



IBM MQ Appliance

What's new in 2017 and futures

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Agenda

- Introduction
- V9.0.1
 - New UI
 - HA Floating IP support
 - Queue manager backup/restore and automatic start-up
 - RESTful administration, administrative security, SNMP
- V9.0.2
 - MQ REST API, HA SSH key renewal
- V9.0.3
 - AMS MCA interception
- V9.0.4
 - SAN support
- Futures



What's an MQ Appliance?

- The scalability and security of IBM MQ
- Integrates seamlessly into MQ networks and clusters
 - Familiar administration model for administrators with MQ skills
- The convenience, fast time-to-value and low total cost of ownership of an appliance
- Ideal for use as a messaging hub running queue managers accessed by clients, or to extend MQ connectivity to a remote location
- Familiar feel for existing MQ users – application interfaces, administration, networking/clustering, security....
- Plus new appliance specific features – e.g. built in high availability

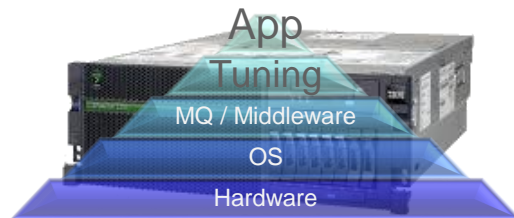


Key differences with appliance form-factor



IBM MQ Appliance

- Prebuilt for hub pattern – no apps on device
- No additional software installation
 - No user exits in MQ
 - Monitoring agents must be remote
- High availability out-of-the-box
- Pre-tuned
- Single firmware update for whole appliance
 - Firmware update inc. appliance and MQ fix pack
 - Can be rolled back as an single unit



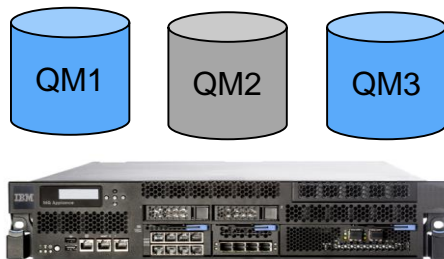
IBM MQ on custom server

- DIY hub or generic server – apps + middleware
- Install any software
 - Build & maintain your own custom extensions
 - Add local monitoring agents
- Needs HA cluster SW or network storage for HA
- Custom tuning for each layer (OS/middleware)
- Discrete maintenance for each layer
 - MQ fix packs
 - OS maintenance, security patches, etc.

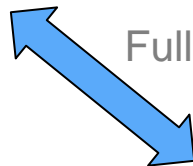
IBM MQ Appliance V8.0 (recap)

- Announced in February 2015 – GA was 13 March 2015 (M2000)
- High availability (HA) support built in
- Firmware updates delivered new function:
 - 8.0.0.4 (October 2015)
 - Disaster recovery (asynchronous replication) for single appliances
 - 8.0.0.5 (May 2016)
 - Disaster recovery for HA groups
 - AMQP channels for MQ Light applications
 - Support for the M2001 hardware model
 - SSD disks and 4-port 10Gb Ethernet module
- V8.0 is now provided as the long-term support (LTS) firmware version

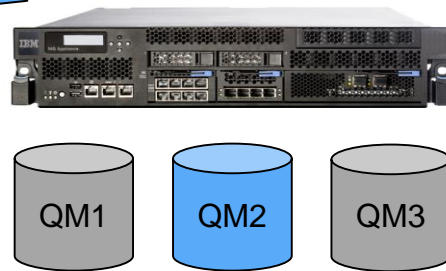
High availability – concept



No persistent data loss on failure
No external storage
No additional skills required



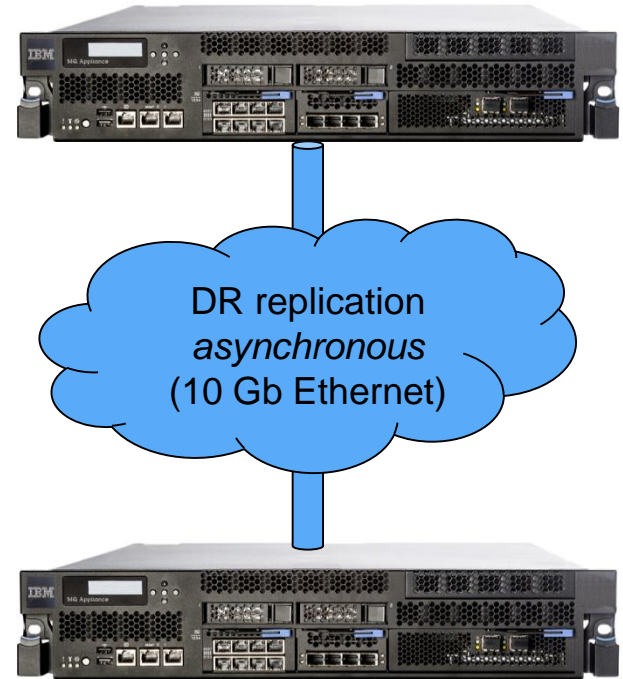
Fully synchronous replication



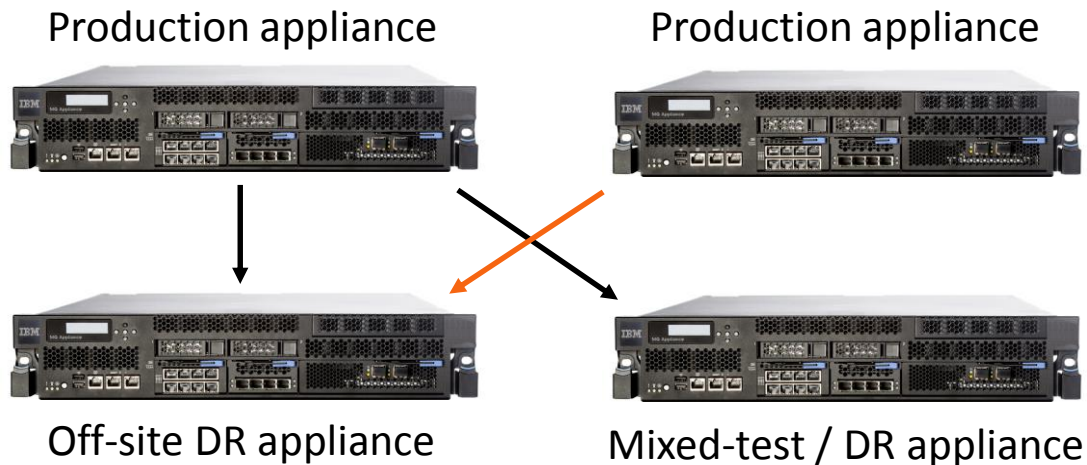
Manual control of failover for migration/maintenance
Queue manager level active/passive (i.e. both appliances can run workload)

Disaster recovery (8.0.0.4) – concept

- Provides for longer distance recovery than HA
 - e.g. out-of-region standby site
- Still ultimately requires high bandwidth connectivity as all persistent data is fully mirrored
- But - asynchronous so better choice than HA for higher latency, 'bursty' or 'lossy' networks
 - Means most recent messages are potentially lost on fail-over and application logic must consider this
- Manual interaction required to trigger fail-over / fail-back



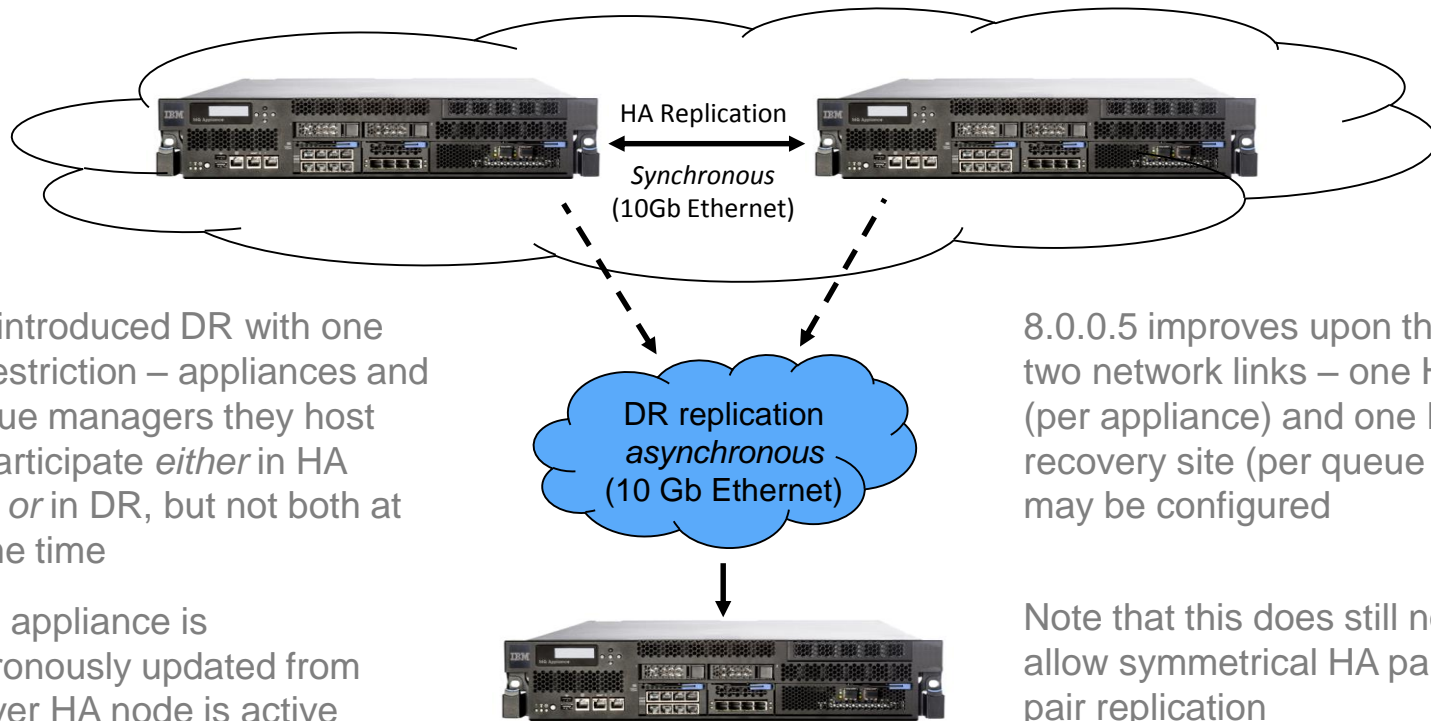
Disaster recovery – flexible topologies



Flexible configuration:

- As with HA, configuration is per queue manager – though with DR there is no concept of a 'group'
- Each QM independently configures replication to one other appliance
- For example, could configure single 'DR' site covering live appliances at multiple sites

Disaster recovery for HA groups (8.0.0.5)



8.0.0.4 introduced DR with one major restriction – appliances and the queue managers they host could participate *either* in HA groups, *or* in DR, but not both at the same time

The DR appliance is asynchronously updated from whichever HA node is active

8.0.0.5 improves upon this using two network links – one HA partner (per appliance) and one DR recovery site (per queue manager) may be configured

Note that this does still not (yet) allow symmetrical HA pair to HA pair replication

New web UI (9.0.1)

- Embedded MQ Console
- Easy access to configure high availability and disaster recovery

The screenshot displays the IBM MQ Appliance web UI. The top navigation bar includes the text "IBM MQ Appliance | MQ00 console at cyrus0", a user dropdown set to "admin", and a help icon. On the left, a blue sidebar contains several icons, with the globe icon at the top highlighted by a yellow box. The main content area features a "Demo" dropdown and a "+" button. Two yellow boxes highlight the "High Availability" and "Disaster Recovery" links in the top right. Below these are two widget panels: "Local Queue Managers" and "Queues on JPS1".

Local Queue Managers

Name	Status
JPS1	Running
JPS2	Stopped

Total: 2 Selected: 0 Updated: 12:08:03 PM

Queues on JPS1

Name	Queue type	Queue depth
TEST.REQUEST	Local	0
TEST.REPLY	Local	0

Total: 2 Selected: 1 Updated: 12:03:40 PM

New web UI (9.0.1)

- Options to import, export and reset the MQ Console dashboard
- Ideal for replicating between appliances

The screenshot displays the IBM MQ Appliance web UI. The top navigation bar includes the title 'IBM MQ Appliance | MQ00 console at cyrus0', the user 'admin', and the IBM logo. Below the navigation bar, there are tabs for 'Demo' and '+'. The main content area is divided into two panels: 'Local Queue Managers' and 'Queues on JPS1'. The 'Local Queue Managers' panel shows a table with columns 'Name' and 'Status', listing JPS1 (Running) and JPS2 (Stopped). The 'Queues on JPS1' panel shows a table with columns 'Name' and 'Queue type', listing TEST.REQUEST (Local) and TEST.REPLY (Local). A settings menu is open on the right side, showing options: 'Keyboard shortcuts', 'Import dashboard', 'Export dashboard', 'Reset dashboard', 'Settings', and 'About'. The settings menu is highlighted with a yellow box. The 'Local Queue Managers' panel is also highlighted with a yellow box.

Name	Status
JPS1	Running
JPS2	Stopped

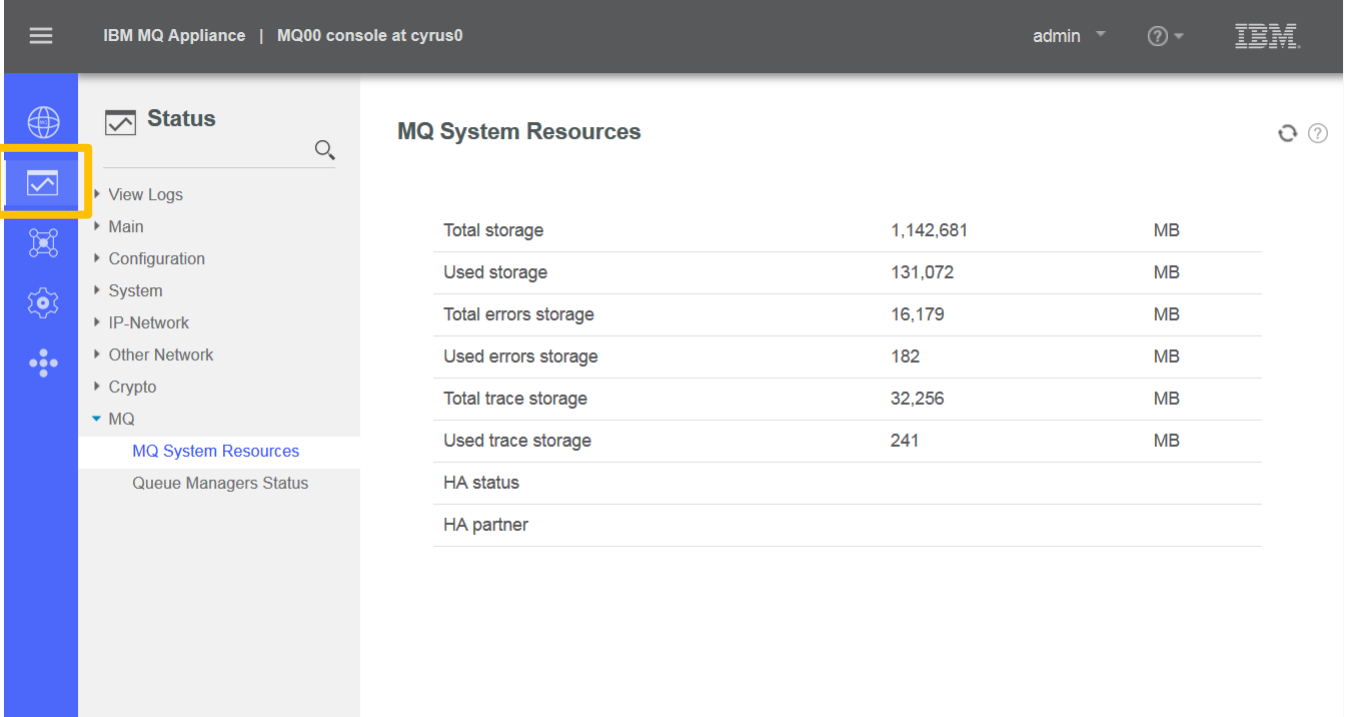
Name	Queue type
TEST.REQUEST	Local
TEST.REPLY	Local

Total: 2 Selected: 0 Updated: 12:17:33 PM

Total: 2 Selected: 1 Updated: 12:03:40 PM

New web UI (9.0.1)

- View status information about resources, hardware sensors, networking, active users, system logs and more



The screenshot displays the IBM MQ Appliance web interface. The top navigation bar shows 'IBM MQ Appliance | MQ00 console at cyrus0' and the user 'admin'. The left sidebar contains a menu with icons for Status, View Logs, Main, Configuration, System, IP-Network, Other Network, Crypto, and MQ. The 'Status' icon is highlighted with a yellow box. The main content area is titled 'MQ System Resources' and contains a table with storage and error statistics.

Resource	Value	Unit
Total storage	1,142,681	MB
Used storage	131,072	MB
Total errors storage	16,179	MB
Used errors storage	182	MB
Total trace storage	32,256	MB
Used trace storage	241	MB
HA status		
HA partner		

System resource example for a M2000 appliance – the M2001 has 3TB of storage

New web UI (9.0.1)

- Configure the Ethernet interfaces, VLANs, link aggregation and other network settings
- Configure SSH and the web UI

The screenshot displays the IBM MQ Appliance web UI. The top header shows 'IBM MQ Appliance | MQ00 console at cyrus0' and 'admin'. The left sidebar has a blue background with a yellow box highlighting the 'Network' icon. The main content area is titled 'Ethernet Interface' and features a 'New...' button, a search filter, and a table of interfaces.

Name	Status	Op-State	Administrative state	Comments	Actions
<input type="checkbox"/> eth10			enabled		
<input type="checkbox"/> eth11			enabled		
<input type="checkbox"/> eth12			enabled		
<input type="checkbox"/> eth13			enabled	HA HB1	
<input type="checkbox"/> eth14			enabled		
<input type="checkbox"/> eth15			enabled		
<input type="checkbox"/> eth16			enabled		
<input type="checkbox"/> eth17			enabled	HA HB2	
<input type="checkbox"/> eth20			enabled	DR	

New web UI (9.0.1)

- Administer local user accounts, role-based management (RBM), SNMP and other system settings

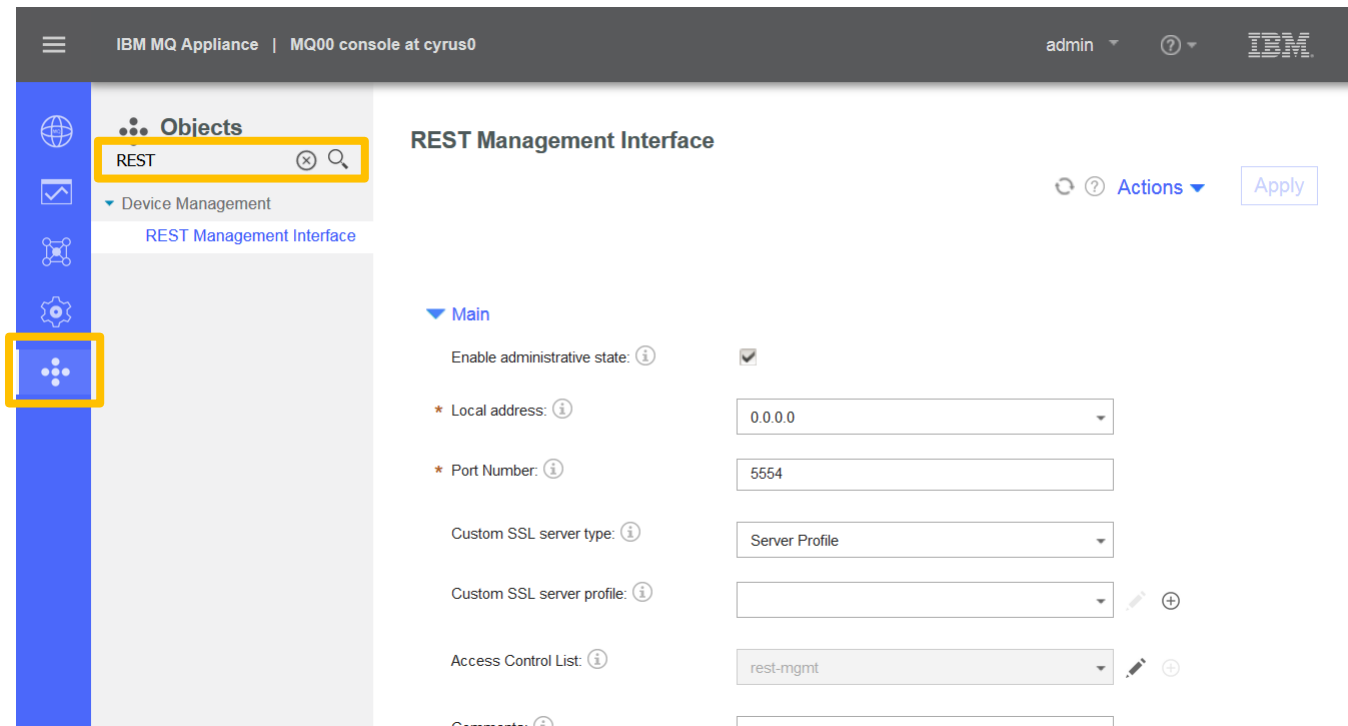
The screenshot displays the IBM MQ Appliance web interface. The top header shows 'IBM MQ Appliance | MQ00 console at cyrus0' and a user dropdown set to 'admin'. The left sidebar contains a navigation menu with icons for Main, Configuration, Access, and Administration. The 'Administration' icon, which is a gear, is highlighted with a yellow box. The main content area is titled 'User Account' and features a 'New...' button, a refresh icon, and a trash icon. Below these is a table with columns: Name, Status, Op-State, Access level, User group, Comments, and Actions. The table contains one entry for the 'admin' user, who is in a 'privileged' access level and belongs to the 'Administrator' group. A filter input field is located above the table. At the bottom of the table, it states 'Total: 1 Selected: 0'.

Name	Status	Op-State	Access level	User group	Comments	Actions
<input type="checkbox"/> admin			privileged		Administrator	

Total: 1 Selected: 0

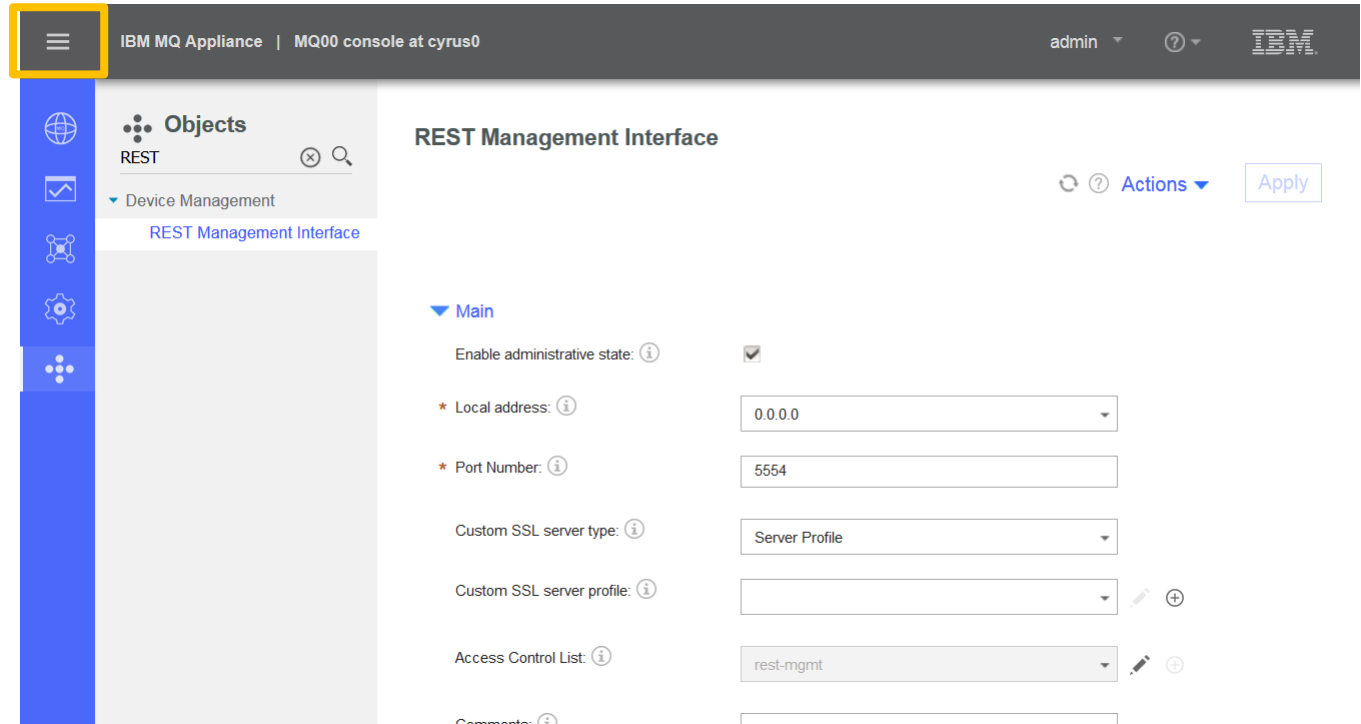
New web UI (9.0.1)

- Manage all system objects in a single view
- Search for object types using keywords



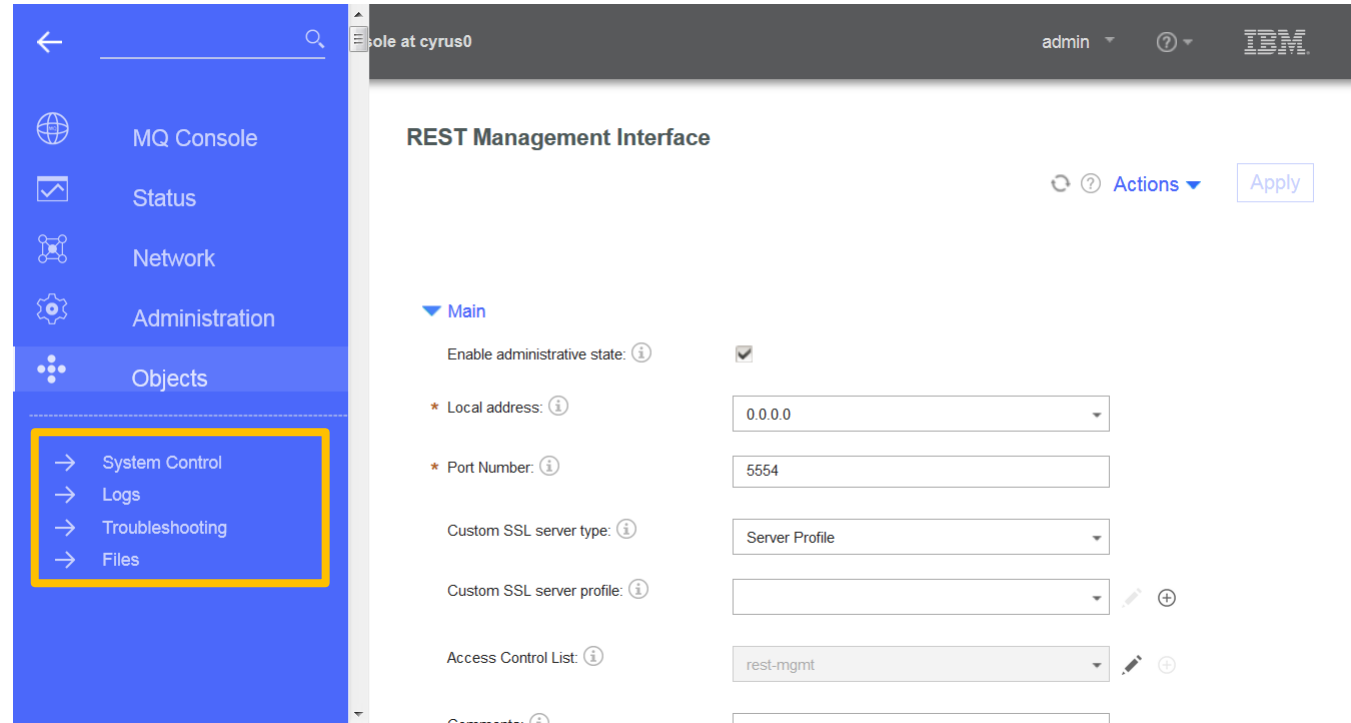
New web UI (9.0.1)

- Expand the searchable navigation menu for quick access to common items



New web UI (9.0.1)

- Access system logs and files at the click of a button



New web UI (9.0.1)

- Use keywords to search for relevant information throughout the UI

The screenshot displays the IBM REST Management Interface. On the left, a blue sidebar contains a search bar with the text 'user' and a magnifying glass icon. Below the search bar, the sidebar is organized into sections: 'Status' with a link to 'Active Users', 'Administration' with links to 'User Account' and 'User Group', and 'Objects' with links to 'IPMI User', 'User Account', and 'User Group'. The main content area on the right is titled 'REST Management Interface' and features a top navigation bar with 'admin', a help icon, and the IBM logo. The main area has a 'Main' section with several configuration options: 'Enable administrative state' (checked), 'Local address' (0.0.0.0), 'Port Number' (5554), 'Custom SSL server type' (Server Profile), 'Custom SSL server profile' (empty), and 'Access Control List' (rest-mgmt). Each option has an information icon. At the top right of the main area, there are refresh, help, and 'Actions' buttons, along with an 'Apply' button.

New web UI (9.0.1)

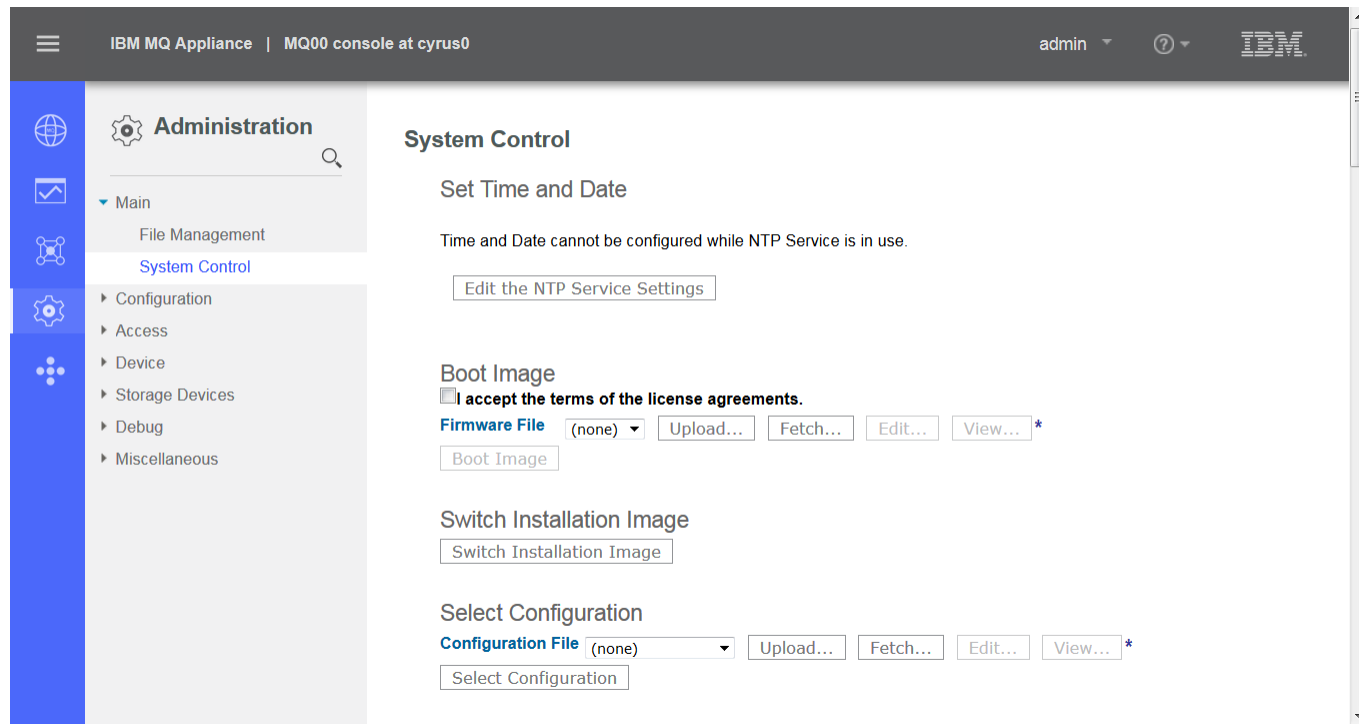
- Upload, download and manage local files, such as logs, trace and certificates

The screenshot displays the IBM MQ Appliance web interface. The top header bar shows 'IBM MQ Appliance | MQ00 console at cyrus0' on the left, 'admin' with a dropdown arrow in the center, and the IBM logo on the right. A left-hand navigation menu is visible, with the 'Administration' section expanded to show 'Main', 'File Management' (highlighted in blue), and 'System Control'. Under 'File Management', there are links for 'Configuration', 'Access', 'Device', 'Storage Devices', 'Debug', and 'Miscellaneous'. The main content area is titled 'File Management' and shows 'Available Space: 9,394 MBytes (encrypted), 4,070 MBytes (temporary)'. Below this, there are buttons for 'Delete', 'Copy', 'Rename', and 'Move'. A table lists various files and directories with columns for 'Name', 'Action', 'Size', and 'Modified'. Each entry has an 'Actions...' link in the 'Action' column.

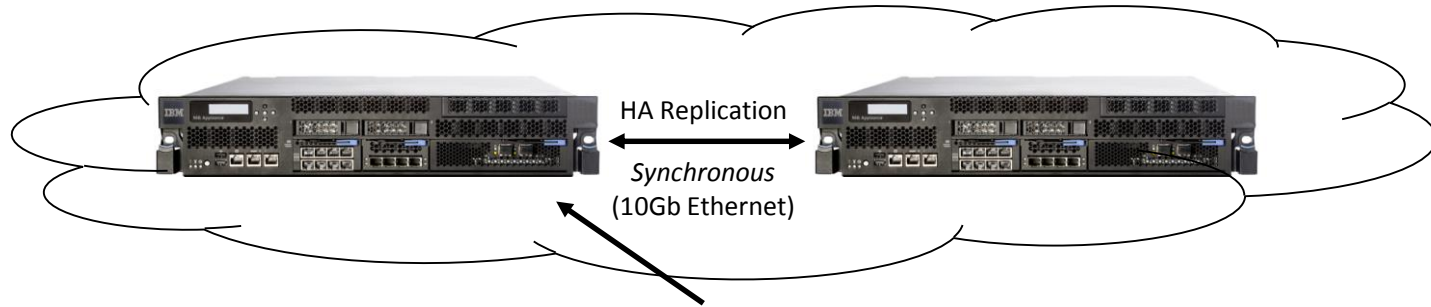
Name	Action	Size	Modified
cert:	Actions...		
chkpoints:	Actions...		
config:	Actions...		
export:	Actions...		
fcvolumes:	Actions...		
image:	Actions...		
local:	Actions...		
logstore:	Actions...		
logtemp:	Actions...		
mqbackup:	Actions...		
mqdiag:	Actions...		

New web UI (9.0.1)

- Use System Control to:
 - Apply firmware updates
 - Shutdown or reboot the appliance
 - Change the logged in user's password (if applicable)
 - Control the blue locator LED



High availability – floating IP support (9.0.1)



In version 8 of the MQ Appliance, clients connecting to HA queue managers must be aware of all possible IP addresses (e.g. via comma separated list or CCDT)

Client transparently connects to active instance

Application

Particularly useful when replacing existing standalone queue managers with HA Appliance queue managers, requiring no changes on the application side

Client applications now able to use a single IP address associated with the queue manager - automatically adopted by whichever instance is currently active

Floating IP configuration (web UI)

- Option to configure the floating IP at queue manager creation in the web UI ...

Create a Queue Manager

* Queue manager name: ?

Port: ?

High availability: None Replicated ?

File system size: Default Custom ?

Startup: Manual Automatic ?

Floating IP interface: None ?

Floating IP: ?

Floating IP configuration (web UI)

The screenshot displays the 'Local Queue Managers' web interface. On the left, a table lists queue managers, with 'QM1' selected. A context menu is open over 'QM1', with 'High Availability...' highlighted. On the right, the 'High Availability (HA)' configuration panel is shown. It contains several actions: 'Add to HA control', 'Remove from HA control', 'Set preferred location', 'Clear preferred location', 'Resolve partitioned state', and 'Configure floating IP'. The 'Configure floating IP' option is highlighted with a yellow box. The panel also includes a 'Close' button at the bottom right.

Local Queue Managers

High Availability...

Disaster Recovery...

Refresh security...

Manage authority records...

Manage create authority records...

Add new dashboard tab

Total: 1 Selected: 1

High Availability (HA)

Perform a HA action on 'QM1'

- Add to HA control** Add queue manager " to the HA group
- Remove from HA control** Remove queue manager from the HA group and run it as a stand-alone queue manager
- Set preferred location** Specify that a queue manager always runs on this particular appliance in the HA pair, if this appliance is available
- Clear preferred location** Revert to manual control of preferred location (leaving the queue manager running on its current host)
- Resolve partitioned state** Identifies this appliance as the 'winner' of a partitioned state. Data on the other appliance is discarded
- Configure floating IP** Configure the high availability floating IP for this queue manager. Delete existing IP to remove floating IP

Close

... and for existing queue managers

Floating IP configuration (CLI)

- A new **sethaint** command can be used to configure a HA floating IP address for a queue manager
- The **dspmq** command has been updated to display the IP information

```
mqa(mqcli)# sethaint -m HA1 -a -f 9.20.87.200 -l eth10  
The sethaint command succeeded.
```

```
mqa(mqcli)# dspmq -o ha  
QMNAME(HA1)          HA(Replicated)  HALSADDR(9.20.87.200)  HALSINT(eth10)
```

- Define a listener to use the floating IP for inbound connections
– DEFINE LISTENER(mylist) IPADDR(9.20.87.200)
- Use LOCLADDR for outbound connections
– DEFINE CHANNEL(mysdr) CHLTYPE(SDR) LOCLADDR(9.20.87.200)

Automatic queue manager start-up (9.0.1)

- New option to configure non-HA queue managers to be started automatically when the appliance boots (was already automatic for HA)
- Option to set in the create queue manager UI dialog:

Startup:

Manual

Automatic

- Use **dspmqini** and **setmqini** to query and modify using the CLI:

```
mqa(mqcli)# setmqini -m JPS1 -s InstanceData -k Startup -v Automatic
Key Startup was successfully updated in stanza InstanceData for
queue manager JPS1.
```

```
mqa(mqcli)# dspmqini -m JPS1 -s InstanceData -k Startup
Automatic
```

Queue manager backup/restore (9.0.1)

- New option to create a point-in-time backup for a queue manager
 - Provides a fall-back position should a firmware update need to be rolled back
 - Can also be used to move a queue manager from one appliance to another
- Allocate storage for backups:

```
mqa(mqcli)# createbackupfs -s 100G  
The createbackupfs command succeeded.
```

- Use **mqbackup** and **mquestore** to backup/restore queue managers:

```
mqa(mqcli)# mqbackup -m JPS3  
Backup operation for 'JPS3' queue manager has completed successfully.  
Created backup file: mqbackup:/QMgrs/JPS3.bak
```

Administrative security (9.0.1)

- Two distinct types of user on the appliance
 - Users who administer the system (appliance/administrative users)
 - Users who perform messaging operations (messaging users)
- Role-Based Management (RBM)
 - New security model for managing appliance users
 - More granular and flexible user and authority management
 - Core capabilities
 - User authentication
 - Credential mapping (authorisation)
 - Password and account policy



Administrative security (9.0.1)

- User authentication options
 - Local users (the only option available in version 8)
 - Users defined in an XML file
 - Easy central deployment of user credentials using SCP or REST
 - External LDAP repository
 - LDAP is commonly used to provide a single sign-on solution
 - E.g. OpenLDAP, Microsoft Active Directory and IBM Security Directory Server
 - Single control point, avoids bespoke security policy
 - Supports user authentication using any unique attribute in user profiles
 - E.g. Serial number, common name, email address
 - Supports LDAP and LDAPS (SSL/TLS) and load balancing for availability
 - Fallback users allow access when LDAP repository is unavailable or settings are wrong



Administrative security (9.0.1)

- Credential mapping
 - Policies assign authorities to users or groups (roles)
 - Generic or specific profiles define access to a type or class of resource
 - Can quickly define simple rules or build granular definitions for complex policies
 - Authority types:
 - View existing objects (read)
 - Edit existing objects (write)
 - Define a new object (add)
 - Remove an object (delete)
 - Perform related actions (execute)



Administrative security (9.0.1)

- Credential mapping cont...
 - Restrict access to specific interfaces
 - E.g. Require local access for more sensitive operations
 - Define access policies using local groups or an XML file
 - Optionally store user-group mapping in LDAP
 - Restrict access to administrative interfaces
 - Web UI, REST API, SSH
 - Can now grant access to system resources but not MQ (or vice-versa)
 - Access to MQ in the CLI is all or nothing
 - Access to MQ Console is as per other platforms (full admin, read-only admin, custom)



Administrative security (9.0.1)

- Password and account policy
 - Define policies for local users
 - Not applicable to XML file and LDAP authentication
 - Configure password rules
 - Minimum length, complexity, expiration, restrict reuse
 - Account policies
 - Restrict the built-in 'admin' account to the serial connection
 - Account lockout after excessive failed login attempts
 - Configurable lockout duration and attempt threshold
 - Disconnect idle CLI sessions



SNMP monitoring (9.0.1)

- Support for Simple Network Management Protocol
 - Supports SNMP versions 1, 2c, and 3
 - Configure an external SNMP server can collect status information
- Download enterprise MIBs that describe the SNMP interface
 - MIB stands for Management Information Base
 - One MIB for configuration, one for status and another for traps/notifications
- Receive notifications about system events
 - Respond to hardware failures, temperature alerts, network errors, ...
 - MQ events are not currently supported

SNMP monitoring (9.0.1)

- Use SNMP tooling or commands
- Example to query the power supply electrical current:

```
$ snmptable -v 2c -c MQ cyrus0 mqStatusCurrentSensorsTable
SNMP table: IBM-MQ-APPLIANCE-STATUS-MIB::mqStatusCurrentSensorsTable

mqStatusCurrentSensorsName mqStatusCurrentSensorsValue
mqStatusCurrentSensorsUpperCriticalThreshold
mqStatusCurrentSensorsReadingStatus
      Current PU +12V 1                      9200 mA
44800 mA                                     ok
      Current PU +3.3V                      2400 mA
16000 mA                                    ok
      Current PU +5V                       2400 mA
16000 mA                                    ok
```

SNMP monitoring (9.0.1)

Query queue manager status:

```
$ snmptable -v 2c -c MQ cyrus0 mqStatusQueueManagersStatusTable
SNMP table: IBM-MQ-APPLIANCE-STATUS-MIB::mqStatusQueueManagersStatusTable

mqStatusQueueManagersStatusName mqStatusQueueManagersStatusStatus
mqStatusQueueManagersStatusCpuUsage mqStatusQueueManagersStatusUsedMemory
mqStatusQueueManagersStatusUsedFs mqStatusQueueManagersStatusTotalFs
mqStatusQueueManagersStatusHaRole mqStatusQueueManagersStatusHaStatus

                                JPS1                                Running
0 %                                177 MB                                225 MB
32256 MB                                NA
NA

                                JPS2                                Ended immediately
0 %                                0 MB                                229 MB
64512 MB                                NA
NA
```

REST administration (9.0.1)

- REST management interface for system administration
- Query system resource status
 - `/mgmt/status/default/...`
- Configure system resources (users, networking, system settings, ...)
 - `/mgmt/config/default/...`
- Perform actions (password resets, set log level, shutdown/reboot, ...)
 - `/mgmt/actionqueue/default`
- Upload/download files
 - `/mgmt/filestore/...`
- Discover the REST API
 - `/mgmt/metadata/...` and `/mgmt/types/...`

REST administration (9.0.1)

- Request methods:
 - GET – query status, object lists/definitions, download file, etc.
 - POST – create new objects, perform actions
 - PUT – create or update an object if it already exists
 - DELETE – delete objects
 - OPTIONS – query supported methods for a URI
- Use query parameters to customise the response:
 - `?view=recursive` - expand object references (nested objects)
 - `?depth=n` - limit the level of recursion
 - `?state=true` - query the runtime state of an object

REST administration (9.0.1)

- All system management REST requests use Basic Authentication (https)
- Enable/disable
- Configurable interface, port, SSL/TLS settings
- Restrict clients based on IP using access control lists

The screenshot displays the IBM MQ Appliance REST Management Interface. The top navigation bar shows 'IBM MQ Appliance | MQ00 console at cyrus0' and a user dropdown for 'admin'. The left sidebar contains icons for various system management functions, with the 'Objects' icon selected. The main content area is titled 'REST Management Interface' and includes a search bar and an 'Actions' dropdown. The 'Main' section contains the following configuration options:

- Enable administrative state:** A checkbox that is currently checked.
- Local address:** A dropdown menu set to '0.0.0.0'.
- Port Number:** A text input field containing '5554'.
- Custom SSL server type:** A dropdown menu set to 'Server Profile'.
- Custom SSL server profile:** A dropdown menu that is currently empty.
- Access Control List:** A dropdown menu set to 'rest-mgmt'.
- Comments:** A text input field that is currently empty.

Each configuration item has an information icon (i) to its left. The 'Access Control List' dropdown has edit and add icons to its right. An 'Apply' button is located in the top right corner of the configuration area.

REST administration (9.0.1)

- Example:
 - GET /mgmt/status/default/SystemMemoryStatus
 - Response:

```
{
  "_links" : { ... }
  "SystemMemoryStatus" : {
    "MemoryUsage" : 2,
    "TotalMemory" : 193638,
    "UsedMemory" : 3677,
    "FreeMemory" : 189961
  }
}
```

REST administration (9.0.1)

- Understand how to interpret the response:
 - GET /mgmt/metadata/default/SystemMemoryStatus/MemoryUsage
 - Response:

```
{  
  "property" : {  
    "name" : "MemoryUsage",  
    "type" : { "href" : "/mgmt/types/default/dmUInt32" },  
    "display" : "Memory usage",  
    "summary" : "The percentage of memory used.",  
    "units" : "%",  
    "description" : "The instantaneous memory usage as a  
                    percentage of the total memory."  
  }  
}
```

MQ REST API (9.0.2)

- MQ REST management API added to the appliance
 - Complements use of REST for system management
- Base URI: `https://<hostname>:<port>/ibmmq/rest/v1/`
- Enabled at the same time as the system management REST API
- No Liberty configuration required
 - Same user authority model and roles as the MQ Console
- Includes all URIs exposed on other platforms

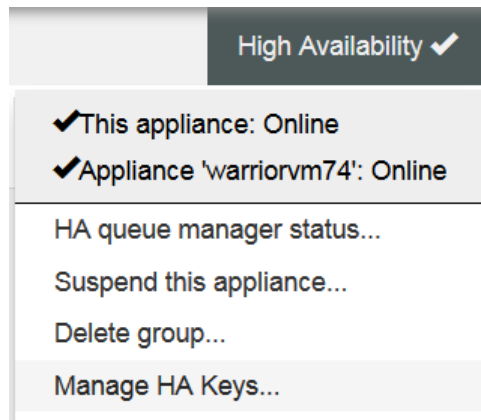
HA SSH key renewal (9.0.2)

- Appliances in a HA group use SSH keys for internal communication
 - Keys not exposed to users
 - Security best practice recommends periodically regenerating SSH keys
 - New capability introduced to allow administrators to do this (undisruptive)
- Two new commands (and equivalent UI capability):
 - **crthakeys**: Regenerates the SSH keys
 - **dsphakeys**: Displays when the SSH keys were last generated

```
mqa(mqcli) # crthakeys
The crthakeys command succeeded.
```

```
mqa(mqcli) # dsphakeys
SSH key generation time: 2017-02-13 16:47:55
```

The generation time is blank if generated at 9.0.1 or earlier



AMS MCA Interception (9.0.3)

- Offers parity of function with software MQ
- Queue manager can perform AMS digital signing and/or cryptographic operations on behalf of client applications
- Configured per server-connection channel using **setamschl** / **dspamschl**
 - Always use SSL/TLS channels – AMS policies applied on queue manager entry/exit
- Use cases:
 - For clients that are not AMS-capable (e.g. Message Service client for .NET)
 - When it is not practical to configure AMS for each client instance
 - For example, 1000s of clients

AMS MCA Interception (9.0.3)

- Not equivalent to full end-to-end signing/encryption using client-side certificates or full disk encryption
 - All clients connecting over a channel share the same certificate
 - The certificates are stored on the same disk as the queue manager data files and are available to MQ administrators or anyone with access to the physical disks
 - We're looking at improvements we can make to alleviate this vulnerability

SAN support (9.0.4)

- Supports use of external SAN storage for queue manager data
 - Exploits Fibre Channel adapters in the M2000 and M2001
- Requested by customers with high storage or I/O performance requirements, or who employ a SAN solution for disaster recovery
- Two-phase implementation:
 - Phase 1: Standalone queue managers only (not HA)
 - Phase 2: Support for HA queue managers
- Configure the appliance to use SAN
 - Specify a queue manager uses SAN storage when you create it
 - Each queue manager uses a separate SAN partition (disk/volume)

SAN support (9.0.4) - New SAN queue manager

Step 1:
Connect to
a switched
SAN fabric
using the
fibre
channel
host bus
adapters

The screenshot displays the IBM MQ Appliance console interface. The top header shows 'IBM MQ Appliance | MQ00 console at cyrus0' and 'admin'. The left sidebar contains navigation icons and a menu. The main content area is titled 'Fibre Channel Host Bus Adapter' and contains a table with two rows of adapter information.

IBM MQ Appliance | MQ00 console at cyrus0 admin ? IBM

Status

- View Logs
- Main
- Configuration
- System
- IP-Network
- Other Network
 - Discovered fibre channel LUNs
 - [Fibre Channel Host Bus Adapter](#)
 - Fibre Channel Volumes
 - NFS Mount Status
 - NTP Refresh Status
 - SNMP Status
- Crypto
- MQ

Fibre Channel Host Bus Adapter

HBA	Op-State	WWPN	Port state	Port speed	Port type	Supported speeds
fch1	up	10:00:00:90:fa:8e:2d:c0	online	8 Gbit	nport	4 Gbit, 8 Gbit, 16 Gbit
fch2	up	10:00:00:90:fa:8e:2d:c1	online	8 Gbit	nport	4 Gbit, 8 Gbit, 16 Gbit

SAN support (9.0.4) - New SAN queue manager

Step 2:
Configure a
LUN for
each queue
manager in
the SAN

One line shown
per LUN for
each HBA and
WWPN

The screenshot shows the IBM MQ Appliance console interface. The top header bar displays 'IBM MQ Appliance | MQ00 console at cyrus0' on the left, 'admin' with a dropdown arrow in the center, and the IBM logo on the right. A sidebar menu on the left contains icons for various functions: a globe, a line graph, a network diagram, a gear, and a cluster of dots. The main content area is titled 'Status' and includes a search icon. Below the title, there is a list of expandable sections: 'View Logs', 'Main', 'Configuration', 'System', 'IP-Network', and 'Other Network'. The 'Other Network' section is expanded, showing 'Discovered fibre channel LUNs' as a link. Below this link, there are links for 'Fibre Channel Host Bus Adapter', 'Fibre Channel Volumes', 'NFS Mount Status', 'NTP Refresh Status', and 'SNMP Status'. At the bottom of the sidebar, there are expandable sections for 'Crypto' and 'MQ'. The main content area displays a table titled 'Discovered fibre channel LUNs' with a refresh icon and a help icon. The table has four columns: 'LUID', 'HBA', 'SCSI LUN', and 'WWPN'. It contains eight rows of data, each representing a discovered LUN.

LUID	HBA	SCSI LUN	WWPN
600507680181804D98000000000001B44	fch2	0	50:05:07:68:01:10:26:65
600507680181804D98000000000001B44	fch2	0	50:05:07:68:01:10:27:05
600507680181804D98000000000001B44	fch1	0	50:05:07:68:01:30:26:65
600507680181804D98000000000001B44	fch1	0	50:05:07:68:01:30:27:05
600507680181804D9800000000000235C	fch2	1	50:05:07:68:01:10:26:65
600507680181804D9800000000000235C	fch2	1	50:05:07:68:01:10:27:05
600507680181804D9800000000000235C	fch1	1	50:05:07:68:01:30:26:65
600507680181804D9800000000000235C	fch1	1	50:05:07:68:01:30:27:05

WWPN = worldwide port number (IP address)

SAN support (9.0.4) - New SAN queue manager

Step 3:
Define a
fibre
channel
volume for
each LUN

Specify the
LUN UUID
(WWID) and
whether to
use
multipath

Fibre Channel Volume

✓ Fibre Channel Volume
jps1 *

* Name: jps1

▼ fibrechannel

Enable administrative state: ☐

Comments:

* LUN-UUID: 600507680181804D9800000000001B44

Use Multipath: ☒

Apply Cancel

SAN support (9.0.4) - New SAN queue manager

Step 4:
Disable
the SAN
volume (if
enabled)

The screenshot shows the IBM MQ Appliance console interface. The top header bar displays 'IBM MQ Appliance | MQ00 console at cyrus0' on the left, 'admin' with a dropdown arrow in the center, and the IBM logo on the right. A left-hand navigation menu is visible, with 'Fibre Channel Volume' selected and highlighted in blue. The main content area is titled 'Fibre Channel Volume'. It includes a 'New...' button, a refresh icon, and a trash icon at the top right. Below these is a 'Filter' input field. A table lists the fibre channel volumes. The table has columns: Name, Status, Op-State, Administrative state, Use Multipath, and Actions. One row is visible with the name 'jps1', a checkbox icon, and the administrative state 'disabled' (which is highlighted with a yellow box). The 'Use Multipath' column shows 'on'. The 'Actions' column contains icons for a list and a trash can. Below the table, it says 'Total: 1 Selected: 0'.

Name	Status	Op-State	Administrative state	Use Multipath	Actions
<input type="checkbox"/> jps1			disabled	on	

Total: 1 Selected: 0

SAN support (9.0.4) - New SAN queue manager

Step 5:
Initialize the
file system
on the SAN
volume

... then
enable the
volume

Fibre Channel Volume: jps1

✓ Fibre Channel Volume
jps1

* Name: jps1

▼ fibrechannel

Enable administrative state: ☐

Comments:

* LUN-UID: 600507680181804D9800000000001B44

Use Multipath: ☒

Actions ▼

- Export
- View Log
- Initialize File System
- Repair File System

Apply Cancel

SAN support (9.0.4) - New SAN queue manager

Step 6:
Save the
configuration
changes

IBM MQ Appliance | MQ00 console at cyrus0 admin ? IBM

Objects

- Network Settings
 - DNS Settings
 - Ethernet Interface
 - Fibre Channel Host Bus Adapter
- Fibre Channel Volume**
- Host Alias
- Link Aggregation Interface
- Load Balancer Group
- Network Settings
- NFS Client Settings
- NFS Static Mounts
- NTP Service
- VLAN Interface
- Crypto Configuration
- Device Management
- Access Settings

Fibre Channel Volume

New... Refresh Delete

Filter

Name	Status	Op-State	Administrative state	Use Multipath	Actions
<input type="checkbox"/> jps1			enabled	on	

Total: 1 Selected: 0

SAN support (9.0.4) - New SAN queue manager

Step 7:
Create the
queue
manager

The screenshot displays the 'Create a Queue Manager' interface in the IBM MQ Appliance console. The form is titled 'Create a Queue Manager' and is located within the 'MQ00 console at cyrus0' environment. The form includes the following fields and options:

- Queue manager name:** JPS1
- Port:** 1414
- High availability:** None (selected), Replicated
- File system size:** Default (selected), Custom
- Startup:** Manual (selected), Automatic
- Floating IP interface:** None
- Floating IP:** (empty fields)
- SAN volume name:** jps1 (highlighted with a yellow box)

The 'SAN volume name' field is highlighted with a yellow box, indicating it is the focus of the current step. The 'Queue manager name' field is also highlighted with a yellow box. The 'High availability' field has a dropdown menu with 'None' and 'Replicated' options. The 'File system size' field has a dropdown menu with 'Default' and 'Custom' options. The 'Startup' field has a dropdown menu with 'Manual' and 'Automatic' options. The 'Floating IP interface' field has a dropdown menu with 'None' as the only option. The 'Floating IP' field has two empty input boxes. The 'SAN volume name' field has a dropdown menu with 'jps1' as the only option.

SAN support (9.0.4) - dspmq

- **dspmq** reports the SAN volume for each queue manager
 - Blank volume name identifies queue managers using local RAID storage

```
mqa (mqcli) # dspmq -o fs
```

```
QMNAME (JPS1)                                FCVOLUME (jps1)
```

```
QMNAME (JPS2)                                FCVOLUME (jps2)
```

```
QMNAME (JPS3)                                FCVOLUME ( )
```

SAN support (9.0.4) – Managed failover

- Managed fail over of a SAN queue manager to another appliance...

– On the old appliance:

- End the queue manager then disable the Fibre Channel Volume object
- Remove the queue manager definition using **rmvmqinf**

```
mqa (mqcli) # rmvmqinf JPS2  
IBM MQ Appliance configuration information removed.
```

– On the new appliance:

- Verify SAN connectivity, then define and enable the Fibre Channel Volume object
- Add the queue manager using **addmqm** in the MQ CLI

```
mqa (mqcli) # addmqm -m JPS2 -fc jps2  
IBM MQ Appliance queue manager 'JPS2' added.
```

- ... or select **Recreate SAN queue manager** in the create queue manager UI dialog

SAN support (9.0.4) – Unplanned failover

- Similar to planned failover – assume old appliance is unavailable:
- On the new appliance:
 - Verify SAN connectivity
 - Define and disable the Fibre Channel Volume object
 - Repair the filesystem to clear locks (SCSI persistent reservations)

```
mqa (mqcli) # fibre-channel-fs-repair -f jps2
```

- Enable the Fibre Channel Volume
- Add the queue manager using **addmqm** in the MQ CLI

```
mqa (mqcli) # addmqm -m JPS2 -fc jps2  
IBM MQ Appliance queue manager 'JPS2' added.
```

Note: we might
change how
the locks are
cleared before
9.0.4 GA

- ... or select **Recreate SAN queue manager** in the create queue manager UI dialog

Resizing queue managers (904)

- For local queue managers only, this can now be modified using new command setmqsize

```
mqa(mqcli)# help setmqsize
```

```
Usage: setmqsize -m <qmname> -s <size>
```

```
-m Queue manager name.
```

```
-s New file system size.
```

```
Optional size modifiers that can be appended are:
```

```
m - megabytes
```

```
g - gigabytes (default)
```

- HA/DR queue managers must be 'demoted' to resize, then returned to HA/DR configuration

Futures

- Candidates for upcoming deliverables:
 - Managed linear logging
 - Support for migrating existing queue managers to a SAN configuration
 - Provision of a secure storage option for queue manager key repositories
 - Integrating MQ error log messages with the system log
 - HA status alerts/events/notifications
- Please let us know which of these candidate items are of interest to you to help us prioritise them (or other items that are not listed)

More information

- IBM MQ Appliance Knowledge Center:
 - <https://www.ibm.com/support/knowledgecenter/en/SS5K6E>
- MQdev blogs for the appliance
 - <https://www.ibm.com/developerworks/community/blogs/messaging?tags=appliance&lang=en>
- MPA1: MQ Appliance performance report
 - <http://www.ibm.com/support/docview.wss?uid=swg24040125>
- MPA2: MQ Appliance HA/DR performance report
 - <http://www.ibm.com/support/docview.wss?uid=swg24041474>

The background of the slide features several overlapping, wavy bands of blue in various shades, ranging from light sky blue to a deeper navy blue. These bands flow from the left side towards the right, creating a sense of movement and depth. The overall composition is clean and modern.

Questions?