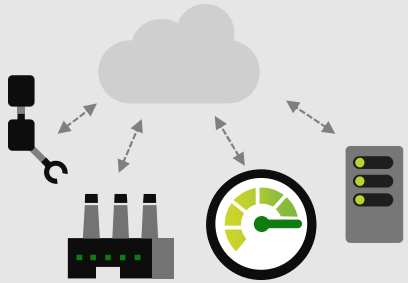
IoT in the Cloud and on the Edge

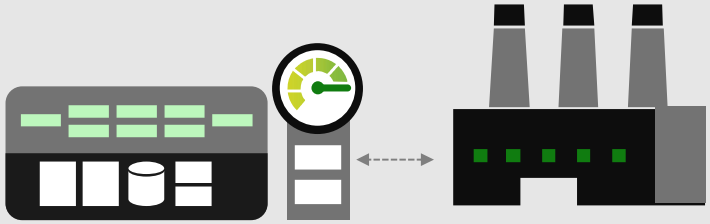


IoT in the Cloud

Remote monitoring and management

Merging remote data from multiple IoT devices

Infinite compute and storage to train machine learning and other advanced AI tools



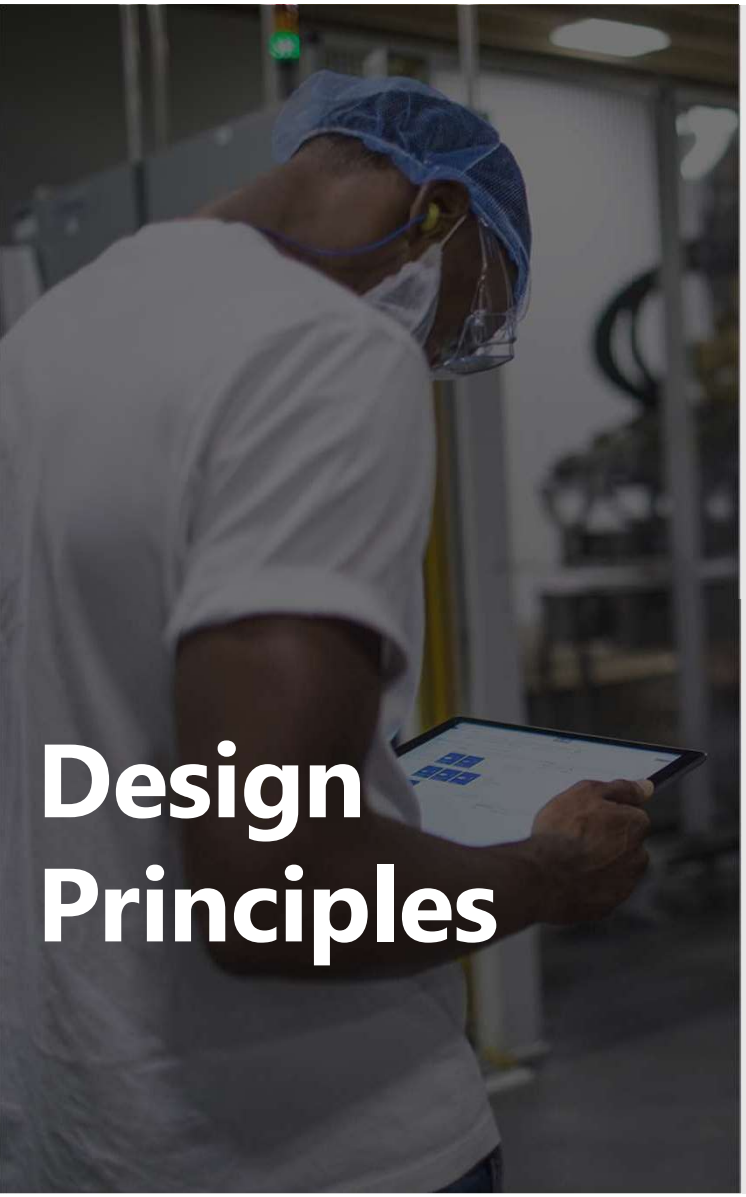
IoT on the Edge

Low latency tight control loops require near real-time response

Protocol translation & data normalization

Privacy of data and protection of IP

Symmetry



Design Principles

Secure

Provides a secure connection to the Azure IoT Edge, update software/firmware/configuration remotely, collect state and telemetry and monitor security of the device

Cloud managed

Enables rich management of Azure IoT Edge from Azure provide a complete solution instead of just an SDK

Cross-platform

Enables Azure IoT Edge to target the most popular edge operating systems, such as Windows and Linux

Portable

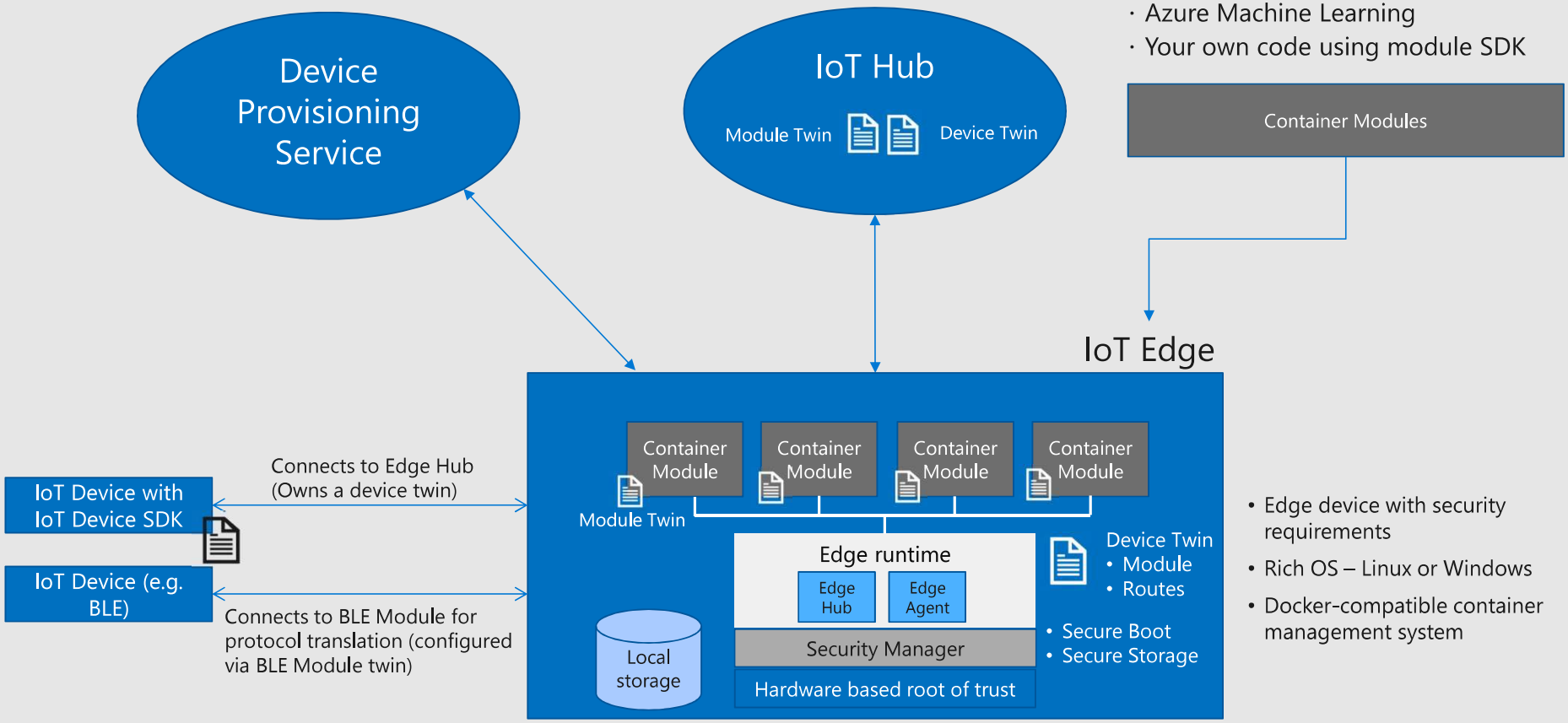
Enables Dev/Test of edge workloads in the cloud with later deployment to the edge as part of a continuous integration / continuous deployment pipeline

Extensible

Enables seamless deployment of advanced capabilities such as AI from Microsoft, and any third party, today and tomorrow

IoT Edge in action

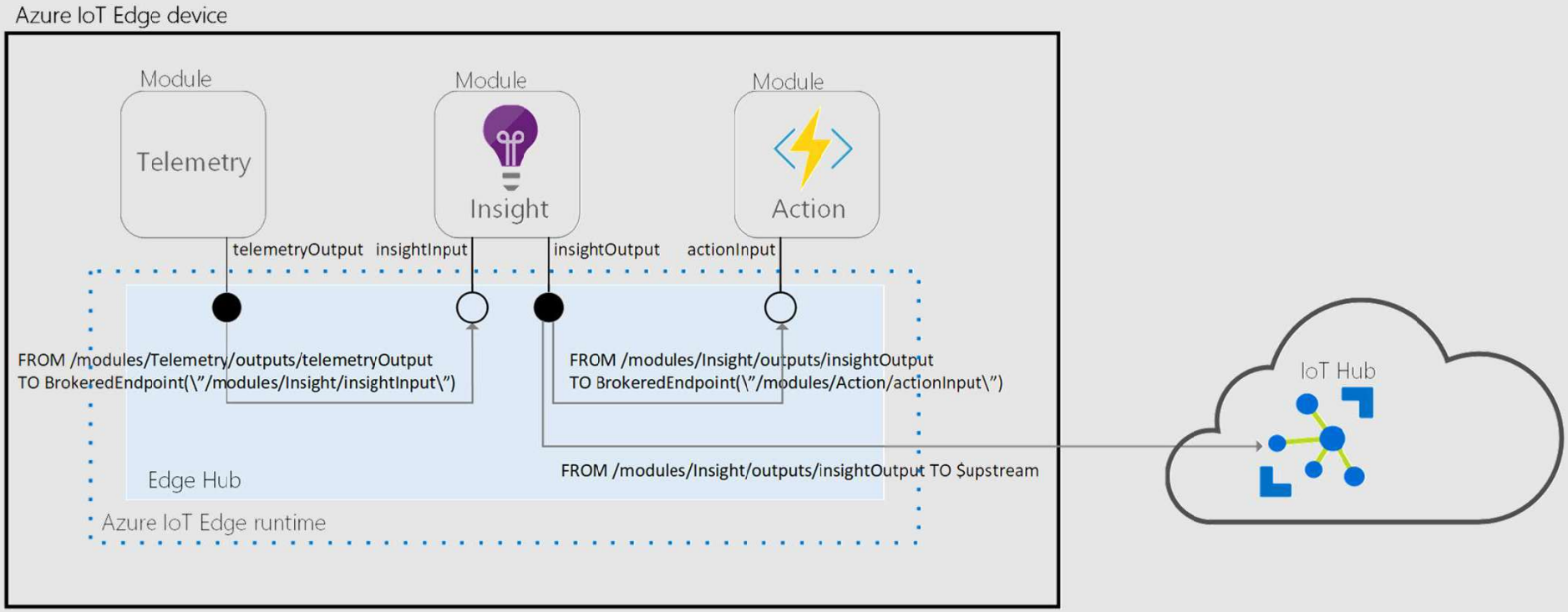
- Container based workloads
- AI Services
- Azure Functions
- Azure Stream Analytics
- Azure Machine Learning
- Your own code using module SDK



- Edge device with security requirements
- Rich OS – Linux or Windows
- Docker-compatible container management system

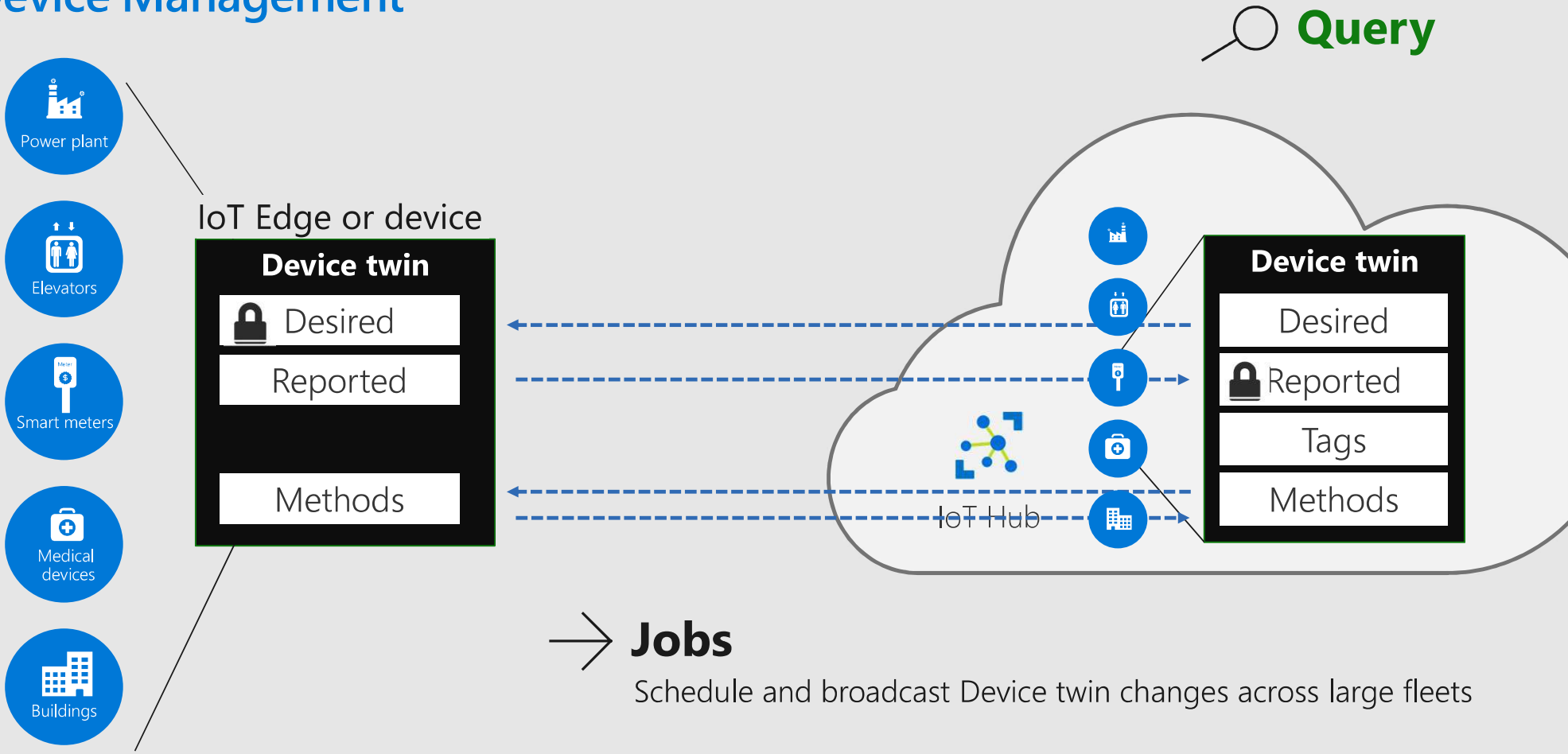
Concept

Routing



Concept

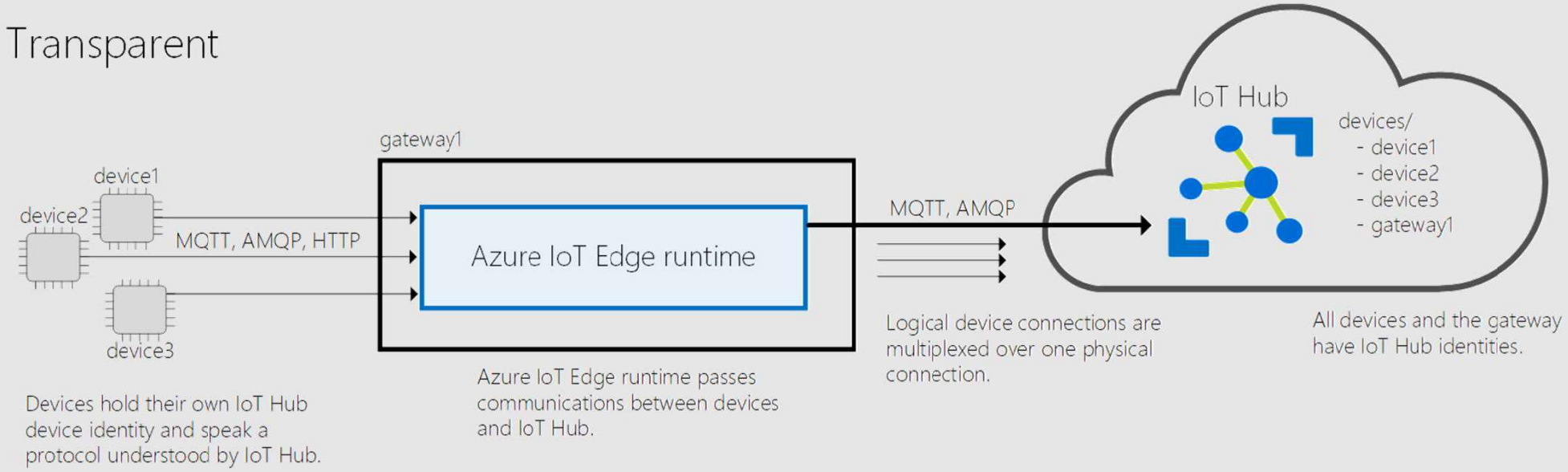
Device Management



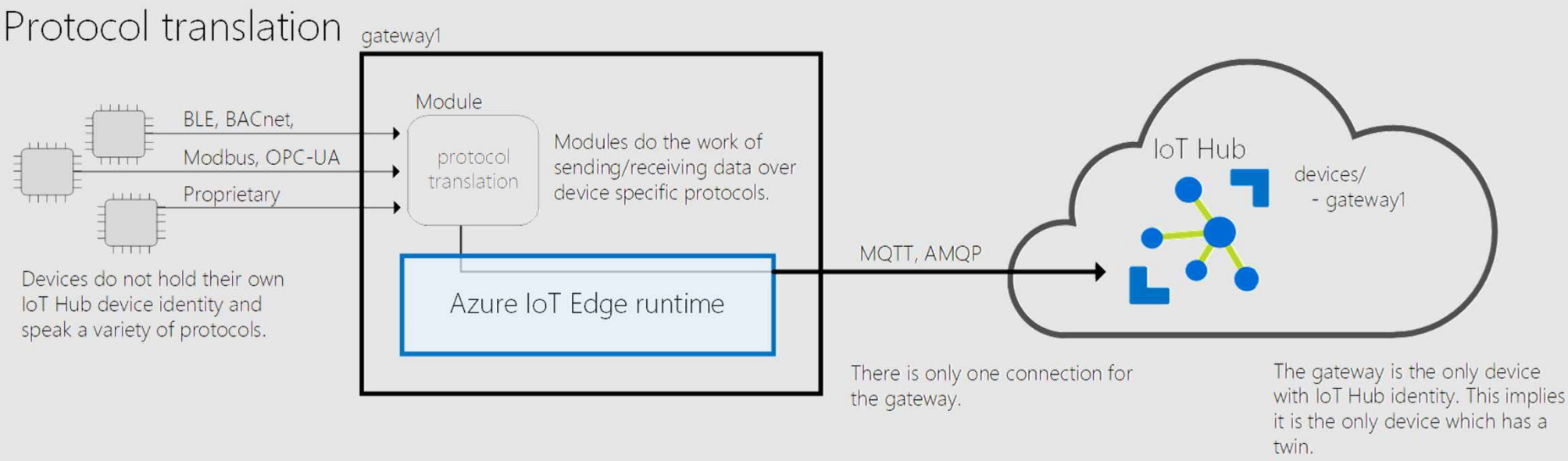
Jobs

Schedule and broadcast Device twin changes across large fleets

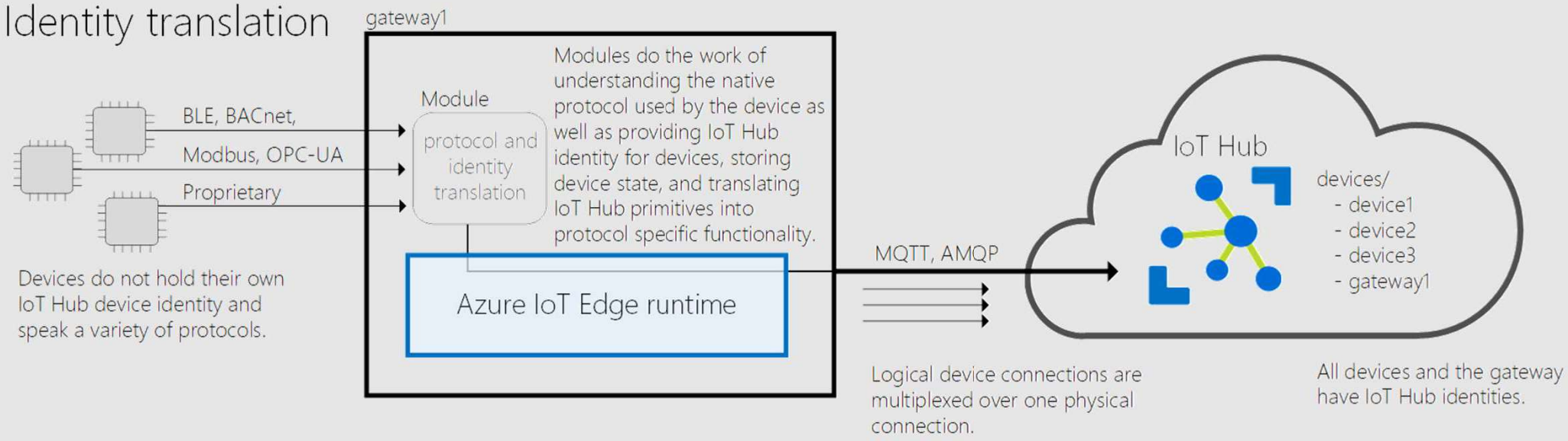
Transparent Gateway



Protocol translation

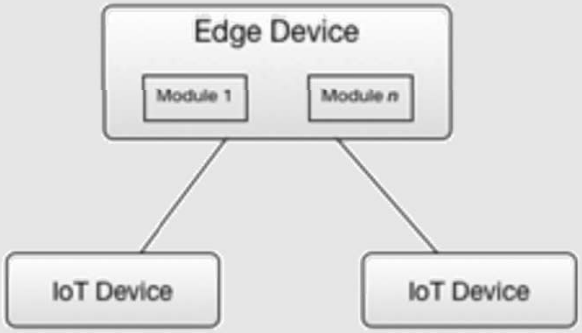


Identity translation



Extended offline operation

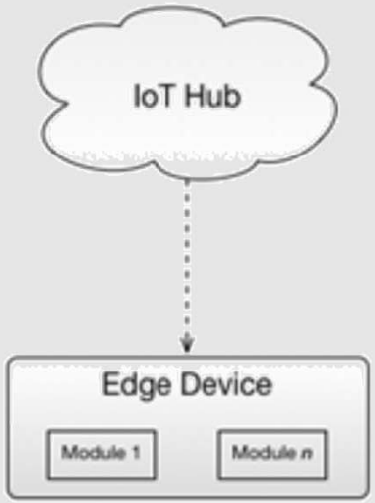
1 Assign child devices to Edge device



- ✓ Establish parent-child relationship in IoT Hub portal
- ✓ Local modules are extended offline capable out-of-the-box

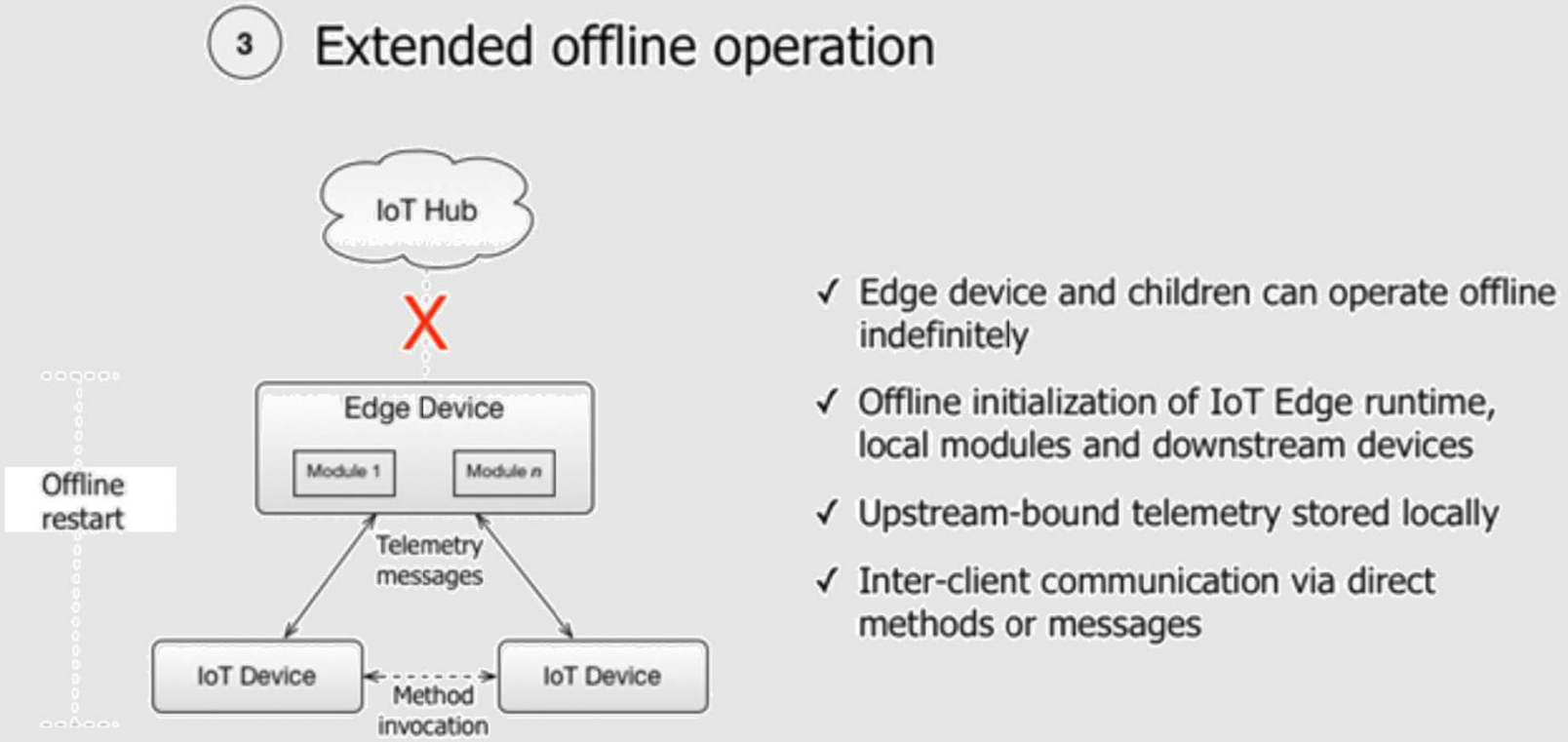
Extended offline operation

2 One-time sync with IoT Hub

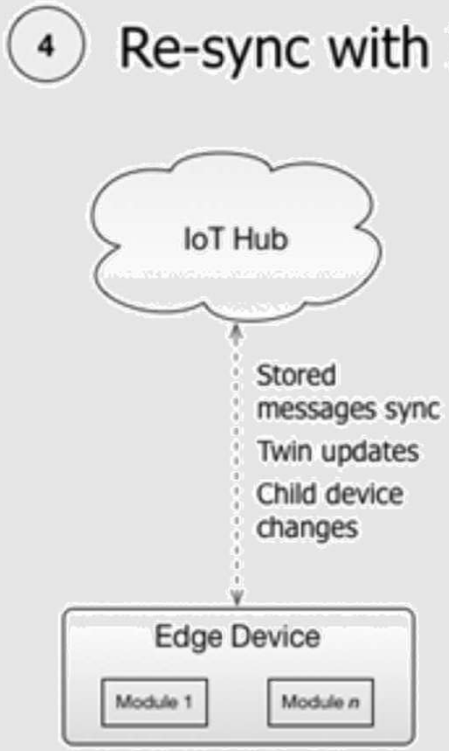


- ✓ Get details of child devices
- ✓ Securely update local cache to enable offline operation
- ✓ Retrieve settings for local storage of telemetry messages

Extended offline operation



Extended offline operation



- ✓ Locally stored messages delivered to IoT Hub
- ✓ Desired/Reported property changes reconciled
- ✓ Child device updates (add/remove) synced

IoT Edge DevOps Challenges

Code and Dependency Security

Integration Testing

Inner Loop Development Workflow

Modules Maintained by Different Teams

Continuous Deployment and Tracking of New Releases

HA/DR

Container Images That Can Be Trusted by Edge Devices

Monitoring

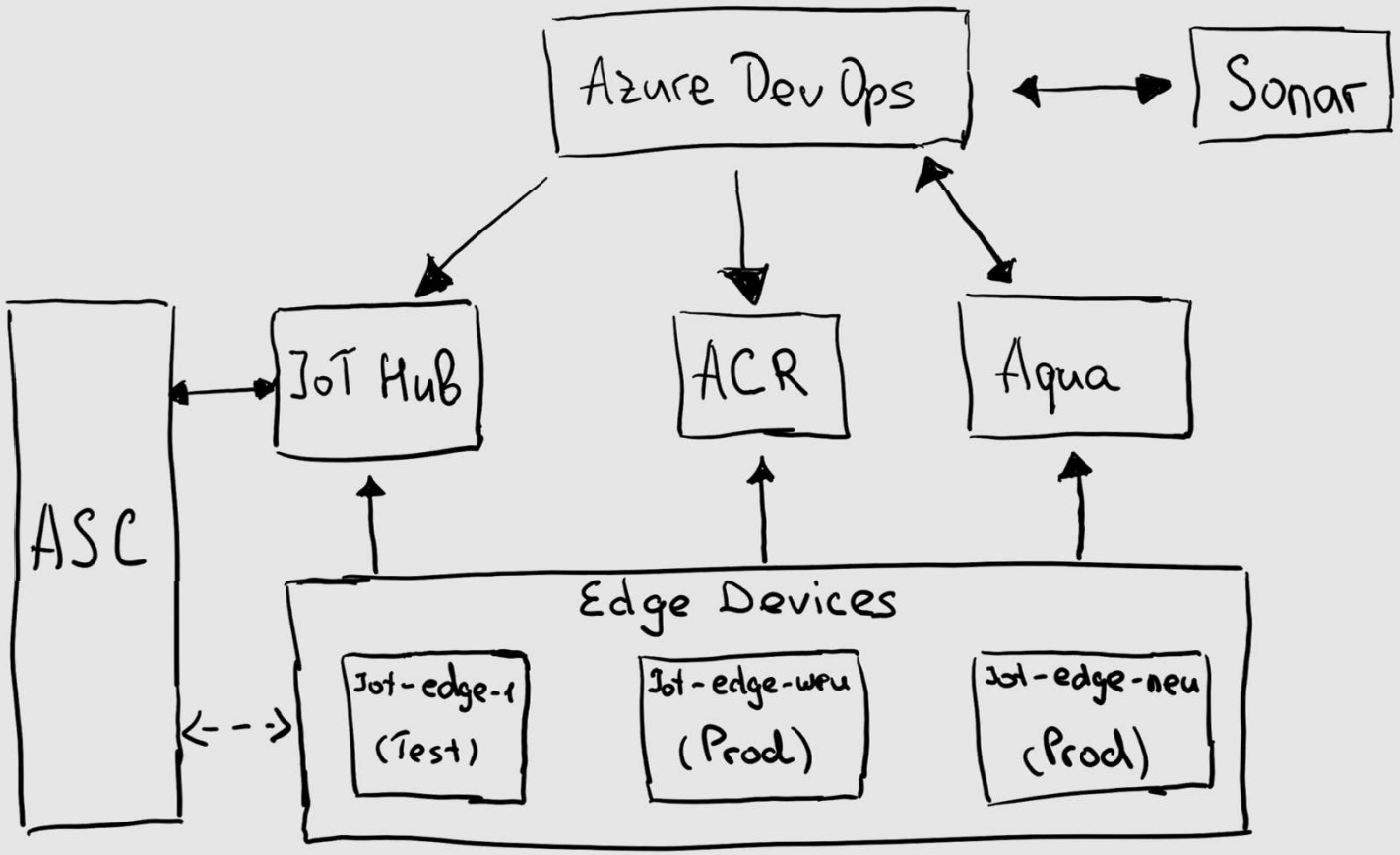
Container Image Security

Deploy Only to Specific Devices

Device Identity and Provisioning

Continuous OS and Framework Base Image Patching

Setup


Azure Dev Ops
Sonar
IoT Hub
ACR
Aqua
ASC
Edge Devices
Iot-edge-1
(Test)
Iot-edge-weu
(Prod)
Iot-edge-neu
(Prod)

IoT Edge DevOps Example (Release Flow)