Microsoft

Microsoft Azure IoT Suite

Technical Scenario: Connect, Manage and Scale with Efficiency Devices & Gateways

Nayana Singh, Alina Stanciu
Program Management, Azure IoT, January 2017

Azure IoT Suite: Ready for the enterprise

Secure
End-to-end

From the endpoint, through the connection, to data, applications, and the cloud

Fast
Start in minutes

Preconfigured solutions for the most common IoT scenarios

Open
Connect anything

Any device, OS, data source, software, or service

Scalable
Grow effortlessly

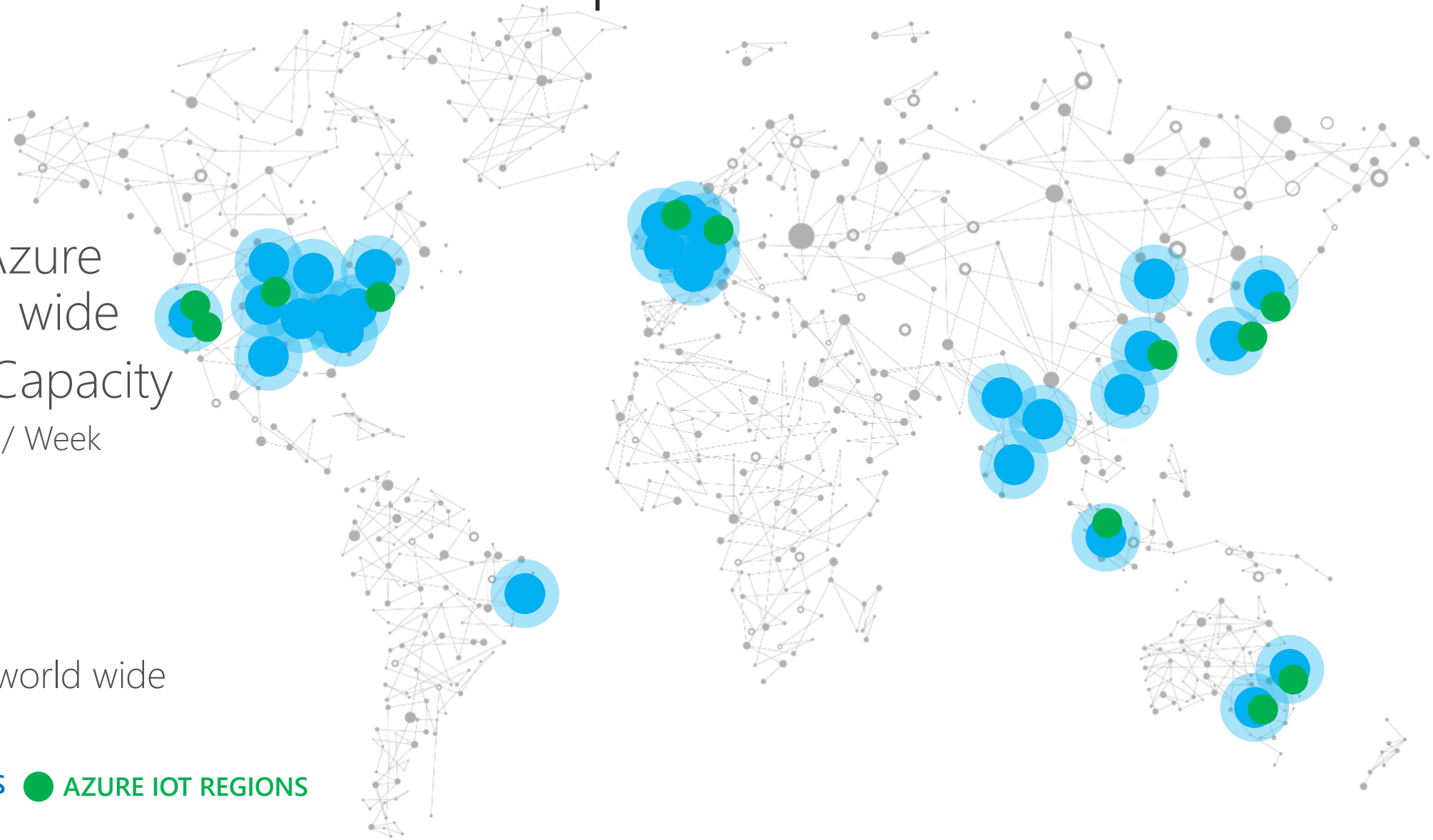
Millions of devices, terabytes of data, on-premises, in the cloud, in the most regions worldwide

From endpoint to insight to action, across the enterprise, and around the world

Magic Quadrant Leader, **Business Intelligence and Analytics Platforms**

Built on the **industry's leading cloud**

Hyper-Scale Azure Footprint



38

Announced Azure regions world wide

Hyper-Scale Capacity

3.5 Trillion Messages / Week

12

Azure IoT regions world wide

AZURE REGIONS AZURE IOT REGIONS

Elements of Azure IoT Suite

1. Connect and Manage Devices & Gateways

- Preconfigured solutions
- Devices & Gateway
- Connect and control

2. Analyze streaming data

- Real time analytics
- Data visualization
- Predictive analytics*

3. Integrate into business systems

- Workflow integration
- Push and broadcast notifications
- ID and access management

4. Secure IoT Infrastructure

5. Customize IoT Architecture

* Only applies to predictive maintenance

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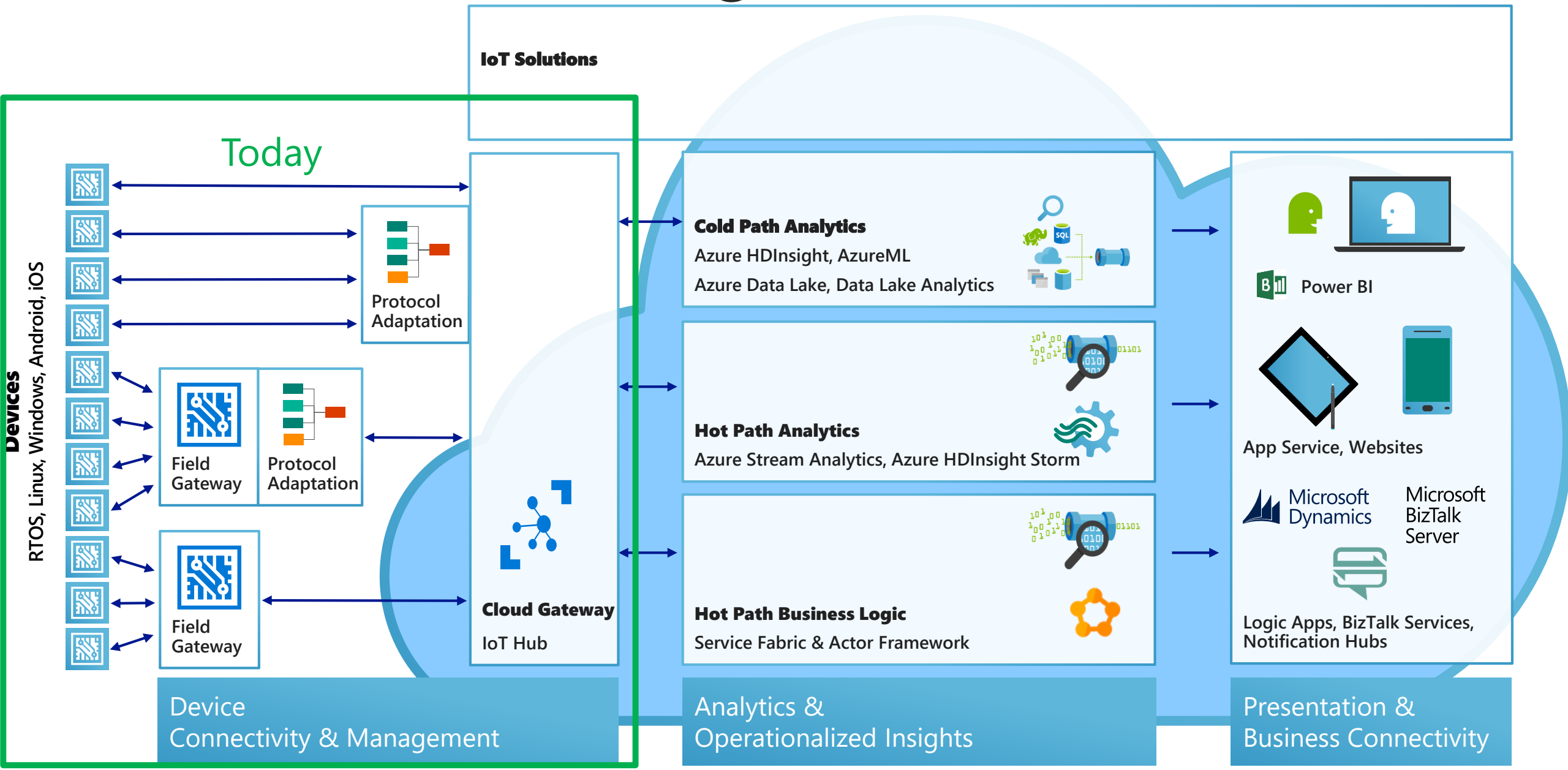
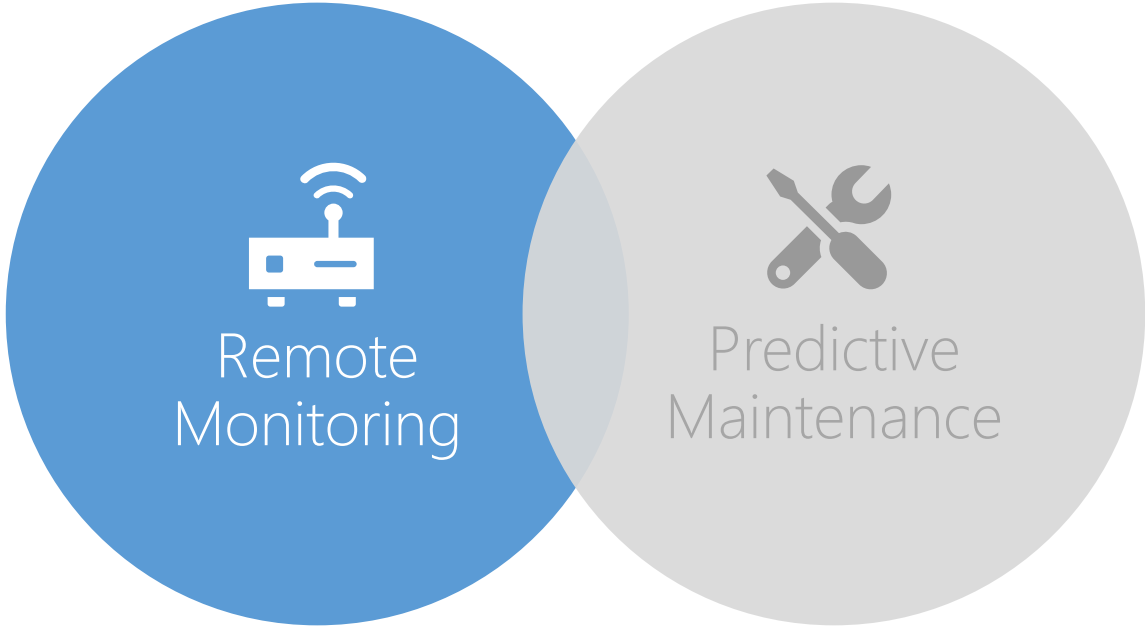
Azure IoT Solutions Big Picture



Overview Azure IoT Suite capabilities

- Device Connectivity & Management
- Gateway Edge intelligence
- Data Ingestion and Command & Control
- Stream Processing & Predictive Analytics
- Workflow Automation and Integration
- Dashboards and Visualization
- Preconfigured Solutions
  - Remote Monitoring
  - Predictive Maintenance

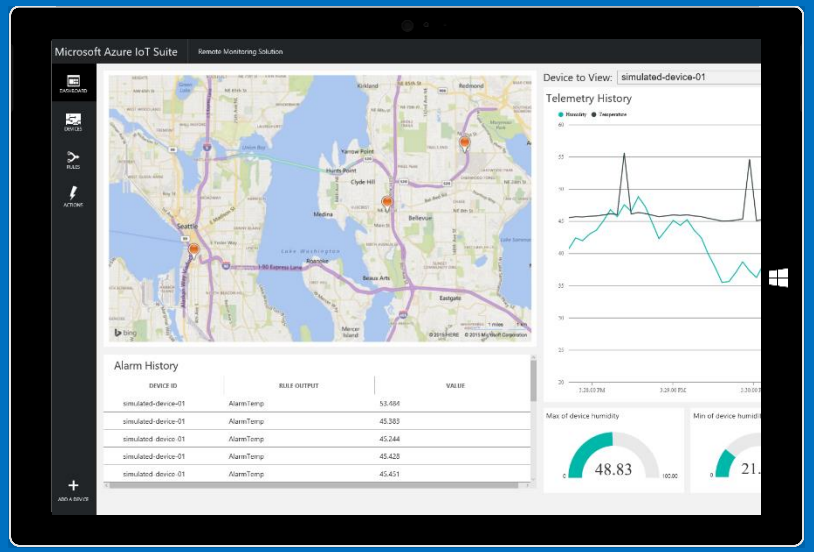
Preconfigured Solutions



More to come…

PreConfigured Solutions
Remote Monitoring and Predictive Maintenance

Start quickly with preconfigured solutions



Get started in minutes

Modify existing rules and alerts

Add your devices and begin tailor to your needs

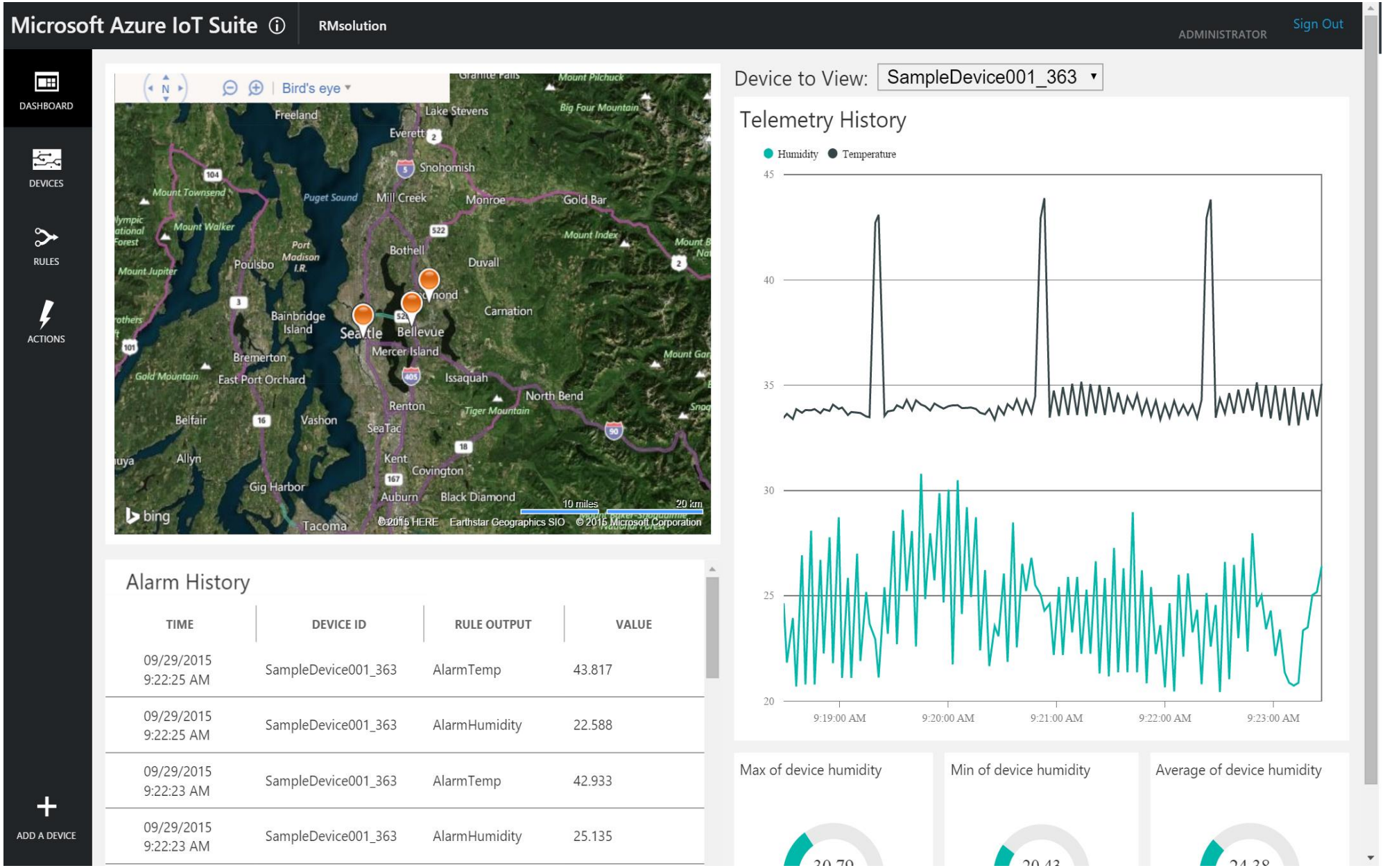
Finish with your Internet of Things application

Fine-tuned to specific assets and processes

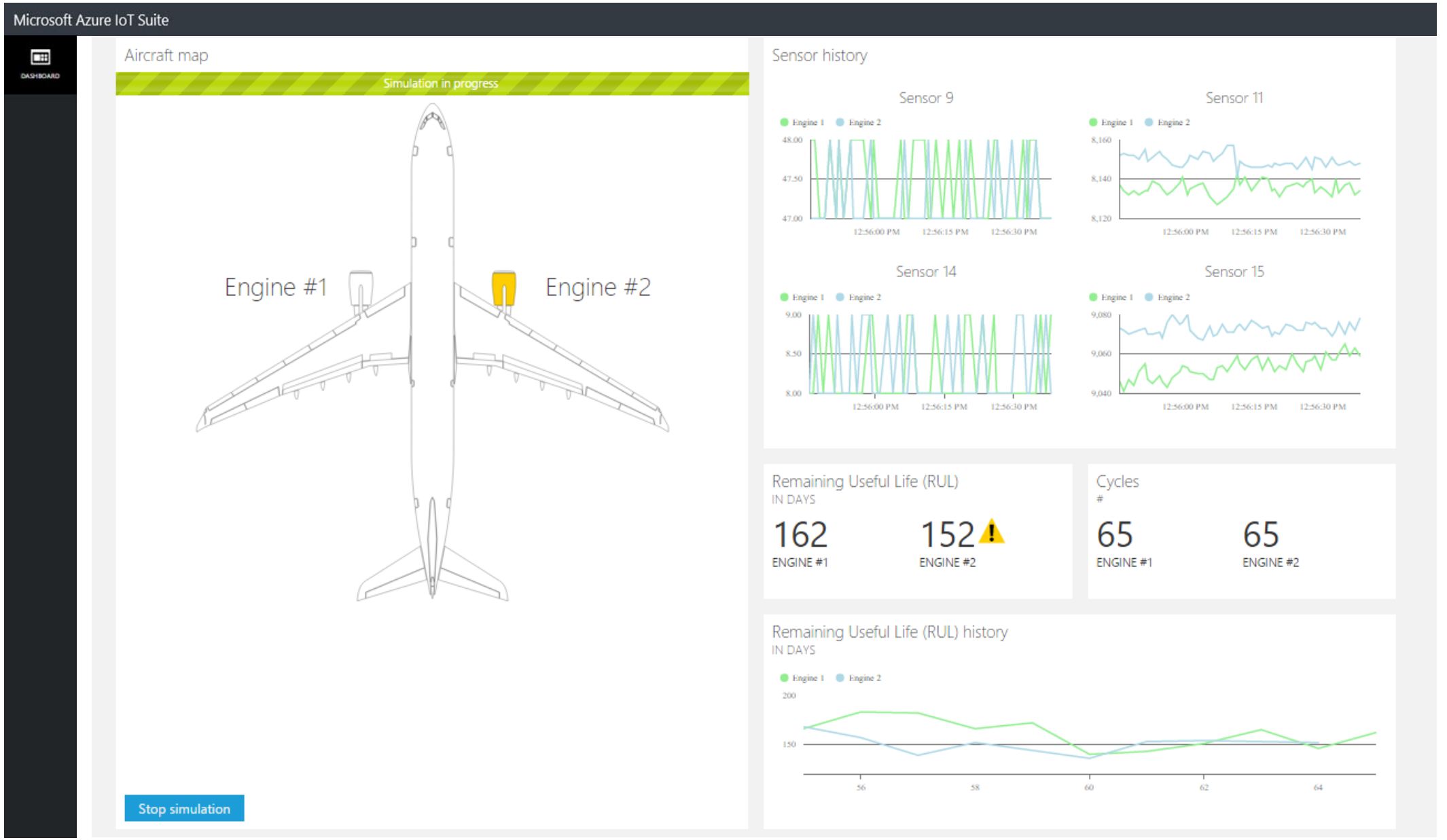
Highly visual for your real-time operational data

Integrate with back-end systems

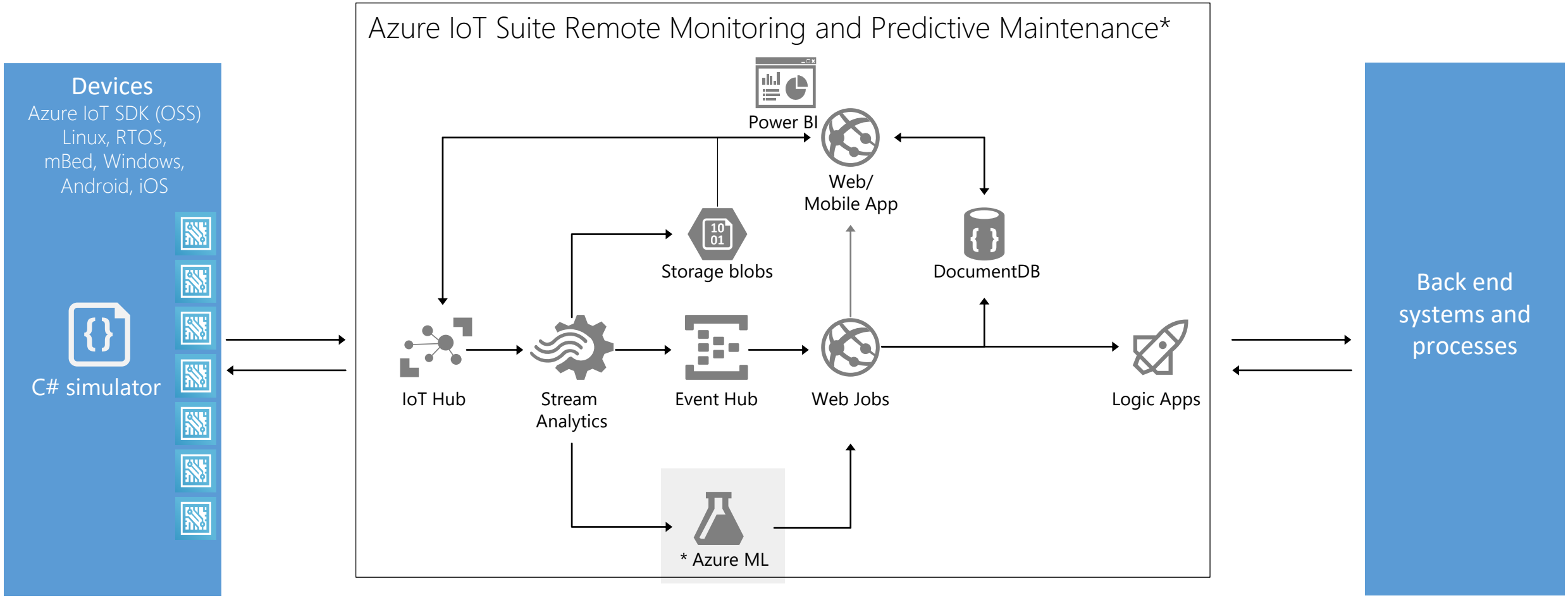
PCS: Remote Monitoring azureiotsuite.com



PCS: Predictive Maintenance azureiotsuite.com



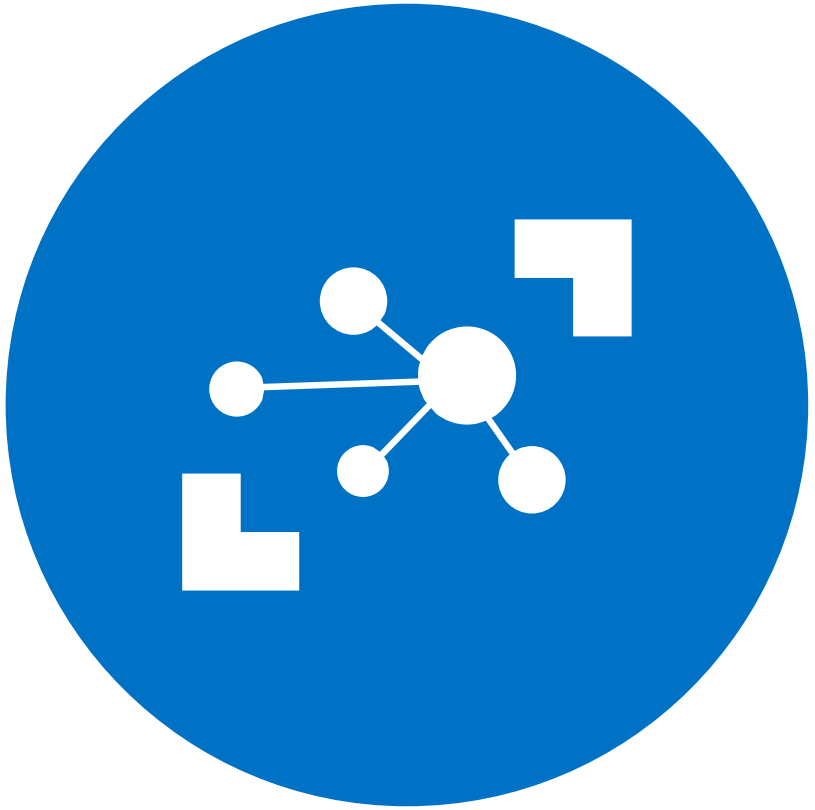
What is behind IoT Suite preconfigured solutions



* Machine Learning available with Predictive Maintenance only

Connect & Control

Azure IoT Hub



Azure IoT Hub

Designed for IoT to multi-scale

- Connect, monitor and manage millions of devices

Security

- Individual device identities and credentials
- Per-device security keys
- X.509 via AMQPS/HTTPS/MQTTS
- IP Filter to reject/accept specific IP addresses

Cloud-scale messaging

- D2C, C2D, File transfer & Request/Reply methods
- Durable messages
- Device management: twin/methods/query/jobs
- Declarative message routing

Cloud-facing feedback

- Delivery receipts, expired messages
- Device communication errors

Operations Monitoring

- Monitor device connectivity and device identity management events

Connection multiplexing

- Single device-cloud connection for all communications (C2D, D2C)

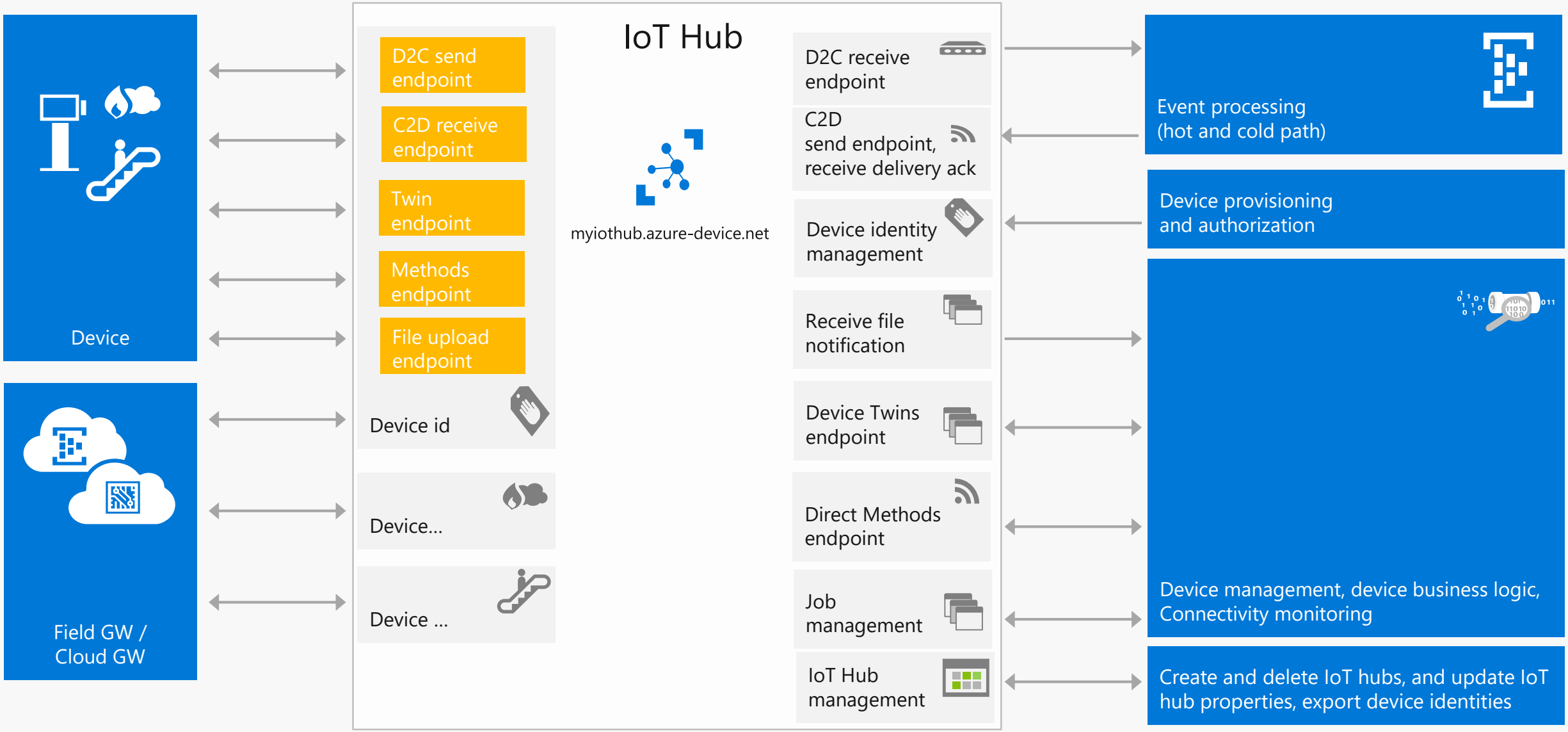
Multi-protocol

- Natively supports AMQP, HTTP, MQTT
- AMQP/MQTT over WebSocket
- Designed for extensibility to custom protocols

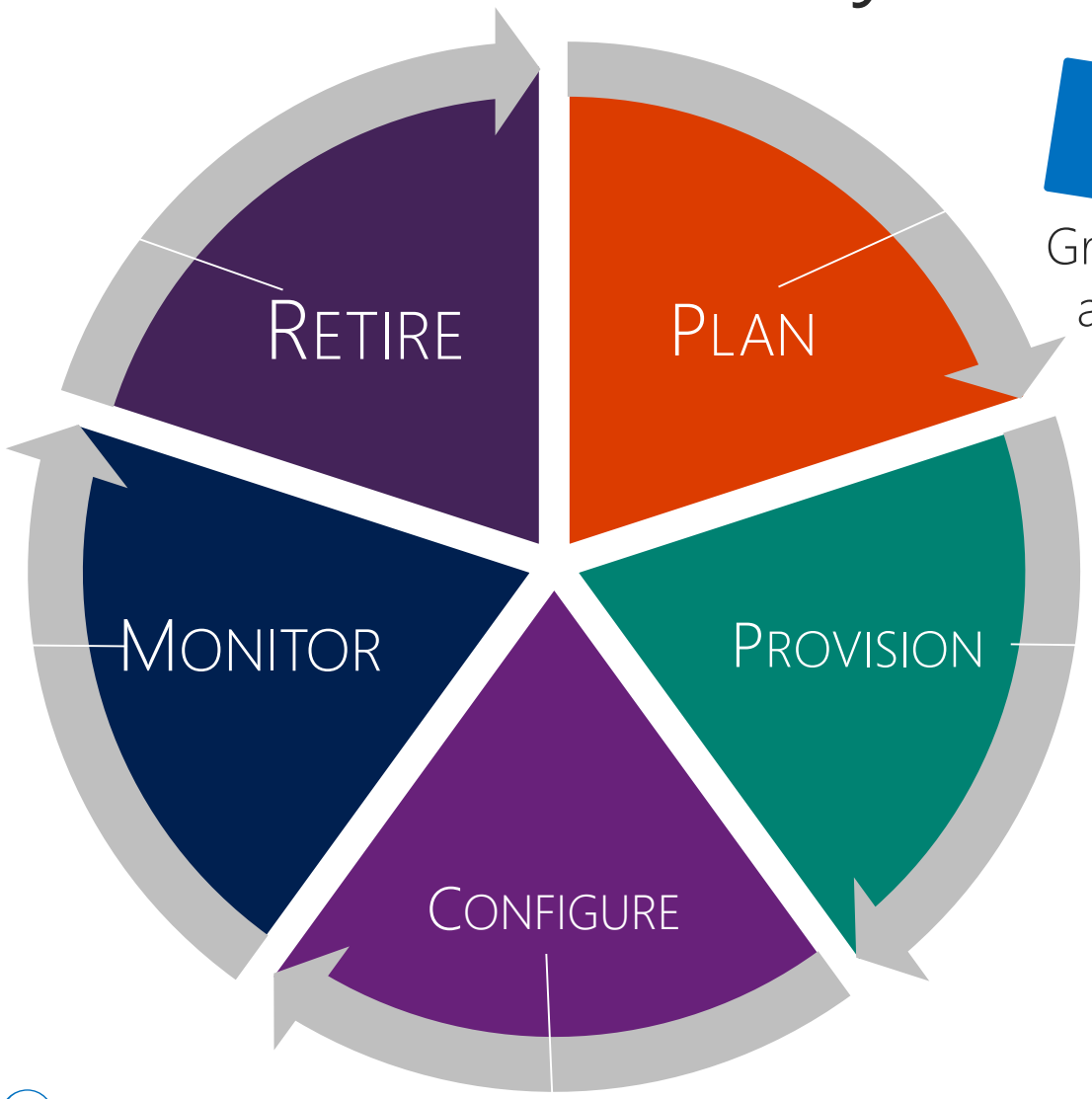
Multi-platform

- Device SDKs available for multiple platforms (e.g. RTOS, Linux, Windows, iOS, Android)
- Multi-platform Service SDK

IoT Hub endpoints



IoT Device Lifecycle



Replace or decommission devices after failure, upgrade cycle or service lifetime

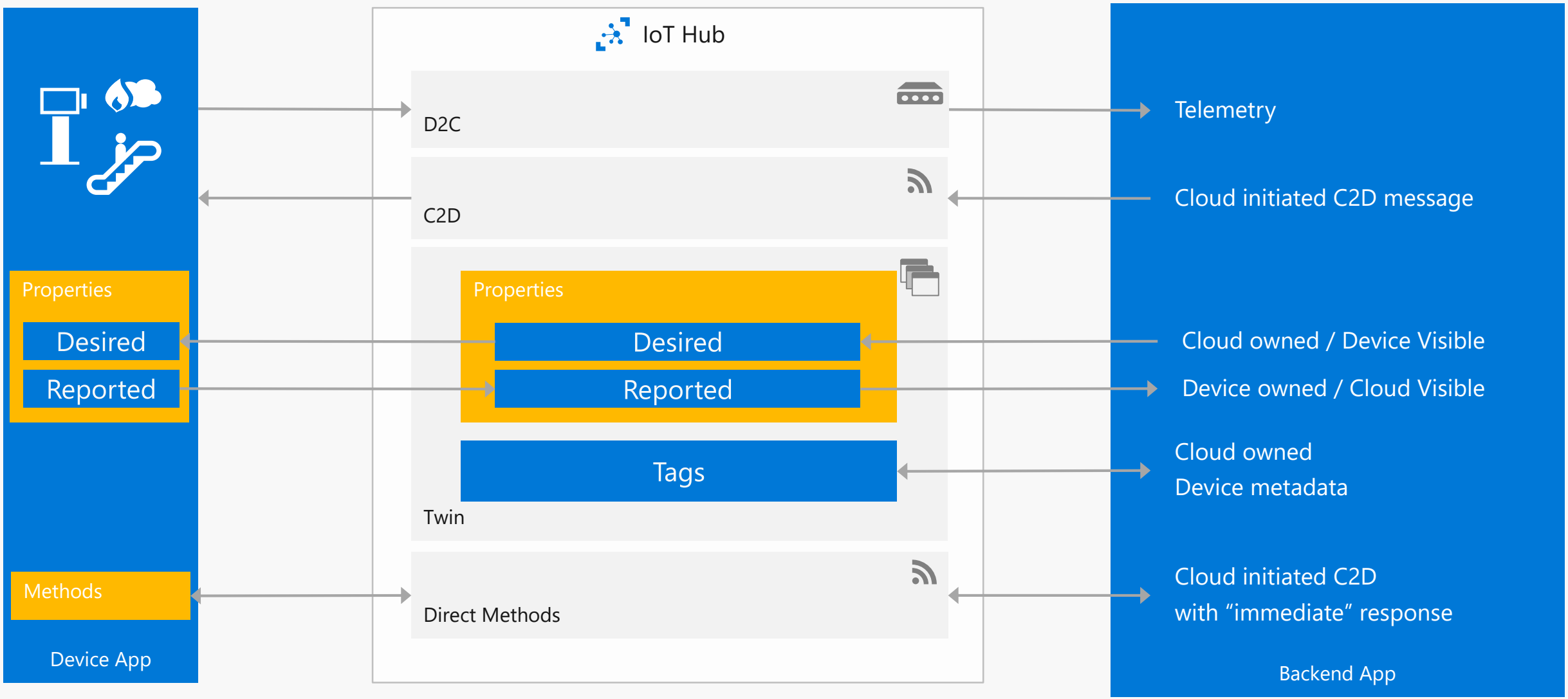
Group devices and control access according to your organization's needs

Monitor device inventory, health & security while providing proactive remediation of issues

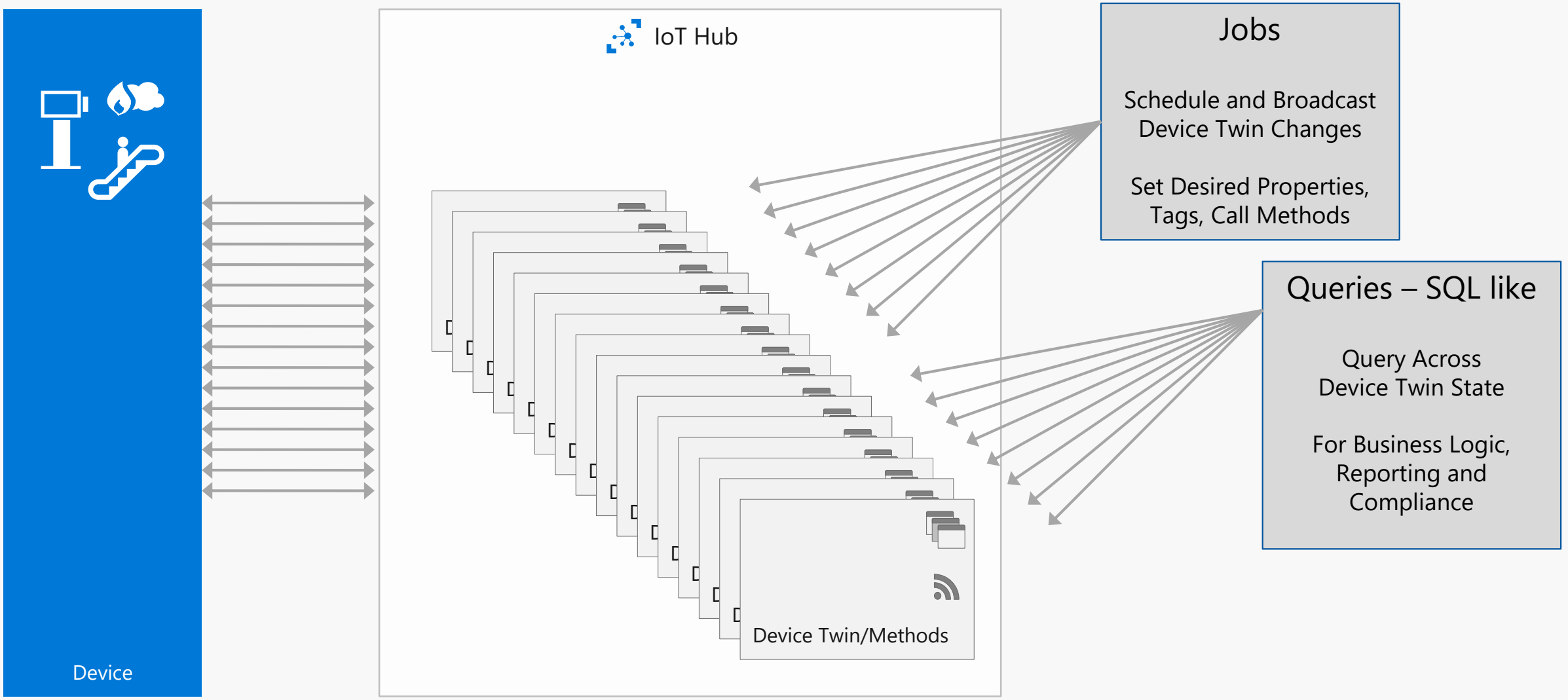
Securely authenticate devices, on-board for management and provision for service

Provide updates, configuration & applications to assign the purpose of each device

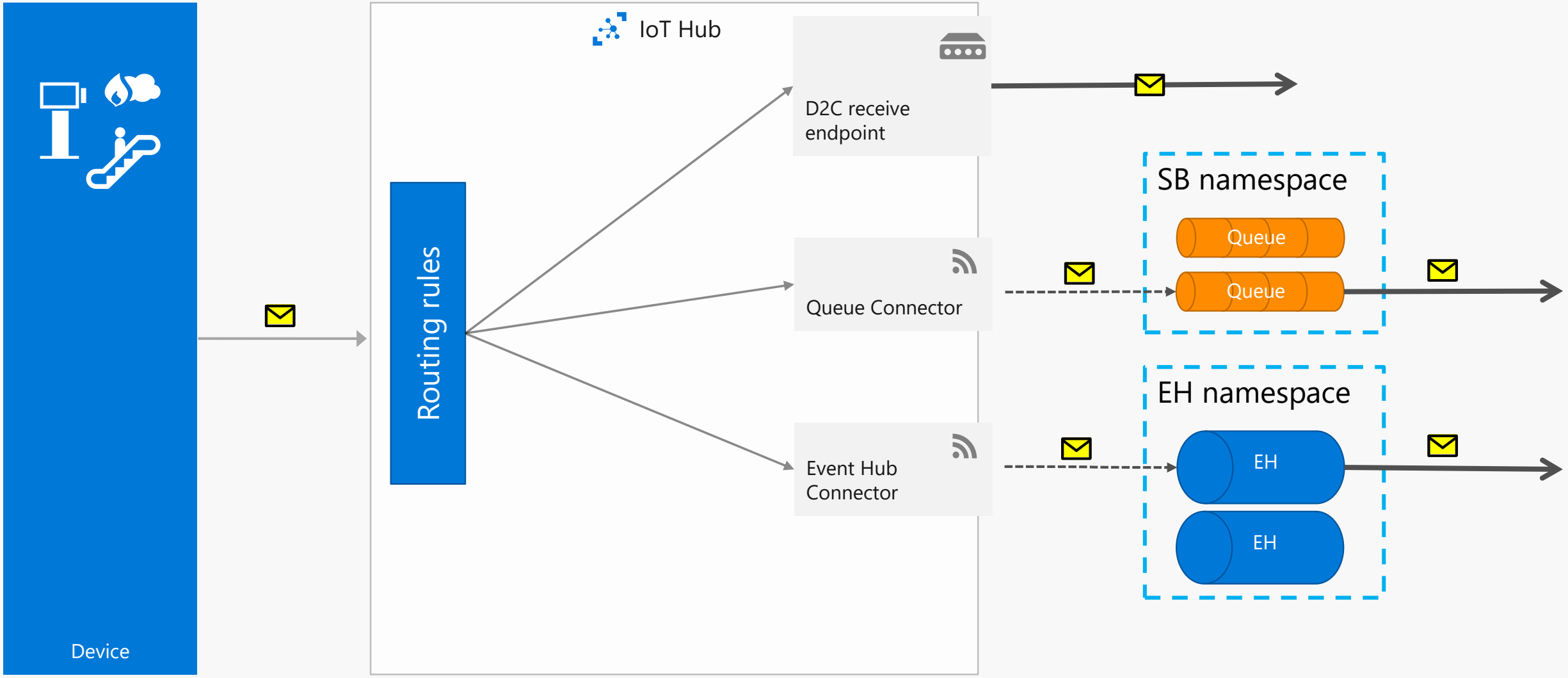
Manage through Device Twin and Methods



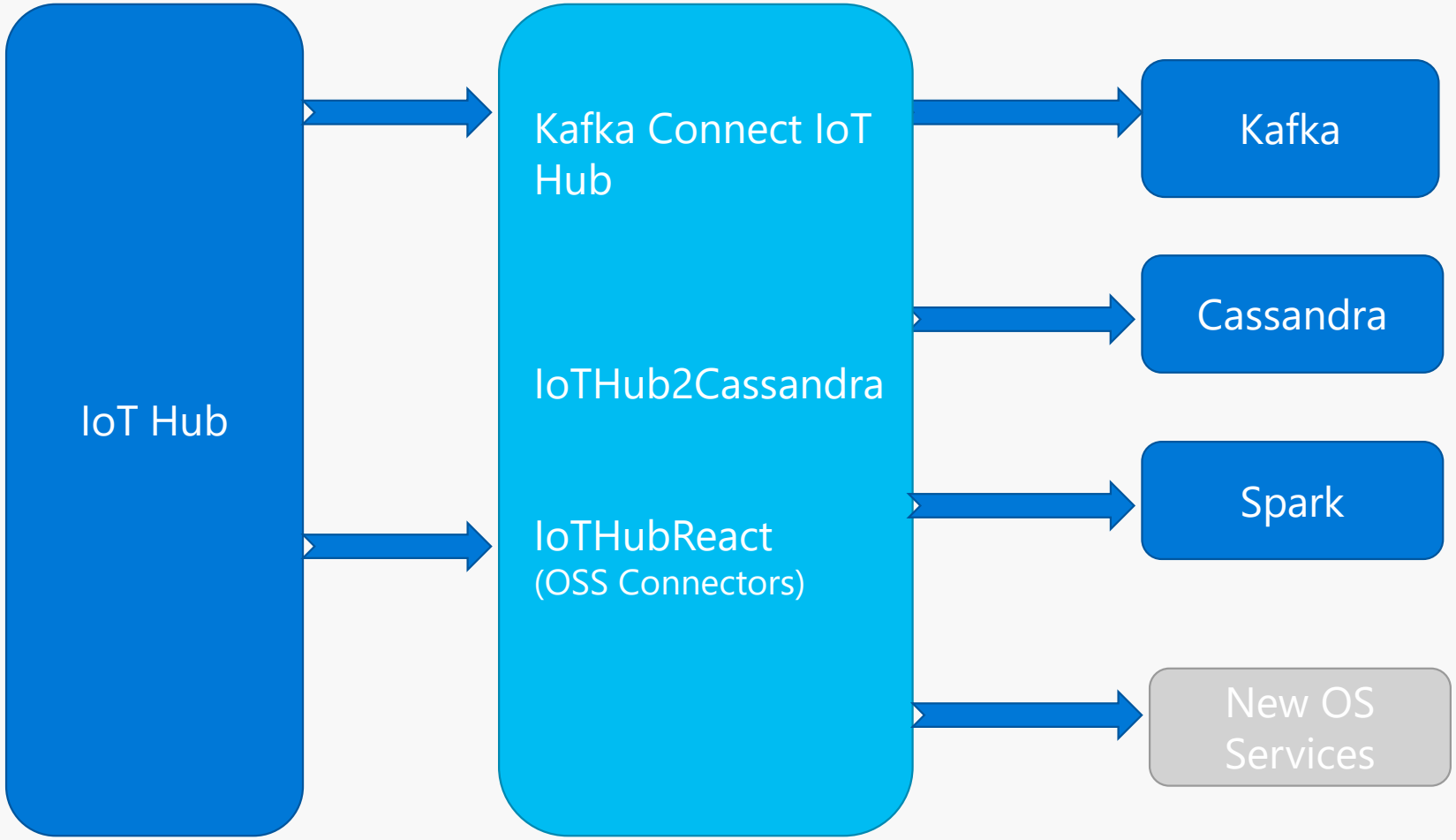
Manage through Jobs and Queries



Azure IoT Message Routing



IoT Hub OSS connectors:



https://github.com/Azure/toketi-kafka-connect-iothub
https://github.com/azure/toketi-iothubreact

Devices and Gateway SDK

SDK Library

SDK, agent libraries

Easily accessible libraries in GitHub

Cross platform support

Choose real time OS, platform and language

Device support

IP and access control capabilities

Connect IP, and non-IP devices

Support for direct connection devices and resource strained or non-IP devices via gateway and field protocols

Open source framework

Develop custom agents for your devices

Secure communication

Simple and secure D2C and C2D connectivity for messaging, device management and command and control

OS support

RTOS, Linux, Windows, Android, iOS etc.

Dev tool support & samples

IoTHub-explorer, Device Explorer, iothub-diagnostics

Service SDKs support

.NET

C# libraries supported:

- Windows Desktop (7,8,10)
- Universal Windows Platform

Node.js library:

- Node.js (v 0.10+)

Java library:

- Java (v 1.7+)

Python library:

- v 2.7.x
- v 3.5.x

Device SDKs support

C library:

- Microcontrollers
- RTOS
- Linux
- Windows

Node.js library:

- Node.js (v 0.10+)
- Node-RED

Java library:

- Java (v 1.7+)
- Android

.NET

C# libraries supported:

- Windows Desktop (7,8,10)
- Universal Windows Platform
- Windows 10 IoT Core
- Xamarin (iOS, Android)

Python library:

- v 2.7.x
- v 3.5.x

Device SDKs platform/OS support

Android (Java or Xamarin)

Arduino

Debian Linux (v 7.5)

ESP8266

Fedora Linux (v 20)

FreeRTOS

iOS (Xamarin)

mbed OS (v 2.0)

OpenWRT

Raspbian Linux (v 3.18)

STM32

TI RTOS

Ubilinux (v3.0)

Ubuntu Linux (v 14.04)

Windows Desktop (7, 8, 10)

Windows IoT Core (v 10)

Windows Server (v 2012 R2)

Yocto Linux (v 2.1)

… more @ Azure Certified for IoT device catalog.

Packages and libraries

NuGet

C on Windows
.Net

Apt-get

C on Linux (Ubuntu/Debian)

Npm

Node.js

Maven

Java

PyPI

Python

Arduino lib

Mbed lib

IoT Hub Developers tools

IoTHub-explorer : node based CLI

npm install -g iothub-explorer

Device Explorer: Windows centennial app

Installer in releases of github.com/azure/azure-iot-sdks

New X-Plat UI tool coming soon

Coming soon!

Device discovery CLI

npm install -g device-discovery-cli

IoTHub Diagnostics tool

github.com/azure/iothub-diagnostics

IoT Developer Center Samples

Azure.com/iotdev

Azure IoT Gateway scenario and benefits

End user IoT gateway scenarios

Security and Isolation of Devices
- Bridge networks and isolate public Internet
- Ensure cloud security and encryption

Integration with any device
- Low resource devices
- Device agents can be simplified
- Connect new and legacy devices

Cloud Offload
- Run logic on premises to reduce network and cloud consumption
- Low-latency / critical messages
- Segregate message types

Edge processing
- Enable time-sensitive decisions
- Run edge analytics
- Auditing - Central choke point to apply data policies

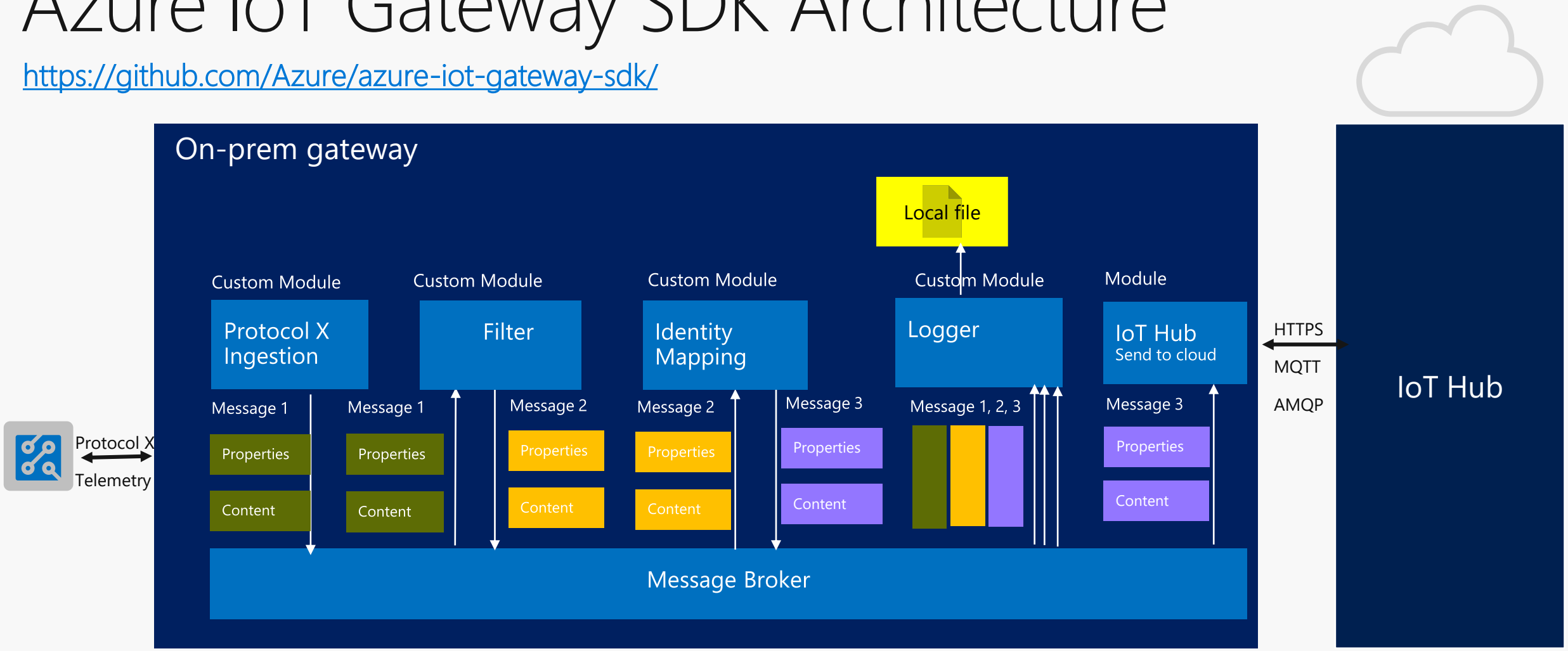
Batching
- Optimize bandwidth and messages

Benefits

1. **SI & End user** – Reduced time to market and maintenance costs for gateway solutions
2. **OEM** - Increased margins on gateway hardware compared to IoT Devices
3. **ISV** - Monetize modules built on top of Azure IoT Gateway SDK

Azure IoT Gateway SDK Architecture

https://github.com/Azure/azure-iot-gateway-sdk/



BLE (Bluetooth Low Energy) Module
Logger Module
Identity Map Module
IoT Hub Module
OPC-UA
Modbus

Simulated Device Module
Hello World Module
...and many more to come

Division of work

SDK facilitates gateway software creation. It is not provide an out of the box solution for every customer.

Provided by SDK	Partner/Customer work
• Pluggable module architecture (SDK infrastructure) • Simplified gateway creation (SDK infrastructure) • Efficient D2C and C2D connectivity (modules) • Protocol translation example (modules)	• Configuration of module pipeline • Writing modules for any logic not provided by SDK • Deployment and maintenance of gateway solution to hardware

Demo

Use a provisioned IoT Hub and walkthrough:

Create a new device in Device Explorer or iothub-explorer

Create a node.js simulated device

- Sends D2C telemetry data and sends C2D commands

Set desired properties via device twin configuration

Execute a direct reboot method via device twin

Show in portal

- Monitoring metrics
- Standard endpoints + custom endpoints
- Operation monitoring

Get started today

Go to InternetOfYourThings.com

Next Module: Analyze, Monitor and Act on Data

Connect with your regional IoT team

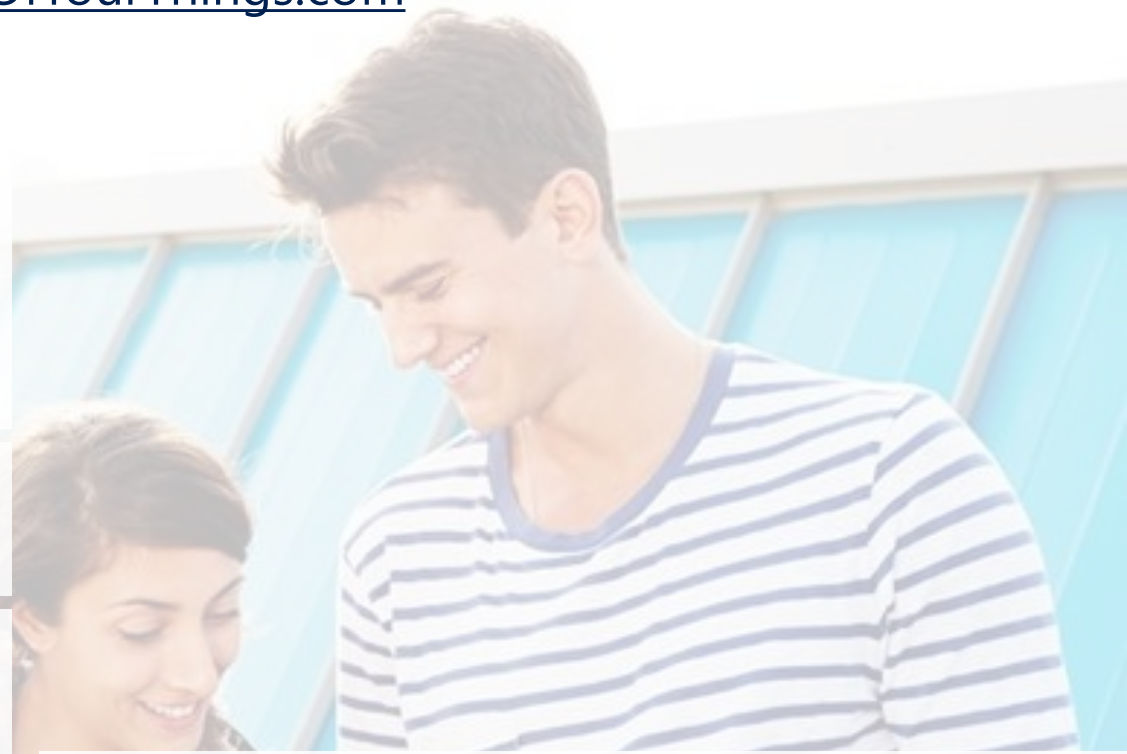
View Preconfigured Solution Demo

Select a partner

Get Started Now

Feedback/Questions @ Feedback.azure.com

Explore IoT **Documentation** tab on Azure.com



More docs:

Azure IoT Hub
Device management
Device & Service SDK
Gateway SDK
HA/DR
Azure IoT Hub Routing
HOL Device Mgmt and Gateway SDK
IoT Hub vs EventHub
Azure IoT Hub Security Ground Up
IoT Hub Dev Security
IoT Hub pricing
Azure IoT Reference Architecture

Thank you

ευχαριστώ Salamat Po متشكرم شكراً Grazie благодаря ありがとうございます

Kiitos Teşekkürler 谢谢 ขอบคุณครับ Obrigado شكريه Terima Kasih Dziękuję

Hvala Köszönöm Tak Dank u Wel дякую Tack Mulţumesc спасибо Danke

Cám ơn Gracias 多謝晒 Ďakujem תודה நன்றி Děkuji 감사합니다