
SRM 3.5

Operations

Requirements

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EMC Response provided on August 21, 2014.

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Background

SRM 3.5 is currently being deployed in Citi's SAN/NAS environment, which, when completed, will replace EMC's Ionix Control Center (formerly known as ECC).

SANScreen, a storage tool currently deployed in Citi's storage environment, would probably not have its license renewed, which will have a negative impact on SAN Ops teams currently using it for extracting various types of information. See section 2 for more details

Section 1 of this document describes high-level requirements for SRM 3.5. Section 2 lists the various uses of SANScreen towards meeting such varied tasks as monitoring, reporting, SAN Fabric and Switch information, etc.

1. SRM Requirements – High Level

a. CTI Distributed SAN and NAS Storage requirements:

- Array Capacity Reporting including

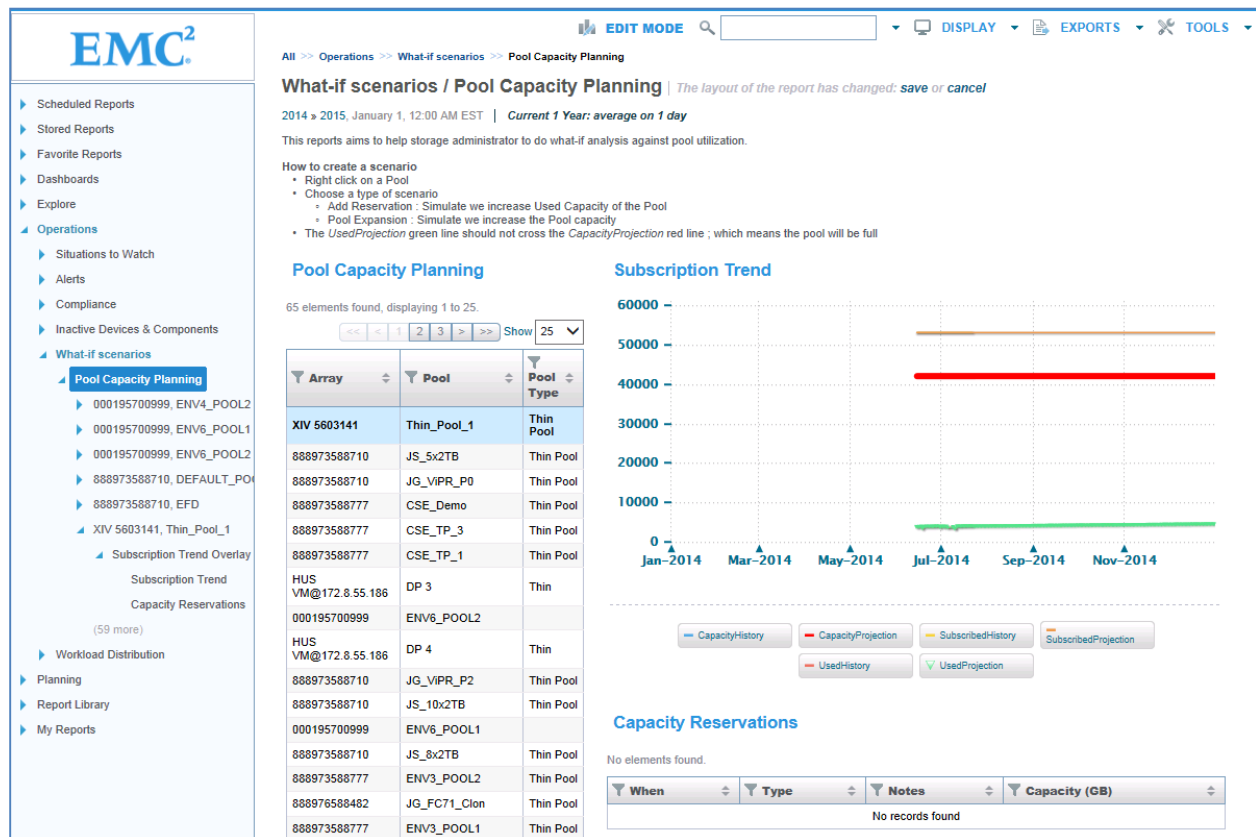
- Trending

EMC response → SRM has built-in capacity trending functionality.

- Forecasting

EMC response → SRM can generate “what if” scenarios, as well as a wealth of analytics that can be applied to capacity and performance metrics for any platform. In addition, SRM enables Demand Management by allowing Capacity Reservations to be placed on any pool from any array type that has been normalized.

(See screenshot below for “What-if scenarios / Pool Capacity Planning”, including Capacity Reservations. Also see pg. 14.)



- Future link into TCRS (ServiceNow)

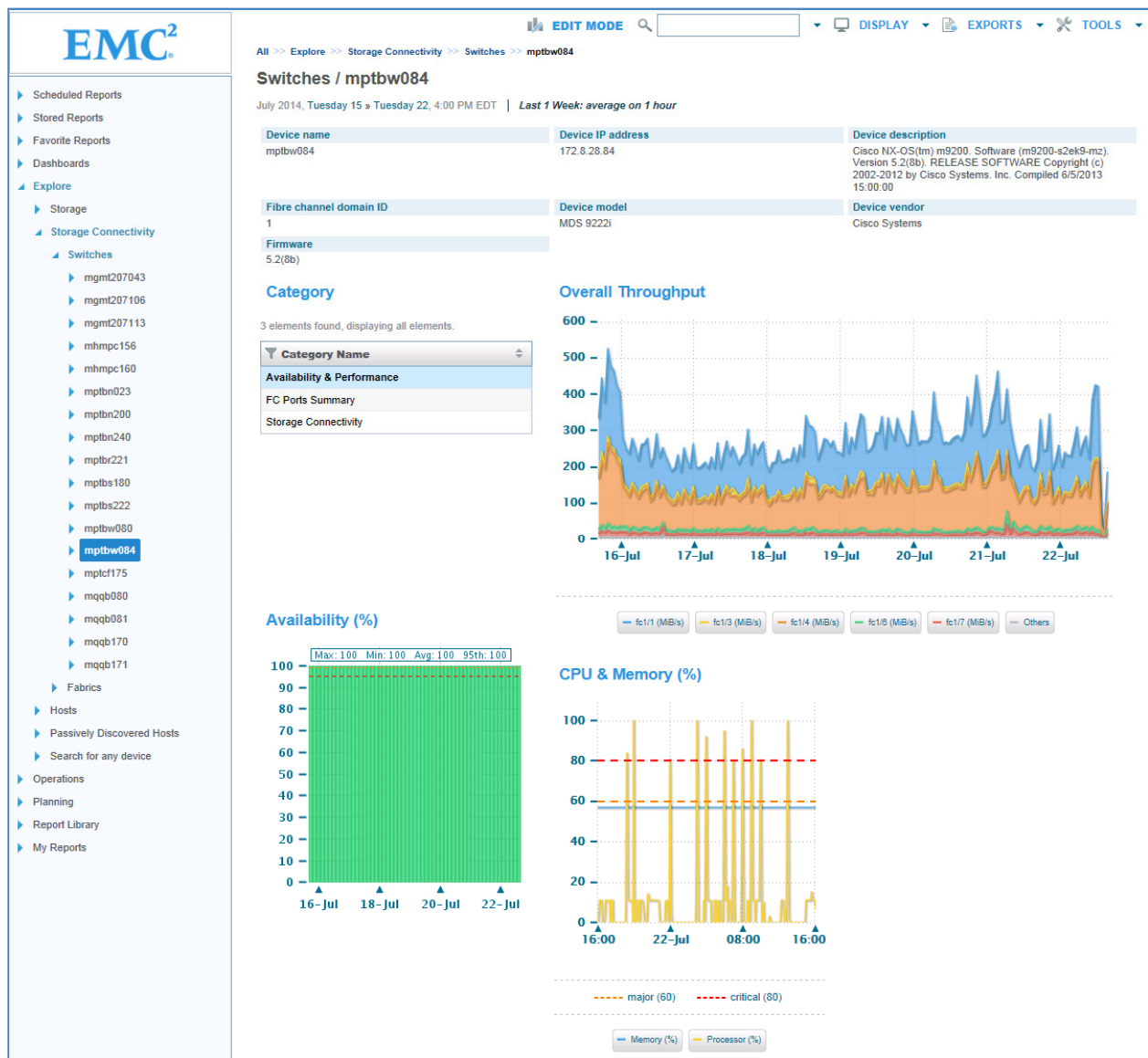
EMC response → SRM does not integrate directly with ServiceNow. However, EMC PS can integrate SRM data into TCRS via web-services functionality.

- Fabric Network Port Reporting including

- Trending

EMC response → SRM has built in trending functionality for switch port metrics. Additionally, SRM can trend on any of the many metrics that are collected from the fabric switches.

(See screenshot below of performance trending metrics for a Cisco switch.)



- Forecasting

EMC response → SRM includes many pre-built formulas that can be applied to switch port metrics.

- Alerting
 - SRM should provide “intelligent alerting” for both SAN and NAS, as well as be able to fill monitoring gaps. (EMC should be made aware of the alerting requirements so they include it in their existing work)

EMC response → SRM can setup threshold-based alerting on any metric. OOTB alerting can be enabled in SRM 3.5, and includes about 30 alerts for VMAX, 4 for VNX, 15 for Cisco, 15 for Brocade, etc. SRM can also be set up as SNMP trap destination, and can generate additional alerts if necessary. (See the attached Alerts matrix.) In addition, the Situations to Watch functionality provides visibility for critical KPIs.

(See screenshot to the right for a list of “Situations to Watch”.)

All >> Operations >> Situations to Watch	
Operations / Situations to Watch	
July 2014, Tuesday 15 » Tuesday 22, 4:00 PM EDT Last 1 Week	
The following reports help identify availability, capacity or performance problems.	
17 elements found, displaying all elements.	
Reports	
Alert: Configured Critical Devices' Alerts	
Alert: Devices with Critical Alerts	
Alert: High Impact Alerts	
Alert: Host Impact Analysis	
Availability: Disks Failed	
Capacity: High FileSystem Utilization (%)	
Compliance: LUN Service Level	
Compliance: Pool Oversubscription	
Compliance: Pools with capacity > 1TB	
Compliance: Primary LUNs not Masked or not Mapped	
Performance: High CPU Utilization (%)	
Performance: High Memory Utilization (%)	
Performance: High Traffic Utilization (%)	
Performance: Worst Disk Response Times	
Performance: Worst LUN Response Time	
Storage Reclamation: Allocated LUNs with no I/O	
Storage Reclamation: Oversized FileSystems	

- E2E Performance reporting

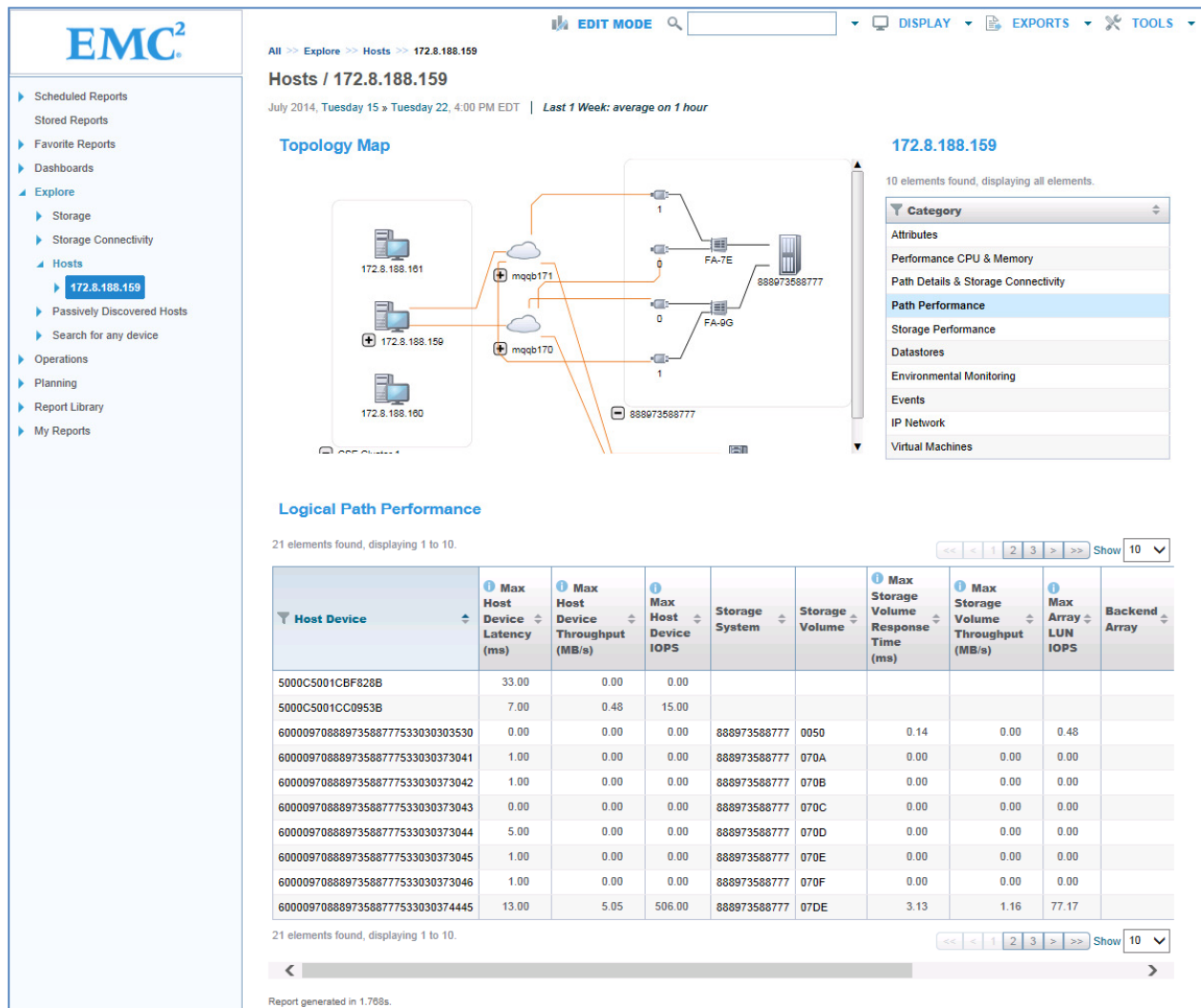
EMC response → SRM collects performance data on all components, “end-to-end” from host to SAN fabric to arrays (or from hosts to NAS devices).
- Performance management, end to end real time monitoring with drill-down capability and analytics

EMC response → SRM is meant to correlate performance metrics from host, fabric and array to help triage performance problems. SRM collects detailed data on each of these elements to allow for drill down into component level details. It also collects and maintains historical performance data so Citi can compare current performance with historical performance to aid in troubleshooting .

SRM also allows you to create operational dashboards that will allow Citi to easily see the status of KPIs e.g. A dashboard showing write pending limits or FA utilization across all frames in a location.

SRM data collection for performance data is not real time, but does provide 5 minute level granularity. If a user is looking for a finer level granularity, they can utilize the element managers for that level of detail. SRM provides the ability to see any metric in context with related data which is extremely beneficial when troubleshooting performance issues.

(See screenshot below for Topology Map, and end-to-end performance metrics.)



- Capacity (SAN and Fabric), installed, available, link in TCRS and understand demand and track growth
EMC response → SRM includes many OOTB reports on SAN and Fabric metrics, as well as the ability to trend & forecast. EMC PS can add business context to the technical by tagging data with Citi-specific labels such as line-of-business, application ID, P&L codes, etc. (See attached “Main Metrics” spreadsheet.)
- Historical data, understand trends. Line –of-Business reporting. Mapping Utilization by application
EMC response → SRM includes many OOTB reports on SAN and Fabric metrics, as well as the ability to trend & forecast. EMC PS can add business context to the technical by tagging data with Citi-specific labels such as line-of-business, application ID, P&L codes, etc. which allows for reports to be modified to show LOB specific details around any of the data collected.

b. SEV 1 Requirements – Doug Chin

- Host connectivity issue resulting in an impact to end users
EMC response → **The SRM SolutionPack for Storage Compliance includes about 90% of the functionality from SCA, and can proactively identify potential issues such as single-pathed servers, or configurations that are not compliant with either EMC or Citi best practices.**

(See screenshot below for “Compliance Reports / All Active Breaches”, including example of I/O Path Redundancy breach, i.e. insufficient pathing.)

Severity	BreachName	Device	Device Type	Affected Objects	Policy	Rule	Creation Time	Last Modified Time
CRITICAL	I/O Path Redundancy	FNM88911788232:FNM88911788232	VirtualStorage	VPLEX-Backend Port:50001442A0287C10 VPLEX-Backend Port:50001442A0287C11 VPLEX-Backend Port:50001442B0287C10 VPLEX-Backend Port:50001442B0287C11 Array:888973588777	VPLEX Configuration	I/O Path Redundancy for VPLEX Backend	2014/07/14 00:00:35 EDT	2014/07/28 08:38:06 EDT
MAJOR	Base Connectivity Interoperability for Hosts	mhmcb180.lss.emc.com	Hypervisor	Array:888973588710	EMC Support Matrix	Base Connectivity Interoperability for Hosts	2014/07/21 17:01:36 EDT	2014/07/29 00:00:07 EDT
MAJOR	Base Connectivity Interoperability for Hosts	mhmcb242.lss.emc.com	Hypervisor	Array:888973588710	EMC Support Matrix	Base Connectivity Interoperability for Hosts	2014/07/21 17:01:40 EDT	2014/07/29 00:00:12 EDT
MAJOR	Base Connectivity Interoperability for Hosts	mhmcb046.lss.emc.com	Hypervisor		EMC Support Matrix	Base Connectivity Interoperability for Hosts	2014/07/21 17:01:38 EDT	2014/07/29 00:00:08 EDT
MAJOR	Base Connectivity Interoperability for Hosts	MHMPC111	Database Server		EMC Support Matrix	Base Connectivity Interoperability for Hosts	2014/07/21 17:01:38 EDT	2014/07/29 00:00:10 EDT
MAJOR	Base Connectivity Interoperability for Hosts	mhmcb243.lss.emc.com	Hypervisor	Array:888973588710	EMC Support Matrix	Base Connectivity Interoperability for Hosts	2014/07/21 17:01:40 EDT	2014/07/29 00:00:10 EDT
MAJOR	Base Connectivity Interoperability for Hosts	MHMPC111	Database Server	Array:888976588482	EMC Support Matrix	Base Connectivity Interoperability for Hosts	2014/07/21 17:01:38 EDT	2014/07/29 00:00:10 EDT
MAJOR	Base Connectivity Interoperability for Hosts	MHMCD012	Host	Array:888973588727	EMC Support Matrix	Base Connectivity Interoperability for Hosts	2014/07/21 17:01:35 EDT	2014/07/29 00:00:05 EDT
MAJOR	Base Connectivity Interoperability for Hosts	mhmcb181.lss.emc.com	Hypervisor	Array:888973588710	EMC Support Matrix	Base Connectivity Interoperability for Hosts	2014/07/21 17:01:38 EDT	2014/07/29 00:00:09 EDT

- VMAX 20K not being able to handle the load
EMC response → **SRM can proactively provide actionable information regarding performance trends; the PS delivery team will re-create many of the dashboards from the VMAX Performance Reporting Web-portal, which was created specifically to address this issue.**
- Double director issue during cache upgrade caused several hosts to lose storage connectivity
EMC response → **SRM will help identify components with insufficient redundancy.**

- HDS Cache/Shared memory caused a performance issue
EMC response → **SRM is able to collect HDS performance metrics, and identify trends that might lead to performance issues. (Please note that SRM data-collection for HDS performance metrics is dependent on SMI-S.)**
- Connectivity issues
EMC response → **The SRM SolutionPack for Storage Compliance can identify potential connectivity issues such as single-pathed servers, or configurations that are not compliant with either EMC or Citi best practices.**
- ISL port flapping caused issues for hosts
EMC response → **If Citi can identify symptoms that lead to ISL port flapping issues, EMC can setup alerts within SRM to issue alerts if these symptoms are detected.**
- Port flapping has caused issues on the host side
EMC response → **If Citi can identify symptoms that lead to host-side port flapping issues, EMC can setup alerts within SRM to issue alerts if these symptoms are detected.**

(See screenshot below for “Situations to Watch / FC Ports Errors Detection”, which will report on port errors that may indicate increased risk of port flapping.)

EMC²

EDIT MODE

DISPLAY EXPORTS TOOLS

All >> Report Library >> Brocade FC Switch >> Situation to Watch >> FC Ports Errors Detection

Situation to Watch / FC Ports Errors Detection

July 2014, Monday 21 » Tuesday 22, 4:00 PM EDT | Last 1 Day

This report shows which switch has FC ports errors. The "Errors on FC Ports?" column indicates errors that are occurred on FC ports. When the column displays a Red Bullet that means one error KPIs has got data. Green means no errors. This report is using the max aggregation for all errors KPIs on each ports.

13 elements found, displaying all elements. Show ALL

Switch	IP	Description	Firmware Version	Last Boot Date	Status	Errors on FC Ports?
mptbs180	mptbs180	DS-5300B	v7.0.1	Tue Apr 22 16:27:00 2014	online	✖
mptbs222	mptbs222	DS-5300B	v6.4.0b	Tue Apr 22 16:28:27 2014	online	✖
mptbw080	172.8.28.80	Brocade 48K	v6.4.3d	Tue Apr 22 16:08:27 2014	online	✖
mgmt207106	172.6.207.106	Connectrix ED-DCX8510-8B	v7.1.1c	Thu May 15 16:10:03 2014	online	✖
mgmt207113	172.6.207.113	DS-6510B	v7.0.1	Thu Dec 19 00:59:35 2013	online	✖
mptbn240	mptbn240	DS-6520B	v7.1.0a	Tue Apr 22 11:48:22 2014	online	✖
mptcf175	172.8.17.175	DS-6510B	v7.0.1	Tue Apr 22 16:08:26 2014	online	✖
mptbn200	mptbn200	Connectrix MP_7500B	v6.4.3f	Tue Apr 22 15:30:32 2014	online	✔
mgmt207043	172.6.207.43	DS-6510B	v7.0.1	Thu Dec 19 01:00:24 2013	online	✔
mptbn023	172.8.21.23	DS-200B	v6.2.2e	Tue Apr 22 16:09:05 2014	online	✔
mqqb171	mqqb171	DS-6510B	v7.0.0	Tue Apr 22 18:18:02 2014	online	✔
mqqb170	mqqb170	DS-6510B	v7.0.0	Tue Apr 22 18:32:35 2014	online	✔
mptbr221	mptbr221	Connectrix ED-DCX8510-8B	v7.0.0a	Tue Apr 22 11:49:12 2014	online	✔

2. SANScreen – Current Usage & Capability

a. NAM SRPP – Gary Battersby

Used Heavily for Storage Provisioning and Allocation as below:

- It is used as a pre-check during the TCRS process to view where the server is connected, to what fabric and array, and what cluster nodes are involved
EMC response → **SRM provides this information in OOTB dashboards & reports, and connectivity information can be collected purely through passive host discovery.**

(See screenshot below for Topology Map, HBA inventory and other connectivity information for a given host.)

The screenshot displays the EMC2 NAM SRPP interface for host MHMCD012. The interface includes a left-hand navigation pane with sections like Scheduled Reports, Storage, Hosts, and a detailed list of hosts. The main content area is divided into several sections:

- Topology Map:** A visual representation of the host's connectivity to storage arrays and switches. It shows MHMCD012 connected to BG44550949, which in turn connects to VSAN0040 and two storage arrays (888973588710 and 888973588727).
- HBA Inventory:** A table listing the host bus adapters (HBAs) installed on the host.
- PowerPath Reports:** A section for reports related to the PowerPath software, including Multipath Software and Health Summary.
- Path Details:** A table showing the details of the storage paths, including host device, storage volume, storage group, storage system, storage type, VPLEX extent, backend array LUN, backend array, backend array type, service level, and protection.
- Connectivity:** A table showing the connectivity details for each HBA, including port, HBA vendor, HBA model, HBA firmware, HBA driver version, port WWN, port status, switch port WWN, switch slot/port, switch name, switch model, and switch vendor.

Name	Driver	Serial Number	Firmware	Model	Vendor	Port WWN	Avail
com.emulex-LP10000-0	2.74.014.001	BG44550949	1.80A2	com.emulex-LP10000-0	Emulex Corporation	10000000C9427115	
com.emulex-LP10000-0	2.74.014.001	BG44550949	1.80A2	com.emulex-LP10000-0	Emulex Corporation	10000000C9427116	

Host Device	Storage Volume	Storage Group/View	Storage System	Storage Type	VPLEX Extent	Backend Array LUN	Backend Array	Backend Array Type	Service Level	Protection
PHYSICALDRIVES	0050	N/A	888973588727	Symmetrix					System Resource	RAID-1
PHYSICALDRIVES	6204	N/A	888973588727	Symmetrix					Bronze	RAID-1

Port	HBA Vendor	HBA Model	HBA Firmware	HBA Driver Version	Port WWN	Port Status	Switch Port WWN	Switch Slot/Port	Switch Name	Switch Model	Switch Vendor
com.emulex-LP10000-0	Emulex Corporation	com.emulex-LP10000-0	1.80A2	2.74.014.001	10000000C9427115	ONLINE	200B000DEC6A2E80	fc1/11	mptbw084	MDS 9222i	Cisco Syst
com.emulex-LP10000-0	Emulex Corporation	com.emulex-LP10000-0	1.80A2	2.74.014.001	10000000C9427116	ONLINE	2092006069E4250A	2/18	mptbw080	Brocade 48000 Director	Brocade

- When it comes to Aperture for new or existing server it acts as a checkpoint to see the fabric connectivity
EMC response → **SRM provides this information in OOTB dashboards & reports, and it can be collected purely through passive host discovery.**
- During allocation process it is used to check FA connectivity, WWN and HBA connectivity for zoning purpose
EMC response → **SRM provides this information in OOTB dashboards & reports, and it can be collected purely through passive host discovery.**
- After allocation, it is used to cross verify whether the allocation is done accurately For some arrays such as Clarion and XIV where target LUN Excel spreadsheets are not available, SanScreen provides a huge insight
EMC response → **SRM certainly provides enough information to verify allocations. If Citi can clarify use cases where allocation is not done accurately, EMC can configure reports to help address the situation.**

Lost Functionality

- Reviewing host connectivity (HBA information, Switch port information, Current/recent state)
EMC response → **SRM provides this information. Reports can be scheduled to be generated automatically, and saved to provide a historical record. In addition, SRM tracks configuration changes.**

(See screenshot below for “Storage Compliance / Track Configuration Changes”.)

EMC²

Scheduled Reports

Stored Reports

Favorite Reports

Dashboards

Explore

Operations

Situations to Watch

Alerts

Compliance

Storage Compliance

Breach Report

Track Configuration Changes

View Policies

Inactive Devices & Components

What-if scenarios

Workload Distribution

Planning

Report Library

My Reports

EDIT MODE

DISPLAY

EXPORTS

TOOLS

All >> Operations >> Compliance >> Storage Compliance >> Track Configuration Changes

Storage Compliance / Track Configuration Changes

2014, June > July, the 22 at 4:00 PM EDT | Last 1 Month

95 elements found, displaying 1 to 25.

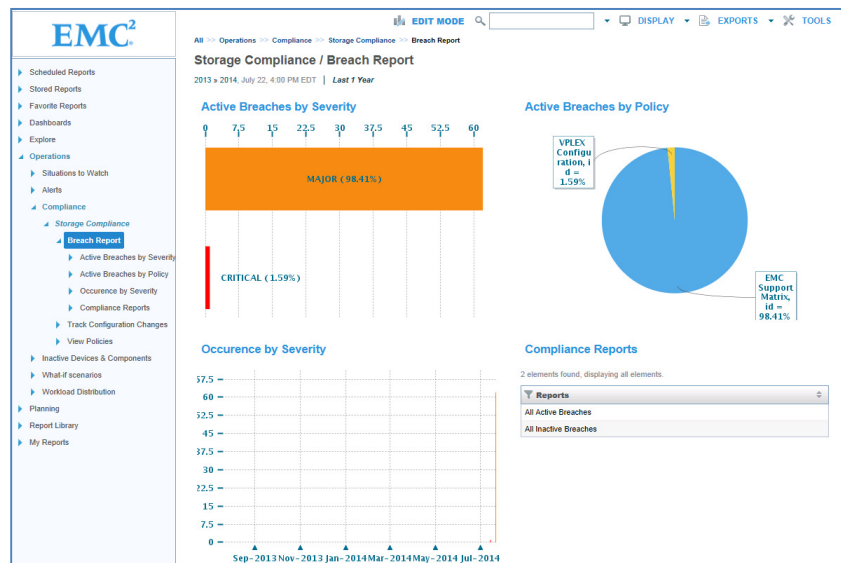
<< < 1 2 3 4 > >>

Show 25

Changed At	Description	Device	Component	# of Breaches
2014/07/22 13:42:26 EDT	The status of switch port 200D0027F84A8E5B on switch mptbn240 changed from online to offline	mptbn240		0
2014/07/22 13:42:26 EDT	The status of switch port 20140027F84A8E5B on switch mptbn240 changed from online to offline	mptbn240		0
2014/07/22 11:42:26 EDT	The status of switch port 203F00051E5A63B3 on switch mptbs222 changed from online to offline	mptbs222		0
2014/07/22 08:42:27 EDT	The status of switch port 203D00051E7B7134 on switch mptbs180 changed from online to offline	mptbs180		0
2014/07/22 08:42:27 EDT	The status of switch port 203C00051E7B7134 on switch mptbs180 changed from online to offline	mptbs180		0
2014/07/22 06:42:30 EDT	The disk device PHYSICALDRIVE8 with disk wwn 6005076801808677C80000000003428 has been added on host MHMPD231.	MHMPD231	PHYSICALDRIVE8	0
2014/07/22 06:42:30 EDT	The disk device PHYSICALDRIVE27 with disk wwn 60000970000194900904533030313238 has been added on host MHMPD231.	MHMPD231	PHYSICALDRIVE27	0
2014/07/22 06:42:30 EDT	The disk device PHYSICALDRIVE24 with disk wwn 60000970000194900904533030313235 has been added on host MHMPD231.	MHMPD231	PHYSICALDRIVE24	0
2014/07/22 06:42:30 EDT	The disk device PHYSICALDRIVE14 with disk wwn 600601608B702200B6D781423EEAE211 has been added on host MHMPD231.	MHMPD231	PHYSICALDRIVE14	0

- Host zoning information and masking information
EMC response → **SRM provides this information, which can be collected purely through passive host discovery.**
- Provisioned arrays' connectivity (Switch port information and current/recent state)
EMC response → **SRM provides this information. Reports can be scheduled to be generated automatically, and saved to provide a historical record.**
- Host storage access topology
EMC response → **SRM provides this information.**
- Host provisioned LUN information and conflicting LUN allocations
EMC response → **SRM provides this information. If Citi can define “conflicting LUN allocations” (inadvertent clustering?), EMC PS can create a report to address the issue.**
- Array inventory, e.g., which arrays and FAs does a host have from which LUNs
EMC response → **SRM provides this information. Select an Array, and see all connected hosts (whether passively or actively discovered).**
- Violation issues and causes
EMC response → **The SRM SolutionPack for Storage Compliance can identify configurations that are not compliant with either EMC or Citi best practices.**

(See screenshot below for “Storage Compliance / Breach Report” dashboard.)



- FA/switch maintenance impacts
EMC response → **Not currently available, but SRM 3.5 Service Pack 1 (scheduled for release on Sept. 5th) is adding functionality around topology views.**

b. NAM DSI – Al Mahmood

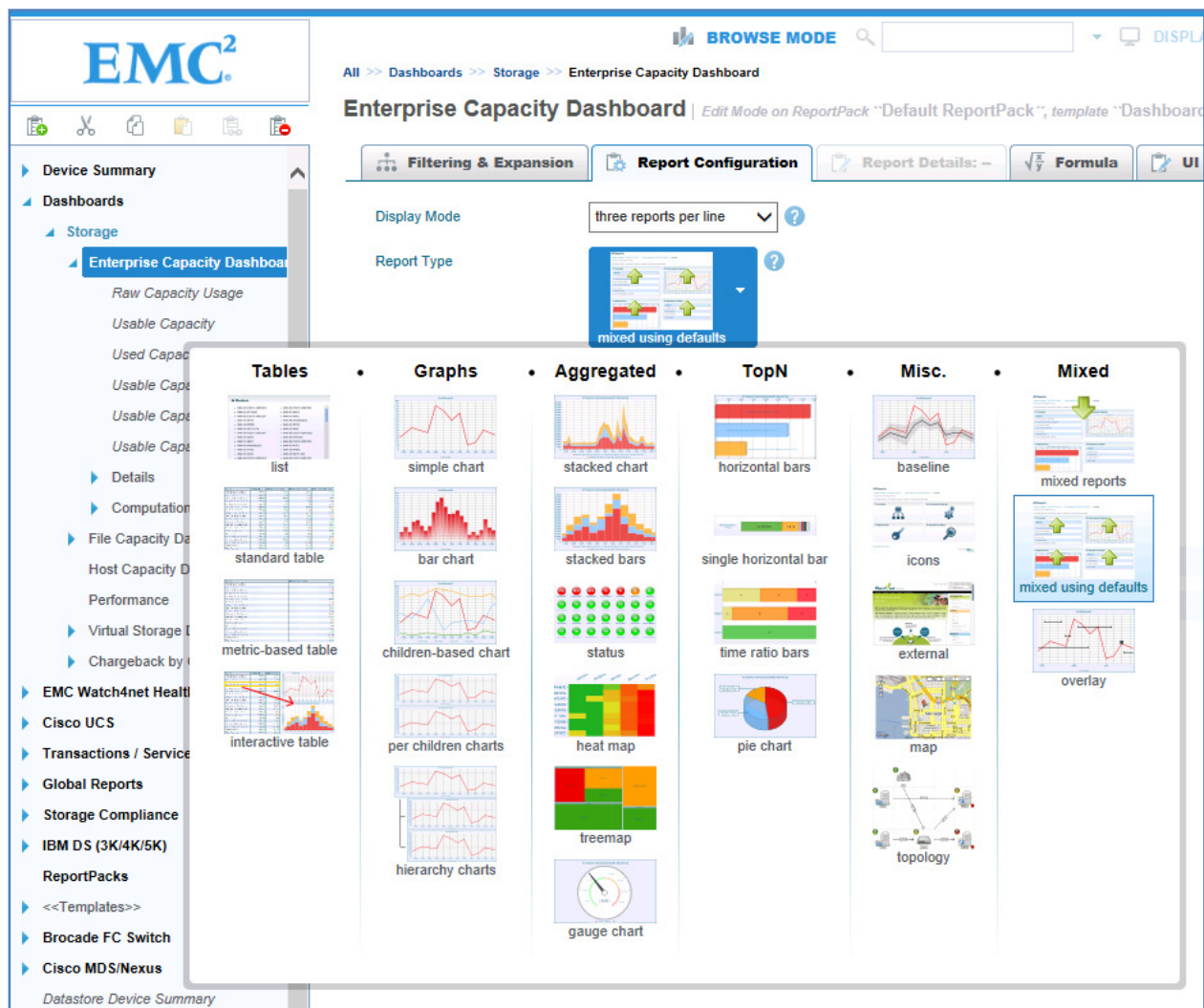
- There will be huge impact on San Analytic Tool portal (SAT) which pulls the SAN fabric and Storage data from SANSscreen. SAT provides canned reports and end-to-end SAN relationships (Storage, Fabric, Host, App Risk, San Stack, Business, App/DBA/SA support) via a GUI interface .

EMC response → **SRM provides similar information, and EMC PS is working to add business context to maximize the utility of SRM.**

- SAT also provides accurate charting options for both easy analysis and management reporting .

EMC response → **SRM features many accurate charting options, which users can leverage to construct their own dashboards & reports.**

(See screenshot below for charting options available when building dashboards.)



- This tool is heavily used by SA's, SAN Ops for info and troubleshooting purposes on SAN Infra and it also currently used for SAN Storage, Fabric TR and SAN analytical info for SAN Storage optimization purposes.

EMC response → **SRM provides much information that can be used for these purposes. (See attached "Main Metrics" spreadsheet.)**

- Most of the reports generated via SAT are used by various businesses for their needs. Example: SAN Chargeback reporting

EMC response → **EMC PS is working to re-create the SAN Chargeback reporting (in addition to many other SAN/NAS/Performance dashboards & reports) within SRM.**

- On an average, SAT site has 1,600 visits per month

EMC response → **SRM front-end web-portals will support this level of traffic.**

c. EMEA Distributed Storage – Nigel Chilcott

- Massive impact, monitoring, MOR/billing, storage reservations all impacted.

EMC response → **EMC PS is working on a global chargeback solution for Citi. Demand management functionality is provided via Capacity Reservation functionality... reservations can be placed on any pool from any array type that has been normalized.**

(See screenshot below for sample Capacity Reservation dashboard. Also see pg. 4.)

The screenshot displays the EMC2 web interface for Pool Capacity Planning. The left sidebar shows a navigation menu with options like Scheduled Reports, Stored Reports, Favorite Reports, Dashboards, Explore, Operations, Situations to Watch, Alerts, Compliance, Inactive Devices & Components, What-if scenarios, Pool Capacity Planning, and a list of specific pools. The main content area is titled 'Pool Capacity Planning / 000195700999, ENV6_POOL1' and includes a 'Subscription Trend' section with a note 'This report does not select any data.' and a 'Capacity Reservations' section. The Capacity Reservations section shows a table with one element found.

When	Type	Notes	Capacity (GB)
2014/08/01 12:00:00 EDT	CapacityReservation	test by fred	100.0

d. ASPAC – Rao Pappula

- Currently using it mainly for switch reporting, inventory and to track changes on McData switches. Also exploring DCNM for reporting during the process of sun-setting McData switches. There won't be any operational impact.

EMC response → **SRM does not support McData switches.**