

# ***IBM MQ Appliance 1 year on***

**What is it – and what's new in 2016?**

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**MQ Development**

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# Agenda

- Introduction
- Use cases
- Capabilities
- What's new?
- On the horizon

# Introducing the IBM MQ Appliance, new in 2015



- **The scalability and security of IBM MQ V8**
  - ▶ 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**

# Introduction/Overview Notes

## ▪ Versions/Levels:

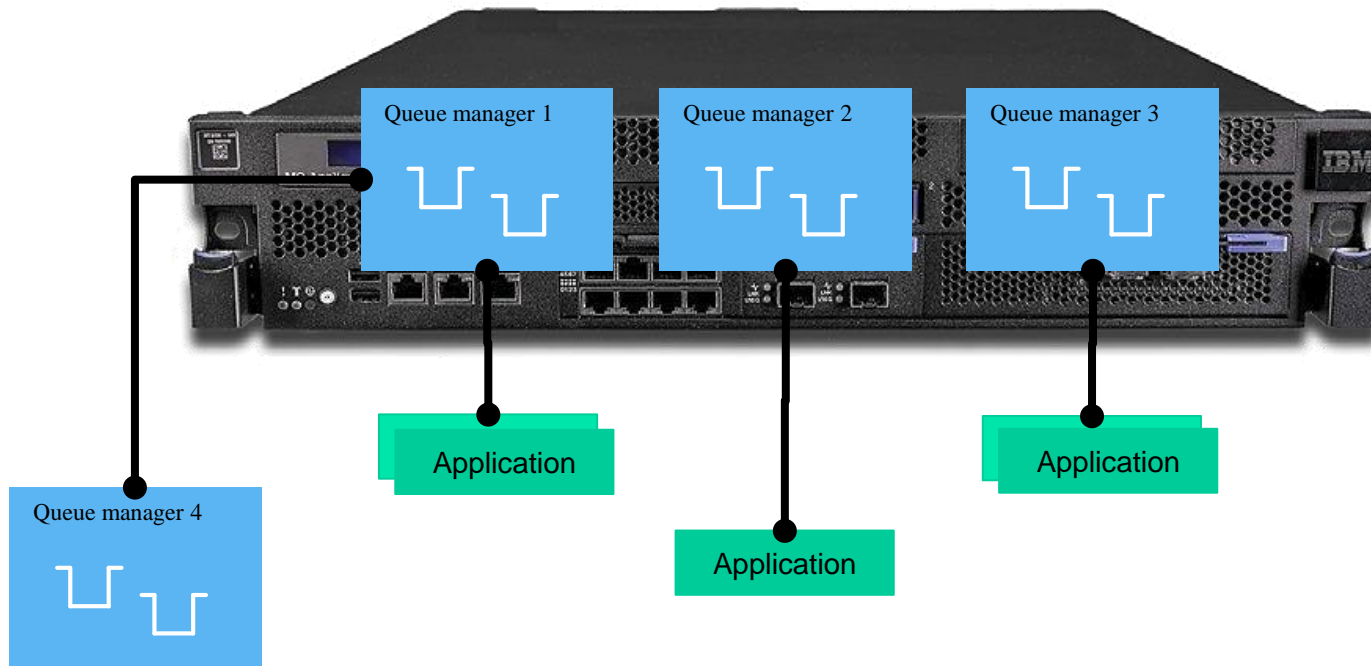
▪ The appliance firmware embeds MQ V8 – so all the industry leading messaging features you would expect, including full support for latest additions – new pub/sub features, user and channel security updates, etc.

## ▪ Dates:

▪ GA March 13 2015, and we have released the first and third fixpack already (skipped FixPack 2 align appliance and MQ version – at 8.0.0.3), with more expected this year.

# Or to really simplify it


- A box where you create and run queue managers...



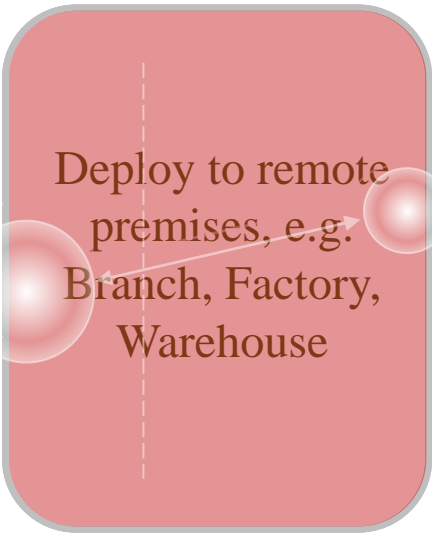
# Notes

- **Some people might not ‘get’ an appliance. This slide says it all!**
- **The appliance is a dedicated system, which you install in your data center, to do one job (messaging) and do it well.**
- **No user code ever runs on the appliance, solely the MQ firmware itself.**
- **Applications always connect as clients over traditional MQ channels, as can other queue managers (appliance or otherwise).**
- **You can configure ‘as many queue managers as you wish’ on an appliance (in practice we expect to see only low double figures at most, for manageability and best performance).**

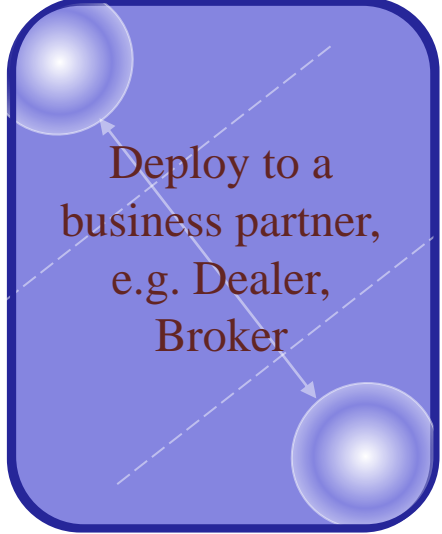
# What do you want to do?



Consolidate my MQ infrastructure into an “MQ Hub” for lower TCO



Deploy to remote premises, e.g. Branch, Factory, Warehouse



Deploy to a business partner, e.g. Dealer, Broker

**IBM MQ Appliance offers:**

**Optimized solutions to meet the needs of these use cases**  
**Differentiation compared to MQ software deployment approaches**  
**2 price points to meet different deployment-based business needs**



# Notes

- “Hub” messaging (most applications clients, large centralised MQ servers) is become an extremely common model, and appliance designed to fit well into this use case – supporting all the traditional MQ tooling and interfaces while adding useful features such as self contained HA
- NOT always appropriate – some applications really do need traditional local queue manager on the same system, for the availability, store and forward characteristics which that provides.
- Other use cases for the appliance (remote deployments, business partners, gateways) generally have common themes of wishing to deploy MQ in environments with fewer skills or resources (hardware, network storage, OS expertise) while maintaining standards compliance and security, availability etc.



# Consolidate my MQ infrastructure into an “MQ Hub” for lower TCO

## Objectives

Reduce TCO

Reduce footprint

Standardise deployments

Build 'hub' - concentrate expertise

## Challenges

Mixture of platforms and versions

Complex dependencies

Migrations difficult – lack of standardization

Application downtime impacts other applications

## Benefits

Easy to deploy

Simplified maintenance

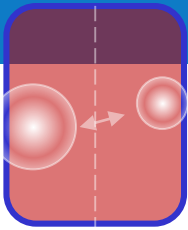
Familiar administration

Separates applications from infrastructure

Supports existing MQ definitions, concepts and security model

HA avoiding external dependencies





# Deploy to a remote premises

## Objectives

Resilient connectivity to remote location

Robust and secure

Flexibility, minimal time to value at new sites

## Challenges

Avoiding single points of failure

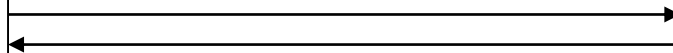
Outside assistance needed – lack of local skills and resources

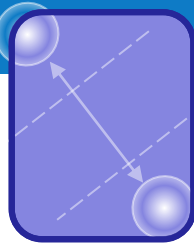
## Benefits

Standardization makes 'pre-canned' rollout simpler

Remote configuration and management

High availability requires no additional systems or skills





# Deploying to business partner: Appliances as 'Gateways'

## Objectives

Extend connectivity to external business partner

Rapid onboarding

Control and limit access

QOS expectations from both parties

## Challenges

Partner may not have MQ or MQ skills today

Time to build and deploy

Configuration needs to meet our standards

Downtime directly effects business relationship

## Benefits

Easy to deploy  
Simplified maintenance

Ability to preconfigure a very standard system both helps ensure standards applied and speed deployment

HA avoiding external dependencies



## Notes: Why an Appliance?

- Fixed hardware specification allows IBM to simplify and tune the firmware
  - Having fewer variables makes it easier to deploy and manage
  - Less performance tuning should be needed
- Standardisation accelerates deployment
  - Repeatable and fast, less configuration/tuning required
  - Post-deployment resource definition or lock down before deployment
- “Hub” pattern separates messaging from applications/middleware
  - Organisational independence from application teams
  - Improved availability, due to reduction of downtime
  - Predictable performance, simpler capacity planning
- Simplified ownership
  - Self-contained: avoids dependencies on other resources/teams
  - Licensing: Simpler than calculating licensing costs (e.g. by PVU)
  - Security: Easier to assess for security compliance audit

# IBM MQ Appliance capabilities

- Administration
- Security
- Connectivity
- High Availability
- Performance and capacity
- Key differences between MQ Appliance and installable MQ





# Administration

- Command-line interface
  - Appliance CLI supports appliance-specific commands such as configuring network interfaces, importing certificates, ...
  - Appliance CLI also offers a familiar subset of MQ control commands
  - You can also use MQSC scripts
- Web UI
  - Browser-based UI for administering the appliance
  - Avoids maintenance of rich client installations
  - Very convenient for proofs-of-concept and application developer use
- MQ Explorer
  - Essential for existing administrators
- PCF
  - Supports remote administration using all of the existing MQ tools



# Command line interface

```
login: admin
```

```
Password: ****
```

```
Welcome to IBM MQ Appliance M2000B console configuration.
```

```
Copyright IBM Corporation 1999-2015
```

```
Version: MQ00.8.0.0.3 build mq-rel.265326 on Aug 12, 2015 11:10:38 AM
```

```
Serial number: 7800537
```

```
M2000# mqcli
```

```
M2000(mqcli)# dspmqver
```

```
Name: IBM MQ Appliance
```

```
Version: 8.0.0.3
```

```
Level: p800-L150812.2
```

```
BuildType: IKAP - (Production)
```

```
Platform: IBM MQ Appliance
```

```
MaxCmdLevel: 802
```

## Notes:

- Key point is that majority of commands will look very familiar to MQ administrators.
- Following slide shows one slight difference – pre allocation of the (tunable) 64 GB storage for the queue manager, making it easier to support many queue managers on a system without them interfering with each other.

# Command line interface

```
M2000(mqcli)# crtmqm test
```

Please wait while 64 GB file system is initialized for queue manager 'test'.

IBM MQ Appliance queue manager created.

The queue manager is associated with installation 'MQAppliance'.

Creating or replacing default objects for queue manager 'test'.

Default objects statistics : 83 created. 0 replaced. 0 failed.

Completing setup.

Setup completed.

```
M2000(mqcli)# strmqm test
```

IBM MQ Appliance queue manager 'test' starting.

The queue manager is associated with installation 'MQAppliance'.

5 log records accessed on queue manager 'test' during the log replay phase.

Log replay for queue manager 'test' complete.

Transaction manager state recovered for queue manager 'test'.

IBM MQ Appliance queue manager 'test' started using V8.0.0.4.

```
M2000(mqcli)# runmqsc test
```

5724-H72 (C) Copyright IBM Corp. 1994, 2014.

Starting MQSC for queue manager test.

# CLI: Notes

## ▪ Access:

▪ Accessible over SSH or local serial connection. SSH can be limited to particular interface (IP address) if desired

## ▪ Functionality:

▪ NOT a traditional OS 'shell'. All function of appliance is available through CLI (the only exception is initial license acceptance). Most system configuration aspects will be familiar to DataPower users, as inherited from the underlying platform.

▪ MQ configuration is achieved using new 'sub shell' for MQ specific tasks (sometimes referred to as the 'mqcli'.) Within this environment, most traditional MQ commands (e.g. crtmqm, strmqm, runmqsc... ) function exactly as they would on Windows/Unix/Linux platforms.

▪ Some tasks can currently ONLY be achieved in the CLI, where support not yet available in MQ Console (Web UI)

▪ Help is available in all areas of the CLI with 'help' command.

# Web UI and MQ Console

IBM MQ Console: Dashboard - Mozilla Firefox

https://nemesishursley.ibm.com:9090/mq/#page=home

IBM MQ Console Dashboard Appliance admin ? IBM

Welcome +

+ Add MQ Object Widget + Add Queue Manager Widget + Add Chart Widget

### Queues on Test

Name	Queue type	Queue depth
APP1Q	Local	0
SYSTEM.ADMIN.ACCOUNTING.QUEUE	Local	0
SYSTEM.ADMIN.ACTIVITY.QUEUE	Local	0
SYSTEM.ADMIN.CHANNEL.EVENT	Local	0
SYSTEM.ADMIN.COMMAND.EVENT	Local	0
SYSTEM.ADMIN.COMMAND.QUEUE	Local	0
SYSTEM.ADMIN.CONFIG.EVENT	Local	0

### Queue Managers

Name	Running TCP listener ports	Status	High Availability
SECURE		↓ Stopped	
Test	1414	↑ Running	

Total: 2 Selected: 1 1 Last updated: 11:04:30 AM

### Chart Widget

Resource to monitor

Resource class: Platform persistent data stores

Resource type: Disk usage - running queue managers

# Web UI

- Only on the appliance (at present), provides both MQ and 'system' administration tools
- Profile based (configuration saved per user) – can import and export
- Create your own dashboard layouts for the things you need to see
  - E.g. developer might have particular set of queue managers/queues they work with, sysadmin might have particular set of monitoring charts
- New charts features give rich set of performance and resource monitoring data – also available programmatically (sample included in MQ client support pack)



## Notes: Security – Users and Objects

- An appliance administrator can be authorised to perform MQ administration
  - Appliance and messaging administrators are completely separate from messaging (application connection) users
- The appliance supports scalable security administration (as software MQ 8.0.0.2 onwards does)
  - For a small number of messaging users, you can define them locally
  - For larger communities, you can use an off-board repository. Expect this to become a popular/common choice for simpler management
    - Using external LDAP repository
    - Authorization checks can include group memberships from LDAP
    - Messaging user ids don't need to be defined in each server/appliance
- In general OAM functionality is as for other distributed MQ platforms.
  - Note that by default on the appliance, authorities are applied to the USER and not the GROUP.



# Security – Messages and connections

```
MQM000001.P messages.txt
Please see the end of this document for information on queue manager 'test'.
IBM MQ Applications queue manager started.
The queue manager is running on hardware 'MQM000001'.
Creating the MQM000001 channel definition for queue manager 'test'.
Starting the queue manager 'test' on port 12345.
Queue manager started.
MQM000001.P messages.txt
MQM000001.P messages.txt
IBM MQ Applications queue manager 'test' started.
The queue manager is running on hardware 'MQM000001'.
Starting the queue manager 'test' on port 12345.
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Starting the queue manager 'test' on port 12345.
Queue manager started.
```

New certificate management commands



Application

TLS (SSL) on channels

Traditional MQ (software) queue Manager

End to end and at-rest encryption using AMS built in and included as standard

Application

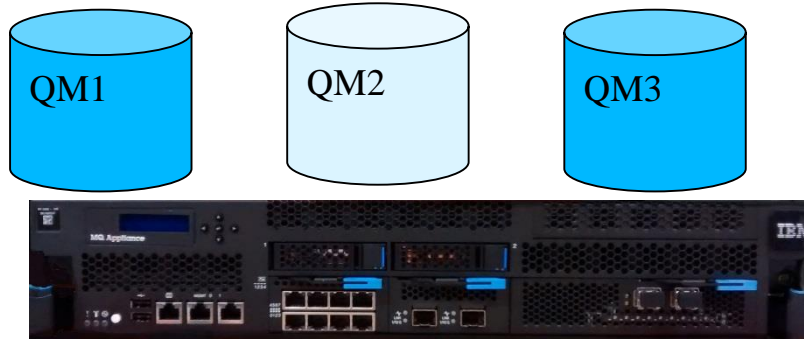
## Notes: Security – Messages and connections

- The appliance supports secure connectivity over TLS (/SSL)
  - Certificates can be imported to the appliance
- Full AMS entitlement is included in the purchase of either the M2000A or M2000B appliance.
  - Though currently limited to client side encryption (no server side interceptor)
- “MQ Internet Pass-Thru” (MS81: MQIPT) may be used in front of appliance queue managers (as for software MQ) to provide DMZ tunnelling or proxy
  - interested in customer feedback on integrating this kind of functionality in a future version of the appliance

# Connectivity

- **The IBM MQ Appliance supports a number of protocols for message transmission**
- **As you would expect, all the usual connectivity to MQ infrastructure:**
  - ▶ MQ client protocol – for connectivity from applications
    - Client libraries available in the usual places, not shipped with the appliance
  - ▶ MQ server protocol – for connectivity with other queue managers
    - This will support sender-receiver channels and server-requester channels
  - ▶ MQ Clustering – for simplified administration and workload management
    - Appliance queue managers can join existing clusters or host full repositories
- **Subject to customer interest we may add further protocols such as**
  - ▶ MQTT – for internet of things and mobile/web messaging

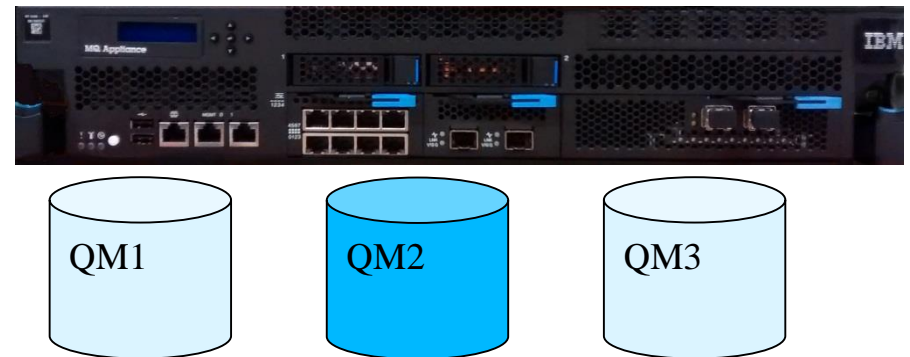
# High Availability - Concept



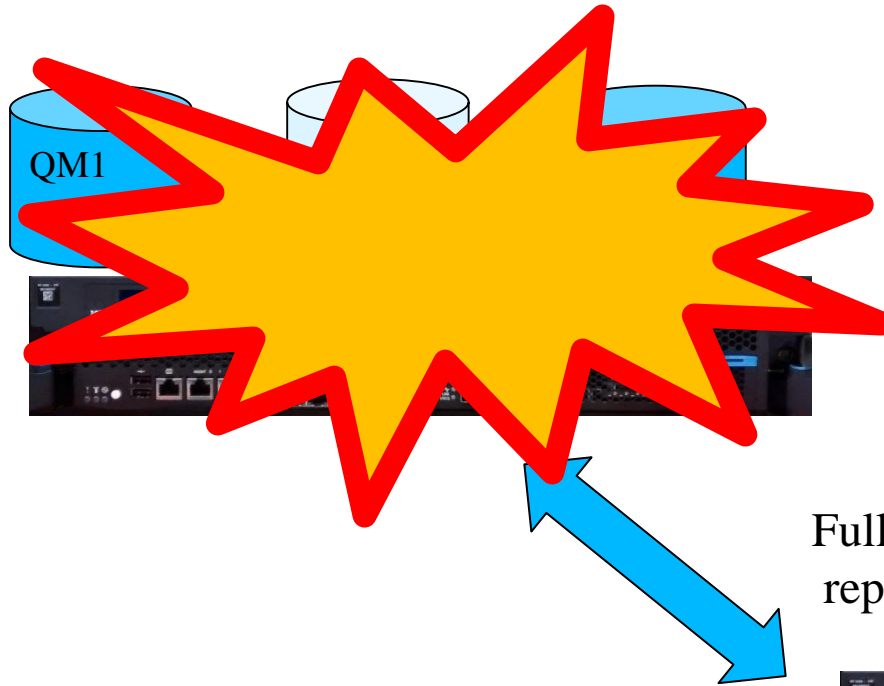
- **No persistent data loss on failure**
- **No external storage**
- **No additional skills required**

Fully synchronous replication

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

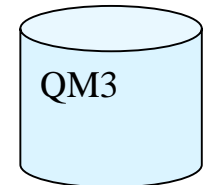
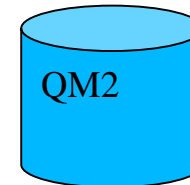
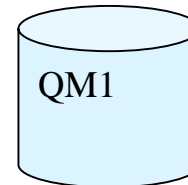


# High Availability – Failure scenario



- **Clients (and other queue managers) reconnect to alternative IP**
- **Usually transparent to application**

Fully synchronous replication



# High Availability – Physical layout



Heartbeat connections  
(1 Gb Ethernet)

Replication connection  
(10 Gb Ethernet)



# HA - Notes

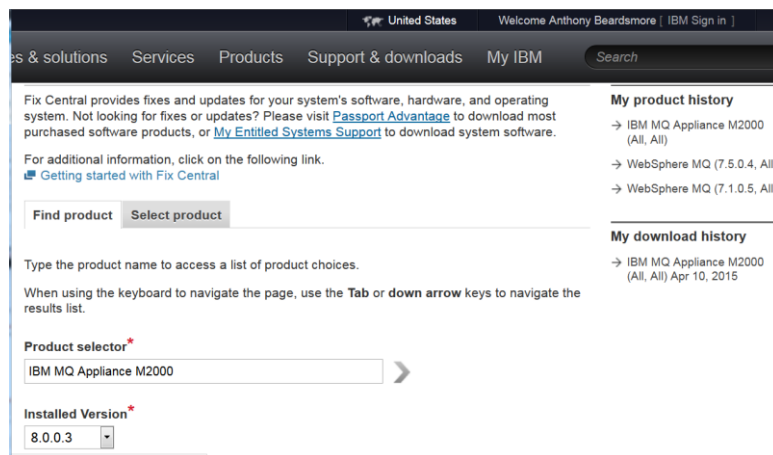
- **Primary instance of queue manager runs on one appliance**
  - Secondary instance on the other for HA protection
- **Primary and secondary work together**
  - Operations on primary automatically replicated to secondary
  - All persistent messages logged at both nodes before return to application
- **Appliances monitor one another and perform local restart/failover**
- **Easier to set up than other HA solutions (no shared file system/shared disks)**
- **Supports manual failover, e.g. for rolling upgrades**
- **Replication is synchronous over Ethernet, for 100% fidelity**
  - Routable but not intended for long distances
  - Ensure all elements of routing redundant if not using direct cables

# Performance and capacity

- **The IBM MQ Appliance is available in two models, to suit a range of performance and capacity requirements**
  - ▶ They're not sold on a PVU basis – but approximately 420 & 1400 PVU
  - ▶ 'B' upgrade can be purchased to 'B+' (equivalent to A)
- **Appliance is dedicated to running messaging server workload**
  - ▶ No other workload (applications or middleware)
  - ▶ Performance should be predictable
  - ▶ Capacity planning should be easier
- **Firmware comes pre-tuned for maximum messaging performance**
  - ▶ Placement of workload, resource utilisation, etc.
- **Performance reports**
  - ▶ MPA1 – general performance, model A/B comparison
  - ▶ MPA2 – high availability and disaster recovery, including scaling to high latencies



# Updating and maintaining



Visit fix central to download appliance updates to a local server ready to deploy

Updates are supplied as a simple single file download, signed and secure, and are the only thing which can be installed on the appliance hardware.

Mq-appliance-8.0.0.3.scrypt3

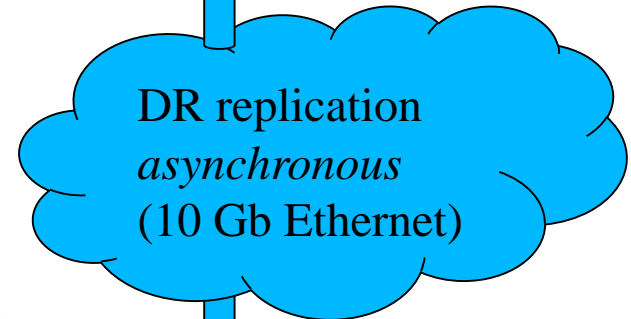


Copy to appliance – update, and reboot. All driver, system and MQ updates are applied as a single operation

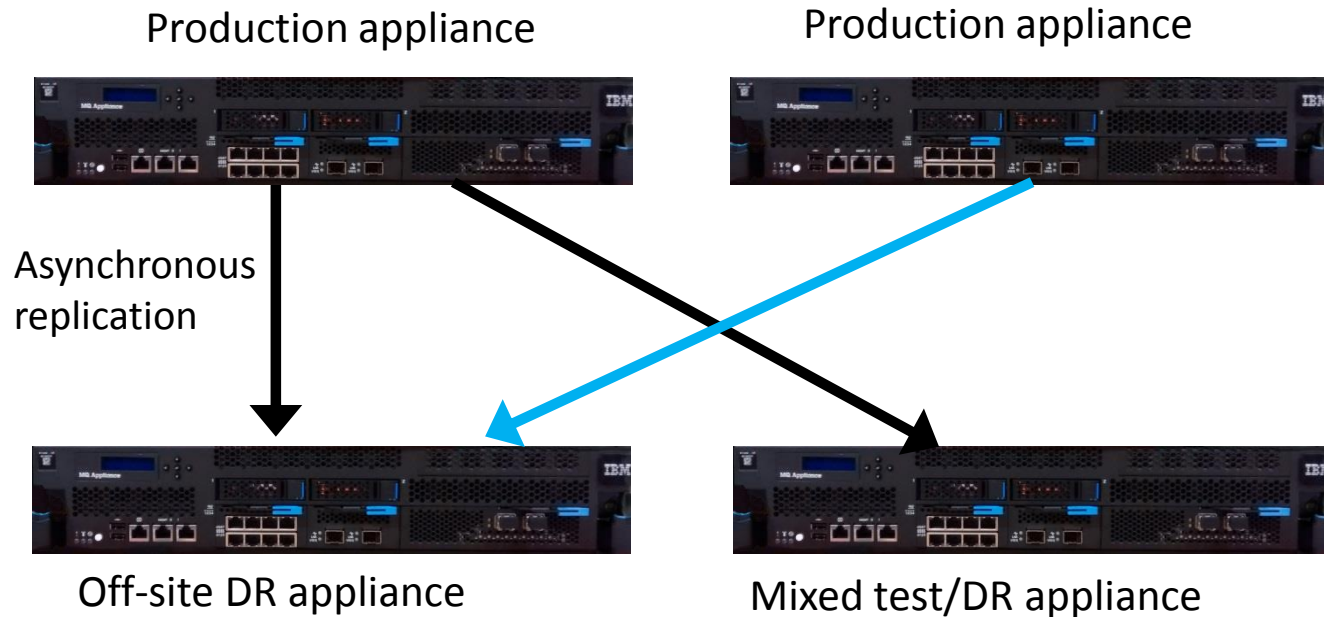
***What's new?***

# Disaster recovery – 8.0.0.4

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



# Disaster recovery – Flexible topologies



## Flexible Config

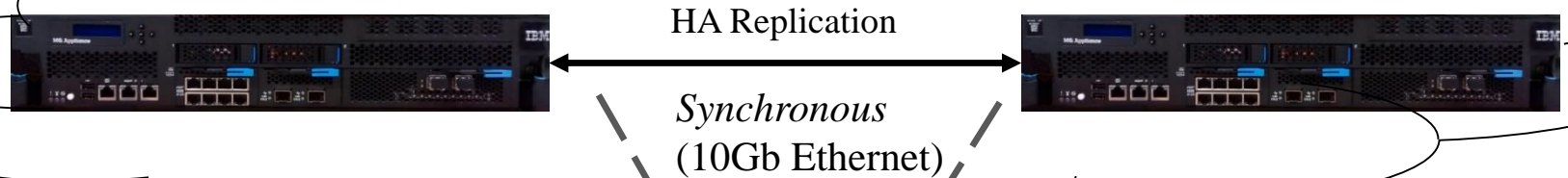
- As with HA, configuration is per queue manager – though with DR there is no concept of a 'group'
- Each QM independently configures replication to a particular appliance
- E.g. could configure single 'DR' site covering live appliances at multiple sites

# File management (UI) – 8.0.0.4

The screenshot displays the IBM MQ Appliance File Management interface. The top navigation bar includes 'Get started', 'Manage Appliance', 'File Management' (highlighted with a red circle), 'MQ Console', 'Save configuration', and 'Export config'. A modal dialog titled 'File Management' is open, showing an upload form for the directory 'cert:'. The form includes a 'File to upload:' section with a 'Browse...' button and 'No file selected.' text, and a 'Save as:' section with a text input field containing 'cert:' and an 'Add' button. Below the form is an 'Overwrite Existing Files' checkbox and 'Upload' and 'Cancel' buttons. In the background, a file list table is visible with columns for file name, size, and modified date.

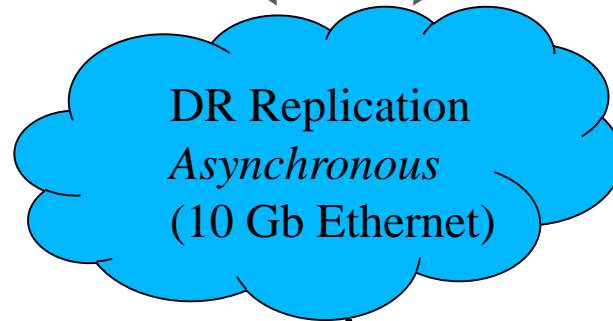
File Name	Size	Modified
mqbackup:		
mqdiag:		
runmqras_150602_114120.zip	18,477,987	Jun 2, 2015 11:41:36 AM
mqerr:		

# Disaster recovery for HA groups – 8.0.0.5



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

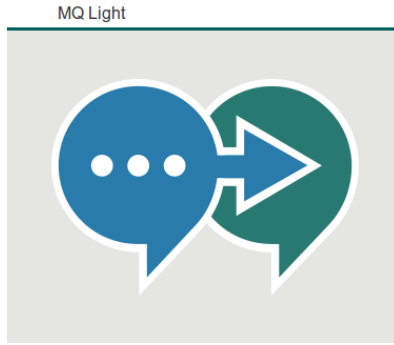
8.0.0.5 improved upon this - by using two network links one HA partner (per appliance) and one DR recovery site (per queue manager) may be configured



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

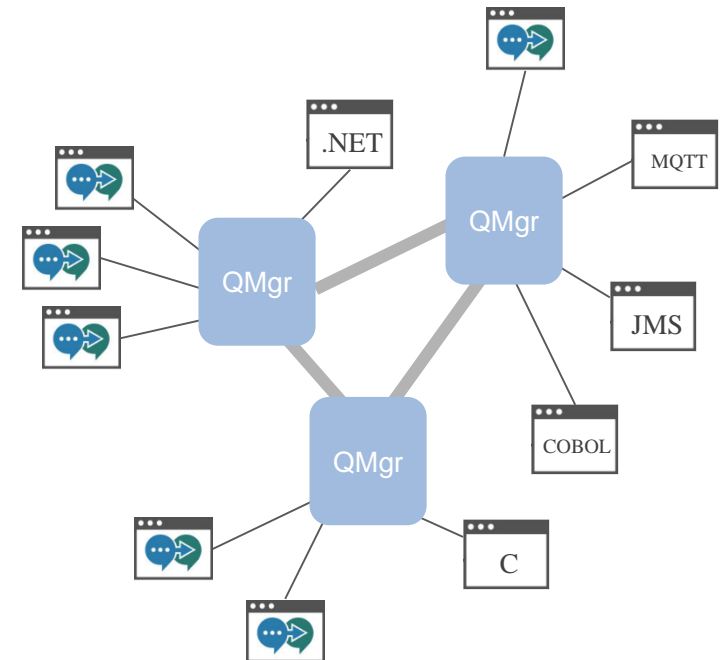
Note that this does still not (yet) allow symmetrical HA pair to HA pair replication

# Connect MQ Light applications directly to MQ Appliance



*Messaging that application developers will love to use, helping them make responsive applications that scale easily*

- **Very simple messaging API**
  - ▶ Support in variety of languages and runtimes: Node.js, Python, Java, etc...
- **MQ support through a new channel type AMQP now (8.0.0.5) also available on the appliance**
  - ▶ Similar in style to an MQTT channel
  - ▶ Supports the subset of the AMQP 1.0 Oasis specification required for MQ Light applications
- **MQ Light applications interoperable with all other MQ applications**
  - ▶ All share the same topic space



# Hardware update – M2001

- **Current 1.2 TB HDDs replaced by 3.2 TB SSDs**
- **Same RAID 1 configuration**
- **Combined HA and DR consumes both currently provided 10GB interfaces**
- **This will be addressed by replacing the 2 port NMC module with a revised adapter giving 4x10GB ports**
- **Notes:**
  - ▶ A and B capacity (CPU) options will remain as today
  - ▶ Customers with M2000 models – contact IBM sales representative for migration options.

Initial results show up to around 3x performance improvement for some (heavily persistent) messaging workloads



Minimum of two spare ports available for MQ/application use – which may also be aggregated for availability and bandwidth



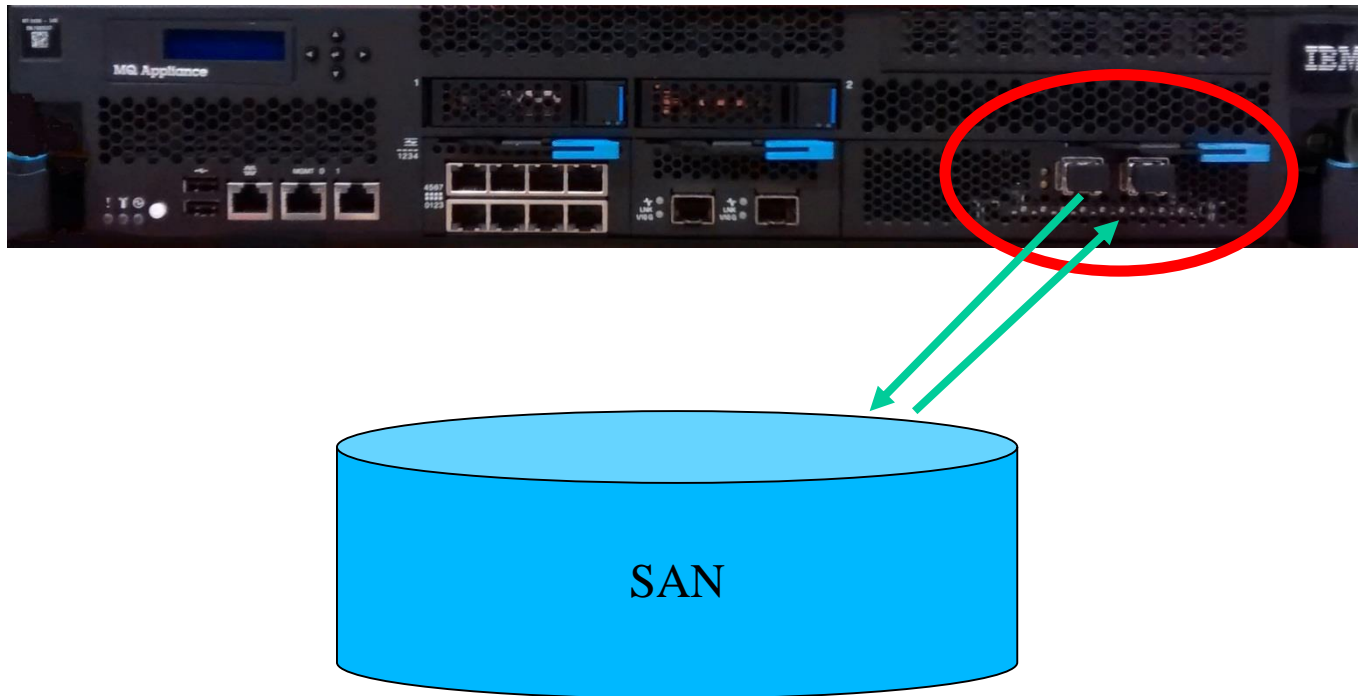
# Hardware refresh - Notes

- The M2001 completely replaces M2000 – which will no longer be available to market from M2001 release.
- M2001 will ship with the latest (8.0.0.5) firmware, also available to download for existing M2000 customers
- M2000 owners may choose to continue with existing hardware (which will remain supported with firmware updates), but upgrade/migration options are available
- New performance reports will be available shortly demonstrating the persistent messaging profile of the new hardware.

# ***On the horizon***

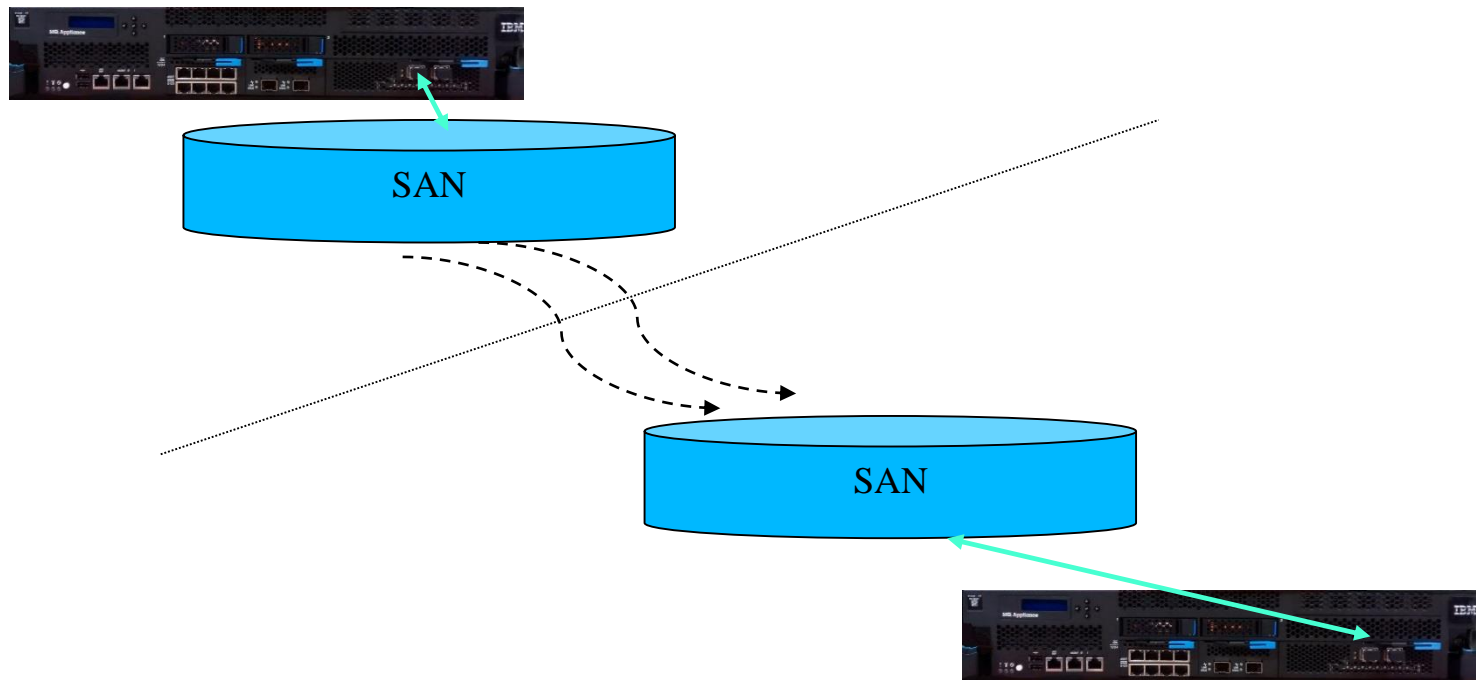
# External storage (statement of direction)

**From the announce letter:** *“In a future version of the appliance IBM intends to support fibre channel connection to external storage, enabling additional capabilities...”*



# External storage (statement of direction)

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# Notes: Update / Lifecycle questions:

**Locked down secure update model and ‘one shot’ upgrade command, is one of the most attractive features of the appliance**

## Basics of lifecycle:

Appliance is on a traditional 5:3 support cycle

Major hardware refreshes are likely to follow DataPower model (traditionally approximately 3 year)

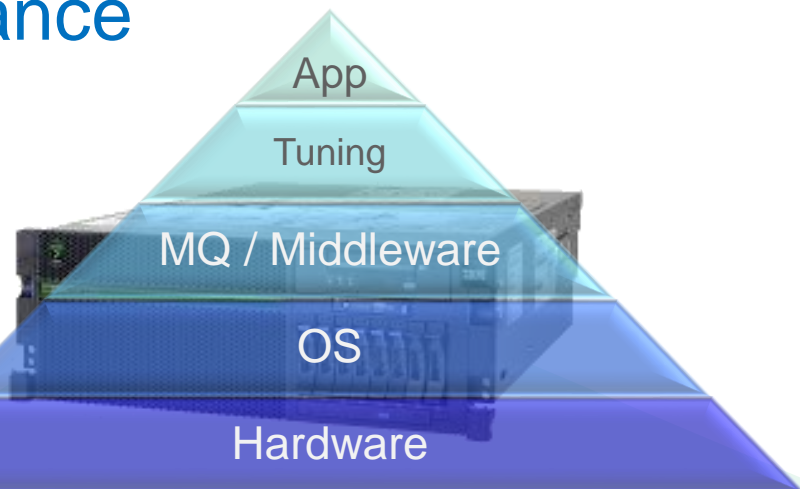
Firmware updates (fixpacks) published through FixCentral.

## Special factors

Taking a ‘continuous delivery’ model at least for early fixpacks, expect regular updates including new function (see statements of direction following)

**Support only provided at latest fixpack** – as part of ‘standardization’ of appliance.  
Should be less challenging proposition on appliance than elsewhere as no local application code, exits etc.

# Notes: 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 Fixpack
  - Can be rolled back as an single unit

## IBM MQ V8 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 Fixpacks
  - OS maintenance, security patches etc.

## Notes: Key differences compared to installable MQ

- “Hub” pattern; no applications deployed to the appliance
  - Applications must connect as remote clients
  - Should not usually need application code changes (build/config only)
  - Does require consideration of QOS this provides
- No user exits can be run on the appliance
  - Many exits already met with built in function – e.g. CHLAUTH, CONNAUTH
  - Appliance specific features address other needs – e.g. Subscription based activity trace, monitoring
  - If you currently customise MQ with exits we’d like to talk...
- A pair of appliances can be used for High Availability
  - With no shared file system or shared disk
- Command-line interface on the appliance is not a general-purpose shell
  - Has familiar commands for things you need
  - e.g. no runmqtsr, because MQ listeners run under QM control

# Summary

- **The MQ appliance is available now!**
- **Two models, to suit different uses and performance requirements**
- **Existing MQ features with simple deployment and administration**
  - ▶ Including built-in HA support
  - ▶ Without customisation via exits
- **Particularly suited to consolidation (“Hub”), and messaging gateway scenarios – as well as any other situation requiring an easy to deploy, low time-to-value MQ configuration**

<http://www-01.ibm.com/support/knowledgecenter/SS5K6E/welcome>

<https://github.com/ibm-messaging/mq-appliance>

<http://www.redbooks.ibm.com/Redbooks.nsf/RedpieceAbstracts/sg248283.html>



# Summary

- Introduction
- Use cases
- Capabilities
- What's new?
- On the horizon

# Questions & Answers

