

IBM FlashSystem A9000R
Version 12.1

Release Notes



Fourth Edition (November 2017)

This edition applies to IBM FlashSystem A9000R version 12.1. Newer document editions may be issued for the same product version in order to add missing information, update information, or amend typographical errors. The edition is reset to 'First Edition' for every new product version.

© **Copyright IBM Corporation 2016, 2017.**

US Government Users Restricted Rights – Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp.

Contents

Overview	1
What's new in version 12.1	1
Hot upgrade from earlier versions	2
Management and solutions	2
Change log	4
Version 12.1 (June 2017).	4
Fixes and features of earlier versions	8
Limitations	8
Known issues	9
Known interoperability issues	14
Related information and publications.	15
Getting information, help, and service	15
Notices	17
Trademarks	18

Overview

IBM FlashSystem® A9000R is a high-end, all-flash storage system that delivers ultra-fast storage together with mission-critical features, including data reduction by compression and inline deduplication, smart scaling, distributed data, automatic load balancing, and a multitude of advanced enterprise-class features and capabilities.

As a pre-integrated rack offering, IBM FlashSystem A9000R comprises grid controllers and flash enclosures that are interconnected by integrated InfiniBand switches, forming a scale-out grid fabric that delivers exceptional IOPS performance.

In its core architecture, IBM FlashSystem A9000R utilizes IBM FlashCore® technology together with IBM® MicroLatency® modules, providing high density, low latency, and storage reliability. In addition, IBM FlashSystem Enhanced Endurance Technology reduces flash disk wearout and ensures long-term durability of the flash storage components, even under heavy workloads.

IBM FlashSystem A9000R is ideal for large enterprises that rely on fast, redundant, and high-capacity data storage, offering high service levels for dynamic workloads and easy hyper-scaling, while supporting multi-tenant environments, flexible consumption models, and robust cloud automation and integration capabilities. IBM FlashSystem A9000R offers security and data protection through advanced remote mirroring, hot encryption, and self-healing mechanisms.

For more detailed information about IBM FlashSystem A9000R, refer to its user documentation and online information.

What's new in version 12.1

Software version 12.1 is a major version that features the IBM HyperSwap® solution, and also includes a new local encryption key option, as detailed below.

General availability (eGA) date: 9 June 2017

IBM FlashSystem A9000R HyperSwap

IBM FlashSystem A9000R HyperSwap support delivers highly-available, non-disruptive storage service through partial or complete system failures and disasters in the same data center and between metro-distant data centers.

HyperSwap high availability is based on active-active pairing of storage systems per volume or per consistency group. Each volume or consistency group pair uses synchronous replication to keep both systems updated at all times. When certain conditions are met, automatic and completely transparent failover is performed, so that applications experience no downtime. As soon as the actual failure is recovered, the pair is automatically resynchronized.

As in other high availability solutions, the A9000R HyperSwap solution uses a Quorum Witness component, to avoid split-brain situations. The IBM Spectrum Accelerate™ Family HyperSwap Quorum Witness constantly monitors the status of

the related storage systems, and, if necessary, acts as a tiebreaker for conflict resolution (see “Management and solutions”).

The A9000R HyperSwap solution uses Asymmetrical Logical Unit Access (ALUA) to inform the host about the optimized paths to the storage system, and to minimize I/O latency.

Local encryption key

Starting from version 12.1, data-at-rest encryption can also be applied with a local encryption key management scheme. Because the encryption key is generated and stored within the storage system, this option eliminates the need for purchasing, deploying, and managing a dedicated, independent key management system. The local encryption key management scheme is based on AES-256 encryption.

In addition:

- Encryption keys are not affected by software upgrades.
- Failure of up to 2 grid controllers does not affect key availability.
- Internal encryption key management has no impact upon the storage system performance.

Hot upgrade from earlier versions

Version 12.1 supports direct non-disruptive upgrade (hot upgrade) from the following versions.

- 12.0.3.a
- 12.0.3

Note: These hot upgrade paths are valid for the time of the general availability (GA) date of version 12.1. However, hot upgrade from additional earlier versions could be supported later on. For up-to-date information, contact IBM Support.

The upgrade procedure must be performed by an authorized IBM service technician.

Prior to initiating software upgrade, consult with IBM Support regarding the required time allocation and expected duration of the upgrade procedure.

Note: The system e-license may automatically prompt in the management GUI upon the first post-upgrade operation, if the e-license was updated since it was last accepted. In such a case, the new e-license must be accepted before any GUI operation can be performed.

Management and solutions

IBM FlashSystem A9000R version 12.1 can be managed and monitored with IBM Hyper-Scale Manager version 5.2 or later.

IBM Hyper-Scale Manager version 5.2 provides an advanced web-based graphical user interface (GUI) from which one or more IBM Spectrum Accelerate family systems can be managed and monitored in real time from a web browser.

IBM FlashSystem A9000R can also be managed from its command-line interface (CLI) or through representational state transfer (REST) application programming interfaces (APIs).

IBM FlashSystem A9000R customers are entitled to free use of IBM Hyper-Scale Manager, which can be obtained at any time from the IBM Fix Central website (www.ibm.com/support/fixcentral).

IBM Spectrum Accelerate Family HyperSwap Quorum Witness

The HyperSwap functionality feature in IBM FlashSystem A9000R version 12.1 is supported by IBM Spectrum Accelerate Family HyperSwap Quorum Witness version 1.0 or later.

To significantly improve the transparent failover and facilitate the constant coordination between two IBM FlashSystem A9000R or A9000 storage systems in a HyperSwap solution, an independent Quorum Witness software component is preferably installed at a separate site (third failure domain).

Note: Newer versions of the Quorum Witness software may be released independently to better support or enhance the HyperSwap operation. For more information, see the latest Quorum Witness release notes and user guide.

IBM Spectrum Control™ Base Edition

IBM FlashSystem A9000R version 12.1 is supported by IBM Spectrum Control Base Edition version 3.2 or later, which provides the following VMware and Microsoft platform integration tools.

- IBM Storage Provider for VMware VASA
- IBM Storage Enhancements for VMware vSphere Web Client
- IBM Storage Plug-in for VMware vRealize Orchestrator
- IBM Storage Management Pack for VMware vRealize Operations Manager
- IBM Storage Automation Plug-in for Microsoft PowerShell

Note: Versions of IBM Spectrum Control Base Edition earlier than 3.2 are not fully supported and must be upgraded to 3.2 or later.

For more information, see IBM Spectrum Control Base Edition on IBM Knowledge Center (www.ibm.com/support/knowledgecenter/STWMS9).

IBM FlashSystem A9000R customers are entitled to free use of IBM Spectrum Control Base Edition, which can be obtained at any time from either the IBM Hyper-Scale Manager software package or from the IBM Fix Central website (www.ibm.com/support/fixcentral).

Available cloud storage solutions

IBM FlashSystem A9000R version 12.1 can be integrated with various independent software vendor (ISV) platform, application, virtualization, and cloud environments.

To facilitate this integration, IBM provides the following software solutions, also referred to as cloud storage solutions.

Cloud storage solution	Version	Compatibility note
IBM Storage Host Attachment Kit	2.8.0 or later	<ul style="list-style-type: none"> Supports the HyperSwap feature that is introduced in IBM FlashSystem A9000R version 12.1 For use with IBM AIX®, Linux (Red Hat Enterprise Linux; SUSE Linux Enterprise Server), and Microsoft Windows Server hosts.
IBM Storage Driver for OpenStack	2.0.0 or later	
IBM Storage Management Pack for Microsoft System Center Operations Manager (SCOM)	2.6.0 or later	
IBM XIV® Provider for Microsoft Windows Volume Shadow Copy Service (VSS)	2.9.0 or later	Supports the HyperSwap feature that is introduced in IBM FlashSystem A9000R version 12.1
IBM XIV Storage Replication Adapter	3.0.0 or later	<ul style="list-style-type: none"> Supports the HyperSwap feature that is introduced in IBM FlashSystem A9000R version 12.1 For use with VMware Site Recovery Manager 5.1–5.8 or 6.x. Requires the use of synchronous or asynchronous remote mirroring.

IBM FlashSystem A9000R customers are entitled to free use of the IBM cloud storage solutions, which can be obtained at any time from the IBM Fix Central website (www.ibm.com/support/fixcentral).

For more information about the available cloud storage solutions for IBM FlashSystem A9000R, see the '**Platform and application integration**' section in the IBM FlashSystem A9000R space on IBM Knowledge Center (www.ibm.com/support/knowledgecenter/STJKN5).

Change log

This change log summarizes the enhancements and fixes in the different 12.1.x code level versions of IBM FlashSystem A9000R.

Note: New functional features of these versions are only briefly summarized. For a detailed summary of the new functional features of a specific version, refer to the 'What's new' section of its release notes.

Version 12.1 (June 2017)

Version 12.1 of IBM FlashSystem A9000R features the IBM HyperSwap solution, and also adds support for a new local encryption key option.

For more detailed information about these features, refer to the IBM FlashSystem A9000R 12.1 Product Overview publication.

Version 12.1 also adds a functionality enhancement to the **smtpgw_update** command. For more information, refer to the IBM FlashSystem A9000R Command-Line Interface (CLI) Reference Guide.

In addition, the following issues have been resolved.

Ticket ID	Description
SYS-286510	<p>Fixed: If the size of a primary volume is not a multiple of 16 MB (in synchronous mirroring) or a multiple of 4 KB (in asynchronous mirroring), the data written to the last few LBAs, whose total size is less than 16 MB or 4 KB respectively, is not replicated to the secondary volume, thus creating undetected data corruption on the secondary volume.</p> <p>Severity: HIPER</p> <p>Affected versions: 12.0.0 or later</p>
SYS-285605	<p>Fixed: In extremely rare cases, a snapshot of the primary volume used in the asynchronous mirroring might be incomplete. As a result, the data in the secondary volume might be inconsistent with the data on the primary volume.</p> <p>Severity: HIPER</p> <p>Affected versions: 12.0.0 or later</p>
SYS-273223	<p>Fixed: In rare cases, a system with an asynchronous mirror relationship might fail, if the target connectivity is down and a new asynchronous mirror is created with the <i>Offline init</i> option selected.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.0 or later</p>
SYS-283113	<p>Fixed: In a scenario of an encrypted system that is shut down and then powered on while the Tivoli® Key Lifecycle Manager (TKLM) is not accessible, the recovery keys might not work and access to the system could be denied.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.0 or later</p>
SYS-283199	<p>Fixed: Common security issues.</p> <p>For more information about these security issues, see CVE-2016-2177, CVE-2016-2178, CVE-2016-2179, CVE-2016-2180, CVE-2016-2181, CVE-2016-2182, CVE-2016-2183, CVE-2016-6302, CVE-2016-6304, and CVE-2016-6306 on the Common Vulnerabilities and Exposures (CVE) information website (cve.mitre.org).</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.0 or later</p>

Ticket ID	Description
SYS-283154	<p>Fixed: In asynchronous mirroring, performing the <i>Change role</i> operation on the slave while IOs are still being sent to the master may cause a rebuild of all data from one module.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.0 or later</p>
SYS-283742	<p>Fixed: Common security issues.</p> <p>For more information about these security issues, see CVE-2016-3134, CVE-2016-4997, CVE-2016-4998, and CVE-2016-5696 on the Common Vulnerabilities and Exposures (CVE) information website (cve.mitre.org).</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.0 or later</p>
SYS-285173	<p>Fixed: When the IBM Hyper-Scale Mobility feature is used, upgrading the system software might result in loss of access to the storage system.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.1 or later</p>
SYS-285571	<p>Fixed: Using QoS/Performance Class to limit the bandwidth of a volume may cause performance fluctuations on that volume.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.2 or later</p>
SYS-285717	<p>Fixed: After issuing the vol_copy CLI command on a volume larger than 40TB, some hosts might lose access to their data.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.1 or later</p>
SYS-285793	<p>Fixed: Common security issues.</p> <p>For more information about these security issues, see CVE-2016-2834, CVE-2016-5285, and CVE-2016-8635 on the Common Vulnerabilities and Exposures (CVE) information website (cve.mitre.org).</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.0 or later</p>
SYS-286002	<p>Fixed: In rare cases, due to an error in the internal defragmentation process, all the hosts connected to the system might lose access to their data.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.2 or later</p>

Ticket ID	Description
SYS-286292	<p>Fixed: In very rare cases, an extremely high number of parallel read I/Os from a single addressable range of 16M might render all data on the system inaccessible.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.0 or later</p>
SYS-286446	<p>Fixed: Common security issues.</p> <p>For more information about these security issues, see CVE-2016-8610 and CVE-2017-3731 on the Common Vulnerabilities and Exposures (CVE) information website (cve.mitre.org).</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.0 or later</p>
SYS-286701	<p>Fixed: After crossing the threshold of 18,181 volumes and/or writable snapshots in total during the system's lifetime, some hosts might lose access to their data.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.1 or later</p>
SYS-286839	<p>Fixed: An internal error in the flash enclosure might cause the flash enclosure to fail.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.0 or later</p>
SYS-287343	<p>Fixed: In rare cases, due to an error in the internal metadata paging process, all the hosts connected to the system might lose access to their data.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.0 or later</p>
SYS-287587	<p>Fixed: In very rare cases, due to an intermittent hardware problem in the canister, a single canister failure might result in a flash enclosure failure, which could lead to host loss of access to the storage system.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.0 or later</p>
SYS-281258	<p>Fixed: Wrong compression and deduplication ratio values are reported after volume deletion.</p> <p>Severity: Moderate</p> <p>Affected versions: 12.0.0.a or later</p>

Ticket ID	Description
SYS-282621	<p>Fixed: When asynchronous remote mirroring is used over a low-bandwidth connection, host performance might be impacted.</p> <p>Severity: Moderate</p> <p>Affected versions: 12.0.2 or later</p>
SYS-285307	<p>Fixed: In rare cases, after restarting a regular Fibre Channel port, the port might stay down. The port status can be checked in IBM Hyper-Scale Manager, but no FC_PORT_DOWN event is issued.</p> <p>Severity: Moderate</p> <p>Affected versions: 12.0.2.c or later</p>
SYS-282945	<p>Fixed: When asynchronous remote mirroring is used, the latency could increase.</p> <p>Severity: Moderate</p> <p>Affected versions: 12.0.2 or later</p>
SYS-280124	<p>Fixed: Numerous MODULE_BBU_IS_CHARGING and MODULE_BBU_IS_FULL events are issued during the periodic discharge of a grid controller's battery backup unit (BBU).</p> <p>Severity: Service</p> <p>Affected versions: 12.0.0 or later</p>
SYS-280703	<p>Fixed: If snapshot space is not configured, a misleading error appears when trying to create a mirror snapshot and the operation fails.</p> <p>Severity: Low</p> <p>Affected versions: 12.0.1 or later</p>

Fixes and features of earlier versions

IBM FlashSystem A9000R version 12.1 includes all the features and fixes that were provided in previous 12.0.x.x versions.

To obtain information regarding previously introduced FlashSystem A9000R features or issues that were resolved in previous versions, see FlashSystem A9000R on IBM Knowledge Center (www.ibm.com/support/knowledgecenter/STJKN5).

Limitations

As opposed to known issues, limitations are functionality restrictions that are part of the predefined system design and capabilities in a particular version.

Note: For information about specification-related functional boundaries, such as maximum number of volumes and hosts per storage system, refer to the IBM FlashSystem A9000R specification sheet document, which can be provided to IBM customers under non-disclosure agreement (NDA).

Synchronous mirroring limitations

Use of synchronous remote mirroring is subject to the following limitation:

- The reported size of data written on the master volume and slave volume does not match. Zero data writes are not counted for the slave volume. However, this discrepancy is by design and no actual data is lost.

Asynchronous mirroring use limitations

Use of asynchronous remote mirroring is subject to the following configuration limitations in order to sustain performance:

- Interval: 1–10 minutes
- Minimum Recovery Point Objective (RPO): 2 minutes
- Maximum number of mirrored volumes: 512

Limitations with IBM SAN Volume Controller

When using IBM FlashSystem A9000R as the backend storage of IBM SAN Volume Controller, the IBM FlashSystem A9000R system is not aware of user-data that is deleted or migrated on the SAN Volume Controller side. In addition, the IBM FlashSystem A9000R physical capacity usage is not directly monitored by IBM SAN Volume Controller.

As a result, the IBM FlashSystem A9000R system cannot regularly reclaim freed capacity, and without direct monitoring, the storage administrator may confront out-of-partition (OOP) condition when the IBM FlashSystem A9000R system runs out of physical storage space.

To mitigate this limitation, when using IBM FlashSystem A9000R as the backend storage of IBM SAN Volume Controller, monitor the IBM FlashSystem A9000R physical capacity from the IBM Hyper-Scale Manager GUI, and make sure not to exceed 70% of the physical capacity utilization.

Known issues

This section details the known issues in IBM FlashSystem A9000R version 12.1, along with possible solutions or workarounds (if available).

The following severity levels apply to known issues:

- **HIPER** – High Impact Pervasive. A critical issue that IBM has either fixed or plans to fix promptly. Requires immediate customer attention or code upgrade.
- **High Impact** – Potentially irrecoverable error that might impact data or access to data in rare cases or specific situations/configurations.
- **Moderate** – Limited functionality issue and/or performance issue with a noticeable effect.
- **Service** – Non-disruptive recoverable error that can be resolved through a workaround.
- **Low** – Low-impact usability-related issue.

Important:

- **The issues listed below apply to version 12.1 or earlier versions.** As long as a newer version has not yet been released, a newer release notes edition for version 12.1 might be issued to provide a more updated list of known issues and workarounds.
 - When a newer version is released for general availability, the release notes of version 12.1 will no longer be updated. Accordingly, check the release notes of the newer version to learn whether any newly discovered issues affect version 12.1 or whether the newer version resolves any of the issues listed below.
-

Ticket ID	Severity	Affected versions	Description
SYS-286560	HIPER	12.0.2, 12.0.3, 12.0.3.a, 12.0.3.a-1, and 12.1.0	If the size of a primary volume of asynchronous mirroring is not a multiple of 32KB, the data written to the last few LBAs, whose total size is less than 32KB, is not replicated to the secondary volume, thus creating undetected data corruption on the secondary volume. Workaround: Define the volume size (or resize the volume) to be a multiple of 32KB.
SYS-276739	High Impact	12.0.1 or later	In rare cases when synchronous mirroring is used, a component failure on the secondary volume side might cause I/Os served by the primary volume to fail. Workaround: No workaround is currently available.
SYS-287459	High Impact	12.0.0 or later	When creating target connectivity over Fibre Channel (FC) in a HyperSwap or mirror relationship, the connectivity might not always come up. Workaround: No workaround is currently available.
SYS-282831	Moderate	12.0.2 or later	Performance improvements that were introduced in version 12.0.2 cannot be applied on data that was written to the system prior to upgrading to version 12.0.2. Workaround: When experiencing performance issues with data that was written to the system prior to upgrading to version 12.0.2, contact IBM Support.
SYS-283856	Moderate	12.0.0 or later	If the master and the slave volumes are not of the same system software version level, the reason code of failure in the MIRROR_SNAPSHOT_CREATE_FAILED event might be erroneous. Workaround: Use the same microcode version on both peer systems.
SYS-285786	Moderate	12.1.0 or later	When unmapping a migrated volume (with IBM Hyper-Scale Mobility) or a HyperSwap volume from a cluster, a delay of the host I/O response might be experienced, ranging from 20 to 170 msec. Workaround: No workaround is currently available.

Ticket ID	Severity	Affected versions	Description
SYS-287613	Moderate	12.1.0 or later	<p>Defining more than 512 HyperSwap relationships causes the loss of access to the Quorum Witness.</p> <p>Workaround: Use Technician Assistant (TA) Tool to set the maximum allowed number of HyperSwap relationships to 512.</p>
SYS-279815	Service	12.0.0 or later	<p>If a MicroLatency module card that is pulled out of the flash enclosure when the enclosure's internal redundancy state is either 'Synching' or 'Degraded', the management GUI indicates that the card has a spare, even if no spare is available.</p> <p>Workaround: Use the flash_card_list CLI command to display the correct status of spares.</p>
SYS-280653	Service	12.0.0 or later	<p>Some CLI commands might hang when storage pools are being cleaned from snapshots.</p> <p>Workaround: In such a case, wait until the command is carried out.</p>
SYS-282223	Service	12.0.0 or later	<p>Data migration over Fibre Channel (FC) does not work if the number of LUNs per host exceeds 255.</p> <p>Workaround: To resolve this issue, use 255 or less LUNs per host.</p>
SYS-284723	Service	12.0.0 or later	<p>Enabling encryption of a flash enclosure that contains a failed flash canister could lead to partial encryption of the flash enclosure, or to complete encryption failure.</p> <p>Workaround: To avoid this issue, before enabling encryption, verify that no flash enclosure contains a failed canister. Otherwise, contact IBM Support.</p>
SYS-284298	Service	12.0.0 or later	<p>When setting up LDAP authentication, entering the storage system password is required, but this requirement is not enforced. This could lead to LDAP authentication failure if the password is not provided.</p> <p>Workaround: To avoid this issue, always make sure to provide the storage system password in order to allow access to the storage system.</p>

Ticket ID	Severity	Affected versions	Description
SYS-284512	Service	12.1.0 or later	<p>An attempt to deactivate a Quorum Witness might render the Quorum Witness unresponsive, and remain in the <i>Deactivating</i> state without timing out (see also SYS-285120 below).</p> <p>Workaround: To resolve this issue, proceed as follows in IBM Hyper-Scale Manager:</p> <ol style="list-style-type: none"> 1. Remove the current Quorum Witness configuration. This action disassociates the Quorum Witness from the connected system(s). 2. Define a new Quorum Witness and make sure that the correct port is used. 3. Activate the newly defined Quorum Witness. 4. Connect the system(s), that were previously using the removed Quorum Witness, to the newly defined Quorum Witness.
SYS-285120	Service	12.1.0 or later	<p>When connecting a system to a Quorum Witness, the Quorum Witness might become unresponsive, and remain in the <i>Activating</i> state without timing out.</p> <p>Workaround: To resolve this issue, proceed as follows in IBM Hyper-Scale Manager:</p> <ol style="list-style-type: none"> 1. Deactivate the Quorum Witness. Note that the Quorum Witness state changes to <i>Deactivating</i> and remains <i>Deactivating</i> without timing out (see also SYS-284512 above). 2. Remove the current Quorum Witness configuration. This action disassociates the Quorum Witness from the system(s). 3. Define a new Quorum Witness and make sure that the correct port is used. 4. Activate the newly defined Quorum Witness. 5. Connect the system(s), that were previously using the removed Quorum Witness, to the newly defined Quorum Witness.
SYS-286013	Service	12.0.0 or later	<p>When an IBM Support technician is removing a canister from the flash enclosure for maintenance purposes, multiple events of <code>POD_IB_LINK_DETECTION_LINK_PERSISTENTLY_DISCONNECTED</code> might be unnecessarily emitted. These events can be safely ignored.</p>
SYS-286449	Service	12.0.0 or later	<p>When the CLI command reservation_key_list is applied to the entire system, the command output displays the maximum of 512 keys, even if the factual number of keys is greater. However, when applied to a volume, reservation_key_list outputs the entire key list.</p> <p>Workaround: Apply the command reservation_key_list per volume.</p>

Ticket ID	Severity	Affected versions	Description
SYS-287068	Service	12.1.0 or later	In rare cases, the ha_create command might fail. Workaround: Retry the operation.
SYS-287279	Service	12.1.0 or later	When removing a target port and adding it back within less than 3 seconds, the high availability state for HyperSwap volumes is insufficient, and a TARGET_CONNECTIVITY_HA_INSUFFICIENT event is issued. Workaround: No workaround is currently available.
SYS-287305	Service	12.1.0 or later	If there are more than 200 volumes in a HyperSwap relation and a failover takes place, some of the HA_AUTOMATIC_FAILOVER_SUCCESSION events might be lost. This does not affect the actual failover. Workaround: No workaround is currently available.
SYS-287421	Service	12.1.0 or later	When the connection to the Quorum Witness is removed and then added back, an empty consistency group (contains no volumes) is not handled properly, and any addition of volumes to that consistency group fails. Workaround: Delete the empty consistency group and then create a new one.
SYS-287459	Service	12.1.0 or later	When creating target connectivity over Fibre Channel (FC) in a HyperSwap or a regular mirror relationship, the connectivity is not always established. Workaround: No workaround is currently available.
SYS-287469	Service	12.1.0 or later	Deleting a HyperSwap relation when the communication between the peer systems is down, deletes only the primary HyperSwap relation. Deleting the HyperSwap relation from a disconnected secondary system is not possible. Workaround: Delete the HyperSwap relationship when the communication between the peer systems is up again. If this is not possible, contact IBM Support.
SYS-287544	Service	12.1.0 or later	The ha_switch_roles command might fail and generate the following event: HA_MASTER_UNAVAILABLE . Workaround: Retry the command.
SYS-287615	Service	12.1.0 or later	When an encrypted system is powered up while none of the key servers is responding, using the recovery keys without intervention of IBM Support will not bring the system to ON state. Workaround: Contact IBM Support.

Ticket ID	Severity	Affected versions	Description
SYS-276870	Low	12.0.0 or later	<p>When a grid controller is replaced, or whenever the system is undergoing a software initiation process, data reduction saving statistics could be temporarily inaccurate. The statistics accuracy is regained as data is being accessed and processed again.</p> <p>This issue has a noticeable effect only when 1 TB or less has been written to the system.</p> <p>Workaround: No workaround is currently available.</p>
SYS-279421	Low	12.0.0 or later	<p>Time stamp is incorrect in statistics reported over SMI-S.</p> <p>Workaround: No workaround is currently available.</p>
SYS-283147	Low	12.1.0 or later	<p>When obtaining I/O statistics for a HyperSwap volume, the remote path I/O value is always zero.</p> <p>Workaround: No workaround is currently available.</p>

Known interoperability issues

This section describes known issues or limitations that could arise when using IBM FlashSystem A9000R in conjunction with other components in the production environment, such as hardware switches, host bus adapters (HBAs), other IBM products, or different software platforms such as operating systems, clustering solutions, virtual machine servers, multipathing solutions, and other third-party components.

Ticket ID	Severity	Affected versions	Description
SYS-286719	Service	12.1 or later	<p>Failover of a Windows Server 2008 or 2008 R2 cluster group results in a stop error on the new active node. This could occur when using these Windows Server versions with HyperSwap volumes. No hotfix is currently available.</p> <p>Workaround: Refer to IBM Support guidelines for Windows Server 2008 and 2008 R2 as described in IBM Technote #S1010299.</p>
SYS-286992	Service	12.1 or later	<p>The HyperSwap feature is not compatible with VMware ESXi 6.0 Update 2 or earlier.</p> <p>Workaround: Use ESXi 6.0 Update 3 or later.</p>
SYS-287993	Service	12.1 or later	<p>Veritas Dynamic Multi-Pathing (DMP) in any configuration does not support HyperSwap volumes.</p> <p>Workaround: No workaround is currently available.</p>

Related information and publications

You can find additional information and publications related to IBM FlashSystem A9000R on the following information sources.

- IBM Flash Storage marketing website (ibm.com/systems/storage/flash)
- IBM FlashSystem A9000R on IBM Knowledge Center (ibm.com/support/knowledgecenter/STJKN5)
- IBM FlashSystem A9000 on IBM Knowledge Center (ibm.com/support/knowledgecenter/STJKMM)
- IBM Storage Redbooks® website (redbooks.ibm.com/portals/storage)

Getting information, help, and service

If you need help, service, technical assistance, or want more information about IBM products, you can find various sources to assist you. You can view the following websites to get information about IBM products and services and to find the latest technical information and support.

- IBM website (ibm.com®)
- IBM Support Portal website (ibm.com/storage/support)
- IBM Directory of Worldwide Contacts website (ibm.com/planetwide)
- IBM service requests and PMRs (ibm.com/support/servicerequest/Home.action)

Use the Directory of Worldwide Contacts to find the appropriate phone number for initiating voice call support. Voice calls arrive to Level 1 or Front Line Support.

Notices

These legal notices pertain to the information in this IBM Storage product documentation.

This information was developed for products and services offered in the US. This material may be available from IBM in other languages. However, you may be required to own a copy of the product or product version in that language in order to access it.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not grant you any license to these patents. You can send license inquiries, in writing, to:

*IBM Director of Licensing
IBM Corporation
North Castle Drive, MD-NC119
Armonk, NY 10504-1785
USA*

For license inquiries regarding double-byte character set (DBCS) information, contact the IBM Intellectual Property Department in your country or send inquiries, in writing, to:

*Intellectual Property Licensing
Legal and Intellectual Property Law
IBM Japan Ltd.
19-21, Nihonbashi-Hakozakicho, Chuo-ku
Tokyo 103-8510, Japan*

INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product and use of those Web sites is at your own risk.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact:

*IBM Director of Licensing
IBM Corporation
North Castle Drive, MD-NC119
Armonk, NY 10504-1785
USA*

Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee.

The licensed program described in this document and all licensed material available for it are provided by IBM under terms of the IBM Customer Agreement, IBM International Program License Agreement or any equivalent agreement between us.

The performance data discussed herein is presented as derived under specific operating conditions. Actual results may vary.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

All statements regarding IBM's future direction or intent are subject to change or withdrawal without notice, and represent goals and objectives only.

Trademarks

IBM, IBM FlashSystem, the IBM logo, and ibm.com are trademarks or registered trademarks of International Business Machines Corp., registered in many jurisdictions worldwide.

Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the Copyright and trademark information website (ibm.com/legal/us/en/copytrade.shtml).

HP, HP-UX, and HP UNIX are trademarks or registered trademarks of Hewlett Packard Company in the United States, other countries, or both.

Linux is a trademark of Linus Torvalds in the United States, other countries, or both.

Microsoft, Windows, Windows Server, and the Windows logo are trademarks or registered trademarks of Microsoft Corporation in the United States, other countries, or both.

Oracle and Solaris are trademarks or registered trademarks of Oracle and/or its affiliates.

UNIX is a registered trademark of The Open Group in the United States and other countries.

VMware, ESX, ESXi, vSphere, vCenter, and vCloud are trademarks or registered trademarks of VMware Corporation in the United States, other countries, or both.

Other product and service names might be trademarks of IBM or other companies.



Printed in USA