MQ Appliance Implementation Scenarios and Migration Best Practices

Sandeep Chellingi

sandeep.chellingi@prolifics.com

Agenda

- **Why IBM MQ Appliance ?**
- **Major difference from " MQ on Distributed Platforms "**
- **Differences between M2000 & M2001**
- **Implementation Scenarios of IBM MQ Appliance**
  - High Available Appliances
  - High Available – Disaster Recovery Appliances
  - Connectivity Hub for MQ/Managed File Transfer
- **Network Consideration for MQ Appliance Implementation**
  - Link Aggregation
  - Host Alias
  - NTP & DNS servers
- **Monitoring MQ Queue Manager & MQ Appliance Hardware**
- **Demo**
- **Questions & Answers**

Why IBM MQ Appliance ?

- **The scalability and security of IBM MQ V8**
  - Integrates seamlessly into MQ networks and clusters.
  - Familiar administration model for administrators with MQ & Datapower skills.
- **Fixed hardware specification allows IBM to tune the firmware**
  - Having fewer POVs makes it easier to deploy and manage
  - Less performance tuning should be needed
- **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

Major difference from “MQ on Distributed Platforms”

- **No traditional “Operating System”**
  - **No** “shell”
  - **No** OS maintenance – Simple firmware upgrades
    - Single “fix pack package” quick and easy to apply
    - “iFixes” will be supplied which will include latest fix pack
    - Full support for “rollback” of entire fix pack
  - **No** OS user management (only 2 types of users defined , Appliance users and MQ users)
  - **No** tuning of OS Kernal parameters, systems services etc.
  - **No** File System (other than limited URI’s for transfer on and off)
  - **Everything** required to Manage and Monitor the system provided directly and focused on MQ
    - ***Single command to collect PMR Info (runmqras).***

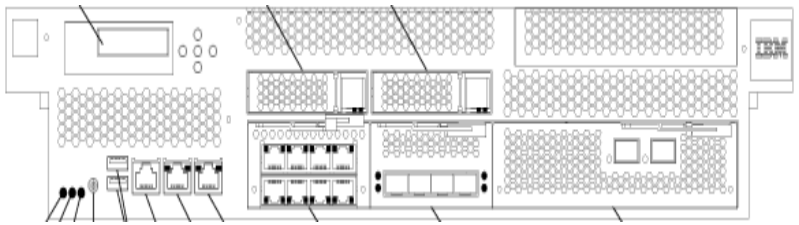
Differences between M2000 & M2001

M2001 model

CPU
Two 10-core 2.80 GHz Intel Xeon E5-2680V2 processors

Disk space
Two 3200 GB SSDs configured as RAID 1

Memory
192 GB (Twelve 1600 MHz DDR3 DIMMs)

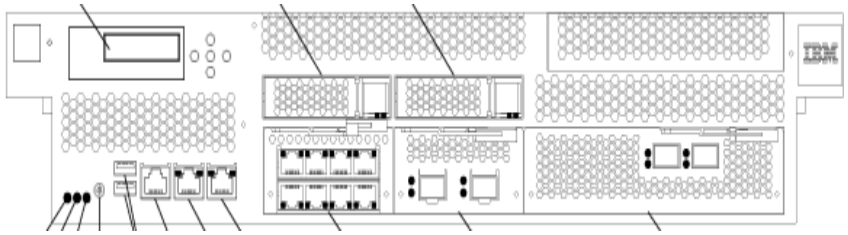


M2000 model

CPU
Two 10-core 2.80 GHz Intel Xeon E5-2680V2 processors

Disk space
Two 1200 GB HDDs configured as RAID 1

Memory
192 GB (Twelve 1600 MHz DDR3 DIMMs)

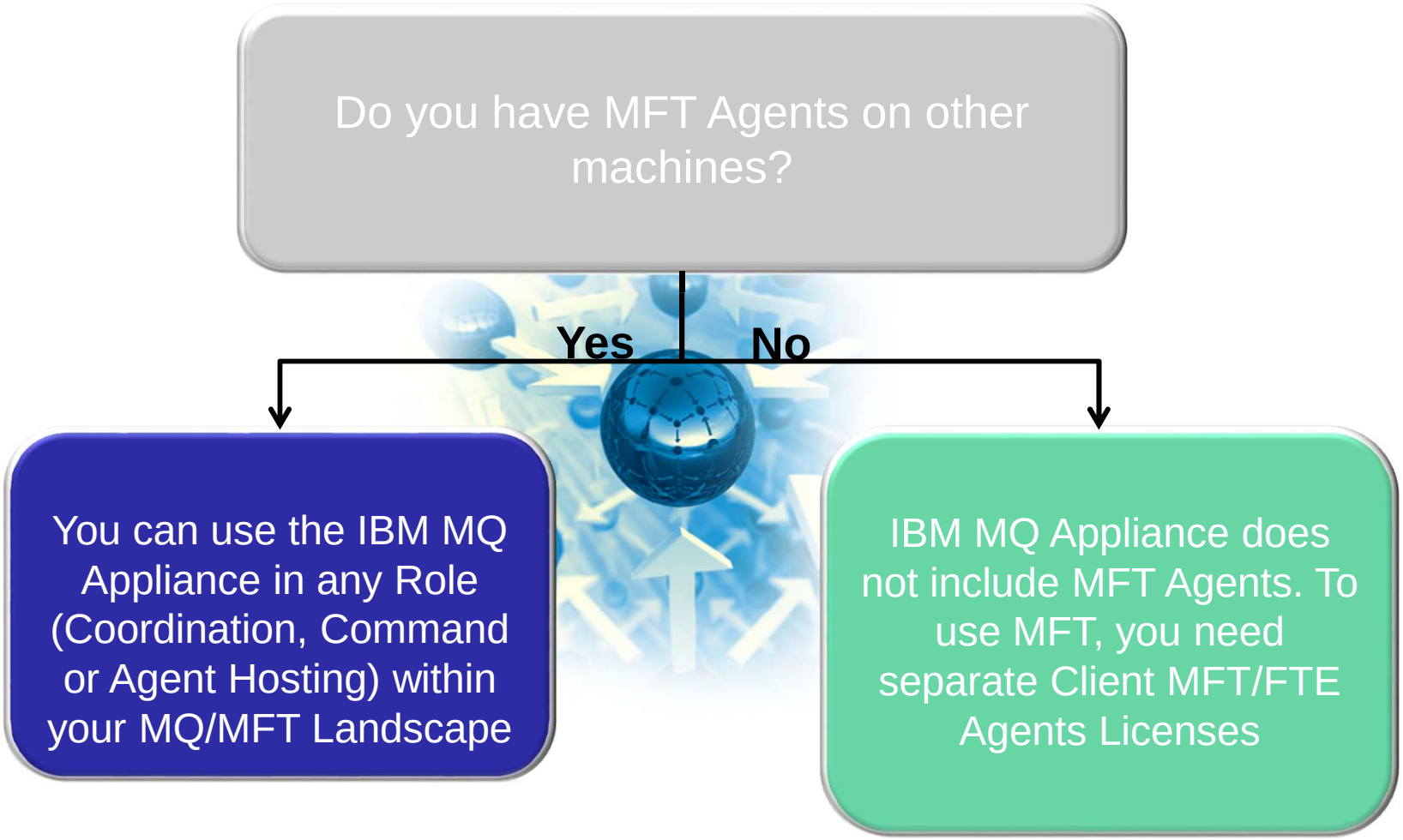


Expected uses of the IBM MQ Appliance

How an appliance may help to achieve the following requirements

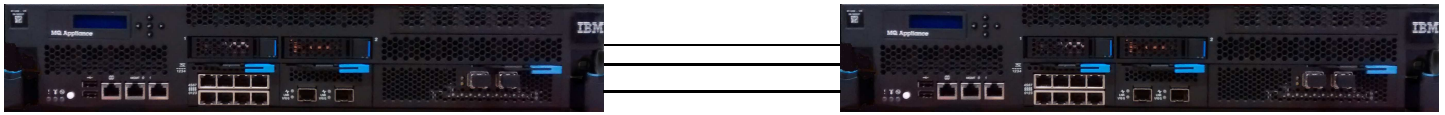
Messaging Hub	One or more dedicated messaging servers to which applications connect
Messaging Outpost	A messaging server located in a remote location with limited skills and facilities
Messaging Gateway	A dedicated server that handles all traffic from a remote messaging system
Messaging Partner	A messaging server located in a business partner that needs to resilient and safe connectivity to your MQ infrastructure

Connectivity Hub for MQ/Managed File Transfer



Highly Available Appliances

Primary Secondary



- **A pair of MQ Appliances can be deployed as an HA group**
  - HA group manage availability of HA queue managers
  - Automatic failover of HA queue managers
  - Failure detection for hardware and software problems
  - Supports manual failover for rolling upgrades
- **Easier to set up than other HA solutions (no shared file system/disks)**
  Only 3 simple commands:
  - **prepareha -s “secretKey” -a (IP Address of MQ APPL2)**
  - **crthagrp -s “secretKey” -a (IP Address of MQ APPL1**
  - **crtmqm -sx -p 1414 -fs 2 -lf 65535 -lp 4 -ls 2 -x 20000 HA_QM1**
- **Replication is synchronous over Ethernet, for 100% fidelity**
  - Routable but not intended for long distances

Highly Available Appliances

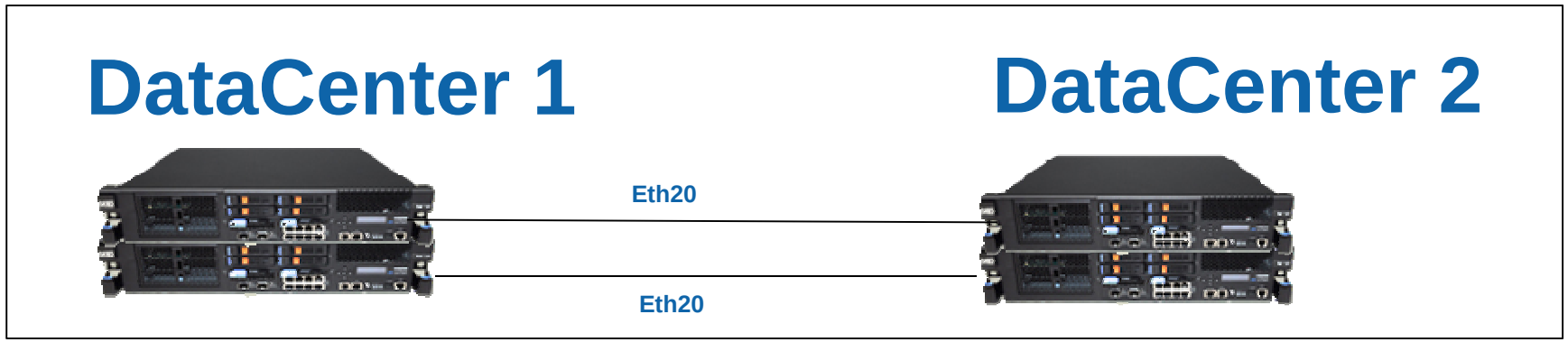
Appliance	Interface	IP address	Subnet prefix length
mqa001p	eth13	192.168.101.1	24
mqa001p	eth17	192.168.102.1	24
mqa001p	eth21	192.168.103.1	24
mqa002p	eth13	192.168.101.2	24
mqa002p	eth17	192.168.102.2	24
mqa002p	eth21	192.168.103.2	24

- **Configure Ethernet interface Eth13 , Eth17 & Eth21 IP Address for Each HA appliance pair on separate subnets.**
- **Ethernet interfaces Eth13, Eth17 and Eth21 are dedicated for HA Implementation and cannot be used for network traffic.**
- **IBM supports upto 10ms network latency between HA appliances pairs.**
- **Data sent across replication link is not encrypted, can use out of the box MQ AMS for additional encryption.**

Testing Highly Available Appliances

- Test scenarios to validate Queue Manager in HA appliance group.
- Build HA Queue manager QMGR1 on Appl A & HA Queue Manager QMGR2 Appl B.
- Disconnecting HA Ethernet Heartbeat links (Eth13 ,Eth17 & Both –Split Brain)
- Disconnecting HA Ethernet Data Replication link (Eth21)
- Recovering Appliance from HA Network Failures
- Issue “makehaprimary QMGR1 “ to resolve the partitioned situation on the HA appliances.
- Testing Power supply to Appliances , remove power cables to Appl A and validate Appl B hosts two HA Qmgrs (QMGR1 & QMGR2).
- sethagrp –s (suspend) , sethagrp –r (resume)

Highly Available - DR Appliances



- Consider Network latency while implementing Cross Data Center MQ Appliance Disaster recovery. IBM support upto 50ms network latency across datacenter.
- Configure Ethernet interface Eth20 DR appliance pair on same or separate subnets. No limitation on eth20 to be on the same subnet on both appliances or Data Centers.
- Eth20 and Link Aggregation IP Address must be configured in different subnets .

Disaster Recovery Appliances

- **Build HA Queue manager HA_DR on Appl A / Appl B & configure HA Qmgr to Disaster recovery on secondary datacenter.**
- **Non HA & DR implementation**
- crtdrprimary –m QM1 –r mydrappl –i 198.51.100.3 –p 2015
- crtdrsecondary –m QM1 –s 65536 –l myliveappl –i 198.51.100.24 –p 2015
- **HA & DR implementation**
- crtdrprimary –m queue_manager –r RecoveryName –i RecoveryIP –p port_number -f floating_IP
- crtdrsecondary –m QM3 –s 65536 –l myliveapp3 –i 198.51.100.10 –p 2015
- **Validate DR Queue Manager is created and DR Appliance using Status command on mqcli.**

Testing Disaster Recovery Appliances

- Test scenarios to validate Queue Manager in DR appliance .
- Build HA Queue manager HA_DR on Appl A / Appl B & configure HA Qmgr to Disaster recovery on secondary datacenter.
- Disconnect DR Ethernet link (Eth20) & Failover sethagrp –r /sethagrp -s
- Snapshot of DR queue Manager is taken as a backup to recover if asynchronous replication halts or Network/power failures.
- Recovering DR Appliance from Network Failures.
- Issue “makedrsecondary HA_DR“ to discard the partitioned data on the DR appliance.
- Issue “makedrprimary HA_DR“ to resynchronize the date on the DR appliance.

Network Consideration for MQ Appliance Implementation

- **Link Aggregation**
  - on M2000A & M2000B appliances if HA – DR are implemented , only 6 1GB Ethernet ports are available for Application traffic .
  - Link Aggregation will increase through put and provide redundant port availability for Application traffic.
  - Link Aggregation cannot be enabled on HA & DR Ethernet ports (Eth13,Eth17,eth20 & eth21).
  - Link Aggregation IP address and Eth20 should be in a different subnet.

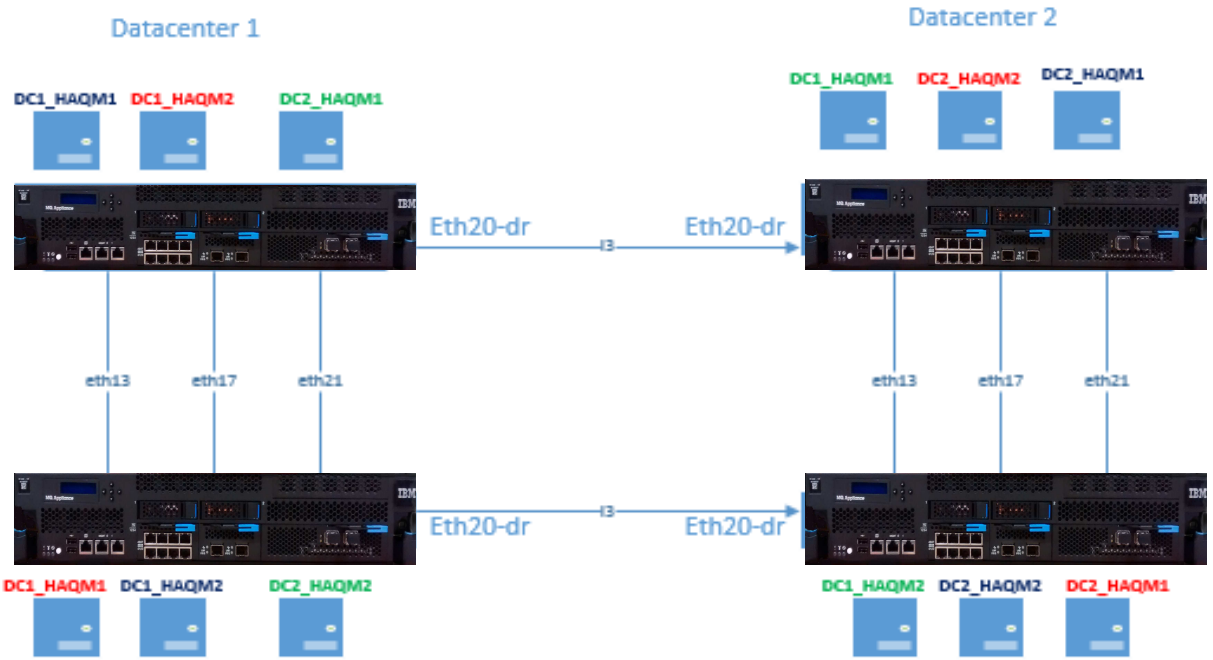
- **Host Alias**
  - Useful while leveraging a single MQ Appliance to be used into multiple environments.
  - Useful for MQ Clustering between multiple HA Appliance & DR appliances.

- **NTP & Static Routes**
  - While implementing HA on pair of appliance , make sure the configure time and ntp server is same.
  - Configure same DNS servers to resolve server names.
  - Configure Static routes on Ethernet interface which are on different subnets.

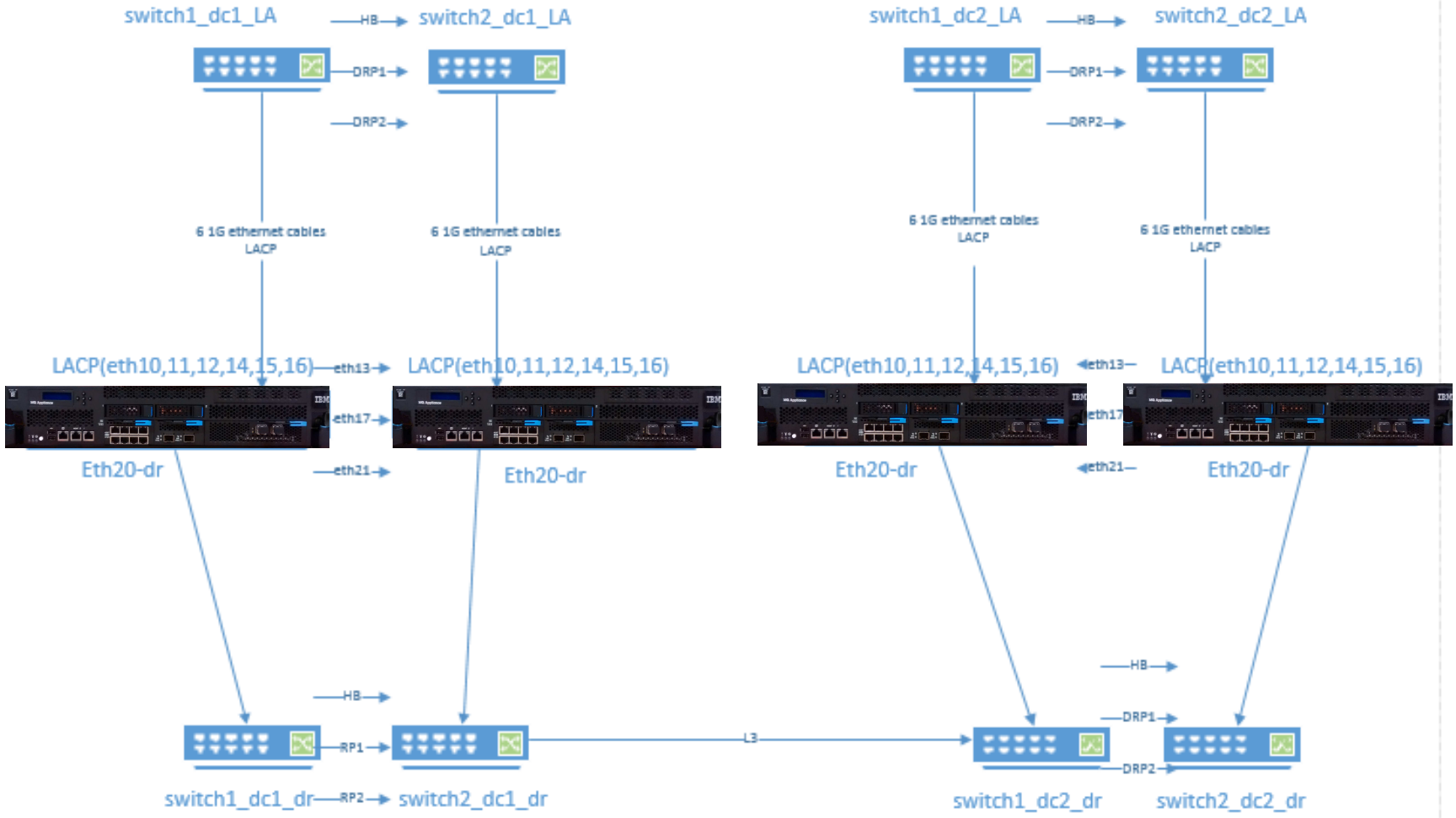
HA-DR MQ Appliances

Legend		
Legend Subtitle		
Symbol	Count	Description
	4	MQ Appliance
	12	MQ QMGR

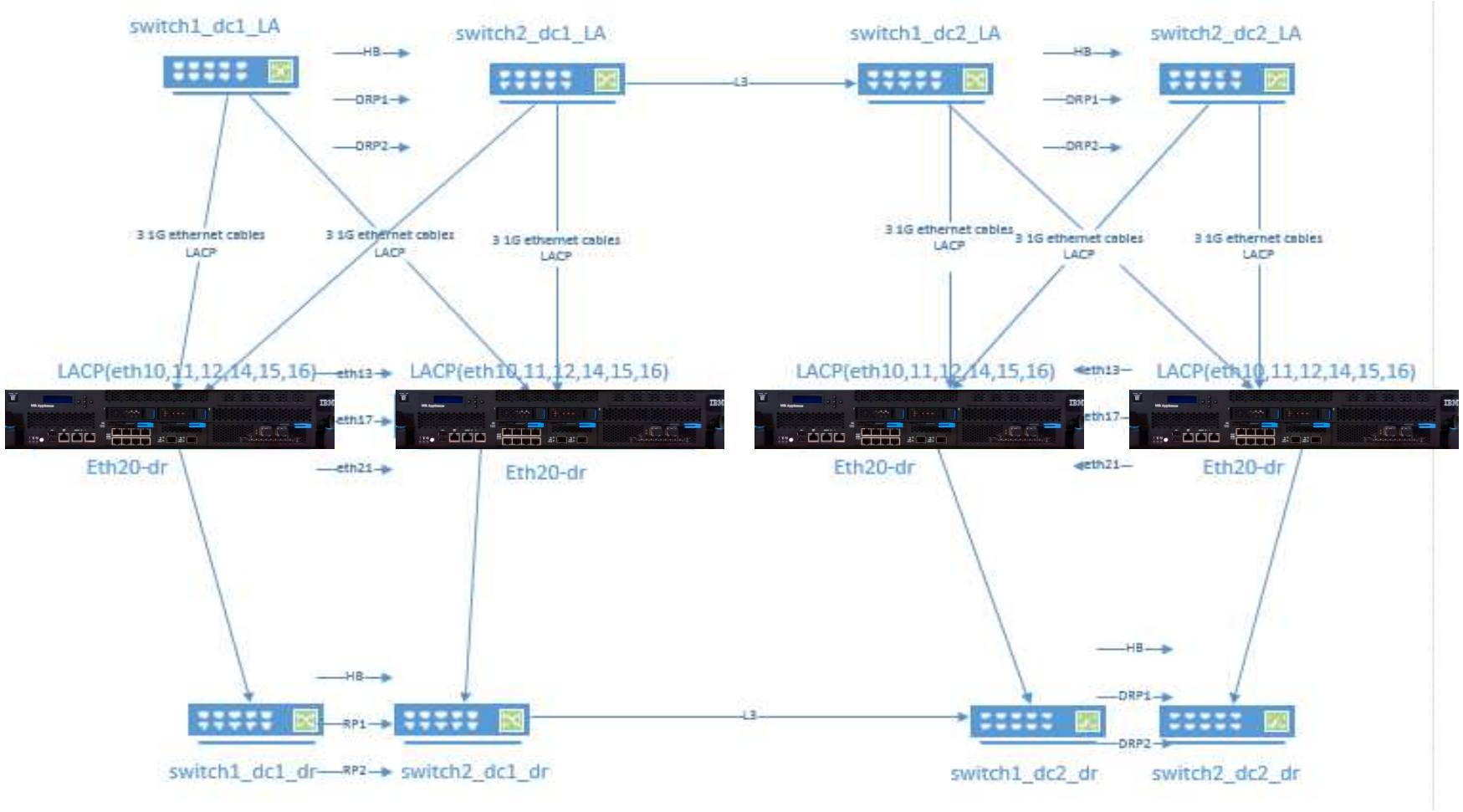
Blue – primary Appliance HA Active Qmgr
Red -Secondary Appliance HA passive Qmgr
Green – DR Appliance Recovery Qmgr



HA-DR MQ Appliances



HA-DR MQ Appliances



Monitoring

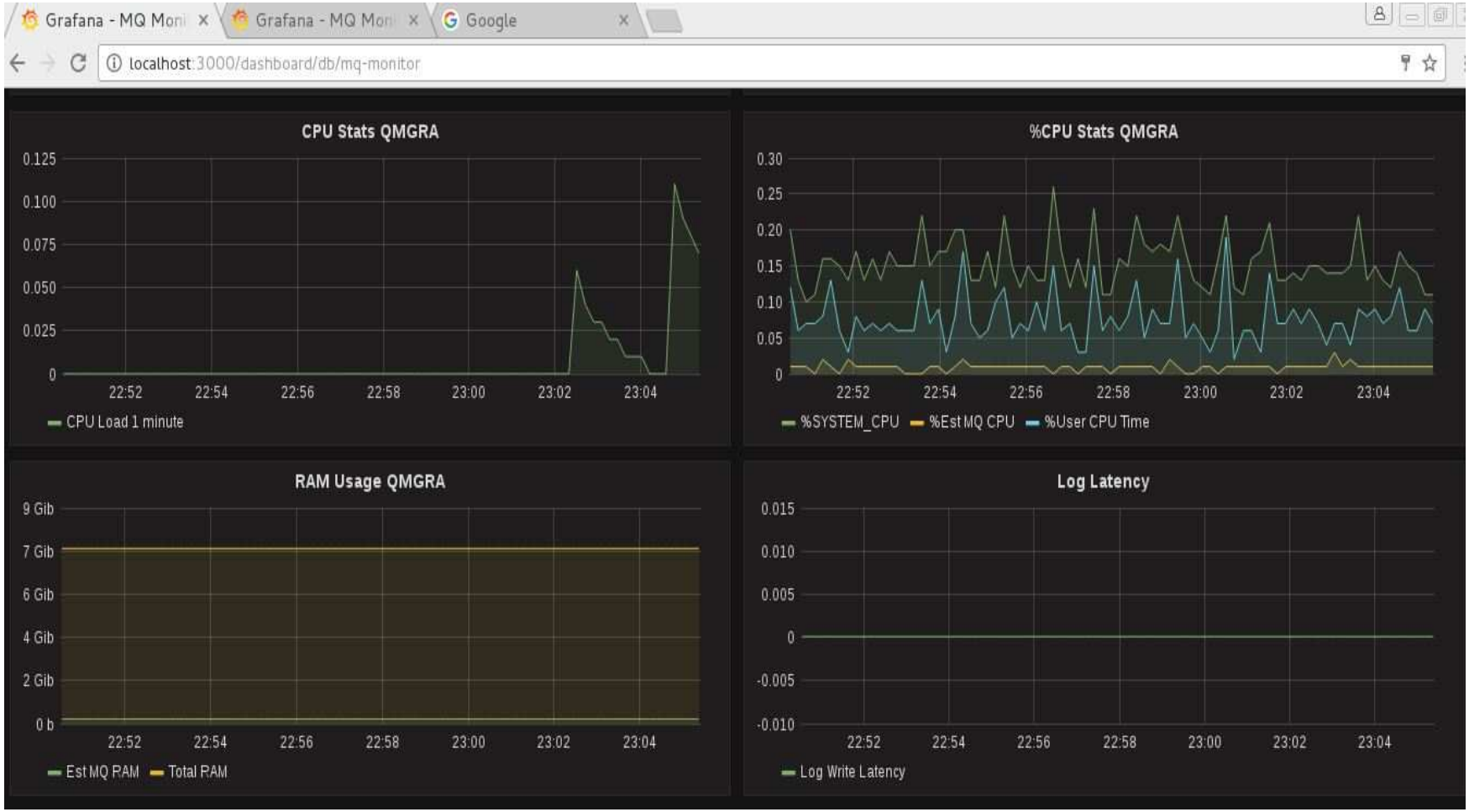
- **IBM MQ Appliance Queue managers can be monitored**
  - ITCAM for Messaging v7 monitoring agent. Need a Client channel created to remote server where the monitoring agent is running.
  - IBM APM 8.1.3 agents can monitors MQ Queue Manager.

- **MQ Web Console.**
  - Provide out of the box charts and widgets to see real time data for Queue , Qmgr disk memory and CPU utilized.
  - Widget Data is not stored , 2 mint interval of data is shown at any given time.

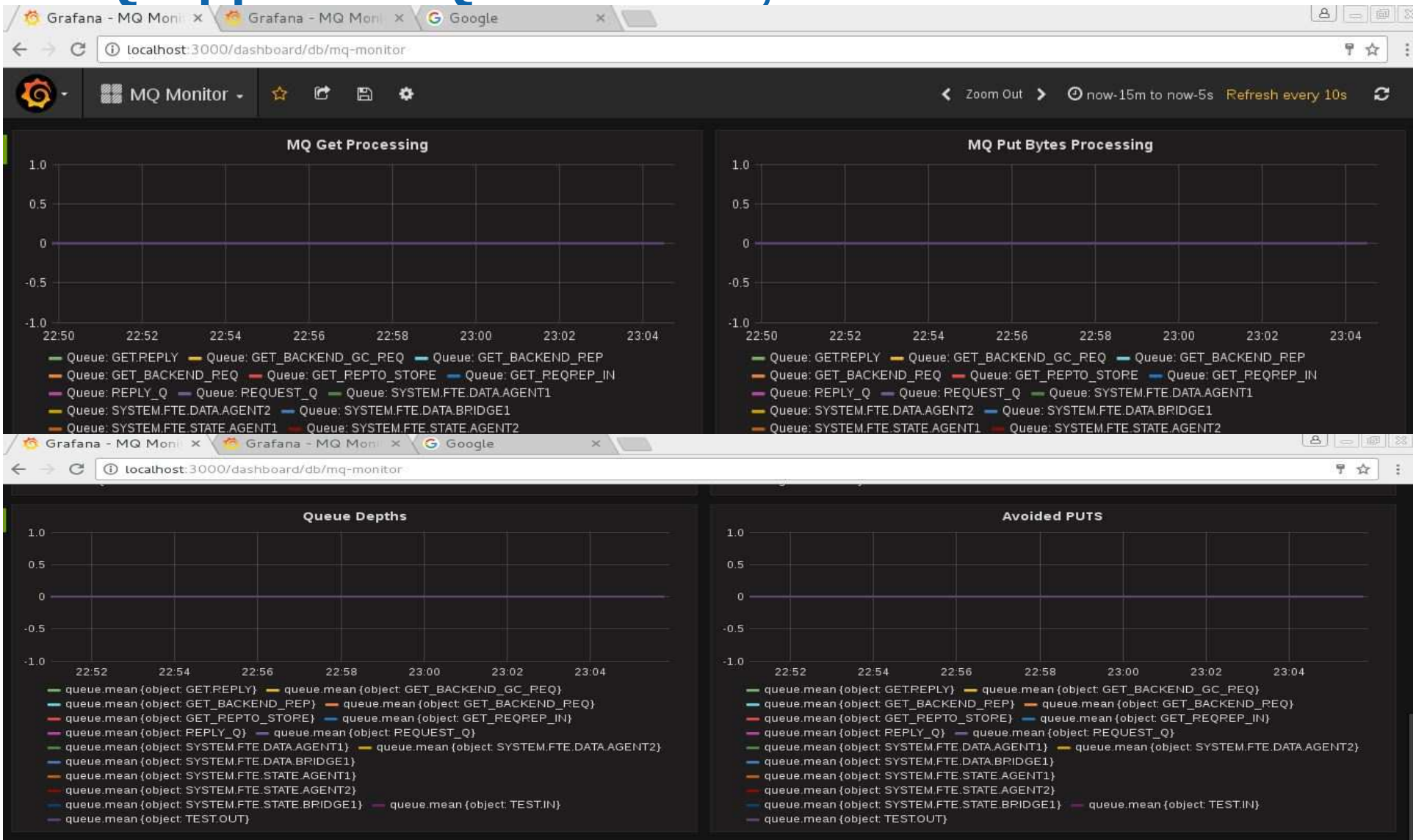
- **Custom Monitoring Solution:**
  - Install Influx /Prometheus Database – time series database.
  - Install MQ go – go Lang Compile code for extracting data to the database .
  - Install Grafana Dashboard
  - https://www.ibm.com/developerworks/community/blogs/messaging/entry/IBM_MQ_Using_Prometheus_and_Grafana_to_montor_queue_managers?lang=en
  - https://www.youtube.com/watch?v=Pi_jHCiqTgU

Demo

MQ Appliance CPU , RAM and Disk stats



MQ Appliance Queue Gets ,Puts and Avoid Puts



Questions & Answers