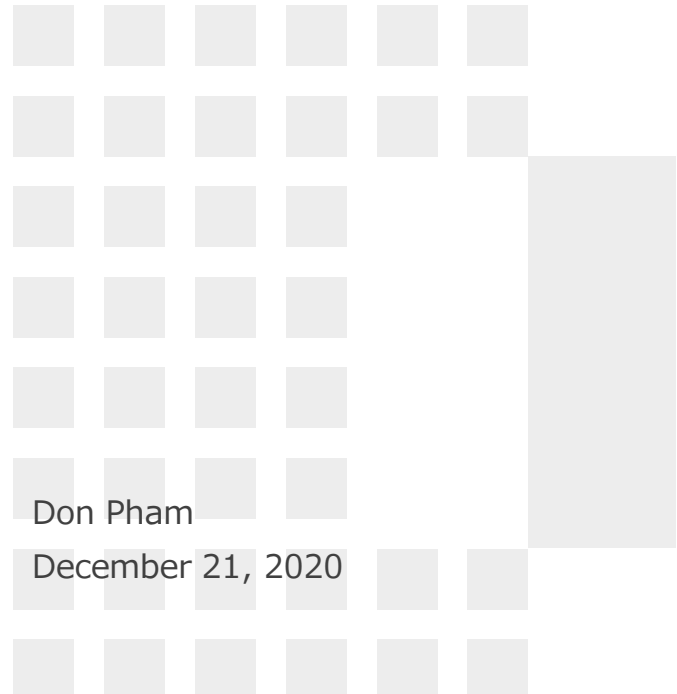# MQTT Intro

Don Pham
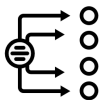December 21, 2020

What is MQTT?

IDEC

MQTT protocol is an extremely lightweight and efficient **publish/subscribe** messaging transport that is ideal for connecting industrial devices to the cloud

Requires minimal network bandwidth

MQTT allows for messaging between device to cloud and cloud to device
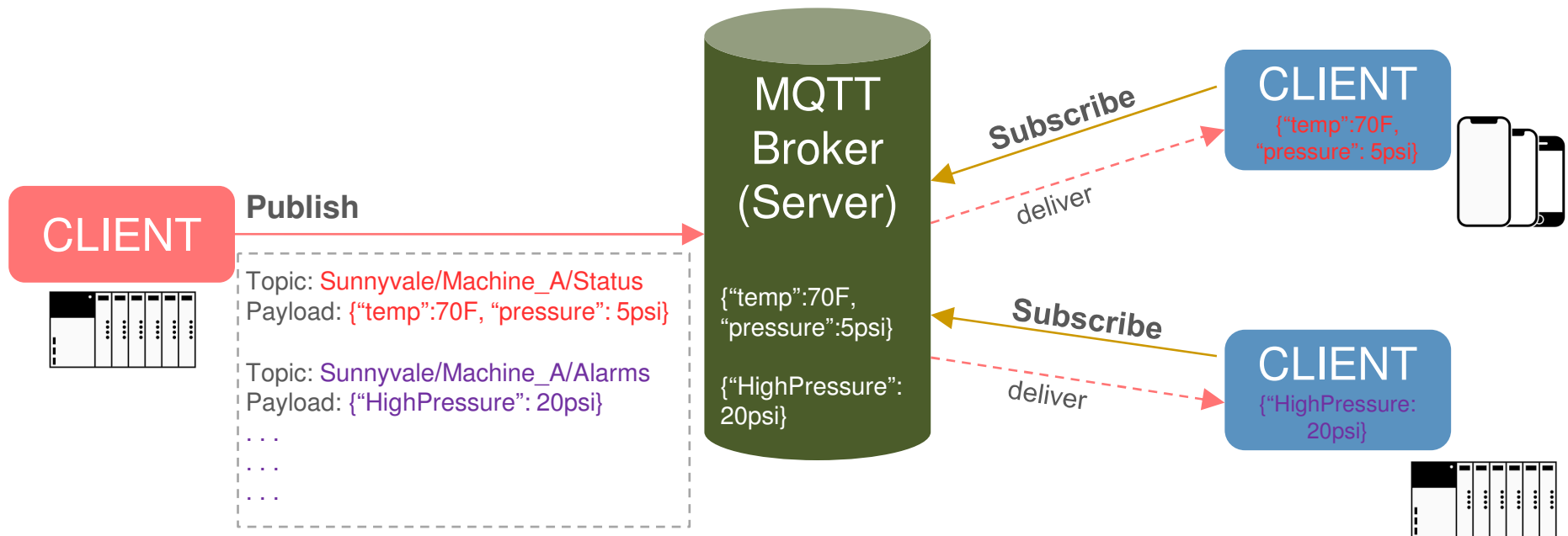
Easy broadcasting messages to groups of things

Very secured (messages encrypted)

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MQTT Communications

■ Publish, Subscribe, and Broker

Publish

Topic: Sunnyvale/Machine_A/Status
Payload: {"temp":70F, "pressure": 5psi}

Topic: Sunnyvale/Machine_A/Alarms
Payload: {"HighPressure": 20psi}
. . .
. . .
. . .

MQTT Broker (Server)

{"temp":70F, "pressure":5psi}

{"HighPressure": 20psi}

Subscribe

deliver

CLIENT
{"temp":70F, "pressure": 5psi}

Subscribe

deliver

CLIENT
{"HighPressure: 20psi}

A client can be

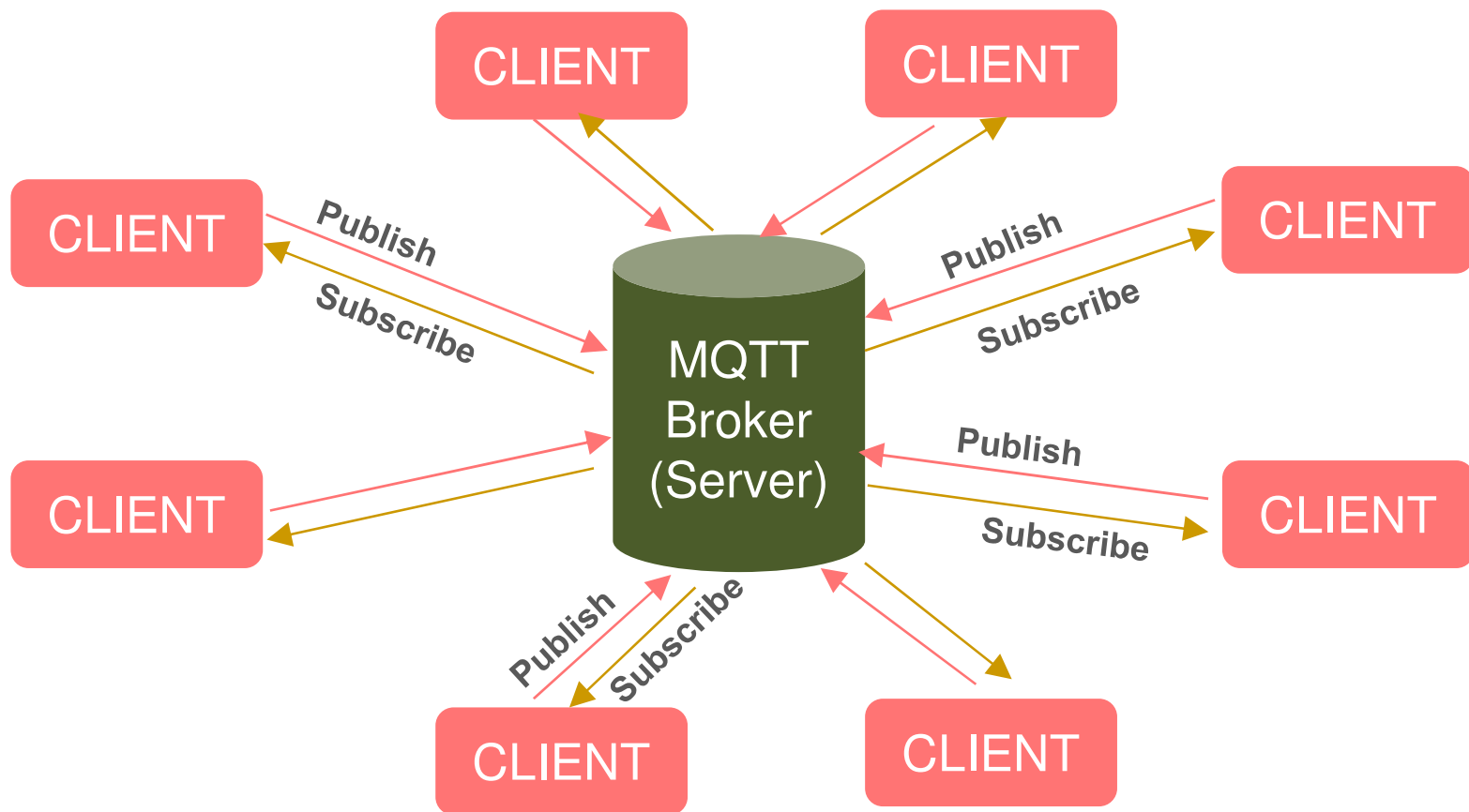**CONFIDENTIAL**

MQTT Communications
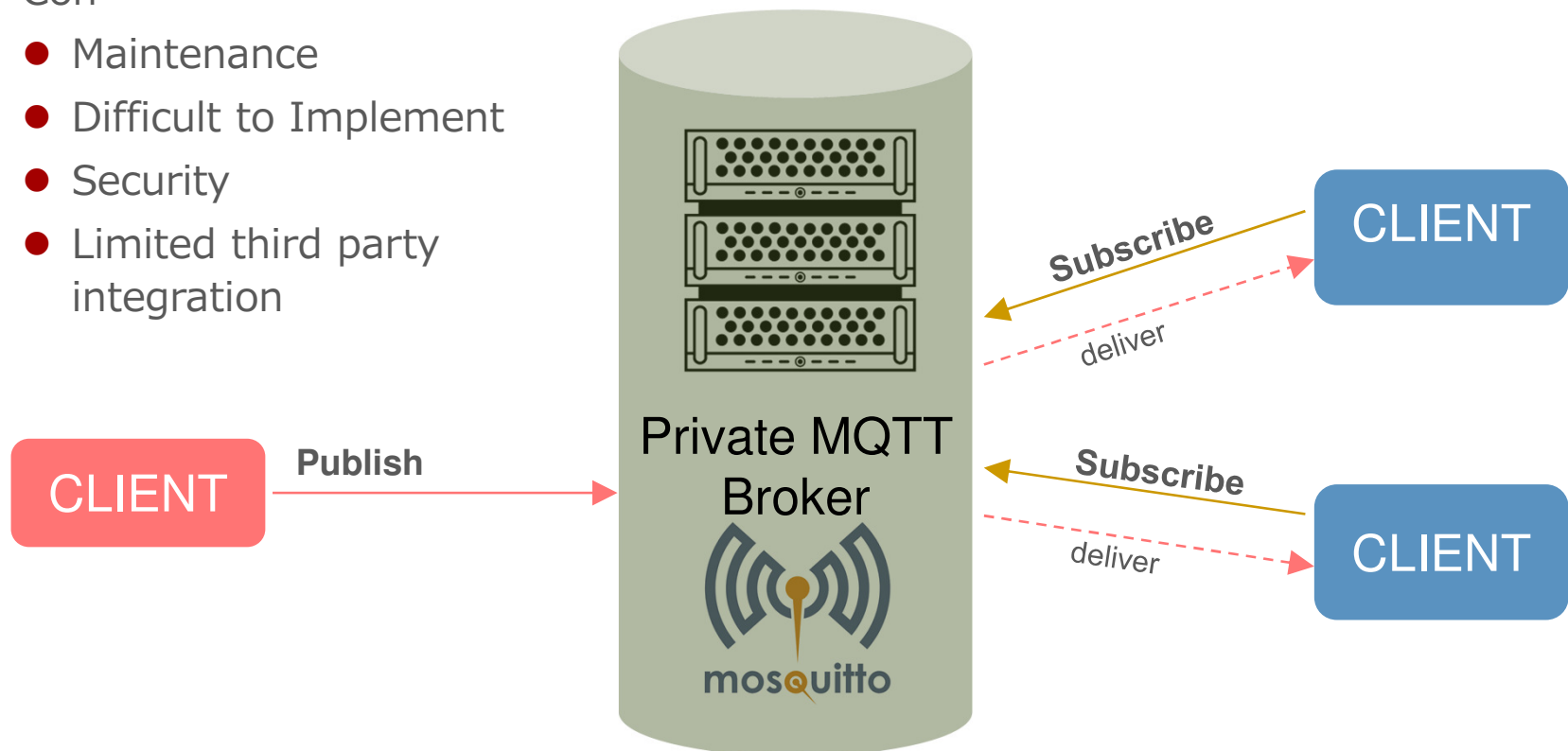
- Multiple clients (No limitation)
- A client can Publish and Subscribe simultaneously (Bi-directional)

Private (Local)

- Pro
  - No subscription fees
- Con
  - Maintenance
  - Difficult to Implement
  - Security
  - Limited third party integration

MQTT Broker

■ **Public (Cloud)**

– Pro
- Maintenance free
- Low cost
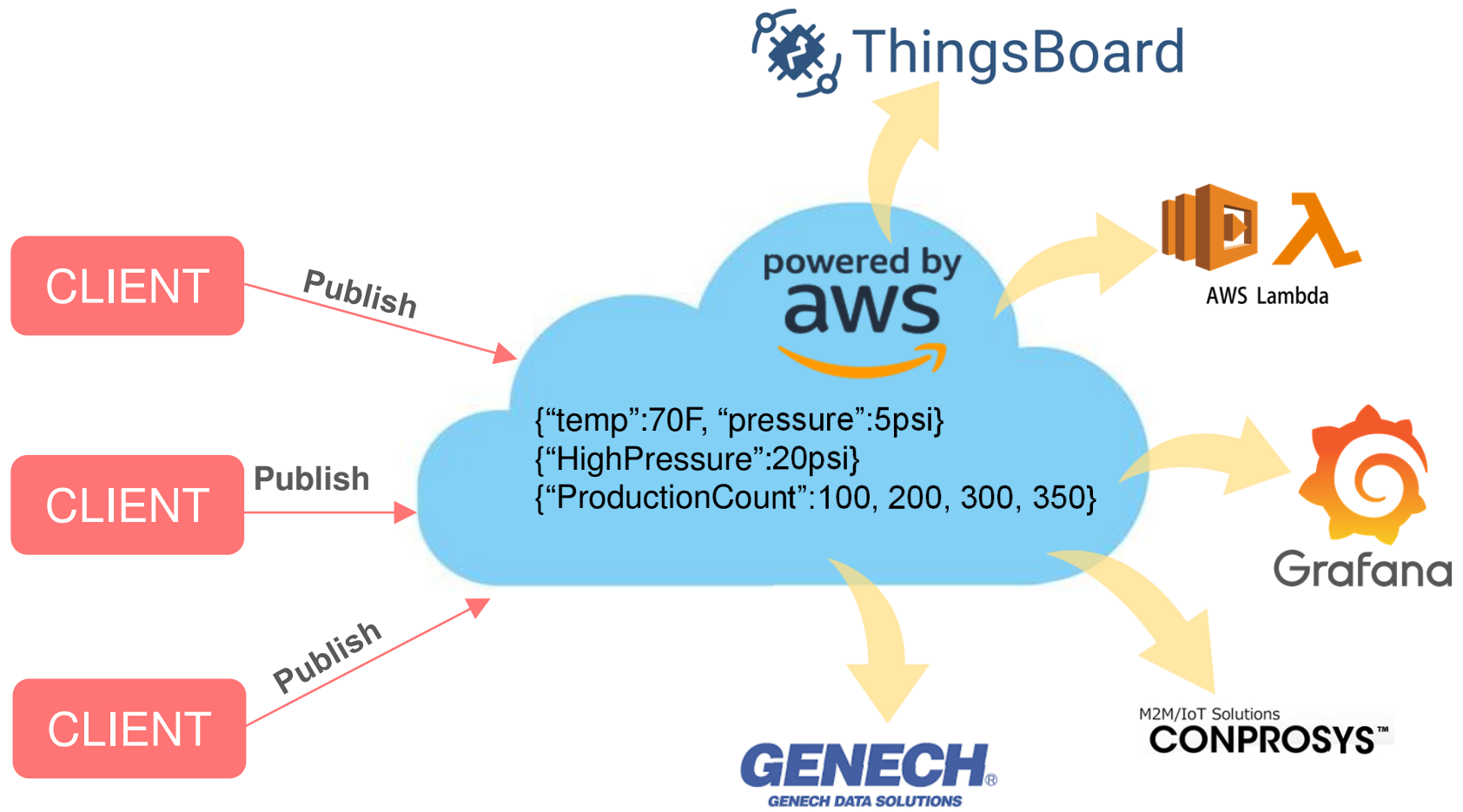- Easy to deploy
- Secured
- Third party integration widely available
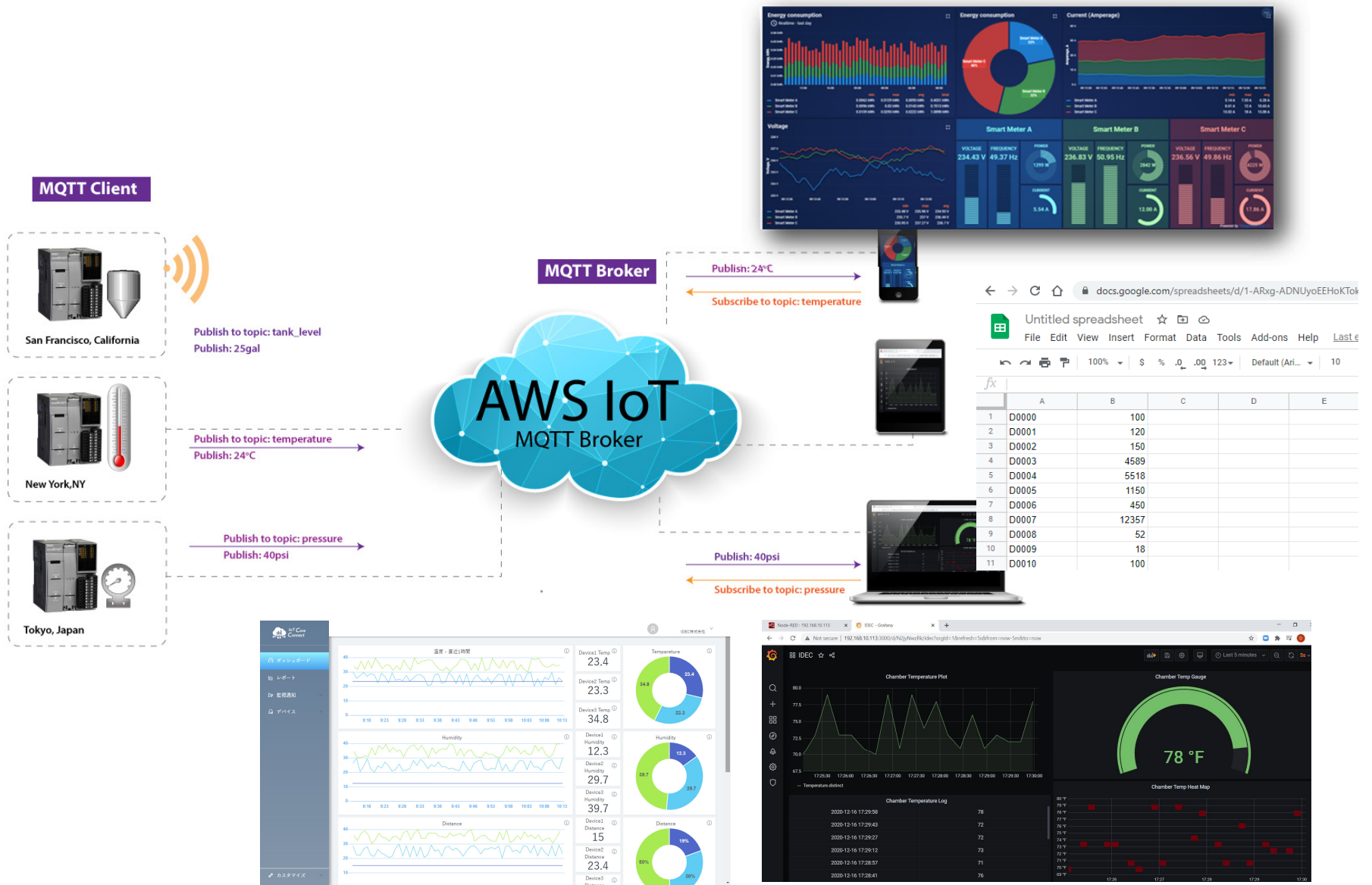
– Con
- Subscription fees (minimal)

Our Focus

Data in the Cloud

- How to utilize raw data in the cloud

8

Data in the Cloud

- **Industrial Internet of Things (IIoT) Protocol**
  - Data is king

  - Analytic

  - Predictive Maintenance

  - Controls at your fingertip
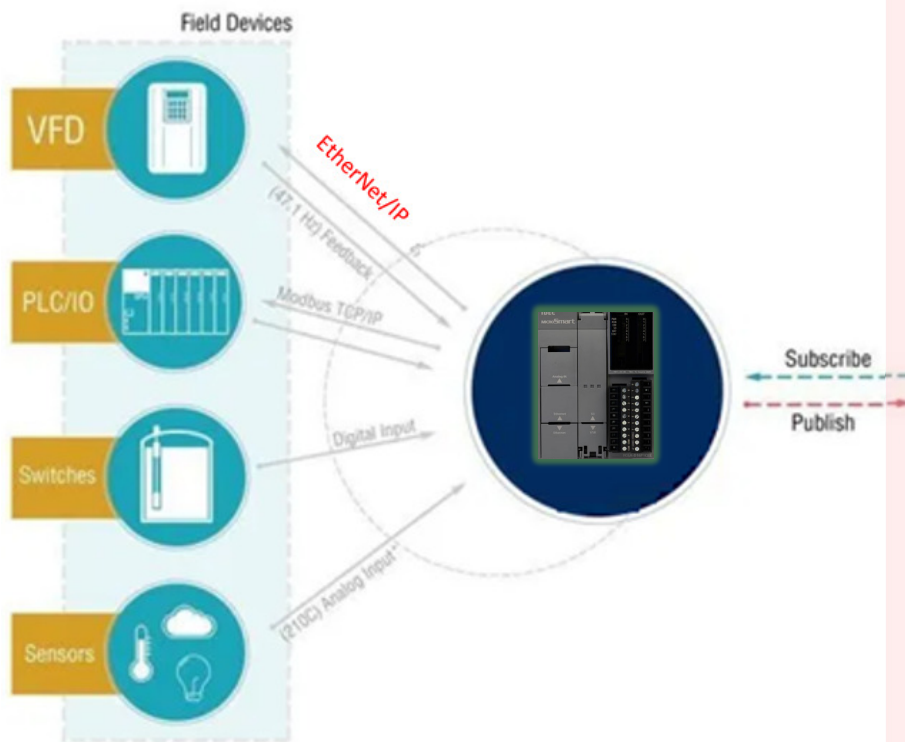
  - Visualization

  - Alarms and Notifications

  - Endless Possibilities
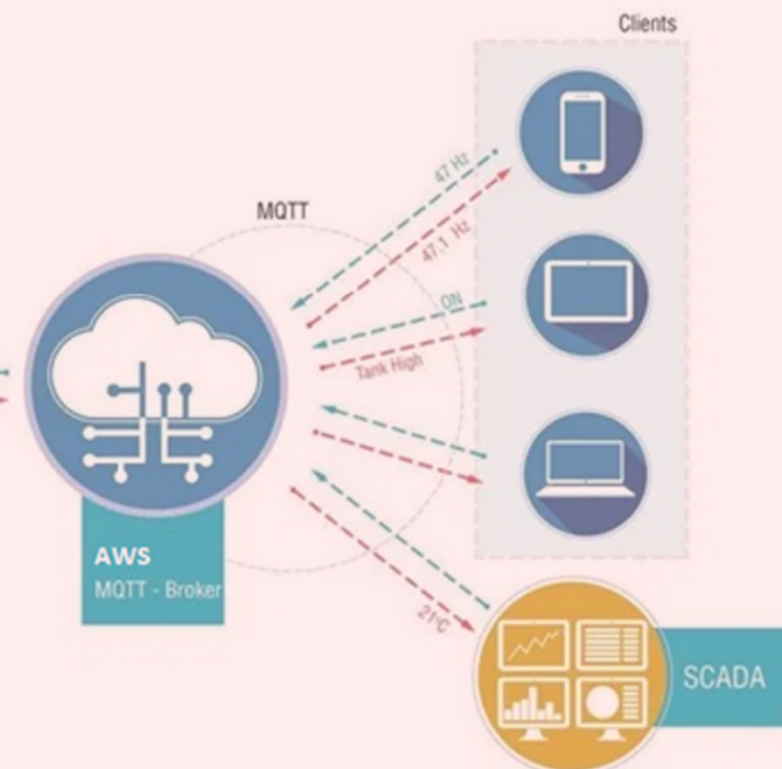   - Third party tools/applications and mobile App

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MQTT vs Industrial Protocols

IDEC

Industrial Protocols
Modbus TCP   CAN J1939
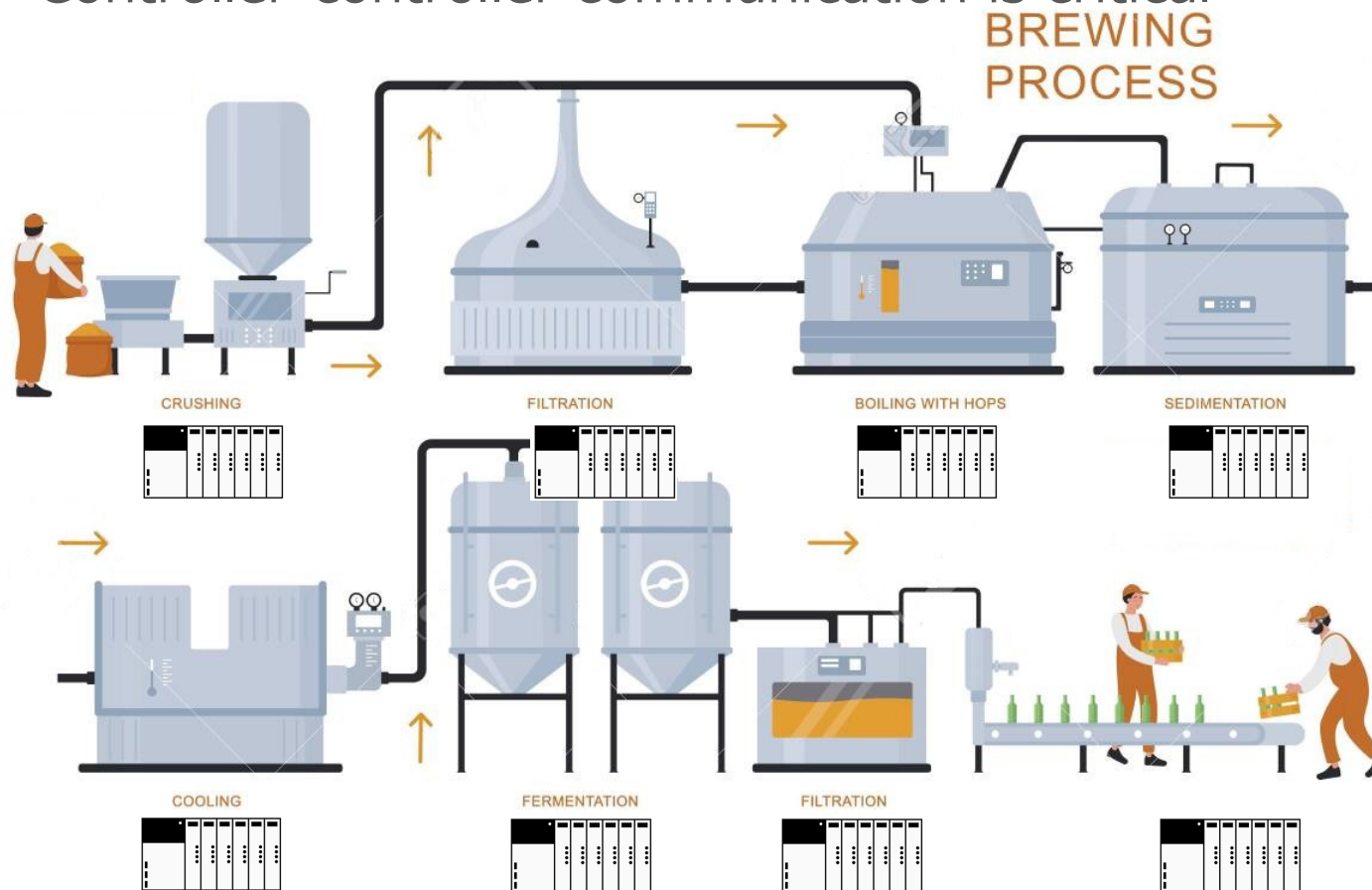EtherNet/IP   BACnet/IP

IIoT Protocol
MQTT

IDEC

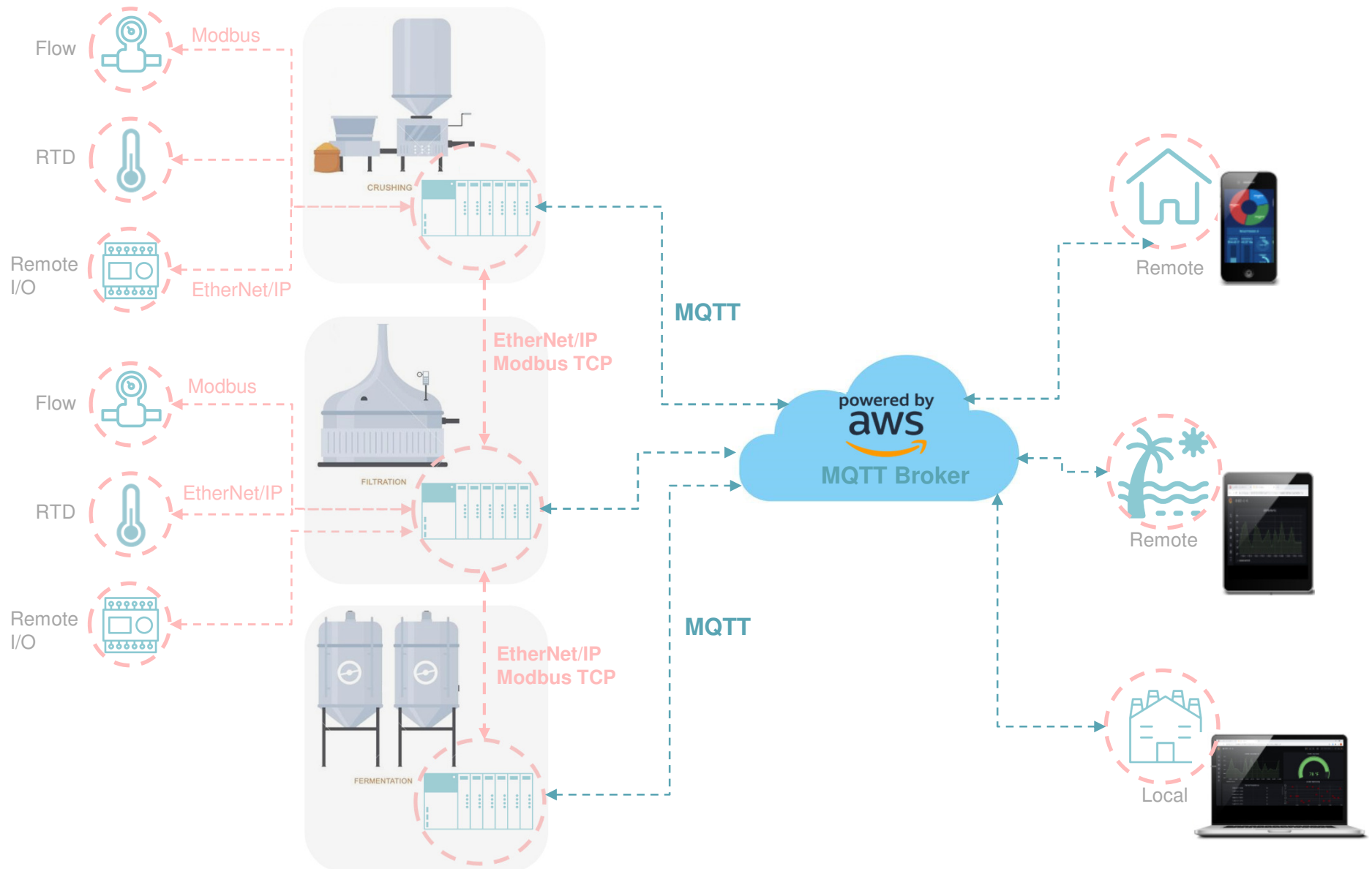## ■ Micro Brewery – single location

- – Separate controllers for each process
- – Controller-controller communication is critical

BREWING PROCESS

CRUSHING · FILTRATION · BOILING WITH HOPS · SEDIMENTATION

COOLING · FERMENTATION · FILTRATION

Flow — Modbus

RTD

Remote I/O — EtherNet/IP

CRUSHING

EtherNet/IP
Modbus TCP

Flow — Modbus

RTD — EtherNet/IP

FILTRATION

Remote I/O

EtherNet/IP
Modbus TCP

FERMENTATION

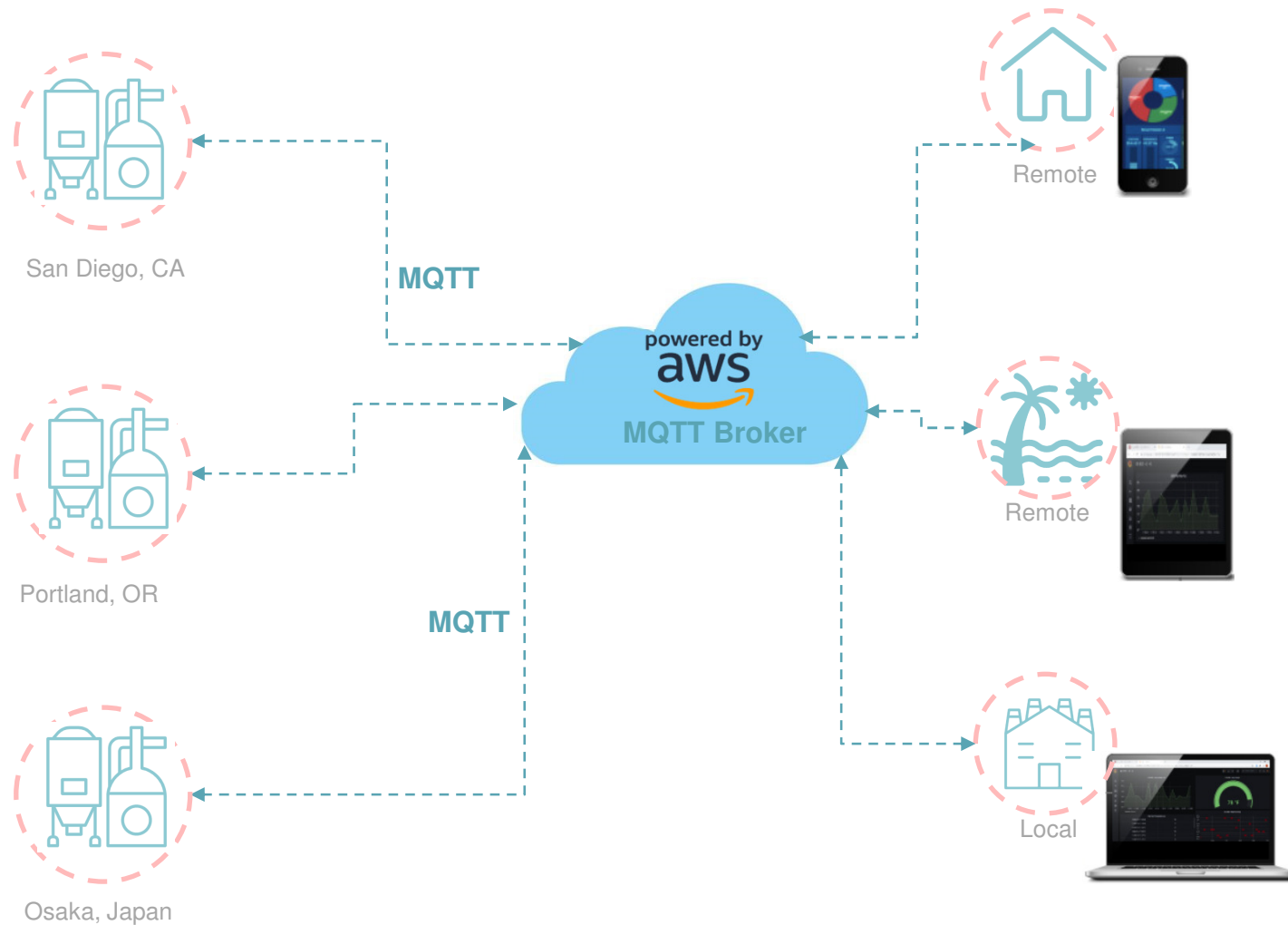**MQTT**

MQTT

powered by aws
MQTT Broker

Remote

Remote

Local

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Applications

Micro Brewery – multiple locations

San Diego, CA

Portland, OR

Osaka, Japan

MQTT

MQTT

powered by
aws
MQTT Broker

Remote

Remote

Local

FC6A with MQTT

How MQTT is supported

- MQTT is supported on ethernet port 1 of the FC6A Plus CPU (FC6A-D%)
- Available as firmware upgrade
  - No extra cost
  - No additional hardware
  - Existing system already deployed in the fields can be upgraded
- Firmware available in AO version 3.21.0 or later (WindLDR 8.17.0)
- Support
  - **AWS IoT Core** powered by aws
- Future support
  - Microsoft Azure   **Microsoft Azure**
  - Google Cloud   **Google** Cloud

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AWS IoT Core Account

- **Sign up for AWS account**
  - https://aws.amazon.com/resources/create-account/
  - Require credit card

- **Cost**
  - https://aws.amazon.com/iot-core/pricing/

Connectivity

Connectivity provides a secure, authenticated connection between your devices and AWS IoT Core. Connectivity is metered in 1 minute increments and is based on the total time your devices are connected to AWS IoT Core.

Region: US West (Northern California) ⬍

Connectivity pricing: $0.08 (per million minutes of connection)

For example, in the US East (N. Virginia) region you pay $0.042 per device per year (1 connection * $0.08/1,000,000 minutes of connection * 525,600 minutes/year) for 24/7 connectivity. In order to maintain connectivity, devices may send keep-alive ("Ping") messages at frequencies ranging from 20 minutes to every 30s, and you do not incur any additional cost for these messages. See additional connectivity pricing details »

Messaging

Messages transport device data to and from AWS IoT Core. Messaging is metered by the number of messages transmitted between your devices and AWS IoT Core.

Region: US West (Northern California) ⬍

MQTT and HTTP messaging pricing

Up to 1 billion messages: $1.00 (per million messages)

Next 4 billion messages: $0.80 (per million messages)

Over 5 billion messages: $0.70 (per million messages)

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