2019 Global Azure BOOTCAMP

Smart Driving Behavior Monitoring System using Azure IoT

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CORPORATE FACTS

Established in 2000

90+
Customers Served

2300+
Employees

23%
CAGR since inception

Top 10
NA P/C IT Svs Provider
by # of customers

OUR DIGITAL & CLOUD SERVICES

VALUEMOMENTUM
Deliver Value. Drive Momentum.

Customers trust ValueMomentum to rapidly deliver new experiences and stay competitive in today's digital-centric market.*

App Dev

- Rapid App Development
- Cloud App Development
- Mobile App Development

Integration

- Integration Architecture
- API Development
- Service Modernization

Cloud & Infrastructure

- Cloud Platform Adoption
- Cloud Migration
- DevOps & CloudOps

ITSM

- IT Service Management
- IT Asset Management
- IT Operations Management

*To learn more, please log on to ValueMomentum – Digital & Cloud Services

Agenda

- Business case
- IoT – What & Why?
- Azure IoT Technologies & Solutions
- Solution Flow
- IoT Communication Patterns
- Azure IoT Hub
- Azure IoT Hub DPS
- Azure IoT Edge

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Business Use case

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Business Case

Auto Insurance

Calculated based on

- Vehicle type
- Vehicle usage & history
- Driver's Age, Gender
- Where driver lives

Premium, why not based on how the driver is driving?

Benefits

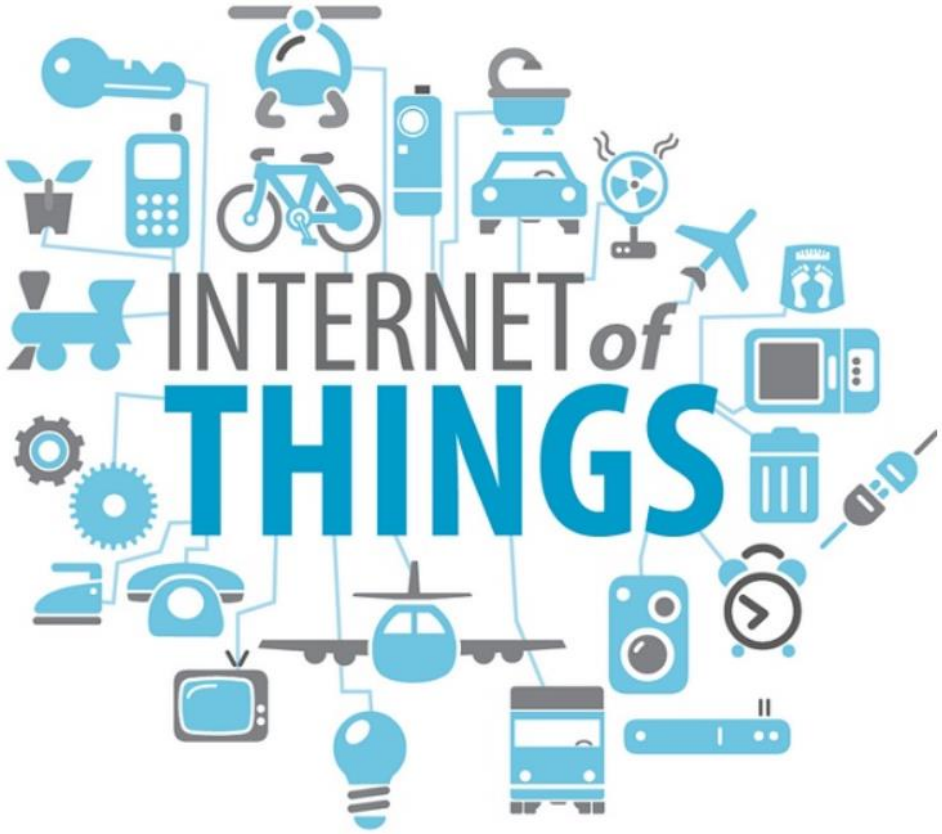
- Better alignment of insurance with actual risk.
- Improved customer satisfaction
- Social and environmental benefits from more responsible driving
- Alerting drivers in real time when risky driving patterns detected.

Actors

- Driver
- Insurer
- Car Manufacturer
- Car Dealer
- Data Providers
- Solution Provider

Basic Workflow

What is IoT?



Term introduced by Kevin Ashton in 1999

The Internet of things (IoT) is the extension of Internet connectivity into physical devices and everyday objects. Embedded with electronics, Internet connectivity, and other forms of hardware (such as sensors), these devices can communicate and interact with others over the Internet, and they can be remotely monitored and controlled. – *Wikipedia*

Adding **connectivity**, whether direct or indirect, to a previously unconnected object, and **deriving a value** from that connection. – *Alex Davies, Rethink IoT*

A **layer of digital intelligence** that makes a dumb device smarter.

Why IoT?

"IoT" Means Opportunity

- Worldwide Spending on the IoT to Reach $745 Billion in 2019 and surpass the $1 trillion mark in 2022 - IDC
- Worldwide IoT security spending will cross $3 billion by 2021 – Gartner
- By 2030, 125 billion connected devices will be part of our daily lives. - IHS
- Microsoft to spend $5 billion on IoT by 2022

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Azure IoT Technologies & Solutions

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PaaS (Solution)

Azure IoT solution accelerators (PaaS)

Preconfigured solutions for common IoT scenarios

- Remote Monitoring
- Predictive Maintenance
- Connected Factory
- Device Simulation

SaaS (Solution)

Azure IoT Central (SaaS)

Fully managed solution
Get started quickly with minimal IoT experience

PaaS (Technologies)

Device Support

- Azure IoT Device SDK
- Azure IoT certified device
- Windows 10 IoT

IoT

- Azure IoT Hub
- IoT Hub DPS
- Azure IoT Edge
- Azure Maps
- Azure TSI
- Azure Digital Twins
- Azure Sphere
- Azure Functions

Data Analytics

- Azure Stream Analytics
- Azure ML
- Azure HDInsight
- Azure Data Lake

Visualization & Integration

- Microsoft Power BI
- Microsoft Flow
- Azure Logic Apps
- Azure AD
- Azure Monitor
- Notification Hubs

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Solution Flow

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Data Generation

Car sensors generate data

- Wheel Angle
- Acceleration
- Break Measure
- Car Speed

Data Ingestion

Azure IoT Hub

Stream Processing

Azure Stream Analytics

Azure ML Web Service

Data Exploration & Visualization

Azure Power BI

Azure Blob Storage

Action

Real Time Driving Statistics

Action

Premium Calculation

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IoT Communication Patterns

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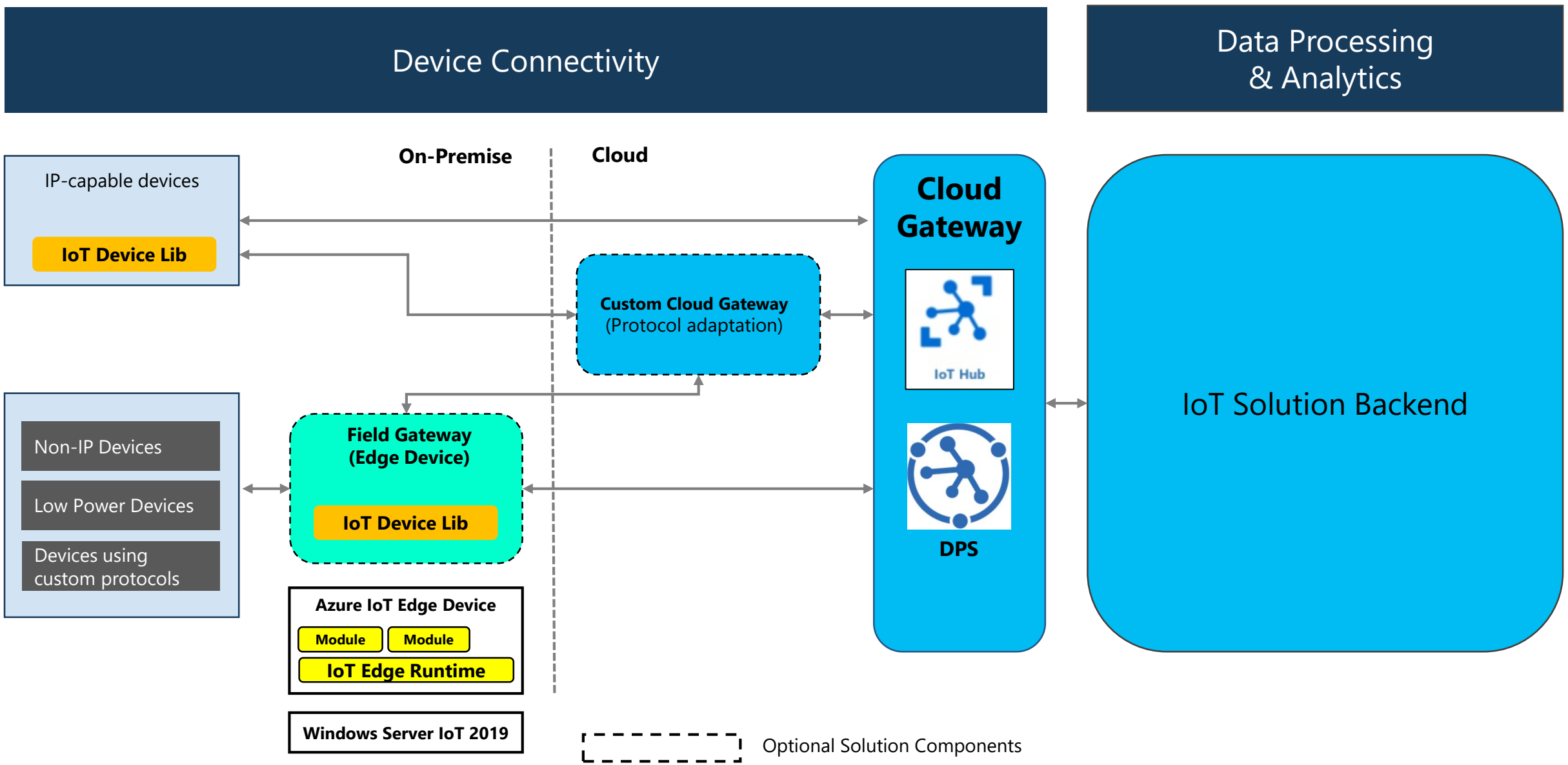


Azure IoT Hub

IoT Hub – An Overview

Fully managed service, Hosted in the cloud, Acts as a central message hub

- Device Authentication
- Multi-Platform Support
- Multiple Communication Options
- Client & Cloud SDK Libraries
- Integrates with other services
- DPS & IoT Edge

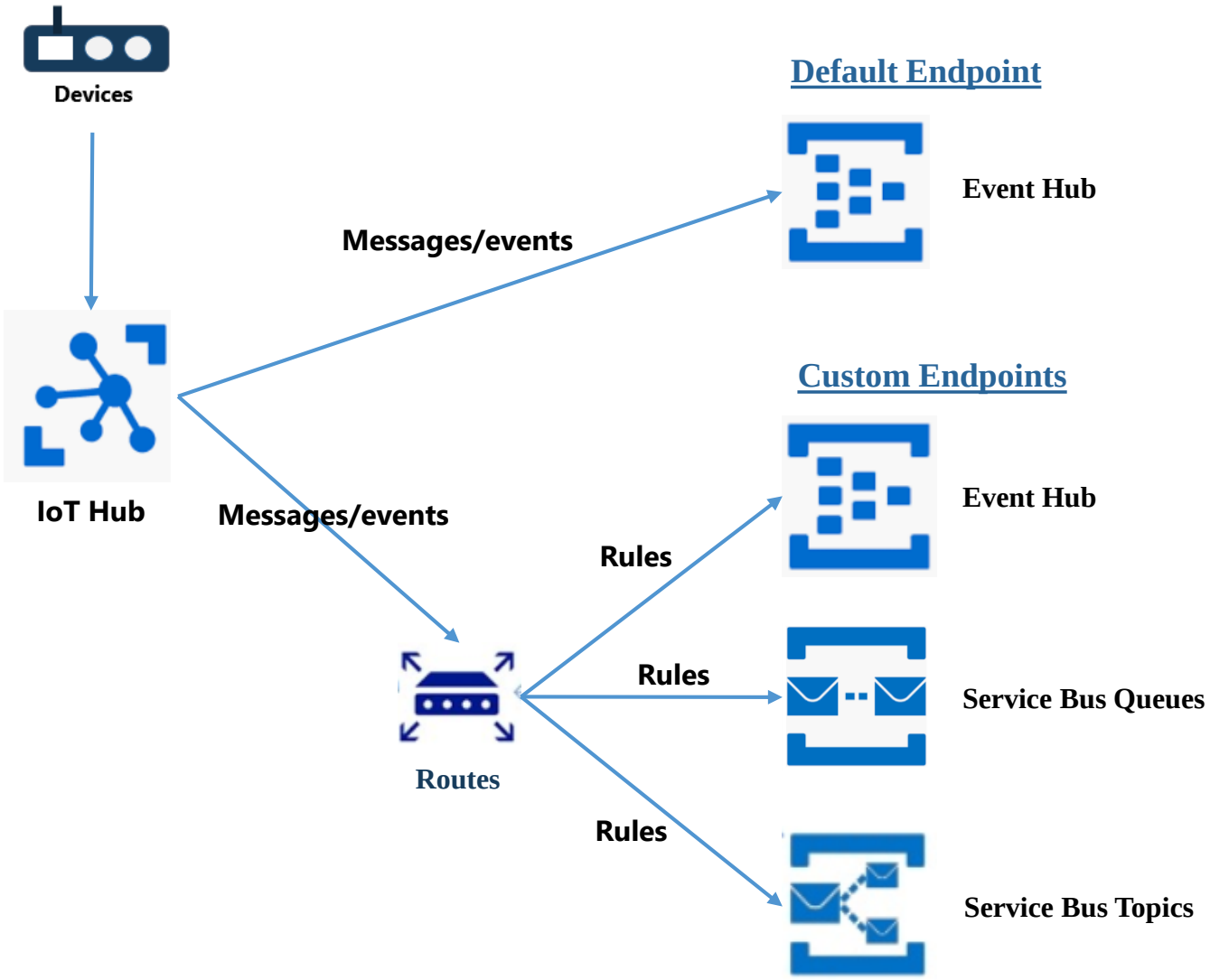
IoT Hub – Message Routing

Device to Cloud Communication

- D2C
- File Upload
- Device Twins Reported Properties

Cloud to Device Communication

- C2D
- Direct Methods
- Device Twins Desired Properties



IoT Hub – Communication Protocols

MQTT
MQTT over WebSockets

- Small footprint so good for low resource devices
- Smaller payload size
- Low latency & quick message delivery
- Cannot reject message

AMQP
AMQP over WebSockets

- Designed with more advanced features
- Larger payload size than MQTT
- Low latency & quick message delivery
- Can accept and reject messages

HTTPS

- Small footprint
- Can be used for rarely connected devices.
- Polls for messages
- Should be the last choice.

IoT Hub – Tiers & Pricing

Capability	Basic Tier	Standard Tier	Free Tier
Device to Cloud Telemetry	Yes	Yes	Yes
Per-device Identity	Yes	Yes	Yes
Message Routing & Event Grid integration	Yes	Yes	Yes
HTTP, MQTT, and AMQP Protocols	Yes	Yes	Yes
Device Provisioning Service	Yes	Yes	Yes
Monitoring & diagnostics	Yes	Yes	Yes
Cloud to device messaging		Yes	Yes
Device & Module Twins		Yes	Yes
Device Management		Yes	Yes
Azure IoT Edge		Yes	Yes
Device Streams (in Preview)		Yes	Yes

Demo – Azure IOT Hub

IoT Hub Device Provisioning Service

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IoT Hub DPS – An Overview

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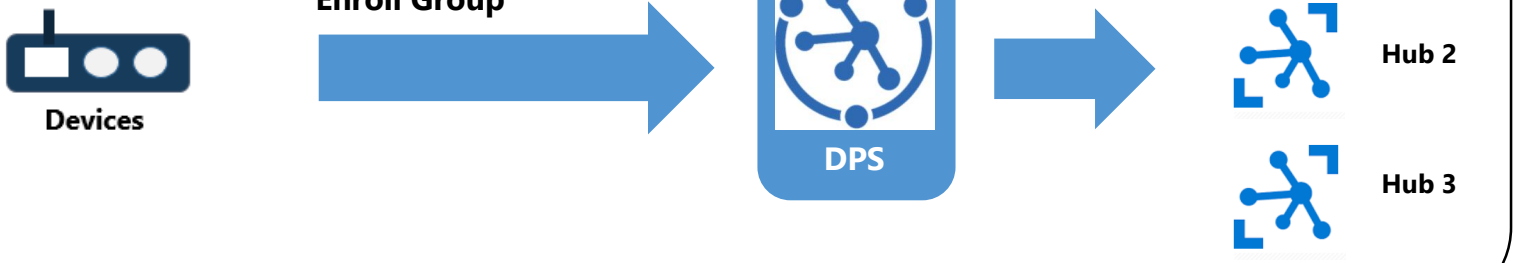
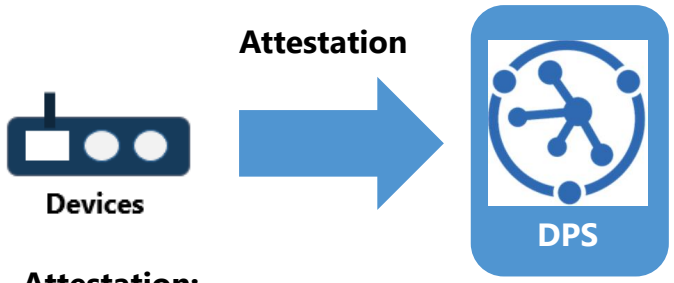
DPS is a helper service, Enables just-in-time provisioning of devices to an IoT hub without requiring human intervention.

Create Device Provisioning Service instance → Link IoT Hubs to DPS

Enrollment



Security



Attestation:

- Trusted Platform Module (TPM)
  - Strong Security
  - Complex
  - Individual enrollment only
- Symmetric Keys
  - Easy
  - Not that Secure
  - Individual enrollment only
- X.509 Certificates
  - Secure
  - Supports group enrollment

Azure IoT Edge

IoT Edge – An Overview

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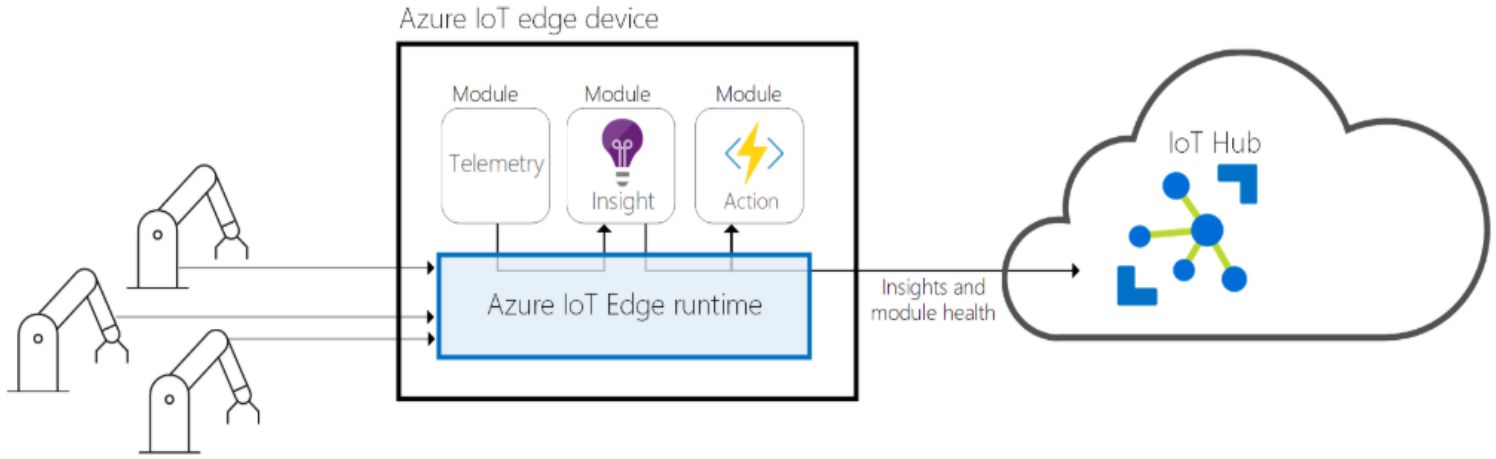
Create an IoT Hub → Register an IoT Edge device to IoT hub → Install and start the IoT Edge runtime on your device → Remotely deploy a module to an IoT Edge device → Edge Device starts sending telemetry to IoT Hub.



Azure IoT Edge Components

IoT Edge runtime:

- The Azure IoT Edge runtime is what turns a device into an IoT Edge device.
- Installs and updates workloads on the device
- Manages the modules deployed to device.
- Reports modules health to the cloud
- All Communication management

IoT Edge modules:

- IoT Edge modules are containers that run Azure services, third-party services, or custom Modules.

Cloud-based interface

- Enables you to remotely monitor and manage IoT Edge devices

Summary

- ✓ Business case explained
- ✓ Understood what is IoT & Why do we need it?
- ✓ Looked at Azure IoT Technologies & Solutions landscape
- ✓ Our proposed Solution Flow
- ✓ Discussed on Communication Patterns for various devices
  - IP Capable
  - Non IP, Low Energy, and Custom protocols
- ✓ Dived deeper on Azure IoT Hub
  - IoT hub creation
  - Endpoints, Message Routing, Protocols Supported
  - Security & Pricing tiers
- ✓ Had a quick overview of DPS & IoT Edge

Demo – Azure IOT Edge