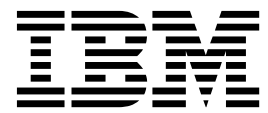


IBM FlashSystem A9000R  
Version 12.2.1.b

## *Release Notes*



**Second Edition (December 2018)**

This edition applies to IBM FlashSystem A9000R version 12.2.1.b. 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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## 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.

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## What's new in version 12.2.1.b

Software version 12.2.1.b is a minor release that removes the maximum pool size limitation and resolves miscellaneous issues.

**General availability (eGA) date:** 2 July 2018

For information about the resolved issue, see “Version 12.2.1.b (July 2018)” on page 4.

### Removal of the maximum pool size limitation

Starting from version 12.2.1.b, IBM FlashSystem A9000R allows the customers to define pools of any size, provided that the total effective capacity of all pools does not exceed the storage system's maximum effective capacity.

To protect the system against overallocation of its resources, which was formerly achieved with the maximum pool size limitation, the maximum allowed total effective capacity of the volumes in a consistency group is now limited to 1 Petabyte.

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## Hot upgrade from earlier versions

Software version 12.2.1.b supports direct non-disruptive upgrade (hot upgrade) on IBM FlashSystem A9000R from the following versions.

- 12.2.1
- 12.2.0, 12.2.0.a, 12.2.0.b
- 12.1.0.a, 12.1.0.b, 12.1.0.d, 12.1.0.e
- 12.0.3, 12.0.3.b

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**Note:** These hot upgrade paths are valid for the time of the general availability (GA) date of version 12.2.1.b. However, hot upgrade from additional earlier versions could be supported later on. For up-to-date information, contact IBM Support.

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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.

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**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.

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## Management and solutions

IBM FlashSystem A9000R version 12.2.1.b can be managed and monitored with IBM Hyper-Scale Manager version 5.4.0 or later.

IBM Hyper-Scale Manager version 5.4.0 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.

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**Note:** Versions of IBM Hyper-Scale Manager earlier than 5.4.0 are not fully supported and must be upgraded to 5.4.0 or later.

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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](http://www.ibm.com/support/fixcentral)).

### IBM Spectrum Accelerate Family HyperSwap Quorum Witness

The HyperSwap functionality feature in IBM FlashSystem A9000R version 12.2.1.b 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).

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**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.

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## IBM Spectrum Connect

IBM FlashSystem A9000R version 12.2.1.b is supported by IBM Spectrum Connect (formerly IBM Spectrum Control Base Edition) version 3.4.0 or later, which provides the following 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
- IBM Storage Enabler for Containers

For more information, see IBM Spectrum Connect on IBM Knowledge Center ([www.ibm.com/support/knowledgecenter/SS6JWS](http://www.ibm.com/support/knowledgecenter/SS6JWS)), and the IBM Spectrum Connect marketing page ([www.ibm.com/us-en/marketplace/spectrum-connect](http://www.ibm.com/us-en/marketplace/spectrum-connect)).

IBM FlashSystem A9000R customers are entitled to free use of IBM Spectrum Connect, 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](http://www.ibm.com/support/fixcentral)).

## Available cloud storage solutions

IBM FlashSystem A9000R version 12.2.1.b 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	2.9.0 or later	For use with IBM AIX®, Linux (Red Hat Enterprise Linux; SUSE Linux Enterprise Server), and Microsoft Windows Server hosts.
IBM Storage Driver for OpenStack	2.2.0 or later	For use with OpenStack Cinder (OpenStack Block Storage) nodes
IBM Storage Management Pack for Microsoft System Center Operations Manager (SCOM)	2.7.0 or later	
IBM Spectrum Accelerate Family Provider for Microsoft Windows Volume Shadow Copy Service (VSS)	2.9.0 or later	

Cloud storage solution	Version	Compatibility note
IBM Spectrum Accelerate Family Storage Replication Adapter (SRA)	3.0.0 or later	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](http://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](http://www.ibm.com/support/knowledgecenter/STJKN5)).

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## Change log

This change log summarizes the enhancements and fixes in the different 12.2.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.

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### Version 12.2.1.b (July 2018)

Software version 12.2.1.b of IBM FlashSystem A9000R resolves the following issues.

Ticket ID	Description
<b>SYS-306116</b>	<p><b>Fixed:</b> On iSCSI-only IBM FlashSystem A9000R storage systems, ports 3 and 4 are not usable.</p> <p>Severity: HIPER</p> <p>Affected versions: 12.2.0 or later</p>
<b>SYS-307062</b>	<p><b>Fixed:</b> In rare cases, read I/O operations might return up to 8 KB of old data. If this case occurs, the error (that is, data corruption) will be undetected.</p> <p>Severity: HIPER</p> <p>Affected versions: 12.2.0 or later</p>
<b>SYS-303705</b>	<p><b>Fixed:</b> The failure of a grid controller during hot upgrade might result in loss of access of hosts to the storage system.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.2 or later</p>

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Ticket ID	Description
SYS-306353	<p><b>Fixed:</b> A performance improvement mechanism for async mirroring that had been introduced in version 12.2.0, was not implemented for consistency groups.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.2.0 or later</p>
SYS-306380	<p><b>Fixed:</b> In rare cases, if not all grid controllers or processes are successfully restored after hot upgrade, loss of access of hosts to the storage system might occur.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.0 or later</p>
SYS-306440	<p><b>Fixed:</b> In rare cases, non-disruptive capacity expansion 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-306448	<p><b>Fixed:</b> In rare cases, the failure of a grid controller or cache node during hot upgrade might result in loss of access of hosts to the storage system.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.1.0 or later</p>
SYS-306573	<p><b>Fixed:</b> During encryption enabling or encryption re-key with any supported version of Gemalto KeySecure key server, the operation fails when attempting to get a new key from the key server. This will result in data staying unencrypted on the storage system.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.1.0 or later</p>
SYS-306586	<p><b>Fixed:</b> In rare cases, non-disruptive capacity expansion 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 and later</p>

Ticket ID	Description
SYS-306844	<p><b>Fixed:</b> In rare cases, when a HyperSwap relation target connection is sufficient for high availability, its state unnecessarily starts toggling between <b>HA_SUFFICIENT</b> and <b>HA_INSUFFICIENT</b>, each state change triggering the corresponding event:</p> <ul style="list-style-type: none"> <li>• TARGET_CONNECTION_HA_SUFFICIENT or</li> <li>• TARGET_CONNECTION_HA_INSUFFICIENT</li> </ul> <p>With the connection states changing intermittently, readiness for automatic failover will be effectively disabled, causing inability to perform failover to the secondary system.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.2.0 and later</p>
SYS-306895	<p><b>Fixed:</b> A parity error in a flash card followed by the flash card failure might lead to loss of access of hosts to the storage system.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.2.0 or later</p>
SYS-306926	<p><b>Fixed:</b> The failure of a cache node or an entire grid controller during hot upgrade might result in loss of access of hosts to the storage system.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.1 or later</p>
SYS-306955	<p><b>Fixed:</b> In rare cases, in a HyperSwap configuration, the storage systems might not be able to recover from temporary disconnections between the Primary and Secondary volumes. Neither System A (which owns the Primary volume) nor System B (which owns the Secondary volume) will be able to serve I/Os to the affected HyperSwap volumes. This might result in loss of access of hosts to the storage systems.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.2.0 or later</p>
SYS-307316	<p><b>Fixed:</b> If, during a data recovery procedure in FlashSystem A9000R using software version 12.0.3, compromised logical block addresses (LBAs) are detected, an upgrade to a newer software version might lead to data loss in case a chunk of data is written into the same blocks.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.3.b or later</p>
SYS-306041	<p><b>Fixed:</b> A medium error might be reported with the wrong offset.</p> <p>Severity: Moderate</p> <p>Affected versions: 12.0.0 or later</p>

Ticket ID	Description
SYS-305827	<p><b>Fixed:</b> 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 <b>fc_port_list</b> CLI command output (the <b>Port State</b> field).</p> <p>Severity: Service</p> <p>Affected versions: 12.0.0 or later</p>
SYS-306743	<p><b>Fixed:</b> Despite the fact that a mirroring or HyperSwap relation was deleted during synchronization, a consequent attempt to delete the target connectivity might fail. If this occurs, a <b>GENERIC_ERROR</b> return code is issued, followed by such events as <b>PROCESS_CORE_DUMP</b>, <b>NODE_DID_NOT_HEARTBEAT</b>, <b>TAKEN_OVER</b>, and <b>NODE_FAILED</b> without any actual impact.</p> <p>Severity: Low</p> <p>Affected versions: 12.1.0 or later</p>

## Version 12.2.1.a-1 (May 2018)

Software version 12.2.1 of IBM FlashSystem A9000R resolved the following issue.

Ticket ID	Description
SYS-306639	<p><b>Fixed:</b> In rare cases, loss of access might occur on hosts connected to IBM FlashSystem A9000R storage systems that had been running version 12.0.0 or 12.0.1 and were then upgraded to version 12.2.1.</p> <p>This issue and its fix apply only to IBM FlashSystem A9000R model 415.</p> <p>Severity: HIPER</p> <p>Affected versions: 12.2.1</p>

## Version 12.2.1 (March 2018)

Software version 12.2.1 of IBM FlashSystem A9000R provided the following enhancements.

- Cross-generation IBM Hyper-Scale Mobility
- Support for IBM Storage Utility Offering
- Support for FC NVMe-ready hardware
- Increased number of simultaneous mirroring connections
- More granular monitoring of latency
- New **mirror\_create\_snapshot** command options
- Non-disruptive capacity increase

Version 12.2.1 also resolved the following issues.

Ticket ID	Description
SYS-304876	<p><b>Fixed:</b> In rare cases, an undetected data corruption might be caused by one of the following scenarios that involve asynchronous mirroring:</p> <ul style="list-style-type: none"> <li>• Restoring the primary volume from a last recent snapshot (LRS).</li> <li>• Deletion of the most recent snapshot (MRS), followed shortly by either copying the LRS (using <b>vol_copy</b>) or by taking a snapshot of the LRS.</li> </ul> <p>Severity: HIPER</p> <p>Affected versions: 12.2.0 or later</p>
SYS-305070	<p><b>Fixed:</b> In rare cases, read I/O operations might cause the system to return corrupted data that will be undetected. When the data is no longer in the cache, subsequent read I/O operations will return correct data.</p> <p>Severity: HIPER</p> <p>Affected versions: 12.2.0 or later</p>
SYS-305533	<p><b>Fixed:</b> 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>Severity: HIPER</p> <p>Affected versions: 12.1.0 or later</p>
SYS-276739	<p><b>Fixed:</b> In rare cases when using synchronous mirroring, a software failure on the secondary system resulting 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>Severity: High Impact</p> <p>Affected versions: 12.0.1 or later</p>
SYS-301571	<p><b>Fixed:</b> In rare cases, querying the Fibre Channel (FC) switch with an FC audit operation might cause AIX hosts to disconnect from the storage system.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.0 or later</p>

Ticket ID	Description
SYS-303455	<p><b>Fixed:</b> 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>Severity: High Impact</p> <p>Affected versions: 12.0.0 or later</p>
SYS-305459	<p><b>Fixed:</b> A system that was encrypted before version 12.2.0 and then upgraded to version 12.2.0 or above, might not resume normal operation after being powered off and restarted.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.2.0 or later</p>
SYS-305527	<p><b>Fixed:</b> In rare cases, if a storage system has gone through a recovery process and is later upgraded, an internal mechanism may 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.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.1.0 or later</p>
SYS-305720	<p><b>Fixed:</b> In rare cases, the internal data garbage collection process might, in some extreme conditions, corrupt an internal metadata structure. This could also lead to loss of access to the storage system.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.3 or later</p>
SYS-306069	<p><b>Fixed:</b> The mirroring (synchronous or asynchronous) of volumes larger than 64 TB may negatively affect the management capabilities of the storage system.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.2.0 or later</p>
SYS-283856	<p><b>Fixed:</b> If the primary and secondary volumes are not of the same system software version level, the reason code of failure in the <b>MIRROR_SNAPSHOT_CREATE_FAILED</b> event might be erroneous.</p> <p>Severity: Moderate</p> <p>Affected versions: 12.0.1 or later</p>
SYS-288324	<p><b>Fixed:</b> When a storage system that owns secondary mirrors reaches the Out Of Physical Space status, the mirrors will be deactivated only on the primary peer, but will still appear as active on the secondary peer.</p> <p>Severity: Service</p> <p>Affected versions: 12.1.0 or later</p>

Ticket ID	Description
SYS-299510	<p><b>Fixed:</b> When a snapshot is created for a HyperSwap consistency group, the emitted event <b>MIRROR_CONS_GROUP_SNAPSHOT_CREATE</b> refers to a mirror consistency group snapshot.</p> <p>Severity: Service</p> <p>Affected versions: 12.1.0 or later</p>
SYS-303701	<p><b>Fixed:</b> When a storage administrator enters the <b>dm_delete</b> CLI command in a state of synchronized data migration while source updating is being performed, the <b>force_delete=yes</b> command option is reported failed, while it actually succeeds in effect.</p> <p>Severity: Service</p> <p>Affected versions: 12.2.0 or later</p>
SYS-279421	<p><b>Fixed:</b> Time stamp is incorrect in statistics reported over SMI-S.</p> <p>Severity: Low</p> <p>Affected versions: 12.0.0 or later</p>
SYS-288933	<p><b>Fixed:</b> When using the <b>nic_list</b> 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>
SYS-305453	<p><b>Fixed:</b> In some scenarios, the CIM server fails to run.</p> <p>Severity: Low</p> <p>Affected versions: 12.0.0 or later</p>

## Version 12.2.0.b (January 2018)

Software version 12.2.0.b of IBM FlashSystem A9000R resolved the following issues.

Ticket ID	Description
SYS-305020	<p><b>Fixed:</b> In rare cases, a single Medium Error might propagate into adjacent blocks, causing Medium Error to up to 16 MB of sequential data.</p> <p>Severity: HIPER</p> <p>Affected versions: 12.2.0</p>
SYS-304844	<p><b>Fixed:</b> 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: 12.2.0</p>

## Version 12.2.0.a (December 2017)

Software version 12.2.0.a of IBM FlashSystem A9000R resolved the following issue.

Ticket ID	Description
SYS-304631	<p><b>Fixed:</b> In rare cases, due to a large amount of internal system configuration information, a hot upgrade procedure could fail and might also cause loss of access to the storage system.</p> <p>This issue and its fix apply only to IBM FlashSystem A9000R model 425.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.2.0</p>

## Version 12.2.0 (November 2017)

Software version 12.2.0 of IBM FlashSystem A9000R introduced the following features.

- Support for the new 425 hardware model, in addition to the previous 415 hardware model.
- Asynchronous mirroring with XIV<sup>®</sup> Gen3 storage systems.
- IBM Hyper-Scale Mobility (volume migration).
- Improved support access by enabling multiple source IP addresses with the **xiv\_support\_enable** command.

Version 12.2.0 also resolved the following issues:

Ticket ID	Description
SYS-287670	<p><b>Fixed:</b> Common security issues.</p> <p>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 (<a href="http://cve.mitre.org">cve.mitre.org</a>).</p> <p>Severity: HIPER</p> <p>Affected versions: 12.0.0 or later</p>

Ticket ID	Description
SYS-301607	<p><b>Fixed:</b> The following would need to occur:</p> <p>Two snapshots or <b>vol_copy</b> targets of the same volume are created very shortly one after the other, followed in a very short time by one of these 3 conditions:</p> <ul style="list-style-type: none"> <li>• Hot upgrade</li> <li>• Shutdown (and later power on)</li> <li>• A grid control fails or a grid element is added (MES)</li> </ul> <p>If followed by the source volume being deleted and a grid controller or a cache node failure, this sequence could lead to an undetected data corruption.</p> <p>Severity: HIPER</p> <p>Affected versions: 12.0.0 or later</p>
SYS-303675	<p><b>Fixed:</b> 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>
SYS-287778	<p><b>Fixed:</b> In rare cases, a grid controller failure might lead to a cache node failure on a different grid controller, thus impacting the system performance until the grid controllers are operational again.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.1.0 or later</p>
SYS-286311	<p><b>Fixed:</b> An error in the SCSI reservation mechanism might render the management operations unavailable, and I/O operations that involve SCSI reservations actions might fail. Regular I/O operations are not affected.</p> <p>Severity: High Impact</p> <p>Affected versions: 12.0.0 or later</p>
SYS-287615	<p><b>Fixed:</b> 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>

Ticket ID	Description
SYS-301747	<p><b>Fixed:</b> 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>
SYS-303370	<p><b>Fixed:</b> 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-287672	<p><b>Fixed:</b> I/O operations associated with a single QoS entity (pool, volume etc) directed to different ports on the same module might cause performance degradation.</p> <p>Severity: Moderate</p> <p>Affected versions: 12.0.1 or later</p>
SYS-287613	<p><b>Fixed:</b> Defining more than 512 HyperSwap relationships causes the loss of access to the Quorum Witness.</p> <p>Severity: Moderate</p> <p>Affected versions: 12.1.0 or later</p>
SYS-283633	<p><b>Fixed:</b> Rebooting the storage system after disabling encryption (after issuing the <b>encrypt_disable</b> 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-285919	<p><b>Fixed:</b> Using high granularity thresholds for monitoring temperature might lead to toggling between warning and normal temperature states with an excessive number of events.</p> <p>Severity: Service</p> <p>Affected versions: 12.0.0 or later</p>
SYS-287421	<p><b>Fixed:</b> 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>Severity: Service</p> <p>Affected versions: 12.1.0 or later</p>

Ticket ID	Description
SYS-287459	<p><b>Fixed:</b> When creating target connectivity over Fibre Channel (FC) in a HyperSwap or a regular mirror relationship, the connectivity is not always established.</p> <p>Severity: Service</p> <p>Affected versions: 12.1.0 or later</p>
SYS-287469	<p><b>Fixed:</b> 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>Severity: Service</p> <p>Affected versions: 12.1.0 or later</p>
SYS-287544	<p><b>Fixed:</b> The <b>ha_switch_roles</b> command might fail and generate the following event: <b>HA_MASTER_UNAVAILABLE</b>.</p> <p>Severity: Service</p> <p>Affected versions: 12.1.0 or later</p>
SYS-291861	<p><b>Fixed:</b> For secondary volumes 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>Severity: Service</p> <p>Affected versions: 12.0.1 or later</p>
SYS-283147	<p><b>Fixed:</b> When obtaining I/O operations statistics for a HyperSwap volume, the remote path I/O operations value is always zero.</p> <p>Severity: Low</p> <p>Affected versions: 12.1.0 or later</p>
SYS-286612	<p><b>Fixed:</b> 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.</p> <p>Severity: Low</p> <p>Affected versions: 12.0.0 or later</p>

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## Fixes and features of earlier versions

IBM FlashSystem A9000R version 12.2.1.b includes all the features and fixes that were provided in previous 12.0.x, 12.1.x, and 12.2.x versions.

This includes the following fix that was not previously reported:

Ticket ID	Description
SYS-280008	<b>Fixed in version 12.0.1:</b> In rare cases when the system is heavily utilized, noticeable performance degradation could occur.  Severity: Moderate  Affected versions: 12.0.0 or later
SYS-287164	<b>Fixed in version 12.2.0:</b> VPN ports are not operational.  Severity: Service  Affected versions: 12.1.0 or later

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](http://www.ibm.com/support/knowledgecenter/STJKN5)).

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## Limitations

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

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**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).

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### 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.

### 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 A9000 physical capacity using IBM Hyper-Scale Manager or IBM Extended Command-Line Interface (XCLI) Utility.
- Keep track of IBM FlashSystem A9000R capacity-related events.
- Upgrade to software version 8.1 or later of IBM SAN Volume Controller.

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## Known issues

This section details the known issues in IBM FlashSystem A9000R version 12.2.1.b, 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.

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### Important:

- **The issues listed below apply to version 12.2.1.b or earlier versions.** As long as a newer version has not yet been released, a newer release notes edition for version 12.2.1.b 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 12.2.1.b will no longer be updated. Accordingly, check the release notes of the newer version to learn whether any newly discovered issues affect version 12.2.1.b or whether the newer version resolves any of the issues listed below.
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Ticket ID	Severity	Affected versions	Description
SYS-307098	HIPER	12.1.0 or later	<p>In a HyperSwap setup with an active SCSI reservation, if only a subset of the host ports defined on System A (which owns the Primary volume) is defined on System B (which owns the Secondary volume), System B might not conform to the SCSI reservation. As a result, the Secondary volume might be read by another host; and after a HyperSwap failover, the new Primary volume (former Secondary volume) might be written to by another host. This violation of SCSI reservation will be undetected.</p> <p><b>Workaround:</b> Ensure that all host ports are configured symmetrically in both systems. Proceed as follows:</p> <ol style="list-style-type: none"> <li>1. If a host is defined on one system, but not on the other, use the <b>host_define</b> CLI command to define this host, where necessary.</li> <li>2. For each host System A is connected to, run the <b>host_list_ports</b> CLI command.</li> <li>3. Run the <b>host_list_ports</b> CLI command for the same host on System B.</li> <li>4. Compare the <b>Port Name</b> columns in the <b>host_list_ports</b> output on both systems.</li> <li>5. If a port appears on one list, but does not appear on the other, use the <b>host_add_port</b> CLI command to add this port.</li> </ol> <p><b>Note:</b> The actual network connectivity does not need to change.</p>
SYS-305091	High Impact	12.0.0 or later	<p>In rare cases, using the <b>io_pause</b> command might cause loss of access to the storage system.</p> <p><b>Note:</b> Starting from version 12.2.1, this CLI command is disabled until a fix for this issue becomes available.</p> <p><b>Workaround:</b> No workaround is currently available.</p>
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><b>Workaround:</b> No workaround is currently available.</p>
SYS-305998	High Impact	12.1.0 or later	<p>When the storage system enters an out-of-physical-space state and the <code>SYSTEM_OUT_OF_PHYSICAL_SPACE</code> 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><b>Workaround:</b> Contact IBM Support.</p>

Ticket ID	Severity	Affected versions	Description
SYS-305999	High Impact	12.0.0 or later	<p>When an encrypted storage system is powered up, it may enter the maintenance state due to an issue in the encryption key management mechanism.</p> <p><b>Workaround:</b> Contact IBM Support.</p>
SYS-282831	Moderate	12.0.2 or later	<p>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.</p> <p><b>Workaround:</b> When experiencing performance issues with data that was written to the system prior to upgrading to version 12.0.2, contact IBM Support.</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 milliseconds.</p> <p><b>Workaround:</b> No workaround is currently available.</p>
SYS-304840	Moderate	12.1.0 or later	<p>Using the IBM Hyper-Scale mobility (volume migration) feature between XIV Gen3 systems and FlashSystem A9000 or A9000R systems is not supported during the hot upgrade of FlashSystem A9000 or A9000R.</p> <p><b>Workaround:</b> No workaround is currently available.</p>
SYS-304905	Moderate	12.2.0 or later	<p>When performing a system wipe-out operation and then disabling the system's data encryption (for example, for the purpose of moving the system), the system performs several emergency shutdowns before the encryption disabling is completed.</p> <p><b>Workaround:</b> Manually restart the system and allow the decryption process to complete.</p>
SYS-279815	Service	12.0.0 or later	<p>If a MicroLatency module 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><b>Workaround:</b> Use the <b>flash_card_list</b> 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><b>Workaround:</b> 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><b>Workaround:</b> To resolve this issue, use 255 or less LUNs per host.</p>

Ticket ID	Severity	Affected versions	Description
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><b>Workaround:</b> 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><b>Workaround:</b> 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 <b>SYS-285120</b> below).</p> <p><b>Workaround:</b> To resolve this issue, proceed as follows in IBM Hyper-Scale Manager:</p> <ol style="list-style-type: none"> <li>1. Remove the current Quorum Witness configuration. This action disassociates the Quorum Witness from the connected system(s).</li> <li>2. Define a new Quorum Witness and make sure that the correct port is used.</li> <li>3. Activate the newly defined Quorum Witness.</li> <li>4. Connect the system(s), that were previously using the removed Quorum Witness, to the newly defined Quorum Witness.</li> </ol>

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><b>Workaround:</b> To resolve this issue, proceed as follows in IBM Hyper-Scale Manager:</p> <ol style="list-style-type: none"> <li>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 <b>SYS-284512</b> above).</li> <li>2. Remove the current Quorum Witness configuration. This action disassociates the Quorum Witness from the system(s).</li> <li>3. Define a new Quorum Witness and make sure that the correct port is used.</li> <li>4. Activate the newly defined Quorum Witness.</li> <li>5. Connect the system(s), that were previously using the removed Quorum Witness, to the newly defined Quorum Witness.</li> </ol>
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 <b>POD_IB_LINK_DETECTION_LINK_PERSISTENTLY_DISCONNECTED</b> might be unnecessarily emitted.</p> <p>These events can be safely ignored.</p>
SYS-286449	Service	12.0.0 or later	<p>When the CLI command <b>reservation_key_list</b> 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, <b>reservation_key_list</b> outputs the entire key list.</p> <p><b>Workaround:</b> Apply the command <b>reservation_key_list</b> per volume.</p>
SYS-287068	Service	12.1.0 or later	<p>In rare cases, the <b>ha_create</b> command might fail.</p> <p><b>Workaround:</b> Retry the operation.</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 <b>HA_AUTOMATIC_FAILOVER_SUCCESFUL</b> events might be lost. This does not affect the actual failover.</p> <p><b>Workaround:</b> No workaround is currently available.</p>
SYS-287279	Service	12.1.0 or later	<p>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 <b>TARGET_CONNECTIVITY_HA_INSUFFICIENT</b> event is issued.</p> <p><b>Workaround:</b> No workaround is currently available.</p>

Ticket ID	Severity	Affected versions	Description
SYS-305312	Service	12.1.0 or later	<p>When using HyperSwap, the <b>HA_MASTER_UNAVAILABLE</b> and <b>HA_MASTER_AVAILABLE</b> 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 <b>ha_list</b> command as long as the disconnection continues.</p> <p><b>Workaround:</b> Wait until the high availability connection to the peer system is reestablished. The correct information will then be displayed.</p>
SYS-305433	Service	12.1.0 or later	<p>When using IBM Hyper-Scale Mobility and aborting (with <b>olvm_abort</b>) a migration process that is currently in Proxy state, the remote volume remains in locked read-only state.</p> <p><b>Workaround:</b> Use the <b>vol_unlock</b> command to unlock the volume state.</p>
SYS-305450	Service	12.0.0 or later	<p>Manually created snapshots that have a reserved name prefix prevent the automatic creation of additional snapshots.</p> <p><b>Workaround:</b> Delete and do not manually create snapshots that have a reserved name prefix.</p>
SYS-305581	Service	12.0.0 or later	<p>The <b>switch_mgmt_ip_list</b> CLI command does not work when using the additional <b>switch</b> argument for displaying the management IP address of a specific InfiniBand switch.</p> <p><b>Workaround:</b> Use the <b>switch_mgmt_ip_list</b> command without the <b>switch</b> argument. This will display the management IP addresses of all InfiniBand switches.</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><b>Workaround:</b> No workaround is currently available.</p>
SYS-306320	Low	12.0.0 or later	<p>In rare cases, the process of enabling encryption may not complete successfully due to a timeout. If this occurs, the system emits the <b>ENCRYPT_ENABLE_NOT_COMPLETED</b> event with all the relevant details.</p> <p><b>Workaround:</b> Retry activating encryption.</p>

Ticket ID	Severity	Affected versions	Description
SYS-306814	Low	12.0.1 or later	By design, an attempt to set up IBM Hyper-Scale Mobility, when a volume with the same name as the source volume already exists at the destination system, fails due to an illegal volume name. However, the emitted return code (REMOTE_VOLUME_NOT_APPLICABLE_FOR_OLVM) provides a wrong reason for the failure.  <b>Workaround:</b> No workaround is currently available.
SYS-306886	Low	12.0.0 or later	In the output of the <b>ipinterface_list_ports</b> CLI command, all iSCSI ports might be listed with the Link Up status, even though some ports have no connectivity.  <b>Workaround:</b> No workaround is currently available.

## 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	12.1.0 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.  <b>Workaround:</b> Refer to IBM Support guidelines for Windows Server 2008 and 2008 R2 as described in IBM Technote #S1010299.
SYS-286992	Service	12.1.0 or later	The HyperSwap feature is not compatible with VMware ESXi 6.0 Update 2 or earlier.  <b>Workaround:</b> Use ESXi 6.0 Update 3 or later.
SYS-287993	Service	12.1.0 or later	Veritas Dynamic Multi-Pathing (DMP) in any configuration does not support HyperSwap volumes.  <b>Workaround:</b> 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<sup>®</sup>/systems/storage/flash](http://ibm.com/systems/storage/flash))
- IBM FlashSystem A9000R on IBM Knowledge Center ([ibm.com/support/knowledgecenter/STJKN5](http://ibm.com/support/knowledgecenter/STJKN5))

- IBM FlashSystem A9000 on IBM Knowledge Center ([ibm.com/support/knowledgecenter/STJKMM](http://ibm.com/support/knowledgecenter/STJKMM))
- IBM Hyper-Scale Manager on IBM Knowledge Center ([ibm.com/support/knowledgecenter/SSUMNQ](http://ibm.com/support/knowledgecenter/SSUMNQ))
- IBM Storage Redbooks® website ([redbooks.ibm.com/portals/storage](http://redbooks.ibm.com/portals/storage))

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## Getting information, help, and service

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- IBM website ([ibm.com](http://ibm.com))
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