

IBM FlashSystem A9000R
Version 12.1.0.e

Release Notes



Third Edition (November 2018)

This edition applies to IBM FlashSystem A9000R version 12.1.0.e. 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.

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Contents

Overview	1
What's new in version 12.1.0.e	1
Hot upgrade from earlier versions	2
Management and solutions	2
Change log	4
Version 12.1.0.e (May 2018)	4
Version 12.1.0.d (November 2017)	7
Version 12.1.0.b (October 2017)	7
Version 12.1.0.a (July 2017)	10
Version 12.1 (June 2017)	10
Fixes and features of earlier versions	14
Limitations	14
Known issues	15
Known interoperability issues	22
Related information and publications	22
Getting information, help, and service	23
Notices	25
Trademarks	26

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 data protection through advanced remote mirroring, including synchronous mirroring, asynchronous mirroring, and HyperSwap® high availability through active-active pairing. It also helps protect data with encryption and a range of data security features.

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

What's new in version 12.1.0.e

Software version 12.1.0.e enhances the operation of existing functional features and resolves miscellaneous issues.

General availability (eGA) date: 24 May 2018

Improved output for the `support_center_status` CLI command

The `support_center_status` CLI command output now displays the status of the `always_on` parameter. When `always_on` indicates yes, the system automatically reconnects to XRSC if the connection drops.

For more information, refer to the IBM FlashSystem A9000R CLI Reference Guide.

Resolved issues

For information about the resolved issues, see “Change log” on page 4.

Hot upgrade from earlier versions

Version 12.1.0.e supports direct non-disruptive upgrade (hot upgrade) from the following versions.

- 12.1.0, 12.1.0.a, 12.1.0.b, 12.1.0.d
- 12.0.3, 12.0.3.a, 12.0.3.b

Note: These hot upgrade paths are valid for the time of the general availability (GA) date of version 12.1.0.e. 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 12.1.0.e 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.x 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 12.1.0.e 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 12.1.0.e 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 2.8.2 if Windows Server is used	<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

Cloud storage solution	Version	Compatibility note
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 12.1.0.e (May 2018)

Version 12.1.0.e of IBM FlashSystem A9000R resolves the following issues.

Ticket ID	Description
SYS-301607	<p>Fixed: In rare cases, undetected data corruption could occur if two snapshots or vol_copy targets of the same volume are created very shortly one after the other, followed in a very short time by one of the following three conditions and then by source volume deletion, grid controller failure, or cache failure:</p> <ul style="list-style-type: none"> Hot upgrade Shutdown (and later power on) A grid controller fails or a grid element is added <p>Severity: HIPER</p> <p>Affected versions: 12.0.0 or later</p>
SYS-303675	<p>Fixed: A unique sequence of I/O operations within a 16 KB range, occurring within a very short time, and at the same time there is a very large number of very short I/O operations, could lead to an undetected data corruption of up to 8 KB.</p> <p>Severity: HIPER</p> <p>Affected versions: 12.0.1 or later</p>

Ticket ID	Description
SYS-287615	<p>Fixed: When an encrypted system is powered up while none of the key servers is responding, using the recovery keys without the intervention of IBM Support will not bring the system to ON state.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.0 or later</p>
SYS-301600	<p>Fixed: Common security issues.</p> <p>For more information about these security issues, see CVE-2016-6515, CVE-2016-6210 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-301674	<p>Fixed: In rare cases, due to a software error, performance might be degraded and hosts might not be able to write to the storage system.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.0 or later</p>
SYS-304526	<p>Fixed: Enabling the CIM interface exposes the system to the "Sweet32" issue, as described in CVE-2016-2183 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-304844	<p>Fixed: In extremely rare cases, a corrupted I/O received on the secondary system during asynchronous mirroring might cause a cache node on the secondary storage system to fail, which could result in loss of access to the secondary system.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.2 or later</p>
SYS-305459	<p>Fixed: A system that was encrypted before version 12.2.0 (not including version 12.1.0.e) and then upgraded to version 12.2.0 or above (but prior to version 12.2.1), might not resume normal operation after being powered off and restarted.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.1 or later</p>

Ticket ID	Description
SYS-306055	<p>Fixed: In rare cases, a flash card failure might cause the flash enclosure to become unresponsive, leading to an emergency shutdown.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.0 or later</p>
SYS-306061	<p>Fixed: In rare cases, replacement of a flash canister might lead to loss of access to the storage system.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.0 or later</p>
SYS-306440	<p>Fixed: In rare cases, non-disruptive addition of grid controllers and flash enclosures to FlashSystem A9000R might result in the inability of hosts to write to the storage system.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.1.0 or later</p>
SYS-306586	<p>Fixed: In rare cases, non-disruptive addition of grid controllers and flash enclosures to FlashSystem A9000R might result in loss of access of hosts to the storage system.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.3 or later</p>
SYS-307080	<p>Fixed: Temperature readings of failed flash enclosures are not taken into account in the overall system temperature reading. This might lead to overheating of the system.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.0 or later</p>
SYS-305453	<p>Fixed: In rare cases CIM-based storage management software cannot access the system, since the CIM service is down.</p> <p>Severity: Moderate</p> <p>Affected versions: 12.0.0 or later</p>
SYS-283633	<p>Fixed: Rebooting the storage system after disabling encryption (after issuing the encrypt_disable command) might cause the system to enter maintenance state rather than ON state.</p> <p>Severity: Service</p> <p>Affected versions: 12.0.1 or later</p>
SYS-306048	<p>Fixed: In rare cases, the LED indicators of the flash enclosure might all remain permanently lit.</p> <p>Severity: Service</p> <p>Affected versions: 12.0.0 or later</p>

Ticket ID	Description
SYS-288933	<p>Fixed: When using the nic_list CLI command, the listed component IDs do not match their associated device names.</p> <p>Severity: Low</p> <p>Affected versions: 12.0.0 or later</p>

Version 12.1.0.d (November 2017)

Version 12.1.0.d of IBM FlashSystem A9000R resolved the following issues.

Ticket ID	Description
SYS-303472	<p>Fixed: During hot upgrade, a grid controller might take longer to restart. This might cause loss of access to the storage system.</p> <p>Severity: HIPER</p> <p>Affected versions: 12.0.0 or later</p>
SYS-303370	<p>Fixed: In rare cases, when a MicroLatency module fails and a rebuild is performed in the flash enclosure, a medium error or loss of access to the entire system might occur.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.0 or later</p>
SYS-301747	<p>Fixed: In rare cases, when a MicroLatency module fails and a rebuild is performed in the flash enclosure, a system shutdown might occur. When the system restarts, it will be in maintenance state.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.0 or later</p>

Version 12.1.0.b (October 2017)

Version 12.1.0.b of IBM FlashSystem A9000R resolved the following issues.

Ticket ID	Description
SYS-288588	<p>Fixed: In a rare case, where snapshots, volume copy or asynchronous mirroring are used, and one of the following occurs at the same time, the system might be exposed to undetected data corruption on the snapshot, volumes created by the vol_copy command, or the remote mirror copy, respectively:</p> <ul style="list-style-type: none"> • A cache node failure or cache node being repaired • A complete grid controller failure or grid controller being repaired • A hardware expansion procedure <p>Severity: HIPER</p> <p>Affected versions: 12.1.0 or later</p>

Ticket ID	Description
SYS-288772	<p>Fixed: In rare cases, when I/O write operations smaller than 8K that are made to volumes that either have snapshots, use volume copy, or are the source of an asynchronous mirroring relationship, the system might be exposed to undetected data corruption on the snapshot, volumes created by the vol_copy command, or the remote mirror copy, respectively.</p> <p>Severity: HIPER</p> <p>Affected versions: 12.1.0 or later</p>
SYS-287521	<p>Fixed: In rare cases, if half of the total grid controllers in a rack system fail, hosts might lose access to the system.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.1.0 or later</p>
SYS-287581	<p>Fixed: A rare firmware error in the flash enclosure might cause hosts to lose access to the system.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.0 or later</p>
SYS-288458	<p>Fixed: In rare cases after a HyperSwap failover, a link disconnection between the two systems or a hot upgrade procedure on the primary system – might cause all interface nodes on the active HyperSwap peer to crash, causing loss of access for all connected hosts.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.1.0 or later</p>
SYS-288693	<p>Fixed: In rare cases, a system that works at a very high deduplication ratio while processing numerous overwrites of the same data, SCSI response of medium error might be returned to the host. At a lower probability, loss of access to the system might occur.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.1.0 or later</p>
SYS-288762	<p>Fixed: In rare cases, an internal flash controller failure may result in:</p> <ul style="list-style-type: none"> • Data redistribution on a flash enclosure. • SCSI response of medium error returned to the host. • Loss of access to the system. • System shutdown. <p>Severity: High Impact</p> <p>Affected versions: 12.0.0 or later</p>

Ticket ID	Description
SYS-288890	<p>Fixed: In rare cases, an internal failure of a MicroLatency module might result in:</p> <ul style="list-style-type: none"> • Pre-upgrade procedure failure. • System shutdown. <p>Severity: High Impact</p> <p>Affected versions: 12.0.0 or later</p>
SYS-288917	<p>Fixed: In rare cases, slow MicroLatency module response in the flash enclosure might cause loss of access to the system.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.0 or later</p>
SYS-297352	<p>Fixed: In rare cases, a large amount of VAAI XCOPY operations that copy data containing zeros (or empty space that was never written to) might cause a failure of all cache nodes, leading to loss of access to the system.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.0 or later</p>
SYS-301291	<p>Fixed: Critical temperature might be erroneously reported, triggering the automatic thermal shutdown procedure for the entire system, causing loss of access to the system.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.0 or later</p>
SYS-286555	<p>Fixed: A flash enclosure canister might fail when its dump file system becomes full.</p> <p>Severity: Moderate</p> <p>Affected versions: 12.0.3 or later</p>
SYS-287803	<p>Fixed: A grid controller failure during a system boot might cause the system to enter maintenance state, rather than start operating as expected.</p> <p>Severity: Moderate</p> <p>Affected versions: 12.0.0 or later</p>
SYS-288549	<p>Fixed: An asynchronous volume mirror relationship cannot be added to an asynchronous consistency group mirror relationship, even after multiple tries.</p> <p>Severity: Moderate</p> <p>Affected versions: 12.1.0 or later</p>

Ticket ID	Description
SYS-288641	<p>Fixed: In rare cases, a full system recovery performed by IBM Support after system failure might need to be restarted due to an enforced timeout.</p> <p>Severity: Service</p> <p>Affected versions: 12.0.0 or later</p>

Version 12.1.0.a (July 2017)

Version 12.1.0.a of IBM FlashSystem A9000R resolved the following issues.

Ticket ID	Description
SYS-286560	<p>Fixed: If the size of a primary volume of asynchronous mirroring is not a multiple of 32 KB, the data written to the last few LBAs, whose total size is less than 32 KB, is not replicated to the secondary volume, thus creating undetected data corruption on the secondary volume.</p> <p>Severity: HIPER</p> <p>Affected versions: 12.0.2, 12.0.3, 12.0.3.a, 12.0.3.a-1, and 12.1.0</p>
SYS-288251	<p>Fixed: Overall system performance degradation due to frequent FC port disconnections.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.1.0</p>
SYS-288274	<p>Fixed: A memory leak might cause storage system performance degradation.</p> <p>Severity: Moderate</p> <p>Affected versions: 12.1.0</p>

Version 12.1 (June 2017)

Version 12.1 of IBM FlashSystem A9000R featured the IBM HyperSwap solution, and also added 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 added 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 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>
SYS-283154	<p>Fixed: In asynchronous mirroring, performing the <i>Change role</i> operation on the slave while I/Os 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>

Ticket ID	Description
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>
SYS-286292	<p>Fixed: In 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>

Ticket ID	Description
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 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>
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>

Ticket ID	Description
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 12.1.0.e includes all the features and fixes that were provided in previous 12.0.x and 12.1.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.

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 back-end storage of IBM SAN Volume Controller, the IBM FlashSystem A9000R system is not aware of user data that is deleted or migrated on the front-end SAN Volume Controller. In addition, the IBM FlashSystem A9000R physical capacity usage is not monitored by the front-end IBM SAN Volume Controller.

As a result, the IBM FlashSystem A9000R system cannot regularly reclaim freed capacity, and over time it may unexpectedly for the storage administrator run out of physical storage space.

To mitigate this limitation, when using IBM FlashSystem A9000R as a back-end storage of an IBM SAN Volume Controller, administrators are strongly advised to:

- Closely monitor the IBM FlashSystem A9000R physical capacity using the IBM Hyper-Scale Manager GUI or using the IBM Extended Command-Line Interface (XCLI) Utility.
- Keep track of IBM FlashSystem A9000R capacity-related events.

No support for Fibre Channel longwave optical adapters

Longwave optical adapters for Fibre Channel (FC) are not supported by IBM FlashSystem A9000R.

Known issues

This section details the known issues in IBM FlashSystem A9000R version 12.1.0.e, 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 12.1.0.e or earlier versions.** As long as a newer version has not yet been released, a newer release notes edition for version 12.1.0.e 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 12.1.0.e will no longer be updated. Accordingly, check the release notes of the newer version to learn whether any newly discovered issues affect version 12.1.0.e or whether the newer version resolves any of the issues listed below.
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Ticket ID	Severity	Affected versions	Description
SYS-287670	HIPER	12.0.0 or later	<p>Common security issues. For more information about these security issues, see CVE-2016-2775, CVE-2017-3136, CVE-2017-3137, and CVE-2017-3138 on the Common Vulnerabilities and Exposures (CVE) information website (cve.mitre.org).</p> <p>Workaround: Upgrade to version 12.2.0 or later.</p>
SYS-305533	HIPER	12.1.0 or later	<p>When using HyperSwap while Quorum Witness server is down and the link between two HyperSwap storage systems is broken, the secondary volumes on System B are not locked for read operations. As a result, the data read from System B might be old while new data is written to System A, if these write and read operations occur consecutively and within 10 seconds of the loss of connection between the storage systems. This data corruption will be undetected.</p> <p>Workaround: Upgrade to version 12.2.1 or later.</p>
SYS-276739	High Impact	12.0.1 or later	<p>In rare cases when using synchronous mirroring, a secondary system software failure that results in loss of access for all connected hosts (depending on the exact type of failure on the secondary system), could cause hosts that are writing to the primary system to lose access as well.</p> <p>Workaround: No workaround is currently available.</p>
SYS-287672	High Impact	12.0.1 or later	<p>I/Os associated with a single QoS entity (pool, volume etc) directed to different ports on the same module might cause performance degradation.</p> <p>Workaround: Configure host mapping (iSCSI) or FC zoning (Fibre Channel) to ensure that all I/Os within one QoS entity are sent to the same port on every module they are connected to.</p>
SYS-287778	High Impact	12.1.0 or later	<p>In rare cases, a grid controller failure might lead to a cache failure on a different grid controller and, consequently, to an emergency shutdown.</p> <p>Workaround: No workaround is currently available.</p>
SYS-303455	High Impact	12.0.0 or later	<p>In rare cases, a communication error that occurs on the storage system's host bus adapter (HBA) causes loss of access to the storage system.</p> <p>Workaround: Upgrade to version 12.2.1 or later.</p>
SYS-305091	High Impact	12.0.0 or later	<p>In rare cases, using the io_pause command might cause loss of access to the storage system.</p> <p>Workaround: No workaround is currently available.</p>

Ticket ID	Severity	Affected versions	Description
SYS-305121	High Impact	12.1.0 or later	<p>When using IBM Hyper-Scale Mobility and the volume migration is in Proxy state, a broken link to the destination system might cause hosts to lose access to one or more of the Proxy-state interface modules.</p> <p>Workaround: No workaround is currently available.</p>
SYS-305527	High Impact	12.1.0 or later	<p>In rare cases, if a storage system has gone through a recovery process and is later upgraded, an internal mechanism might identify a metadata inconsistency and shut down the storage system in order to avoid any potential impact to the customer data, thus causing a loss of access to the storage system.</p> <p>Workaround: Upgrade to version 12.2.1 or later.</p>
SYS-305998	High Impact	12.1.0 or later	<p>When the storage system enters an out-of-physical-space state and the SYSTEM_OUT_OF_PHYSICAL_SPACE event is logged, freeing up physical space will allow the storage system to return to normal operation. However, in rare cases, the storage system might enter the same state again, even if there is some free space available.</p> <p>Workaround: Contact IBM Support.</p>
SYS-306573	High Impact	12.1.0 or later	<p>During encryption enabling, encryption re-key, or encryption disabling with any supported version of Gemalto KeySecure key server, the operation fails when attempting to obtain a new key from the key server.</p> <p>Workaround: No workaround is currently available.</p>
SYS-283856	Moderate	12.0.0 or later	<p>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.</p> <p>Workaround: Use the same microcode version on both peer systems.</p>
SYS-285786	Moderate	12.1.0 or later	<p>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.</p> <p>Workaround: No workaround is currently available.</p>
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>

Ticket ID	Severity	Affected versions	Description
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-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>
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.

Ticket ID	Severity	Affected versions	Description
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-285919	Service	12.0.0 or later	<p>When the temperature of the flash enclosure is close to the threshold of maximum allowed temperature, the system may generate an excessive number of events.</p> <p>Workaround: Upgrade to version 12.2.0 or later.</p>
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 generated.</p> <p>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>
SYS-287305	Service	12.1.0 or later	<p>If there are more than 200 volumes in a HyperSwap relation and a failover takes place, some of the HA_AUTOMATIC_FAILOVER_SUCCESFUL events might be lost. This does not affect the actual failover.</p> <p>Workaround: No workaround is currently available.</p>

Ticket ID	Severity	Affected versions	Description
SYS-287421	Service	12.1.0 or later	<p>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.</p> <p>Workaround: Delete the empty consistency group and then create a new one.</p>
SYS-287459	Service	12.1.0 or later	<p>When creating target connectivity over Fibre Channel (FC) in a HyperSwap or a regular mirror relationship, the connectivity is not always established.</p> <p>Workaround: No workaround is currently available.</p>
SYS-287469	Service	12.1.0 or later	<p>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.</p> <p>Workaround: Delete the HyperSwap relationship when the communication between the peer systems is up again. If this is not possible, contact IBM Support.</p>
SYS-287544	Service	12.1.0 or later	<p>The ha_switch_roles command might fail and generate the following event: HA_MASTER_UNAVAILABLE.</p> <p>Workaround: Retry the command.</p>
SYS-288324	Service	12.1.0 or later	<p>When the OUT_OF_PHYSICAL_SPACE event (notifying that the storage system is out of physical space) is recorded on a system that own secondary mirrors, the mirrors will be deactivated only on the primary peer, but will still appear as active on the secondary peer.</p> <p>Workaround: No workaround is currently available.</p>
SYS-291861	Service	12.0.1 or later	<p>For a secondary volume in an asynchronous mirroring relationship, the creation of a local snapshot of a local Consistency Group (that includes one or more inconsistent volumes) is not blocked.</p> <p>Workaround: Upgrade to version 12.2.1 or later.</p>
SYS-299510	Service	12.1.0 or later	<p>When a snapshot is created for a HyperSwap consistency group, the generated event MIRROR_CONS_GROUP_SNAPSHOT_CREATE whereas HA_CONS_GROUP_SNAPSHOT_CREATE would be expected.</p> <p>Workaround: Upgrade to version 12.2.1 or later.</p>

Ticket ID	Severity	Affected versions	Description
SYS-305312	Service	12.1.0 or later	<p>When using HyperSwap, the HA_MASTER_UNAVAILABLE and HA_MASTER_AVAILABLE system events are not logged for all volumes and consistency groups after a system reboot followed by disconnection from the peer system. As a result, incorrect values are shown when using the ha_list command as long as the disconnection continues.</p> <p>Workaround: Wait until the high availability connection to the peer system is reestablished. The correct information will then be displayed.</p>
SYS-305581	Service	12.0.0 or later	<p>The switch_mgmt_ip_list CLI command does not work when using the additional switch argument for displaying the management IP address of a specific InfiniBand switch.</p> <p>Workaround: Use the switch_mgmt_ip_list command without the switch argument. This will display the management IP addresses of all InfiniBand switches.</p>
SYS-305827	Service	12.0.0 or later	<p>In rare cases, the status of an FC port that is not connected to the FC fabric might be erroneously displayed as Online, rather than Offline, in the fc_port_list CLI command output (the Port State field).</p> <p>Workaround: To verify the FC port status, check the Port ID field in the same output. If the port is offline, the value of Port ID will be FFFFFFF.</p>
SYS-310649	Service	12.1.0 or later	<p>When adding a volume which is being replicated with async mirroring to a consistency group (CG) using the cg_add_vol command, the operation might fail with the MIRROR_LAST_SYNC_TIMES_DIFFER return code.</p> <p>Workaround: To resolve this issue, wait until the configured mirroring interval has elapsed, hold for few additional minutes, then rerun the cg_add_vol command.</p>
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>

Ticket ID	Severity	Affected versions	Description
SYS-286612	Low	12.0.0 or later	In some cases, after a backup battery unit (BBU) test, the related power supply unit (PSU) might be reported as failed, although it is operating normally. Workaround: Upgrade to version 12.2.0 or later.

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	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. Workaround: Refer to IBM Support guidelines for Windows Server 2008 and 2008 R2 as described in IBM Technote #S1010299.
SYS-286992	Service	12.1 or later	The HyperSwap feature is not compatible with VMware ESXi 6.0 Update 2 or earlier. Workaround: Use ESXi 6.0 Update 3 or later.
SYS-287993	Service	12.1 or later	Veritas Dynamic Multi-Pathing (DMP) in any configuration does not support HyperSwap volumes. Workaround: No workaround is currently available.

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)

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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.

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