Gary Johnson / CSBE

For additional details on each revision change, see [Appendix Z: Detailed Revision History](#).

4.1 Key Feature Changes

The HDS G1000 series storage array is the latest generation hardware platform for HDS's enterprise product line. The HDS enterprise product line is certified within Citi for the highest tiers of fiber channel attached storage.

5 Assembly/Solution Description

The Hitachi Data Systems (HDS) G1000 Storage Array (VSP G1000) is the latest generation of scale-out storage on purpose built and highly redundant hardware. This array is the successor to the currently deployed VSP model. The G1000 has increased throughput is more expandable than its predecessor.

The redundant architecture ensures no single point of failure and support for online hardware upgrades, hot preventive maintenance, and proactive drive sparing. Non-disruptive (NDU) microcode upgrades can be completed without affecting application quality of service. Seamless migrations have been improved, reducing or eliminating the need for host reboots.

Proven scalability outperforms other enterprise-class systems. Powered by 896GB/sec aggregate internal bandwidth 7th-generation Hi-Star crossbar switch-based architecture, the block storage controllers deliver far in excess of 3 million transactions per second. The system supports up to 8 virtual storage director pairs for large database processing and the highest virtual machine

density. It utilizes SAS 10-15k 3-6Gb, FMD Purpose Built Flash Storage, and SAS interface SSDs for data storage.

The G1000 is the first array in the G-series line of enterprise and mid-tier arrays, all running the same microcode and management software.

5.1 Technology

The G1000 is a dedicated hardware storage platform that will provide shared block-based storage via a fiber channel SAN.

5.2 Applicability

Global datacenters requiring block-based enterprise storage over a SAN.

6 Components

6.1 List of Components

The following tables list the required components and versions for the G1000 solution.

Component Name	Capability Description
R800 Storage Array	Enterprise Storage Array
R800 Microcode	The basis of all array features and patches for the array and the SVP.
HDvM CLI Software	Array Management Software (RHEL 6)
HTnM RAID Agent Software	Performance reporting agent. (RHEL 6)
TMEA Agent Software	Performance reporting agent for TMEA reporting service (RHEL 6)
RHEL Management server	Fiber attached SOE RHEL server running TMEA, HTnM RAID Agent, HDvM CLI, and RAIDCOM. Used for management, logging, monitoring, and alerting.
Hitachi Command Suite	SOE Windows server running HDvM, HTnM, and HRpM under the HCS umbrella. Used for management, monitoring, and reporting (Windows 2008 / 2012 64bit Server Standard).
RAIDCOM	Array command line management software (RHEL 6)

6.1.1 Packages for Software Components

Component Name	Package Name	Package Location
HDvM CLI Software	HDvM_CLI_810	Stealth.../sw/PKG/ HDvM_CLI_810
HTnM RAID Agent	HTnM_AFR_810	Stealth.../sw/PKG/HTnM_AFR_810

Software		
TMEA Agent Software	HDS_TMEA_970b11	Stealth.../sw/PKG/HDS_TMEA_970b11
Hitachi Command Suite	CITI_WIN_x64_HDSHCS_81_00	TPM
RAIDCOM	N/A	N/A

Note: RAIDCOM is restricted to read-only commands due to auditing issue. Once corrected, RAIDCOM will be released for general command use.

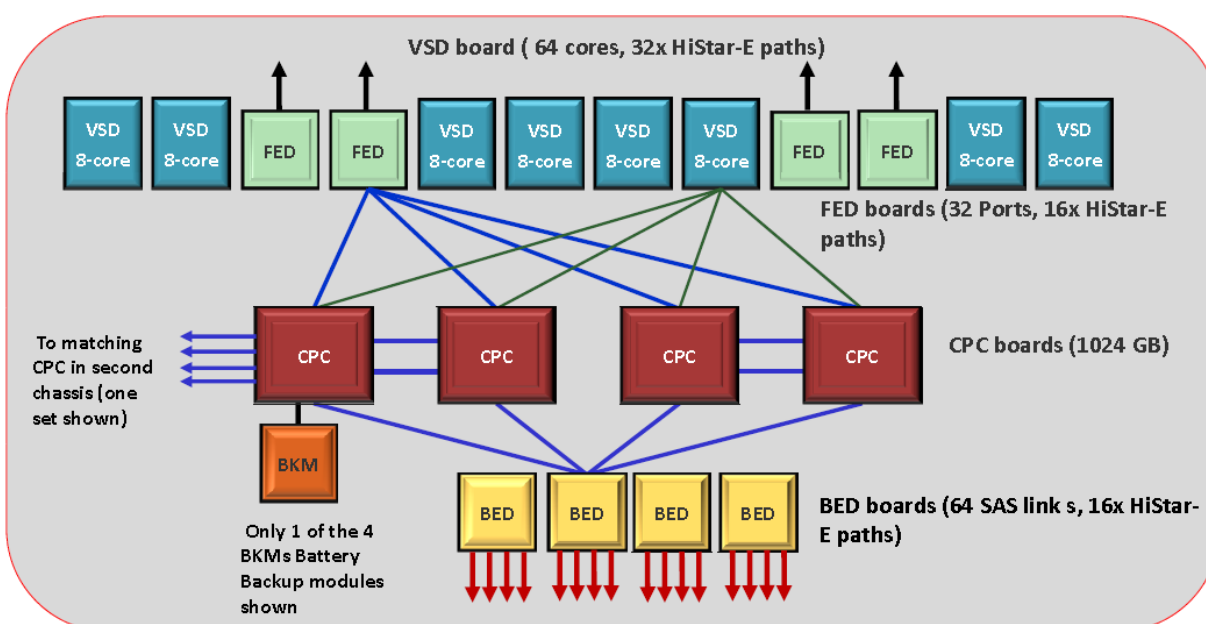
6.2 Operational Tools

The following tools listed in the table will have each G1000 storage array integrated into their infrastructure to help with monitoring the solution.

Name	Capability Description
Tivoli	Event Notification (ESS)
Hewlett Packard Network Automation	SBCC (Configuration Checklist) Automation
Arcsight	SEMS Audit Log Reconciliation
EMC SRM	Chargeback and Performance reporting
McAfee Virus Scan and ePO	Anti-Virus for the SVP
Microsoft Active Directory	Authentication and authorization of HCS software

7 Assembly/Solution Architecture

7.1 G1000 Architecture



7.1.1 G1000 Product Components

The major logical components of the G1000 array are:

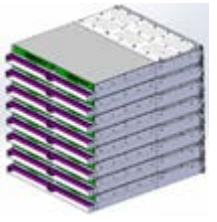
- Front-End Director Board (FED) with 8x 8Gbps FC ports each.
- Virtual Storage Director (VSD) with an 8-core Xeon CPU
- Cache Control Path (CPC) with 8x DIMM slots for 128GB or 256GB of cache each. These boards provide 22x HiStar-E ports and 4x cache memory controllers.
- Back-End Director Board (BED) with 16x 6Gbps SAS ports each
- Battery and SSD Backup Board (BKM) for each CPC board each with 2x NiMH batteries and 1x SSD.
- Storage Drives (FMD, SSD, SFF SAS, or LFF SAS) organized into DKUs.

The storage drives are organized into DKUs according to the form factor of the drive. The available drives are:

- Flash Module Drives (FMD) – 1.6TB, 3.2TB: 48x per FBX drive chassis (DKU)
- SSDs SAS – 400GB, 800GB: 192x per SBX drive chassis (DKU)
- SFF (2.5”) SAS drives – 300GB 15k, 600GB 10k, 900GB 10k, 1200GB 10k: 192x per SBX drive chassis (DKU)
- LFF (3.5”) NL-SAS drives – 4TB 7.2k: 96x per UBX drive chassis (DKU)

The Citi configuration of the G1000 array (Power Config) is a single chassis array with 8x VSD boards, 4x FEDs, 4x BEDs, and 4x CPCs. Collectively this is organized into the DKC.

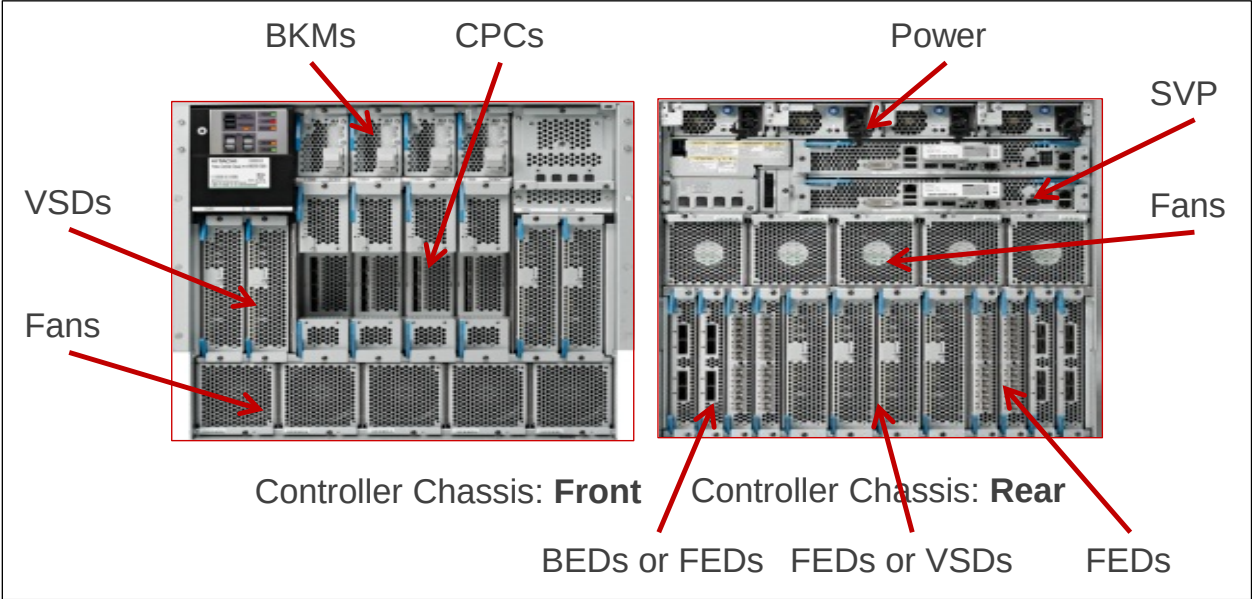
Drive Chassis Information

	Front view	Rear view	Details
SFF Drive Chassis DKC-F810-SBX			8 Trays x 2U Maximum of <u>192 SFF drives</u> Height: 16U
LFF Drive Chassis DKC-F810I-UBX			8 Trays x 2U Maximum of <u>96 LFF drives</u> Height: 16U

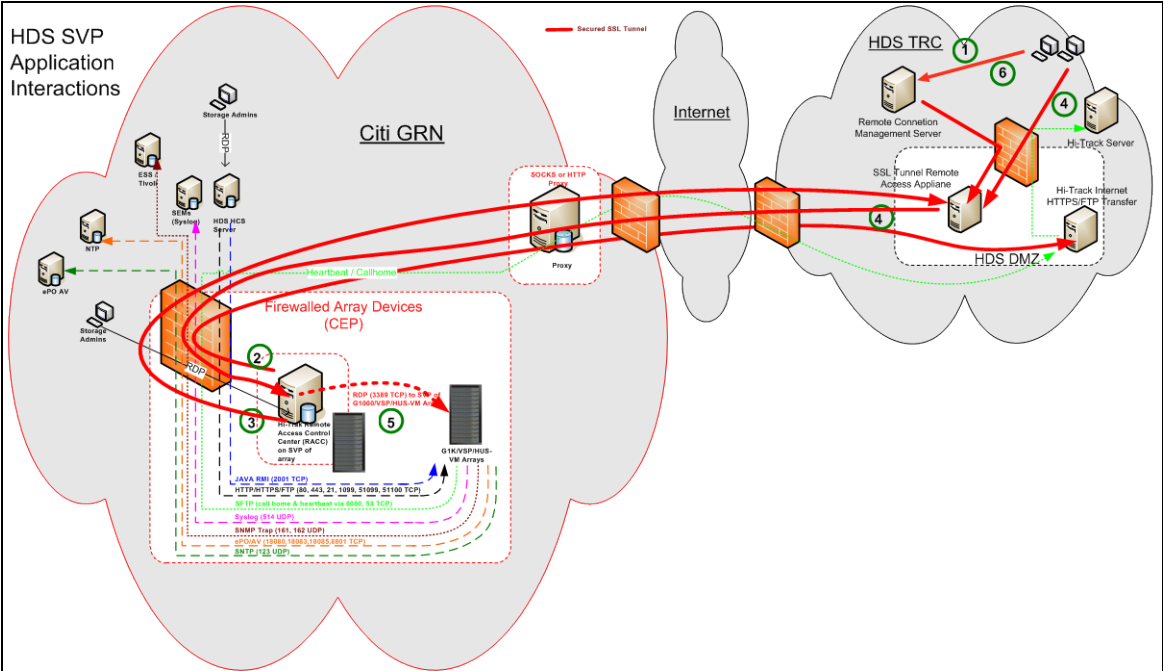


FMD Chassis DKC-F810I-FBX			4 Trays x 2U Maximum of <u>48 FMDs</u> Height: 8U
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Controller Chassis (CBX)



Application Interactions



8 Installation & Configuration Instructions

The following sections of this document discuss the installation and configuration steps of the G1000 storage array and are summarized:

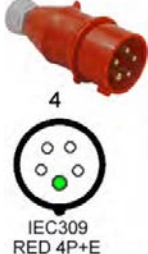
1. Physical installation of the G1000 storage array
2. Installation of G1000 microcode
3. Connect G1000 management connections
4. Setup Vendor Remote Management
5. Connect G1000 to SAN
6. Setup Management Infrastructure
7. Licensing
8. Provision storage to host servers

8.1 Physical G1000 Storage Array Installation

The three CATE standard array sizes are for a single, dual, and triple bay configuration. Subsequently the power, weight, and cooling go up on this array with the models .

8.1.1 Power Connections

Location	Phase	PDU Plug	PDU Plug Format	Operating / Max Voltage Rating	Max Current Rating	Breaker Rating	Power Cables per Rack

NAM/ LATAM	Single	NEMA L6 30P twistlock 2 pole, 3 wire (A + B + gnd)	 1 NEMA L6-30P	208 VAC	30 A	16 A, 20 A trip	4
NAM/ LATAM	Three	NEMA L15 30P (3 pole, 4 wire) (A + B + C + gnd)	 2 NEMA L15-30P	208 VAC / 240 VAC	30 A per phase	15 A 2 pole	2
EMEA/ APAC	Single	IEC 309, blue 2 pole, 3 wire (A + B + gnd)	 3 IEC309 BLUE 2P+E	230 VAC / 250 VAC	32 A	16 A, 20 A trip	4
EMEA/ APAC	Three	IEC 309, red 4 pole, 5 wire (A + B + C + N + gnd)	 4 IEC309 RED 4P+E	400 VAC	32 A per phase	16 A 2 pole	2

8.1.2 Floor Load Rating

The minimum to maximum floor load rating is 62.5 lbs. (28.5 kg) to 146 lbs. (66.25 kg) per square foot. The maximum Citi configuration weight is 4335 lbs. (1964 kg).

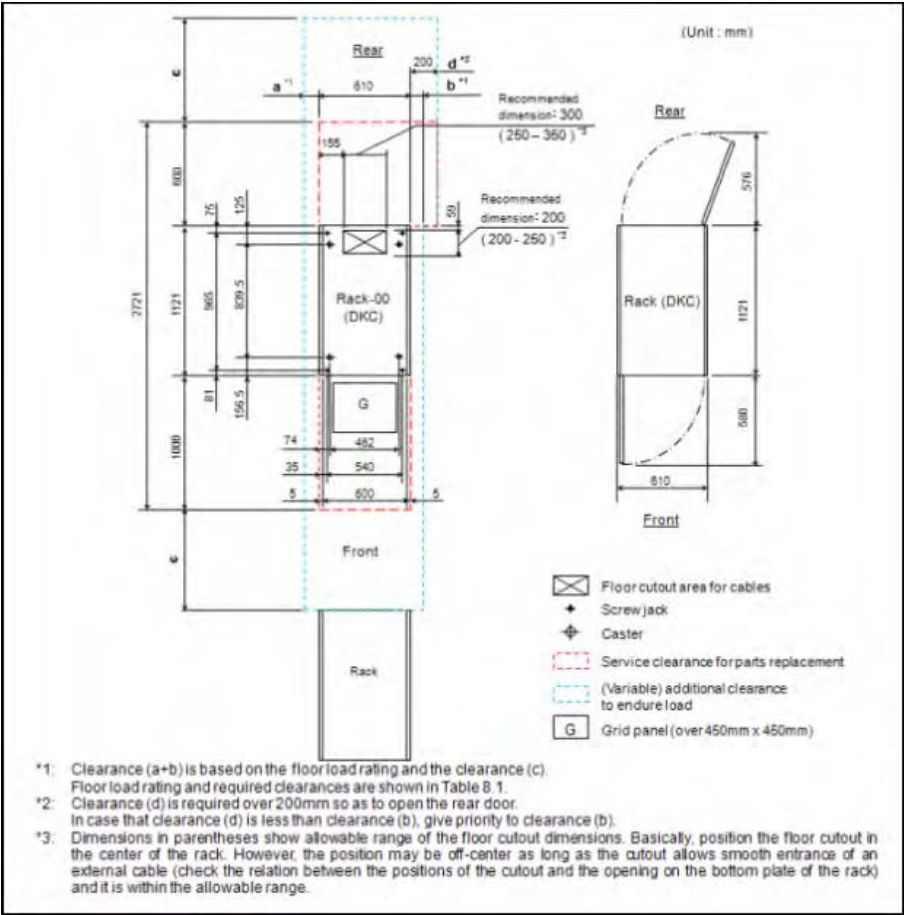
8.1.3 Power, Dimensions, and Weight for Small Array

Weight		Power Consumed / Heat Output		Power Supply Requirement
(kg)	(lb)	(kW)	BTU/hr	(kVA)
784	1,731	4.5	15,496	4.8

Width:	600 mm 23.6 inches	Depth:	1,200 mm 47.2 inches	Height:	2006 mm 79.0 inches
---------------	--------------------------	---------------	----------------------------	----------------	---------------------------

Service clearances	Left	Right	Front	Back
mm	0	0	1,000	600
Inches	0	0	39	24

Floor space & loading				
	floor space		floor loading	
	m ²	ft ²	kg/m ²	lb/ft ²
Without service clearances (machine only)	0.7	7.8	1120	222
With 1/2 service clearances (overlapped service clearances)	1.2	12.9	653	134
With full service clearances	1.7	18.1	461	96



For specifications of this array see [G1000 Small Array](#)

8.1.4 Power, Dimensions, and Weight for Medium Array

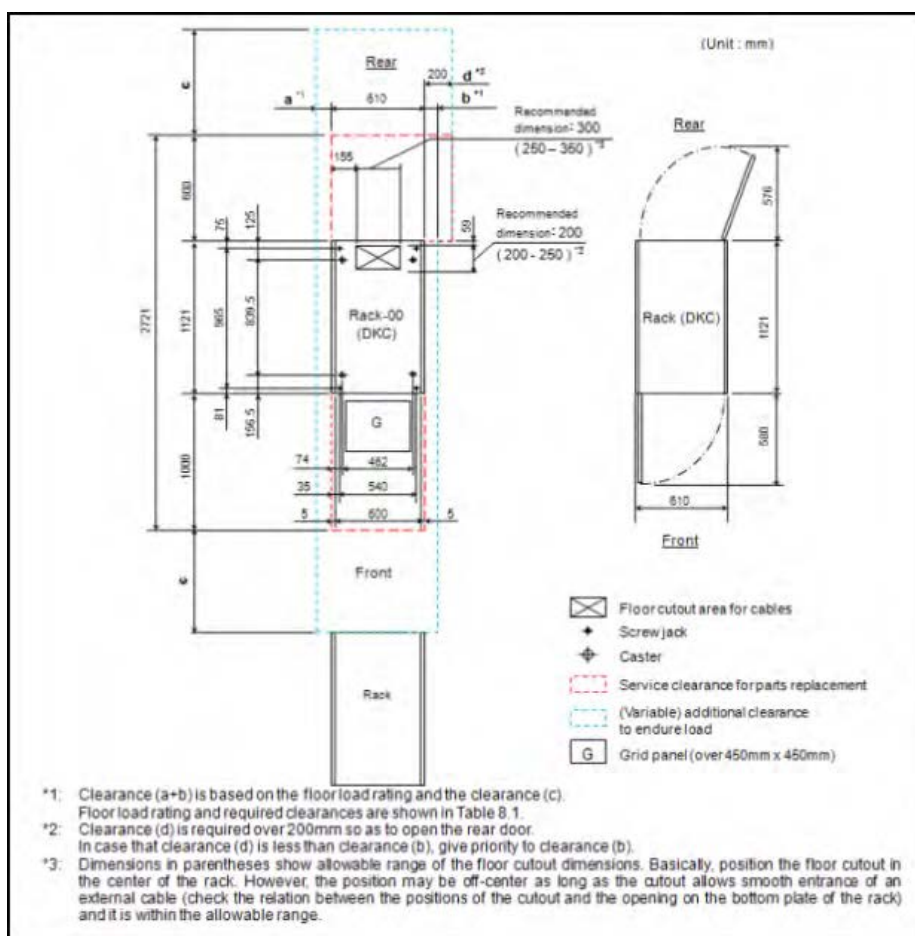
Weight		Power Consumed / Heat Output		Power Supply Requirement
(kg)	(lb)	(kW)	BTU/hr	(kVA)
1,374	3,033	8.0	27,408	8.5

Width:	1200 mm 47.2 inches	Depth:	1,200 mm 47.2 inches	Height:	2006 mm 79.0 inches
---------------	------------------------	---------------	-------------------------	----------------	------------------------

Service clearances	Left	Right	Front	Back
mm	0	0	1,000	600
Inches	0	0	39	24

Floor space & loading

	floor space		floor loading	
	m ²	ft ²	kg/m ²	lb/ft ²
Without service clearances (machine only)	1.4	15.5	981	196
With 1/2 service clearances (overlapped service clearances)	2.4	25.8	573	118
With full service clearances	3.4	36.2	404	84



For specifications of this array see [G1000 Medium Array](#)

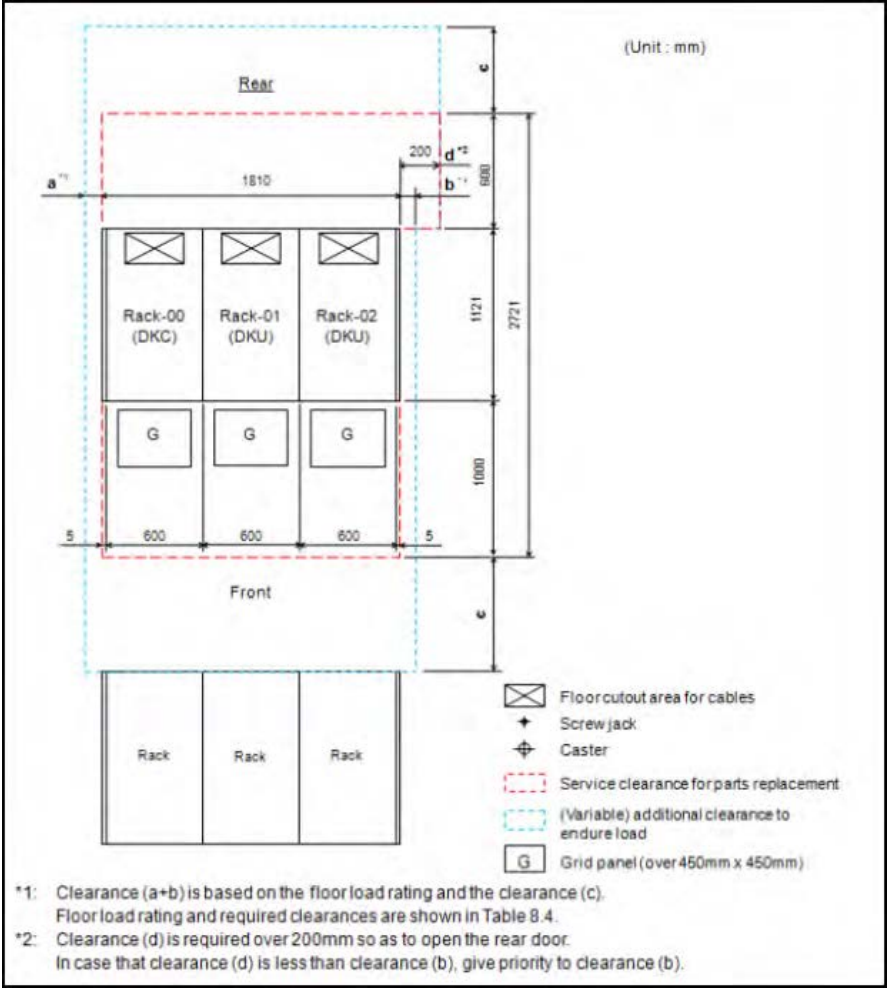
8.1.5 Power, Dimensions, and Weight for Large Array

Weight		Power Consumed / Heat Output		Power Supply Requirement
(kg)	(lb)	(kW)	BTU/hr	(kVA)
1,964	4,335	11.5	39,259	12.2

Width:	1800 mm 70.9 inches	Depth:	1,200 mm 47.2 inches	Height:	2006 mm 79.0 inches
---------------	------------------------	---------------	-------------------------	----------------	------------------------

Service clearances	Left	Right	Front	Back
mm	0	0	1,000	600
Inches	0	0	39	24

Floor space & loading				
	floor space		floor loading	
	m ²	ft ²	kg/m ²	lb/ft ²
Without service clearances (machine only)	2.2	23.3	893	186
With 1/2 service clearances (overlapped service clearances)	3.6	38.8	546	112
With full service clearances	5.0	54.3	393	80



For specifications of this array see [G1000 Large Array](#).

8.1.6 Power, Dimensions, and Weight for XL Array

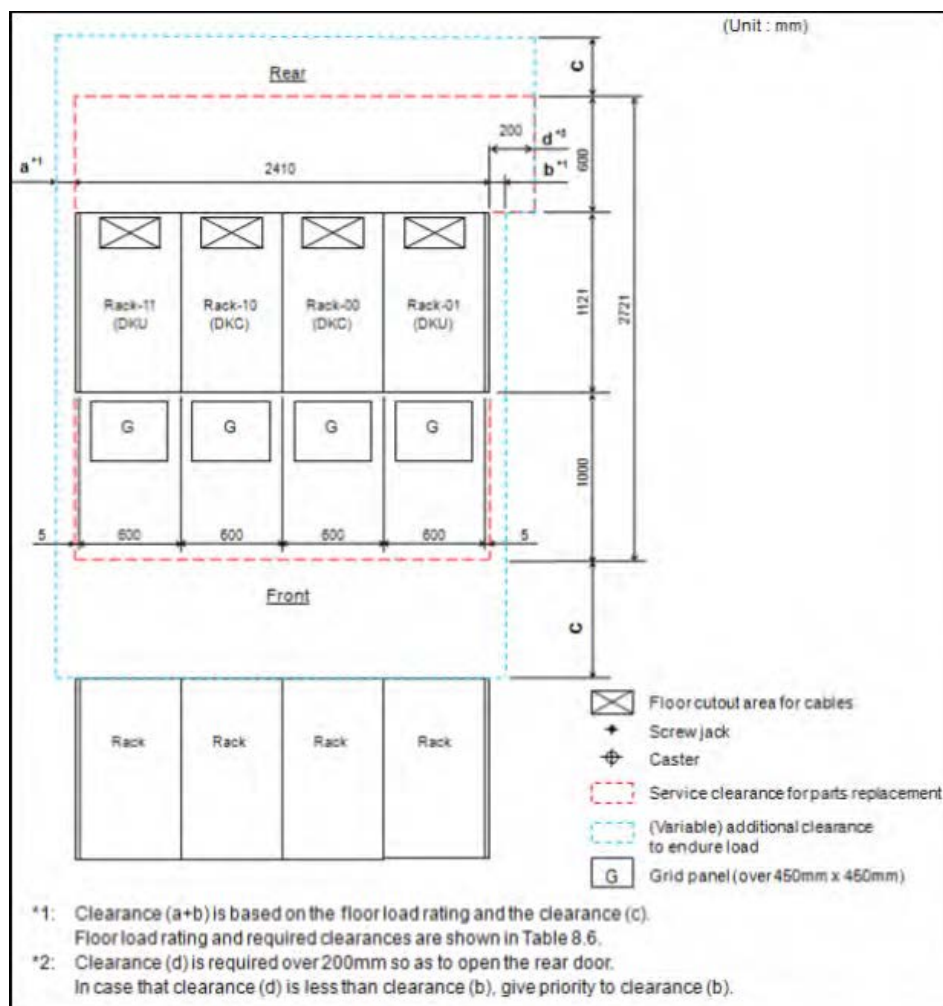
Weight		Power Consumed / Heat Output		Power Supply Requirement
(kg)	(lb)	(kW)	BTU/hr	(kVA)
2,700	5,960	15.6	53,133	16.5

Width:	2400 mm 94.5 inches	Depth:	1,200 mm 47.2 inches	Height:	2006 mm 79.0 inches
---------------	------------------------	---------------	-------------------------	----------------	------------------------

Service clearances	Left	Right	Front	Back
mm	0	0	1,000	600

Inches	0	0	39	24
--------	---	---	----	----

Floor space & loading				
	floor space		floor loading	
	m ²	ft ²	kg/m ²	lb/ft ²
Without service clearances (machine only)	2.9	31.0	931	192
With 1/2 service clearances (overlapped service clearances)	4.8	51.7	563	115
With full service clearances	6.7	72.3	403	82



For specifications of this array see [G1000 XL Array](#).

8.2 G1000 Microcode and System Options

8.2.1 Array Microcode

Refer to the [CSBE HDS Configuration Matrix](#) to determine what array code is supported. The HDS CE should downgrade/upgrade the G1000 to the most recently certified G1000 microcode version specified in the matrix. The G1000 array uses microcode with 80-xx-xx-xx/xx nomenclature.

When the microcode is installed, the default Maintenance account password should be changed to the global CTI standard by the HDS CE. This is unique to Citi and known only to HDS support staff and CTI personnel.

8.2.2 Array System Option Modes (SOMs)

There are several system option modes (occasionally referred to as SOM) that are needed for the array to function as expected. These options must be configured by HDS CE staff. HDS can provide a report of these options for every array they receive update data from (dial-home).

The following system options should be configured on all G1000 systems:

System Option	Citi Value	Default	Description	Notes
87	ON	OFF	Mode 87 = ON: Normal Restore (Reverse Copy) is performed for Shadow Image. Mode 87 = OFF (default): Quick Restore is performed for ShadowImage.	Shadow Image
467	ON	ON	In case of using the following features, the current copy processing slows down if the dirty percentage is 60% or larger, and it stops if the dirty percentage is 75% or larger. Mode 467 is to prevent the dirty percentage from over 60% so that the host performance is not affected. The copy processing stops if the dirty percentage is 60% or larger. If the dirty percentage becomes lower than 60%, the copy processing restarts.	Shadow Image
729	ON	OFF	This setting limits writes and reads to a full pool if the setting is ON.	Prevents data corruption
741	ON	OFF	Pool threshold alerts are reported to HDS with SIM alerts.	
749	OFF	OFF	Dynamic Provisioning Rebalance (OFF = rebalance is enabled)	
803	ON	OFF	This setting limits writes and reads when a pool volume error is encountered if the setting is ON (Data Retention Utility is enabled). This is for protection of the pool during disk failure. Locks the pool against read/write to avoid host corruption.	Prevents data corruption when pool is full

867	ON	OFF	All-page reclamation (discarding all mapping information between DP pool and DP volumes) is executed in DP-VOL LDEV format. Mode 867 = ON (default): LDEV format of the DP-VOL is performed with page reclamation.	LDEV Format with Page Reclamation
872	ON	OFF	When the mode is applied, the order of data transfer slots is guaranteed at the de-staging from array to an external storage. Mode 872 = ON (default): The order of data transfer slots from VSP to an external storage is guaranteed.	UVM
896	ON	OFF	The mode enables or disables the background format function performed on an unformatted area of a HDP/HDT pool. Note: The actions of this mode between RAID700/RAID800 and HM700 are reversed.	Background Format

The following system options should be enabled on only replicated (source and destination) G1000 (when certified for replication) systems:

System Option	Value	Default	Description	Notes
448	OFF	OFF	When the SVP detects a blocked path and when the path does not recover within a specified period of time, an error is assumed and the remote replication is suspended.	
449	ON	ON	Configures the SVP to ignore all HUR path failures. In the event of link failure, HUR will continue to operate and write all update I/Os	

8.2.3 Shared Memory Setting

The G1000 should be configured for 24GB of shared memory. This includes the base and 64K LDEV addressing options. If replication is used then an additional 8GB option is needed. If more than 1 PB is configured, then an additional 8GB is needed.

- Replication is not yet certified for use on the G1000 array.
- Petabyte (1.0PB +) configurations are by CATE exception only.

8.3 G1000 SVP Ethernet Connections

Each G1000 storage array will need two Ethernet connections to the Citi CEP network for vendor remote notification/support, alerting to ESS, and communication to management servers. The Ethernet connections will be connected to the G1000 primary and secondary SVPs management interfaces. Once connected, HDS will configure the management interfaces and the various software components on the SVPs. HDS Support will verify that RACC can connect to the G1000 successfully.

If IPs have been assigned, HiTrack and RACC setup should occur (by HDS CE). This will require that an application HTTP proxy be assigned to the SVP IPs. Email server(s) should be

8.4 G1000 SAN Connections

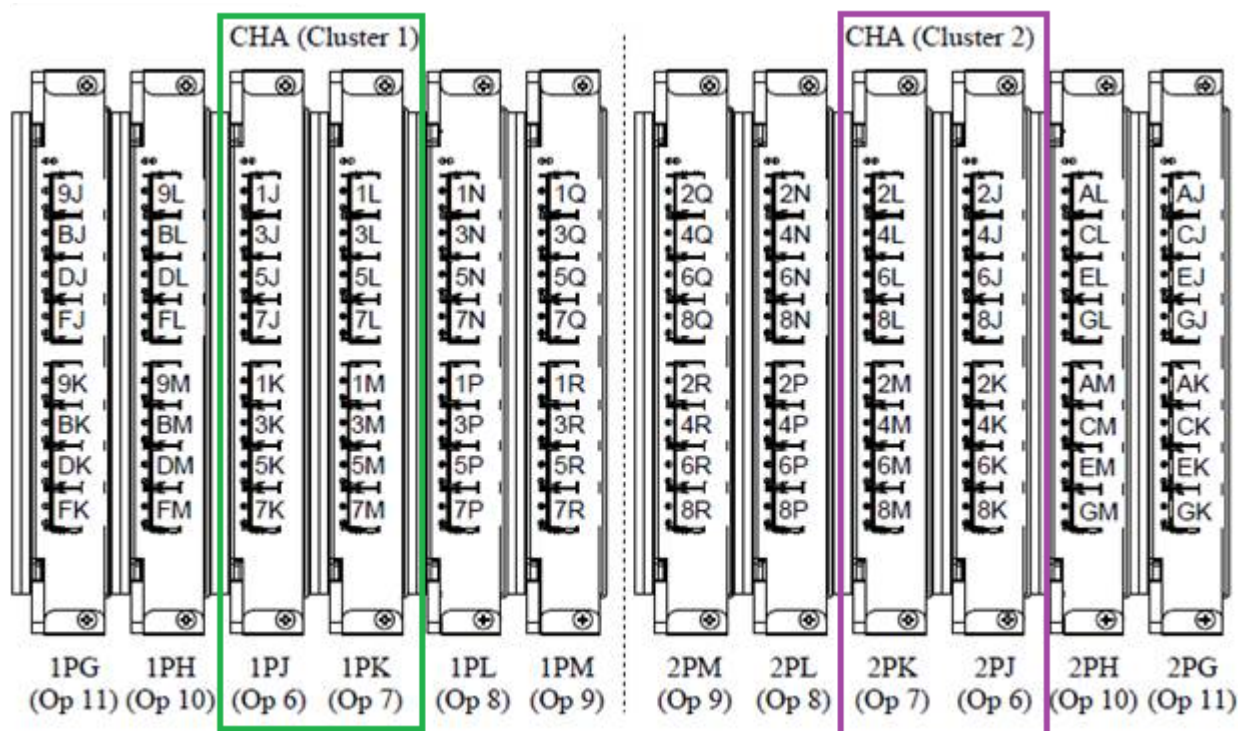
8.4.1 Host Zoning

CHA (Cluster 1)

CHA (Cluster 2)

1PA (Op 5) 1PB (Op 4) 1PC (Basic) 1PD (Op 1) 1PE (Op 2) 1PF (Op 3) 2PF (Op 3) 2PE (Op 2) 2PD (Op 1) 2PC (Basic) 2PB (Op 4) 2PA (Op 5)

In the case of a 400TB configuration, there are two chassis, and so another set of slots and host port cards. These would be named as follows:



Any given host should span its ports across the array cluster barrier (CL1 / CL2), and across the slots such that any single board replacement impacts a single host minimally. If more than 4 ports are allocated to a host, then there will be overlap of port cards (and unbalanced host impact is unavoidable without the addition of more port cards). The following is a recommended zone port configuration for every host:

Host	Zone Member 1 (Fabric A)	Zone Member 2 (Fabric A)	Zone Member 1 (Fabric B)	Zone Member 2 (Fabric B)
Host1	CL1A	CL1C	CL2A	CL2C
Host2	CL3A	CL3C	CL4A	CL4C
Host3	CL5A	CL5C	CL6A	CL6C
Host4	CL7A	CL7C	CL8A	CL8C
Host5	CL1B	CL1D	CL2B	CL2D
Host6	CL3B	CL3D	CL4B	CL4D
Host7	CL5B	CL5D	CL6B	CL6D
Host8	CL7B	CL7D	CL8B	CL8D

If fewer ports will be connected to the SAN for host zoning, then all of the storage should be evenly divided among the connected ports to balance the front-end ports as best as possible. However, as applications do not access their LUNs in an identical way and at the same time, hosts and their paths to storage will need to be moved to different ports over time. This movement is based on the performance analysis (from HTnM or TMEA) of the ports.

The maximum amount of storage any one port should have configured is 10TB. This maximum is a planning objective and not a hard rule as performance of the port will dictate its ability to handle more (or less) storage.

8.4.2 Migrations and Host Zoning

Migrations to/from an array will need to dedicate ports for array to array migrations (4 ports is typical) via Universal Volume Migrator (UVM). These ports could then be repurposed for host zoning once migrations have been completed. If multiple arrays are being consolidated, then additional ports may be used or the same ports may be used sequentially. Likewise, upon the end of life of the array, host ports will need to be repurposed to accommodate array to array migrations.

8.5 RHEL Management Server

The RHEL management server(s) will need to be configured in order to manage and administer the G1000 storage array. This expected to be a RHEL 6.3 physical server.

8.6 Hitachi Command Suite (HCS) Server

HCS is a graphical user interface (GUI) used to manage Hitachi enterprise (and mid-tier) storage arrays. HCS can be installed on a Citi SOE Windows 2008 (or 2012 when certified) virtual (ESX) or physical server. HCS requires Ethernet connectivity through the CEP firewall to discover and manage the storage arrays. HCS is needed for G1000 configuration, performance monitoring, and external reporting (currently EMC ViPR SRM).

8.6.1 HCS 8.1 Sizing

Most implementations of HCS are likely to be virtual rather than physical servers. The following is the current sizing minimum required for HCS deployment. It is based on the performance of the previous generation of HCS deployed at Citi and what HDS has tested in their laboratory environments.

- 16GB RAM
- Quad Core 3.0+GHz
- Windows 2008x64 R2 Standard (2012 when certified)
- 50GB (SAN or Local) Disk Space -- SAN preferred (plus any backup/export space)
- This should accommodate 40+arrays with 7300 volumes per array (300,000 volumes total).
- Required Software:
 - JRE 1.7+
 - Adobe Flash 11.10+

Notes:

1. Beyond 40 arrays, a server analysis should be performed to examine clustering, 32GB Ram, or additional CPUs.

2. An 86-array(>1 Million total volumes) configuration was tested with 32GB Ram, i7-4770 @ 3.40GHz, 2012 R2 Datacenter
3. Citi EOS for 2008 Server is 01/14/2020 (date may change)
4. Smaller sites (<10 arrays) could be configured with 8GB RAM as an alternative configuration

8.7 Accounts

8.7.1 Default Accounts

There are several default accounts that need to have the password changed or disabled to prevent unauthorized use. These should be changed before the environment is considered production ready. *The Maintenance account must be updated on the SVP Application and within Storage Navigator by HDS CE/Support staff.*

Account	Application Function (Location)	Role	Interactive / Non-Interactive	Privileged / Non-Privileged	Password Change Frequency
Maintenance (local)	Array configuration (SN)	Administrator	Interactive	Privileged	Change to Citi global standard
System (local)	HCS configuration (HCS)	Administrator	Interactive	Privileged	Change password and/or disable account

8.7.2 Functional IDs

The following is a list of accounts that are to be used for integrating the G1000 Array and its components into the infrastructure required for secure and efficient operation. There are several rules around these functional ids that must be followed:

- These userids are restricted and to be used only by the system processes described.
- They are not to be used for a person to directly login into the system they are being created in.
- There must be an operational owner assigned to each of these userids that is fully responsible for the maintenance, use and entitlement review of these accounts.
- The passwords on these accounts should be changed at least every 12 months.

For more information regarding functional id requirements see [Citi Information Security Standards \(CISS\)](#)

Account	Application Function (Location)	Role	Interactive / Non-Interactive	Privileged / Non-Privileged	Password Change Frequency
HDS_HCS_SN_Link (local)	HCS to Array (SN)	Read-Only	Interactive	Privileged	12 Months
HDS_SRM_HCS_Link (AD)	ViPR SRM to HCS (HCS)	Read-Only	Interactive	Privileged	12 Months
HDS_ViPRC_HCS_Link (AD)	ViPR Controller to HCS (HCS)	Admin	Interactive	Privileged	12 Months

HDS_HPNA_HCS_Link (AD)	HPNA to HCS (HCS)	Read-Only	Interactive	Privileged	12 Months
Exports (local)	Export performance data from array for HDS support (SN)	Performance Data Only (Read-Only)	Non-Interactive	Privileged	12 Months
	<i>ECC to HCS (HCS)</i>	<i>Retired</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>
	<i>SANScreen to HCS (HCS)</i>	<i>Retired</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>

The legacy applications ECC and SANScreen may still have functional accounts on HCS. These accounts should be removed when the applications have been retired.

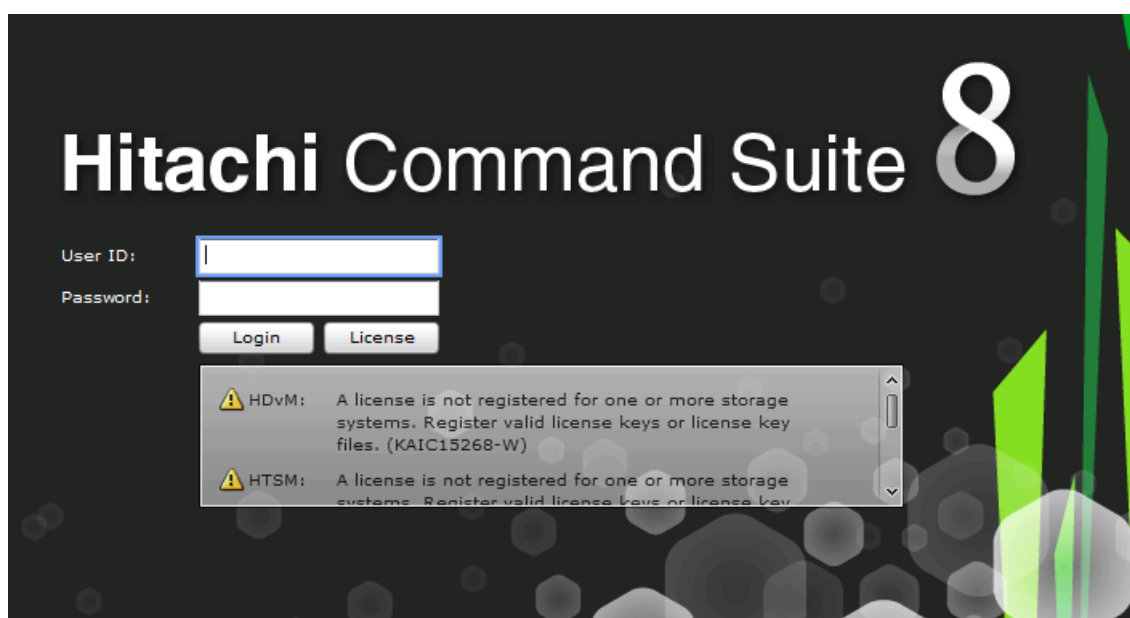
8.8 Logging into HCS

Command Suite 8 is similar in structure to previous releases of HCS. The login can be found at: <https://127.0.0.1:22016/DeviceManagerWebService/index.html> (if HTTPS has been configured)

<http://127.0.0.1:22015/DeviceManagerWebService/index.html> (if HTTPS has not been configured)

The above addresses assume the user is accessing from a RDP/terminal session on the HCS server. This is the only supported configuration at Citi due to firewall constraints.

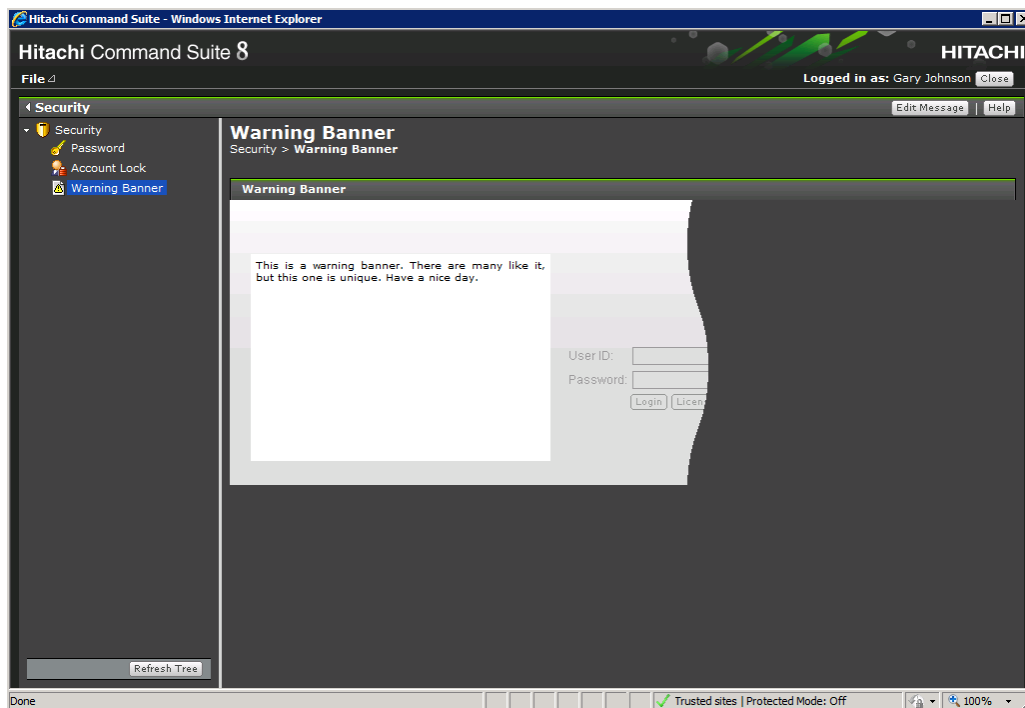
The default username and password is: system/manager. This default password should be changed by the build team. For more information see [Default Accounts](#).



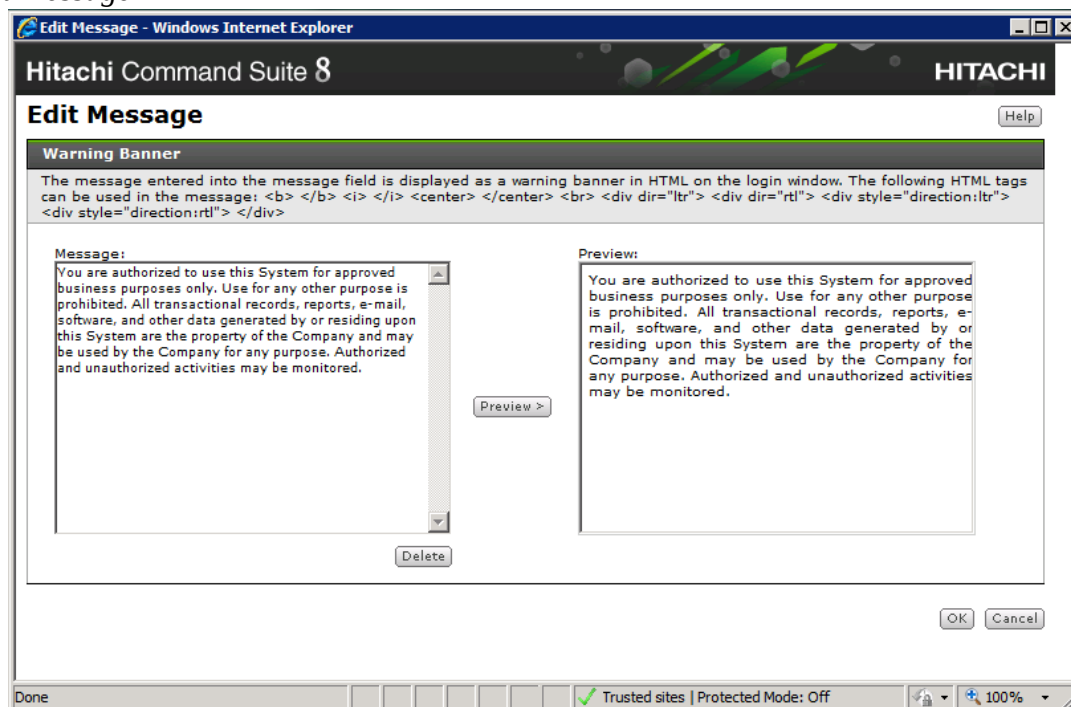
8.9 Warning Banner for HCS

A warning banner is required by security policy.

Go to Administration → Security → Warning Banner



Select *Edit Message*



The following warning banner should be added:

You are authorized to use this System for approved business purposes only. Use for any other purpose is prohibited. All transactional records, reports, e-mail, software, and other data generated by or residing upon this System are the property of the Company and may be used by the Company for any purpose. Authorized and unauthorized activities may be monitored.

Select OK to make the change effective immediately.

8.10 Warning Banner for the SVP

These steps are performed by HDS CE

Go to Admin Tools → Local Security Policy Application

Select *Local Policies* → *Security Options*

Change the item “Interactive Logon: Message Text for users attempting to logon” to:

You are authorized to use this System for approved business purposes only. Use for any other purpose is prohibited. All transactional records, reports, e-mail, software, and other data generated by or residing upon this System are the property of the Company and may be used by the Company for any purpose. Authorized and unauthorized activities may be monitored.

Change the item “Interactive Logon: Message Title for users attempting to login” to:
Citigroup Security Warning

8.11 Creating a Local User on Array for HCS Link

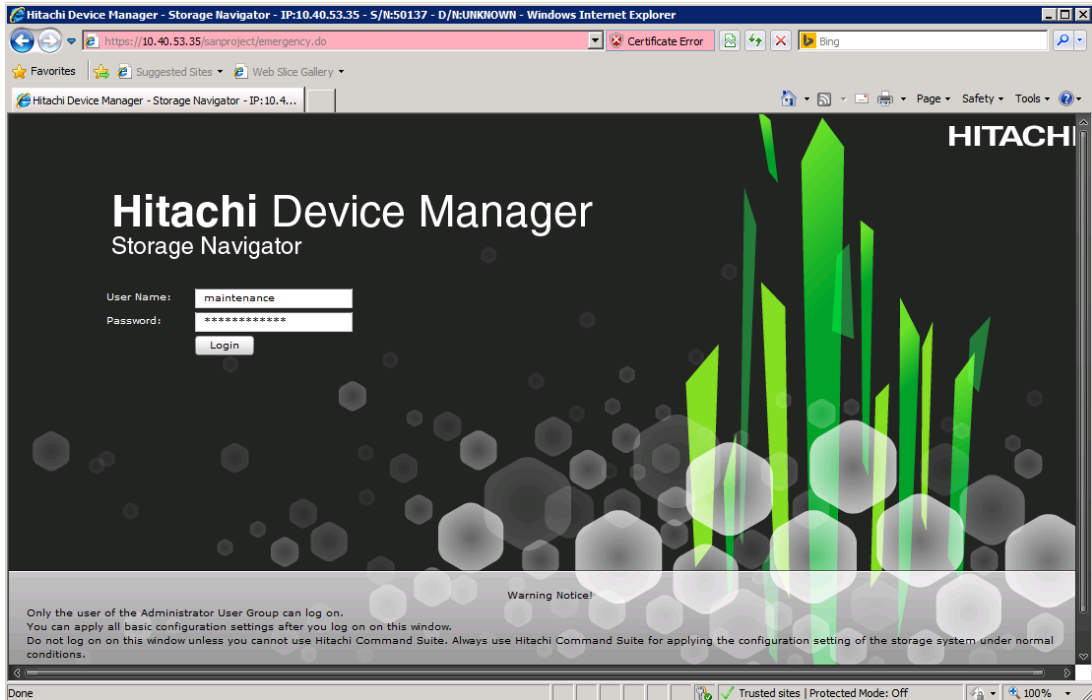
You will need to access the following website to be able to create a local account on the array. This is the functional account that will be used to link HCS to the G1000 Array. For a complete list of Functional IDs, see [Functional IDs](#). The account created is read-only, as HCS security prevails. This website is the legacy Storage Navigator interface to the array:

<https://<primary-svp-ip-address>/sanproject/emergency.do>

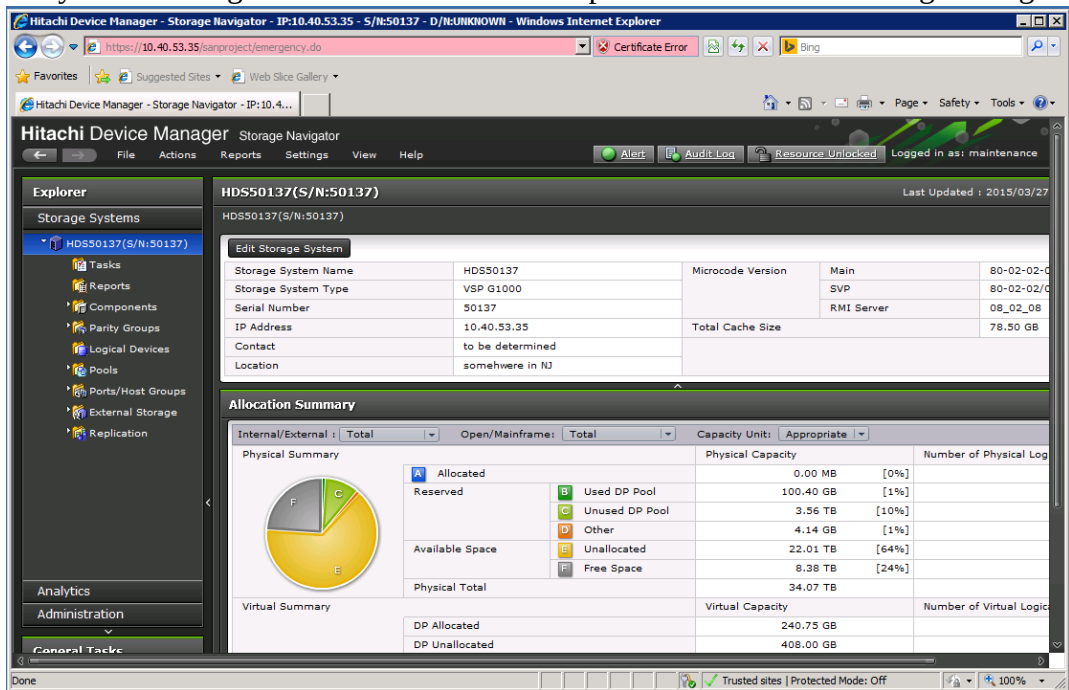
Note: This website is supposed to be used only when HCS is unavailable or is unable to configure the array. It should not be used as a primary means of configuration as it relies on local array security.

Log into the array using the Maintenance user and password.

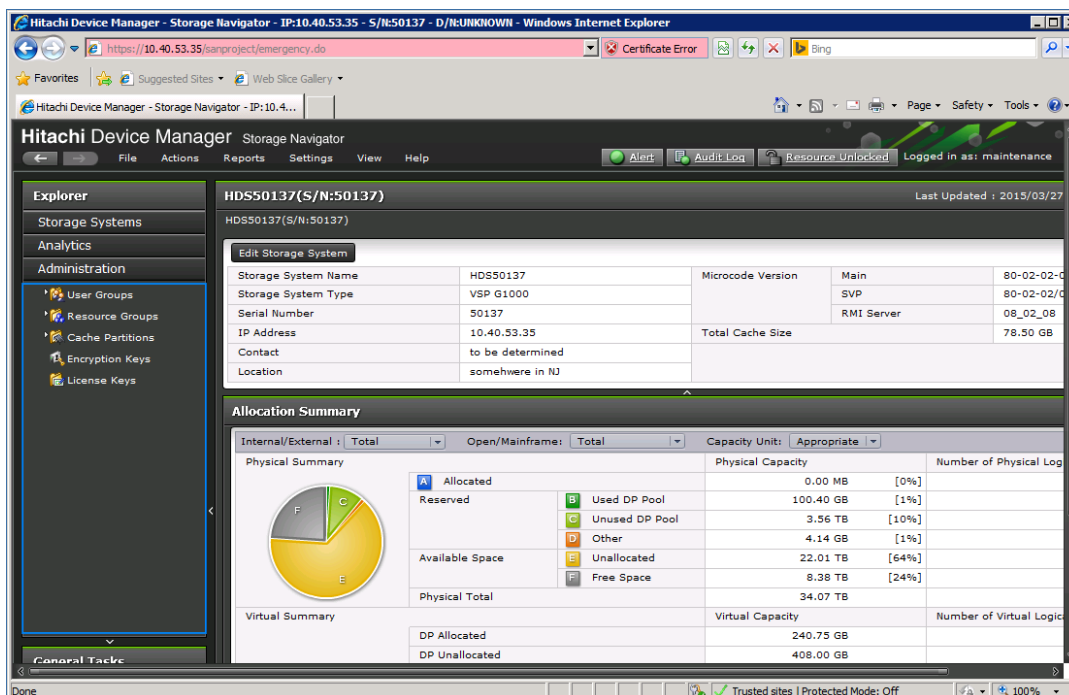
Note: Citi has changed the default Maintenance passwords (raid-maintenance, etniam-diar) on all HDS arrays.



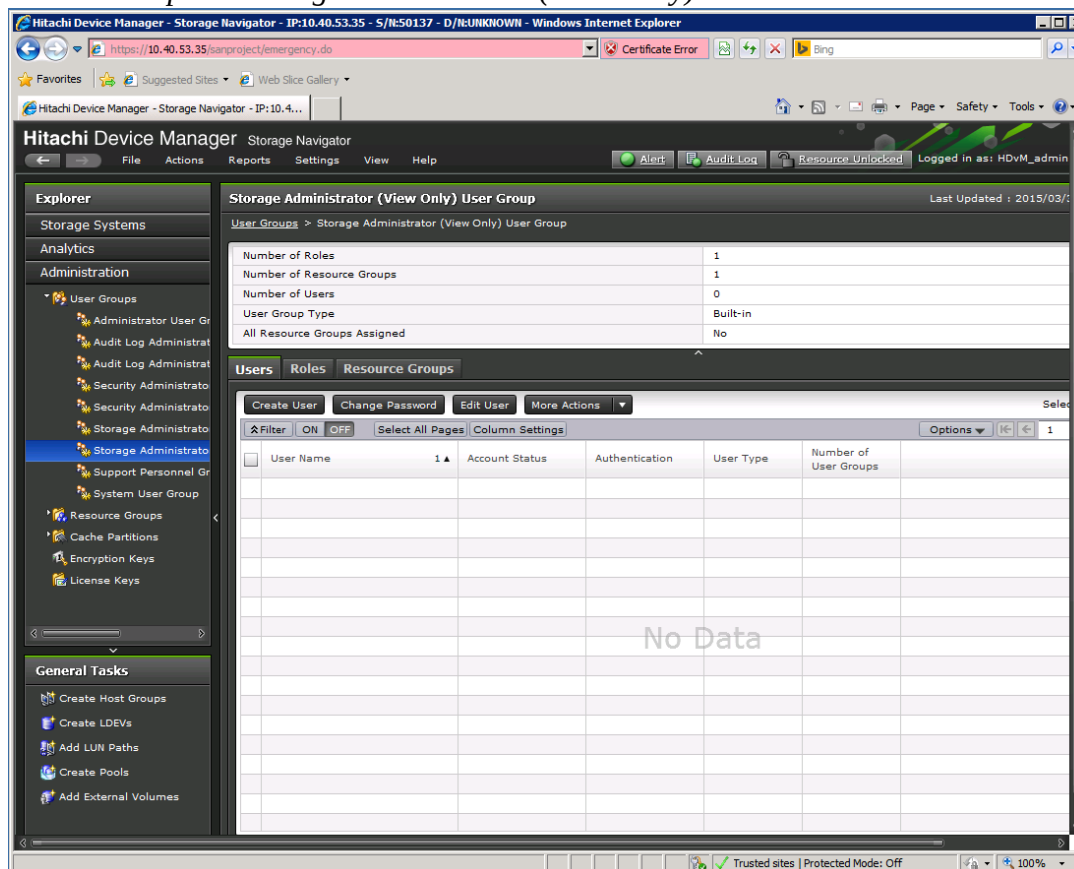
The primary screen is organized similar to HCS and previous releases of Storage Navigator.



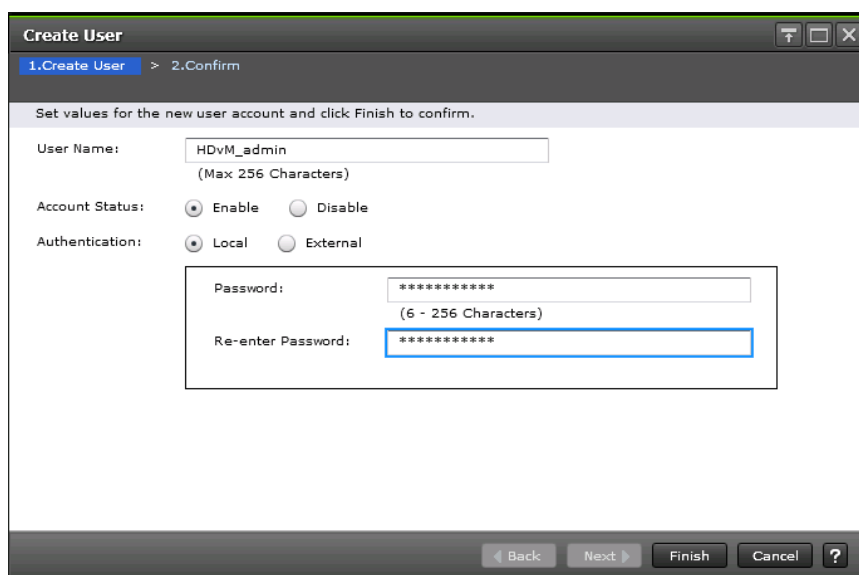
On the Explorer menu on the left side, select *Administration*



Then select *User Groups* → *Storage Administrator (Read Only)*



Select the *Create User* button



The image shows a 'Create User' dialog box with a title bar containing standard window controls. Below the title bar, there is a progress indicator showing '1. Create User' as the active step and '2. Confirm' as the next step. A message states: 'Set values for the new user account and click Finish to confirm.' The form contains the following fields and options:

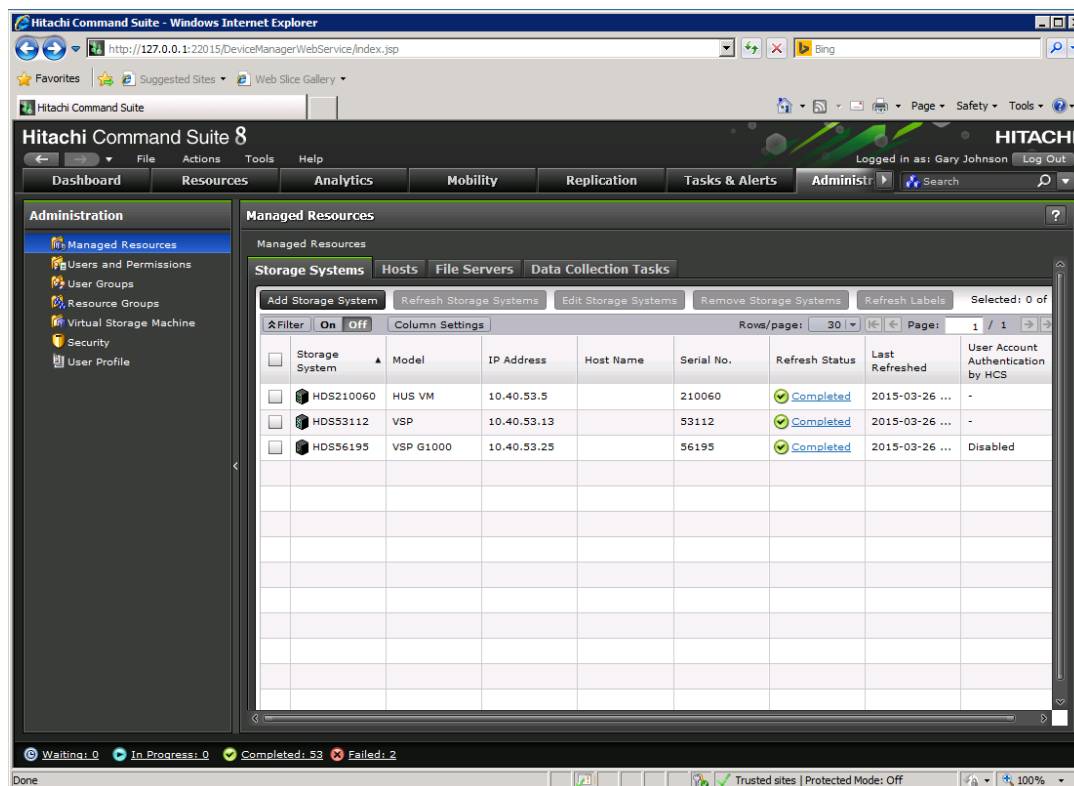
- User Name:** A text box containing 'HDvM_admin' with a '(Max 256 Characters)' label below it.
- Account Status:** Two radio buttons, 'Enable' (selected) and 'Disable'.
- Authentication:** Two radio buttons, 'Local' (selected) and 'External'.
- Password:** A text box containing '*****' with a '(6 - 256 Characters)' label below it.
- Re-enter Password:** A text box containing '*****'.

At the bottom of the dialog, there are four buttons: 'Back', 'Next', 'Finish', and 'Cancel', along with a help icon (?) on the far right.

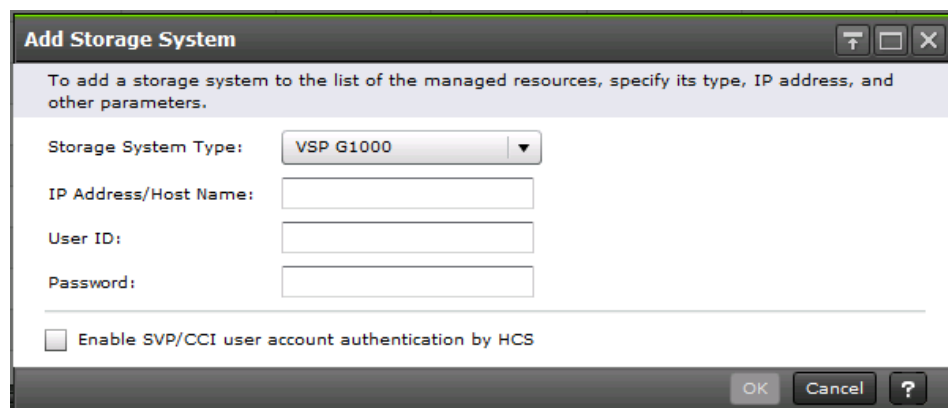
Enter the functional id username and password for HCS to access the array. The account status should be *Enabled* and the authentication should be Local. Select Finish (and then confirm) to start the task to create the read-only user. Once the user has been added, logoff and close the Storage Navigator (emergency.do) web page.

8.12 Adding an array to HCS

Go to the *Administration* tab → *Managed Resources* → *Storage Systems* tab



Select the *Add Storage System* button

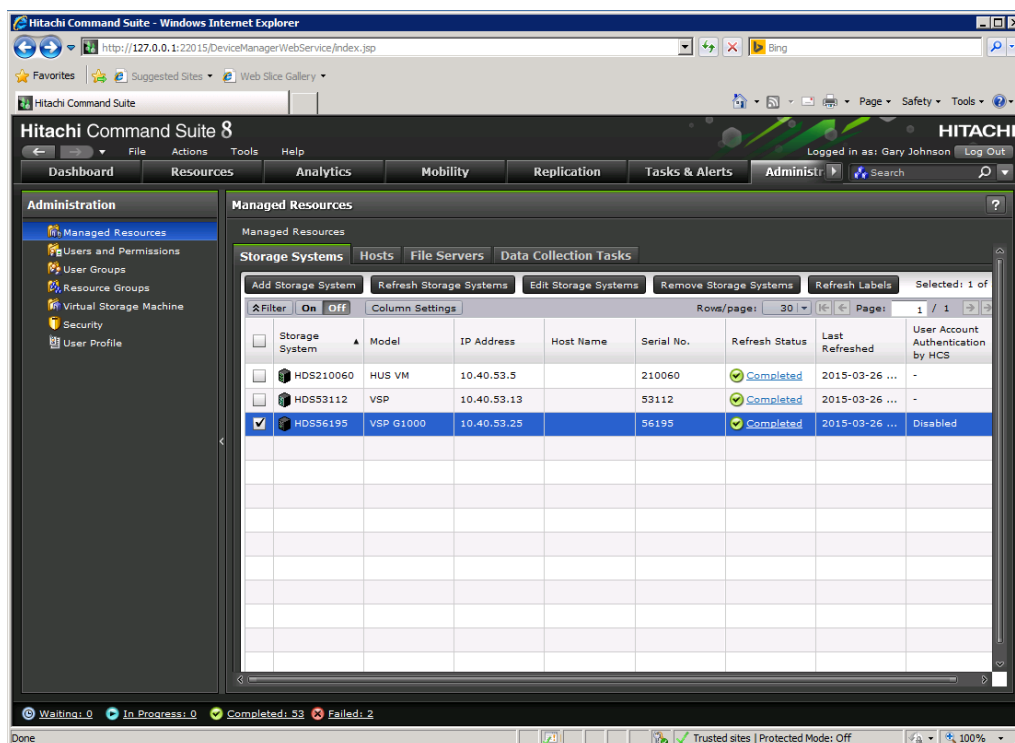


- Select the arrays type (VSP G1000, VSP, HUS VM)
- Enter the *IP address* of the primary SVP
- The *userid* and *password* should come from the local read-only (FID) account created with the Storage Navigator interface (emergency.do) – see above.
- Do not select the SVP/CCI user account option. A task will be created when you select OK.

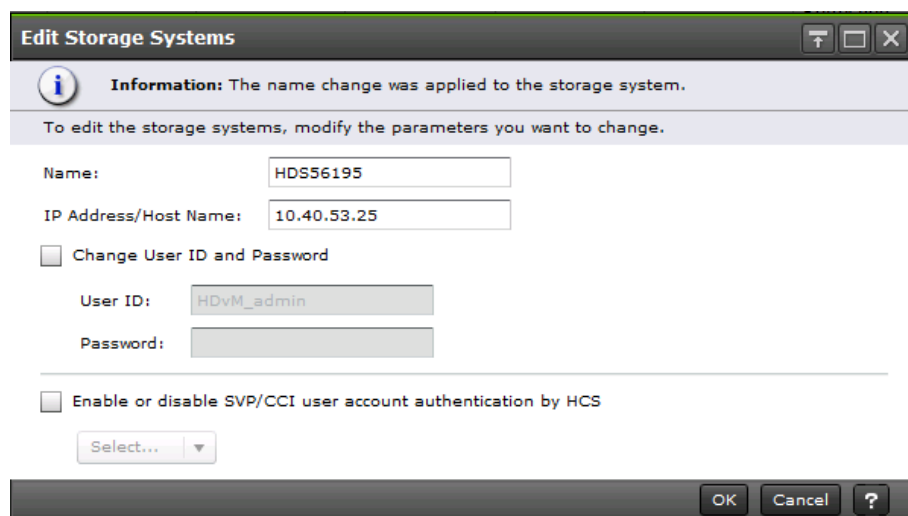
8.13 Editing an Array

Go to the *Administration* Tab (Storage Systems)

Select the array(s) you wish to remove with the checkbox to the left of the Storage System column.



Select the *Edit Storage Systems* button



Edit Storage Systems

Information: The name change was applied to the storage system.

To edit the storage systems, modify the parameters you want to change.

Name:

IP Address/Host Name:

☐ Change User ID and Password

User ID:

Password:

☐ Enable or disable SVP/CCI user account authentication by HCS

Select...

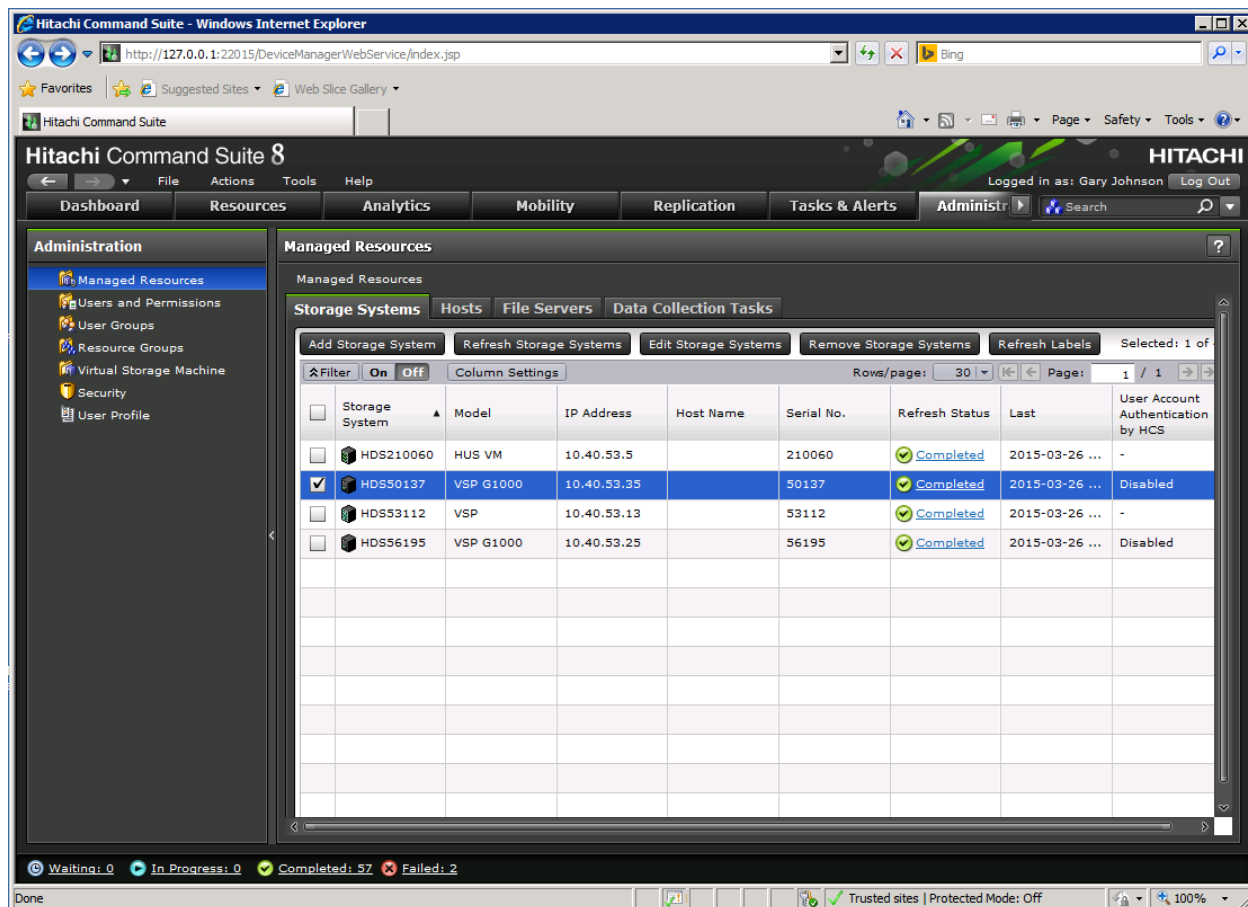
OK Cancel ?

You can update the name, *IP/Hostname*, *User Account* (for HCS access to the array), or user Password. The *Name* of the array should reflect the Citi name used to identify the array. The default name is not useful at Citi. A task will be created when you select the **OK** button.

8.14 Removing an array from HCS

Go to the Administration Tab (Storage Systems)

Select the array(s) you wish to remove with the checkbox to the left of the Storage System column.



Select Remove Storage System. Once the task has been completed, the storage system will no longer be in HCS.

8.15 G1000 Licensing

There are three types of licensing required for this solution:

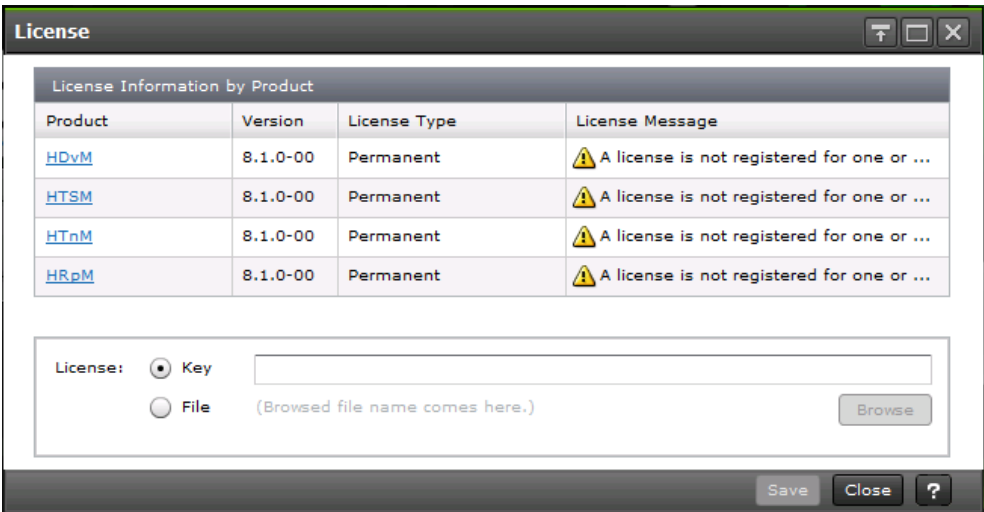
- HCS Licensing (per site)
- Array Licensing
- TMEA Licensing (per array)

8.15.1 HCS Licensing

On the initial login screen (before you login), you can view and add license keys to HCS. You can also access the licensing screen via the help option on the main menu.



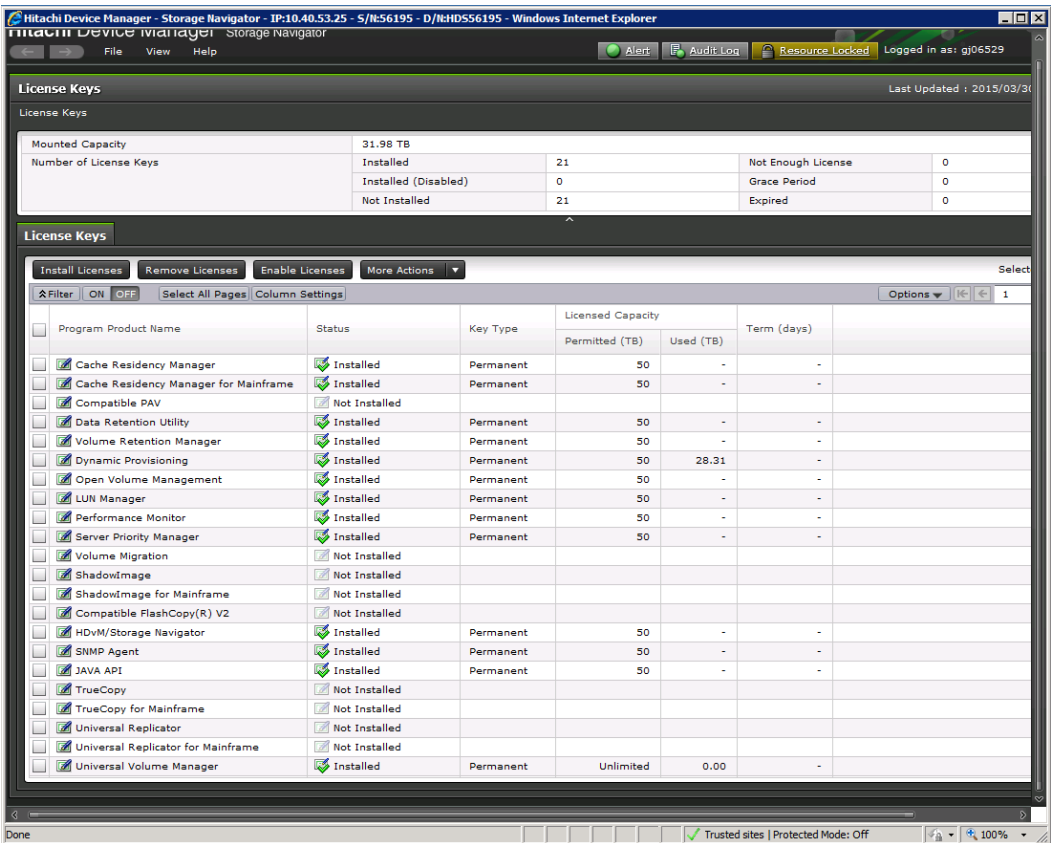
Select the *License* button.



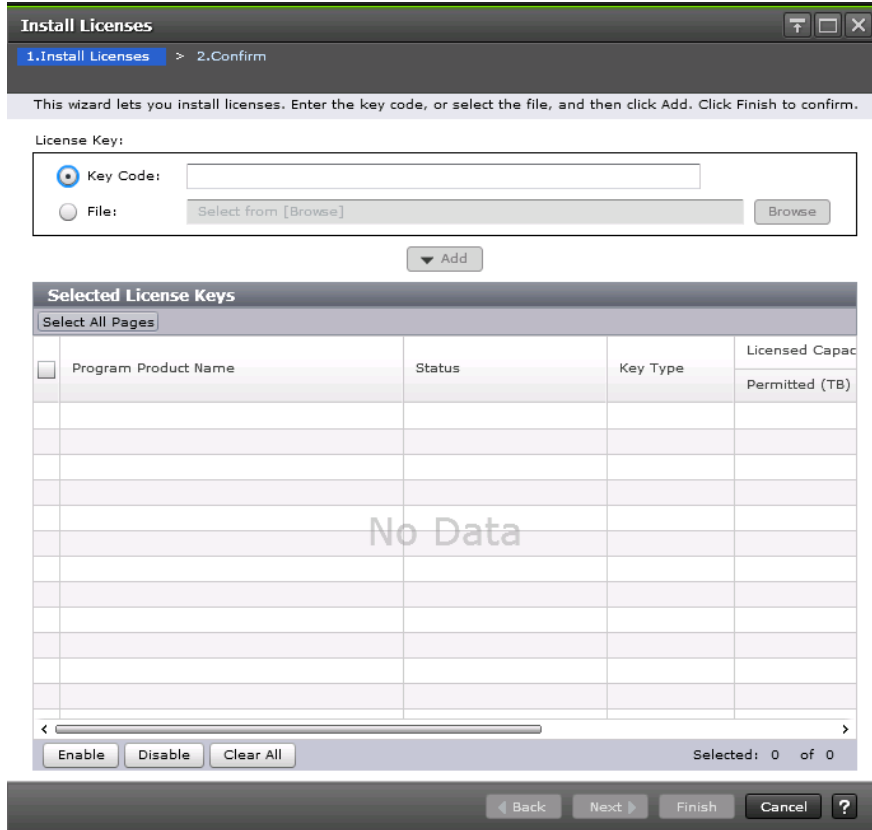
Provide the license file (license key files from HCS 7+ are compatible) from a local or network drive. Contact HDS support if there are issues with reading the file(s).

8.15.2 Array License Keys

Go to *Resources* → *Storage Systems* → <desired array> → *License Keys*



To install licenses, select the *Install Licenses* button.



Select the File button and then browse to find the .PLK file on your local HCS server storage. Since the HCS server is accessed via RDP, the best location for these files is a shared network group drive. Once the file is read and verified, select Finish to complete the activation.

Notes:

- HCS 7.x licenses are compatible with HCS 8.x
- You can extract the Key Code from the .PLK file for specific licenses, but this is not recommended.

8.15.3 TMEA Licensing

TMEA licensing (1 license file per array) is obtained by contacting the TMEA support team. They will respond with appropriate licensing files that must be copied to the TMEA (RHEL) management server. Typically, these files are received on Windows machines, so they must be converted to UNIX format before they can be read. This is accomplished by running the “dos2unix” command on the file before attempting to setup any new array (or updating the license key for any existing array). It is noted that G1000 license keys for the array will require a 6-digit serial number. For example, the license key for array 56195 has a serial number of 356195. This is due to the raw scsi inquiry showing 6-digits.

For more details around installing and updating license keys for TEMA, see [Appendix D: TMEA Agent Setup](#).

8.16 HCS Security Configuration

The HCS Server is the primary means of access for the configuration and reporting for the G1000 array. As such, securing the HCS application is a critical step before being production ready.

Once the AD setup has been completed, SAN Administrators (also ISA, and Read-only users) will be granted access to HCS via their membership in certain configured Active Directory groups. Membership in these groups will determine their role on HCS. All SAN Administrators will have the ability to modify all aspects of array configuration with the exception of user management. The *User Management* privilege is exclusively for ISA personnel. Read-only users will only have viewing privileges.

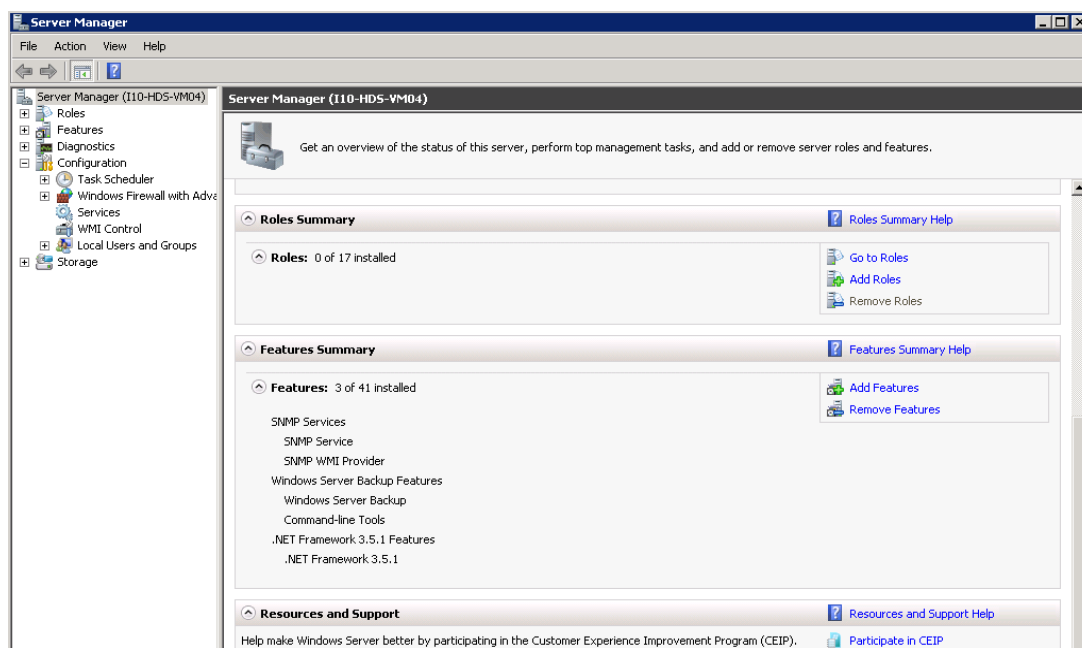
8.16.1 HCS Active Directory Setup

Active Directory is used for authentication and authorization to HCS and subsequently the arrays attached to HCS. There is an association of AD group membership to a specific role within HCS. There is an optional step to install the Active Directory tools.

Installing Active Directory Tools (dsquery, Active Directory Users and Directories, etc.)

This is needed to provide some basic AD tools used later. If this is not allowed by local SA teams, then have the SA run the dsquery commands listed in later sections. Output from commands will be needed for first time setup. Once configured for a given site, these values should not change for other sites within a region. Therefore this setup is optional.

Go to *Server Manager* under *Administrator Tools*. Select *Features*.



Select *Add Features*. Select the following features to add:

```

Windows PowerShell Integrated Scripting Environment (ISE)
Remote Server Administration Tools
  Role Administration Tools
    Active Directory Certificate Services Tools
      Certification Authority Tools
      Online Responder Tools
    AD DS and AD LDS Tools
      AD DS Tools
        AD DS Snap-Ins and Command-Line Tools
        Active Directory Administrative Center
        Server for NIS Tools
      AD LDS Snap-Ins and Command-Line Tools
      Active Directory module for Windows PowerShell
      Active Directory Rights Management Services Tools

```

Once the checkboxes have been turned on, select Next and then Install. A Restart of the server is likely needed. Tool setup will be completed after restart.

1. Run a command prompt as administrator
2. copy the general AD certificate (not servername specific) to a known location.

```
copy cacert.crt \HCS_LDAP_Cert\*.*
```

2. cd \Program Files\HiCommand\Base64\uCPSB\jdk\bin

3. Import the certificate

```
keytool -import -alias i10-hds-vm04 -file "C:\HCS_LDAP_Cert\cacert.crt" -keystore
"C:\Program Files\HiCommand\Base64\conf\sec\ldapcacerts" -storepass hdskey
```

When prompted to trust this certificate, respond yes.

```

C:\Program Files\HiCommand\Base64\uCPSB\jdk\bin>keytool -import -alias i10-hds-v
Owner: O=WAR 159, C=US
Issuer: O=WAR 159, C=US
Serial number: 44b80703
Valid from: Fri Jul 14 16:35:10 EDT 2006 until: Tue Jul 14 17:05:10 EDT 2026
Certificate fingerprints:
    MD5:  98:FB:DC:C0:CE:29:26:95:DB:98:46:6C:DD:AA:45:5B
    SHA1: EA:8F:F2:2B:F6:7A:DC:FA:66:1C:99:6D:23:28:34:3A:69:39:68:08
    Signature algorithm name: SHA1withRSA
    Version: 3

```

Extensions:

```
#1: ObjectId: 1.2.840.113533.7.65.0 Criticality=false
```

```
#2: ObjectId: 2.16.840.1.113730.1.1 Criticality=false
```

```

NetscapeCertType [
  SSL CA
  S/MIME CA
  Object Signing CA]

```

```
#3: ObjectId: 2.5.29.14 Criticality=false
```

```
SubjectKeyIdentifier [
```

```
KeyIdentifier [
```

```
0000: 8A E7 68 C3 D6 AD CD 14   F8 A9 42 B8 21 4F 05 14   ..h.....B.!0..
```

```
0010: 21 0D C8 A3
```

```
!...
```

```
]
```

```
]
```

```
#4: ObjectId: 2.5.29.15 Criticality=false
KeyUsage [
  Key_CertSign
  Crl_Sign
]

#5: ObjectId: 2.5.29.16 Criticality=false
PrivateKeyUsage: [
  From: Fri Jul 14 16:35:10 EDT 2006, To: Tue Jul 14 17:05:10 EDT 2026]

#6: ObjectId: 2.5.29.19 Criticality=false
BasicConstraints:[
  CA:true
  PathLen:2147483647
]

#7: ObjectId: 2.5.29.31 Criticality=false
CRLDistributionPoints [
  [DistributionPoint:
    [CN=CRL1, O=WAR 159, C=US]
  ], DistributionPoint:
    [URIName: ldap://10.40.41.160/o=WAR%20159,c=US?certificateRevocationList?ba
  ]]

#8: ObjectId: 2.5.29.32 Criticality=false
CertificatePolicies [
  [CertificatePolicyId: [2.16.840.1.113903.1.99.1.0]
  [] ]
  [CertificatePolicyId: [2.16.840.1.113903.1.99.1.4]
  [] ]
  [CertificatePolicyId: [2.16.840.1.113903.1.99.1.3.1]
  [] ]
  [CertificatePolicyId: [2.16.840.1.113903.1.99.1.3.2]
  [] ]
]

#9: ObjectId: 2.5.29.35 Criticality=false
AuthorityKeyIdentifier [
  KeyIdentifier [
    0000: 8A E7 68 C3 D6 AD CD 14   F8 A9 42 B8 21 4F 05 14   ..h.....B.!0..
    0010: 21 0D C8 A3               !...
  ]
]

Trust this certificate? [no]: yes
Certificate was added to keystore
```

4. Verify the certificate

```
keytool -list -v -keystore "C:\Program Files\HiCommand\Base64\conf\sec\ldapcacerts" -storepass hdskey
```

5. Modify \Program Files\HiCommand\Base64\conf\exauth.properties

```
(add entries for each of the site's DCs )
example configuration lines:
(comment out the "auth.server.type=internal" at top of the file)

#
# *****
# * HCS AD Setup 07/03/2014 GJ *
# *****
#
auth.server.type=ldap
auth.server.name=namdev001.namdev.nsrootdev.net,namdev002.namdev.nsrootdev.net,namdev003.namdev.
nsrootdev.net,namdev004.namdev.nsrootdev.net,namdev005.namdev.nsrootdev.net
auth.group.mapping=true
```

```

auth.ldap.namdev001.namdev.nsrootdev.net.protocol=ldaps
auth.ldap.namdev001.namdev.nsrootdev.net.host=namdev001.namdev.nsrootdev.net
auth.ldap.namdev001.namdev.nsrootdev.net.port=636
auth.ldap.namdev001.namdev.nsrootdev.net.timeout=15
auth.ldap.namdev001.namdev.nsrootdev.net.attr=sAMAccountName
auth.ldap.namdev001.namdev.nsrootdev.net.basedn=DC=namdev,DC=nsrootdev,DC=net
auth.ldap.namdev001.namdev.nsrootdev.net.retry.interval=1
auth.ldap.namdev001.namdev.nsrootdev.net.retry.times=20
auth.ldap.namdev001.namdev.nsrootdev.net.domain.name=namdev.nsrootdev.net
auth.ldap.namdev001.namdev.nsrootdev.net.dns_lookup=false
auth.ldap.namdev002.namdev.nsrootdev.net.protocol=ldaps
auth.ldap.namdev002.namdev.nsrootdev.net.host=namdev002.namdev.nsrootdev.net
auth.ldap.namdev002.namdev.nsrootdev.net.port=636
auth.ldap.namdev002.namdev.nsrootdev.net.timeout=15
auth.ldap.namdev002.namdev.nsrootdev.net.attr=sAMAccountName
auth.ldap.namdev002.namdev.nsrootdev.net.basedn=DC=namdev,DC=nsrootdev,DC=net
auth.ldap.namdev002.namdev.nsrootdev.net.retry.interval=1
auth.ldap.namdev002.namdev.nsrootdev.net.retry.times=20
auth.ldap.namdev002.namdev.nsrootdev.net.domain.name=namdev.nsrootdev.net
auth.ldap.namdev002.namdev.nsrootdev.net.dns_lookup=false
auth.ldap.namdev003.namdev.nsrootdev.net.protocol=ldaps
auth.ldap.namdev003.namdev.nsrootdev.net.host=namdev003.namdev.nsrootdev.net
auth.ldap.namdev003.namdev.nsrootdev.net.port=636
auth.ldap.namdev003.namdev.nsrootdev.net.timeout=15
auth.ldap.namdev003.namdev.nsrootdev.net.attr=sAMAccountName
auth.ldap.namdev003.namdev.nsrootdev.net.basedn=DC=namdev,DC=nsrootdev,DC=net
auth.ldap.namdev003.namdev.nsrootdev.net.retry.interval=1
auth.ldap.namdev003.namdev.nsrootdev.net.retry.times=20
auth.ldap.namdev003.namdev.nsrootdev.net.domain.name=namdev.nsrootdev.net
auth.ldap.namdev003.namdev.nsrootdev.net.dns_lookup=false
auth.ldap.namdev004.namdev.nsrootdev.net.protocol=ldaps
auth.ldap.namdev004.namdev.nsrootdev.net.host=namdev004.namdev.nsrootdev.net
auth.ldap.namdev004.namdev.nsrootdev.net.port=636
auth.ldap.namdev004.namdev.nsrootdev.net.timeout=15
auth.ldap.namdev004.namdev.nsrootdev.net.attr=sAMAccountName
auth.ldap.namdev004.namdev.nsrootdev.net.basedn=DC=namdev,DC=nsrootdev,DC=net
auth.ldap.namdev004.namdev.nsrootdev.net.retry.interval=1
auth.ldap.namdev004.namdev.nsrootdev.net.retry.times=20
auth.ldap.namdev004.namdev.nsrootdev.net.domain.name=namdev.nsrootdev.net
auth.ldap.namdev004.namdev.nsrootdev.net.dns_lookup=false
auth.ldap.namdev005.namdev.nsrootdev.net.protocol=ldaps
auth.ldap.namdev005.namdev.nsrootdev.net.host=namdev005.namdev.nsrootdev.net
auth.ldap.namdev005.namdev.nsrootdev.net.port=636
auth.ldap.namdev005.namdev.nsrootdev.net.timeout=15
auth.ldap.namdev005.namdev.nsrootdev.net.attr=sAMAccountName
auth.ldap.namdev005.namdev.nsrootdev.net.basedn=DC=namdev,DC=nsrootdev,DC=net
auth.ldap.namdev005.namdev.nsrootdev.net.retry.interval=1
auth.ldap.namdev005.namdev.nsrootdev.net.retry.times=20
auth.ldap.namdev005.namdev.nsrootdev.net.domain.name=namdev.nsrootdev.net
auth.ldap.namdev005.namdev.nsrootdev.net.dns_lookup=false

```

6. Restart Services

```

C:\Program Files\HiCommand\Base64\bin>hcnds64srv /stop
KAPM05017-I Succeeded in stopping of service. service-name=HCS Tuning Manager REST Application Service
KAPM05017-I Succeeded in stopping of service. service-name=HiCommand Performance Reporter
KAPM05017-I Succeeded in stopping of service. service-name=HiCommand Suite TuningManager
KAPM05017-I Succeeded in stopping of service. service-name=HBase 64 Storage Mgmt Common Service
KAPM05017-I Succeeded in stopping of service. service-name=HCS Device Manager Web Service
KAPM05017-I Succeeded in stopping of service. service-name=HBase 64 Storage Mgmt SSO Service
KAPM05017-I Succeeded in stopping of service. service-name=HBase 64 Storage Mgmt Web SSO Service
KAPM05017-I Succeeded in stopping of service. service-name=HBase 64 Storage Mgmt Web Service
KAPM06439-I The HiRDB service has stopped.

C:\Program Files\HiCommand\Base64\bin>hcnds64srv /start
KAPM06438-I The HiRDB service has started.
KAPM05016-I Succeeded in starting of service. service-name=HBase 64 Storage Mgmt Web Service
KAPM05016-I Succeeded in starting of service. service-name=HBase 64 Storage Mgmt Web SSO Service

```

```
KAPM05016-I Succeeded in starting of service. service-name=HBase 64 Storage Mgmt SSO Service
KAPM05016-I Succeeded in starting of service. service-name=HCS Device Manager Web Service
KAPM05016-I Succeeded in starting of service. service-name=HBase 64 Storage Mgmt Common Service
KAPM05016-I Succeeded in starting of service. service-name=HiCommand Suite TuningManager
KAPM05016-I Succeeded in starting of service. service-name=HiCommand Performance Reporter
KAPM05016-I Succeeded in starting of service. service-name=HCS Tuning Manager REST Application
Service
```

7. Query AD for the bind account details

```
C:\>dsquery user -samid srv_hds_ad
"CN=srv_hds_ad,OU=Svc_Accts,OU=StorageEng,DC=namdev,DC=nsrootdev,DC=net"
```

8. Bind to each of the DCs listed in the exauth.properties file

```
C:\Program Files\HiCommand\Base64\bin>hcnds64ldapuser /set /dn
"CN=srv_hds_ad,OU=Svc_Accts,OU=StorageEng,DC=namdev,DC=nsrootdev,DC=net" /name
namdev001.namdev.nsrootdev.net
KAPM09100-I Enter a value for the option. (option name = pass)
*****
KAPM09101-I For confirmation, re-enter the value of the pass option.
*****
KAPM05250-I Registration of the information-search user has finished.
```

(repeat for all DCs listed in the exauth.properties file)

List the bound servers

```
C:\Program Files\HiCommand\Base64\bin>hcnds64ldapuser /list
[ServerName]
namdev001.namdev.nsrootdev.net
namdev002.namdev.nsrootdev.net
namdev003.namdev.nsrootdev.net
namdev004.namdev.nsrootdev.net
namdev005.namdev.nsrootdev.net
```

9. Test the authentication

```
C:\Program Files\HiCommand\Base64\bin>hcnds64checkauth /user gj06529
KAPM09100-I Enter a value for the option. (option name = pass)
*****

KAPM15003-I The configuration check of Phase1 will now start.
type : ldap
server :
namdev001.namdev.nsrootdev.net,namdev002.namdev.nsrootdev.net,namdev003.namdev.nsrootdev.net,namdev004.namdev.nsrootdev.net,namdev005.namdev.nsrootdev.net
KAPM15227-I Group linkage is enabled.
KAPM15004-I The result of the configuration check of Phase1 was normal.
KAPM15003-I The configuration check of Phase2 will now start.
KAPM15006-I The configuration of the server namdev001.namdev.nsrootdev.net will now be checked.
KAPM15007-I The result of the configuration check of the server namdev001.namdev.nsrootdev.net was normal.
KAPM15006-I The configuration of the server namdev002.namdev.nsrootdev.net will now be checked.
KAPM15007-I The result of the configuration check of the server namdev002.namdev.nsrootdev.net was normal.
KAPM15006-I The configuration of the server namdev003.namdev.nsrootdev.net will now be checked.
KAPM15007-I The result of the configuration check of the server namdev003.namdev.nsrootdev.net was normal.
KAPM15006-I The configuration of the server namdev004.namdev.nsrootdev.net will now be checked.
KAPM15007-I The result of the configuration check of the server namdev004.namdev.nsrootdev.net was normal.
KAPM15006-I The configuration of the server namdev005.namdev.nsrootdev.net will now be checked.
KAPM15007-I The result of the configuration check of the server namdev005.namdev.nsrootdev.net was normal.
KAPM15004-I The result of the configuration check of Phase2 was normal.
KAPM15003-I The configuration check of Phase3 will now start.
KAPM15010-I The connection to the server namdev001.namdev.nsrootdev.net will now be checked. (host = namdev001.namdev.nsrootdev.net, port = 636, protocol = ldaps)
```

```

KAPM15011-I The server namdev001.namdev.nsrootdev.net can be connected to normally.
KAPM15010-I The connection to the server namdev002.namdev.nsrootdev.net will now be checked. (host
= namdev002.namdev.nsrootdev.net, port = 636, protocol = ldaps)
KAPM15011-I The server namdev002.namdev.nsrootdev.net can be connected to normally.
KAPM15010-I The connection to the server namdev003.namdev.nsrootdev.net will now be checked. (host
= namdev003.namdev.nsrootdev.net, port = 636, protocol = ldaps)
KAPM15011-I The server namdev003.namdev.nsrootdev.net can be connected to normally.
KAPM15010-I The connection to the server namdev004.namdev.nsrootdev.net will now be checked. (host
= namdev004.namdev.nsrootdev.net, port = 636, protocol = ldaps)
KAPM15011-I The server namdev004.namdev.nsrootdev.net can be connected to normally.
KAPM15010-I The connection to the server namdev005.namdev.nsrootdev.net will now be checked. (host
= namdev005.namdev.nsrootdev.net, port = 636, protocol = ldaps)
KAPM15011-I The server namdev005.namdev.nsrootdev.net can be connected to normally.
KAPM15004-I The result of the configuration check of Phase3 was normal.
KAPM15003-I The configuration check of Phase4 will now start.
KAPM15229-I Group acquisition for the server will now be checked. (server name =
namdev001.namdev.nsrootdev.net, host = namdev001.namdev.nsrootdev.net, port = 636, protocol =
ldaps)
KAPM15230-I Group acquisition was successful.
KAPM15229-I Group acquisition for the server will now be checked. (server name =
namdev002.namdev.nsrootdev.net, host = namdev002.namdev.nsrootdev.net, port = 636, protocol =
ldaps)
KAPM15230-I Group acquisition was successful.
KAPM15229-I Group acquisition for the server will now be checked. (server name =
namdev003.namdev.nsrootdev.net, host = namdev003.namdev.nsrootdev.net, port = 636, protocol =
ldaps)
KAPM15230-I Group acquisition was successful.
KAPM15229-I Group acquisition for the server will now be checked. (server name =
namdev004.namdev.nsrootdev.net, host = namdev004.namdev.nsrootdev.net, port = 636, protocol =
ldaps)
KAPM15230-I Group acquisition was successful.
KAPM15229-I Group acquisition for the server will now be checked. (server name =
namdev005.namdev.nsrootdev.net, host = namdev005.namdev.nsrootdev.net, port = 636, protocol =
ldaps)
KAPM15230-I Group acquisition was successful.
KAPM15004-I The result of the configuration check of Phase4 was normal.
KAPM15237-I Group acquisition was successful. (server name = namdev001.namdev.nsrootdev.net,
namdev002.namdev.nsrootdev.net, namdev003.namdev.nsrootdev.net, namdev004.namdev.nsrootdev.net,
namdev005.namdev.nsrootdev.net)

```

10. Query AD for the groups

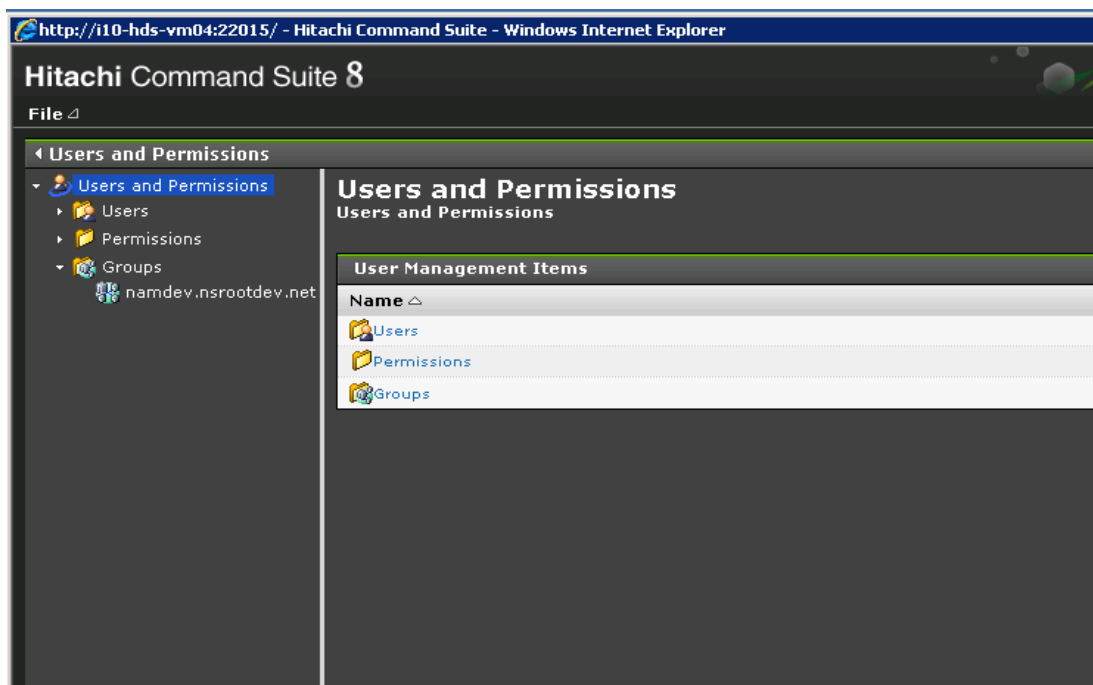
```

C:\>dsquery group -name *per_gdse_hds*
"CN=per_gdse_hds_admins,OU=Dept_Grps,OU=StorageEng,DC=namdev,DC=nsrootdev,DC=net"
"CN=per_gdse_hds_isa,OU=Dept_Grps,OU=StorageEng,DC=namdev,DC=nsrootdev,DC=net"
"CN=per_gdse_hds_readonly,OU=Dept_Grps,OU=StorageEng,DC=namdev,DC=nsrootdev,DC=net"

```

11. Configure Groups in HCS

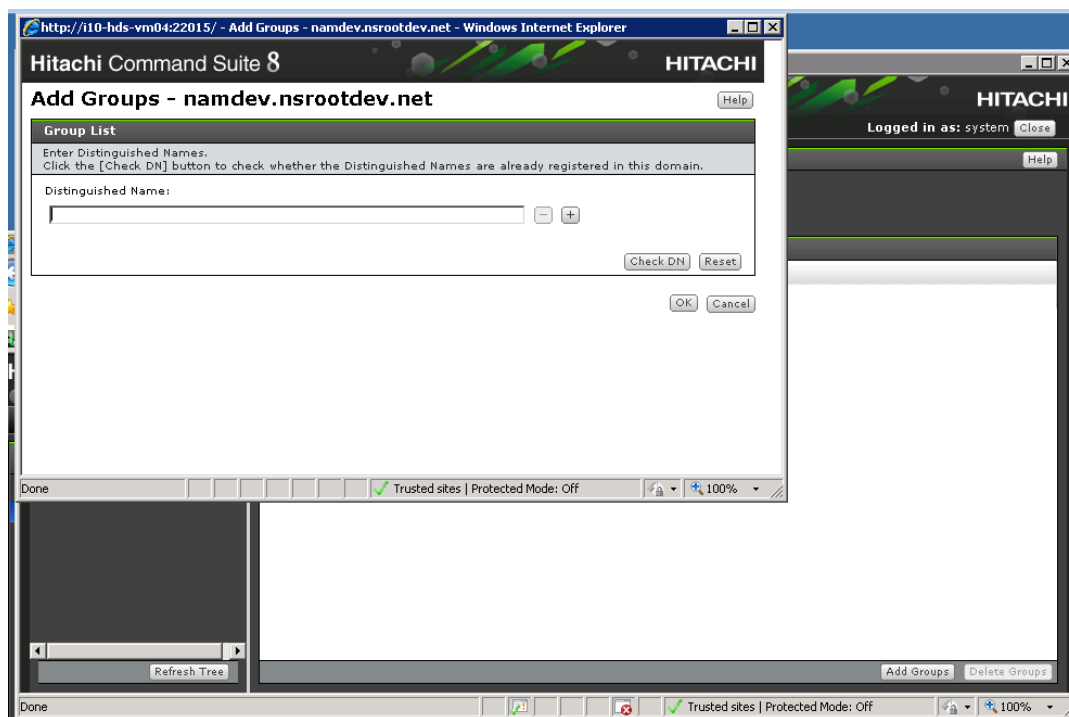
Log into HCS --> Administration Tab --> Users and Groups



Select *Groups*

Select the entry for your domain

Select the *Add Groups* button



Enter the distinguished Name of the Admin group. Select *Check DN*.

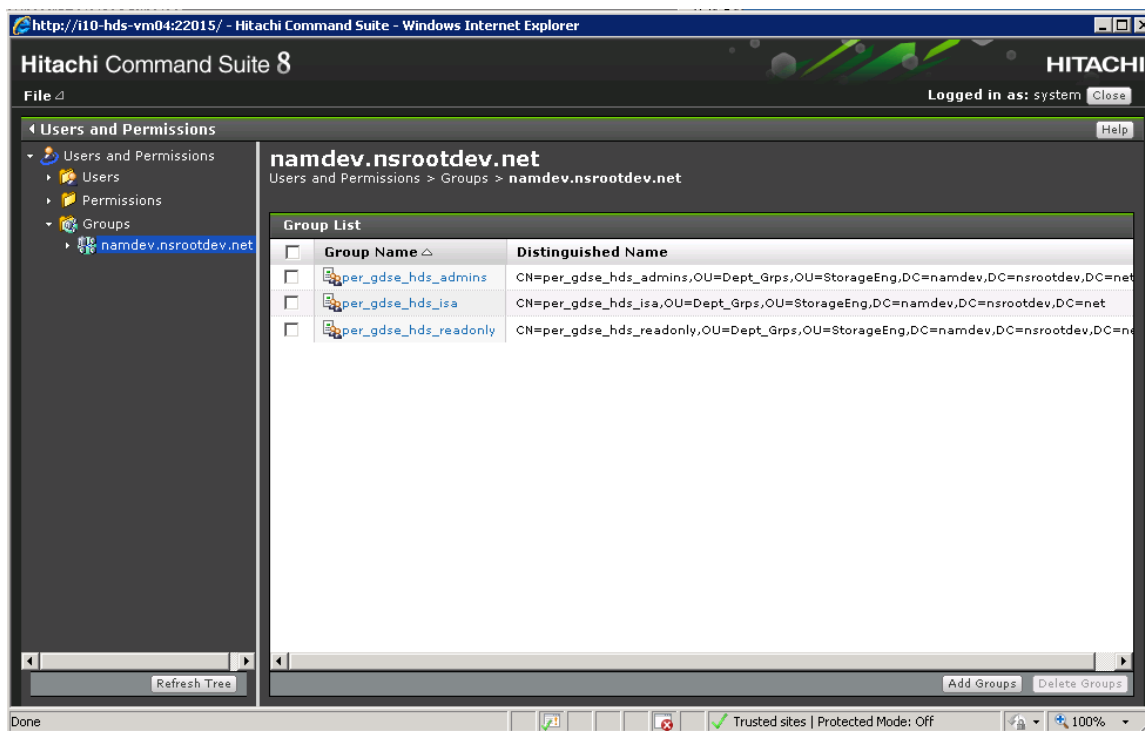
You should get a message that the Distinguished Name is already registered in the domain. Select OK to make the

entry.

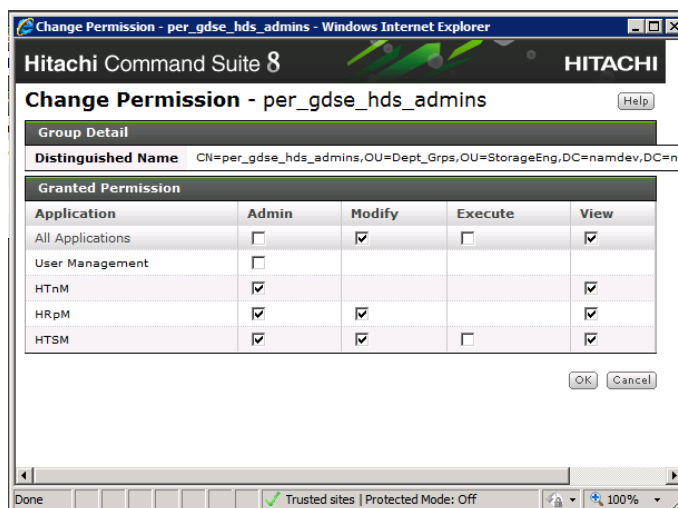
If you get an error that it cannot find the group, check that the entire distinguished name was pasted into the field. Or repeat the dsquery command line inquiry for the expected group distinguished names.

Repeat for ISA/Security Group

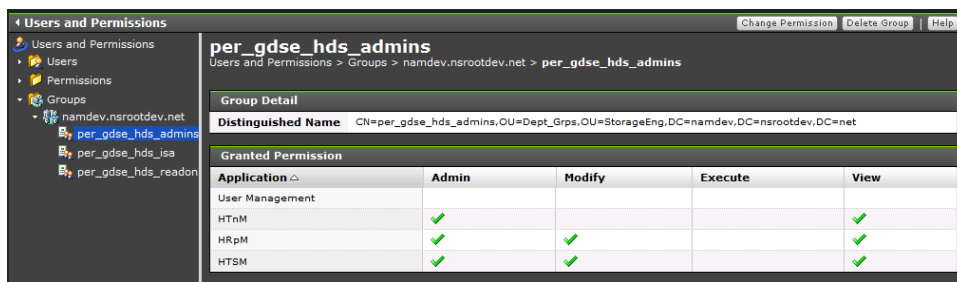
Repeat for Read Only Group



Click on each group and change the permissions. The check box represents the granted permission.



Admin Group should have Admin privileges on every HCS component with the exception of User Management. Only the ISA group will have Admin privileges on User Management. ***This is a critical security setting.***



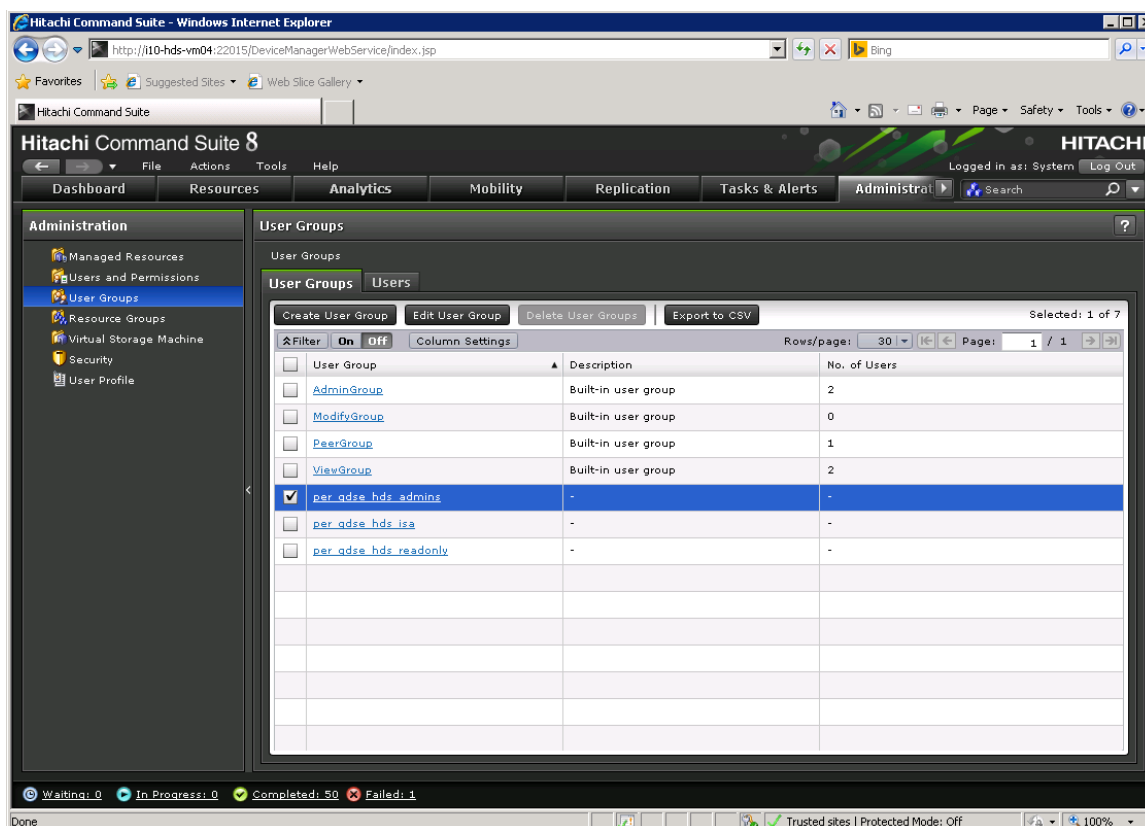
ISA/Security should have Admin on User Management, and View on everything else.

Read Only Group should have View on all items.

Adding more than these three groups (Admin, ISA, ReadOnly) is optional and may be necessary if there are multiple AD groups for the SAN Administrators.

Go to Administration Tab --> User Groups

Select the AD Admin Group, then select the Edit User Group



Edit User Group

Specify resource groups for the user group.

Name: * per_gdse_hds_admins

Description: -

Resource Groups

Filter On Off Column Settings Rows/page: 30 Page: 1 / 1

☐	Resource Group	Description	Storage System	User Groups	Virtual Storage Machine	Role
No Data						

Add Resource Groups Edit Roles Remove Resource Groups Selected: 0 of 0

* Required Field OK Cancel ?

Select Add Resource Groups

Select All Resource Groups, then select the Admin option for the Role (then OK)

Add Resource Groups

Specify resource groups for the user group.

Resource Groups

Filter On Off Column Settings Rows/page: 30 Page: 1 / 1

☐	Resource Group	Description	Storage System	User Groups	Virtual Storage Machine	Role
☒	All Resources	All Resources	-	AdminGroup,...	-	Admin
☐	HUS VM_210...	Default Reso...	HDS210060		-	View
☐	VSP G1000_...	Default Reso...	VSP G1000@...		-	View
☐	VSP G1000_...	Default Reso...	HDS56195		-	View
☐	VSP_53112	Default Reso...	HDS53112		-	View

Selected: 1 of 5

OK Cancel ?

Repeat for ISA and Read Only with View roles on All Resources for both.

8.16.2 HCS HTTPS Setup

This section will be updated in an upcoming release.

8.16.3 HCS HTTPS Certificates

This section will be updated in an upcoming release.

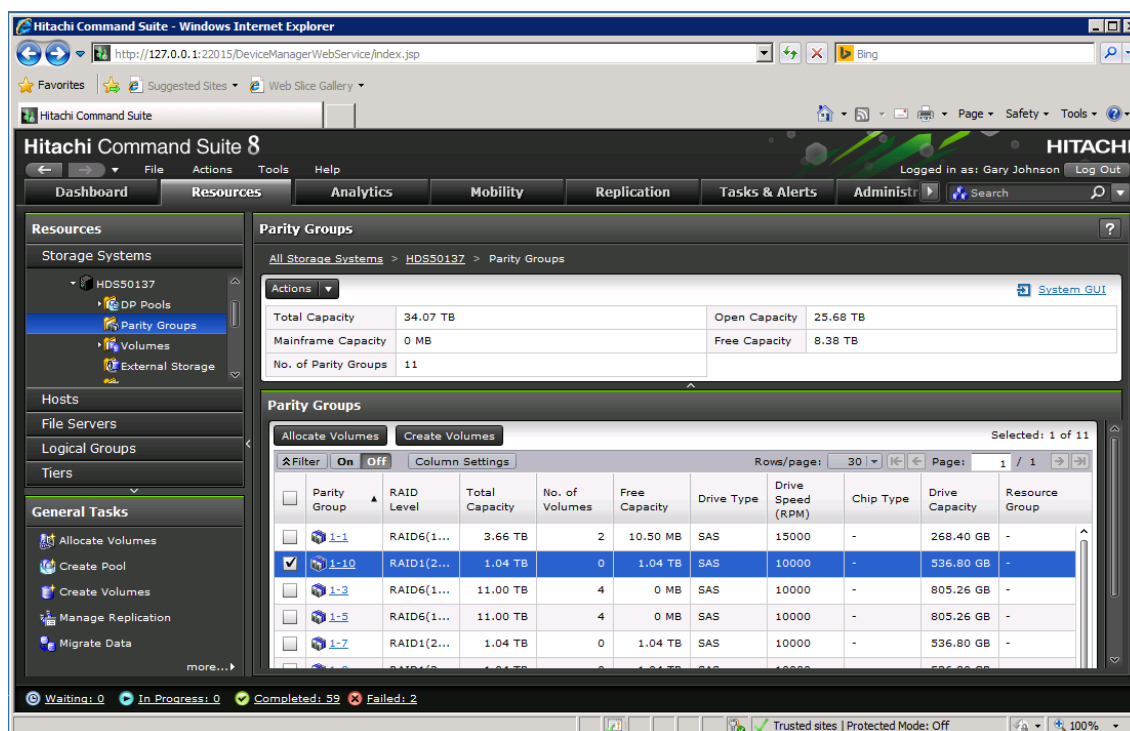
8.17 Storage Configuration

The RAID configuration of Parity Groups is not accessible to the SAN Administrator. The HDS CE must configure the disks (including spares) per instructions by Citi staff. Citi Staff will create the pools (including pool LDEVs) and LDEVs for host allocation created from those pools.

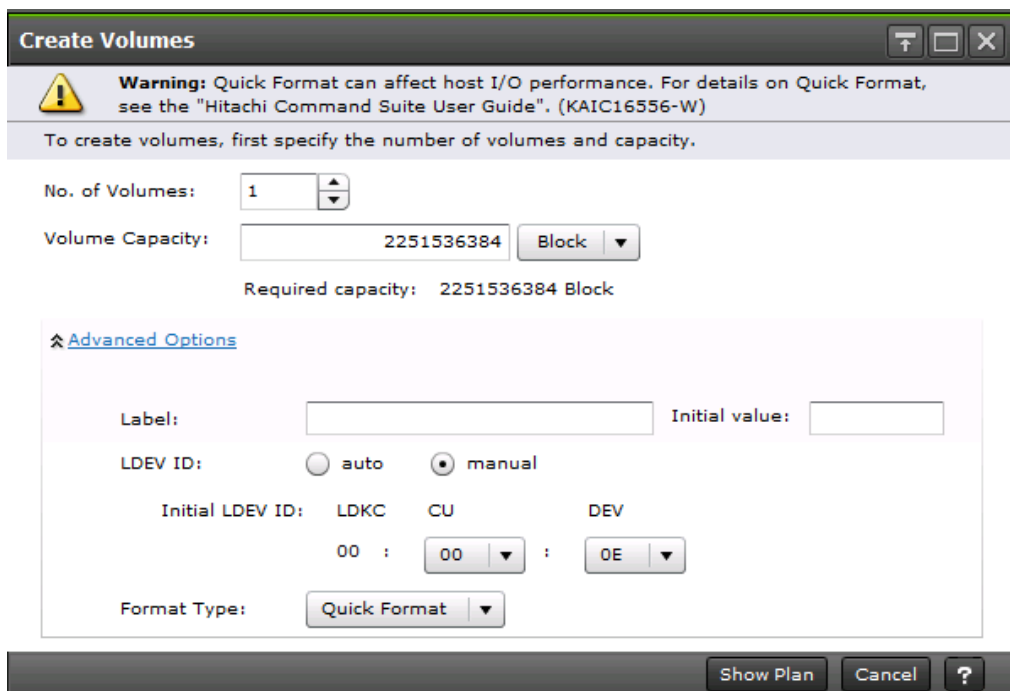
8.17.1 Creating Storage Pools

To create a pool, LDEVs must be created on all parity groups that are going to be used in the pool. Go to *Resources* → *Storage Systems* → <array desired> → *Parity Groups*

Select the first Parity Group to be used in the pool. If you select more than one Parity Group, you will not be able to create volumes.



Select the *Create Volumes* button.



Create Volumes

Warning: Quick Format can affect host I/O performance. For details on Quick Format, see the "Hitachi Command Suite User Guide". (KAIC16556-W)

To create volumes, first specify the number of volumes and capacity.

No. of Volumes: 1

Volume Capacity: 2251536384 Block

Required capacity: 2251536384 Block

[Advanced Options](#)

Label: Initial value:

LDEV ID: ☐ auto ☒ manual

Initial LDEV ID: LDKC CU DEV

00 : 00 : 0E

Format Type: Quick Format

Show Plan Cancel ?

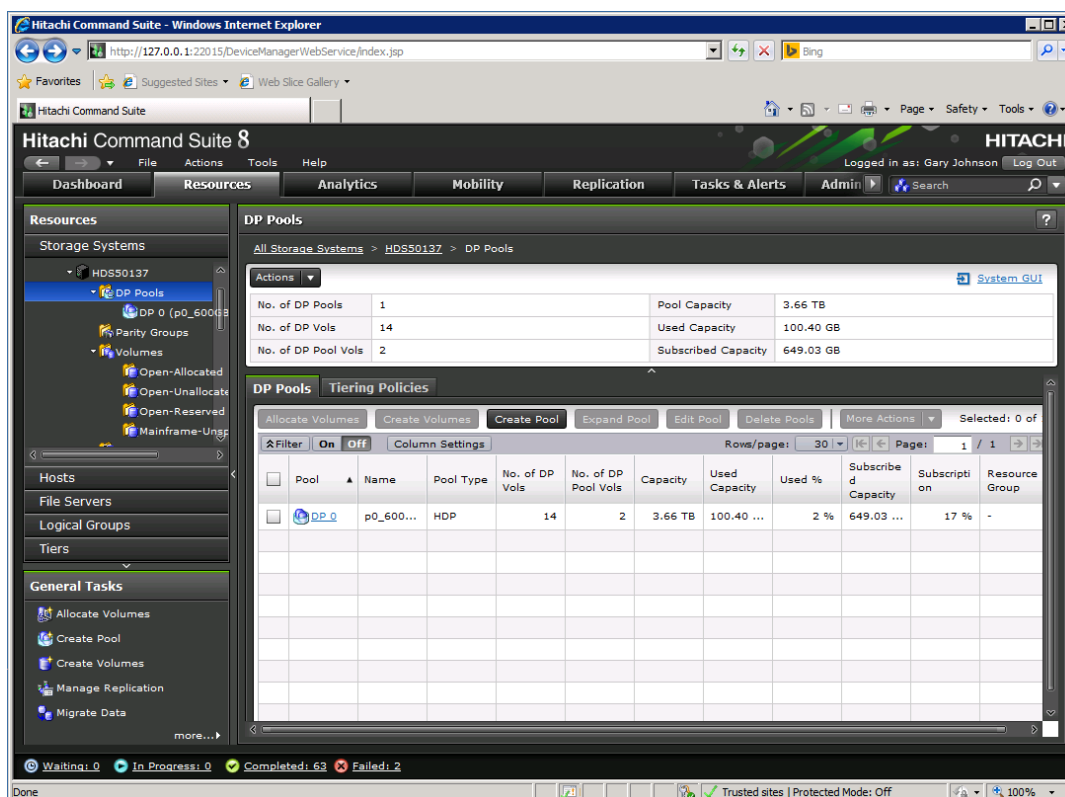
For 600GB R10 Parity Groups, use 2251536384 blocks (on a single LDEV) to maximize the use of the parity group.

For 900GB R6 14+2 Parity Groups, you will need to create multiple LDEVs as the maximum LDEV size is 2.99TB.

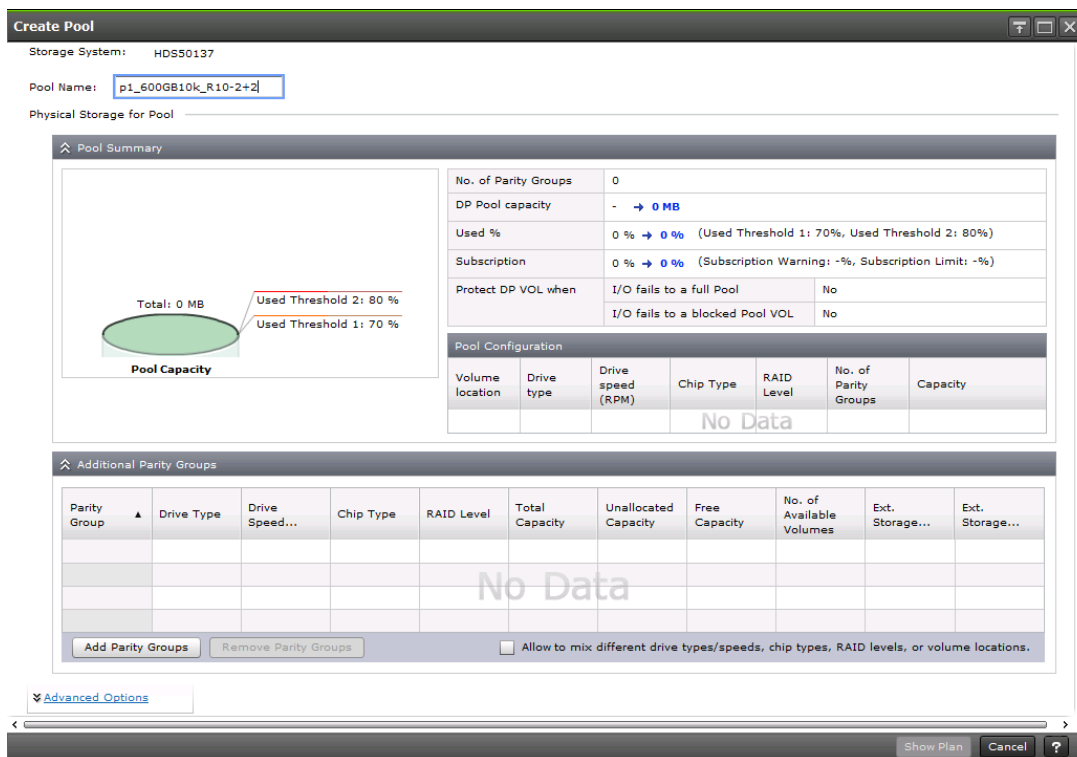
Select *Advanced Options*. Select *Manual* for LDEV ID. Use the next available address for LDKC = 00, CU = 00. This range (CU=00) of LDEVs is reserved for Pool LDEVs.

Select the *Show Plan* button and confirm the LDEV creation. Once the Pool LDEVs have been created (all tasks completed), select Pools under the desired array.

Go to *Resources* → *Storage Systems* → <desired array> → *DP Pools*.

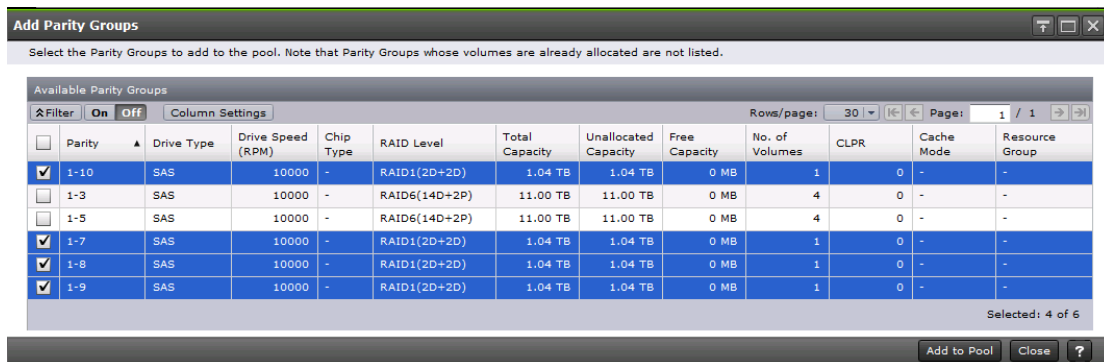


With the DP Pools tab selected (default), select the Create Pool button.



Pool Name: The pool should have a functional name that describes the pool id, the drives being used, and the raid configuration. For example “p1_600GB10k_R10-2+2”. Do not select the Allow to mix different types/speeds, chip types, RAID levels, ... option. **Multi-tier (multiple RAID level) pools are called HDT pools and are not yet supported at Citi.**

Select the *Add Parity Groups* to select the Parity Groups you created Pool LDEVs in the previous step. Any Parity Groups that do not have these large LDEVs will not be listed as candidates. Only select Parity Groups with the same RAID level . **Multi-tier (multiple RAID level) pools are called HDT pools and are not yet supported at Citi.**

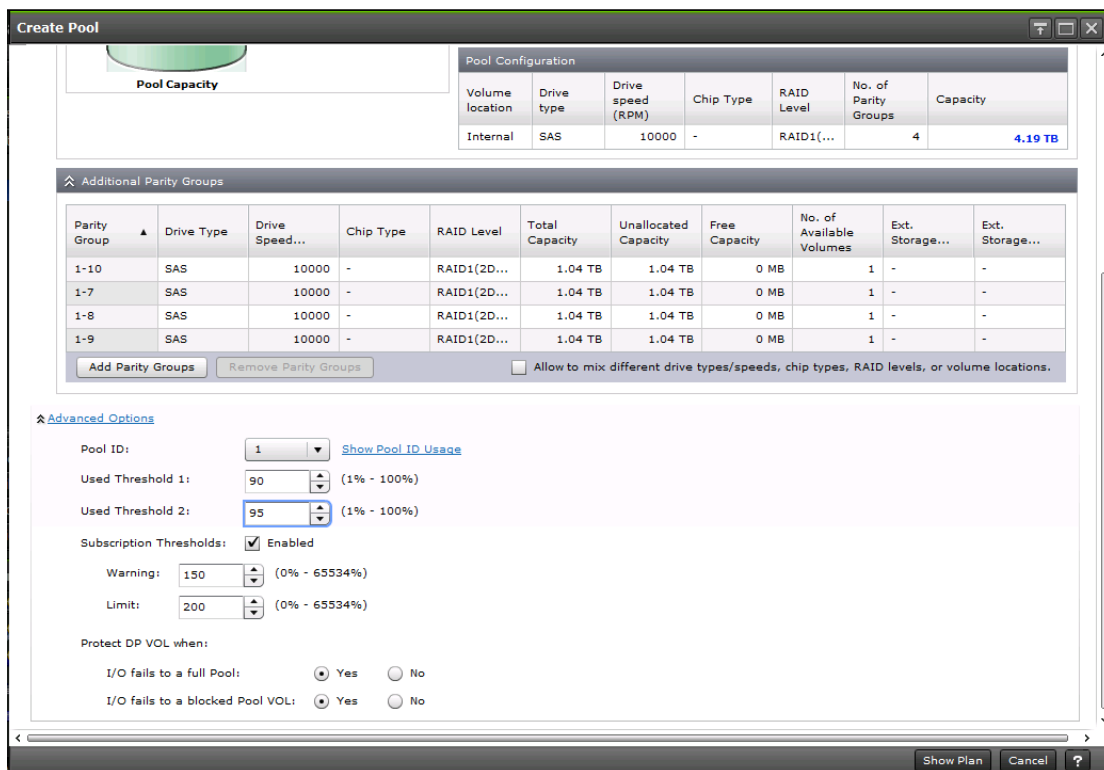


Parity	Drive Type	Drive Speed (RPM)	Chip Type	RAID Level	Total Capacity	Unallocated Capacity	Free Capacity	No. of Volumes	CLPR	Cache Mode	Resource Group
☒ 1-10	SAS	10000	-	RAID1(2D+2D)	1.04 TB	1.04 TB	0 MB	1	0	-	-
☐ 1-3	SAS	10000	-	RAID6(14D+2P)	11.00 TB	11.00 TB	0 MB	4	0	-	-
☐ 1-5	SAS	10000	-	RAID6(14D+2P)	11.00 TB	11.00 TB	0 MB	4	0	-	-
☒ 1-7	SAS	10000	-	RAID1(2D+2D)	1.04 TB	1.04 TB	0 MB	1	0	-	-
☒ 1-8	SAS	10000	-	RAID1(2D+2D)	1.04 TB	1.04 TB	0 MB	1	0	-	-
☒ 1-9	SAS	10000	-	RAID1(2D+2D)	1.04 TB	1.04 TB	0 MB	1	0	-	-

Selected: 4 of 6

Add to Pool Close ?

Select the *Add to Pool* button. Any remaining Parity Groups will be listed. Select Close to go back to the previous screen. Under *Advanced Options*, you can adjust the pool ID (if a different pool ID is desired).



Volume location	Drive type	Drive speed (RPM)	Chip Type	RAID Level	No. of Parity Groups	Capacity
Internal	SAS	10000	-	RAID1(...)	4	4.19 TB

Parity Group	Drive Type	Drive Speed...	Chip Type	RAID Level	Total Capacity	Unallocated Capacity	Free Capacity	No. of Available Volumes	Ext. Storage...	Ext. Storage...
1-10	SAS	10000	-	RAID1(2D...	1.04 TB	1.04 TB	0 MB	1	-	-
1-7	SAS	10000	-	RAID1(2D...	1.04 TB	1.04 TB	0 MB	1	-	-
1-8	SAS	10000	-	RAID1(2D...	1.04 TB	1.04 TB	0 MB	1	-	-
1-9	SAS	10000	-	RAID1(2D...	1.04 TB	1.04 TB	0 MB	1	-	-

Add Parity Groups Remove Parity Groups ☐ Allow to mix different drive types/speeds, chip types, RAID levels, or volume locations.

Advanced Options

Pool ID: 1 [Show Pool ID Usage](#)

Used Threshold 1: 90 (1% - 100%)

Used Threshold 2: 95 (1% - 100%)

Subscription Thresholds: ☒ Enabled

Warning: 150 (0% - 65534%)

Limit: 200 (0% - 65534%)

Protect DP VOL when:

I/O fails to a full Pool: ☒ Yes ☐ No

I/O fails to a blocked Pool VOL: ☒ Yes ☐ No

Show Plan Cancel ?

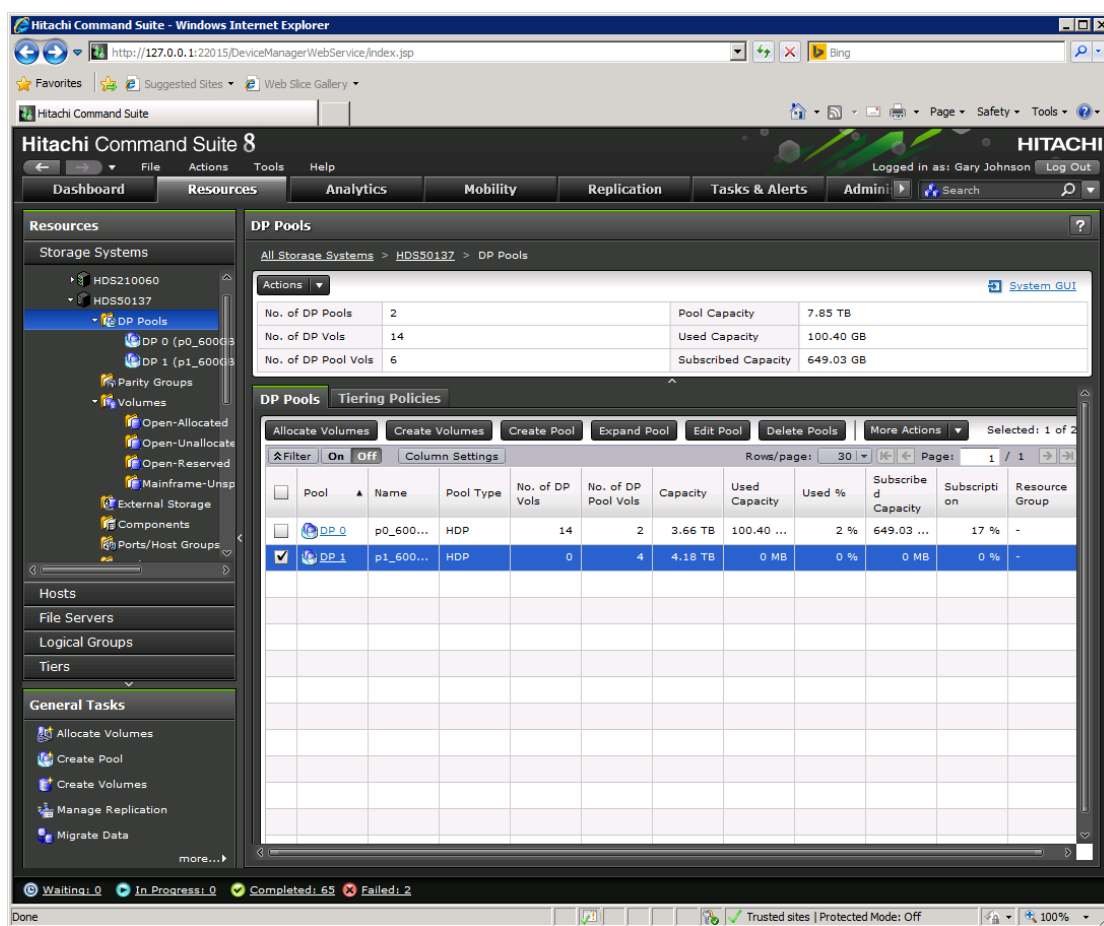
- o Recommended Thresholds:
 - Threshold 1: 90%
 - Threshold 2: 95%
- o Subscription Thresholds (enabled):
 - Warning: 150%
 - Limit: 200%
- o Protect DP Vol when:
 - I/O fails to a full Pool: Yes
 - I/O fails to a blocked Pool VOL: Yes

Select the *Show Plan* button to review the pool create task details. Select *Submit* to create the task for creating the pool.

8.17.2 Expanding a Pool

You must create Pool LDEVs (large LDEVs taking up the entire Parity Group) before trying to expand the pool. See initial step under Pool Create.

Go to *Resources* → *Storage Systems* → <desired array> → *DP Pools*



The screenshot displays the Hitachi Command Suite 8.17.2 web interface. The left sidebar shows the navigation tree with 'Resources' expanded, leading to 'Storage Systems' and then 'DP Pools'. The main content area shows the 'DP Pools' configuration for storage system 'HDS50137'. A summary table at the top provides key metrics:

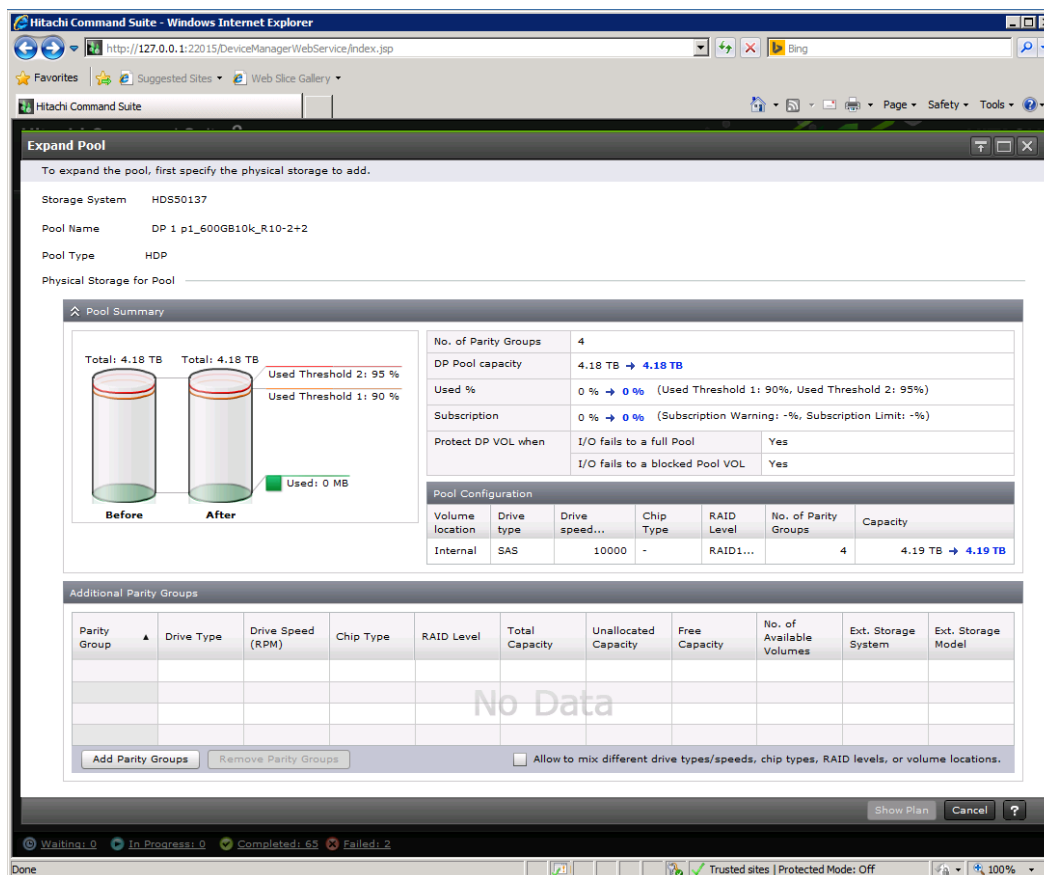
Parameter	Value	Parameter	Value
No. of DP Pools	2	Pool Capacity	7.85 TB
No. of DP Vols	14	Used Capacity	100.40 GB
No. of DP Pool Vols	6	Subscribed Capacity	649.03 GB

Below the summary, a table lists the DP Pools. The 'DP 1' pool is selected for expansion:

Pool	Name	Pool Type	No. of DP Vols	No. of DP Pool Vols	Capacity	Used Capacity	Used %	Subscribed Capacity	Subscription	Resource Group	
☐	DP 0	p0_600...	HDP	14	2	3.66 TB	100.40 ...	2 %	649.03 ...	17 %	-
☒	DP 1	p1_600...	HDP	0	4	4.18 TB	0 MB	0 %	0 MB	0 %	-

The interface includes various action buttons like 'Allocate Volumes', 'Create Volumes', 'Create Pool', 'Expand Pool', 'Edit Pool', and 'Delete Pools'. The bottom status bar shows 'Waiting: 0', 'In Progress: 0', 'Completed: 65', and 'Failed: 2'.

Select the pool you wish to expand. Select the *Expand Pool* button.



Expand Pool

To expand the pool, first specify the physical storage to add.

Storage System: HDS50137
 Pool Name: DP 1 p1_600G810k_R10-2+2
 Pool Type: HDP
 Physical Storage for Pool: _____

Pool Summary

Total: 4.18 TB Total: 4.18 TB Used Threshold 2: 95 %
 Used Threshold 1: 90 %
 Used: 0 MB

Before After

No. of Parity Groups	4
DP Pool capacity	4.18 TB → 4.18 TB
Used %	0 % → 0 % (Used Threshold 1: 90%, Used Threshold 2: 95%)
Subscription	0 % → 0 % (Subscription Warning: -%, Subscription Limit: -%)
Protect DP VOL when	I/O fails to a full Pool: Yes I/O fails to a blocked Pool VOL: Yes

Pool Configuration

Volume location	Drive type	Drive speed...	Chip Type	RAID Level	No. of Parity Groups	Capacity
Internal	SAS	10000	-	RAID1...	4	4.19 TB → 4.19 TB

Additional Parity Groups

Parity Group	Drive Type	Drive Speed (RPM)	Chip Type	RAID Level	Total Capacity	Unallocated Capacity	Free Capacity	No. of Available Volumes	Ext. Storage System	Ext. Storage Model
No Data										

☐ Allow to mix different drive types/speeds, chip types, RAID levels, or volume locations.

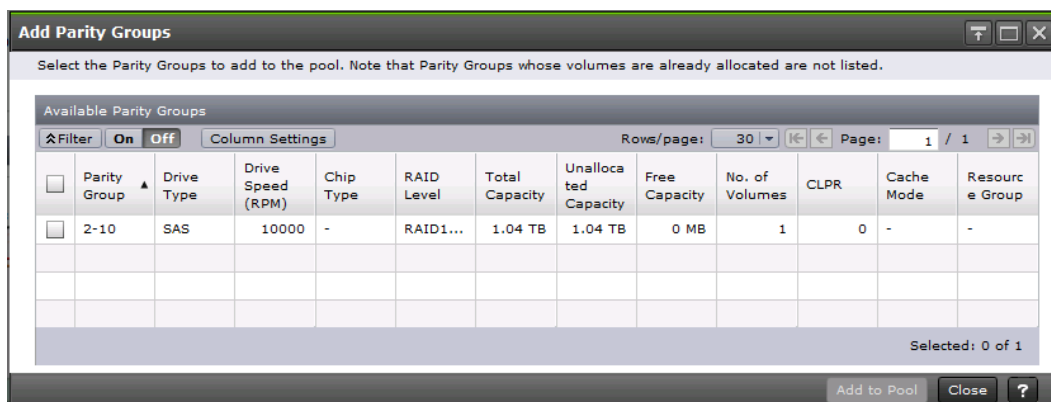
Waiting: 0 In Progress: 0 Completed: 63 Failed: 2

Done

Do not select the “Allow to mix different types/speeds, chip types, RAID levels, ...” option.

Multi-tier (multiple RAID level) pools are called HDT pools and are not yet supported at Citi.

To select the parity groups that you want to add to the pool, select the *Add Parity Group* Button. You will see only Parity Groups that are the same RAID type and disk speed as with the existing Pool LDEVs. You will need to create these Pool LDEVs before you can add any Parity Groups to a pool (see initial steps on Creating a Pool).



Add Parity Groups

Select the Parity Groups to add to the pool. Note that Parity Groups whose volumes are already allocated are not listed.

Available Parity Groups

Filter: ☒ On ☐ Off Column Settings Rows/page: 30 Page: 1 / 1

Parity Group	Drive Type	Drive Speed (RPM)	Chip Type	RAID Level	Total Capacity	Unallocated Capacity	Free Capacity	No. of Volumes	CLPR	Cache Mode	Resource Group
☐ 2-10	SAS	10000	-	RAID1...	1.04 TB	1.04 TB	0 MB	1	0	-	-

Selected: 0 of 1

Select the *Add to Pool* button. Any remaining Parity Groups will be listed. Select *Close* to go back to the previous screen. Select the *Show Plan* button to verify the task details and to initiate the pool expansion.

8.17.3 Creating LDEVs for Host Allocation

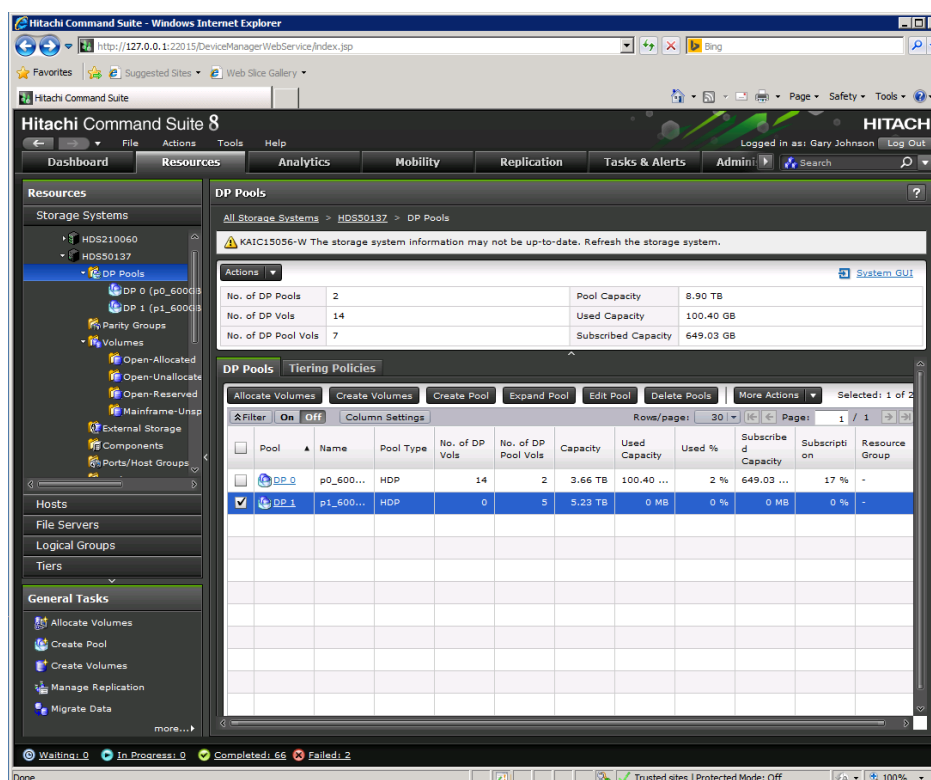
There are restrictions on the ranges of addresses to be used for LDEVs.

Logical Volume Addressing (CU:LDEVs)

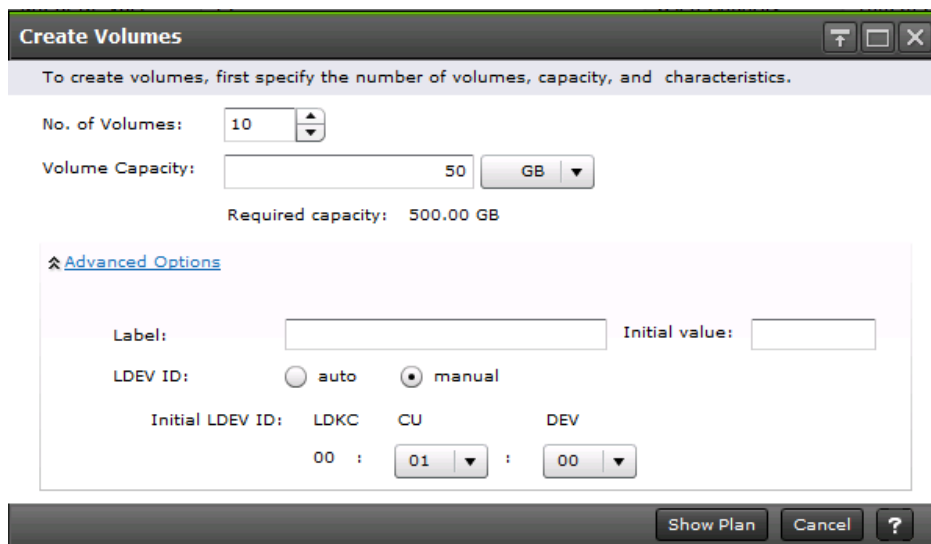
CU:LDEV	Purpose
00:00-00:FF	Used for Pool volumes
01:00-3A:FF	Used for Host LDEVs
3E:00-3E:FF	Reserved for Control LUNs
3D:00-3D:FF	Reserved for Quorum or similar communication

Note: Performance Exports and HTnM configuration rely upon the use of a limited number of CUs (00-3F). If varying from this range, then export configuration will need to be altered. Do not exceed 64K addresses.

To create LDEVs for hosts, go to *Resources* → *Storage Systems* → <desired array> → *DP Pools*



Select the pool you want to create volumes from, and then select the *Create Volumes* button. Alternatively, you can select the DP Pool on the left and then right-click to see a menu. Select *Create Volumes*.



- Select the number of volumes to create (1-500).
- Fill in the volume capacity in GB (or TB, MB, or blocks).

You should expand the *Advanced Options* button. Make sure the CU is between 01 and 3F. 00 should only be for Pool LDEVs. 3E should be used for command devices. Labels are recommended if you know the hosts/applications that are going to use them.

8.17.4 Creating Command Devices

Command devices are used by management servers to communicate with the array via the scsi / fiber-channel protocol. They are not used for storage and should not be shared between different management applications or servers.

Create the LDEVs from a pool as normal. However, these LDEVs are only used for array communication, so make them 47MB in size (minimum size allowed). Use the CU=3E address range for these LDEVs. Using the label “command_device” may also be helpful in identifying these special LDEVs.

Create Volumes

To create volumes, first specify the number of volumes, capacity, and characteristics.

No. of Volumes:

Volume Capacity: MB

Required capacity: 235.00 MB

[Advanced Options](#)

Label: Initial value:

LDEV ID: ☐ auto ☒ manual

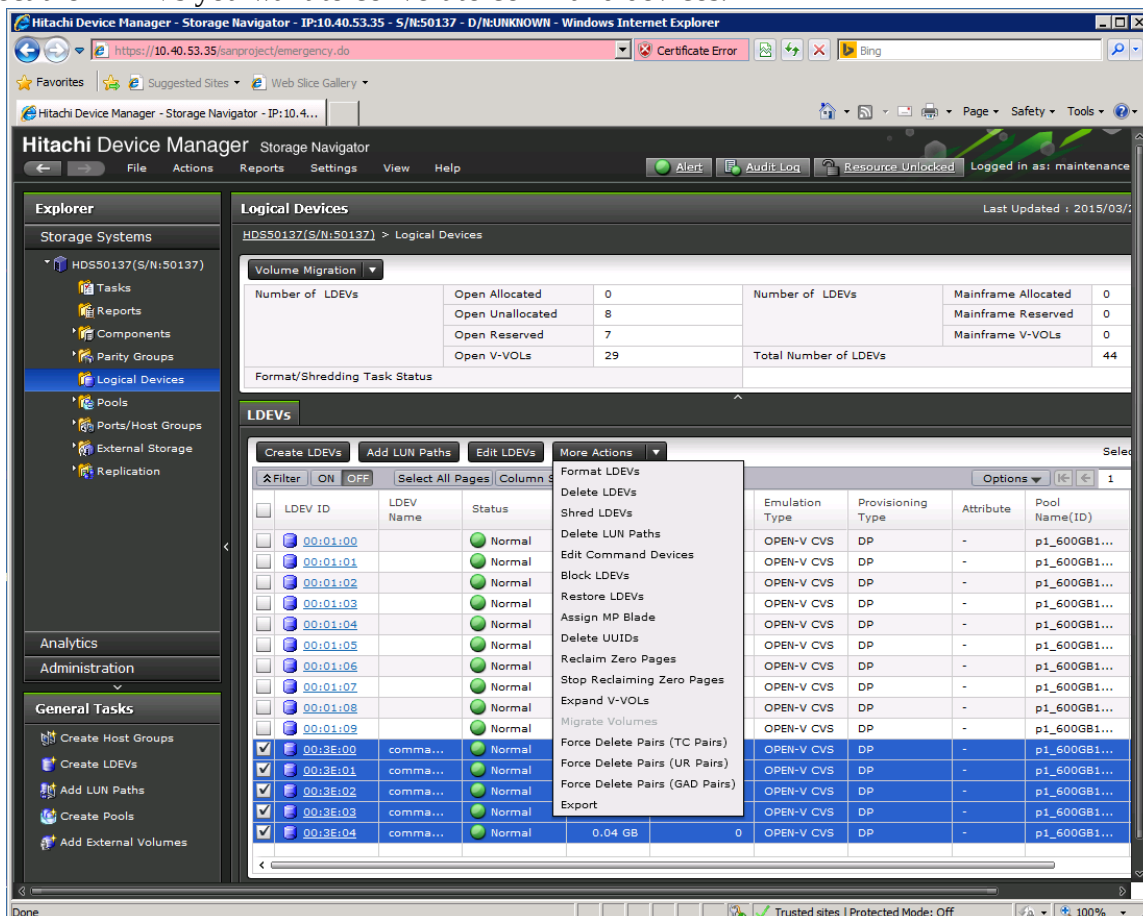
Initial LDEV ID: LDKC CU DEV

00 : :

Show Plan Cancel ?

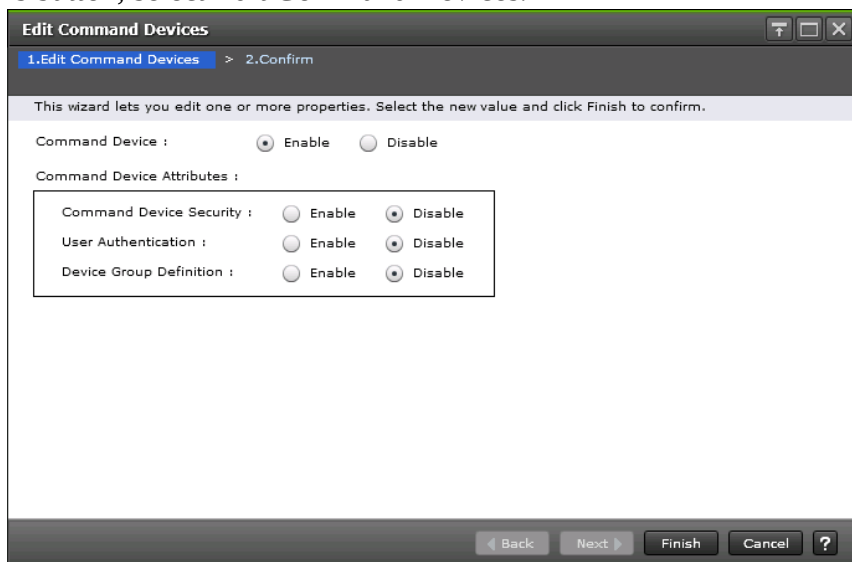
To modify an LDEV to be a command Device, you will need to go to the emergency.do webpage (The HCS screens are not functional in this area).

Go to *Explorer* → *Storage Systems* → *Logical Devices*
 Select the LDEVs you want to convert to command devices.



The screenshot shows the Hitachi Device Manager Storage Navigator interface. The left sidebar contains the Explorer tree with 'Logical Devices' selected. The main area displays the 'Logical Devices' page for HDS50137(S/N:50137). Below this, the 'LDEVs' section is visible, showing a table of LDEVs with columns for LDEV ID, LDEV Name, Status, and more. A context menu is open over the table, showing options like 'Format LDEVs', 'Delete LDEVs', 'Shred LDEVs', etc. The table lists several LDEVs, including those with IDs 00:01:00 through 00:01:09, and 00:3E:00 through 00:3E:04. The LDEVs 00:3E:00 through 00:3E:04 are highlighted in blue, indicating they are selected.

Under More Actions button, select Edit Command Devices.



- Command Device should be enabled.
- Command Device Security should be disabled.
- User Authentication should be enabled for RAIDCOM command devices only.
- Device Group Definition should be enabled only for replicated RAIDCOM / CCI environments only where device groups are used.

Select *Finish* to create a task and to make the changes effective.

8.18 Storage Provisioning

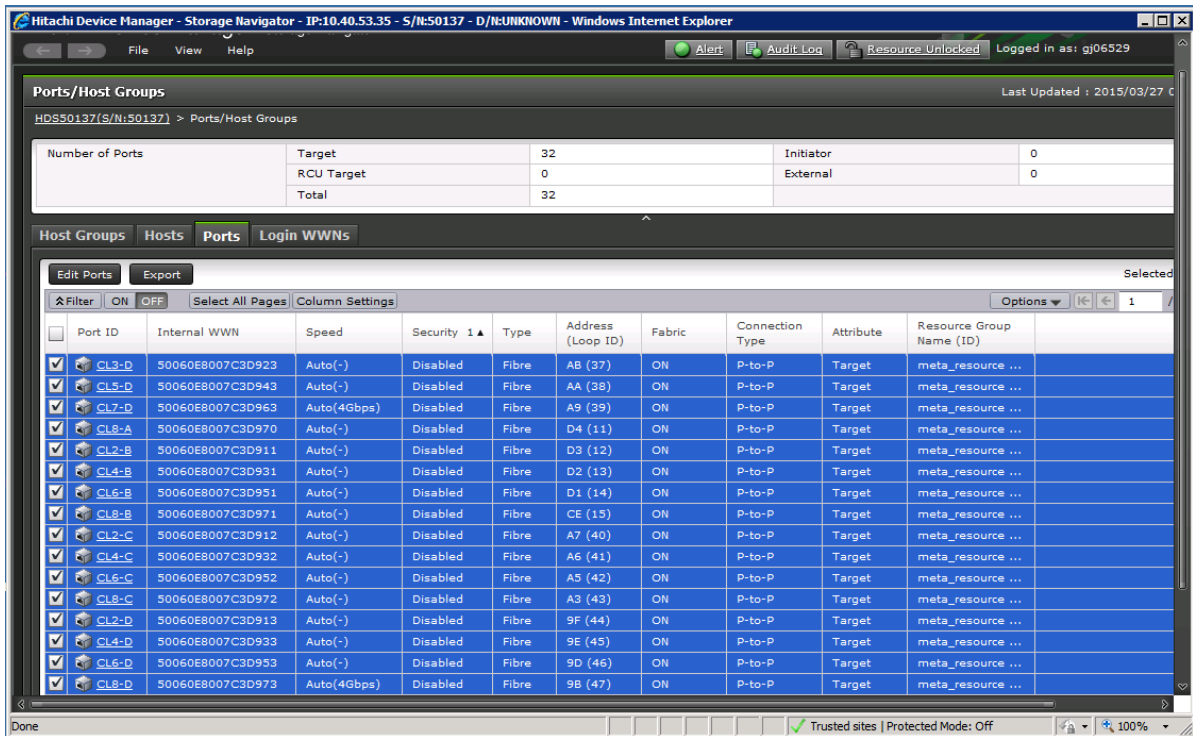
All devices (LDEVs) on the G1000 are thin (or virtual) devices from an HDP storage pool. These include standard LDEVs and the Command Devices used by management servers.

8.18.1 Configuring LUN security

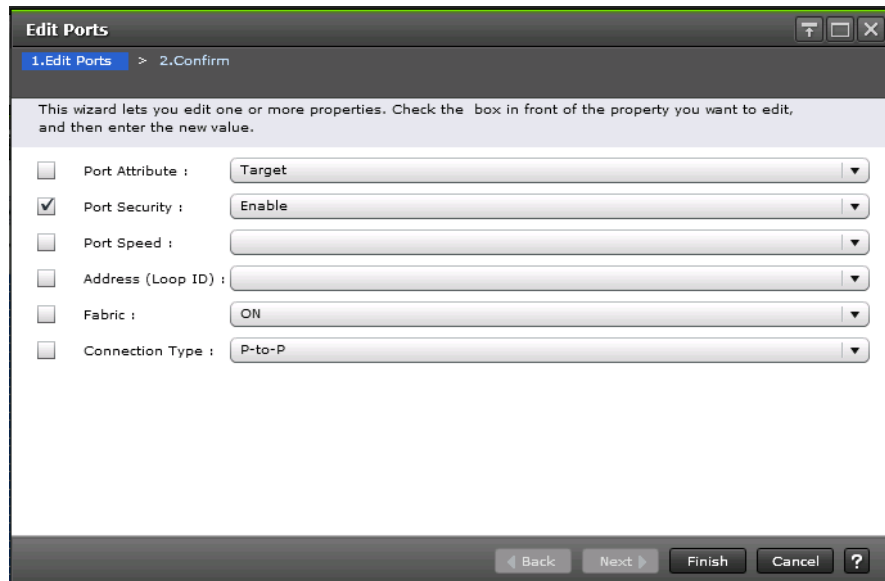
Port Security allows for LUN masking by isolating LDEVs/LUNs in a given host group to only the WWN(s) listed in the host group.

Go to *Resources* → *Storage Systems* → <array desired> → *Ports*. The select the port tab in the middle of the screen.

Select all of the ports that have port security disabled.



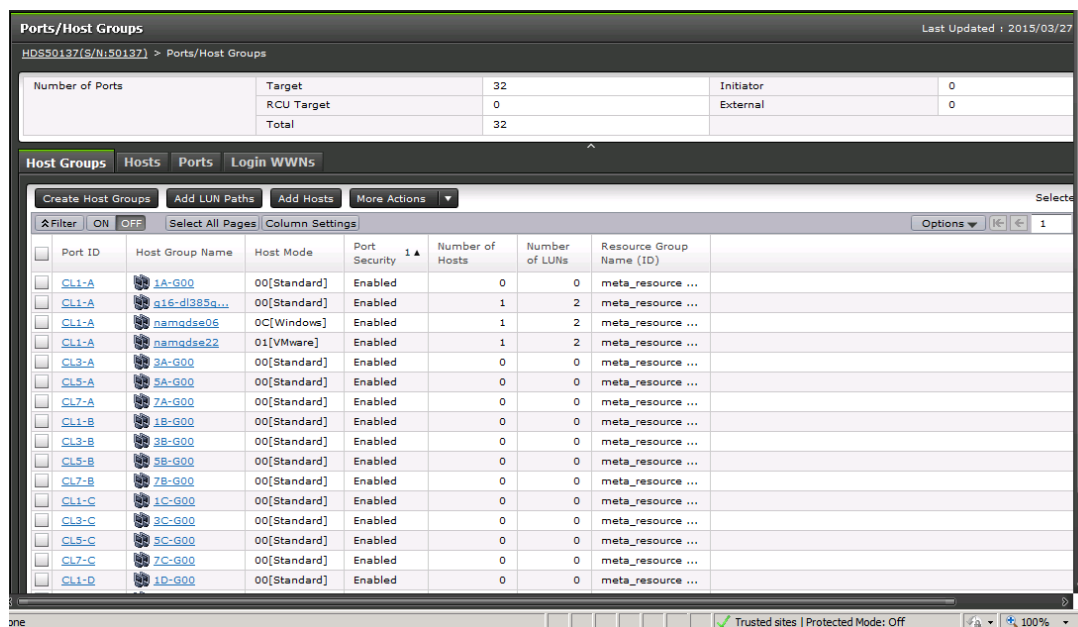
Select the *Edit Ports* button



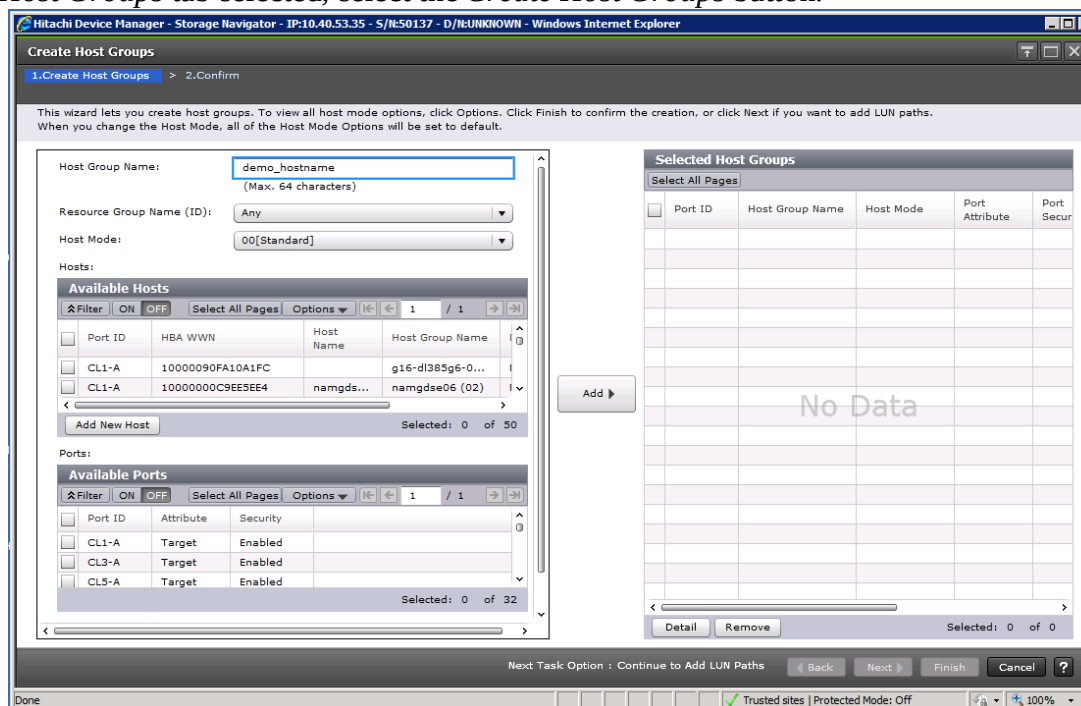
Change the Port Security value from *Disabled* to *Enabled*. The checkbox will automatically be selected. Select *Finish* (and *Apply* on confirmation screen) to create a task to update all of the selected ports to have security enabled.

8.18.2 Creating Host Groups

Go to *Resources* → *Storage Systems* → <desired array> → *Ports/Host Groups*.



With the *Host Groups* tab selected, select the *Create Host Groups* button.

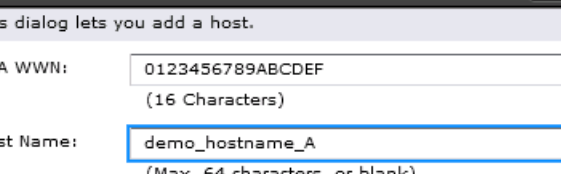


- Host Group Name: *name of the host/cluster*
- Resource Group: *Any*
- Host Mode: *Select the appropriate host type*

A list of the common Host Modes can be found at [Updating Host Mode and Host Mode Options](#).

Host Mode Options are set after the allocation step, by modifying the host group. For details on Host Options, see [Updating Host Mode and Host Mode Options](#).

Hosts: *If the host HBAs have been zoned to the array, you may see them listed under the available Hosts list. Otherwise, you will need to select the Add New Host button.*



Add New Host

This dialog lets you add a host.

HBA WWN: 0123456789ABCDEF
(16 Characters)

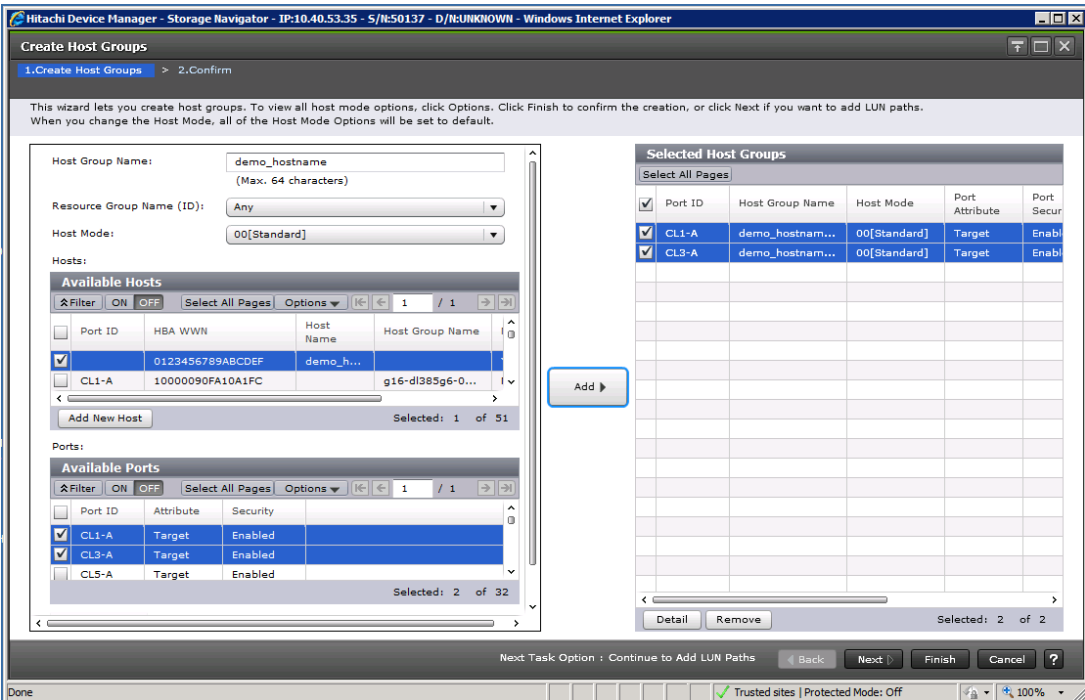
Host Name: demo_hostname_A
(Max. 64 characters, or blank)

OK Cancel ?

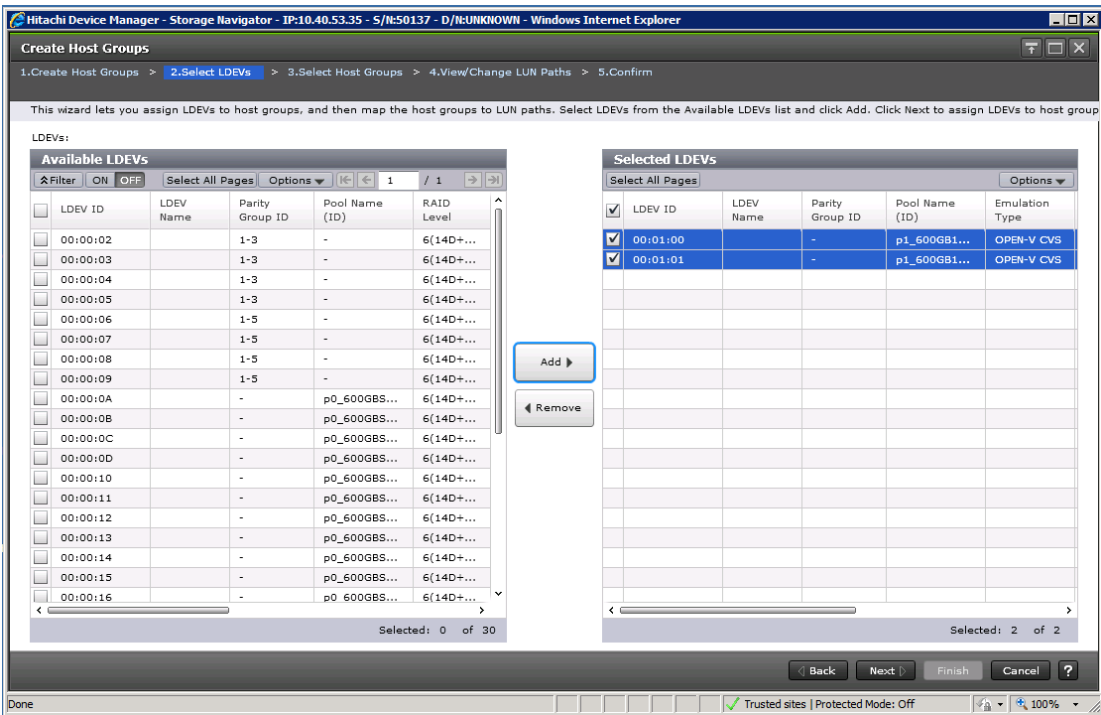
It is important to use the Hostname label to describe the HBA (esp. with clusters). Use hostname and fabric/HBA numbering to match any zoning details. Select OK to return to the previous screen. You should see the entered HBA with a selected checkbox.

[illegible]

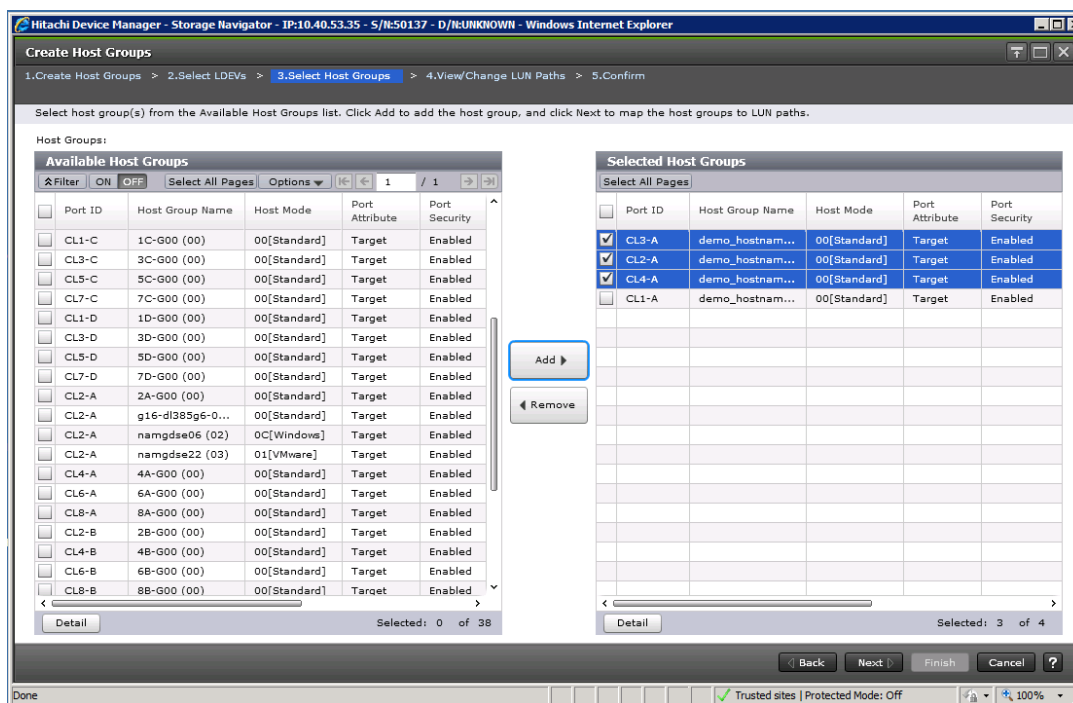
Select the ports that this HBA will be (is) zoned to. Then select the *Add* button.



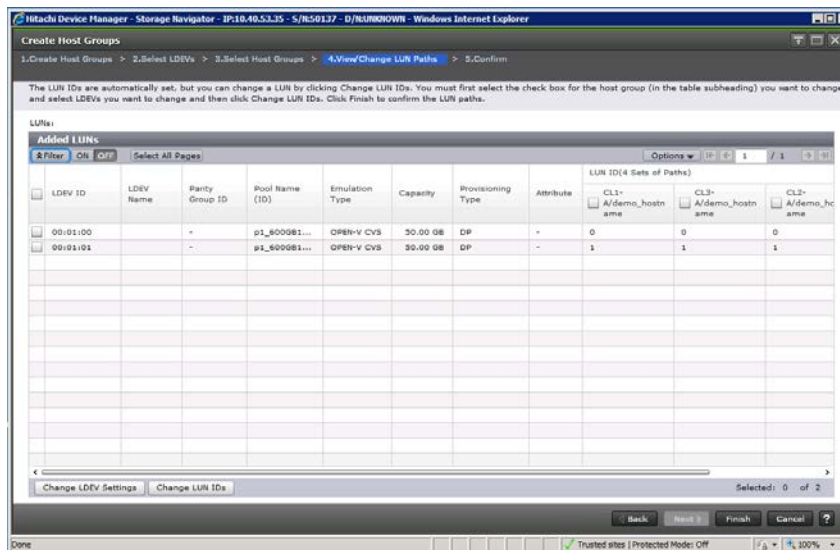
This should be repeated for any other HBAs for this host. You can remove any mis-configurations. Click *Next* to continue to the next steps for allocation (*Finish* if only creating the host groups).



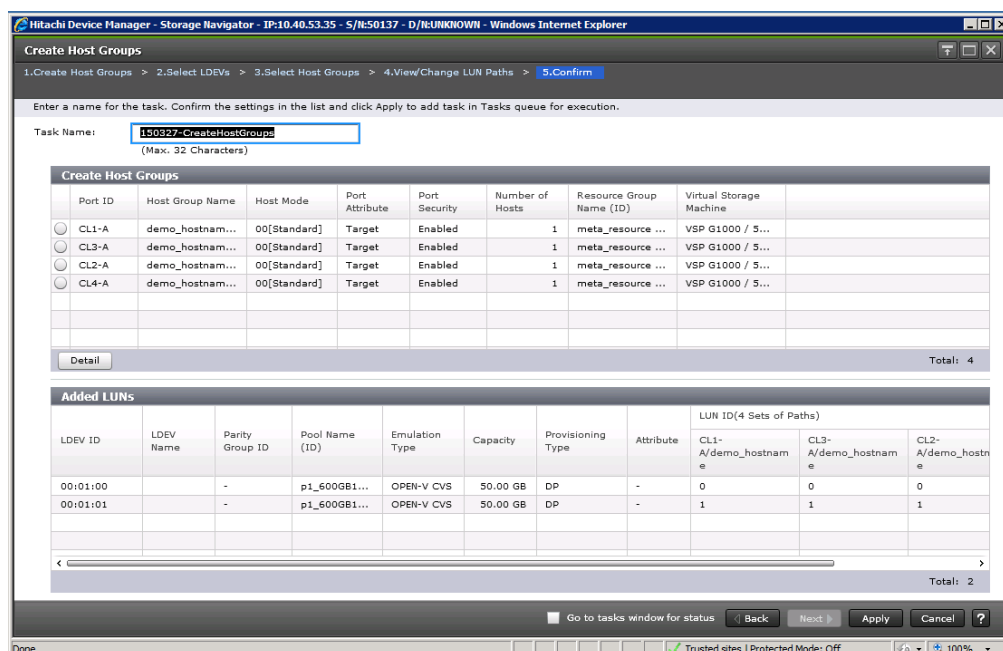
Select the LDEVs you are going to allocate to this host group and then *Add* to move them to the selected LDEV list. Select the *Next* button to continue with the allocation.



Select the *Next* button.



Change the LUN ID for any of the LDEVs from the host perspective). Normally this is not changed. Select the *Finish* button to review the task details.



Hitachi Device Manager - Storage Navigator - IP:10.40.53.35 - S/N:50137 - D/UNKNOWN - Windows Internet Explorer

Create Host Groups

1.Create Host Groups > 2.Select LDEVs > 3.Select Host Groups > 4.View/Change LUN Paths > **5.Confirm**

Enter a name for the task. Confirm the settings in the list and click Apply to add task in Tasks queue for execution.

Task Name: (Max. 32 Characters)

Port ID	Host Group Name	Host Mode	Port Attribute	Port Security	Number of Hosts	Resource Group Name (ID)	Virtual Storage Machine
☐ CL1-A	demo_hostnam...	00[Standard]	Target	Enabled	1	meta_resource ...	VSP G1000 / 5...
☐ CL3-A	demo_hostnam...	00[Standard]	Target	Enabled	1	meta_resource ...	VSP G1000 / 5...
☐ CL2-A	demo_hostnam...	00[Standard]	Target	Enabled	1	meta_resource ...	VSP G1000 / 5...
☐ CL4-A	demo_hostnam...	00[Standard]	Target	Enabled	1	meta_resource ...	VSP G1000 / 5...

Total: 4

LDEV ID	LDEV Name	Parity Group ID	Pool Name (ID)	Emulation Type	Capacity	Provisioning Type	Attribute	LUN ID(4 Sets of Paths)		
								CL1-A/demo_hostnam...	CL3-A/demo_hostnam...	CL2-A/demo_hostnam...
00/01:00		-	p1_600GB1...	OPEN-V CVS	50.00 GB	DP	-	0	0	0
00/01:01		-	p1_600GB1...	OPEN-V CVS	50.00 GB	DP	-	1	1	1

Total: 2

☐ Go to tasks window for status

Select *Apply* to make the changes effective.

You will need to modify the host group in order to change any host group option. These are typical for hosts such as clusters that need special SCSI Reservation settings.

8.18.3 Updating Host Mode and Host Mode Options

The following are the Host Modes and Options for the host types used at Citi:

Operating System Type	Host Mode	Option	Array
AIX	OF		G1000, VSP, HUS-VM
AIX with VCS	OF	2, 22	G1000, VSP, HUS-VM
AIX with Oracle AMS	OF		G1000, VSP, HUS-VM
AIX with Oracle RAC & AMS	OF		G1000, VSP, HUS-VM
AIX with HACMP	OF	15	G1000, VSP, HUS-VM
AIX with VIO vSCSI	OF		G1000, VSP, HUS-VM
ESX (VMWare)	0	54, 63	G1000, VSP, HUS-VM
HP-UX	3	12	G1000, VSP, HUS-VM
HP-UX with VCS	3	2,12,22	G1000, VSP, HUS-VM
HP-UX with Oracle AMS	3	12	G1000, VSP, HUS-VM
Linux (RH)	0		G1000, VSP, HUS-VM
Linux (RH) with RHCS (Red Hat Linux Cluster)	0		G1000, VSP, HUS-VM
Linux (RH) with VCS	0	2, 22	G1000, VSP, HUS-VM
Linux (RH) with VDBE/AC for Oracle RAC	0	2	G1000, VSP, HUS-VM
Solaris with VM	9	2	G1000, VSP, HUS-VM
Solaris with VCS	9	2, 22	G1000, VSP, HUS-VM
Solaris with VDBE/AC for Oracle RAC	9	2	G1000, VSP, HUS-VM

Solaris with Oracle AMS	9	2	G1000, VSP, HUS-VM
Solaris with ZFS	9	2	G1000, VSP, HUS-VM
Solaris with Sun Cluster	9		G1000, VSP, HUS-VM
Windows	2C		G1000, VSP, HUS-VM
Windows with VCS	2C	2, 22	G1000, VSP, HUS-VM
Windows with VDBE/AC for Oracle RAC	2C	2	G1000, VSP, HUS-VM
Windows Cluster	2C		G1000, VSP, HUS-VM
Windows Cluster with Veritas Volume Mgr	2C		G1000, VSP, HUS-VM
Windows 2012 with Server Thin Provisioning	2C	73	G1000, VSP, HUS-VM

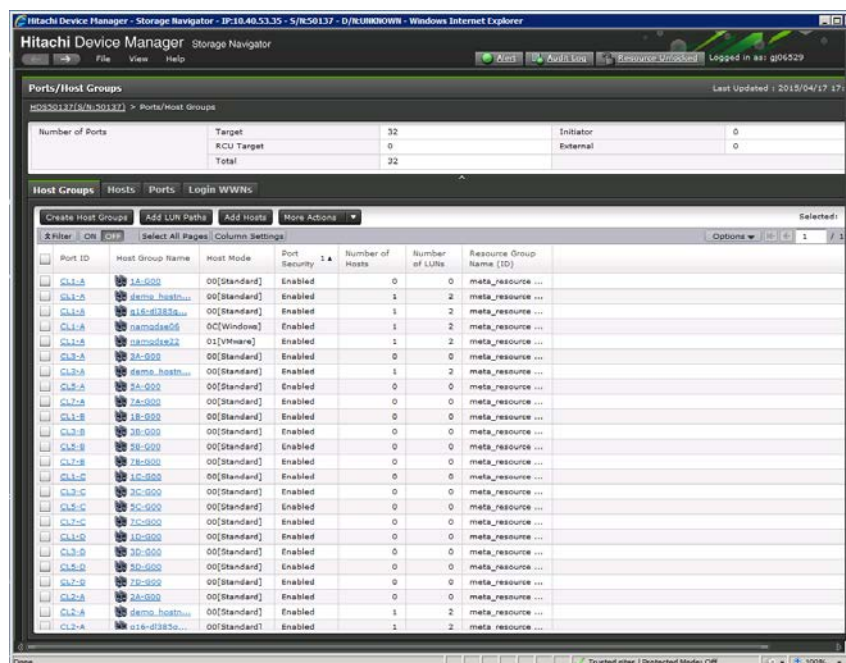
The following are all of the Host Mode Options for the G1000:

Host Mode Option	Description / Usage
02(1)	VERITAS Database Edition/ Advanced Cluster
05	AIX+HACMP, SOM 847 has to be ON before setting the HMO
06	Windows (Host Mode 0C or 2C) with EMULEX HBA & Mini port Driver with TPRLO=2 specified
07	SUN StorEdge SAN Foundation Software Version 4.2 or higher used Host Modes 00 or 09 (Solaris) allows automatic recognition function of LUN when a genuine SUN HBA is connected
12	HP Host (Host Mode 03) and you don't want to have Ghost Luns displayed
13	SIM report at Link failure – set on HDS support request
14	HP TruCluster (Host Mode 07 Tru 64) and a cluster set to each P-Vol and S-Vol of TrueCopy or Universal Replicator
15	HACMP cluster, Host Mode 0F (AIX) and version 4.5.0.4+ ,5.1.0.4+, 5.2+
20	Tru64 Boot Disk is installable (recognizable as boot device) if host mode 07 is set to on as well
22	VCS is used
33	HP host (Host Mode 03 –HP- or 05 – Open VMS-) allowing to assign a nickname to device by commands or set a UUID for host identification
39	Allows to control the host groups that will receive target reset
40	Windows (Host Mode 0C or 2C) V-Vol expansion recognized by host
41	to execute commands to recognize the device preferentially
43	HP-UX host allow Queue Full response to the host instead of Busy
49	TC Buffer to buffer credit option 1 to be used in conjunction with 50. Not applicable in case of MF Basic Hyperswap. Topology has to be point to point (Fabric OFF or ON). SOM 769 has to be OFF
50	TC Buffer to buffer credit option 2 to be used in conjunction with 49. Not applicable in case of MF Basic Hyperswap. Topology has to be point to point (Fabric OFF or ON). SOM 769 has to be OFF
51	TC single round trip set up option. Topology has to be point to point (Fabric OFF or ON). Fast Write option has to be disabled.
54	VMware VAAI, enabling XCOPY command (ESX 4 & 5)
63	VMware ESXi 5.x and use the VAAI function for T10 standards. When ON SOM 729 preferably OFF
68	Linux, Support Page Reclamation. Should be used separately with Host Mode Option 63
69	Online LUSE expansion with host notified of expansion of volume capacity
71	Change the Unit Attention for Blocked Pool-VOLs from

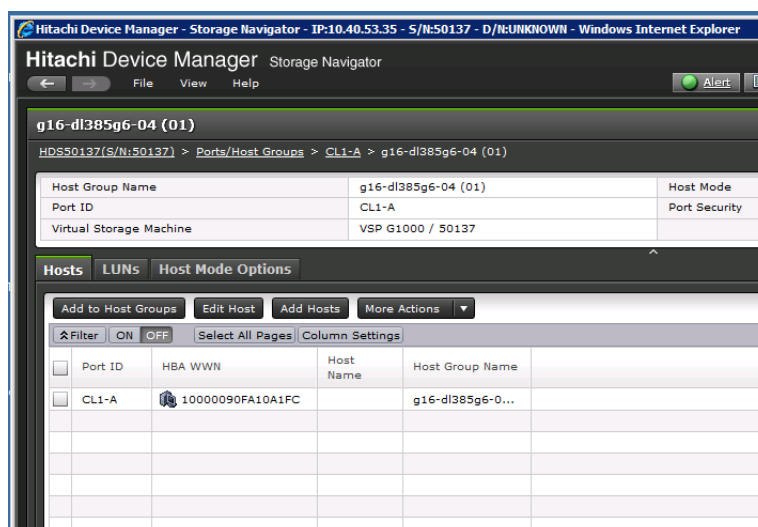
	NOT READY to MEDIUM ERROR
72	AIX GPFS Support (PGR)
73	Support the Thin Provisioning function provided by Windows Server 2012
78	HDLM preferred path option for GAD

For certain hosts, such as clustering and SCSI Reservations, you will need to modify the Host Group to enable or disable certain behavior.

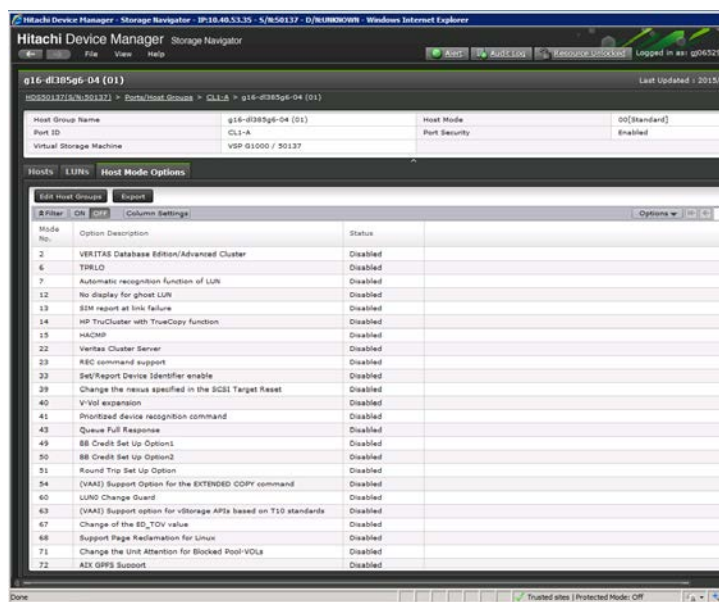
Go to *Resources* → *Ports/Host Groups* → Select *Host Groups* tab



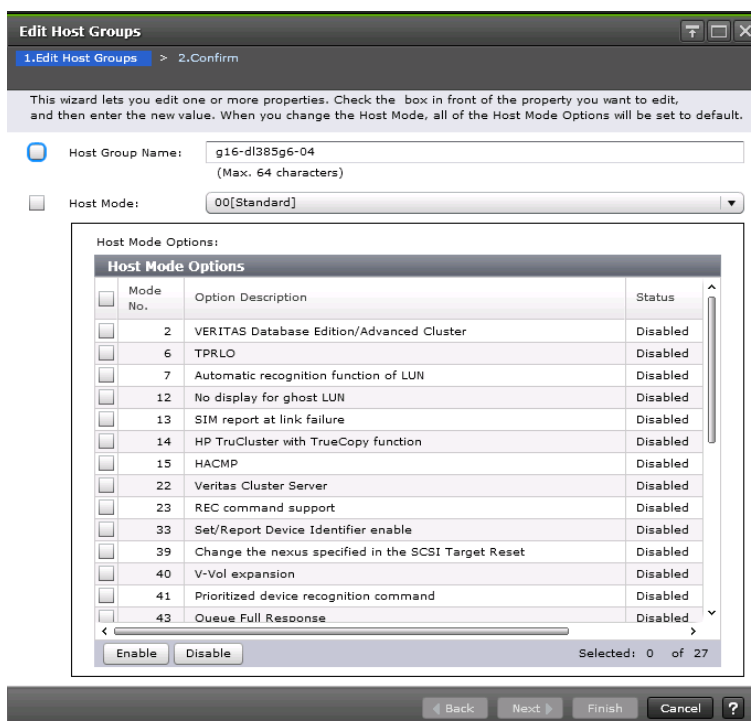
Select the host group(s) desired. Select all of the paths for a given host group (i.e. CL1-A, CL2-A, ...) to avoid repeating this step after making the change. If you use the checkbox to select more than one, then you will need to select *Edit Host Group* under *More Actions*.



Select the *Host Mode Option* tab



Enable any appropriate host mode option by selecting the *Edit Host Groups* button.



You can modify the host group name, the host mode, and the status (enabled/disabled) of each host mode option. Select Finish to create a task and to make the changes effective. You will need to repeat this for any other paths if only a single path was selected on the host group selection.

8.19 Event Notification (SNMP / Trap / Tivoli / ESS)

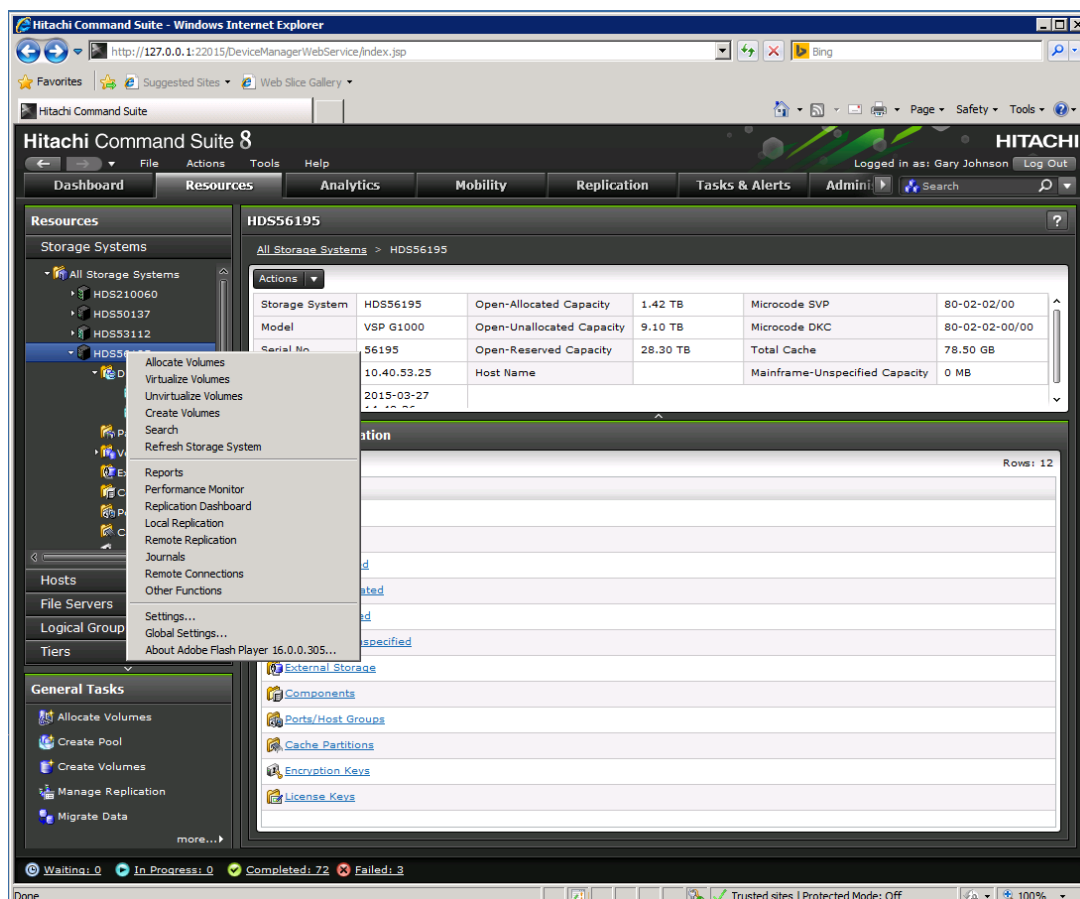
The Tivoli Monitoring system will be used to alert the Citi storage teams for component failures or threshold alerts. Tivoli alerting is setup via HCS. Traps originate from the primary SVP. For more information on setting up SNMP traps see [Setup of SNMP \(Trap / Tivoli / ESS\) Alerting](#).

8.20 Log Reconciliation (Syslog / SEMs / ArcSight)

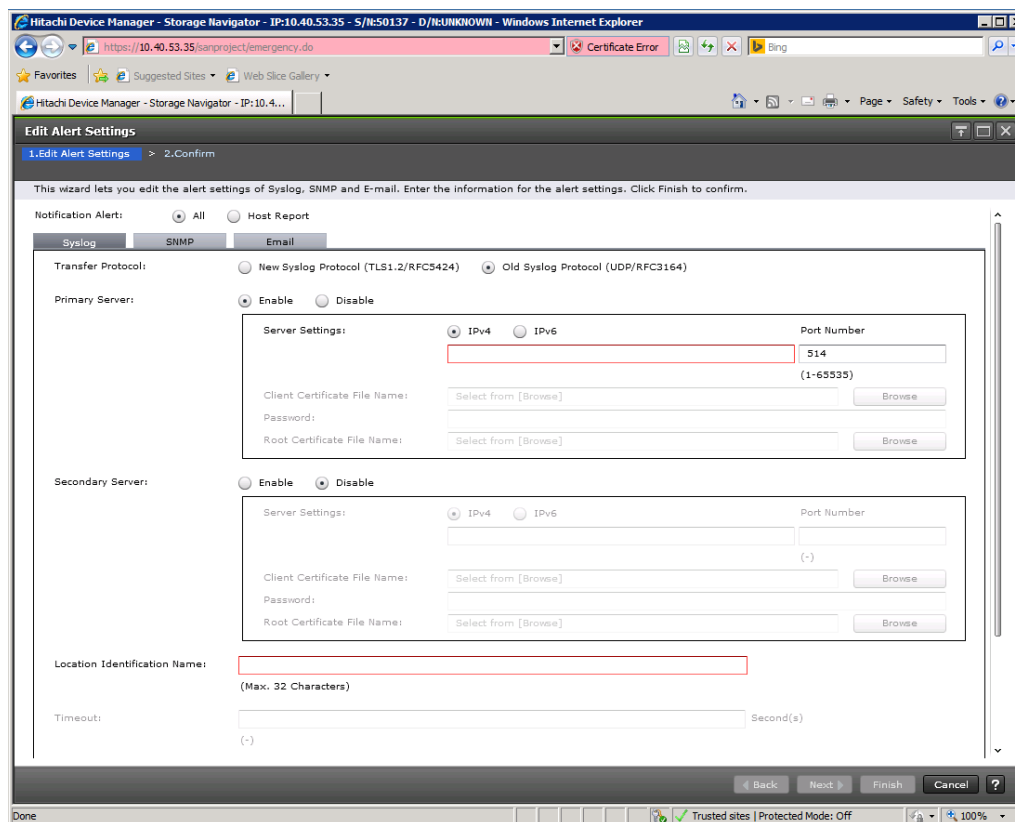
Audit log reconciliation is required for all user-initiated changes on the G1000. The audit log will be configured to send audit events to the ArcSight system via syslog protocol (port 514). These events will be parsed and reconciled once received. Audit log events originate from the primary SVP. Reports are generated on the parsed records and reviewed by the audit team.

You will need a primary and secondary syslog server IP to send the syslog messages to (via UDP port 514). Firewall rules may need to be adjusted.

Go to **Resources** → **Storage Systems** → <array desired>
Right click the array name and then select **Other Functions**.



Go to **Settings** → **Environmental Setting** → **Edit Alert Settings** → Select the **Syslog** Tab



- Transfer Protocol: Old Syslog Protocol (UDP.RFC3164)
- Primary Server: Enable
- Server Settings: IPv4 <IP of primary SEMs syslog server> 514 (Port)
- Secondary Server: Enable
- Server Settings: IPv4 <IP of secondary SEMs syslog server> 514 (Port)
- Location Identification Name: Use the array name here

Select *Finish* to confirm the change and to create a task to make the change on the array.

8.21 Automated SBCC (HPNA)

The Hewlett Packard Network Automation (HPNA) solution is used to verify that the G1000 configuration is compliant with the [HDS Standard Build Configuration Checklist](#) (SBCC). A functional ID will need to be created for HPNA and assigned the Administrator (Read Only) role to verify the G1000 configuration. Many of the items in the SBCC must be conformed manually until HDS adds functionality to RAIDCOM. Currently, HPNA uses the HDvM CLI to access HCS to gather any data on the arrays.

8.22 Chargeback Reporting (EMC ViPR SRM)

Once certified by CATE (expected end of Q2 2015), ViPR SRM will be used for chargeback reporting for G1000. ViPR SRM will utilize HCS to discover and report on the G1000 storage array. A functional ID will need to be created for ViPR SRM and assigned the Administrator (Read Only) role to gather the data.

8.23 McAfee Anti-Virus for SVP

The HDS CE will install and configure the ePO client on the primary and secondary SVP. The ePO client is automatically configured to point to the production ePO environment in each region. The CTI SAN Administration Build Team will configure the entry for the primary and secondary SVPs to be included in the correct ePO container associated with the HDS exclusion policy. VSE will be pushed to the SVPs from the ePO infrastructure by CTI SAN Admin Build Team. The following exclusion list and low-risk process list comprise the HDS Exclusion Policy:

The current exclusion list for HDS arrays is:

- C:\DKC200**.DAT
- C:\DKC200**.DBG
- C:\DKC200**.DMP
- C:\DKC200**.TRC
- D:\DAT**.DAT

Low risk processes:

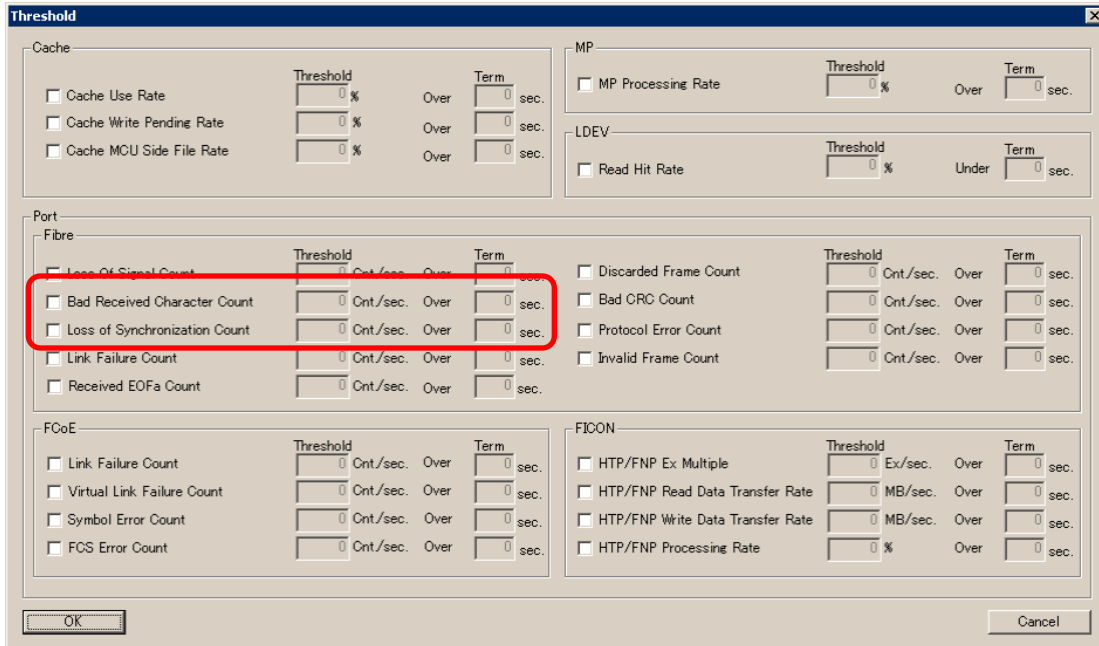
- ctfmon.exe
- svp_chk.exe

This HDS Exclusion Policy is slated for a refresh in Q2 2015.

8.24 SAN “Port Flapping” Alerting

Under special circumstances, SAN ports may exhibit multiple failures (and recoveries) over a short period of time. This condition is known as port flapping and indicates failing or failed components that generally reside outside of the array. However, it is possible to alert on these events. It is important to use conservative values to prevent frequent and unnecessary alerting.

To configure these alerts, remote session access to the SVP will be needed (RDP). This is to be configured by HDS CE/Support staff.



Threshold

Cache

	Threshold	Over	Term
☐ Cache Use Rate	0 %		0 sec.
☐ Cache Write Pending Rate	0 %		0 sec.
☐ Cache MCU Side File Rate	0 %		0 sec.

MP

	Threshold	Over	Term
☐ MP Processing Rate	0 %		0 sec.

LDEV

	Threshold	Under	Term
☐ Read Hit Rate	0 %		0 sec.

Port

Fibre

	Threshold	Over	Term
☐ Loss Of Signal Count	0 Cnt./sec.		0 sec.
☐ Bad Received Character Count	0 Cnt./sec.		0 sec.
☐ Loss of Synchronization Count	0 Cnt./sec.		0 sec.
☐ Link Failure Count	0 Cnt./sec.		0 sec.
☐ Received EOFa Count	0 Cnt./sec.		0 sec.

	Threshold	Over	Term
☐ Discarded Frame Count	0 Cnt./sec.		0 sec.
☐ Bad CRC Count	0 Cnt./sec.		0 sec.
☐ Protocol Error Count	0 Cnt./sec.		0 sec.
☐ Invalid Frame Count	0 Cnt./sec.		0 sec.

FCoE

	Threshold	Over	Term
☐ Link Failure Count	0 Cnt./sec.		0 sec.
☐ Virtual Link Failure Count	0 Cnt./sec.		0 sec.
☐ Symbol Error Count	0 Cnt./sec.		0 sec.
☐ FCS Error Count	0 Cnt./sec.		0 sec.

FICON

	Threshold	Over	Term
☐ HTP/FNP Ex Multiple	0 Ex/sec.		0 sec.
☐ HTP/FNP Read Data Transfer Rate	0 MB/sec.		0 sec.
☐ HTP/FNP Write Data Transfer Rate	0 MB/sec.		0 sec.
☐ HTP/FNP Processing Rate	0 %		0 sec.

OK Cancel

The recommended values are:

Bad Received Character Count	1000	900 secs
Loss of Synchrnization Count	1000	900 secs

These recommended values are based on observed issues at Citi. Once either threshold has been met, dial-home events will be generated. HDS will relay these events to Citi if they occur. No SIMs or SNMP traps will be generated.

9 Configuration Assurance

See section [8.1.10 Automated SBCC \(HPNA\)](#).

10 Scalability & Capacity (Array Configurations)

10.1 G1000 Single Tier Non-Replicated Arrays

There are three configurations of the G1000 used at Citi that do not utilize HDT (Dynamic Tiering). These models use the 2.5" slots exclusively (SAS only) and are considered a 'Silver' tier offering.

Summary of Configurations

Config #	Usable Capacity (TB)	Configuration Objective	Number working of disks/spares	RAID	Latency Response Rating (IOPS)	Reliability Rating (yrs)	Cache Per Chassis/Total	Number of Bays (include system bay)	IOPS Per uTB
G1000 - Single Chassis - 600GB 10K SAS 2.5" - Non Replicated									
1	98	Small	376/4	R10 2+2	49,200	TBD	160	1	502
2	199	Medium	760/6	R10 2+2	99,400	TBD	288	2	499
3	296	Large	1144/8	R10 2+2	149,700	TBD	384	3	501
4	399	XL	1528/8	R10 2+2	199,900	TBD	256/512	4	499

Notes:

Latency Response Rating: Number of IOPS sustained for a specific workload where all array components are within an operating envelope providing acceptable performance and response time. The OLTP2HW (Online transaction processing release 2-heavy write) workload was used for these configurations and 8 milliseconds was the target response time.

Reliability Rating: Equates to the thin pool failure probability which is a measure in years of the likelihood that a thin pool unavailable or data loss condition will occur due to hard drive failures. Takes into consideration MTBF, MTBR, number of disks in pool, and RAID protection.

10.1.1 #1 (Small): 98TB 1 Bay 376 x 600GB 10K SAS RAID 10

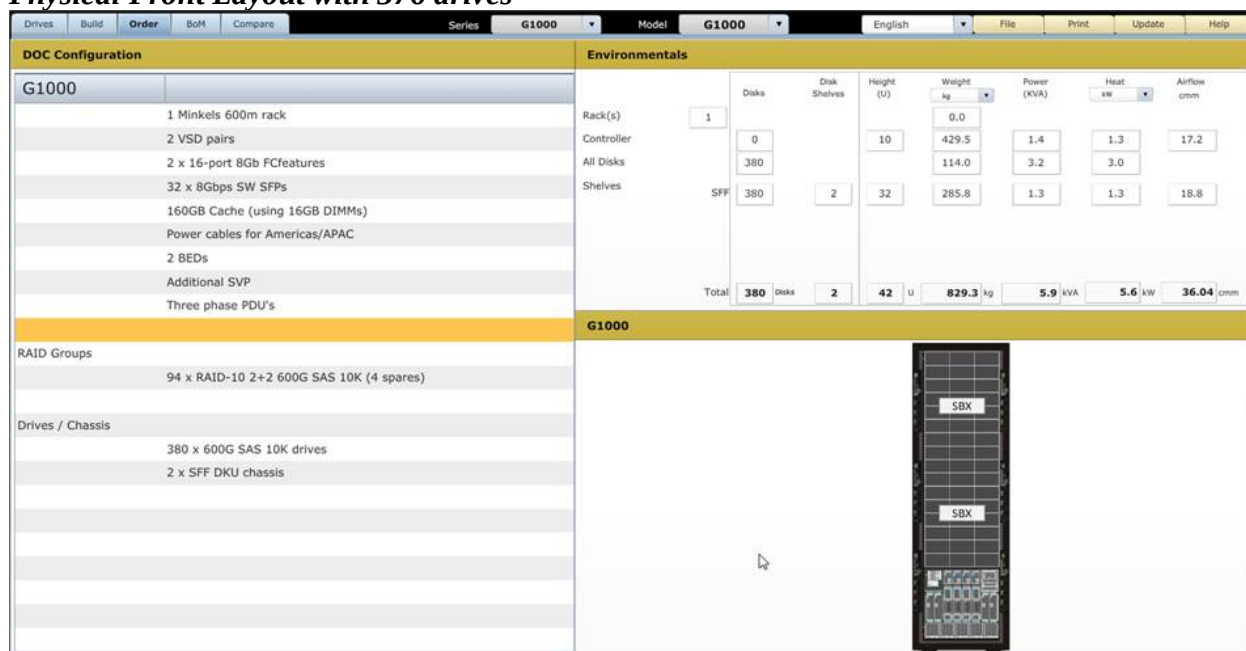
This G1000 configuration includes 2 DKU's with a single DKC chassis. The physical footprint for this option is a single rack and can grow to the larger configurations. This 98 TB configuration is targeted for medium capacity requirements. Each DKU holds up to 192 2.5" SAS drives.

Specifications

Component	Small (00)
Number working	376/4

drives/spares	
DKU x 2.5" (SSD/SAS)	2
Drive Type	600GB 10K SAS
Protection Type	RAID10 2+2
Usable Capacity in TB	98
DKC / DKU Racks	1
DKC Chassis	1
Drive Slots 2.5"	384
Cache in GB	160
BED Pairs	2
FED Ports	32
VSD Pairs	2

Physical Front Layout with 376 drives



The screenshot displays the G1000 configuration interface. On the left, the 'DOC Configuration' tab is active, showing a list of components for the G1000 model, including 1 Minkets 600m rack, 2 VSD pairs, 2 x 16-port 8Gb FC features, 32 x 8Gbps SW SFPs, 160GB Cache (using 16GB DIMMs), Power cables for Americas/APAC, 2 BEDs, Additional SVP, and Three phase PDU's. Below this, the 'RAID Groups' section shows 94 x RAID-10 2+2 600G SAS 10K (4 spares). The 'Drives / Chassis' section shows 380 x 600G SAS 10K drives and 2 x SFF DKU chassis. On the right, the 'Environmentals' tab is active, showing a table of environmental specifications for the G1000 model. The table includes columns for Rack(s), Disks, Disk Shelves, Height (U), Weight (kg), Power (KVA), Heat (kW), and Airflow (cmh). The table shows values for the G1000 model, including 1 rack, 380 disks, 2 disk shelves, 42 U height, 829.3 kg weight, 5.9 KVA power, 5.6 kW heat, and 36.04 cmh airflow. Below the table, a 3D rendering of the G1000 chassis is shown, labeled 'SBX'.

10.1.2 #2 (Medium): 199TB 2 Bay 760 x 600GB 10K SAS RAID 10

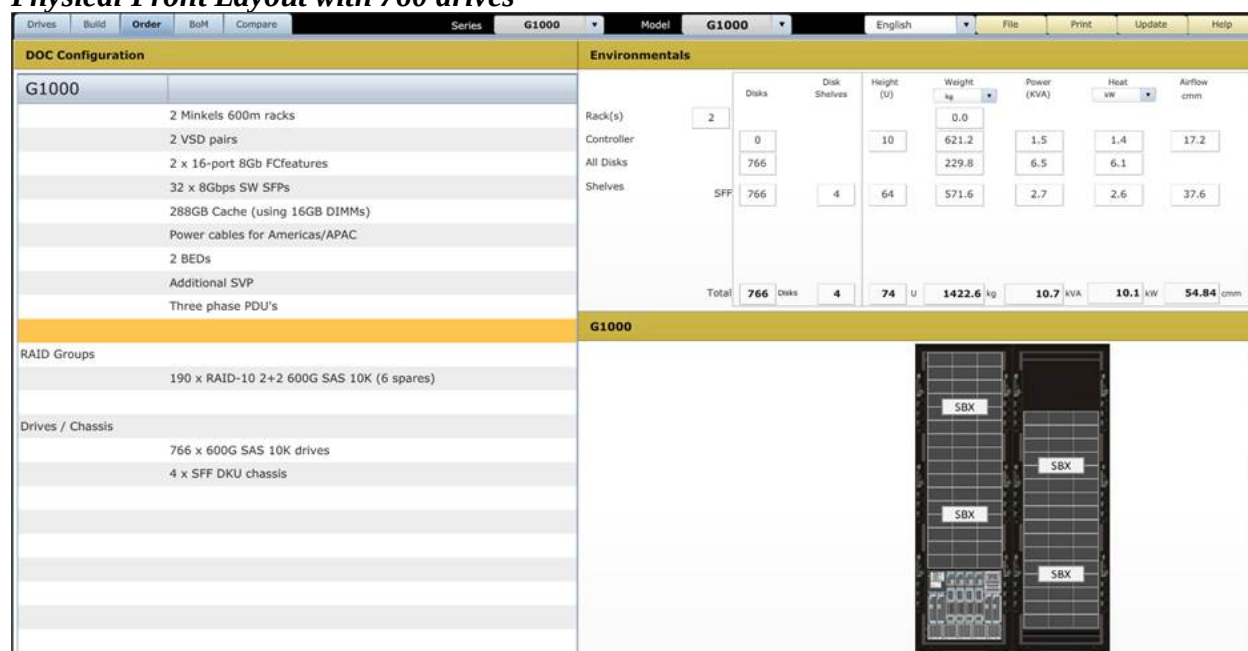
This G1000 configuration includes 4 DKU's with a single DKC chassis. The physical footprint for this option is 2 racks and could grow by one more rack. This 199TB configuration is targeted for large capacity requirements. Each DKU holds up to 192 2.5" SAS drives.

Specifications

Component	Medium (00,01)
Number working	760/6

drives/spares	
DKU x 2.5" (SSD/SAS)	4
Drive Type	600GB 10K SAS
Protection Type	RAID10 2+2
Usable Capacity in TB	199
DKC / DKU Racks	2
DKC Chassis	1
Drive Slots 2.5"	768
Cache in GB	288
BED Pairs	2
FED Ports	32
VSD Pairs	2

Physical Front Layout with 760 drives



The screenshot displays the CitiStorage configuration tool interface. The 'DOC Configuration' pane on the left lists the following components:

- 2 Minkels 600m racks
- 2 VSD pairs
- 2 x 16-port 8Gb FCfeatures
- 32 x 8Gbps SW SFPs
- 288GB Cache (using 16GB DIMMs)
- Power cables for Americas/APAC
- 2 BEDs
- Additional SVP
- Three phase PDU's

The 'Environmentals' pane on the right shows the following specifications:

	Disks	Disk Shelves	Height (U)	Weight (kg)	Power (KVA)	Heat (kW)	Airflow (cmm)
Rack(s)	2						
Controller	0		10	621.2	1.5	1.4	17.2
All Disks	766			229.8	6.5	6.1	
Shelves	SFF 766	4	64	571.6	2.7	2.6	37.6
Total	766 Disks	4	74 U	1422.6 kg	10.7 KVA	10.1 kW	54.84 cmm

The 3D rack diagram at the bottom right shows two racks, each with four shelves labeled 'SBX'.

10.1.3 #3 (Large): 299TB 3 Bay 1144 x 600GB 10K SAS RAID 10

This G1000 configuration includes 6 DKU's with a single DKC chassis. The physical footprint for this option is 3 racks and should not grow. This 299TB configuration is targeted for the largest capacity requirements. Each DKU holds up to 192 2.5" SAS drives.

Specifications

Component	Large (00,01,02)
Number working	1144/8

drives/spares	
DKU x 2.5" (SSD/SAS)	6
Drive Type	600GB 10K SAS
Protection Type	RAID10 2+2
Usable Capacity in TB	299
DKC / DKU Racks	3
DKC Chassis	1
Drive Slots 2.5"	1152
Cache in GB	384
BED Pairs	2
FED Ports	32
VSD Pairs	2

Physical Front Layout with 1144 drives

DOC Configuration		Environmentals								
G1000	3 Minkels 600m racks 2 VSD pairs 2 x 16-port 8Gb FCfeatures 32 x 8Gbps SW SFPs 384GB Cache (using 32GB DIMMs) Power cables for Americas/APAC 2 BEDs Additional SVP Three phase PDU's	Rack(s)	3							
		Controller			10		806.5	1.4	1.4	17.2
		All Disks	1152				345.6	9.8	9.2	
		Shelves	SFF 1152	6	96		857.4	4.0	3.8	56.4
		Total	1152 disks	6	106 U		2009.5 kg	15.3 kVA	14.4 kW	73.64 cmh
		G1000								
RAID Groups	286 x RAID-10 2+2 600G SAS 10K (8 spares)									
Drives / Chassis	1152 x 600G SAS 10K drives 6 x SFF DKU chassis									

These models maximize the slot and floor space available to the array. Adherence to these models is recommended.

10.1.4 #4 (XL): 399TB 3 Bay 1144 x 600GB 10K SAS RAID 10

This G1000 configuration includes 8 DKU's with a dual DKC chassis. The physical footprint for this option is 4 racks and should not grow. This 399TB configuration is targeted for the largest capacity requirements. Each DKU holds up to 192 2.5" SAS drives.

Specifications

Component	X-Large (00,01,02,03)
Number working drives/spares	1528/8
DKU x 2.5" (SSD/SAS)	8
Drive Type	600GB 10K SAS
Protection Type	RAID10 2+2
Usable Capacity in TB	399
DKC / DKU Racks	4
DKC Chassis	2
Drive Slots 2.5"	1536
Cache in GB	512
BED Pairs	2
FED Ports	64
VSD Pairs	2

Physical Front Layout with 1528 drives

[illegible]

These models maximize the slot and floor space available to the array. Adherence to these models is recommended.

10.2 G1000 Multi-Tier Non-Replicated Arrays

The use of multiple tiers within the same storage pool is not yet a certified feature at Citi (expected 2015).

10.3 G1000 Single Tier Replicated Arrays

The use of replication (Hitachi Universal Replicator / True Copy) is not yet a certified feature at Citi (expected 2015).

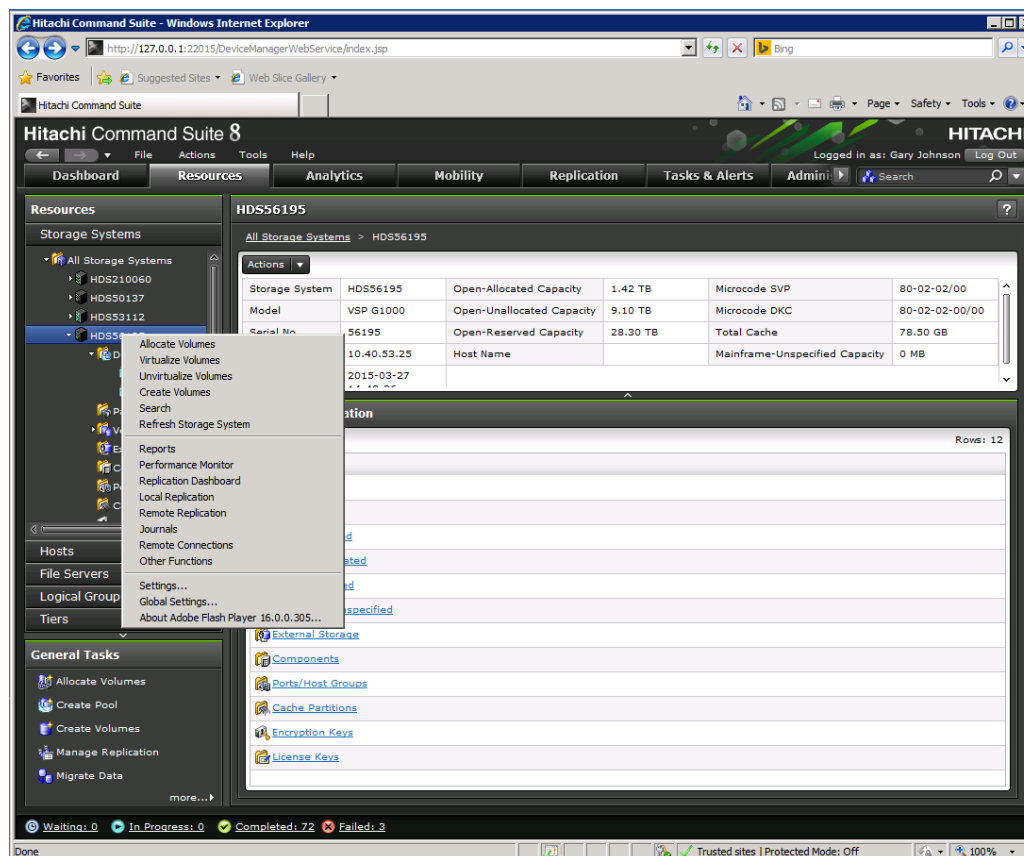
11 Availability Management

The G1000 will be integrated with Tivoli for alerting Citi Storage operations teams. Hi-Track software on the SVP will be used for vendor (HDS) remote alerting and email alerting to CTI. HCS is also used for email alerting. RACC software on the SVP will be used for vendor (HDS) remote support (dial-in).

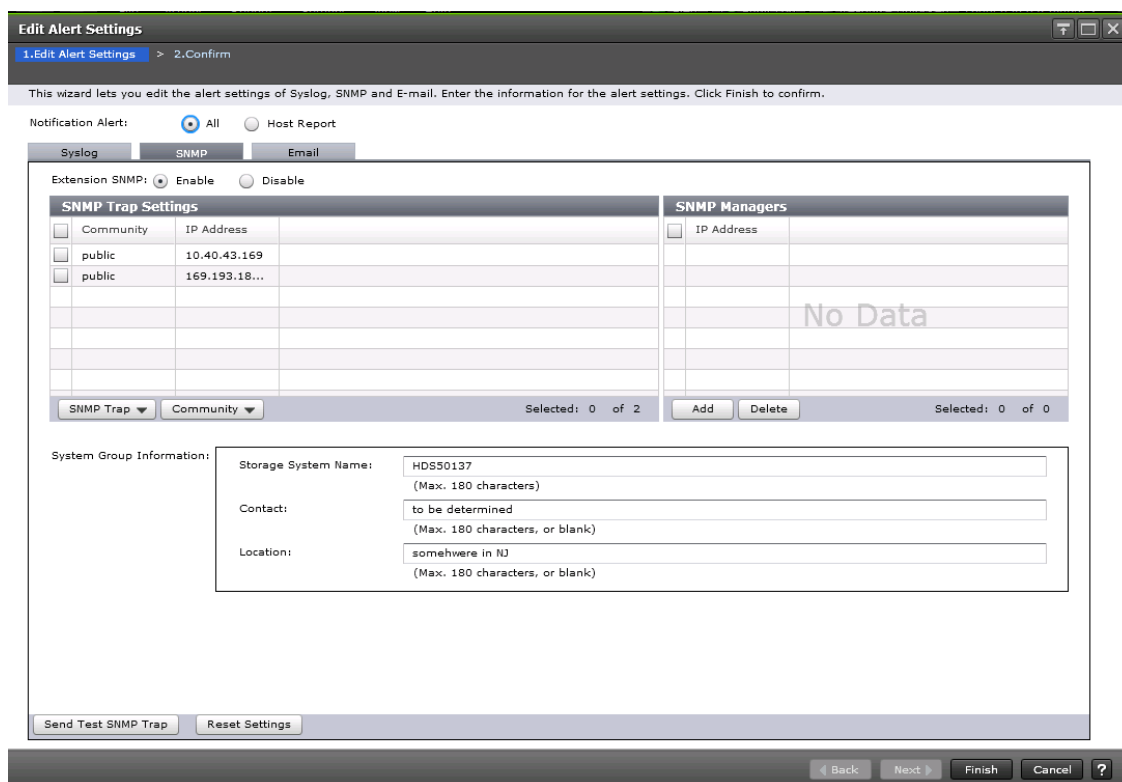
11.1 Setup of SNMP (Trap / Tivoli / ESS) Alerting

Go to *Resources* → *Storage Systems* → <array desired>

Right click the array name and then select *Other Functions*.



Go to *Settings* → *Environmental Setting* → *Edit Alert Settings* → Select the *SNMP* tab



- Notification Alert: All (This is a critical setting)
- Storage System Name: Should be the same as the Array Name provided in HCS
- Contact: This data does not show up in Trap
- Location: This data does not show up in Trap
- Create a community by selecting the Community button (Add): public
- Create a SNMP Trap server by selecting the SNMP Trap button (Add): <IP of each Trap Server>

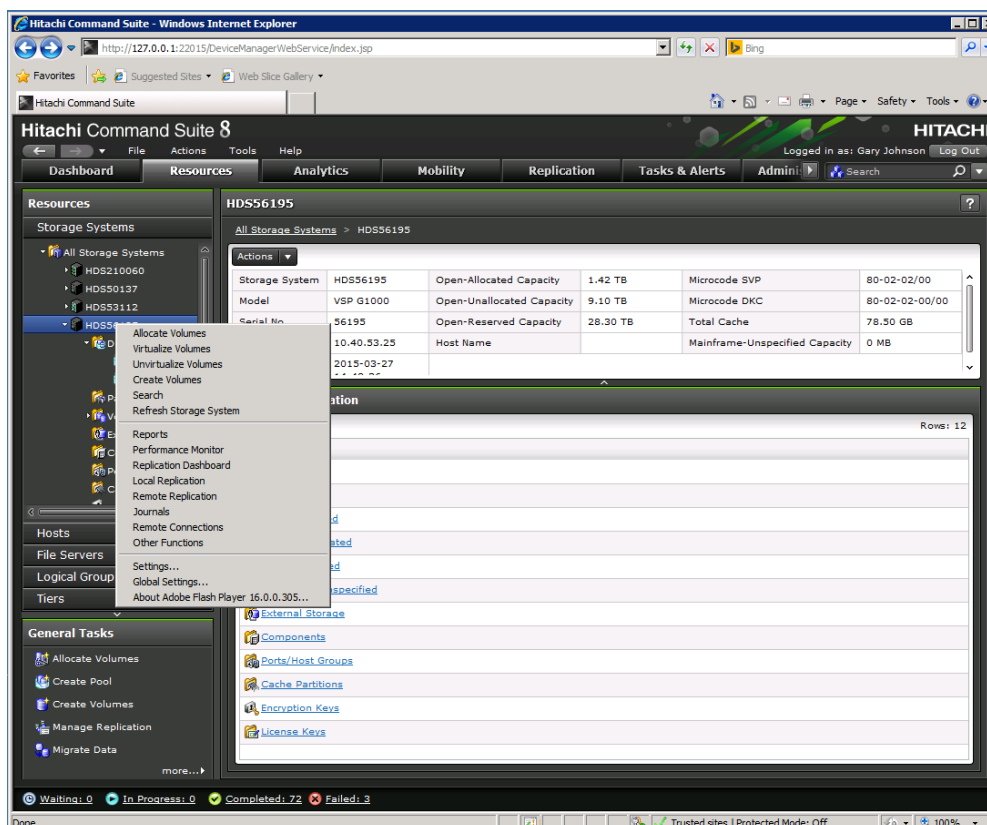
The following is an example trap (FAN Warning):

Date	Time	Priority	Hostname	Message
03-25-2015	12:50:46	Local7.Debug	10.40.53.35	community=public, enterprise=1.3.6.1.4.1.116.3.11.4.1.1, uptime=18315, agent_ip=10.40.53.35, generic_num=6, specificTrap_num=3, specificTrap_name=eventTrapREFCODE, version=Ver1, 1.3.6.1.4.1.116.5.11.4.2.1=50137, 1.3.6.1.4.1.116.5.11.4.2.2=RAID800, 1.3.6.1.4.1.116.5.11.4.2.3=BF7611, 1.3.6.1.4.1.116.5.11.4.2.4=1.3.6.1.4.1.116.5.11.4.1.1.6.1.8, 1.3.6.1.4.1.116.5.11.4.2.5=2015/03/25, 1.3.6.1.4.1.116.5.11.4.2.6=12:53:06, 1.3.6.1.4.1.116.5.11.4.2.7="DKCFAN warning"

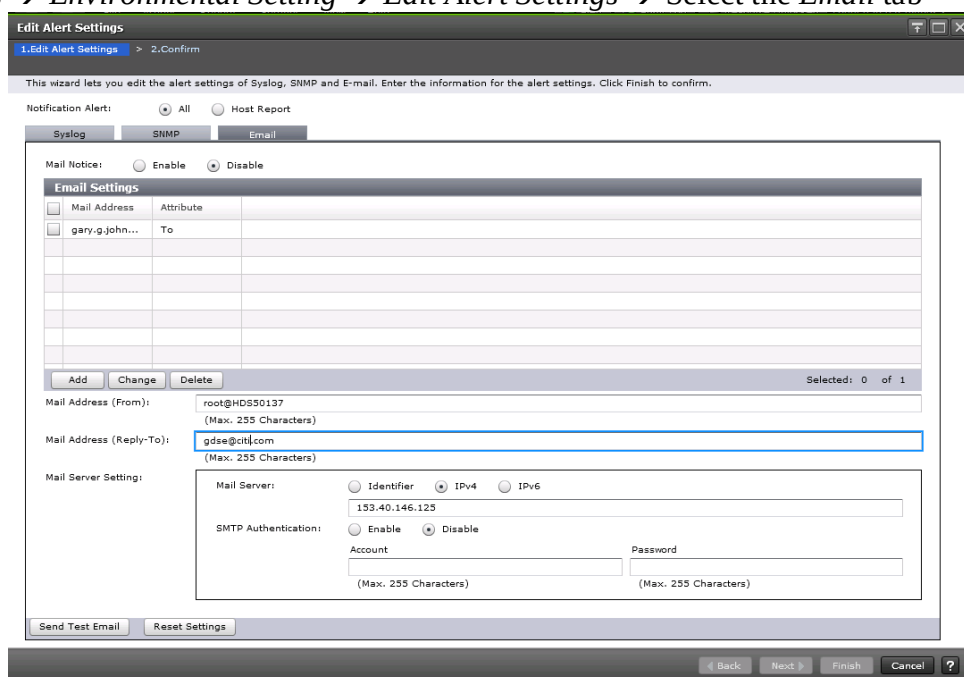
11.2 Setup of Email Alerting (HCS)

This email alerting comes from the SVP. Access to any email server will likely depend on firewall rules.

Go to *Resources* → *Storage Systems* → <array desired>
Right click the array name and then select *Other Functions*.



Go to *Settings* → *Environmental Setting* → *Edit Alert Settings* → Select the *Email* tab



- Mail Address(From): root@array_svp_hostname

- Mail Address(Reply-To): should be a valid email address (some email servers require this)
- Mail Server Setting: IPv4 <IP of Email Server> or IP based Round-Robin of Email Servers
- SMTP Authentication : Disabled

Select the *Test Email* button. If successful, then save the settings by selecting the Finish button to create a task that will make the changes effective. The following is a sample email:

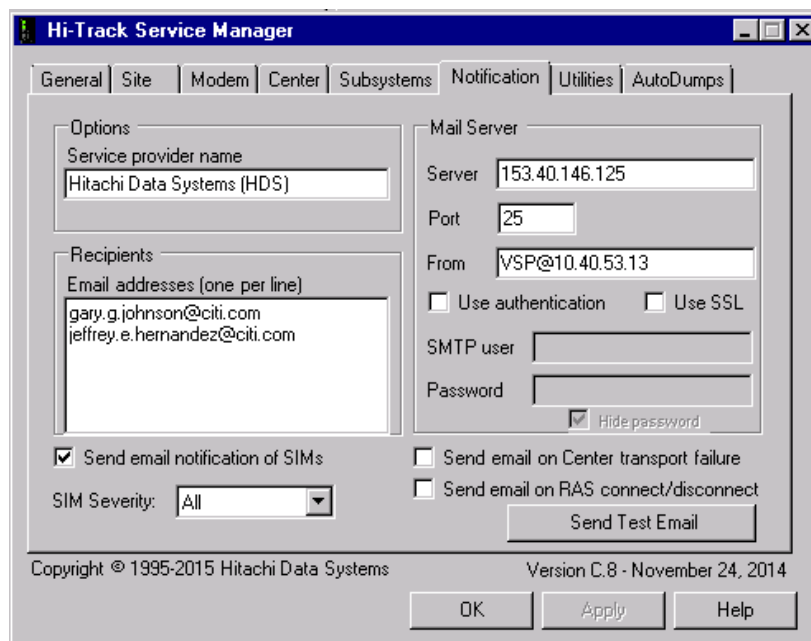
From: root@HDS50137.nam.nsroot.net [mailto:root@HDS50137.nam.nsroot.net]
Sent: Monday, March 30, 2015 4:42 PM
To: Johnson, Gary G [CCC-OT]
Subject: HDS50137 Report

DATE : 03/30/2015
TIME : 17:44:02
Machine : HDS50137(Serial# 50137)
RefCode : 7FFFFFFF
Detail : This is Test Report

11.3 Setup of Email Alerting (Hi-Track)

This email alerting comes from the SVP and is the best source of email alerting. Access to any email server will likely depend on firewall rules. Hi-Track is the dial-home application that resides on the SVP. It has the capability to send home alerts and performance data. In addition, it has the capability to send an email alert when it alerts HDS with similar information.

Hi-Track email alerting is in addition to the HCS configuration. This should be configured by the CE as it requires RDP access to the SVP. The following screenshot from Hi-Track is presented as a guideline:



The server and port should be the same as the values entered on the HCS Email Alerting screen. The email addresses can be a distribution list, but need to be in the external format xyz@citi.com (or similar). The “From” address is variable, so system-name@ipaddress is recommended. This Hi-Track Email alerting is by far the most reliable method and visible to the SAN administrators. The following is an example alert from Hi-Track:

From: VSP@10.40.53.13 [mailto:VSP@10.40.53.13]
 Sent: Monday, March 30, 2015 11:29 AM
 To: Johnson, Gary G [CCC-OT]
 Subject: Hi-Track message from site R054665 (Citigroup).

This is a test email sent from the Hitachi Data Systems (HDS) Hi-Track Site Manager at the site referenced in the subject line above.

12 Regional or Merger Partner Consideration

None

13 Global Standard

The G1000 uses role-based access control to ensure that only authorized hosts and users can access the system for management. Users are authenticated to the management systems using Active Directory on the HCS management server for G1000.

14 Relevant Links

Document/Web Site	Location
CSBE HDS Array Website	https://catecollaboration.citigroup.net/domains/platstor/gdse/products/techstdshmpgs/tagmastore.aspx
CSBE G1000 Configuration Guide	https://catecollaboration.citigroup.net/domains/platstor/gdse/products/platforms/Tagmastore/CSBE-14073-SG.pdf
Citi Information Security Standards (CISS)	https://technology.home.citi.net/sites/itpolicylib/docs/CISS.pdf
HDS G1000 Hardware User Guide (Site Prep)	http://www.hds.com/assets/pdf/virtual-storage-platform-g1000-hardware-guide-80-01-2x.pdf

15 Appendices

15.1 Appendix A: Firewall Rules

The G1000 resides in a CEP/DMZ to isolate it from the Citigroup GRN. In order to function properly, there must be firewall rules in place to allow for the array to communicate with The following is a summary of the firewall rules required for the G1000

Description	Type	Port	Protocol
HCS to SVP	TCP	1099	
	TCP	51099	
	TCP	21	FTP
	TCP	51100	
SVP to HCS	TCP	2001	Physical View
	UDP	161	SNMP
	UDP	162	SNMP
	TCP	51099	
	TCP	51100	
Device Manager CLI (HCS CLI)	TCP	2001	Does not go through firewall
RAIDCOM/CCI for Replication		User Config	Does not go through firewall
HCS to SVP (SN Client)	TCP	80	HTTP
	TCP	443	HTTPS
	TCP	21	FTP
	TCP	1099	
	TCP	51099	
	TCP	51100	
HCS RD to SVP (for emergencies)	TCP	3389	MS-RDP
HDS Dial Home	TCP	8080	HTTPS Application Proxy
	TCP UDP	53	DNS
Audit Records to External Syslog Server	UDP	514	Syslog
SVP to SNTP	UDP	123	SNTP
SVP to ePO	TCP	18080	
	TCP	18083	
	TCP	18085	
	TCP	8801	

ePO to SVP	TCP	18081	
	TCP	18082	
	TCP	18443	New Port
ESS/Tivoli/SNMP to SVP	UDP	161	SNMP
SVP to ESS/Tivoli/SNMP	UDP	162	SNMP

15.2 Appendix B: Configuration of HTnM Agent for RAID (AFR)

The Tuning Manager (HTnM) Agent for RAID (AFR) collects performance data from the array fiber fiber channel and sends it back to the HCS server for data reporting. This agent requires that a command device be allocated to the agent server from every array that needs to be included in HTnM performance reporting.

15.2.1 HTnM AFR for RHEL

The following are the steps required to setup the HTnM AFR on a RHEL server:

1. Update/install the RAID Manager Library (RMLIB). Run the following CPIO command to extract the files to the desired location. It will force a destination directory name of RMLIB, so initiate the CPIO extract from the /opt directory.

```
[root@namgdse04 opt]# cpio -idmu <
/net/stealth/export1/home1.localhost/sw/PKG/HDS_TMEA_970b11/Linux/RMLIB_01-19-03
1999 blocks
[root@namgdse04 opt]# cd RMLIB
[root@namgdse04 RMLIB]# ls
bin include lib RLSYSLK rmlibinstall.sh rmlibuninstall.sh sample
[root@namgdse04 RMLIB]# ls -al
total 32
drwxr-xr-x  6 root sys  4096 Nov 26 12:43 .
drwxr-xr-x 49 root root 4096 Mar 23 18:32 ..
drwxr-xr-x  2 root sys  4096 Nov 26 12:43 bin
drwxr-xr-x  2 root sys  4096 Nov 26 12:43 include
drwxr-xr-x  2 root sys  4096 Nov 26 12:43 lib
-rw-rw-rw-  1 root root    0 Dec  3 2013 PARALLEL_RLSYSLK
-rw-r--r--  1 root root    0 Sep 26 2013 RLSYSLK
-rw-r--r--  1 root root    0 Dec  3 2013 RLSYSLK_5000274C
-rw-r--r--  1 root root    0 Dec  3 2013 RLSYSLK_50002776
-rw-r--r--  1 root root    0 Dec  3 2013 RLSYSLK_5000CF78
-rw-r--r--  1 root root    0 Nov 25 16:14 RLSYSLK_5030DB83
-r-xr-xr-x  1 root sys  4006 Jan  5 2014 rmlibinstall.sh
-r-xr-xr-x  1 root sys  3284 Jan  5 2014 rmlibuninstall.sh
drwxrwxrwx  2 root sys  4096 Nov 26 12:43 sample
```

Run /opt/RMLIB/rmlibinstall.sh after the setup to make sure the symbolic link is in place.

```
[root@namgdse04 RMLIB]# rmlibinstall.sh
The symbolic link of '/usr/lib/libsvrrm.so' was successful.

If previously run:
[root@namgdse04 RMLIB]# ./rmlibinstall.sh
The symbolic link of '/usr/lib/libsvrrm.so' was successful.
The symbolic link of '/lib64/libsvrrm.so' was successful.
In: creating symbolic link `/usr/lib/RMLIB/bin/whatrmver' to `/usr/lib/RMLIB/bin/whatrmverx64':
File exists
```

To verify the symbolic links are functional and that RMLIB is working, run the version command (/opt/RMLIB/bin/whatrmver):

```
[root@namgdse04 bin]# cd /opt/RMLIB/bin
[root@namgdse04 bin]# ./whatrmver
Model :RAID-Manager/LIB/Linux
Ver&Rev:01-19-03/00
```

RMLIB 01-19-03 is the minimum version required for communication with G1000 arrays.

You can uninstall the software by running `rmlibuninstall.sh` from the `/opt/RMLIB` directory.

2. Install or upgrade the HTnM AFR:

```
Package example for /net/stealth/export1/home1.localhost/sw/PKG/HTnM_AFR_810

[root@namgdse04 /]# /bin/sh
sh-4.1# pwd
/
sh-4.1# /net/stealth/export1/home1.localhost/sw/PKG/HTnM_AFR_810/install.sh
Begin installation of Hitachi Tuning Manager - Agent for RAID - 8.1.0(8.1.0-00)
Support OS: Linux x86/x64
Mon Mar 23 17:41:25 EDT 2015
> A current version [xxxxxx]
> A premise version [101022]
> Install version ok [ 074000 -> 081000 ]
> Agent Common Component version ok [ 074000 -> 081000 ]
> Shutdown all Tuning Manager processes.
The service will now stop.
KAVE06008-I The service will now stop. (service=Agent for RAID, inst=53112)
KAVE06008-I The service will now stop. (service=Agent Store for RAID, inst=53112)
KAVE06008-I The service will now stop. (service=Agent for RAID, inst=210060)
KAVE06008-I The service will now stop. (service=Agent Store for RAID, inst=210060)
KAVE06008-I The service will now stop. (service=Action Handler)
KAVE06008-I The service will now stop. (service=Status Server)
> /opt/jp1pc/tools/jpcstop: Completed.
Installing The Common Files.
Preparing... ##### [100%]
1:HTMRaid ##### [100%]
> #####
> # : RAID Agent for Linux
> # Script starts: after installation script
> # date: Mon Mar 23 18:31:33 EDT 2015
> mkdir /opt/jp1pc/jp1pc_AGDTMP: Completed.
./
./opt/
./opt/jp1pc/
./opt/jp1pc/tools/
./opt/jp1pc/tools/jpctminfo
./opt/jp1pc/tools/jpctdlstraid
./opt/jp1pc/tools/jpctdchkinst
./opt/jp1pc/tools/jpctdrefresh
./opt/jp1pc/setup/
./opt/jp1pc/setup/extract/
./opt/jp1pc/setup/update/
./opt/jp1pc/setup/update/jpccomm.ini.update
./opt/jp1pc/setup/jpcagtdw.exe
./opt/jp1pc/setup/jpcagtdu.Z
./opt/jp1pc/agtd/
./opt/jp1pc/agtd/agent/
<lines were removed from this output to shrink documentation>
/opt/jp1pc/./agtd/store/jpcsto.ini.instmpl
/opt/jp1pc/./agtd/store
/opt/jp1pc/./agtd/nls/C/jpcagtdmsg.cat
/opt/jp1pc/./agtd/nls/C
/opt/jp1pc/./agtd/nls/ja_JP.UTF-8/jpcagtdmsg.cat
```

```

/opt/jp1pc/./agtd/nls/ja_JP.UTF-8
/opt/jp1pc/./agtd/nls/ja_JP.eucJP/jpcagtdmsg.cat
/opt/jp1pc/./agtd/nls/ja_JP.eucJP
/opt/jp1pc/./agtd/nls/ja_JP.utf8
/opt/jp1pc/./agtd/nls/ja_JP.ujis
/opt/jp1pc/./agtd/nls
/opt/jp1pc/./agtd/insrules.dat
/opt/jp1pc/./agtd/patch_history
/opt/jp1pc/./agtd/PATCHLOG.TXT
/opt/jp1pc/./agtd/pplistd
/opt/jp1pc/./agtd/jpcagtras
/opt/jp1pc/./agtd/jpcagtcfgbackup
/opt/jp1pc/./agtd/agent/inssetup
/opt/jp1pc/./agtd/uninstall.sh
/opt/jp1pc/./agtd
/opt/jp1pc/./instagtd.ini
50071 blocks
> cpio: IndividualFiles Completed.
/opt/jp1pc/./tools/jpctminfo
57 blocks
> cpio: HTM-CommonFiles Completed.
> Remove temporary PP files: /bin/rm -rf /opt/jp1pc/jp1pc_AGDTMP
# /opt/jp1pc/tools/jpcagtsetup agtd -s
> jpcagtsetup: Completed.
> /opt/jp1pc/bin/jpciniupdate: Execution completed.
> /opt/jp1pc/bin/jpciniupdate: Execution completed.
> /opt/jp1pc/bin/jpciniupdate: Execution completed.
# /bin/rm -f /opt/jp1pc/setup/update/jpccomm.ini.update
> Completed.
# /bin/rm -f /opt/jp1pc/setup/update/jpccomm.ini.update.lck
> Completed.
> PROPID : D
> /bin/chmod: Change Agent File Permission(prodid=d)
> Change Agent File Permission: Completed.
> # Script completed: after installation script
> #####
Start IPv6 Setup.
KAVE05932-I The function for IPv6 communication will now be set up. (enable)
KAVE05933-I The function for IPv6 communication was successfully set up. (enable)
End IPv6 Setup.
Mon Mar 23 18:33:54 EDT 2015
Done installing Hitachi Tuning Manager - Agent for RAID.

```

3. Confirm the utilities are present:

```

[root@namgdse04 tools]# ls /opt/HTnM/tools
jpcagtsetup  jpchasetup  jpcnsconfig  jpcspm  jpctdlistraid
jpcfcgbackup jpcimevt    jpcnshostname jpcstart jpctdrefresh
jpcconf      jpcinslist  jpcparamdump jpcstop  jpctminfo
jpcctrl      jpcinssetup jpcras       jpcstsetup jpctool
jpcdbctrl    jpcinsunset jpcresto     jpctdchkinst log

```

4. List the HDS devices masked to this server.

```

[root@namgdse04 tools]# ./jpctdlistraid
KAVF18700-I The detection of the monitorable storage system has begun.
"PRODUCT"      , "SERIAL"    , "LDEV"      , "SLPR"    , "PORT"    , "DEVICE_FILE"
"VSP"          , "53112"     , "00:3E:16" , ""        , "CL1-A"   , "/dev/sda"
"VSP"          , "53112"     , "00:3E:19" , ""        , "CL1-A"   , "/dev/sde"
"VSP"          , "53112"     , "00:3E:17" , ""        , "CL1-A"   , "/dev/sdb"
"VSP"          , "53112"     , "00:3E:18" , ""        , "CL1-A"   , "/dev/sdc"
"VSP G1000"    , "56195"     , "00:3E:00" , ""        , "CL1-A"   , "/dev/sdl"
"VSP G1000"    , "56195"     , "00:3E:01" , ""        , "CL1-A"   , "/dev/sdm"
"VSP G1000"    , "56195"     , "00:3E:02" , ""        , "CL1-A"   , "/dev/sdn"
"HUS VM"       , "10060"     , "00:01:FC" , ""        , "CL1-A"   , "/dev/sdq"
"HUS VM"       , "10060"     , "00:01:68" , ""        , "CL1-A"   , "/dev/sdo"
"VSP"          , "53112"     , "00:3E:16" , ""        , "CL2-A"   , "/dev/sdr"
"HUS VM"       , "10060"     , "00:01:69" , ""        , "CL1-A"   , "/dev/sdp"
"VSP"          , "53112"     , "00:3E:19" , ""        , "CL2-A"   , "/dev/sdv"

```

```
"VSP"           , "53112"      , "00:3E:18", ""      , "CL2-A", "/dev/sdt"
"VSP"           , "53112"      , "00:3E:17", ""      , "CL2-A", "/dev/sds"
"VSP G1000"     , "56195"      , "00:3E:00", ""      , "CL2-A", "/dev/sdw"
"VSP G1000"     , "56195"      , "00:3E:02", ""      , "CL2-A", "/dev/sdy"
"VSP G1000"     , "56195"      , "00:3E:01", ""      , "CL2-A", "/dev/sdx"
"HUS VM"        , "10060"      , "00:01:68", ""      , "CL2-A", "/dev/sdz"
"HUS VM"        , "10060"      , "00:01:69", ""      , "CL2-A", "/dev/sdaa"
"HUS VM"        , "10060"      , "00:01:FC", ""      , "CL2-A", "/dev/sdab"
KAVF18701-I The detection of the monitorable storage system has ended.
```

5. Find the listed device by its SCSI or WWN name for persistence.

```
[root@namgdse04 tools]# ls -al /dev/disk/by-id | grep "3e01"
lrwxrwxrwx 1 root root 9 Mar 23 18:40 scsi-360060e8007db83000030db8300003e01 -> ../../sdx
lrwxrwxrwx 1 root root 9 Mar 23 18:40 wwn-0x60060e8007db83000030db8300003e01 -> ../../sdx
```

6. Start the setup for the G1000 array

```
[root@namgdse04 tools]# ./jpcinssetup agtd -inst 56195
Storage Model (1:HUS100/AMS 2:VSP G1000/VSP/USP V/HUS VM) : 2
Command Device File Name [/dev/sda] : scsi-360060e8007db83000030db830000^C
[root@namgdse04 tools]# ./jpcinssetup agtd -inst 56195
Storage Model (1:HUS100/AMS 2:VSP G1000/VSP/USP V/HUS VM) : 2
Command Device File Name [/dev/sda] : /dev/disk/by-id/scsi-
360060e8007db83000030db8300003e01
Unassigned Open Volume Monitoring (Y/N) [N] : Y
Mainframe Volume Monitoring (Y/N) [N] : N
Store Version [2.0] :
KAVE05080-I The instance environment is now being created. (servicekey=RAID, inst=56195)
KAVE05081-I The instance environment has been created. (servicekey=RAID, inst=56195)
```

7. Verify the instance exists.

```
[root@namgdse04 tools]# ./jpcinslist agtd
56195
```

8. Verify the instance communication is valid.

```
[root@namgdse04 tools]# ./jpctdchkinst -inst 56195
KAVF18800-I The verification of the agent instance settings will now start. (instance name=56195)
[Instance parameters]
Storage Model : VSP G1000/VSP/USP V/HUS VM
Command Device File Name : /dev/disk/by-id/scsi-360060e8007db83000030db8300003e01
Unassigned Open Volume Monitoring : Y
Mainframe Volume Monitoring : N
[Check result]
KAVF18850-I No error was found during verification of the agent instance setting.
[Monitored storage system information]
PRODUCT : VSP G1000
SERIAL : 56195
FIRMWARE : 80-02-02/00
KAVF18801-I The verification of the agent instance settings will now end.
```

9. Verify the location of the HTnM server. Point (or redirect) it to the correct server if needed.

```
[root@namgdse04 tools]# ./jpcnshostname
i10-hds-vm03
[root@namgdse04 tools]# ./jpcnshostname -s i10-hds-vm04
KAVE05089-Q Running services will be forcibly terminated. Do you want to continue? (Y/N)Y
KAVE05090-I Service is stopped.
KAVE05087-I The connecting host has changed. (i10-hds-vm03 -> i10-hds-vm04)
```

10. List the agent processes. Each valid array instance will have a Agent Store and Agent Collector.

```
[root@namgdse04 tools]# ./jpcctrl list ""
```

Host Name	ServiceID	Service Name	PID	Port	Status
namgdse04	PT1namgdse04	Status Server			Inactive*
namgdse04	PH1namgdse04	Action Handler			Inactive*

```

namgdse04      DS153112[namgdse04] Agent Store      Inactive*
namgdse04      DS1210060[namgdse04] Agent Store      Inactive*
namgdse04      DA153112[namgdse04] Agent Collector   Inactive*
namgdse04      DA1210060[namgdse04] Agent Collector   Inactive*
KAVE06021-W The detailed information cannot be displayed because Status Server is not running.
(host=namgdse04)
KAVE06003-I List processing of the service information terminated normally.

```

11. Start all of the agent processes.

```

[root@namgdse04 tools]# ./jpcstart all
KAVE06007-I The service will now start. (service=Status Server)
KAVE06007-I The service will now start. (service=Action Handler)
KAVE06007-I The service will now start. (service=Agent Store for RAID, inst=56195)
KAVE06007-I The service will now start. (service=Agent for RAID, inst=56195)

[root@namgdse04 tools]# ./jpcctrl list "*"

```

Host Name	ServiceID	Service Name	PID	Port	Status
namgdse04	PT1namgdse04	Status Server	18000	22350	Active
namgdse04	PH1namgdse04	Action Handler	18011	40325	Active
namgdse04	DS153112[namgdse04]	Agent Store			Inactive
namgdse04	DS1210060[namgdse04]	Agent Store			Inactive
namgdse04	DS156195[namgdse04]	Agent Store	18023	46598	Active
namgdse04	DA153112[namgdse04]	Agent Collector			Inactive
namgdse04	DA1210060[namgdse04]	Agent Collector			Inactive
namgdse04	DA156195[namgdse04]	Agent Collector	18042	54020	Active

```

KAVE06003-I List processing of the service information terminated normally.

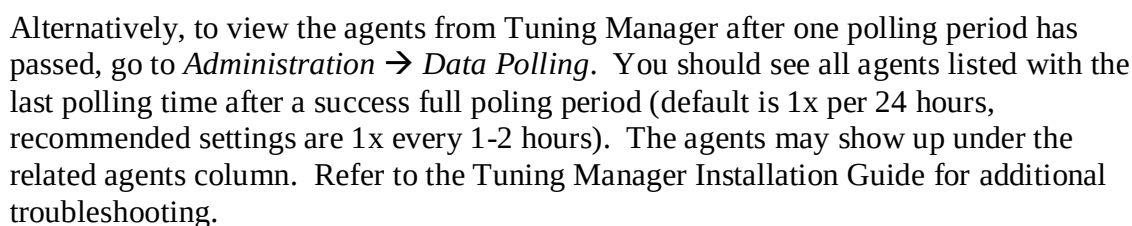
```

12. Repeat for any other new arrays. You may have to delete old array instances (./jpcinssetup agtd -inst <array_instance_name>) and/or add them after an upgrade if they are not running as Active as the above example.

13. HTnM AFR processes are not automatically configured for restart after a boot of the server. You will need to consult with local SAs for the best method to accomplish this. **Running the start all command (./jpcstart all) is ideal as it would avoid any needed modification of the scripting when an array is added.**

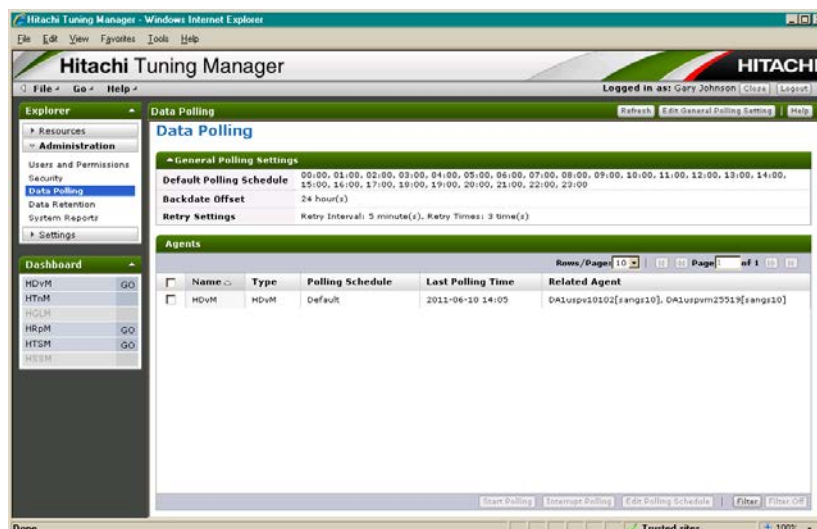
15.2.2 Verify Agents from HCS

To see if the agent communication is working before a polling period has passed, go to *Performance Reporter* → *Products* → *RAID*. You should see all active agents listed with the “DA” at the beginning of the instance name. The hostname of where the agent resides is in brackets.

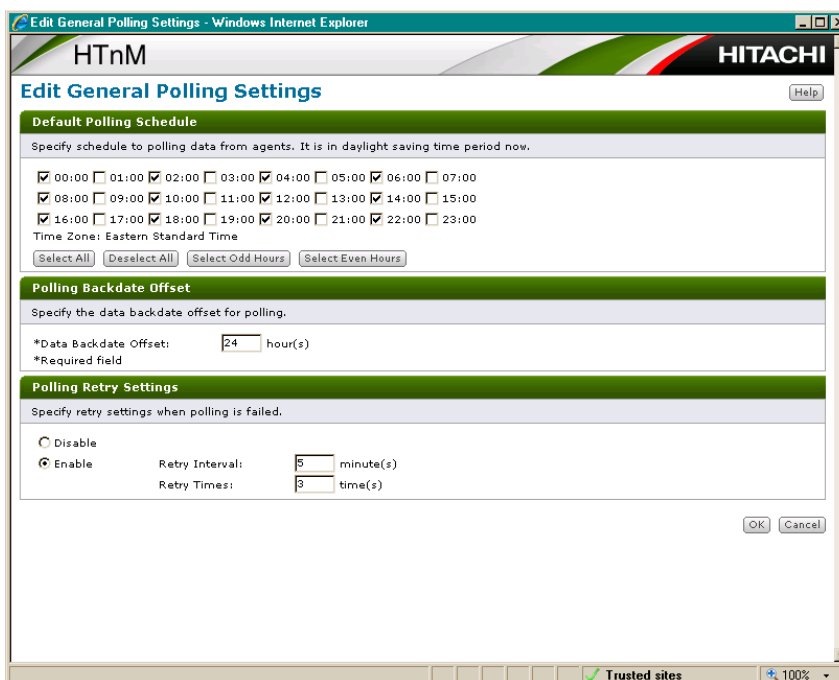


GNAST-[ProductName]-#### [Design/Standard] Document
INTERNAL USE ONLY

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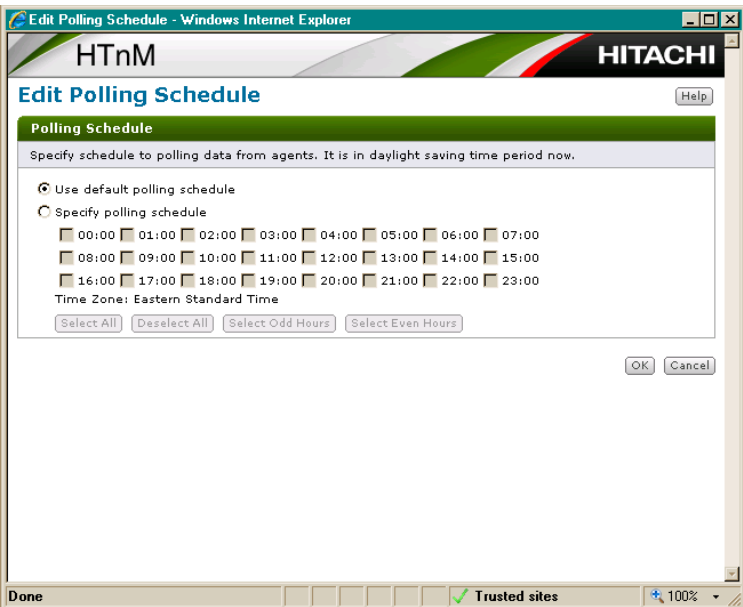


Select all desired hours for Polling Times. Select at least every two hours (even hours) for Aggregation Times. Enable the retry settings (use approximately 5 minutes as the retry interval and 3 as the retry times).



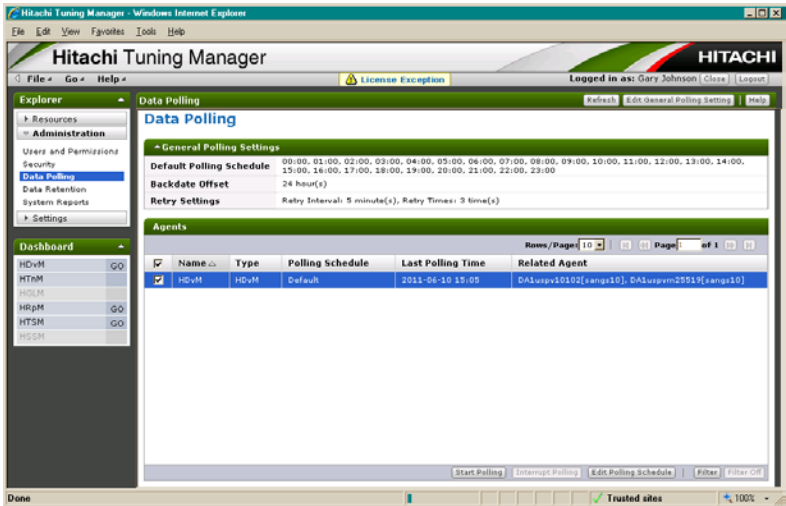
Select OK when you are done with the changes.

You can also go to the previous screen and change the polling times of any group of agents from a given server. Select the agent(s) you wish to modify and then select the Edit Polling Schedule button on the bottom right of the screen. You cannot modify the retry settings or backdate offset here.

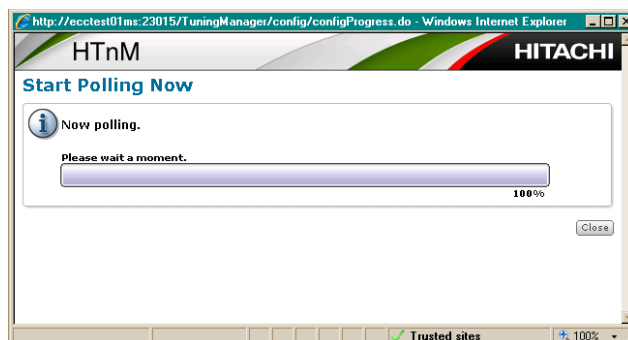


15.2.4 Manual Polling (Starting or Interrupting Polling)

To manually start an agent polling session, go to *Administration* under *Explorer*, then select *Data Polling*.



Select the agent you want to manually start and then select the Start Polling button on the bottom of the screen.



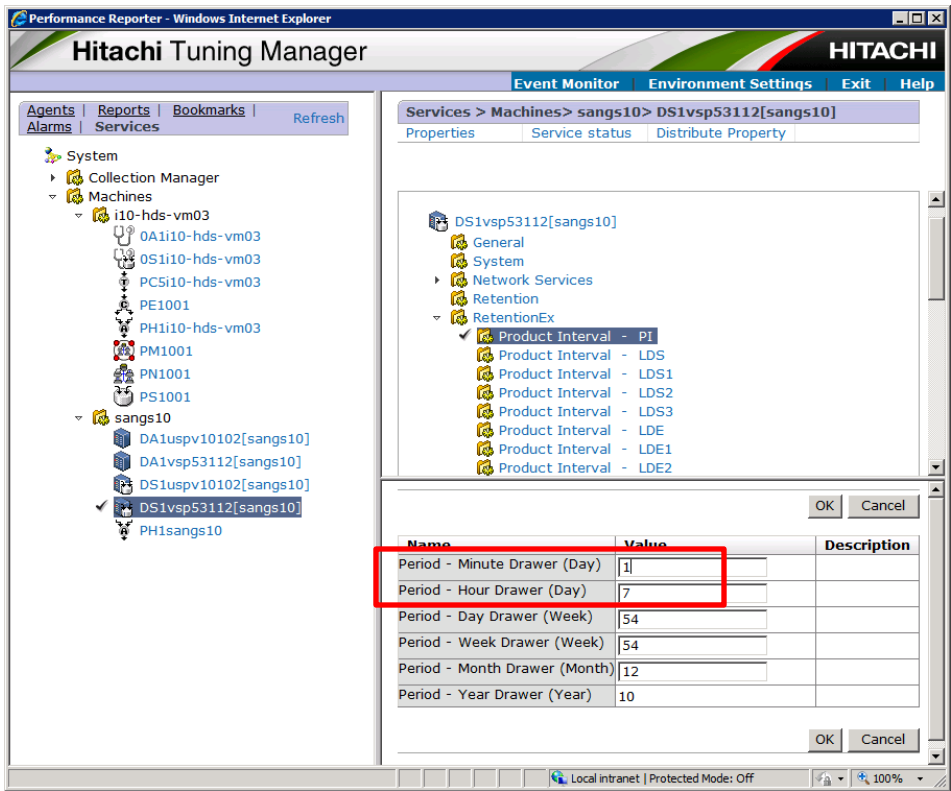
You can also interrupt polling that is taking too long or causing other issues. It is advised to refresh the screen before deciding that it is taking too long as the Data Polling screen can quickly get out of date. During an active polling, you will have the Interrupt Polling button enables and the Start Polling button grayed out.

15.2.5 Performance Reporter Configuration (60-day data storage)

The default settings for HTnM (Performance Reporter) provide only a small amount of historical data. These settings need to be changed in order to expand the reporting data storage to 60 days and to make sure all critical components are measured equally. The estimated amount of storage that the HTnM Agent for RAID will need is approximately 3GB per array.

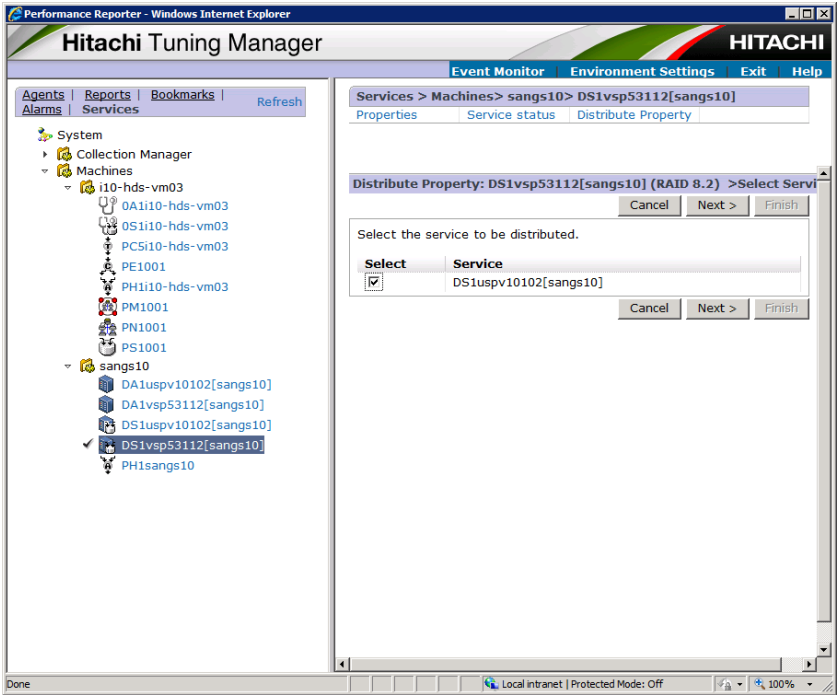
15.2.5.1 Expansion of data set (data retention)

Go into *HCS* → *Tools* → *Tuning Manager* → *Go* → *Performance Reporter* → *Services* → *Machines* → Select the agent host. Then select the **DS1 instance name[agent host]** as shown below on left panel. Then select (on the right panel) *Properties* and then *RetentionEx*.

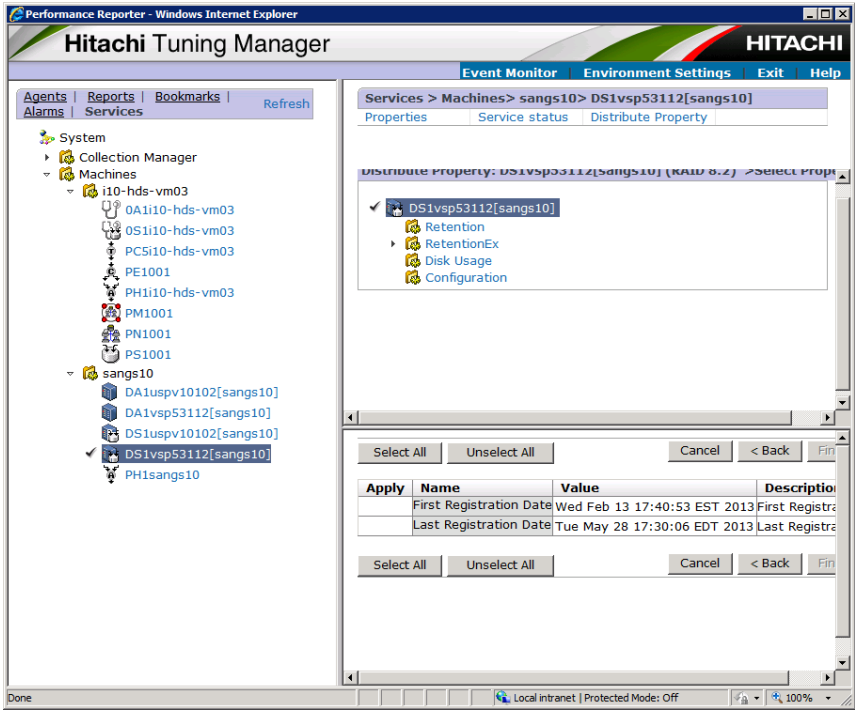


On each Product Interval Record (PI, LDS, LDS1, ...), change the Period - Minute Drawer (Day) from 1 to 60 and the Period Hour Drawer (Day) from 7 to 60. Press OK when you have changed the last record.

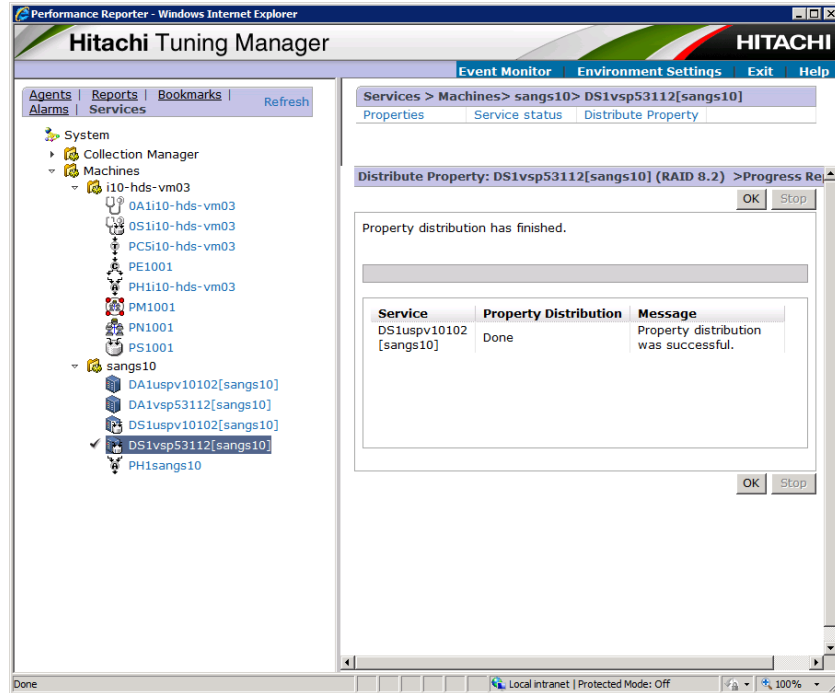
To make this change effective on all other instances (i.e. other arrays on same Tuning Manager), select the Distribute Property on the right panel after you have updated the periods above.



Select all of the other instances (G1000, HUS-VM, VSP arrays, etc.). Then Select Next.



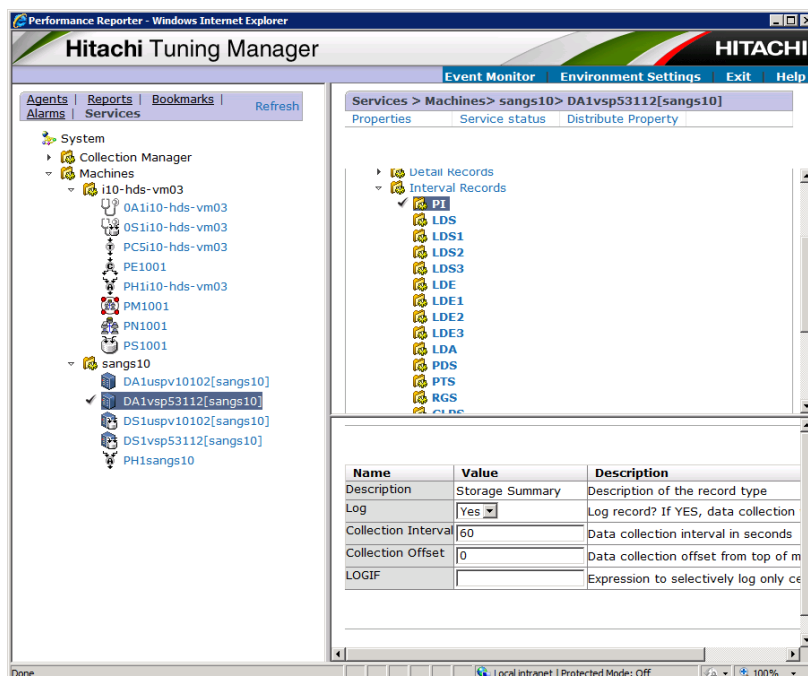
Go into the RetentionEx on the right panel. For each of the interval records, hit the select all button. After going through all of the interval records, select Finish. The setting changes will be distributed for all of the other instances (arrays).



Note: This will increase the amount of storage that the agent requires on the agent host, but will not affect the HCS/Tuning Manager server. The estimated amount of storage required is 3GB per array.

15.2.5.2 Expansion of Collection Interval

The collection interval needs to be modified to make all of the components consistent. The default values do not have this consistency. This will further improve reporting accuracy. Go into *Performance Reporter* → *Services* → *Machines* → Select the agent host. Then select the DA1 instance name [agent host] as shown below. Then select *Properties* and then *Interval Records*.



The following Collection Interval records need to be changed:

- LDS Logical Device Summary 300 to 60
- LDA Logical Device Aggregation 300 to 60
- PDS Physical Device Summary 300 to 60
- RGS RAID Group Summary 300 to 60

You will want to distribute these settings to the other agent instances (arrays). Select the Distribute Properties from the right panel and distribute similar to previous step.

Note: This will also affect the agent disk usage as you will be collecting records more frequently. The total amount of storage needed is 3GB per array.

15.2.5.3 Updating Max Records Allowed (config.xml parameter change)

This change (made on the HCS server) allows the reports to include more data in the report table and graph.

Update the config.xml under

\Program Files (x86)\HiCommand\TuningManager\PerformanceReporter\conf

There are two locations to change within this file . You can search for “1440” and replace the value with “2147483647”.

Location #1

```
</vserver-connection>

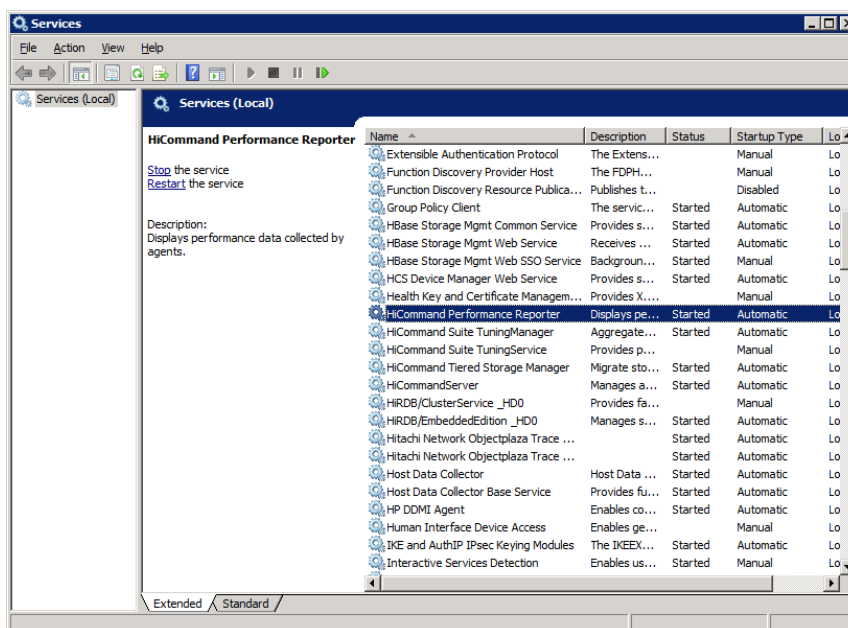
<!-- The maximum limits of the records.
      Specifiable values: 1 to 2,147,483,647
      Default             : 1,440
-->
```

```
<param name="maxFetchCount" value="2147483647"/>
```

Location #2

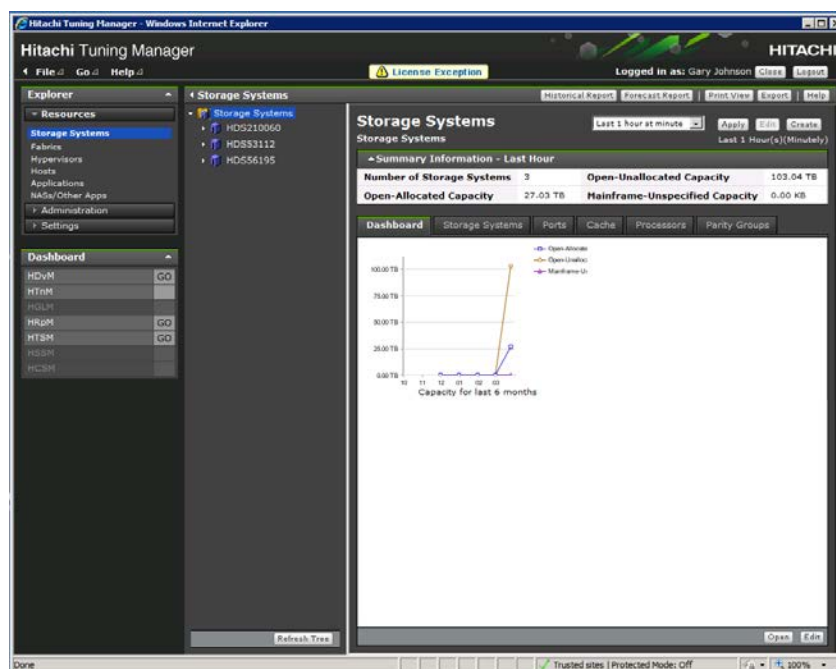
```
<export>
  <!-- The maximum limits of the records.
        Specifiable values: 1 to 2,147,483,647
        Default           : The value of maxFetchCount of the <vsa> tag is applied.
  -->
  <param name="maxFetchCount" value="2147483647"/>
</export>
```

From the HCS server, restart the HiCommand Performance Reporter services (from services.msc) to make this change effective.



15.3 Appendix C: HTnM Reporting Examples

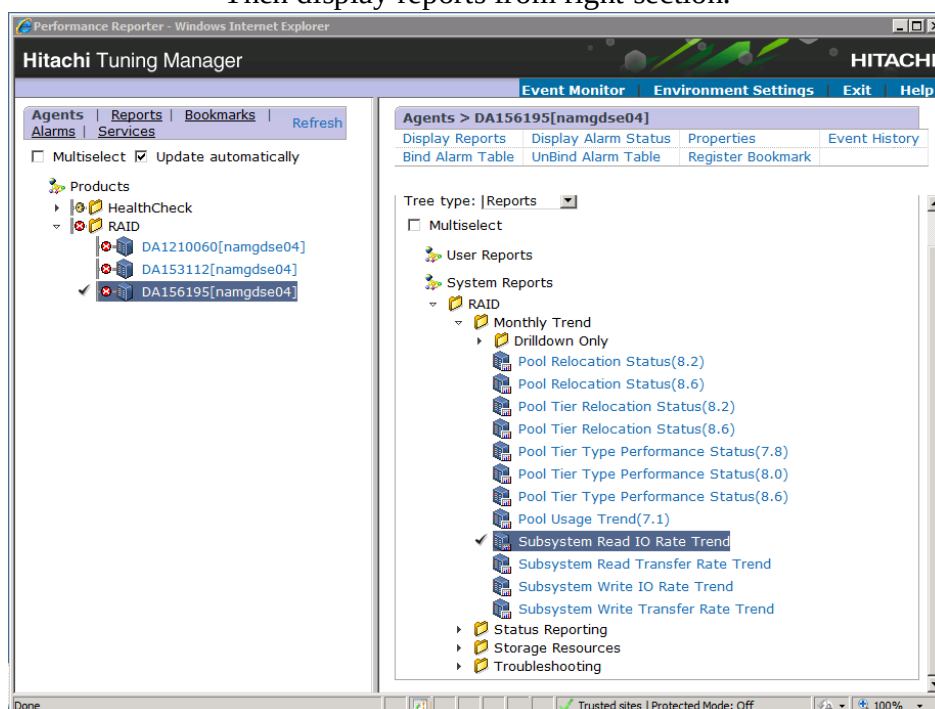
Go to Tools → Tuning Manager



Go → Performance Reporter → Agents → RAID

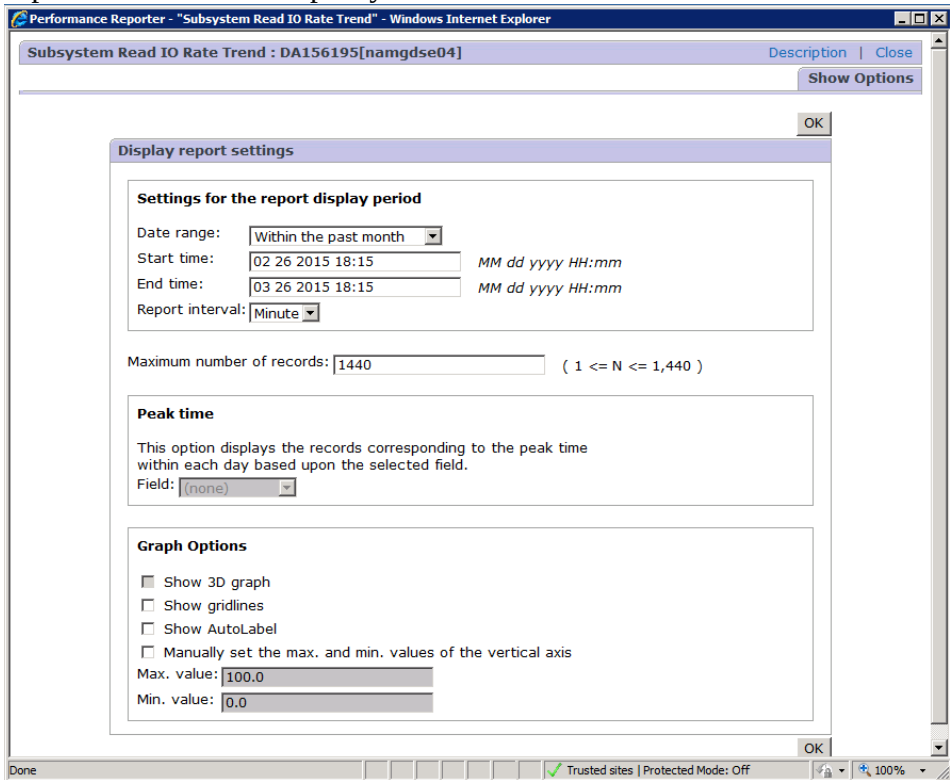
Select agent (each array has DA preceding id followed by the agent hostname)

Then display reports from right section.

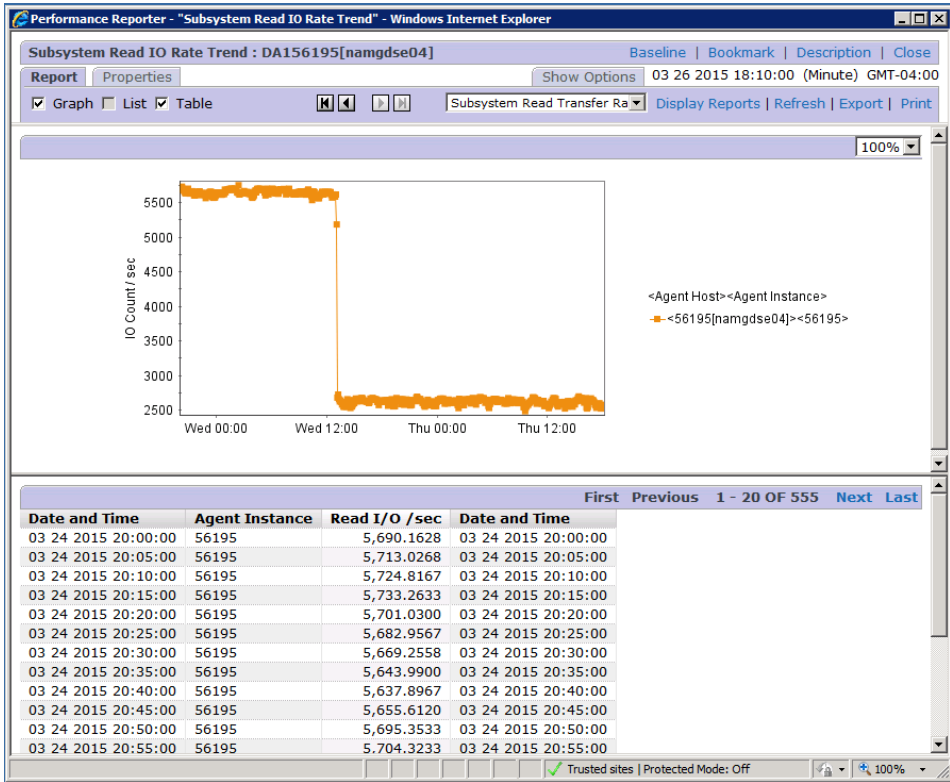


Right Panel → System Reports → RAID

Expand the reports and select the report you want to run.

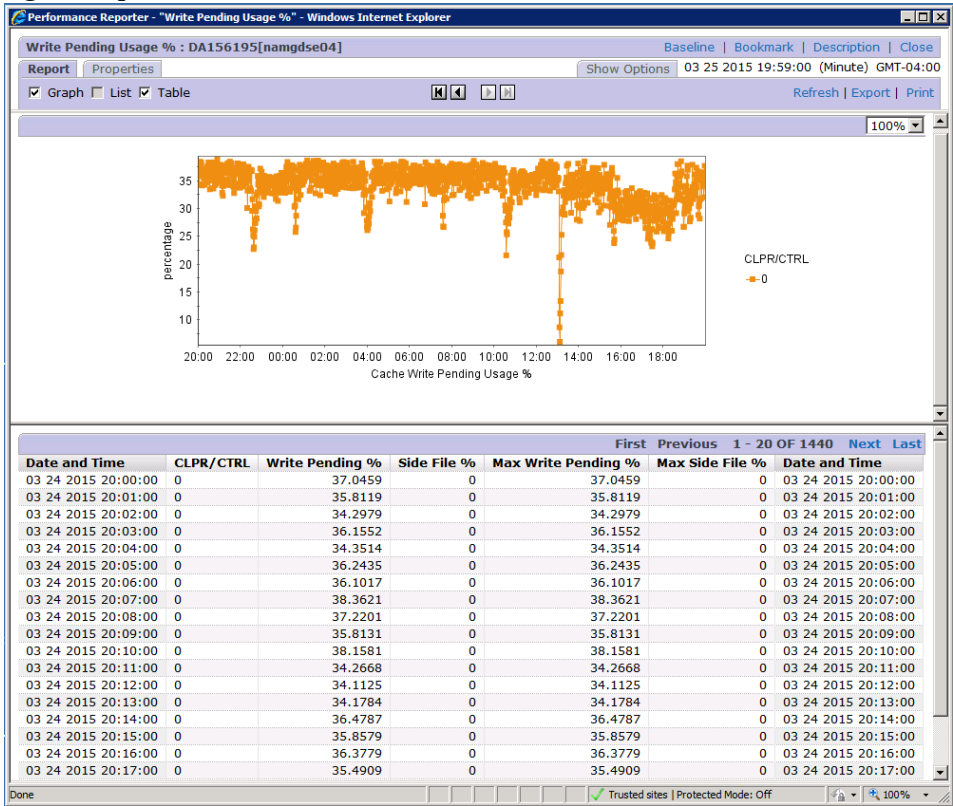


You may need to alter the report interval to minute rather than the default value to see more useful detail.

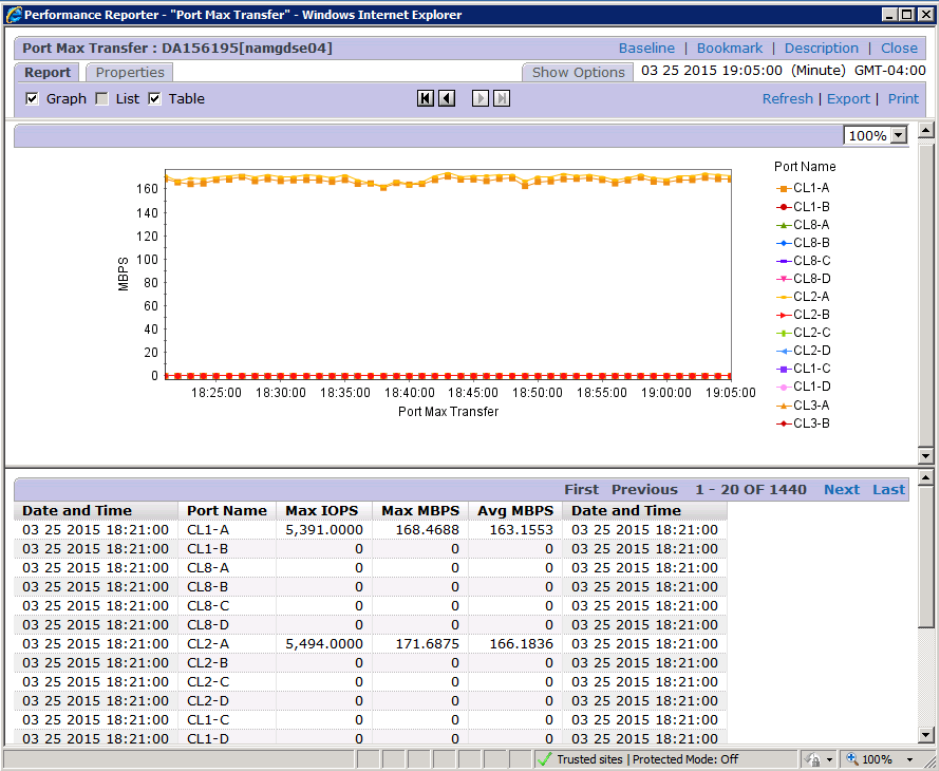




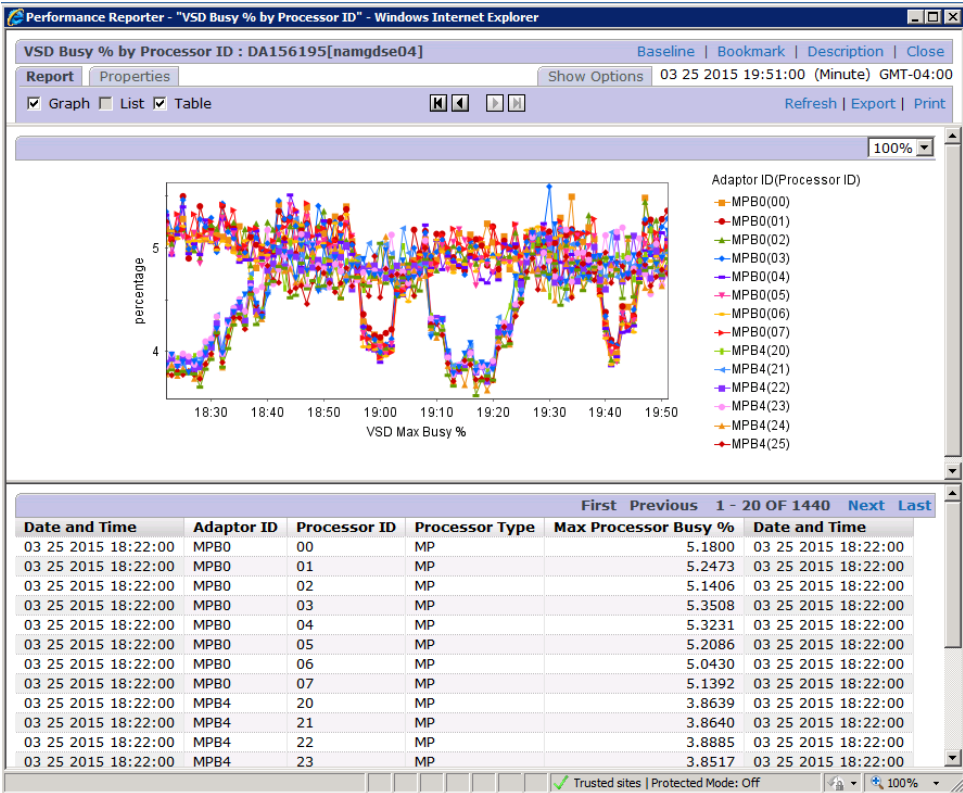
Write Pending % Report



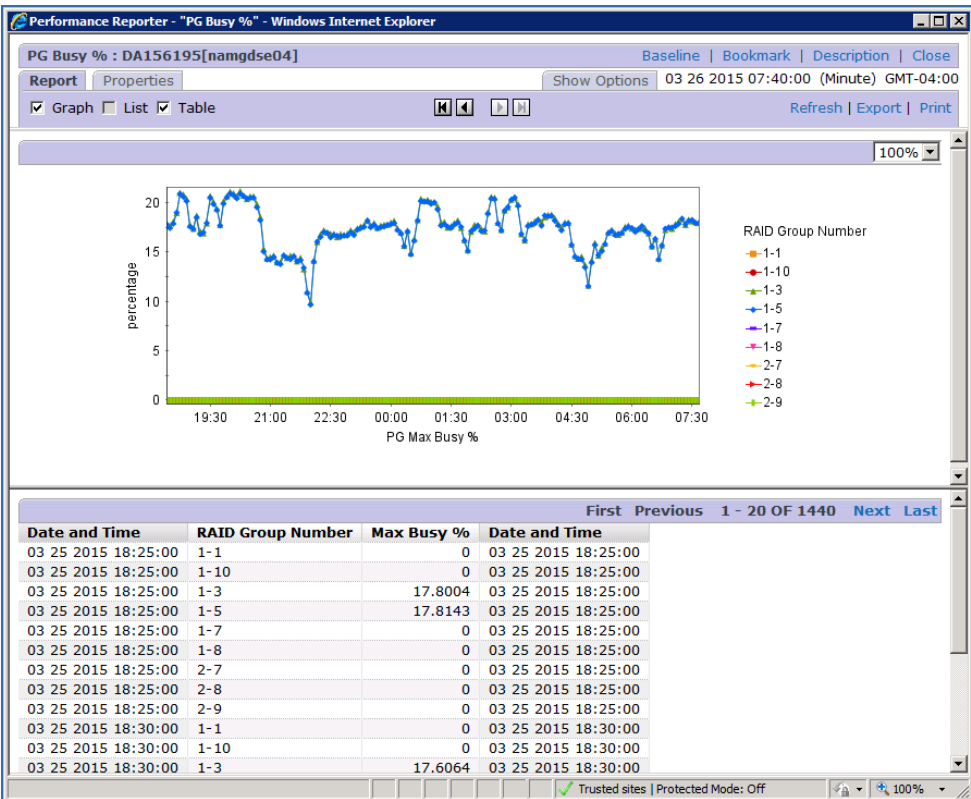
Port Max Transfer



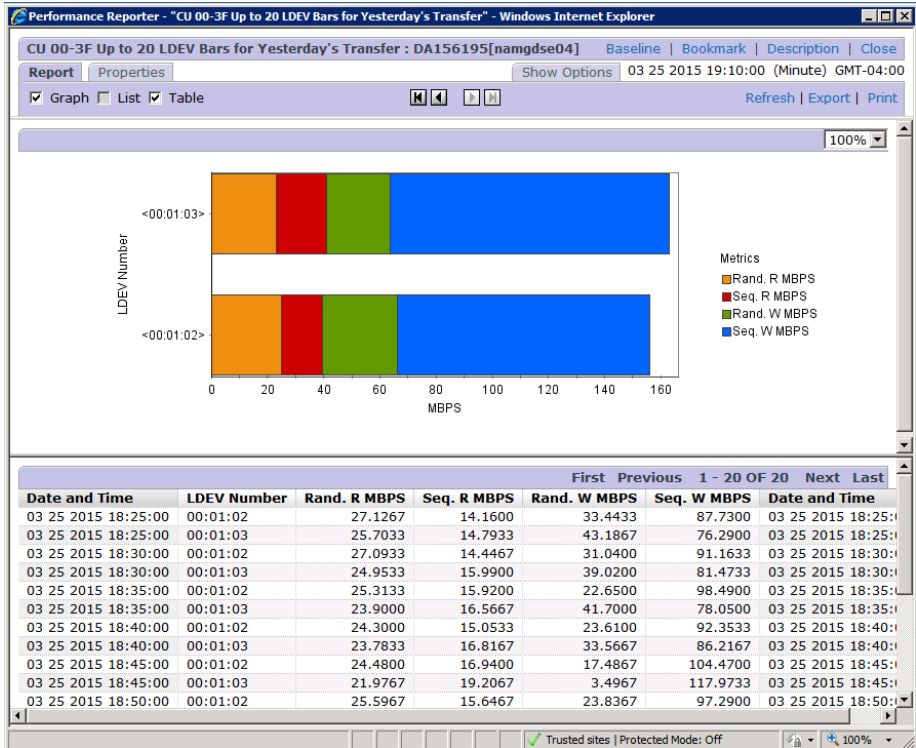
VSD % Busy by Processor ID



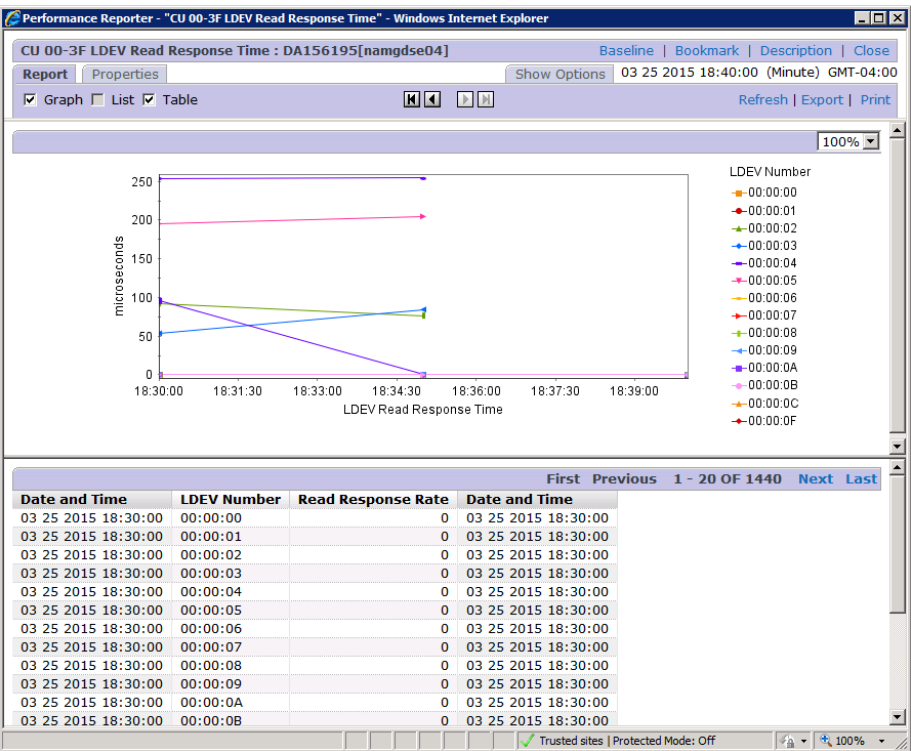
Parity Group Busy %



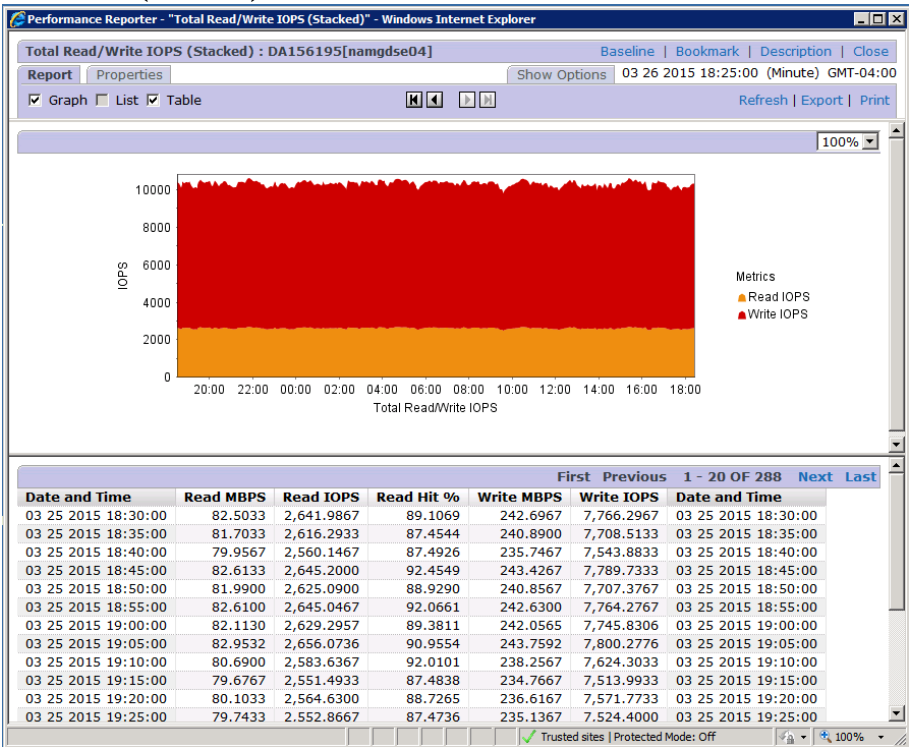
LDEV Bars for Yesterday's Transfer



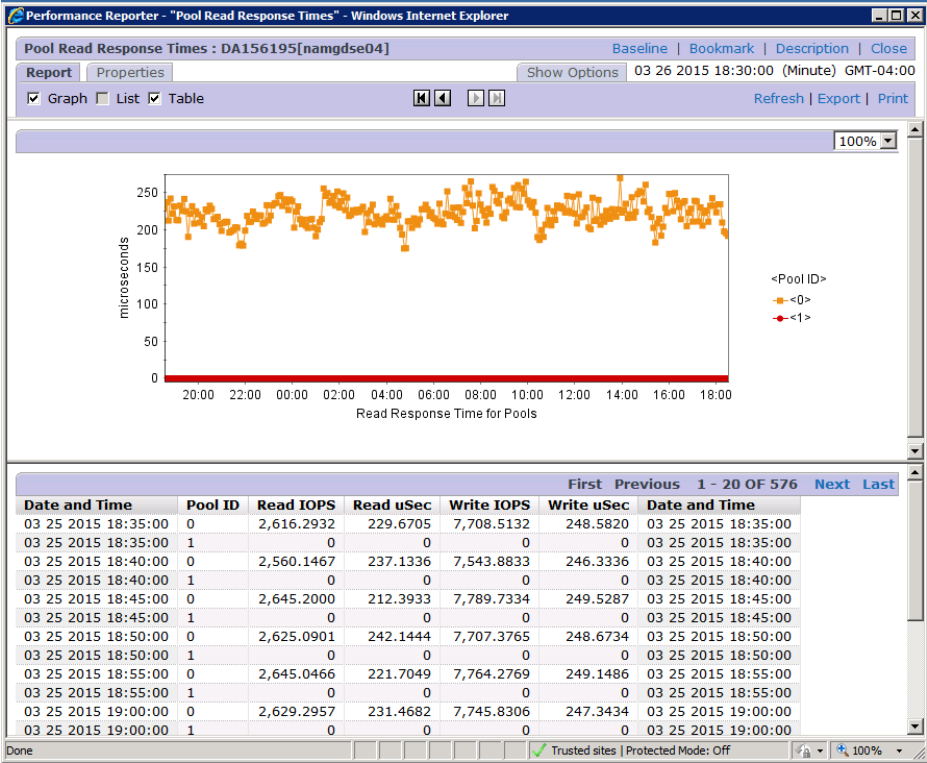
LDEV Read Response Time



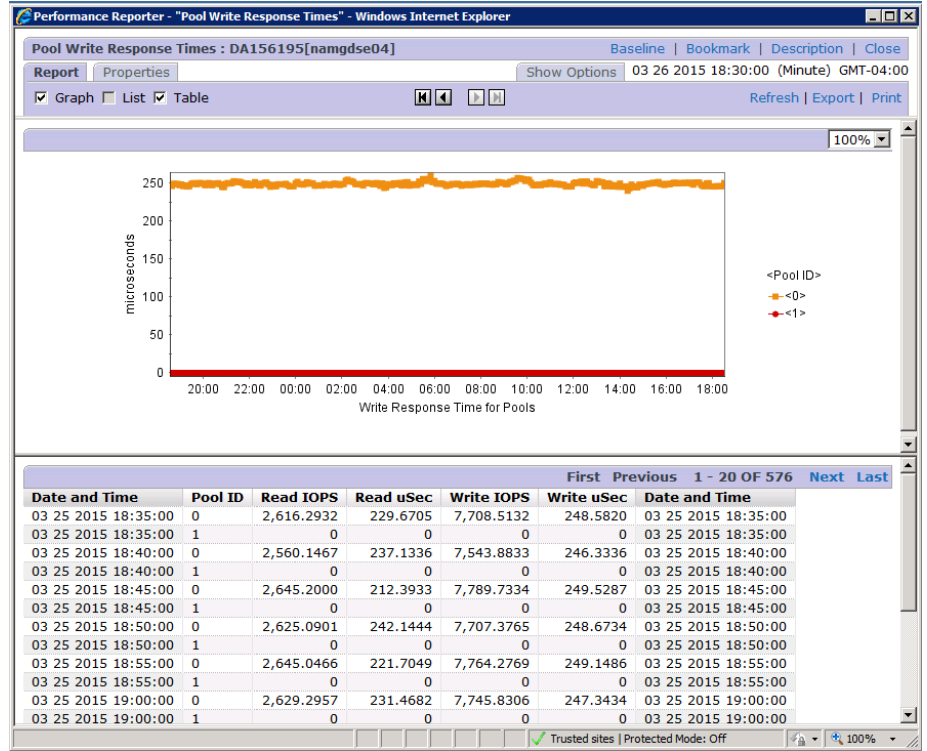
Total Read/Write IOPS (Stacked)



Pool Read Response Times



Pool Write Response Times



15.4 Appendix D: TMEA Agent Setup

The TMEA agent is used to collect data via fiber channel and to send it back to HDS (Datamart Support) via the Application (SOCKS5 or SOCKS4) proxy. This agent requires that a command device be allocated to the agent server from every array that needs to be included in TMEA performance reporting.

15.4.1 TMEA Agent Setup and Upgrade for RHEL

You will need a data directory to hold the TMEA data. If using a SAN drive, then the SA should create a symbolic link to a simple directory (such as /HDS_data/TMEA). The following steps are to be followed for setup/updating the TMEA agent.

1. Update/install the RAID Manager Library (RMLIB). Run the following CPIO command to extract the files to the desired location. It will force a destination directory name of RMLIB, so initiate the CPIO extract from the /opt directory.

```
[root@namgdse04 opt]# cpio -idmu <
/net/stealth/export1/home1.localhost/sw/PKG/HDS_TMEA_970b11/Linux/RMLIB_01-19-03
1999 blocks
[root@namgdse04 opt]# cd RMLIB
[root@namgdse04 RMLIB]# ls
bin include lib RLSYSLK rmlibinstall.sh rmlibuninstall.sh sample
[root@namgdse04 RMLIB]# ls -al
total 32
drwxr-xr-x 6 root sys 4096 Nov 26 12:43 .
drwxr-xr-x 49 root root 4096 Mar 23 18:32 ..
drwxr-xr-x 2 root sys 4096 Nov 26 12:43 bin
drwxr-xr-x 2 root sys 4096 Nov 26 12:43 include
drwxr-xr-x 2 root sys 4096 Nov 26 12:43 lib
-rw-rw-rw- 1 root root 0 Dec 3 2013 PARALLEL_RLSYSLK
-rw-r--r-- 1 root root 0 Sep 26 2013 RLSYSLK
-rw-r--r-- 1 root root 0 Dec 3 2013 RLSYSLK_5000274C
-rw-r--r-- 1 root root 0 Dec 3 2013 RLSYSLK_50002776
-rw-r--r-- 1 root root 0 Dec 3 2013 RLSYSLK_5000CF78
-rw-r--r-- 1 root root 0 Nov 25 16:14 RLSYSLK_5030DB83
-r-xr-xr-x 1 root sys 4006 Jan 5 2014 rmlibinstall.sh
-r-xr-xr-x 1 root sys 3284 Jan 5 2014 rmlibuninstall.sh
drwxrwxrwx 2 root sys 4096 Nov 26 12:43 sample
```

Run /opt/RMLIB/rmlibinstall.sh after the setup to make sure the symbolic link is in place.

```
[root@namgdse04 RMLIB]# rmlibinstall.sh
The symbolic link of '/usr/lib/libsvrrm.so' was successful.

If previously run:
[root@namgdse04 RMLIB]# ./rmlibinstall.sh
The symbolic link of '/usr/lib/libsvrrm.so' was successful.
The symbolic link of '/lib64/libsvrrm.so' was successful.
ln: creating symbolic link `/usr/lib/RMLIB/bin/whatrmver' to `/usr/lib/RMLIB/bin/whatrmverx64':
File exists
```

To verify the symbolic links are functional and that RMLIB is working, run the version command (/opt/RMLIB/bin/whatrmver):

```
[root@namgdse04 bin]# cd /opt/RMLIB/bin
[root@namgdse04 bin]# ./whatrmver
```

Model :RAID-Manager/LIB/Linux
Ver&Rev:01-19-03/00

RMLIB 01-19-03 is the minimum version required for communication with G1000 arrays.

You can uninstall the software by running rmlibuninstall.sh from the /opt/RMLIB directory.

2. If installing TMEA on a new RHEL server then go to step 6. If upgrading TMEA, then run the manage command from /opt/TMEA/bin and then stop all the instances.

```
[root@namgdse04 TMEA]# cd bin
[root@namgdse04 bin]# ./manage

Please select an option :-
1  -- Manage Collector instances
2  -- Manage Watchdog
q  -- Quit
? 1

Enter number to select instance or 'cv' to create RAID instance and 'ca' to create
Modular instance. Enter 'b' to go back or 'q' to quit.
1 53112          running
2 210060         running
3 56195          running
? 1

Instance 53112 -- Collector: running, Autoxfer: enabled
Last ftp transfer: succeeded at Fri Mar 20 10:46:41 EDT 2015
Watchdog : Enabled

Enter operation code:
stat -- Display detailed status of Collector instance
stop -- Stop the Collector
endebug -- Enable the debug logs
disdebug -- Disable the debug logs
dis  -- Disable auto transfer of data
fc   -- Force collection of configuration data
diswd -- Disable Watchdog for this instance
n    -- Select new instance
!CMD -- Execute CMD in sh
b    -- Go back one level
q    -- Quit
? stop

TMEA config for 53112 stopped
TMEA dkcbusy for 53112 stopped
TMEA ldevio for 53112 stopped
TMEA portio for 53112 stopped
TMEA pairstat for 53112 stopped
TMEA clprbusy for 53112 stopped
TMEA poolstat for 53112 stopped
TMEA for 53112 stopped
Auto Transfer for 53112 stopped

Instance 53112 -- Collector: stopped, Autoxfer: disabled
Last ftp transfer: succeeded at Fri Mar 20 10:46:41 EDT 2015
Watchdog : Enabled

Enter operation code:
start -- Start the Collector
stat -- Display detailed status of Collector instance
stop -- Stop the Collector
endebug -- Enable the debug logs
disdebug -- Disable the debug logs
```

```

en    -- Enable auto transfer of data
fc    -- Force collection of configuration data
xd    -- Transfer all data to Analyzer
diswd -- Disable Watchdog for this instance
rm    -- Remove this instance
n     -- Select new instance
!CMD  -- Execute CMD in sh
b     -- Go back one level
q     -- Quit
? b

```

3. Repeat for any other running instances

Enter number to select instance or 'cv' to create RAID instance and 'ca' to create Modular instance. Enter 'b' to go back or 'q' to quit.

```

1 53112          stopped
2 210060         stopped
3 56195          stopped
? q

```

```

[root@namgdse04 bin]# ls
addInstance.sh      ftp_method          manage              volinfo
autostart.sh        hiper_20141126.log  nc                  xd
autoxfer            hiperf_ctl.sh       registerUnit        xd_ams
bkp_sftp_xfer.bash  hiperf_watchdog_ctl.sh removeInstance.sh   xdc
expect              hiper.log            sftp_addddir.bash  xdc_ams
fc                  http_proxy.sh       sftp_xfer.bash     xds
ftpcheck.sh         mailsend             temp1               xds_ams
ftpcheck.sh.bkp     mailsend_wrapper.sh validate.sh

```

4. Make a copy of the property files

```

[root@namgdse04 bin]# cd ../properties
[root@namgdse04 properties]# ls
bkp_col2anal.config      config_56195.properties      pairstat_53112.properties
clprbusy_210060.properties devicenumbers.config         pairstat_56195.properties
clprbusy_53112.properties devicenumbers.config.bak     poolstat_210060.properties
clprbusy_56195.properties dkcbusy_210060.properties   poolstat_53112.properties
col2anal.config          dkcbusy_53112.properties    poolstat_56195.properties
col2anal.config.bak      dkcbusy_56195.properties    portio_210060.properties
col2anal.config.old      ldevio_210060.properties    portio_53112.properties
col2anal.config.rpmnew   ldevio_53112.properties     portio_56195.properties
config_210060.properties ldevio_56195.properties
config_53112.properties pairstat_210060.properties
[root@namgdse04 properties]# mkdir /HDS_data/TMEA/properties.old
[root@namgdse04 properties]# cp *.* /HDS_data/TMEA/properties.old/*.*
[root@namgdse04 properties]# cd /HDS_data/TMEA/properties.old
[root@namgdse04 properties.old]# ls
bkp_col2anal.config      config_56195.properties      pairstat_53112.properties
clprbusy_210060.properties devicenumbers.config         pairstat_56195.properties
clprbusy_53112.properties devicenumbers.config.bak     poolstat_210060.properties
clprbusy_56195.properties dkcbusy_210060.properties   poolstat_53112.properties
col2anal.config          dkcbusy_53112.properties    poolstat_56195.properties
col2anal.config.bak      dkcbusy_56195.properties    portio_210060.properties
col2anal.config.old      ldevio_210060.properties    portio_53112.properties
col2anal.config.rpmnew   ldevio_53112.properties     portio_56195.properties
config_210060.properties ldevio_56195.properties
config_53112.properties pairstat_210060.properties

```

5. Run the upgrade script

```

[root@namgdse04 03192015]# dos2unix upgradeCollector.sh
dos2unix: converting file upgradeCollector.sh to UNIX format ...
[root@namgdse04 03192015]# ./upgradeCollector.shctor.sh
Enter ftp port number to be used (Press enter to use default port number 22):
Modifying /etc/init.d/hiperfa_53112...
Deleting timestamp file /HDS_data/TMEA/53112/ts_53112.txt...

```

```
Upgrading /opt/TMEA/properties/col2anal.config...
DONE.
```

6. Install the TMEA package

```
[root@namgdse04 03192015]# rpm -Uvh --nomd5 --nodeps TMEA-9_7_0b11.rpm
Preparing... ##### [100%]
 1:TMEA ##### [100%]
warning: /opt/TMEA/properties/col2anal.config created as /opt/TMEA/properties/col2anal.config.rpmnew
```

7. Add an instance for each array that needs to be monitored if not already present. Note that the G1000 arrays require a license key based on 6-digits (preceding 3).

```
[root@namgdse04 03192015]# cd /opt/TMEA
[root@namgdse04 TMEA]# cd bin
[root@namgdse04 bin]# ./manage

Please select an option :-
1 -- Manage Collector instances
2 -- Manage Watchdog
q -- Quit
? 1

Enter number to select instance or 'cv' to create RAID instance and 'ca' to create
Modular instance. Enter 'b' to go back or 'q' to quit.
 1 53112 running
? cv
Adding new instance ...

Instance Name (one word): 56195
Storage Subsystem Alias: HDS56195-G1K
Storage Subsystem Type(USP/USPV/VSP/HUSVM/VSPG1000): VSPG1000
Specify a command device in /dev/sd[a-z] format: /dev/disk/by-id/scsi-360060e8007db8
3000030db8300003e00
License File: /HDS_data/TMEA/license_keys/TMEA_56195.lic
/HDS_data/TMEA/license_keys/TMEA_56195.lic: Invalid
License File: /HDS_data/TMEA/license_keys/TMEA_356195.lic
Output Directory: /HDS_data/TMEA/56195
/HDS_data/TMEA/56195 does not exist; would you like to create it [y] y
making /HDS_data/TMEA/56195 directory...
Log Directory: [/HDS_data/TMEA/56195]

***** Configuration Setup
Collection Interval (in HOURS) (default 4): 24
Number of collections (0 for continue until stopped.) (default 0): 0
No limit being set on number of collections.

***** Performance Setup
Collection Interval (in MINUTES)(default 1): 1
Number of performance collections (0 for continue until stopped.) (default 0): 0
No limit being set on number of performance collections.
Roll file after x collections(default 60): 60
Enter Start Collection Time for performance (enter between 0-55,in the order of 5):
5
Enter sftp proxy machine address for sftp xfer or 'none' to skip sftp proxy
or just [return] to use the default: [ 10.40.35.101] ?

Enter protocol(SOCKS4/SOCKS5/HTTP) for sftp proxy xfer
or just [return] to use the default: [SOCKS5] ?
Enter sftp proxy port for SOCKS5
or just [return] to use the default: [1080] ?

Enter machine address for sftp xfer or 'none' to skip sftp xfer
or just [return] to use the default: [ 207.126.248.84] ?
Enter user name for sftp xfer
or just [return] to use the default: [citi] ?
Enter password for sftp xfer
```

```

or just [return] to use the default?
Enter sftp port(default 22):

Transfers will be made to 207.126.248.84 using sftp account for citi
Enter path to directory relative to the citi sftp account
where the data directory will be created for the transferred files.
Use forward slashes (/) instead of back slashes.
or just [return] to use default path:
/56195 ?
Creating /56195 directory for citi on 207.126.248.84 with port 22...
Added row to col2anal.config
TMEA config for 56195 started
TMEA dkcbusy for 56195 started
TMEA ldevio for 56195 started
TMEA portio for 56195 started
TMEA pairstat for 56195 started
TMEA clprbusy for 56195 started
TMEA poolstat for 56195 started
TMEA for 56195 started
/opt/TMEA/bin/autoxfer started at 03/20/15 15:28:58
Auto Transfer for 56195 started
56195 set up completed.

```

8. Repeat for any other instances needed.

15.4.2 Updating TMEA Licenses

The TMEA licenses periodically need to be replaced with updated license keys. Note that the G1000 arrays require a license key based on 6-digits (preceding 3). When TMEA license keys expire, Datamartsupport will need to send you another key.

1. Look in the properties folder for the array config files (config_<instance name>.properties)

```

[root@namgdse04 TMEA]# cd /opt/TMEA/properties
[root@namgdse04 properties]# ls
clprbusy_210060.properties  dkcbusy_56195.properties
clprbusy_53112.properties  ldevio_210060.properties
clprbusy_56195.properties  ldevio_53112.properties
col2anal.config             ldevio_56195.properties
col2anal.config.bak         pairstat_210060.properties
col2anal.config.old         pairstat_53112.properties
col2anal.config.rpmnew      pairstat_56195.properties
config_210060.properties    poolstat_210060.properties
config_53112.properties     poolstat_53112.properties
config_56195.properties     poolstat_56195.properties
devicenumbers.config        portio_210060.properties
devicenumbers.config.bak    portio_53112.properties
dkcbusy_210060.properties   portio_56195.properties
dkcbusy_53112.properties

[root@namgdse04 properties]# cat config_210060.properties
#####
# This file is generated with HiPERF Collector Command Center
# Hitachi Storage Software Inc.(c) 2004 , All rights reserved.
#####
commanddevice.alias=HDS210060-HUSVM
commanddevice.name=/dev/disk/by-id/wwn-0x60060e8013274c000000274c00000168
commanddevice.instance=210060
raidInstance.name=
collection.binary.dir=/HDS_data/TMEA/210060/data/binary
collection.general.type=CONFIGURATION
collection.general.subtype=
collection.time.interval=86400
collection.start.time=0
collection.time.max=0
collection.file.dir=/HDS_data/TMEA/210060/data/config

```

```
collection.file.log=/HDS_data/TMEA/210060//config.log
collection.file.timestamp=/HDS_data/TMEA/210060/ts_210060.txt
collection.file.status=/HDS_data/TMEA/210060//config.status
collection.file.lock=/HDS_data/TMEA/210060/data/config/hiperf.lock
license.file=/HDS_data/TMEA/license_keys/TMEA_210060.lic
feature.sync=0
Feature.debug=1
```

2. Go to the configured location and rename the old file and replace it with a new file.

```
[root@namgdse04 properties]# cd /HDS_data/TMEA/license_keys
[root@namgdse04 license_keys]# mv TMEA_210060.lic TMEA_210060.lic.old
[root@namgdse04 license_keys]# cp TMEA_210060.new TMEA_210060.lic
[root@namgdse04 license_keys]# cat TMEA_210060.lic
## license
devices = 1
expires = 12/9/2015
good_for = 400
hostid = 210060
issued = 11/4/2014
key[0] = V4rJc02aV0KMqC1jIjFbgBJgONGAJov4n+mWyxB1wD8ynJC/VCJBs7K/B5mOKZ4QjcASnrnuydQ=
key_version = 2.0
nproducts = 1
product[0] = HiPERFC
version = 2.x
```

3. Use the Dos2Unix utility to convert any non-unix characters as the application is sensitive.

```
[root@namgdse04 license_keys]# dos2unix TMEA_210060.lic
dos2unix: converting file TMEA_210060.lic to UNIX format ...
```

4. Run the manage application and start the instance for the array.

```
[root@namgdse04 license_keys]# cd /opt/TMEA/bin
[root@namgdse04 bin]# ./manage

Please select an option :-
1 -- Manage Collector instances
2 -- Manage Watchdog
q -- Quit
? 1

Enter number to select instance or 'cv' to create RAID instance and 'ca' to create Modular
instance. Enter 'b' to go back or 'q' to quit.
1 53112          stopped
2 210060         stopped
3 56195         running
? 2

Instance 210060 -- Collector: stopped, Autoxfer: enabled
Last ftp transfer: succeeded at Sun Dec 28 22:06:55 EST 2014
Watchdog : Enabled

Enter operation code:
start -- Start the Collector
stat -- Display detailed status of Collector instance
stop -- Stop the Collector
endebug -- Enable the debug logs
disdebug -- Disable the debug logs
dis -- Disable auto transfer of data
fc -- Force collection of configuration data
diswd -- Disable Watchdog for this instance
n -- Select new instance
!CMD -- Execute CMD in sh
b -- Go back one level
q -- Quit
? start
TMEA config for 210060 started
TMEA dkcbusy for 210060 started
```

```
TMEA ldevio for 210060 started
TMEA portio for 210060 started
TMEA pairstat for 210060 started
TMEA clprbusy for 210060 started
TMEA poolstat for 210060 started
TMEA for 210060 started
TMEA autoxfer for 210060 already running

Instance 210060 -- Collector: running, Autoxfer: enabled
Last ftp transfer: succeeded at Sun Dec 28 22:06:55 EST 2014
Watchdog : Enabled
```

15.4.3 Manual SFTP Transfer

It may be necessary to manually force the sftp transfer for a specific array. Run the manage command (/opt/TMEA/bin/manage). Select the id of the instance you want to manually force the transfer.

Run the fc command to reinitiate the transfer of data to HDS.

```
Enter number to select instance or 'cv' to create VSP instance and 'ca' to create AMS
instance.
  1 53112                running
? 1

Instance 53112 -- Collector: running, Autoxfer: enabled

Enter operation code:
stat -- Display detailed status of Collector instance
stop -- Stop the Collector
endebug -- Enable the debug logs
disdebug -- Disable the debug logs
dis -- Disable auto transfer of data
fc -- Force collection of configuration data
n -- Select new instance
!CMD -- Execute CMD in sh
q -- Quit
? fc
TMEA config for 53112 stopped
TMEA config for 53112 started
waiting 60 seconds for configuration collection to complete

Instance 53112 -- Collector: running, Autoxfer: enabled
```

15.4.4 Removing an Instance

Upon retirement of an array (or removal from TMEA reporting), you will want to delete the instance. Run the manage command (/opt/TMEA/bin/manage). Select the id of the instance you want to delete and then type the command “rm”.

```
Enter number to select instance or 'cv' to create VSP instance and 'ca' to crea
te AMS instance.
  1 53112                stopped
  2 10102                stopped
  3 210060              stopped
? 3

Instance 210060 -- Collector: stopped, Autoxfer: disabled
Last ftp transfer: succeeded at Thu Nov 14 14:53:52 EST 2013

Enter operation code:
start -- Start the Collector
stat -- Display detailed status of Collector instance
stop -- Stop the Collector
endebug -- Enable the debug logs
```

```

disdebug -- Disable the debug logs
en      -- Enable auto transfer of data
fc      -- Force collection of configuration data
xd      -- Transfer all data to Analyzer
rm      -- Remove this instance
n       -- Select new instance
!CMD    -- Execute CMD in sh
q       -- Quit
? rm
If you are sure you want to remove instance 210060, enter 'YES': YES
Removing instance ...

Instance Name: 210060 removed successfully

```

Note: The /opt/TMEA/properties directory contains all of the configuration files for each instance. Removing these files would be needed if a manual deletion is necessary. The output directory (i.e. /HDS_data/TMEA/<serial num> would need to be empty before trying to re-add the instance.

15.4.5 Removing TMEA Collector

When retiring a collector server (or for other reasons recommended by HDS), it may be desirable to remove the TMEA Collector software. This activity requires root access. The rpm command is used to manage the package.

Run the rpm -qa command to find out the current package name.

```

[root@namgdse04 ~]# rpm -qa | grep TMEA
TMEA-9_5_0b11-0.el5.i386

```

Run the rpm -e --nodeps command to remove the package. Then verify that the package no longer exists.

```

[root@namgdse04 ~]# rpm -e --nodeps TMEA-9_5_0b11-0.el5.i386
warning: /opt/TMEA/properties/devicenumbers.config saved as /opt/TMEA/properties
/devicenumbers.config.rpm.save
warning: /opt/TMEA/properties/col2anal.config saved as /opt/TMEA/properties/col2
anal.config.rpm.save
[root@namgdse04 ~]# rpm -qa | grep TMEA
[root@namgdse04 ~]#

```

15.4.6 TMEA Space Cleanup Maintenance (Cleanup Script)

The SA for the TMEA server will need to create a cleanup script to maintain the amount of storage used by TMEA. TMEA does not automatically clean itself up with the current release. The following command should be run on a daily basis to maintain the space estimate of 10GB per array (keeping only 7 days of data locally):

```

[root@namgdse04 ~]# find /HDS_data/TMEA/ -name "*f_*.zip" -mtime +7 -exec rm -rf {} \;

```

This will remove files from the /HDS_data/TMEA/<array serial>/archive/ directory and should not affect other files.

*Note: Currently these archive files are root owned, so pbrun may need to be utilized. There is considerable risk running the command “rm -rf” from the root account, so be sure that the command search criteria (-name “*_*.zip” -mtime +7) is typed in correctly to prevent unintended deletions.*

15.4.7 Debug Mode

To troubleshoot problems with particular arrays or sites, it may be useful to enable debug mode for the affected arrays. Use the manage command to enable or disable debug mode. Enabling or disabling debug mode will restart the processes for an array. Enabling debug mode will generate additional log files that may need to be uploaded to HDS Datamart / TMEA Support.

Enable Debug Mode:

```
[root@namgdse04 bin]# ./manage
Enter number to select instance or 'cv' to create VSP instance and 'ca' to create AMS instance.
 1 53112          running
 2 10102          running
 3 210060         running
? 1

Instance 53112 -- Collector: running, Autoxfer: enabled
Last ftp transfer: succeeded at Thu Dec 19 10:22:46 EST 2013

Enter operation code:
stat -- Display detailed status of Collector instance
stop -- Stop the Collector
endebug -- Enable the debug logs
disdebug -- Disable the debug logs
dis -- Disable auto transfer of data
fc -- Force collection of configuration data
n -- Select new instance
!CMD -- Execute CMD in sh
q -- Quit
? endebug
TMEA config for 53112 stopped
TMEA dkcbusy for 53112 stopped
TMEA ldevio for 53112 stopped
TMEA portio for 53112 stopped
TMEA pairstat for 53112 stopped
TMEA clprbusy for 53112 stopped
TMEA poolstat for 53112 stopped
TMEA for 53112 stopped
Auto Transfer for 53112 stopped
TMEA config for 53112 started
TMEA dkcbusy for 53112 started
TMEA ldevio for 53112 started
TMEA portio for 53112 started
TMEA pairstat for 53112 started
TMEA clprbusy for 53112 started
TMEA poolstat for 53112 started
TMEA for 53112 started
/opt/TMEA/bin/autoxfer started at 12/19/13 10:38:15
Auto Transfer for 53112 started

Instance 53112 -- Collector: running, Autoxfer: enabled
Last ftp transfer: succeeded at Thu Dec 19 10:22:46 EST 2013
```

Disable Debug Mode:

```
[root@namgdse04 bin]# ./manage
Enter number to select instance or 'cv' to create VSP instance and 'ca' to create AMS instance.
 1 53112          running
 2 10102          running
 3 210060         running
```

```
? 1

Instance 53112 -- Collector: running, Autoxfer: enabled
Last ftp transfer: succeeded at Thu Dec 19 10:22:46 EST 2013

Enter operation code:
stat -- Display detailed status of Collector instance
stop -- Stop the Collector
endebug -- Enable the debug logs
disdebug -- Disable the debug logs
dis -- Disable auto transfer of data
fc -- Force collection of configuration data
n -- Select new instance
!CMD -- Execute CMD in sh
q -- Quit
? disdebug
TMEA config for 53112 stopped
TMEA dkcbusy for 53112 stopped
TMEA ldevio for 53112 stopped
TMEA portio for 53112 stopped
TMEA pairstat for 53112 stopped
TMEA clprbusy for 53112 stopped
TMEA poolstat for 53112 stopped
TMEA for 53112 stopped
Auto Transfer for 53112 stopped
TMEA config for 53112 started
TMEA dkcbusy for 53112 started
TMEA ldevio for 53112 started
TMEA portio for 53112 started
TMEA pairstat for 53112 started
TMEA clprbusy for 53112 started
TMEA poolstat for 53112 started
TMEA for 53112 started
/opt/TMEA/bin/autoxfer started at 12/19/13 10:43:34
Auto Transfer for 53112 started
```

15.4.8 Automatic Process Management (Keeping TMEA Running)

For large deployments of TMEA, there may be some stability issues with keeping processes running. To keep the processes running automatically, add the autostart script to the crontab (SA should complete this). The changes to the crontab are **highlighted** below. You may have to adjust the mode settings to match other executables in the bin directory (chmod 0755 autostart.sh).

```
[root@namgdse04 bin]# ls -al /opt/TMEA/bin/autostar*
-rwxr-xr-x 1 root root 1332 Dec 19 12:46 /opt/TMEA/bin/autostart.sh

[root@namgdse04 etc]# crontab -l
# rinfo job starting line
14 02 * * * /opt/rinfo/bin/rinfosend >/var/opt/rinfo/rinfosend.log 2>&1
# rinfo job ending line
0 23 * * * /opt/ecc/exec/check_ecc_processes.sh >/dev/null 2>&1
# SCpacct Entry - DO NOT REMOVE
5 16 * * * /opt/SCpacct/bin/preprocess # SCpacct Entry - DO NOT REMOVE
# SCpacct Entry - DO NOT REMOVE
#
# HDS TMEA Manual Entry 12192013 - checks processes every 30 mins
*/30 * * * * /opt/TMEA/bin/autostart.sh
# HDS TMEA Manual Entry - End
```

When running this option, debug mode should also be enabled. This script will check to make sure all of the processes are running every thirty minutes.

15.4.9 Process Impact to RHEL Server

To determine the memory / CPU impact to the RHEL server hosting TMEA collections, the following command can be run (not root dependent):

```
[testuser1@namgdse04 ~]$ ps -eo pmem,pcpu,pid,user,args | grep TMEA
0.0 0.0 537 root /bin/sh /opt/TMEA/bin/autoxfer VSP
0.1 0.0 11796 root /opt/TMEA/HiPERFC -f /opt/TMEA/properties/config_53112.properties
0.1 0.0 11801 root /opt/TMEA/HiPERFC -f /opt/TMEA/properties/dkcbusy_53112.properties
0.1 0.1 11808 root /opt/TMEA/HiPERFC -f /opt/TMEA/properties/ldevio_53112.properties
0.1 0.0 11814 root /opt/TMEA/HiPERFC -f /opt/TMEA/properties/portio_53112.properties
0.0 0.0 11824 root /opt/TMEA/HiPERFC -f /opt/TMEA/properties/pairstat_53112.properties
0.0 0.0 11833 root /opt/TMEA/HiPERFC -f /opt/TMEA/properties/clprbusy_53112.properties
13.5 0.0 11842 root /opt/TMEA/HiPERFC -f /opt/TMEA/properties/poolstat_53112.properties
0.0 0.0 11886 root /bin/sh /opt/TMEA/bin/autoxfer VSP
0.5 0.0 12430 root /opt/TMEA/HiPERFC -f /opt/TMEA/properties/config_10102.properties
0.1 0.0 12435 root /opt/TMEA/HiPERFC -f /opt/TMEA/properties/dkcbusy_10102.properties
0.1 0.2 12440 root /opt/TMEA/HiPERFC -f /opt/TMEA/properties/ldevio_10102.properties
0.1 0.3 12445 root /opt/TMEA/HiPERFC -f /opt/TMEA/properties/portio_10102.properties
0.0 0.0 12450 root /opt/TMEA/HiPERFC -f /opt/TMEA/properties/pairstat_10102.properties
0.0 0.0 12455 root /opt/TMEA/HiPERFC -f /opt/TMEA/properties/clprbusy_10102.properties
2.4 0.0 12460 root /opt/TMEA/HiPERFC -f /opt/TMEA/properties/poolstat_10102.properties
0.0 0.0 12468 root /bin/sh /opt/TMEA/bin/autoxfer VSP
0.2 0.0 23500 root /opt/TMEA/HiPERFC -f /opt/TMEA/properties/config_210060.properties
0.0 0.0 23507 root /opt/TMEA/HiPERFC -f /opt/TMEA/properties/dkcbusy_210060.properties
0.1 0.0 23517 root /opt/TMEA/HiPERFC -f /opt/TMEA/properties/ldevio_210060.properties
0.0 0.0 23532 root /opt/TMEA/HiPERFC -f /opt/TMEA/properties/portio_210060.properties
0.0 0.0 23539 root /opt/TMEA/HiPERFC -f /opt/TMEA/properties/pairstat_210060.properties
0.0 0.0 23547 root /opt/TMEA/HiPERFC -f /opt/TMEA/properties/clprbusy_210060.properties
3.5 0.0 23560 root /opt/TMEA/HiPERFC -f /opt/TMEA/properties/poolstat_210060.properties
```

15.5 Appendix Z: Detailed Revision History

Release	Change Description [Section Number]
1.0	All sections added
1.0.1	Added Appendix A: Firewall Rules [15.1] Added Appendix B: HTnM AFR [15.2] Added Appendix C: HTnM Reporting [15.3] Added Appendix D: TMEA Agent Setup/Upgrade [15.3] Added Appendix Z: Detailed Revision History (all updates below will update this section) [15]
1.0.2	Realigned section numbering [Multiple] Added HBA Login Status Added SOMs [8.2.2] Added Shared Memory [8.2.3] Updated array weight and power with clearance diagrams [8.1] Added Power Ratings/Plugs [8.1.1] Added Weight Rating [8.1.2] Updated Relevant Links [14] Added Functional ID List and Default Accounts (8.7, sections 8.8+ renumbered) [8] Added 400TB model (XL) and renamed 100TB (S), 200TB (M), 300TB (L) [10] Added AD for HCS [] Added Port Flapping [8.24]

1.0.3	Updated AD Configuration to remove User Management privilege from Admins [8.16] Updated SOM descriptions [8.2.2] Added Host Mode and Host Mode Options [8.18] Removed Maintenance password [various]

<insert certificates for SVP>

<insert architecture discussion>