Messaging as a Service | AMQ ONLINE

Designing cloud-based messaging services for business and IoT

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Introduction

Rob Godfrey - Engineering Manager AMQ Online

- Red Hat since January 2017
- Previously Distinguished Engineer at JPMorganChase
- Co-Author AMQP - The Advanced Message Queuing Protocol (ISO/IEC 19464:2014)

Agenda

- Why is messaging important (but hard)?
- What do we mean by MaaS (and how does it help)?
- An Open Source MaaS solution - EnMasse
- The role of the Service Administrator
- Developing an application for AMQ Online
- Messaging and IoT
- Roadmap

The Software

- EnMasse
  - https://enmasse.io
  - https://github.com/EnMasseProject/enmasse
- Hono
  - https://www.eclipse.org/hono/
  - https://github.com/eclipse/hono

THE PROBLEM(S)

Why use Messaging in 2019?

- Scalable distributed applications require communication between processes
- HTTP is not always the best option
- Reactive applications built on asynchronous message passing
- Integrate with existing applications

Setting up Messaging is Hard

- Complicated configuration
  - ⇒ Security (Authn, Authz, TLS)
  - ⇒ HA, Storage
  - ⇒ Inter-broker links...
- Not cloud friendly
  - ⇒ large monolithic processes,
  - ⇒ vertical scaling,
  - ⇒ long startup times
- Sizing is an art
  - ⇒ Users and Engineers rarely speak the same language

What about existing services?

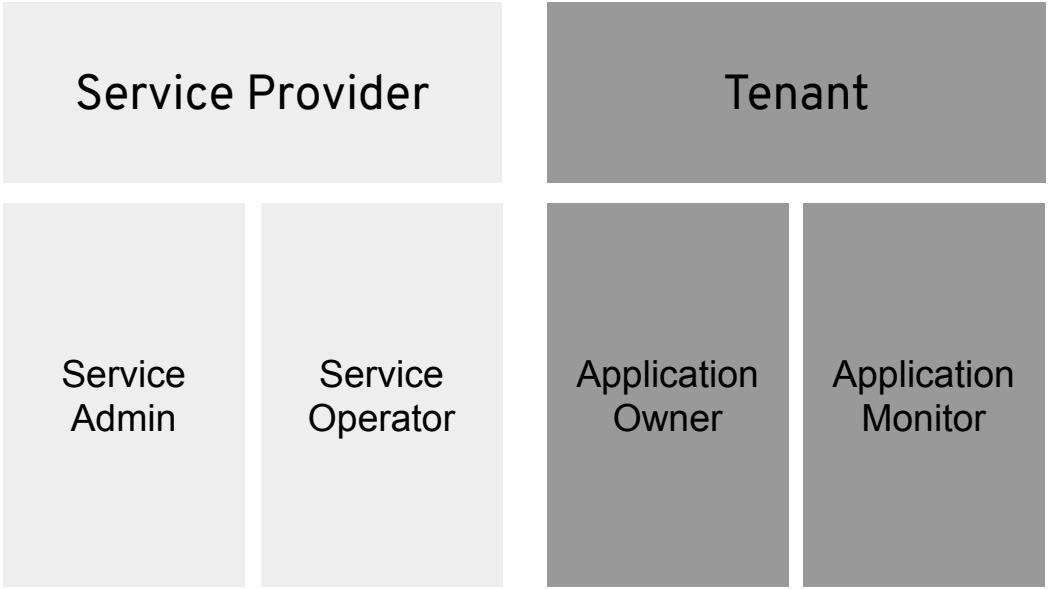
- Tied to your provider
- Not available on-prem
- Proprietary APIs
- Non-standard protocols

MESSAGING AS A SERVICE

Messaging as a Service

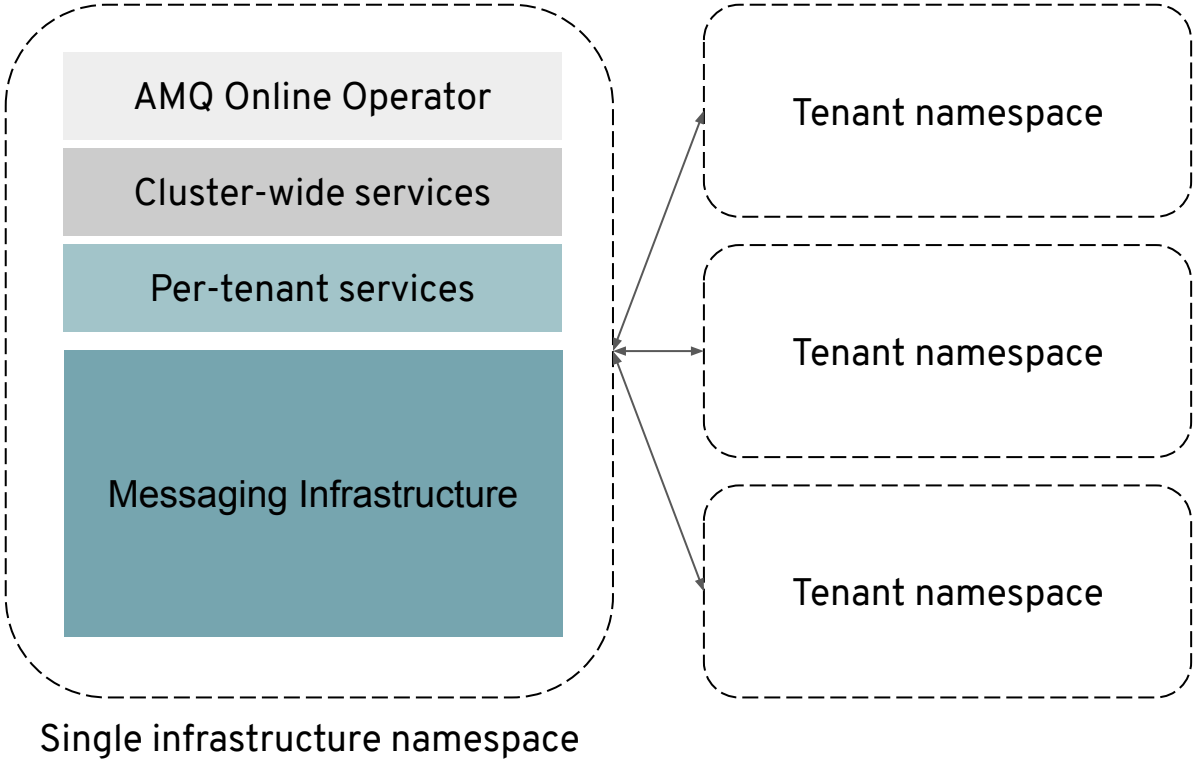
- Messaging as Infrastructure
- Separate the use of Messaging from management of infrastructure
- Create messaging “on demand”
- Rapidly scale from small applications to huge volumes
- Declaratively define application messaging requirements
- Optimise resource usage by sharing infrastructure

User Personas



AMQ ONLINE

AMQ Online Architecture



Messaging as Resources

- Configuration of the service achieved using Custom Resources
  - Define messaging “plans” a tenant can choose from
  - Plans define sizing but also auth scheme, HA requirements, etc
- Tenants define their requirements using Custom Resources
  - An instance of messaging using a particular plan

SETTING UP A MESSAGING SERVICE

Configuring your AMQ Online Service

- AddressSpacePlan
- AddressPlan
- BrokeredInfraConfig
- StandardInfraConfig
- AuthenticationService
- ConsoleService

The AMQ Online Model

Address Space

- A collection of messaging endpoints (such as queues or topics) which can be accessed with the same set of credentials
- The unit of provisioning of AMQ Online

Address

- A messaging endpoint (such as a queue or topic) within an Address Space to which messages can be sent, or messages can be received.

The AMQ Online Model

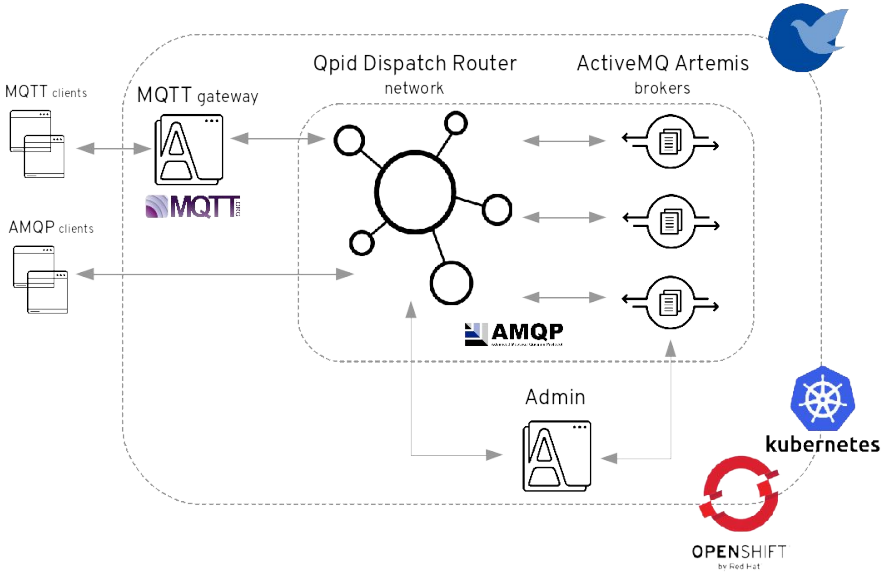
Address Space Types

AMQ Online supports multiple *types* of Address Space.

- Different address space types
  - may support differing types of messaging endpoints
  - may support differing messaging protocols
  - may have different abilities to scale to high workloads
- The type reflects the underlying technology used
- The supported types are currently not user-definable

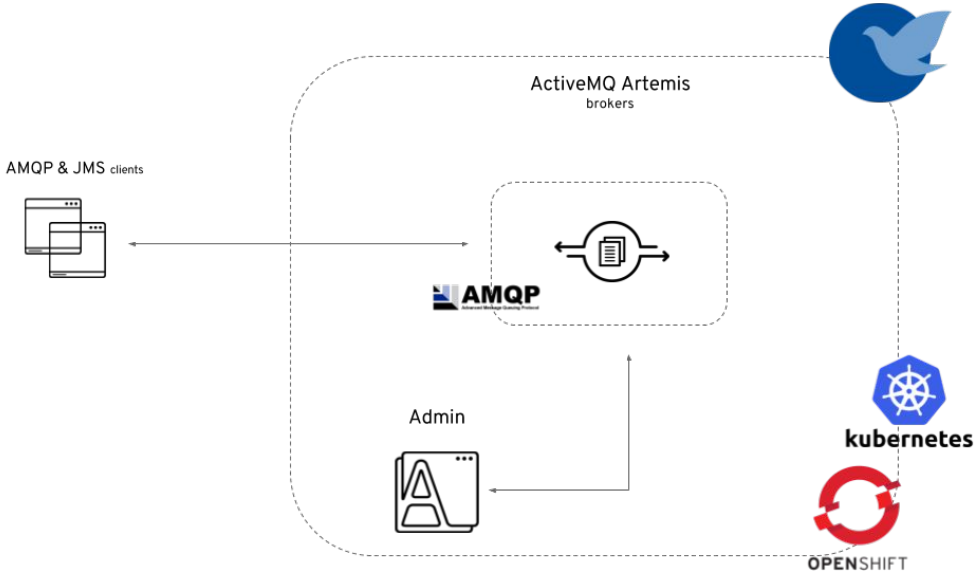
The AMQ Online Model

“Standard” Address Space Type



The AMQ Online Model

“Brokered” Address Space Type



The AMQ Online Model

Address Space Plans

The service admin defines a number of plans for each Address Space type

- A plan defines *how much* messaging you get
- A plan may enable or disable some features

The AMQ Online Model

Address Types

Each Address Space Type supports its own set of Address Types.

- Different address types represent different types of messaging endpoint, e.g. Queue, Topic
- The supported types are not user-definable

The AMQ Online Model

Address Plans

The service admin defines a number of plans for each Address type

- A plan defines *how much* messaging you get in terms of resource usage
- A plan may enable fine grained configuration of the address

The service admin defines which address plans are available in each address *space* plan

Configuring your AMQ Online Service

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AMQ Online Resources

Address Space Plans

- An AMQ Online address space plan resource:

```
apiVersion: admin.enmasse.io/v1beta2
kind: AddressSpacePlan
metadata:
  name: example-plan
  labels:
    app: enmasse
addressSpaceType: standard
infraConfigRef: example-infra
addressPlans:
- example-queue
- example-topic
- example-anycast
resourceLimits:
  router: 2.0
  broker: 2.0
  aggregate: 3.0
```

AMQ Online Resources

Infrastructure Config

- An AMQ Online infrastructure config resource looks like:

```
apiVersion: admin.enmasse.io/v1beta1
kind: StandardInfraConfig
metadata:
  name: example-infra
spec:
  admin:
    resources:
      memory: 256Mi
  broker:
    resources:
      memory: 2Gi
      storage: 100Gi
    addressFullPolicy: PAGE
  router:
    resources:
      memory: 256Mi
    linkCapcity: 1000
    minReplicas: 1
    podTemplate:
      spec:
        affinity: {}
        tolerations: []
  networkPolicy:
    ingress:
      - from:
        - namespaceSelector:
            component: secure-ns
```

AMQ Online Resources

Address Plans

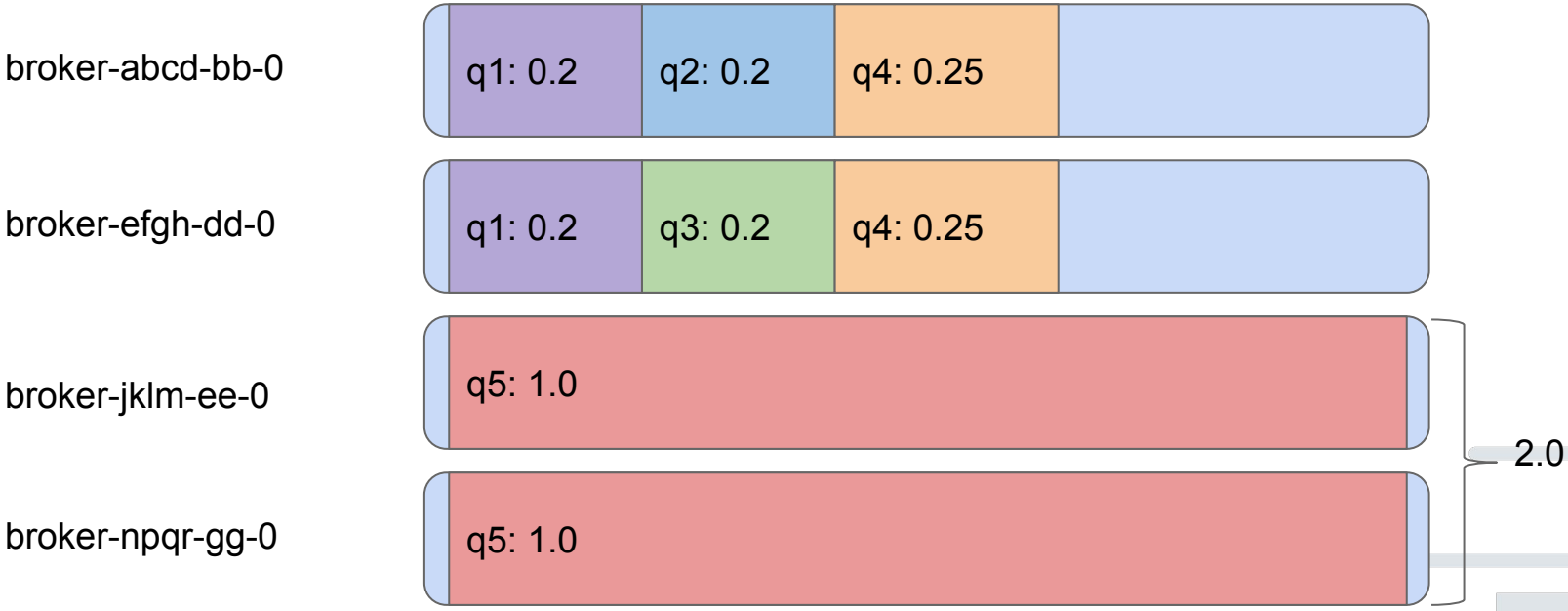
- An AMQ Online address plan resource:

```
apiVersion: admin.enmasse.io/v1beta2
kind: AddressPlan
metadata:
  name: example-queue
  labels:
    app: enmasse
addressType: queue
```

```
addressType: queue
partitions: 1 // Only takes effect on queues!
resources:
  router: 0.2
  broker: 0.3
```

- On creation of the address, the credits are compared to available resources (of broker and router) and new instances are created if necessary

Effect of Address Resource Usages



AMQ Online Resources

Authentication Service

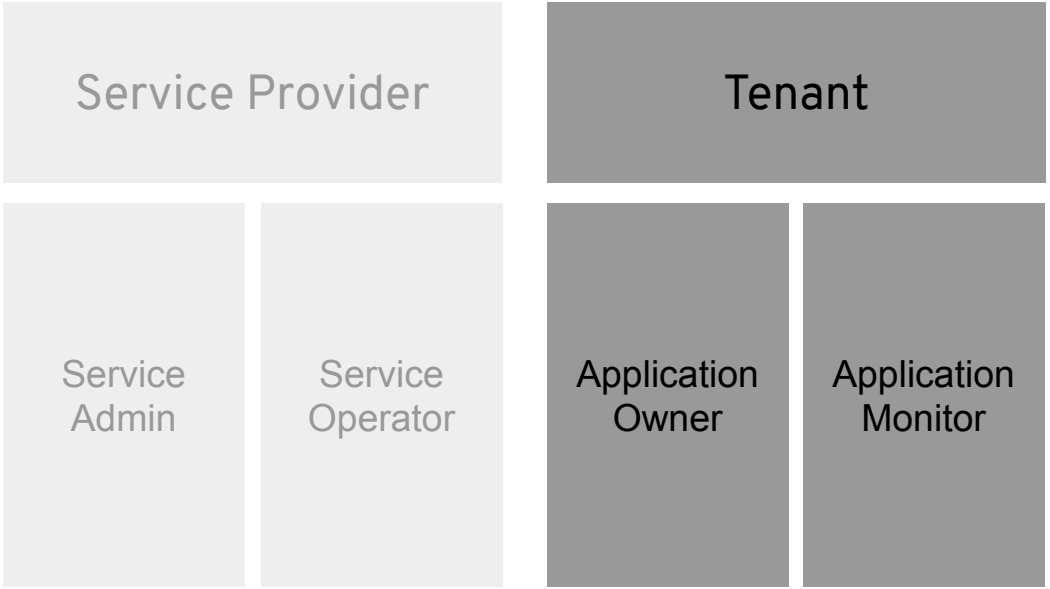
- An AMQ Online ‘standard’ authentication service resource looks like:

```
apiVersion: admin.enmasse.io/v1beta1
kind: AuthenticationService
metadata:
  name: example-authservice
spec:
  type: standard
  standard:
    certificateSecret:
      name: my-authservice-cert
    credentialsSecret:
      name: my-authservice-admin-creds
```

```
    storage:
      type: ephemeral | persistent-claim
      size: 5Gi
      class: glusterfs
    resources: {}
    datasource:
      type: postgresql // default is h2 (embedded)
      host: postgresql.example.com
      port: 5632
      database: authservice-db
      credentialsSecret:
      name: my-db-credentials
```

DEVELOPING AN APPLICATION

User Personas



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The AMQ Online Model

Users

- A `User` represents an identity which has access to an `addressspace`.
- `Users` are granted permissions within the `addressspace` to send/receive messages
- Users can have one of two forms of authentication:
  - `Addressspace` specific username/password
  - an OpenShift service account token

Defining Your Messaging Needs

- AddressSpace
- Address
- MessagingUser

AMQ Online Resources

Address Space

- An AMQ Online address space:

```
apiVersion: enmasse.io/v1beta1
kind: AddressSpace
metadata:
  name: myspace
spec:
  type: brokered
  plan: brokered-single-broker
  authenticationService:
    Name: standard-authsvc
  endpoints:
    - name: messaging
      service: messaging
      exports:
      - kind: ConfigMap
        name: messaging-config
      cert:
        provider: openshift
```

AMQ Online Resources

Address

- An AMQ Online address space:

```
apiVersion: enmasse.io/v1beta1
kind: Address
metadata:
  name: myspace.myqueue
spec:
  address: myqueue
  type: queue
  plan: brokered-queue
```

AMQ Online Resources

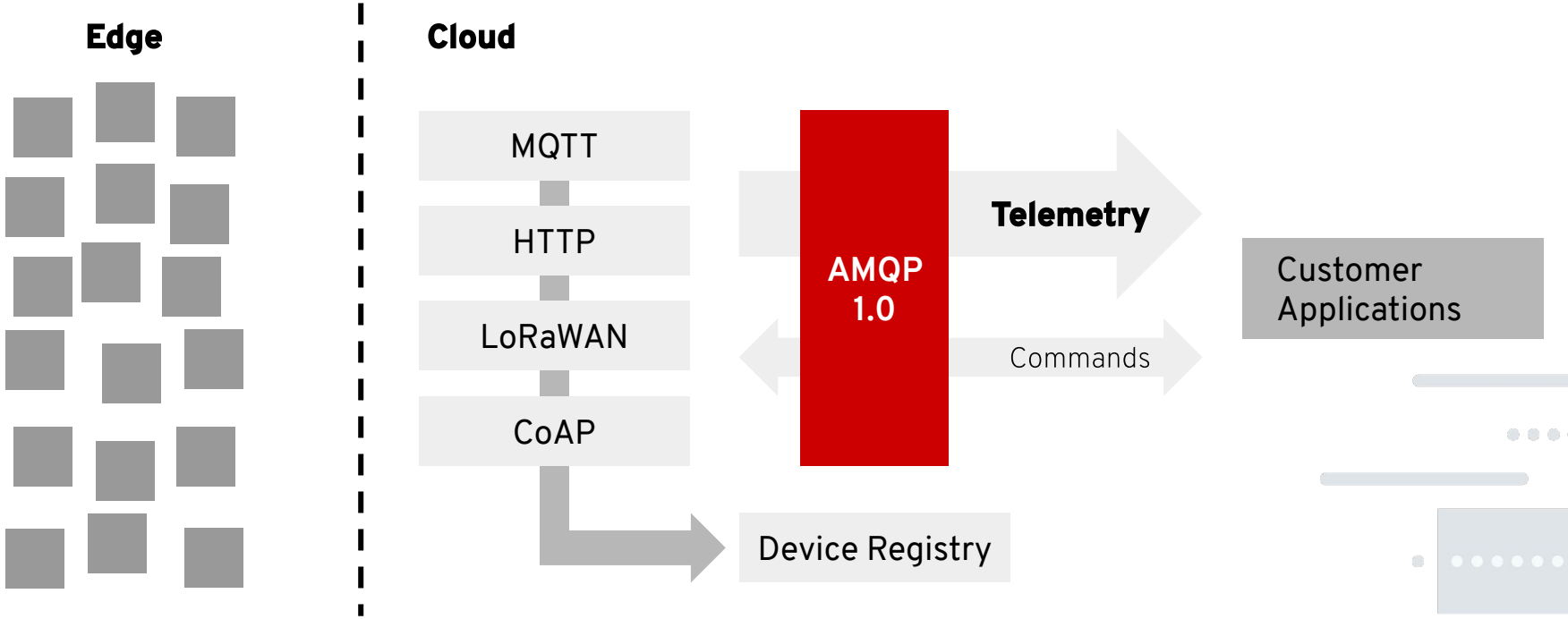
User

- An AMQ Online user:

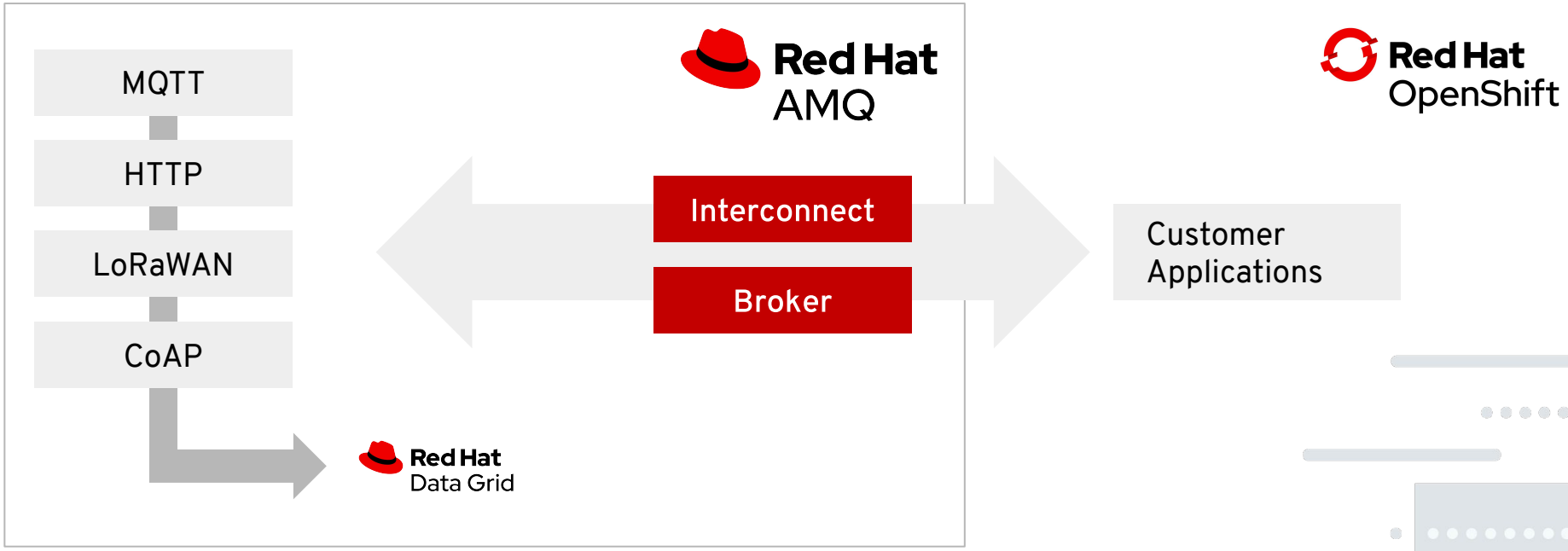
```
apiVersion: enmasse.io/v1beta1
kind: MessagingUser
metadata:
    name: myspace.user2
spec:
    username: system:serviceaccount:myapp:sa1
    authentication:
      type: serviceaccount
    authorization:
      - operations: [“send”, “recv”],
        addresses: [“myqueue”]
```

MESSAGING AND IoT

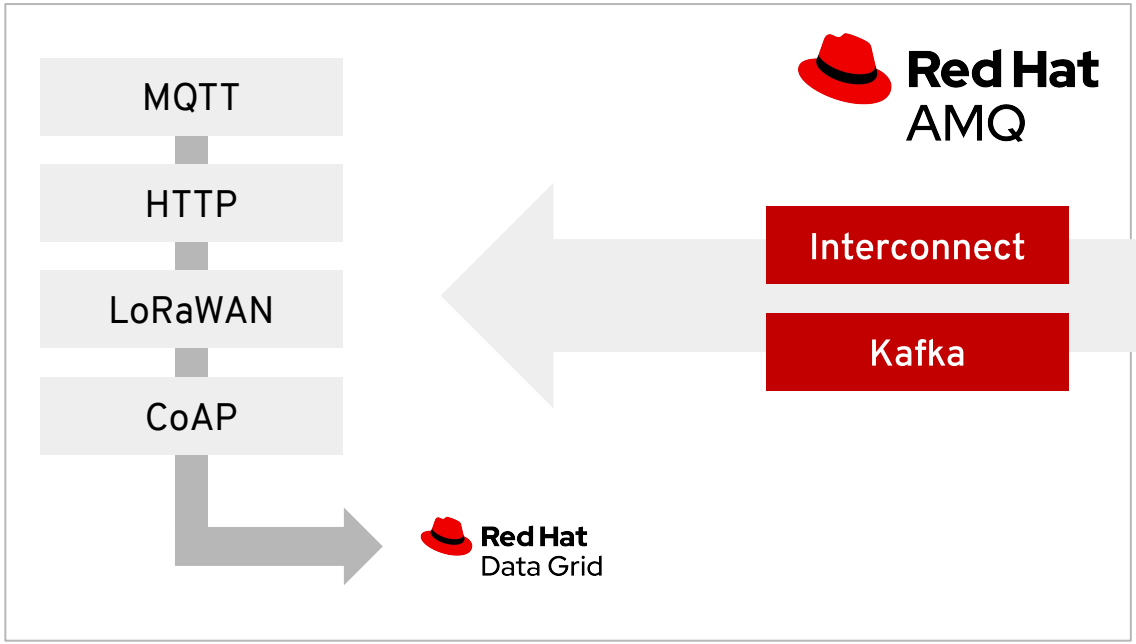
WHAT IS ECLIPSE HONO™?



AMQ ONLINE & IoT



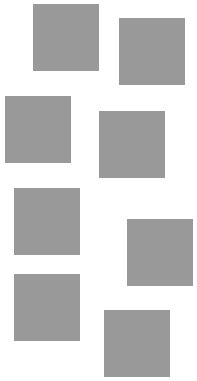
AMQ ONLINE & IoT



Red Hat OpenShift

Customer Applications

INTEGRATION



MQTT

HTTP

LoRaWAN

CoAP

Red Hat AMQ

Broker

Interconnect

Streams

Red Hat Integration

Customer Applications

3scale

FUSE

Decision Manager

Custom Code

EVOLVING AMQ ONLINE

COMING SOON(ISH)

- Managed AMQ Streams / Kafka topics
- Shared Infrastructure for improved density
- Bridging between addressspaces - wide area messaging
- Improved Auto-scaling
- Cross-cluster messaging / Cloud-bursting
- IoT integration
  - ⇨ Kafka integration
  - ⇨ Bring your own adapters
- Tooling for Service Admins

RED HAT SUMMIT

THANK YOU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