



IBM MQ

MQ Appliance Administration: Best Practices for running in High Availability

Presented by

Bob Beckett, Sr. Consultant TxMQ

Cindy Gregoire, Middleware Practice Manager TxMQ

Presentation Overview

- Intermediate – assumes you know what an MQ Appliance is used for and have some background with MQ.
- We will cover the hardware set up and Appliance configurations needed to enable and test High Availability.
- We will then demonstrate a High Availability failover event and an Appliance Resume event with active clients.
- Along the way we will point out Best Practices and some “Gotchas” and how to deal with them

New Form Factor: *MQ Appliance*

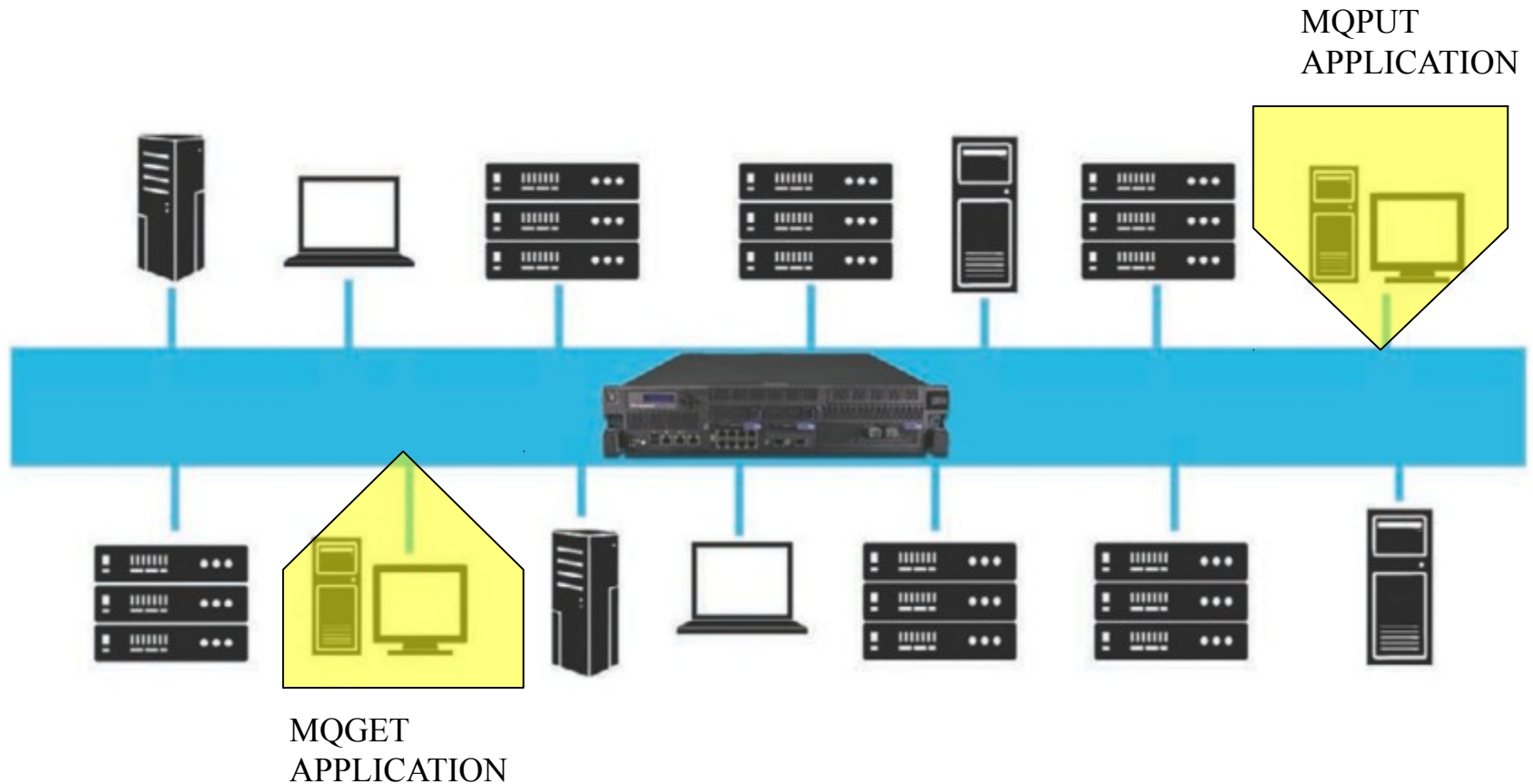
Released in March 2015

- An optimized version of IBM MQ v9 that runs in a hardware appliance
- Reduce the demand on IT skillset to administer and support MQ as a communications backbone for an organization



- ✓ Easy to install
- ✓ Easy to configure
- ✓ Lower administrative overhead
- ✓ Upgrades delivered as firmware

Demo: MQ Appliance HA Scenario

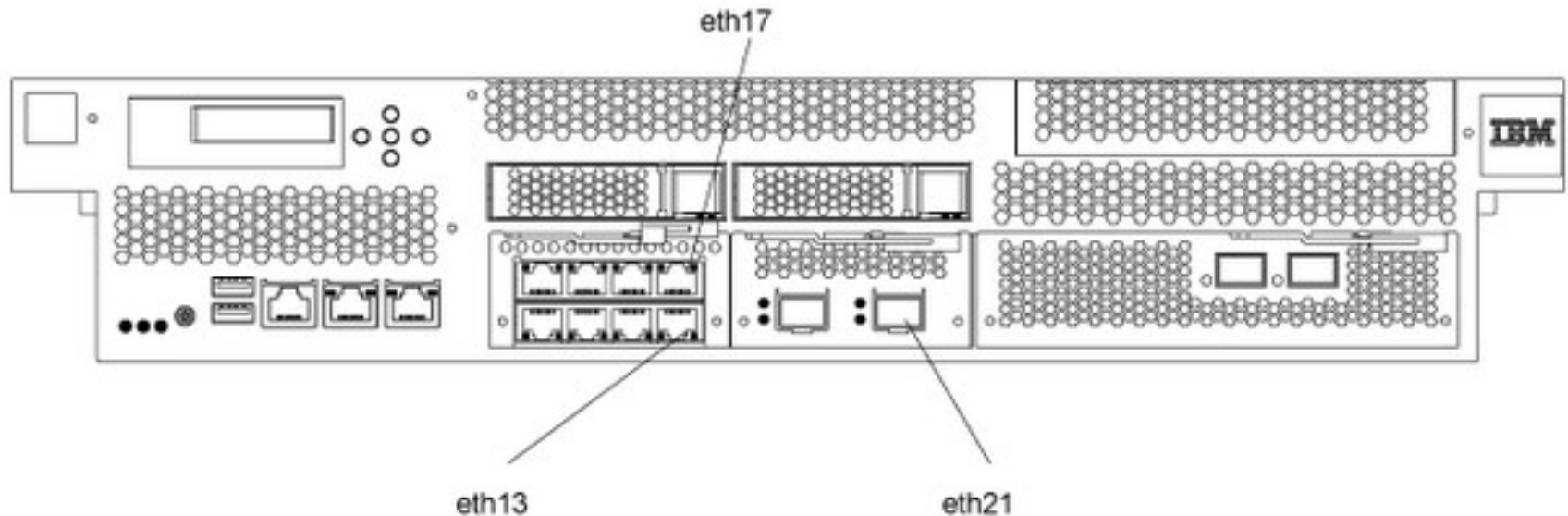


Hardware Setup

What is needed:

- 2 – MQ Appliances attached to your Network
- 2 – 1Gb Ethernet straight-through cables
- 1 – 10Gb Ethernet cable (OM3 or OM4 fiber cable recommended)

Hardware Setup



- Connect an Ethernet cable between port eth13 on Appliance 1 and eth13 on Appliance 2. This connection is the HA group primary interface.
- Connect an Ethernet cable between port eth17 on Appliance 1 and eth17 on Appliance 2. This connection is the HA group alternate interface.
- Connect 10Gb Ethernet cable between port eth21 on Appliance 1 and eth21 on Appliance 2. This connection is the replication interface.

Hardware Setup

The screenshot displays the IBM MQ Appliance console interface. The top header shows 'IBM MQ Appliance | MQ00 console at MQLoaner1' on the left, 'admin' with a dropdown arrow in the center, and a help icon and the IBM logo on the right. A left-hand navigation menu is visible, with 'Network' selected and expanded to show 'Interface' options: Ethernet Interface (highlighted), VLAN Interface, Link Aggregation Interface, Network Settings, Host Alias, DNS Settings, NTP Service, and Management. The main content area is titled 'Ethernet Interface' and features a 'New...' button, a refresh icon, a delete icon, and a search filter box. Below this is a table listing network 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		
<input type="checkbox"/> eth14			enabled		
<input type="checkbox"/> eth15			enabled		
<input type="checkbox"/> eth16			enabled		
<input type="checkbox"/> eth17			enabled		
<input type="checkbox"/> eth20			enabled		
<input type="checkbox"/> eth21			enabled		
<input type="checkbox"/> mgt0			enabled		

Hardware Setup

Ethernet Interface: eth13

✓ Ethernet Interface

eth13

⌂ ? Actions ▼

★ Name:

eth13

▼ Main

Basic configuration

Enable administrative state: ⓘ

☒

Comments: ⓘ

IP address configuration mode: ⓘ

☒ Static

☐ DHCP

☐ SLAAC

Enable for link aggregation: ⓘ

☐

IP addressing

Primary IP Address: ⓘ

192.168.101.1/24

Apply

Cancel

Hardware Setup

IBM MQ Appliance | MQ00 console at MQLoaner1

Administration

System Settings

Time Settings

Failure Notification

Language

Storage Devices

Debug

Miscellaneous

System Settings

▼ Main

Enable administrative state: ⓘ ☒

Comments: ⓘ

Product OID: ⓘ

Description: ⓘ

Serial number: ⓘ

Entitlement serial number: ⓘ

Product ID: ⓘ

Contact: ⓘ

Appliance name: ⓘ

Hardware Setup

Gotchas and things to know:

- You must not disable or disconnect Ethernet links that are used for high availability configurations. If you do disable such links, high availability operation is no longer available, and you might have to set up the configuration again.
- You must not change IP addresses for Ethernet links that are used for high availability configurations. If you do change IP addresses, high availability operation is no longer available, and you might have to set up the configuration again.
- You must not aggregate Ethernet links that are used for high availability configurations. If you do aggregate such links, high availability operation is no longer available, and you might have to set up the configuration again.

MQ Appliance HA Setup

- Create HA Group
- Create HA Queue Manager
- Create Queue, Channel, Listener and Client-connection for Queue Manager
- Set security using Command Line Interface

MQ Appliance HA Setup

IBM MQ Appliance | MQ00 console at MQLoaner1 admin

High Availability

Tab 1 +

Not configured
Create new group...

Local Queue Managers

Name	Status
------	--------

Total: 0 Selected: 0 Updated: 1:39:49 PM

MQ Appliance HA Setup

Create a high availability (HA) group

Connect two appliances to form a HA group. This may take several minutes to complete.

* Connection order:	<div>FirstSecond</div>	?
* Primary IP address of other appliance:	<div>192.168.101.2</div>	?
* Secret text:	<div>MySecretText </div>	?
Timeout:	<div></div>	?

Prepare

Cancel

MQ Appliance HA Setup

Create a high availability (HA) group

Connect two appliances to form a HA group. This may take several minutes to complete.

* **Connection order:**

First

Second



* **Primary IP address of other appliance:**

192.168.101.1



* **Secret text:**

MySecretText




Timeout:









Connect



Cancel




MQ Appliance HA Setup






 IBM MQ Appliance | MQ00 console at MQLoaner2 admin



High Availability 

Tab 1  

Local Queue Managers   

     More... Search

▲ Name	Status
--------	--------

Total: 0 Selected: 0 Updated: 1:52:45 PM

✓ Appliance 'MQLoaner1': Online

✓ This appliance: Online

HA queue manager status...

Suspend this appliance...

Delete group...

Manage HA Keys...

MQ Appliance HA Setup

The screenshot displays the IBM MQ Appliance console interface. At the top, the header bar shows 'IBM MQ Appliance | MQ00 console at MQLoaner1' on the left, 'admin' and a help icon in the center, and the 'IBM' logo on the right. Below the header, a navigation bar includes 'High Availability' and 'Disaster Recovery' tabs, with a hamburger menu icon on the far right. The main content area features a 'Tab 1' selector and a '+ Add widget' button. A dropdown menu is open, showing 'Not configured' and 'Create new group...'. The 'Local Queue Managers' widget is prominently displayed, featuring a table with columns for 'Name' and 'Status'. The table is currently empty. At the bottom of the widget, it shows 'Total: 0 Selected: 0' and 'Updated: 1:39:49 PM'. The left sidebar contains various system icons.

IBM MQ Appliance | MQ00 console at MQLoaner1

admin ? IBM

High Availability Disaster Recovery

Tab 1 +

Not configured
Create new group...

+ Add widget

Local Queue Managers

Name	Status
------	--------

Total: 0 Selected: 0 Updated: 1:39:49 PM

MQ Appliance HA Setup

Create a Queue Manager

* Queue manager name:	<input type="text" value="QM1"/>	?
Port:	<input type="text" value="1414"/>	?
High availability:	<input type="button" value="None"/> <input checked="" type="button" value="Replicated"/>	?
File system size:	<input checked="" type="button" value="Default"/> <input type="button" value="Custom"/> <input type="text" value=""/> <input type="button" value="MB"/> <input type="button" value="GB"/>	?
Startup:	<input type="button" value="Manual"/> <input type="button" value="Automatic"/>	?
Floating IP interface:	<input type="text" value="eth10"/>	?
Floating IP:	<input "="" type="text" value="10.100.2."/> <input type="text" value="103"/>	?

MQ Appliance HA Setup

IBM MQ Appliance | MQ00 console at MQLoaner2

admin

?

IBM

High Availability ✓

Disaster Recovery



✗ Failed to create queue manager 'QM1' <?xml version="1.0" encoding="UTF-8"?> <!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" 2:17:12 PM ✗
"/schemas/xhtml1-transitional.dtd"> <html lang="en" xml:lang="en"><head><meta http-equiv="content-type" content="text/html; charset=utf-8"/><title>Error 500:
Internal Error</title><dpwebgui:javascript src="/js/dojo/dpWidgets/config.js?build=287652mq" xmlns:dpwebgui="http://www.datapower.com/webgui"
xmlns:dp="http://www.datapower.com/extensions"/><script type="text/javascript" src="/js/dojo/dojo/dojo.js?build=287652mq"
djConfig="parseOnLoad:true,locale:",lang:",dojolang:",djlocale:"" xmlns:dpwebgui="http://www.datapower.com/webgui"
xmlns:dp="http://www.datapower.com/extensions"></script><dpwebgui:javascript xmlns:dpwebgui="http://www.datapower.com/webgui"
xmlns:dp="http://www.datapower.com/extensions"/><link href="/js/dojo/dijit/themes/tundra/tundra.css?build=287652mq" rel="stylesheet" type="text/css"
xmlns:dpwebgui="http://www.datapower.com/webgui" xmlns:dp="http://www.datapower.com/extensions"/><link href="/js/dojo/dojox/grid/resources/Grid.css?
build=287652mq" rel="stylesheet" type="text/css" xmlns:dpwebgui="http://www.datapower.com/webgui" xmlns:dp="http://www.datapower.com/extensions"/><link
href="/js/dojo/dojox/grid/enhanced/resources/tundra/EnhancedGrid.css?build=287652mq" rel="stylesheet" type="text/css"
xmlns:dpwebgui="http://www.datapower.com/webgui" xmlns:dp="http://www.datapower.com/extensions"/><script type="text/javascript" src="/js/datapower.js?
build=287652mq"></script><script type="text/javascript"> dpGetTopWindow().loadingMaskHide(); </script><style type="text/css"> * { font-family: Verdana, Arial,
sans-serif; color: #000000; } body { font-size: 12px; background-color: #FFFFFF; font-weight: normal; margin: 0px 0px; padding: 24px; } h1 { font-size: 16px; }
</style></head><body><h1>Error 500: Internal Error</h1><p>An internal error has occurred.</p></body></html>

Tab 1



+ Add widget

Local Queue Managers



More...

Search

▲ Name

Status

MQ Appliance HA Setup

The screenshot displays the IBM MQ Appliance console interface. The top navigation bar shows 'IBM MQ Appliance | MQ00 console at MQ'. A left sidebar contains icons for navigation. The main content area is divided into two panels. The left panel, titled 'Local Queue Managers', shows a table with one entry, 'QM1', which is selected. Below the table, it indicates 'Total: 1 Selected: 1'. The right panel, titled 'Authority records for 'QM1'', shows a table with one row: 'mqm' under 'Entity name' and 'Group' under 'Entity type'. Below this table is a 'Create Authorities' form. The form has two fields: '* Entity name:' with a text input containing 'cindy' and a help icon, and '* Entity type:' with two radio buttons, 'User' (selected) and 'Group'. At the bottom right of the form are four buttons: 'Create', 'Cancel', 'Save', and 'Close'.

IBM MQ Appliance | MQ00 console at MQ

Tab 1

Local Queue Managers

▲ Name
QM1

Total: 1 Selected: 1

Authority records for 'QM1'

▲ Entity name	Entity type
mqm	Group

Create Authorities

* Entity name: ?



* Entity type: ☒ User ☐ Group

Create Cancel

Save Close

MQ Appliance HA Setup

Authority records for 'QM1'

		Search
▲ Entity name		Entity type
cindy	User	
mqm	Group	
mqsystem	User	

Total: 3 Selected: 1 Updated: 3:25:15 PM

Administration

- ☐ Change
- ☐ Delete
- ☐ Display
- ☐ Ctrl

Context

- ☐ Set all context
- ☐ Set identity context

MQI

- ☐ Alternate user authority
- ☒ Connect
- ☒ Inquire
- ☐ Set
- ☐ System

Check all

Uncheck all

Save

Close

MQ Appliance HA Setup

Add a new widget

Local Queue Managers

Manage local queue managers

Chart

Monitor your MQ platform

Add a widget to display MQ object information for the specified queue manager

Queue manager:

QM1 ▼

Queues

Configure destinations for messages

Topics

Administrative objects for assigning attributes to topics

Listeners

Configure processes to accept network requests

Channels

Queue manager communication paths

Client-connection Channels

Client connectivity details

Authentication Information

Configure authentication mechanisms

Subscriptions


Configure how subscriptions to topics are handled



Channel Authentication Records


Control access to channels


Close




MQ Appliance HA Setup






 IBM MQ Appliance | MQ00 console at MQLoaner2 admin ? IBM


High Availability  Disaster Recovery 

Tab 1 




 Add widget






Local Queue Managers   

     More... Search

▲ Name	Status
QM1	 Running

Total: 1 Selected: 1 Updated: 4:27:30 PM

Queues on QM1   

     More... Search

▲ Name	Queue type	Queue depth
--------	------------	-------------

Total: 0 Selected: 0 Updated: 4:27:18 PM

MQ Appliance HA Setup

Create a Queue

* Queue name: ?

* Queue type: Local Remote Alias Model

Create Cancel

MQ Appliance HA Setup

Properties for 'Q1'

General

Extended

Cluster

Triggering

Events

Storage

Statistics

Status

Queue name:

Q1

Queue type:

Local

Description:

Enable put:

Allowed

?

Enable get:

Allowed

?

Default priority:

0

?

Default persistence:

Persistent

?

Usage:

Normal

?

Save

Cancel

MQ Appliance HA Setup

Properties for 'Q1'

General

Extended

Cluster

Triggering

Events

Storage

Statistics

Status

Max queue depth:	<input type="text" value="100000"/>	?
Max message length:	<input type="text" value="4194304"/>	
Shareability:	<input type="text" value="Shareable"/>	▼
Default input open option:	<input type="text" value="Input shared"/>	▼
Message delivery sequence:	<input type="text" value="Priority"/>	▼
Retention interval:	<input type="text" value="999999999"/>	
Definition type:	<input type="text" value="Predefined"/>	▼
Distribution lists:	<input type="text" value="Not Supported"/>	▼
Default read ahead:	<input type="text" value="No"/>	▼
Default put response type:	<input type="text" value="Synchronous"/>	▼
Property control:	<input type="text" value="Compatibility"/>	▼
Custom:	<input type="text"/>	?
Cluster channels:	<input type="text"/>	
Scope:	<input type="text" value="Queue manager"/>	▼

! You have unsaved changes

Save


Cancel

MQ Appliance HA Setup

IBM MQ Appliance | MQ00 console at MQLoaner1

admin ? IBM

Authority records for 'Q1' on QM1

+  Search

▲ Entity name	Entity type
mqm	Group
mqsystem	User

High Availability ✓ Disaster Recovery

Add widget

Create Authorities

* Entity name:

?

* Entity type:

User

Group

Create

Cancel

Queue type



Queue depth

0

Updated: 3:51:53 PM

MQ Appliance HA Setup

Authority records for 'Q1' on QM1

		Search
▲ Entity name		Entity type
cindy		User
mqm		Group
mqsystem		User

Total: 3 Selected: 1 Updated: 4:42:53 PM

Administration

- ☐ Change
- ☐ Clear
- ☐ Delete
- ☐ Display

Context

- ☐ Pass all context
- ☐ Pass identity context
- ☐ Set all context
- ☐ Set identity context

MQI

- ☒ Browse
- ☒ Inquire
- ☒ Get
- ☒ Put
- ☐ Set

Check all

Uncheck all

Save

Close

admin



High Availability ✓

Disaster Recovery



 Add widget

Queues on QM1



More...

Search


▲ Name	Queue type	Queue depth
Q1	Local	0

Total: 1 Selected: 1

Updated: 3:51:53 PM

MQ Appliance HA Setup

Create a Channel

* Channel name: 

* Channel type:

MQ Appliance HA Setup

Properties for 'CLNTCHL'

General

Extended

MCA

Exits

SSL

Statistics

MCA user ID:


?


Save

Cancel

MQ Appliance HA Setup

Create a TCP Listener

*** Listener name:** 

Port: 

MQ Appliance HA Setup

Properties for 'L1'

General

Listener name:

L1

Description:

Control:

Queue Manager

?

Xmit protocol:

TCP

?

Port:

2323

?

IP address:

?

Backlog:

0

?

Alteration date:

September 13, 2017

?

Alteration time:

4:50:53 PM

?

!

You have unsaved changes

Save

Cancel

MQ Appliance HA Setup

Create a Client-connection Channel

* Channel name: ?

* Conn name: ?

MQ Appliance HA Setup

Put Message

Enter a message to put on queue 'Q1'

Message:

Test|

Put

Cancel

MQ Appliance HA Setup

The screenshot displays the IBM MQ Appliance console interface. The top navigation bar includes the text "IBM MQ Appliance | MQ00 console at MQLoaner1", the user "admin", and the IBM logo. On the right, it shows "High Availability" with a checkmark and "Disaster Recovery" with a menu icon. The main content area is divided into four widget panels:

- Local Queue Managers:** A table with columns "Name" and "Status". It lists "QM1" with the status "Running elsewhere".
- Queues on QM1:** A table with columns "Name", "Queue type", and "Queue depth". It displays a yellow banner with the message "Queue manager unavailable".
- Channels on QM1:** A table with columns "Name", "Type", and "Overall channel status". It displays a yellow banner with the message "Queue manager unavailable".
- Listeners on QM1:** A table with columns "Name", "Port", and "Listener status". It displays a yellow banner with the message "Queue manager unavailable".

Each widget panel includes a toolbar with icons for refresh, settings, and close, and a footer showing "Total" and "Selected" counts along with the last update time.

MQ Appliance HA – Failover Demo

■ Demo – transition over to laptops to view MQ Appliance in action

- Connect to MQ consoles on both Appliances
- Start Sender application on Laptop A
- Demo messages going from A to Appliance A via looking at MQ console
- Start Receiver application on Laptop B
- Create an IT disaster – HA event
- Verify messages still flowing and observe failover pause
- Resume after an IT disaster
- Verify messages still flowing and observe resume pause

MQ Appliance Wrap-Up Discussion

■ HA Discussion items:

- ♦ MQ Appliance Setup does require two appliances and cabling between the two
- ♦ Easy to configure – works as expected
- ♦ Review Best Practices and Gotchas
- ♦ Monitoring
 - ITCAM for Messaging monitoring agent. Need a Client channel created to remote server where the monitoring agent is running.
 - IBM APM agents can monitor MQ Queue Manager.
 - MQ Web Console. Provide out of the box charts and widgets to see real time data for Queue , Qmgrdisk memory and CPU utilized. Widget Data is not stored.
 - Several Third-Party Applications are available.

Resources

- https://www.ibm.com/support/knowledgecenter/en/SS5K6E_9.0.0/com.ibm.mqa.doc/configuring/co00240_.htm [Configuring the hardware for high availability]
- https://www.ibm.com/support/knowledgecenter/SS5K6E_9.0.0/com.ibm.mqa.doc/configuring/co00101_.htm [Configuring Ethernet interfaces by using the IBM MQ Appliance web UI]
- https://www.ibm.com/support/knowledgecenter/SS5K6E_9.0.0/com.ibm.mqa.doc/configuring/co00251_.htm [Creating a high availability group]
- https://www.ibm.com/support/knowledgecenter/SS5K6E_9.0.0/com.ibm.mqa.doc/configuring/co00261_.htm [Creating a high availability queue manager]

Resources

- <http://www.redbooks.ibm.com/abstracts/sg248283.html> [IBM Redbook: Integrating the IBM MQ Appliance into your IBM MQ Infrastructure]
- <http://www.redbooks.ibm.com/abstracts/redp5307.html> [IBM Redbook: Enabling IBM MQ Messaging with the IBM MQ Appliance]
- https://www.ibm.com/developerworks/community/blogs/messaging/entry/Configuring_client_connection_to_a_IBM_MQ_Appliance_queue_manager_using_Client_Channel_Definition_Table_CCDT?lang=en

Questions & Answers

