

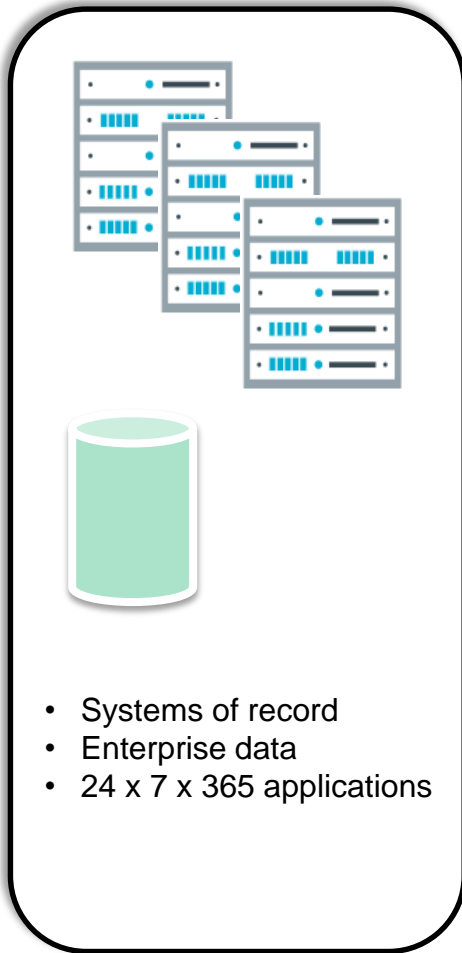
# *Hybrid Messaging with MQ and IBM Bluemix*

*Matthew Whitehead  
IBM MQ Development  
mwhitehead@uk.ibm.com*

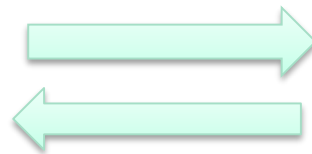
# Agenda

- Hybrid Messaging – What and Why?
- IBM Message Hub
- Micro Service Architecture
- Connecting On-Premise to Bluemix:
  - Message Connect
  - Secure Gateway
- Other approaches

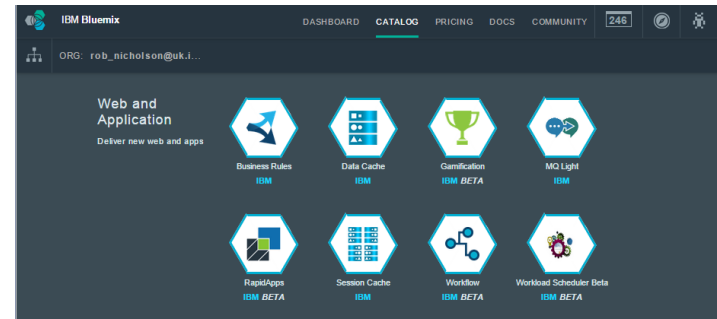
# Bluemix Hybrid Messaging – Joining the 2 worlds together



On Premise



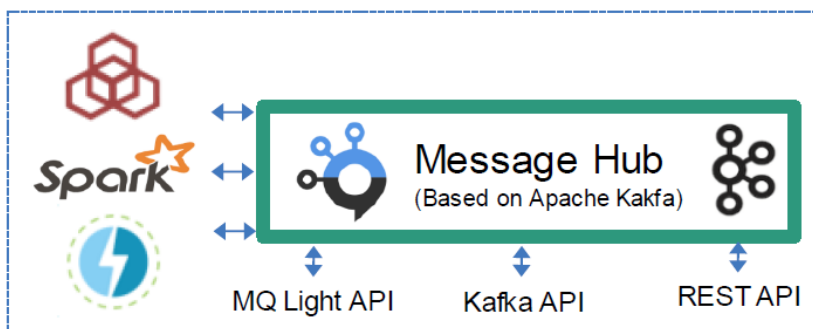
- Systems of engagement
- Mobile
- Social
- Analytics & Watson
- Rapid development



Bluemix Cloud

# Hybrid Messaging

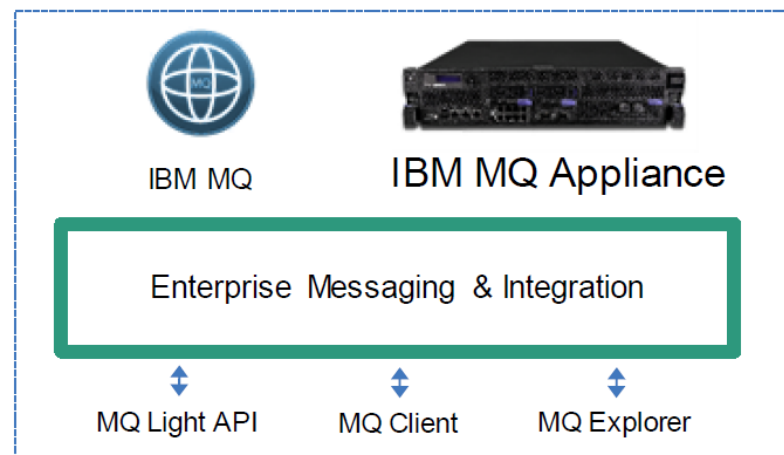
## Bluemix



Bluemix Public	<input checked="" type="checkbox"/>
Bluemix Dedicated (Announced, GA March)	<input checked="" type="checkbox"/>
Bluemix Local (Coming soon)	<input type="checkbox"/>



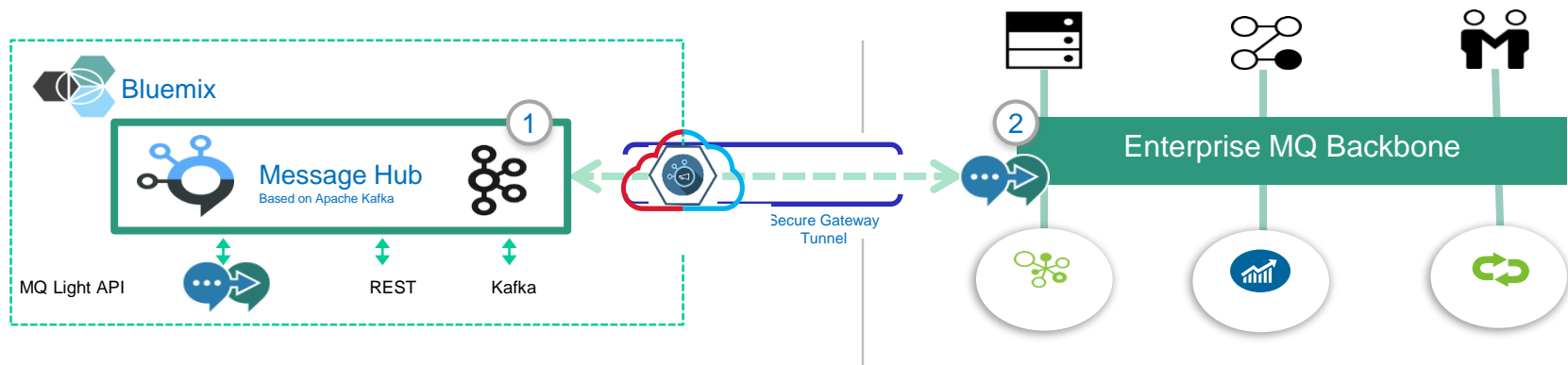
## On-Premise



# Components of an IBM Hybrid Messaging architecture

Connects Enterprise MQ with your cloud native Bluemix applications

- Driving cloud applications with events from back-end systems creates minimal additional load
1. **Message Hub** : Managed messaging service on Bluemix
  2. **AMQP Channel in MQ** : Accepts AMQP protocol connections into IBM MQ
  3. **Message Connect** : Bridging messaging systems using MQ Light API

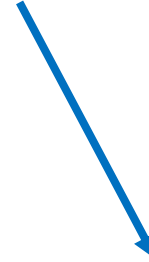


# Why Hybrid Messaging?

“All the benefits of cloud, with access to your enterprise data”



- Doing more with less
- Being more ready to change
- Making the development process less heavyweight
- Paying for what you use
- Integrating with other cloud services
- Rapidly scaling up and down with demand



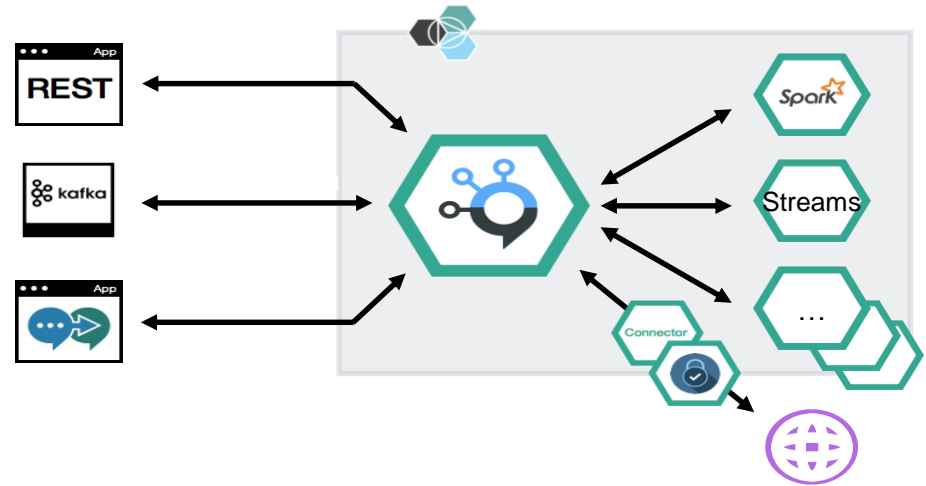
- Customer profiles
- Purchases (online orders)
- Data requests (e.g. insurance quotes)
- Website comments

# Agenda

- Hybrid Messaging – What and Why?
- **IBM Message Hub**
- Micro Service Architecture
- Connecting On-Premise to Bluemix:
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  - Secure Gateway
- Other approaches

# Upgrade from MQ Light service to Message Hub

- MQ Light service is now deprecated in most Bluemix Regions
- Message Hub provides support for the MQ Light API, so upgrading is a streamlined process



## Partitions

\$10 per month per Message Hub partition created (Pro-rated by number of days in the month that the partition was provisioned for)

## Messages

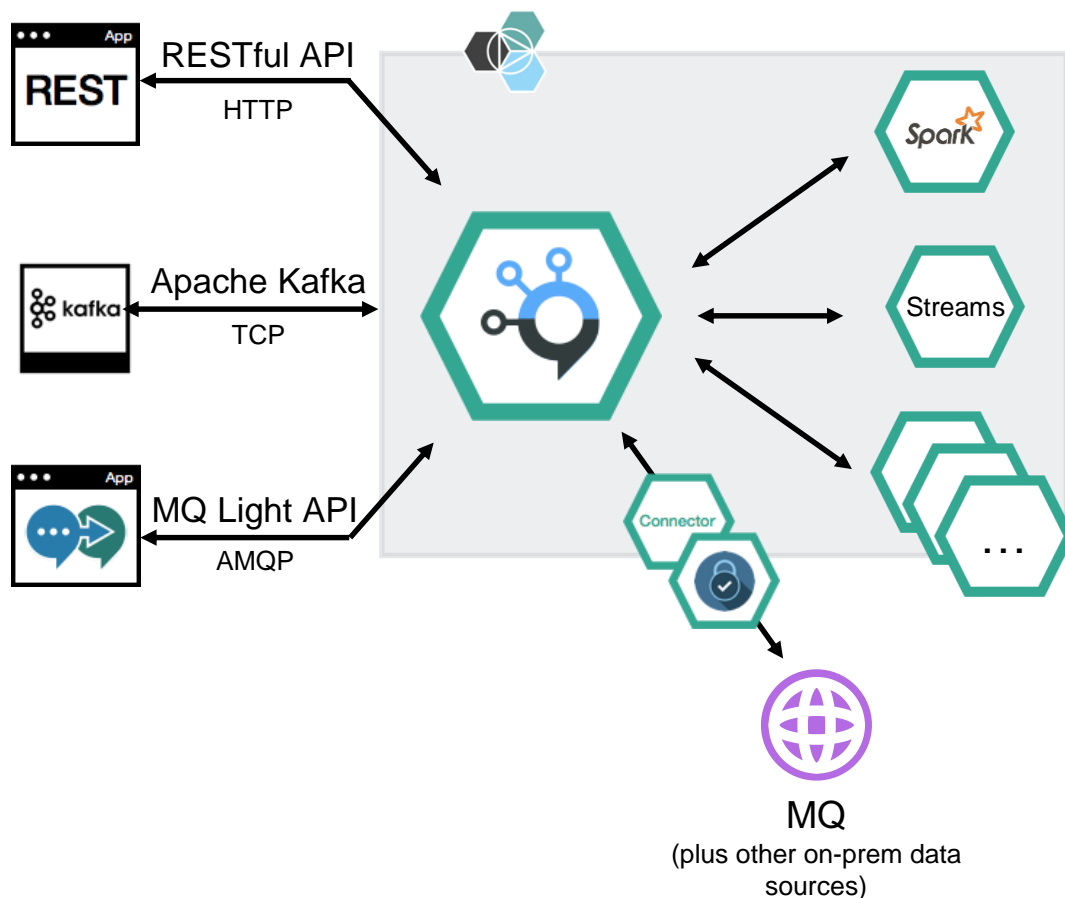
Messages sent / received

Tier (million msgs)	Price per Million
1 – 200	\$0.10
201 – 700	\$0.05
701 – 1,700	\$0.03
1,701 +	\$0.017




- Benefits
- Elastic scale
- Greater range of APIs
- Workloads less expensive



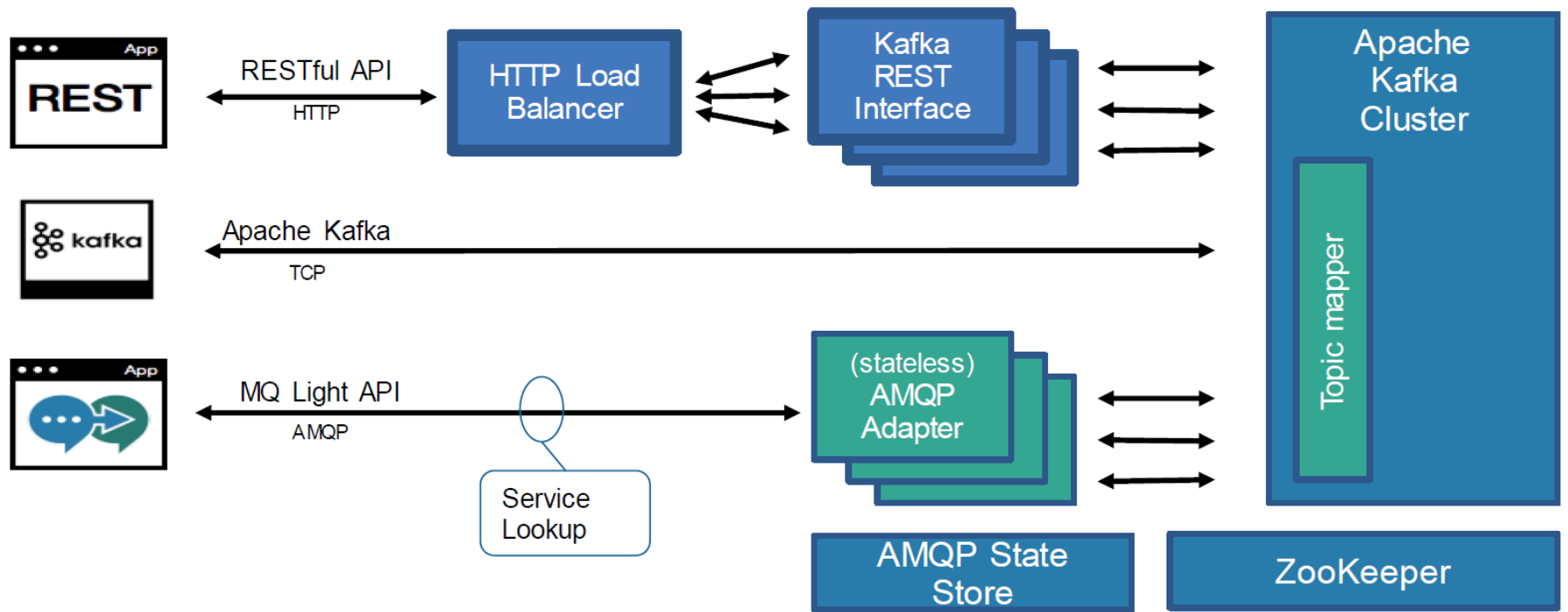
# Message Hub



- Max 1 MB message size
- Max 30 day message retention

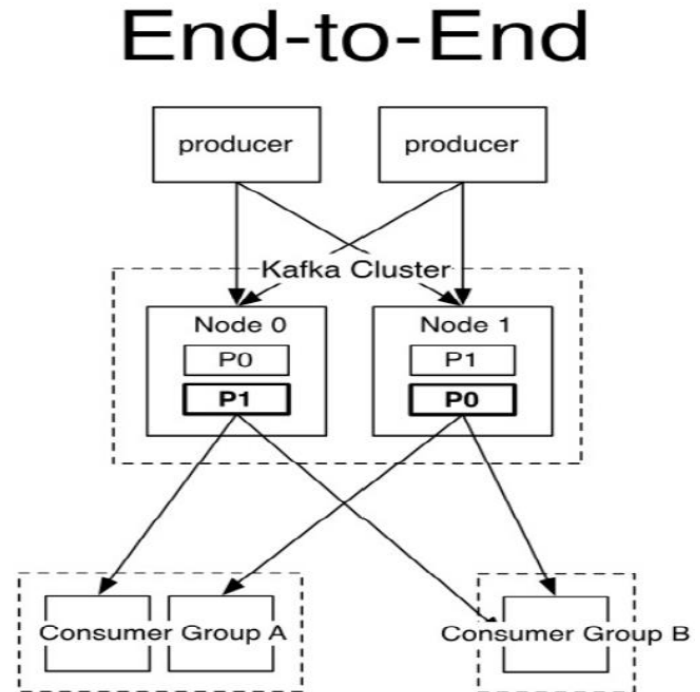
Available for ...	
 Bluemix Public	<input checked="" type="checkbox"/>
 Bluemix Dedicated	<input checked="" type="checkbox"/>
Bluemix Local (Coming soon)	

# Message Hub Architecture



# Based on Apache Kafka

- **Apache Kafka** is publish-subscribe messaging re-thought as a distributed commit log. The following attributes are claimed of Kafka:
- **Fast** - a single broker on commodity hardware can handle hundreds of megabytes of reads and writes per second from thousands of clients.
- **Scalable** - a single cluster can serve as the central data backbone for a large organization. Data streams are partitioned and spread over a cluster of machines to allow data streams larger than the capability of any single machine.
- **Durable** - messages are persisted on disk and replicated within the cluster to prevent data loss. Each broker can handle terabytes of messages without performance impact.
- **LinkedIn** developed Kafka to solve its internal data integration problems
  - Felt available commercial solutions didn't address their scalability requirements
  - Open sourced early 2011
  - Apache incubator graduation fall 2012



# What does Message Hub enable?



**Real-time  
traffic flow  
optimization**



**Understand  
and act on  
customer  
sentiment**



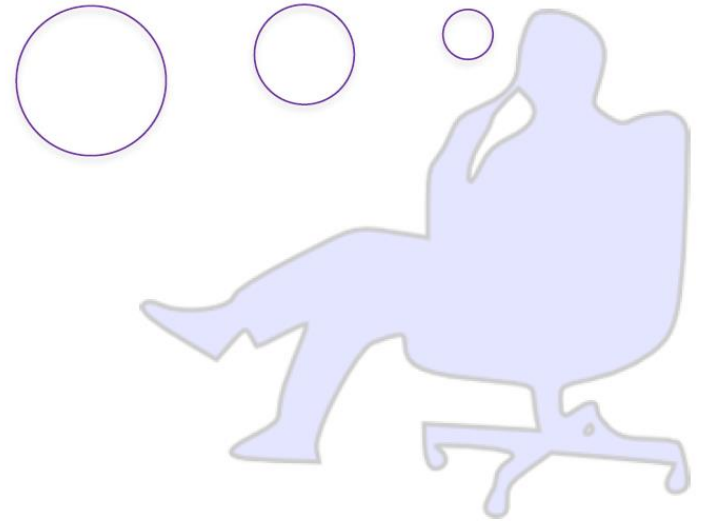
**Fraud and  
risk  
detection**



**Accurate and  
timely threat  
detection**



**Predict and  
act on intent  
to purchase**



Throughput of the cluster is about 300,000 msg/s

- 100 byte messages
  - Max size of 1MB
- Secure connection from public network
- Disk encryption of Kafka log
- Secure connections for all user data

Latency ranges from 20ms to 100ms

- Average ~50ms

# Message Hub is built on Micro Services!

- Message Hub is developed using a continuous delivery process and a microservice architecture
  - It's built out of small pieces that we can enhance rapidly
- Multiple deployment environments with promotion from dev/test towards production
  - We can deploy changes into production as often as required, even several times as day if we had to
- When there's a critical patch for Kafka, we...
  - Build the patch as deploy to dev/test
  - Test it thoroughly
  - Evaluate suitability for promotion to staging...
  - And repeat until the patch reaches production

IBM Messaging Blog Answers Videos

## IBM Message Hub Incubator (Experimental)

The experimental IBM Message Hub Incubator service gives early access to Message Hub features and function as Message Hub – with some limitations – plus new features that are being developed and that are not available in the current Message Hub service.

The first feature that we are trialing is support for the MQ Light API, which is based on the AMQP protocol. This offers a third option. This significant addition to the current Message Hub service means that new or existing applications can use the Message Hub Incubator, in the same way as applications that use the existing Kafka and REST APIs.

- Early access to development function
- Opportunity to provide feedback on features
- Limited performance



**IBM Messaging**  
@IBMmessaging

[Follow](#)

Trial new function ahead of time with the **#MessageHub** incubator. Take a look at this demo of the **#MQLight #API**



**IBM Message Hub Incubator Service with MQ Light API**  
How to use the MQ Light API in the Message Hub Incubator. To try it out, go to the Message Hub Incubator:  
<http://ibm.biz/message-hub-incubator-bluemix-catalog>  
youtube.com

# Agenda

- Hybrid Messaging – What and Why?
- IBM Message Hub
- **Micro Service Architecture**
- Connecting On-Premise to Bluemix:
  - Message Connect
  - Secure Gateway
- Other approaches



# Micro Service Architecture

A supermarket runs an app that allows customers to take advantage of special offers when they are in specific areas of the store



Chris, your developer, decides to make a quick change to the app



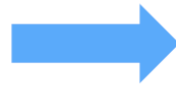
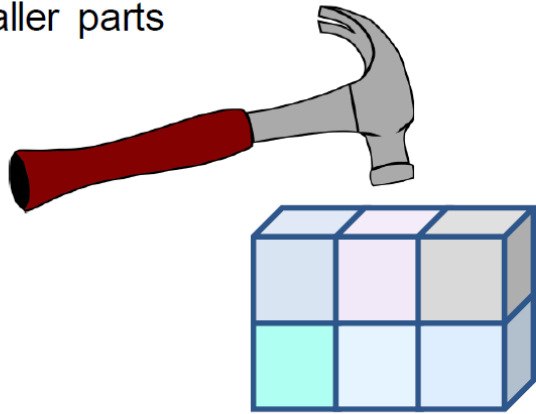
*(Except he has to re-build the entire app, because of the way that it has been built, so it's not so quick...)*

His change introduces an error, and the whole thing crashes

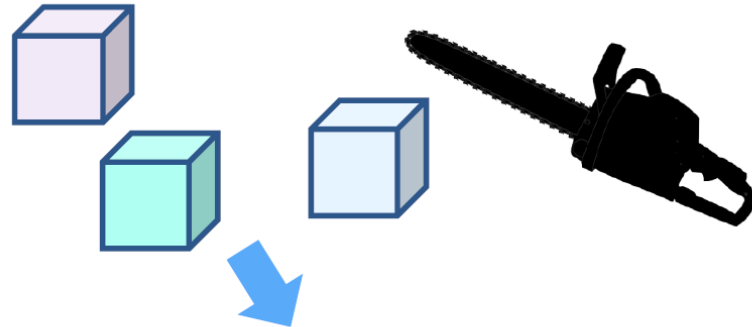


# Micro Service Architecture

Working in a microservices framework means that applications are broken into smaller parts

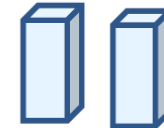
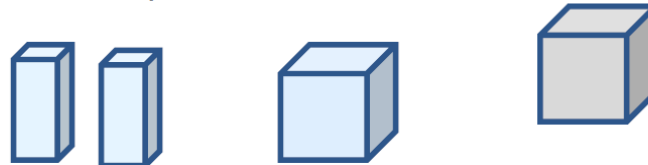


So that changes to individual parts can be quickly made



And because they are independent

One change does not affect the other parts



# Micro Service Architecture

A supermarket runs an app that allows customers to take advantage of special offers when they are in specific areas of the store



Chris, your developer, decides to make a quick change to the app



**IT'S QUICK** because he doesn't have to rebuild the entire app

**QUICK TO FIX** because he doesn't have to rebuild the entire app

OK, his code breaks, but the rest of app is unaffected



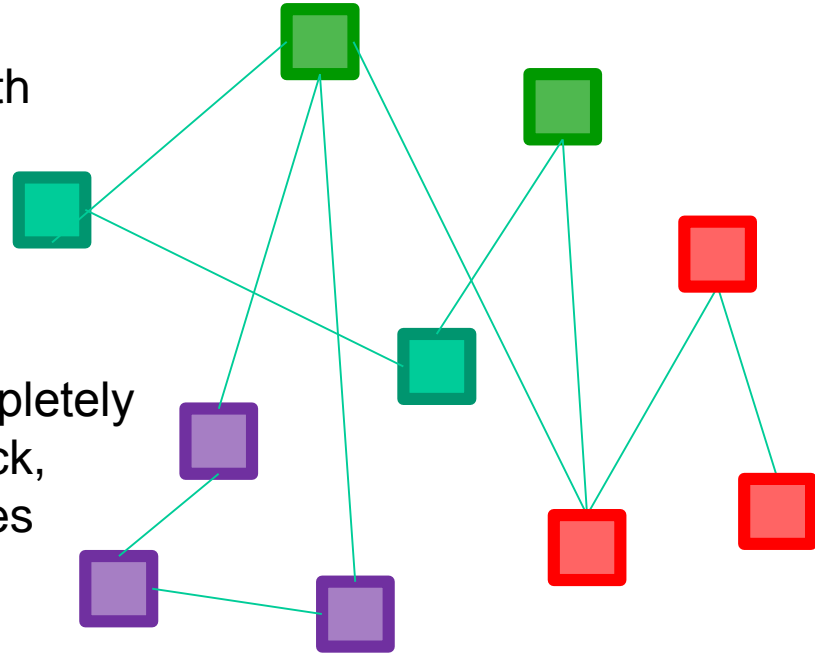
# Trend towards cloud native microservices

## Development teams

Delivering global scale applications with unprecedented agility using a microservices architecture

## Challenges developing microservices :

Agility come from “2 pizza” teams operating completely independently, owning the whole technology stack, deploying on their own schedules, writing services that will scale when demand dictates



## Cloud messaging delivers :

### Self service cloud messaging accessible from any language

Open standards are essential; guaranteeing full stack architects complete freedom

### Reactive scaling

The infrastructure must scale up to any conceivable load

### Application controlled messaging

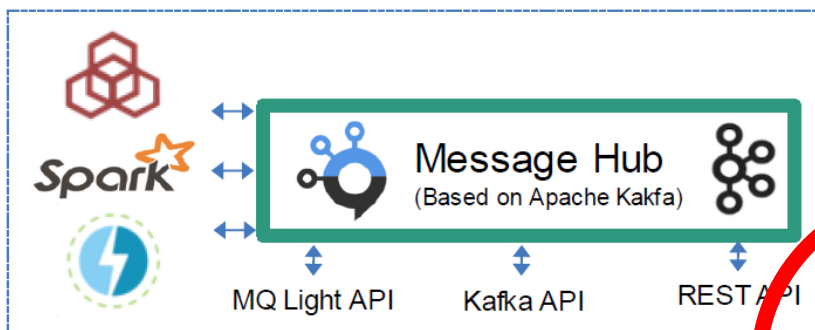
Eradicates coordination of configuration changes alongside with new service versions

# Agenda

- Hybrid Messaging – What and Why?
- IBM Message Hub
- Micro Service Architecture
- **Connecting On-Premise to Bluemix:**
  - **Message Connect**
  - **Secure Gateway**
- Other approaches

# Message Connect

## Bluemix

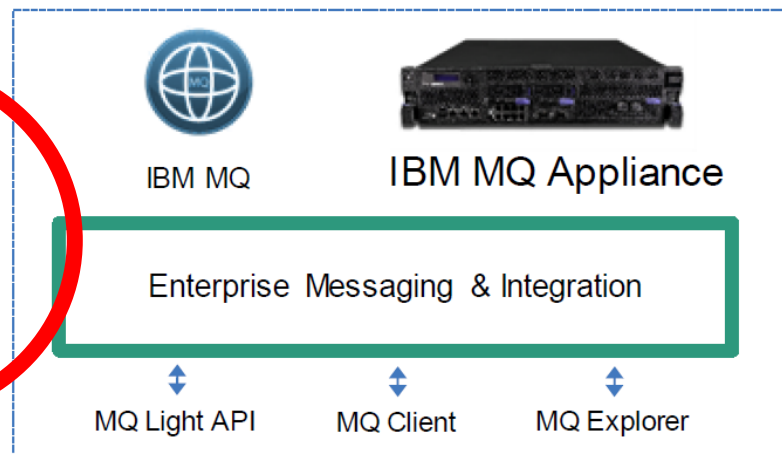


Bluemix Public	<input checked="" type="checkbox"/>
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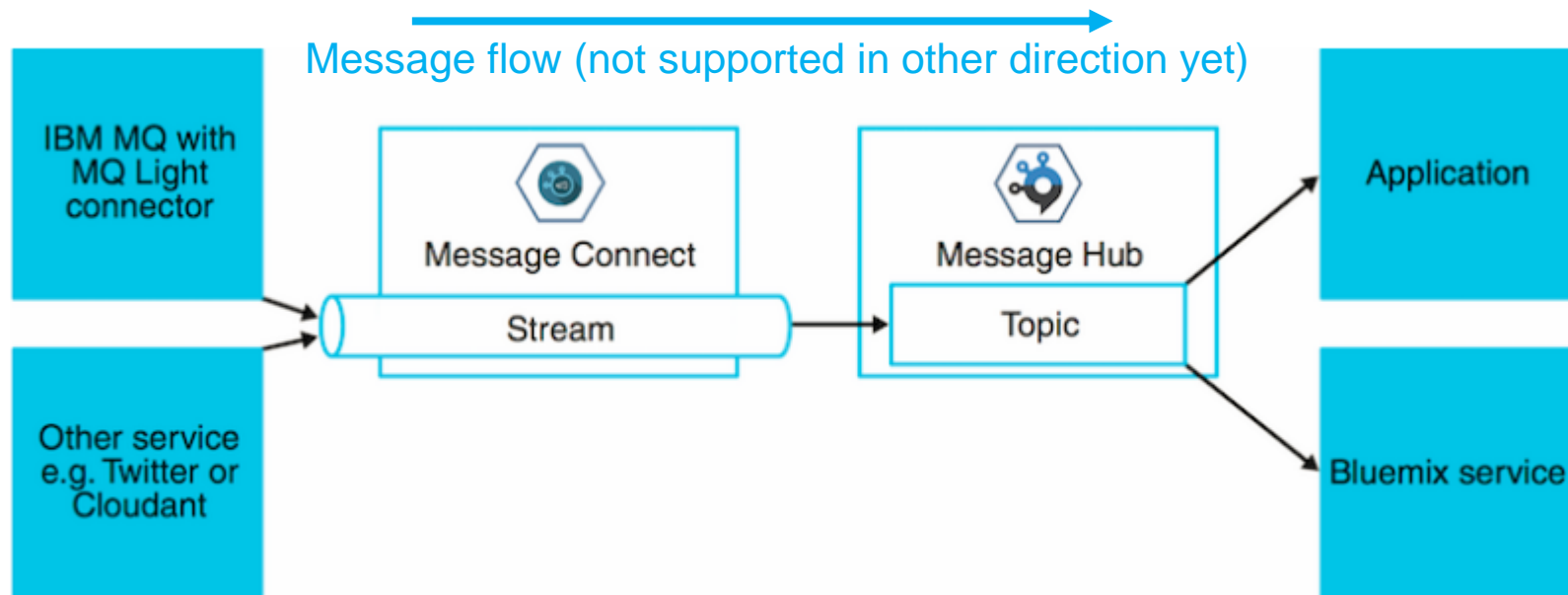
MQ Light API

## On-Premise





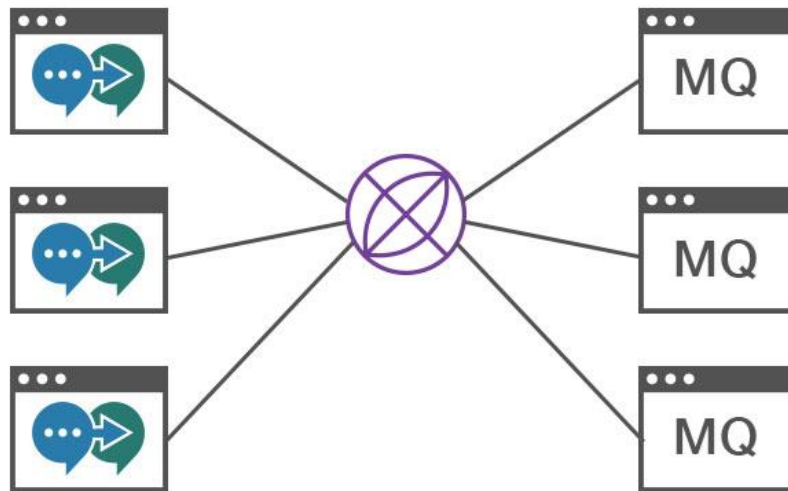
# Message Connect



- Message Connect is intentionally a separate service to Message Hub
- Allows for more rapid development of Message Connect outside of the Message Hub development cycle
- More rapid delivery of new connectors
- Uses its **MQ Light** connector to connect to on-premise MQ via **AMQP channel**

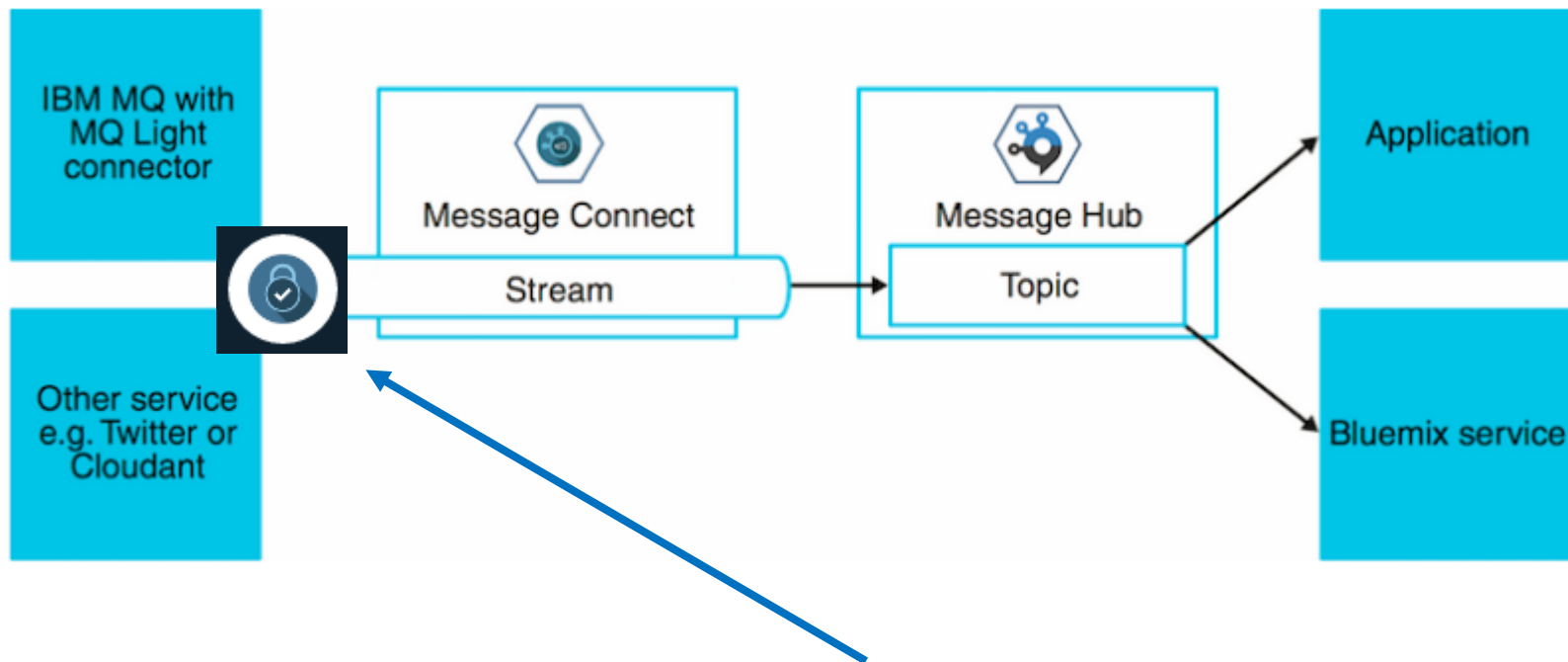
# New AMQP channel used for Message Connect

- Added a channel type of “AMQP” to MQ 8.0.0.4
- Supports a subset of the AMQP 1.0 Oasis specification
- Interoperable with MQ FAP and MQTT applications
- Provides MQ Light support in IBM MQ





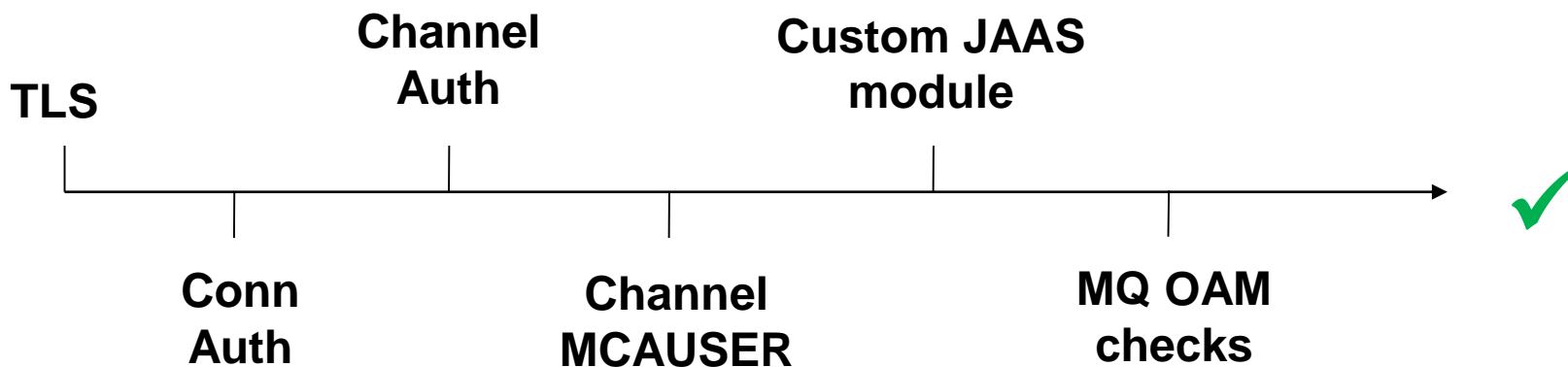
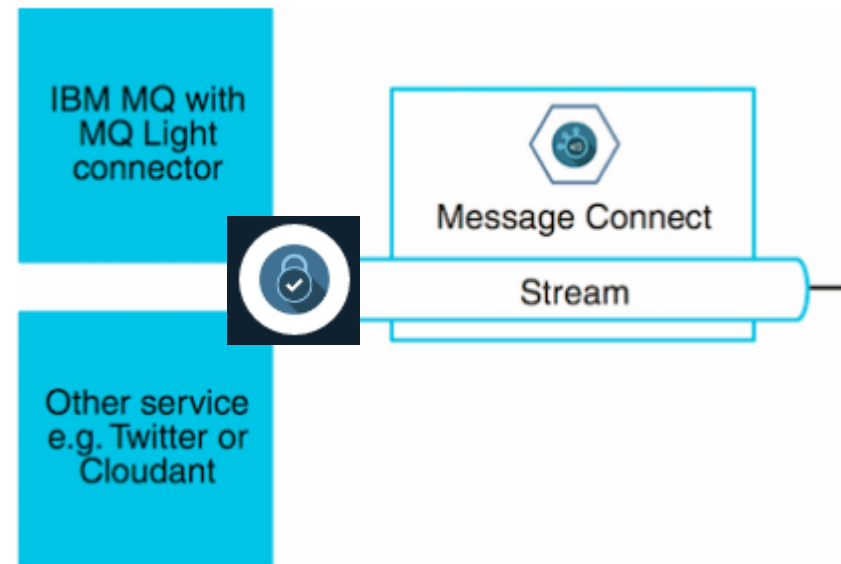
# Message Connect



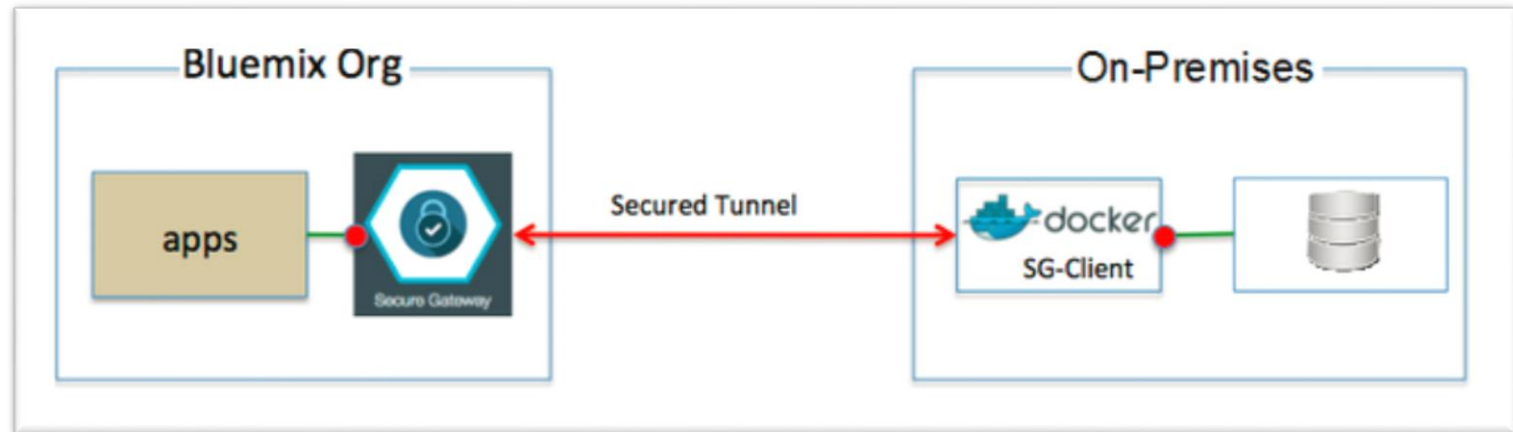
- Connectivity to MQ likely to be via the **Secure Gateway**
- Provides a secure tunnel from Bluemix to On-Premise network
- Avoids opening MQ ports to the internet

# Message Connect Security

- MQ security checks applied to the MessageConnect client
- MessageConnect configured with username and password (check against conn-auth and/or custom JAAS module)
- OAM configuration used to limit access to the MQ topic space

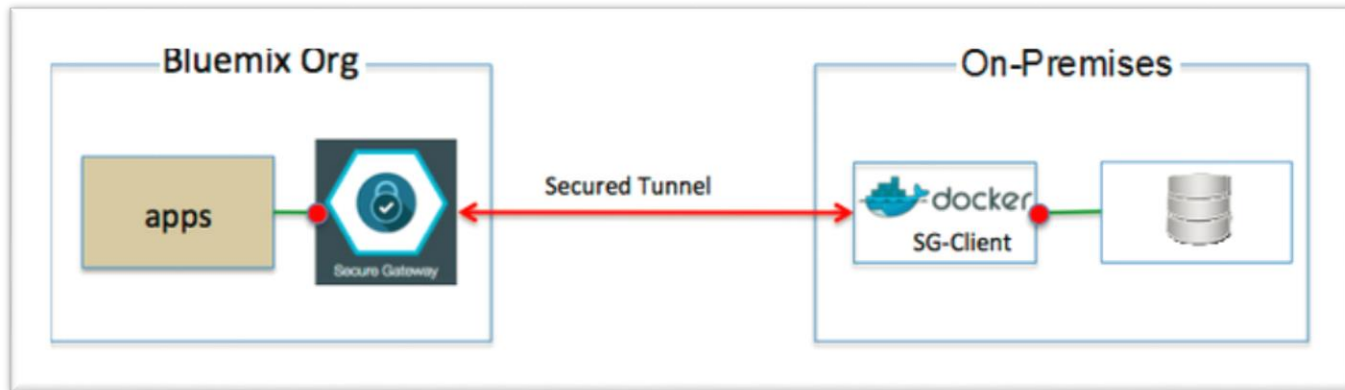


## Connecting the cloud with the enterprise



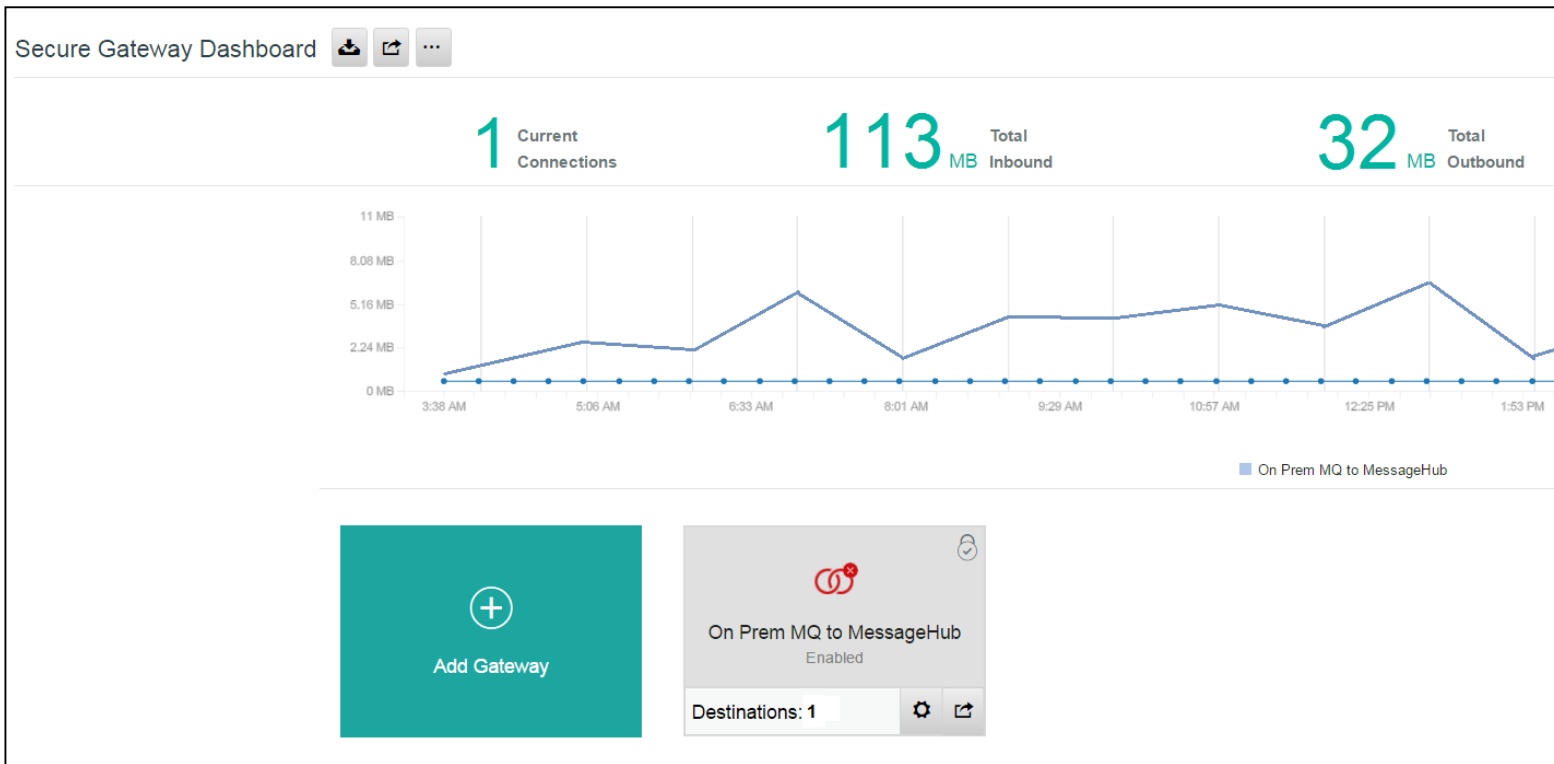
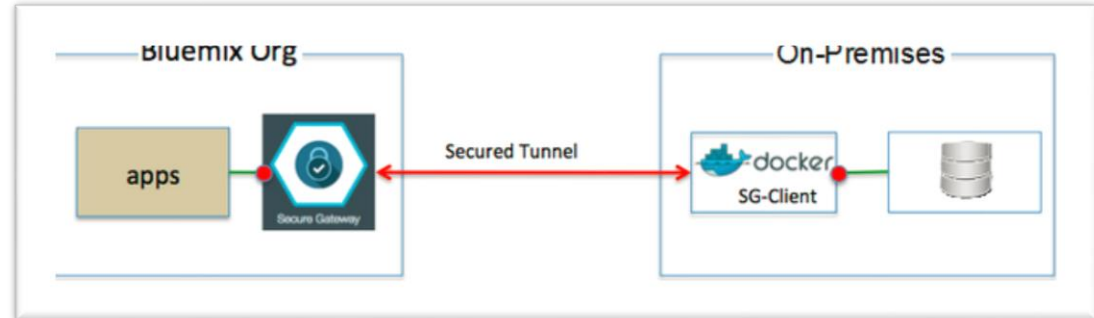
- **Bluemix Secure Gateway** provides a tunnel between Bluemix and your enterprise
- Gives your Bluemix apps an IP and port that routes through to a server in the enterprise

# Secure Gateway



- A Secure Gateway client application must run on-premise to create the initial connection
  - Docker image
  - Native Linux client
  - Native Windows client
  - Native Mac OS client
  - DataPower 7.2 node
- Once connection is established, communication is full duplex

# Secure Gateway



# Secure Gateway On-Premise Destinations

## Add Destination ✕

On-Premises Destination ⓘ  Cloud Destination ⓘ

On Prem MQ Gateway (QM123) 192.168.5.12 1414 TCP ▾

▼Advanced

**TLS options**

Destination Authentication: ⓘ

None  Destination-side  Destination-side MutualAuth

(optional) Click here or drag & drop to upload your server's certificate

If using a self-signed certificate, you must upload it. No more than 6 files may be uploaded at any given time.

\_\_\_\_\_

**User Authentication:**

Mutual auth: Auto-generate certificate and private key ⓘ

Click here or drag & drop a certificate for authentication

**Network security**

Restrict network access to cloud destination ⓘ

IP Addresses	Ports
IP or IP Range	Port or Port Range (+)

Enter an IP address or range of IPs, followed by a single port or range of ports.

**ADD DESTINATION**

[Destination Wizard](#)

# Secure Gateway Destinations

### Add Destination

On-Premises Destination ⓘ  Cloud Destination ⓘ

On Prem MQ Gateway (QM123)   TCP

▼Advanced

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**Network security**

Restrict network access to cloud destination ⓘ

IP Addresses	Ports
<input type="text" value="IP or IP Range"/>	<input type="text" value="Port or Port Range"/>

Enter an IP address or range of IPs, followed by a single port or range of ports.

**ADD DESTINATION**

[Destination Wizard](#)

On-premise host/port go here

# Secure Gateway Destinations

### Add Destination ✕

On-Premises Destination ⓘ  Cloud Destination ⓘ

On Prem MQ Gateway (QM123) 192.168.5.12 1414 TCP ▾

▼Advanced

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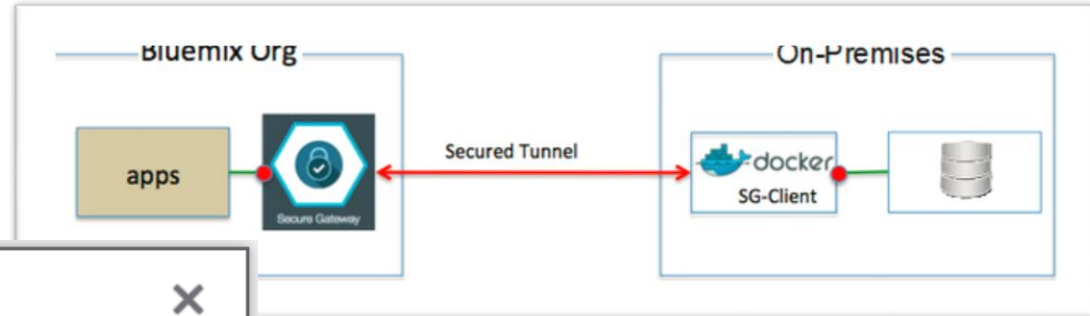
**ADD DESTINATION**

[Destination Wizard](#)

TLS configured here if on-prem endpoint is TLS authenticated



# Secure Gateway



## On Prem MQ Gateway - QM123 details

### Destination ID

ZoCg8kF0nRF\_46D

### Cloud Host : Port

cap-sg-prd-2.integration.ibmcloud.com:15746

### Resource Host : Port

192.168.5.12:1414

### Created by

Matthew Whitehead at 9/22/2016, 3:33:07 PM

### Last modified by

Matthew Whitehead at 9/22/2016, 3:33:07 PM

### Security

Protocol: TCP

EDIT

DISABLE

DELETE

- Once an on-premise destination IP address has been defined, the secure gateway allocates a host name and port
- Your Bluemix application connects to this virtual host name
- The secure gateway routes traffic to the on-premise address 192.168.5.12:1414

# Message Connect Configuration

## Step 1

### Create a new stream

Give your stream a name, then pick a type, and provide any requested additional information.

Stream name

MQ-On-Prem

### Select a connector

Connectors enable pre-built connectivity to other services around the web or on-premises using a Secure Gateway.

#### Twitter

Process a stream of tweets based on search criteria.

#### Force.com

Flow notifications of changes to data in Salesforce.

#### MQ Light

Subscribe to topics from an on-premises MQ Light instance.

- Create a new stream, selecting “MQ Light” as the connector
- Streams scoped to topic string
  - Define streams for every topic you will consume data from

# Message Connect Configuration

## Step 2

Import configuration from Secure Gateway

If you have configured the Secure Gateway to connect securely to remote locations on-premises or in the cloud, you can use your configuration to configure this stream

Gateway

Gateway: On Prem MQ to MessageHub

Destination

Destination: On Prem MQ Gateway - QM123

IMPORT REFRESH

- Import SecureGateway configuration
- Select your pre-configured destination
  - Maps to an on-premise host and port

# Message Connect Configuration

## Step 3

Pre-populated

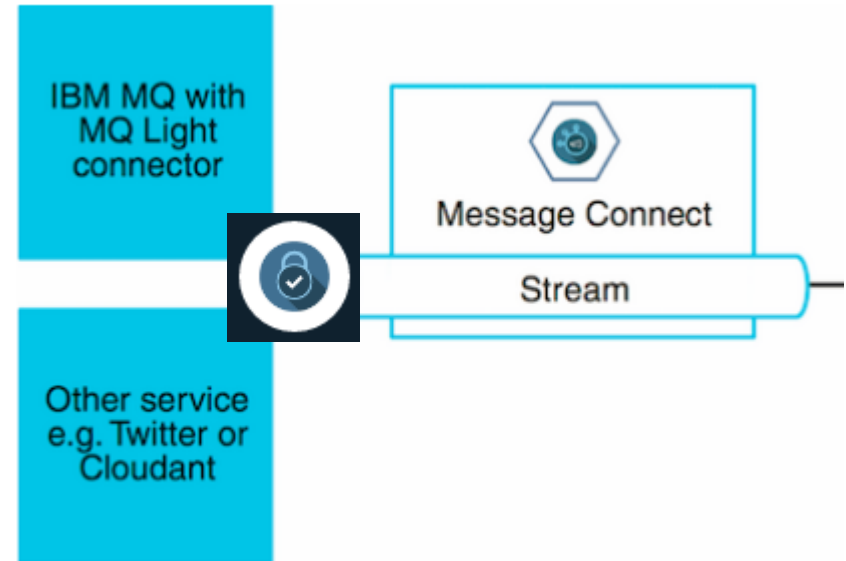
You configure

Additional information  
Please provide some additional information required to configure this stream.

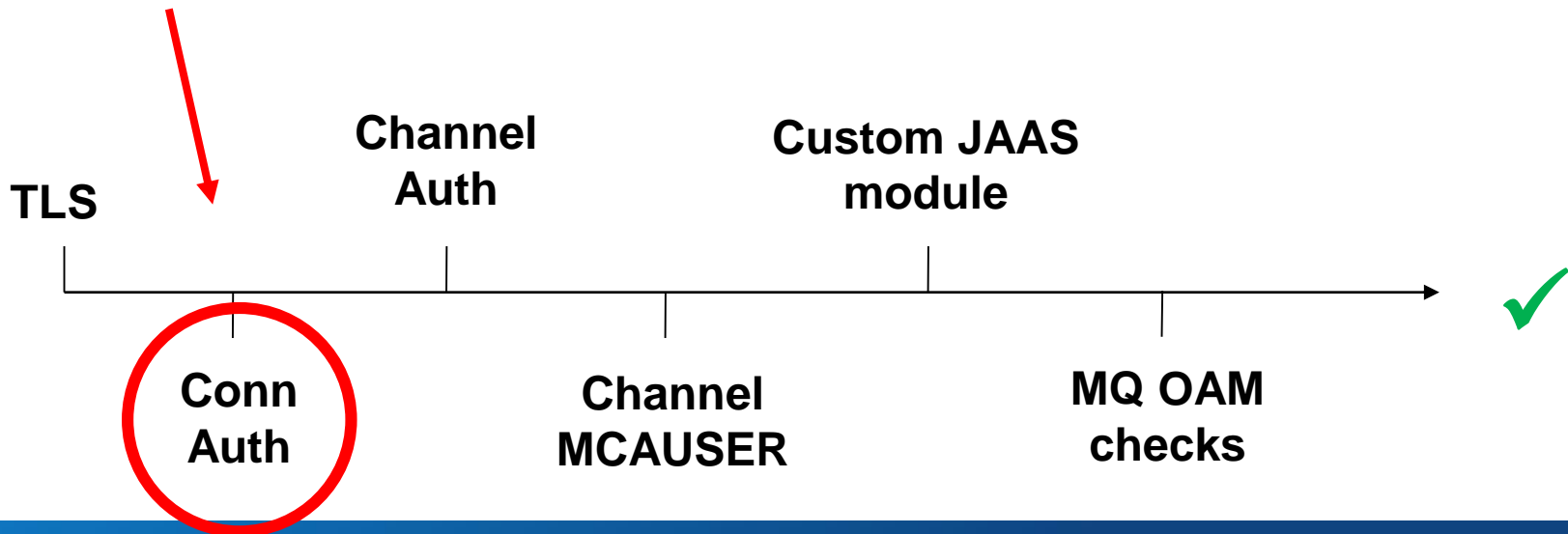
ID	On Prem MQ Gateway - QM123	Username	mwhitehead
Hostname	cap-sg-prd-2.integration.ibmcloud.com	Password	.....
Port #	15746	Topic pattern	website/comments

- Finally add MQ credentials to use and topic pattern to subscribe to

# Message Connect Security



Message Connect credentials checked here

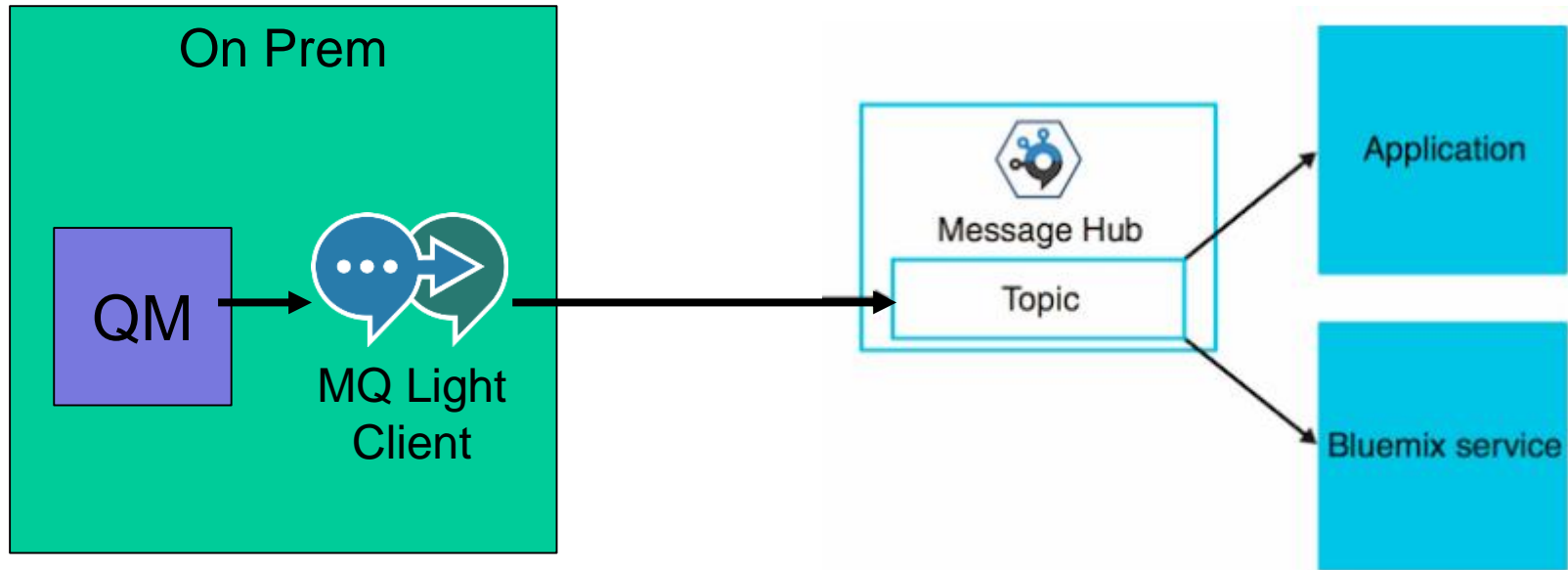


# Agenda

- Hybrid Messaging – What and Why?
- IBM Message Hub
- Micro Service Architecture
- Connecting On-Premise to Bluemix:
  - Message Connect
  - Secure Gateway
- Other approaches

# Other Approaches – MQ Light Client On-Prem

- MQ Light (on-prem) -> MessageHub (Bluemix)



- Manually bridge from an on-premise MQ Light client directly to Message Hub
- SecureGateway still required to form connection into Bluemix

# Other Approaches – MQ in Docker

- MQ 8.0.0.4 supported in Docker containers
- Lots of deployment options
  - Bluemix Containers
  - Bluemix VMs
  - Any cloud-based container service
- Complete MQ environment – usual considerations
  - Administration
  - Monitoring
  - Security
  - Logging
  - Availability



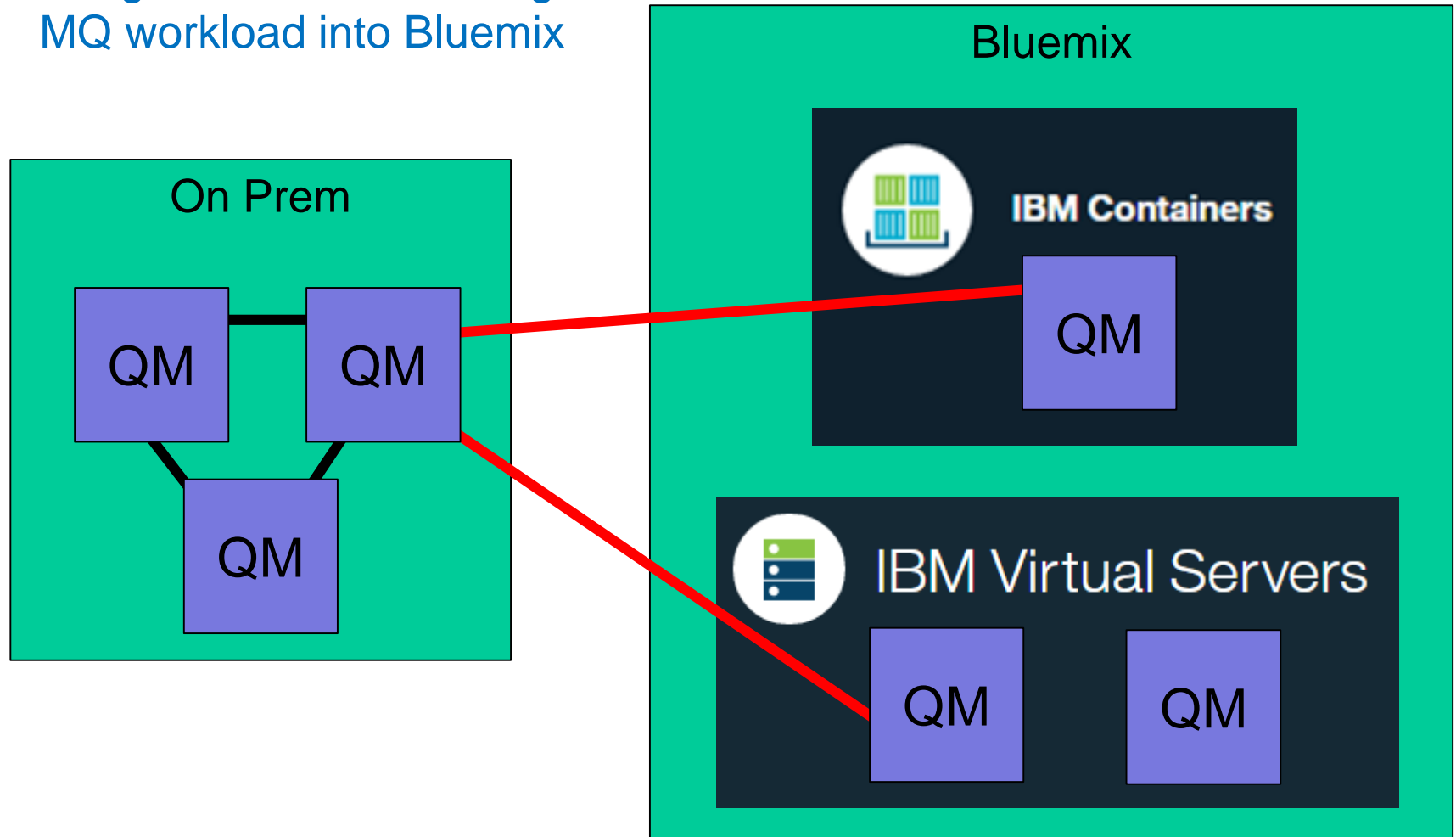
More information:

IBM Messaging in the Cloud  
2.30pm Today



# Other Approaches – MQ to MQ

- Bridge subsets of existing MQ workload into Bluemix



# Thank You - Questions?



Related session:

- IBM Messaging in the Cloud
  - Today 2.30pm (in here)

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