


Automating Configuration Compliance in Complex SANs

*Introducing EMC Ionix Storage
Configuration Advisor*

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Manual Change Processes Are Too Inefficient and Error-prone



I can't believe we still use spreadsheets to track this %#@\$. There's gotta be a better way.

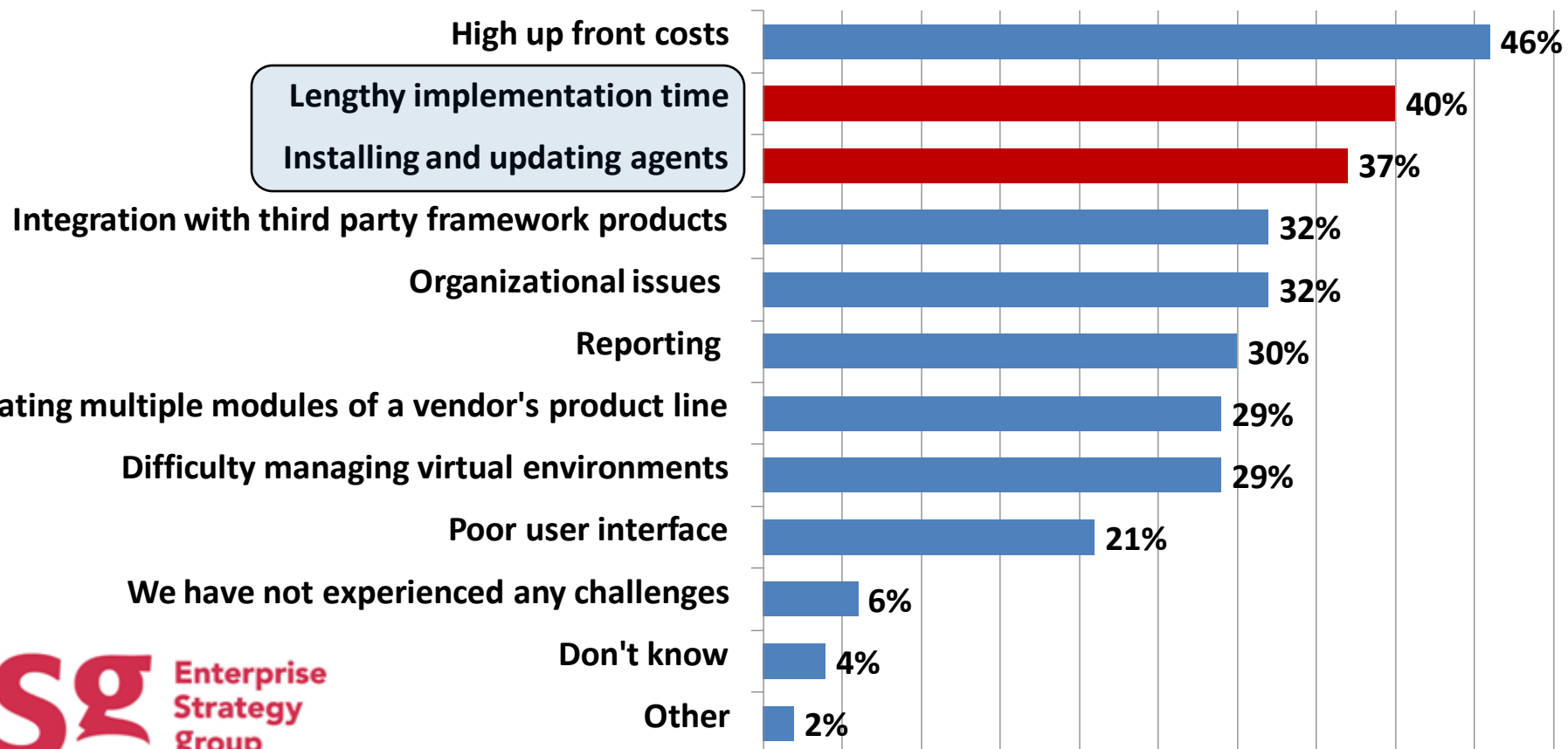
“Experience has shown that more than half of SAN outages occur due to improper configurations that are a result of either a poorly designed or executed change.”

“With all the moves, adds and changes that take place daily, SAN administrators struggle to maintain adequate service levels for the business.”

- Bob Laliberte, Enterprise Strategy Group

Challenges in Deploying SRM Solutions

What challenges -- if any -- has your organization experienced in terms of deploying and using your SRM solution?



Ionix Storage Configuration Advisor

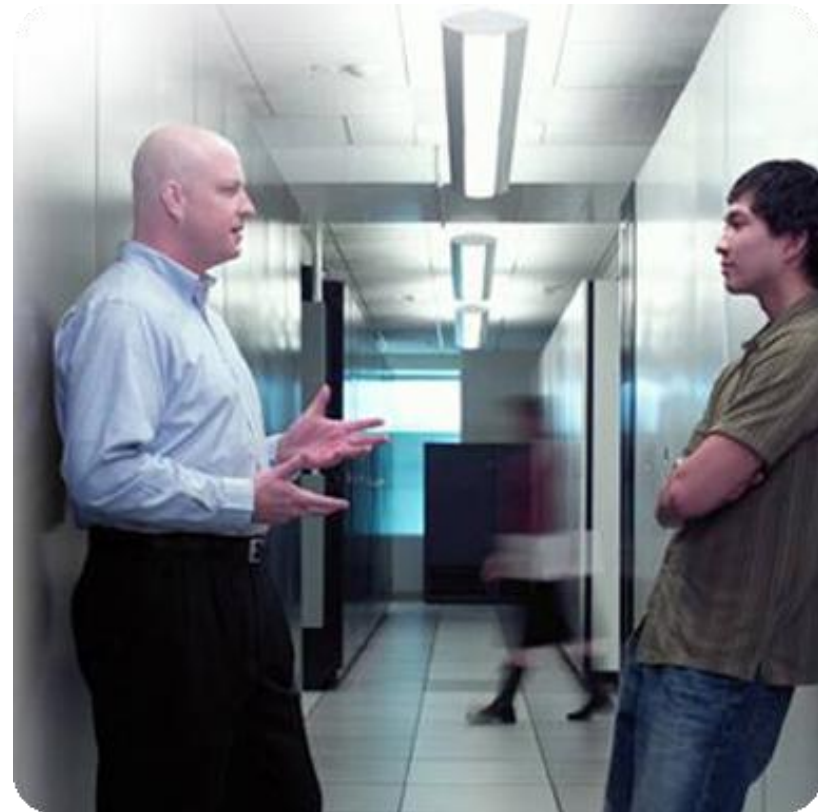


- Identifies the impact of change on the storage infrastructure
 - Provides near real-time change tracking and best practice validation
- Simplifies deployment and management
 - Agentless discovery
- Provides comprehensive reporting, gap and trend analysis
- Automates the capture and documentation of your SAN configuration details
 - Server configuration
 - Path management details
 - Storage hardware configuration
 - End-to-end dependency mapping

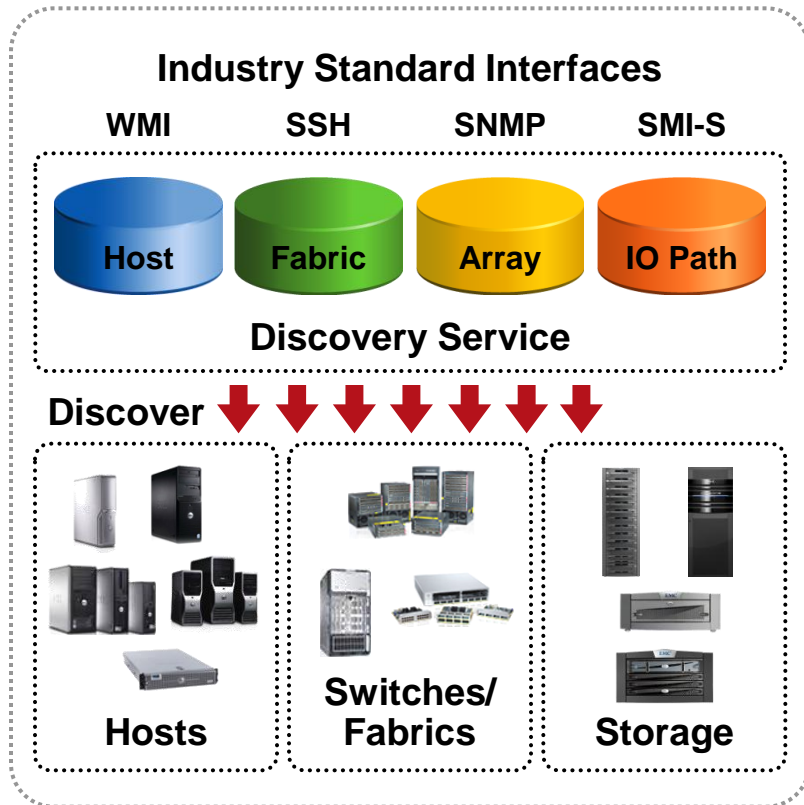
The Value of Ionix Storage Configuration Advisor



- **Storage Admin/Architect (ICs)**
 - Reduce the time I spend validating compliance with our configuration best practices
 - Half of all SAN outages are due to human error – Help me identify a problem before it occurs
 - Help me prioritize my tasks – Give me a report by severity level of all configuration issues
 - Help me document changes and any configuration problems that occur
- **Director of Storage/CIO (Management)**
 - Make my team more efficient by automating configuration discovery and change validation
 - Help me understand how well we are complying with service level agreements
 - How many changes are we making in a day, a week or a month?
 - How long does it take us to correct a policy breach?
 - What components within the infrastructure have the most breaches?
 - How do we maintain an audit trail of all changes?
 - Are we improving over time?



Agentless Discovery and Dependency Mapping



Agentless Discovery

- Eliminates management complexity
- Accelerates time to deployment
- Leverages industry standard interfaces to discover managed objects and relationships

Change Tracking



- Near real time tracking provides audit trail of configuration changes*

Configuration Changes			
Date/Time (GMT-04:00)		Description	
2009-04-01 15:40		No access to required volumes -- breach resolved on host losal146,volume LUN 33 at 01-Apr-2009 15:40:23	
2009-04-01 15:40		No access to required volumes -- breach resolved on host losal146,volume Volume 016C4 at 01-Apr-2009 15:40:23	
2009-04-01 15:40		No access to required volumes -- breach resolved on host losal146,volume Volume 00081 at 01-Apr-2009 15:40:23	
2009-04-01 15:40		No access to required volumes -- breach resolved on host losal146,volume Volume 000DD at 01-Apr-2009 15:40:23	
2009-04-01 15:40		Rule Missing Path:Missing Path -- rule disabled by Security Administrator	
2009-04-01 14:45		Backup_restore1 -- policy edited by Security Administrator	
2009-04-01 09:00		Masking and/or mapping and/or storage group configuration changed on array 000187700037	
2009-04-01 08:26		Masking and/or mapping and/or storage group configuration changed on array 000187700037	
2009-04-01 07:42		Masking and/or mapping and/or storage group configuration changed on array 000187700037	
2009-04-01 06:04		Switch brcd_48000 -- Firmware configuration changed	
2009-04-01 05:15		Switch port SW4900_l82c7219:Slot 0, Port 1 <--> Switch port SW3850_l82c7105:Slot 0, Port 0 -- link configuration changed	

Wizard Driven Policy Management



- *Wizards and built-in templates enable you to quickly build and apply policies to groups of objects*

Create Policy Wizard

1. Select Policy Template

Step	Description
1	Select Policy Template
2	Policy Definition
3	Select Scope
4	Manage Rules
5	Set Notifications
6	Associate to Policy Groups
7	Review Policy

1. Select Policy Template

Policy Template Name	# of Rules	Last Modified (GMT-04:00)
Array Configuration	4	2007-12-16 00:58
EMC Best Practice Configuration	6	2007-12-16 00:58
Empty Policy	0	2007-12-16 00:58
High Availability Physical Connectivity	2	2007-12-16 00:58
High Availability Software Configuration	5	2007-12-16 00:58
Host Configuration	6	2007-12-16 00:58
Path Management	6	2007-12-16 00:58

0 Selected

Show Policy Template

Description

Select an existing policy template from which to create your custom policies.

Click Next to continue creating the policy.

Use the Save As button from the Policies page, to create a policy based on the attributes of an existing policy.

Click Help for more information on this step.

Continuous Change & Policy Analysis



- *Policy breaches, severity level, and related changes are displayed in near real time*

The screenshot displays the EMC Investigate interface. At the top, there is a navigation bar with tabs for Dashboard, Investigate (selected), Configuration Changes, Policies, Templates, Search, Reports, and Administration. Below the navigation bar, the 'Investigate' section shows a table of policy breaches. The table has columns for Severity, Active?, Ack.?, Breach, Policy, and Rule. One row is highlighted in blue, indicating the selected breach.

Severity	Active ?	Ack.?	Breach	Policy	Rule
Critical	Yes	No	Unsupported multipathing software.	Host Configuration	Supported Multipath Software Version
Warning	Yes	No	Unsupported Solutions Enabler version.	Host Configuration	Supported Solutions Enabler Version
Critical	Yes	No	Number of masked volumes exceeds limit.	Masking Policy	Maximum Number of Volumes Masked to F
Critical	Yes	No	Number of masked volumes exceeds limit.	Masking Policy	Maximum Number of Volumes Masked to F
Critical	Yes	No	I/O Path Redundancy	High Availability Physical Connectivity	I/O Path Redundancy
Critical	Yes	No	I/O Path Redundancy	High Availability Physical Connectivity	I/O Path Redundancy

Below the table, there are buttons for 'Show Configuration Changes', 'Acknowledge', 'Unacknowledge', and 'Manage Notes'. The interface also shows '1 Selected' and 'Page 1' of 'Items 1 to 25 of 77'. A detailed view of the selected breach, 'Vulnerability-I/O Path Redundancy', is shown below. This view includes tabs for 'Breach Causes', 'Scope', 'Rule Information', 'Recommendation', 'Map', 'Breach Timeline', and 'Acknowledgment and Notes'. The 'Map' tab is active, displaying a network diagram with nodes for Hosts, Indicators, Connectivity, and Storage. A red dashed line indicates a 'Missg-redundancy' between the 'losal147' host and the 'losam083' connectivity node. A filter panel on the left shows various options checked, including Path Types, Physical, Masking, Zoning, Hosts, Host, Host Device, HBA, and Host Port.

SCA Validates Key Host Configuration Properties Prior to a Change



- To avoid unplanned application outages, host configuration must be validated prior to a change
- This means checking the version number of key parameters for conformance with policy
 - Array microcode
 - HBA vendor, model, firmware and driver
 - Operating System
 - PowerPath
 - Solutions Enabler
 - SAN Switch firmware

Edit Rule - Supported Multipath Software Version

* Rule Name: Supported Multipath Software Version

* Rule Type: Multi-pathing software

* Breach Type: Vulnerability

* State: Enabled

Severity:
 Critical
 Warning
 Information

Scope:
Policy Scope: [All Arrays](#) [All Fabrics](#) [All Hosts](#) [All Switches](#)
Rule Scope Applies to all **Hosts** in the policy scope.

Rule Scope Includes: **7 Hosts**

Excluded objects from rule scope: **5 Switches 6 Arrays 4 Fabrics** [Exclude]

Desired State:
 Multi-pathing software version in 5.0

Recommendation:
1. Uninstall the unsupported multipathing software version and install the supported version.
2. Reconfigure the rule to allow the installed multipathing software version.

OK Cancel Help

End to End Path Validation



- SCA provides visibility into compliance with SAN design best practices
- With SCA, storage teams gain insight into the vulnerabilities in their environment
 - Do I have any single points of failure in my SAN? If so, where?
 - Do I have the minimum number of paths between host and storage to ensure optimal performance?
 - Am I complying with best practice rules for maximum fan-out or number of hops
 - Has the right version of PowerPath been deployed on my host?

This policy validates configuration to ensure connectivity and redundancy.

Enabled	Rule Name	Type	Severity	Last Modified (GMT-04:00)
	Host Must Be Provisioned with Storage	Pathing	Critical	2007-12-01 00:00
	I/O Path Redundancy	Redundancy	Critical	2007-12-01 00:00
	Masking Entry on Unmapped Volume	Masking	Critical	2007-12-01 00:00
	Maximum Number of Hops in Fabric	Pathing	Critical	2007-12-01 00:00
	Missing Path	Pathing	Critical	2007-12-01 00:00

0 Selected

Details

Desired State	Description	Scope	Recommendation

Validating Zoning Best Practices



- SCA analyzes how SAN zoning aligns with configuration best practices to optimize performance and minimize downtime
- Quickly modify and apply zoning policies to
 - Validate Fan-in and Fan-out ratios
 - Verify use of Single Initiator zoning
 - Ensure accurate zone membership

3. Manage Rules

Enabled	Rule Name	Type	Severity	Last I
	Authorized Zone Membership Types	Zoning	Critical	2C
	Default Zoning Must Be Disabled	Zoning	Critical	2C
	Host Port Fan-In	Zoning	Information	2C
	Minimum Number of Members in Zone	Zoning	Critical	2C
	Single Initiator Zoning	Zoning	Critical	2C
	Storage Port Fan-Out	Zoning	Critical	2C

0 Selected Page 1 of 9 Items 1 to 6 of 9

Create Rule From Template Edit Delete Enable Disable

Details **Host Port Fan-In**

Desired State Description Scope Recommendation

Host Port Fan-In includes:
Host Port Fan-in <= 2.

< Back Next > Finish Cancel Help

Improving Operational Oversight and Planning Processes Through Storage Service Analytics



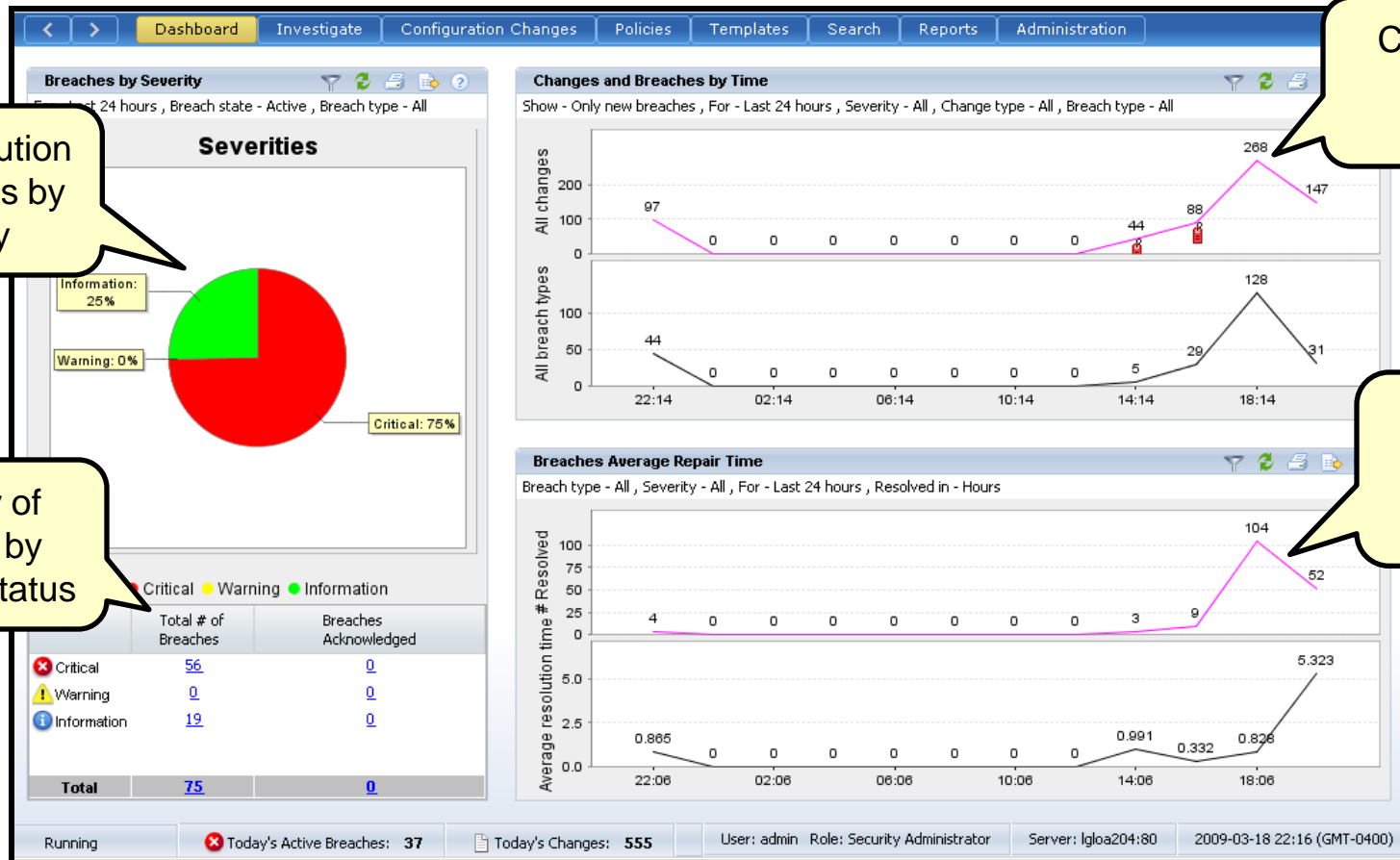
- Storage managers often lack sufficient data on changes to their infrastructure to improve management oversight and planning processes.
- Storage Configuration Advisor *storage service analytics* provide insight into changes and their impact



SCA Dashboard



- The SCA Dashboard provides a high level snapshot of quantity and impact of change on the environment



See distribution of breaches by severity

Summary of breaches by severity & status

Changes vs. breaches trends

of breaches resolved vs. time to repair trends

SCA Reporting



- SCA contains built in reports on configuration, service levels, and compliance to provide more granular operational insight

The screenshot displays the SCA Reporting interface with a navigation bar at the top containing: Dashboard, Investigate, Configuration Changes, Policies, Templates, Search, Reports (highlighted), and Administration.

The main content area is divided into four sections:

- Configuration Reports**
 - [Summary Report](#)
 - [Fabric Summary](#)
 - [Storage Summary](#)
 - [Host Connectivity](#)
 - [Masked Host to Storage](#)
 - [Switch Connectivity](#)
 - [Firmware Levels](#)
 - [Storage Volumes](#)
 - [Host Summary](#)
 - [Installed Software](#)
- Service Reports**
 - [Service Quality Report](#)
 - [Breach Trending](#)
- Compliance Reports**
 - [Breach Summary](#)
 - [Breach List](#)
- Other Reports**
 - [Configuration Changes](#)
 - [Exceptions](#)

Configuration Reports



Summary Report

Navigation: < > Dashboard Investigate Configuration Changes Policies Templates Search Reports Administration

Reports > Summary Report

Summary Report

Summary	# Paths	79
	Today's Changes	17975
	Today's Breaches	1837
Connectivity Summary	# Fabrics	7
	# Switches	6
	# Switch Vendors	4
	# Switch Ports	277
	# Active Switch Ports	10
	# Available Switch Ports	267
	Today's Fabric Changes	0
	Today's Fabric Breaches	38
Host Summary	# Hosts	14
	# Windows Hosts	5
	# Unix Hosts	0
	# Hosts with Multipath Software	0
	# Host Ports	26
	Today's Host Changes	0
	# Host Breaches	263
Storage Summary	# Arrays	4
	# Array Vendor Types	1
	# Array Ports	142
	# Storage Volumes	25212
	Total Capacity (TB)	234484363256960
	Total Capacity that is Masked (TB)	0
	Total Available / Unused Capacity (TB)	33294750667264
	Total Orphaned Capacity (TB)	0
	Average storage utilization (%)	0
	Today's Storage Changes	0
	Today's Storage Breaches	209

Running ✖ Today's Active Breaches: **294** 📄 Today's Changes: **17975** User: admin Role: Security Administrator Server: lqlca204:80 2008-06-26 16:42 (GMT+0000)

Configuration Reports



Host Connectivity Report

Dashboard Investigate Configuration changes Policies Templates Search Reports Administration

Reports > Host Connectivity

Host Connectivity

# Hosts	3
# Host Ports	3
# Used Host Ports	0
# Unused Host Ports	0
Total Allocated Capacity (TB)	279879030244864

Display Name ^	IP	Operating System	Operating System Version	Location	HBA Vendor	HBA WWN	HBA Port Display Name	HBA Port WWN	Max Speed	Status	Display Name
Host[SDM-ECIM-SM]	172.23.137.149	Red Hat Linux	2.6.9.42.EL.4	not supported	Emulex Corporation	0000000000000000	Port[SDM-ECIM-Anlanw5t]	10000000C9587704	2147483648		Element@null[null] (null)[EMC_GDMPort](null){r
Host[SDM-ECIM-SM]	172.23.137.149	Red Hat Linux	2.6.9.42.EL.4	not supported	Emulex Corporation	0000000000000000	Port[SDM-ECIM-rvSRFT3C]	10000000C9587705	2147483648		Element@null[null] (null)[EMC_GDMPort](null){r
Host[SDM-ECIM-JeC]	172.23.152.70	Solaris	8	not supported	Emulex Corporation	20000000C9283354	Port[SDM-ECIM-McmNVXI]	10000000C9283354	1073741824		Element@null[null] (null)[EMC_GDMPort](null){r

< ||| >

Compliance Reports



Breach List Report

Severity	Active ?	Affected Objects	Age	Ack.?	Acknowledged Time (GMT-04:00)	Breach Causes
Information	Yes	host147, host147:HBA 0, Port 1, switch083	2 hours	No		Host port HBA 0, Port 1 on host host147 has a fan-in of 4:1, and 1. A storage port was added to a zone in the fabric, exceeding th
Information	Yes	VSAN0001, VSAN0001:Zone_01, VSAN0001:Zone_Shiva	2 hours	No		2. An additional zone was activated, containing the same host po
Information	Yes	VSAN0001, VSAN0001:Zone_03, VSAN0001:Zone_Shiva	2 hours	No		Fabric VSAN0001 contains duplicate zones. A zone was added or
Information	Yes	switch083, switch083:Z_Hba1_146_Sym137, switch083:Z_Hba1_146_Sym137_Test	2 hours	No		Fabric switch083 contains duplicate zones. A zone was added or
Warning	Yes	HK190807070012, HK190807070012:SG_JG_OnlyLUN	2 hours	No		1. Storage group was created without adding hosts.
Warning	Yes	HK190807070012, HK190807070012:Storage Group 21	2 hours	No		1. Storage group was created without adding hosts.
Warning	Yes	HK190807070012, HK190807070012:l1ach1	2 hours	No		1. Storage group was created without adding hosts.
Warning	Yes	HK190807070012, HK190807070012:Duplicate Storage Group for lun 21 in TEST_Two_group	2 hours	No		1. Storage group was created without adding hosts.
Warning	Yes	HK190807070012, HK190807070012:NewLosal147	2 hours	No		1. Storage group was created without adding hosts.
Warning	Yes	HK190807070012, HK190807070012:SG_AG_Empty	2 hours	No		1. Storage group was created without adding hosts.
Warning	Yes	HK190807070012, HK190807070012:losar178	2 hours	No		1. Storage group was created without adding hosts.
Warning	Yes	HK190807070012, HK190807070012:host182	2 hours	No		1. Storage group was created without adding hosts.
Warning	Yes	HK190807070012, HK190807070012:SG_AG_empty2	2 hours	No		1. Storage group was created without adding hosts.
Warning	Yes	HK190807070012, HK190807070012:Storage Group without host	2 hours	No		1. Storage group was created without adding hosts.
Warning	Yes	HK190807070012, HK190807070012:another empty group	2 hours	No		1. Storage group was created without adding hosts.
Warning	Yes	HK190807070012, HK190807070012:losat177	2 hours	No		1. Storage group was created without adding hosts.
Warning	Yes	HK190807070012, HK190807070012:SG_JG_Empty	2 hours	No		1. Storage group was created without adding hosts.
Warning	Yes	FNM00084200133, FNM00084200133:SG_host147	2 hours	No		1. Storage group was created without adding hosts.
Critical	Yes	host147, HK190807070012, switch083:Slot 0, Port 8	2 hours	No		Array-connected switch port redundancy from host host147 to ar
Critical	Yes	host147, host147:HBA 0, HK190807070012	2 hours	No		HBA redundancy from host host147 to array HK190807070012 w
Critical	Yes	host147, HK190807070012, HK190807070012:SP_B	2 hours	No		Array adapter redundancy from host host147 to array HK190807
Critical	Yes	host147, host147:HBA 0, Port 1, HK190807070012	2 hours	No		Host port redundancy from host host147 to array HK1908070700
Critical	Yes	host147, HK190807070012, HK190807070012:SP_A:2	2 hours	No		Array port redundancy from host host147 to array HK190807070
Critical	Yes	host147, HK190807070012, switch083:switch083	2 hours	No		Array-connected switch redundancy from host host147 to array F
Critical	Yes	host147, switch083, HK190807070012	2 hours	No		Fabric redundancy from host host147 to array HK190807070012

0 Selected

Page 1 of 143 Items 1 to 25 of 143

UNFILTERED: 143 Items

Compliance Reports

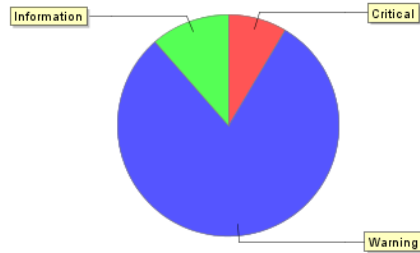


Breach Summary Report

[Dashboard](#)
[Investigate](#)
[Configuration Changes](#)
[Policies](#)
[Templates](#)
[Search](#)
[Reports](#)
[Administration](#)

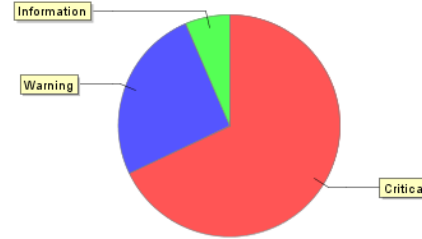
Breach Summary

Violations Bv Severity Level



● Critical ● Warning ● Information

Vulnerabilities Bv Severity Level



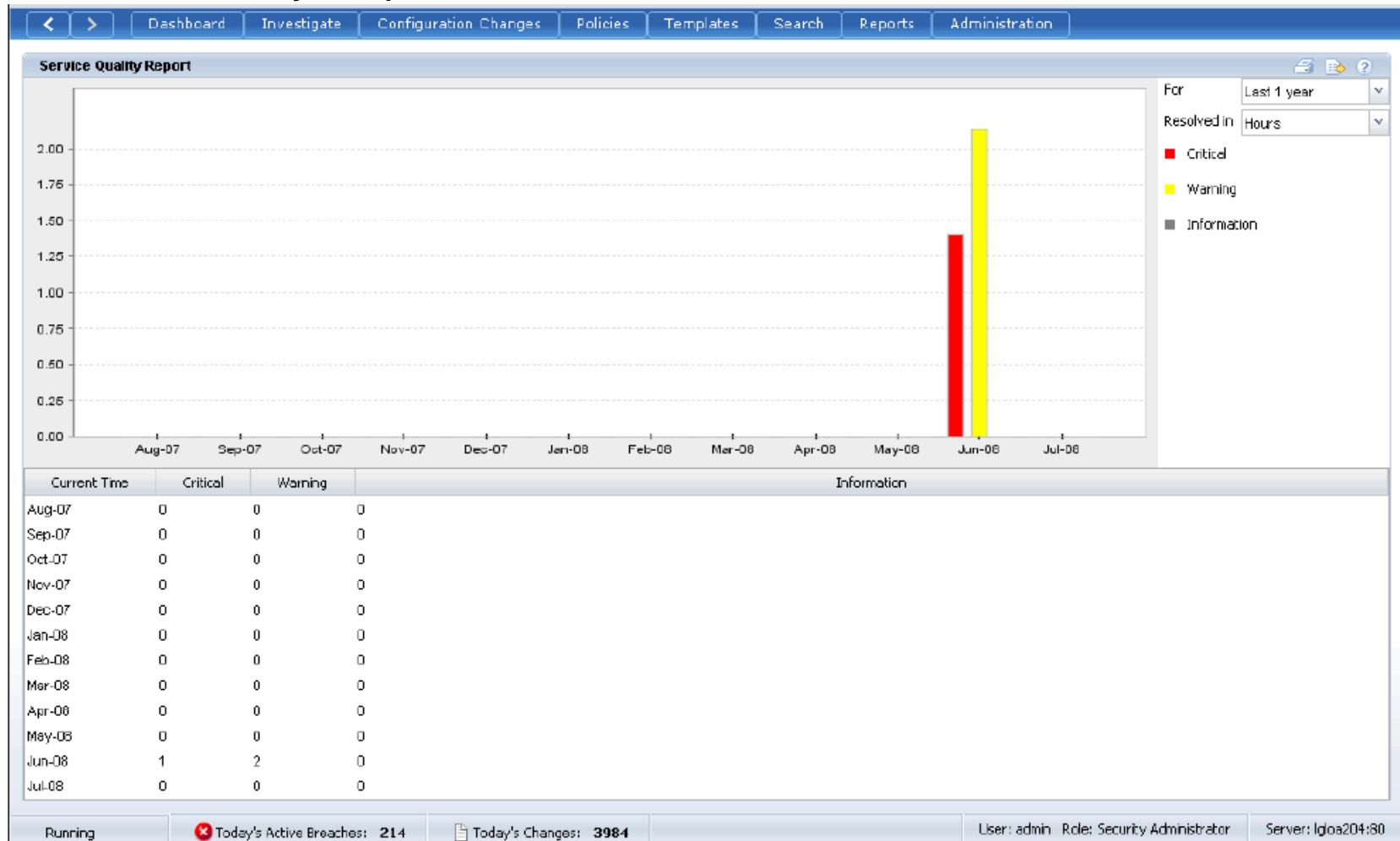
● Critical ● Warning ● Information

	Critical Violations	High Violations	Informational Violations	Critical Vulnerabilities	High Vulnerabilities	Informational Vulnerabilities	Total
Total # of Breaches	3	28	4	74	28	7	144
Breaches Acknowledged	0	0	0	0	2	0	2
Age of New Breaches - Average	0	2 hours	2 hours	2 hours	3 hours	3 hours	2 hours
Age of New Breaches - Min	0	2 hours	2 hours	2 hours	3 hours	3 hours	2 hours
Age of New Breaches - Max	0	2 hours	2 hours	2 hours	3 hours	3 hours	3 hours
Age of Acknowledged/Resolved Breaches - Average	2 hours	2 hours	0	2 hours	3 hours	0	2 hours
Age of Acknowledged/Resolved Breaches - Min	2 hours	2 hours	0	2 hours	3 hours	0	2 hours
Age of Acknowledged/Resolved Breaches - Max	2 hours	2 hours	0	2 hours	3 hours	0	3 hours

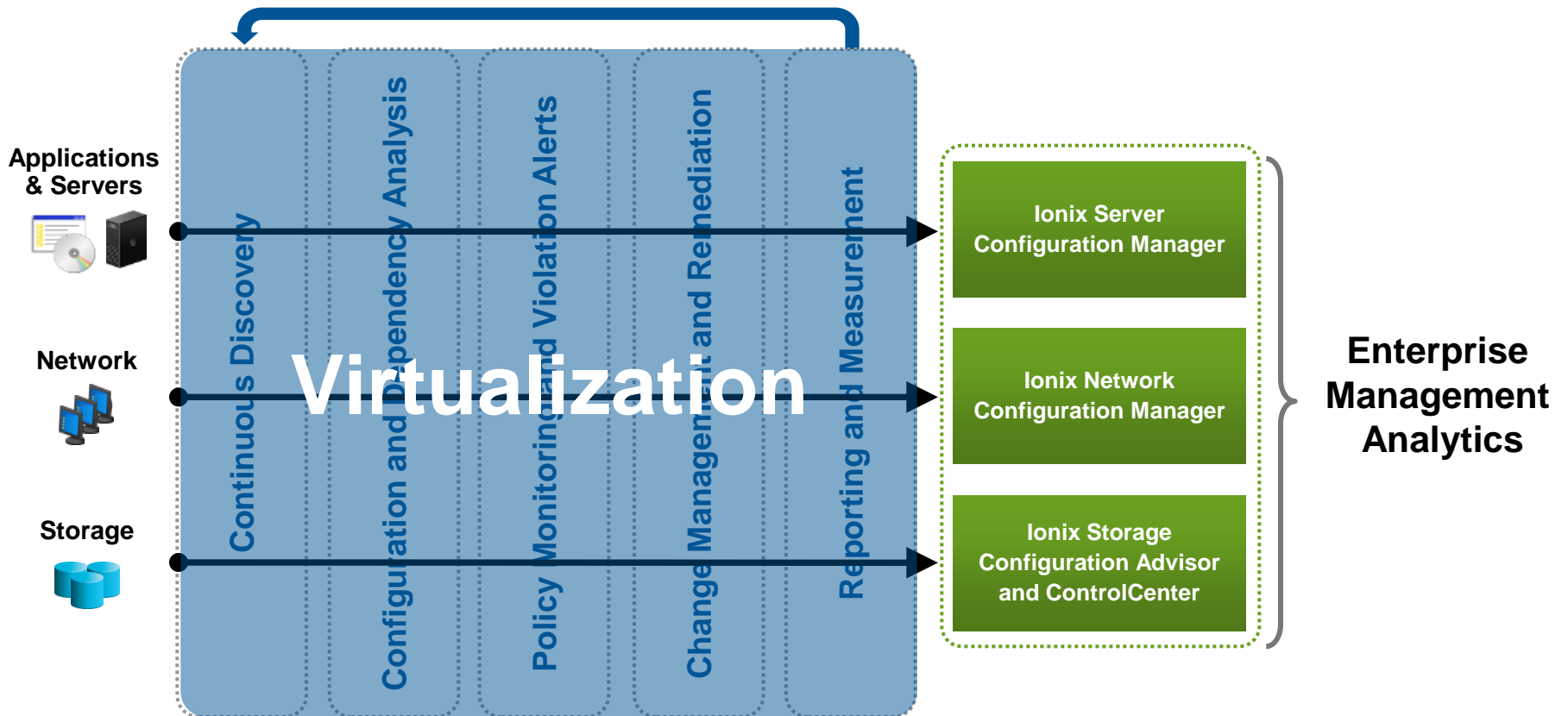
Service Reports



Service Quality Report



EMC Ionix for Data Center Automation and Compliance



EMC Education Services



- Develop and validate your IT resource management expertise
 1. Information Storage Technology 'Open' Curriculum
 2. EMC Technology-Specific Learning Paths
 3. EMC Proven Professional Certification Program



- Enhance resource management capabilities

Featured Learning Paths for EMC Ionix

- Service Discovery and Mapping
- Data Center Automation & Compliance
- IT Operations
- Service Management



Take the next step
Visit <http://education.EMC.com/ionix>

Summary



- **Storage Configuration Advisor helps you manage change across complex SANs by...**
 - Leveraging agentless discovery to simplify deployment and ongoing management
 - Performing near real-time change tracking and policy validation
 - Automating discovery, change tracking, and policy validation to improve service levels and operational efficiency
 - Providing comprehensive analytics to help you understand your current state of compliance and improve planning processes
- **EMC offers a comprehensive set of change management solutions for managing your IT infrastructure**
 - These solutions cut across application, server, network, and storage domains



Ionix Storage Configuration Advisor Demo

To Find Out More.....



- Contact Information:
 - Call 1-866-362-2700
 - Email Us at: EMCionix@emc.com
- Visit our website:
http://www.emcionix.com/solutions/solutions_datacenter_change.html

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