OverNet EDUCATION

presenta

2015
WPC
MILANO
01-02//DICEMBRE

Who am I ? Contacts !

- Senior Software Engineer *(Leonardo Ricerche S.r.l.)*
- Microsoft MVP for Windows Embedded & IoT

"… constantly moving between the devices and the cloud …"

- «DotNetCampania» member
  - https://paolopatierno.wordpress.com
- «TinyCLR.it» member
  - http://www.tinyclr.it
- «Embedded101» board of director member
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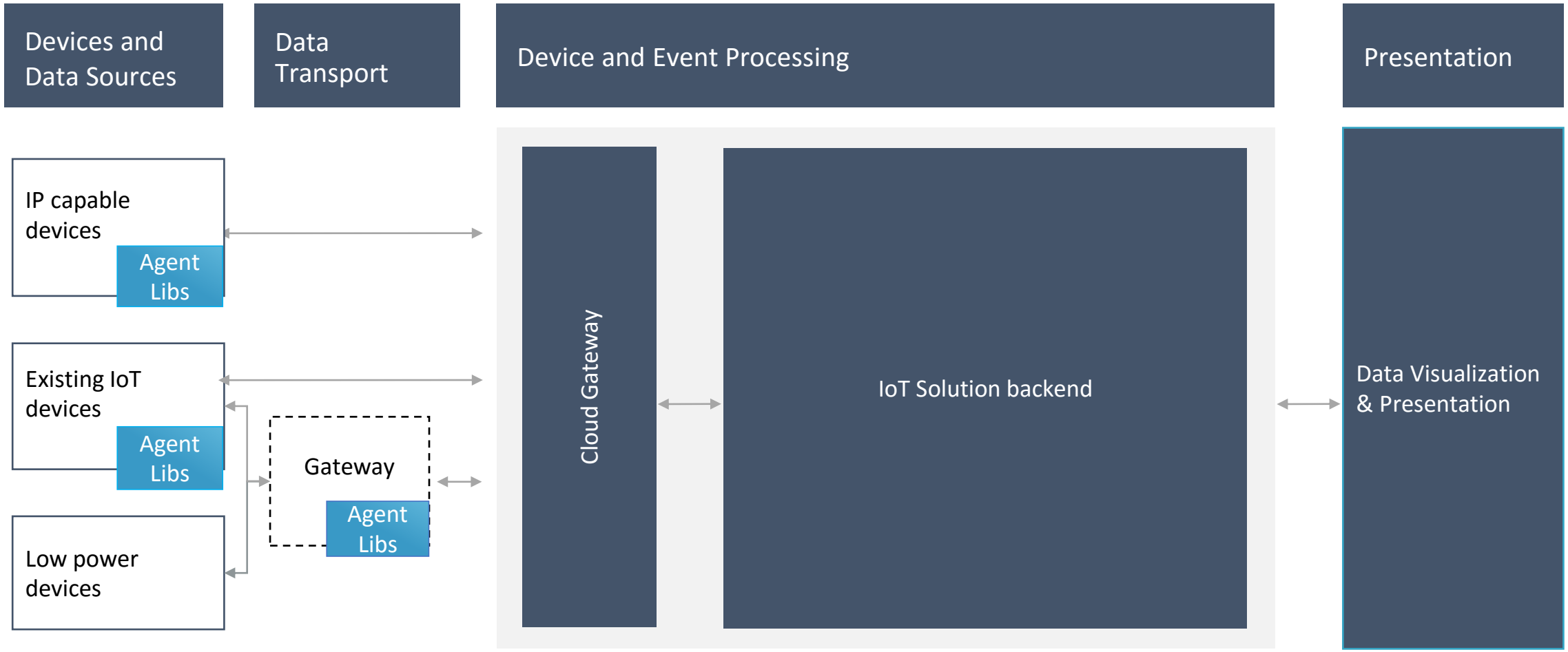
Agenda

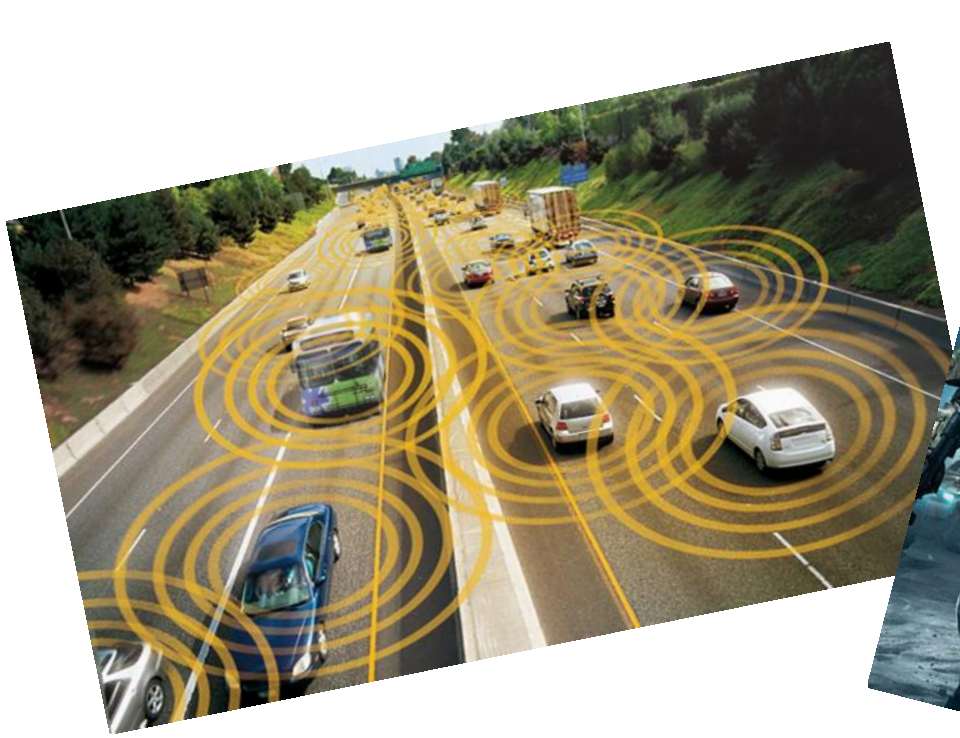
- IoT Reference Architecture
- IoT Cloud Gateway ? Why ? What ?
- IoT Hub architecture
  - features
  - endopoints
  - messagges
- Developing on IoT Hub : SDKs and Hardware
- Identity, Security & Authentication
- Provision a starting IoT solution : IoT Suite !
- Demo time

IoT Reference Architecture



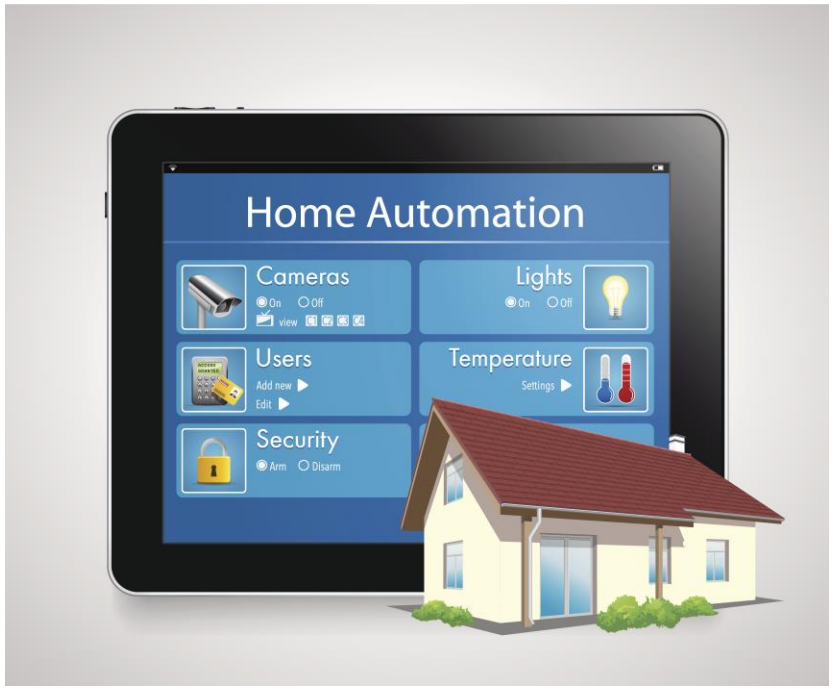
Telemetry

- Need to ingest million events/second from billion (??) devices



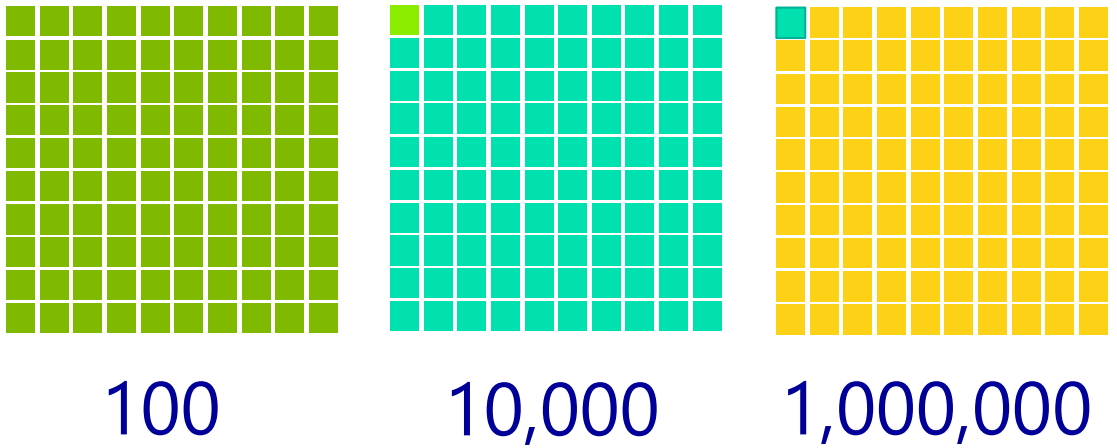
Command/Notification

- Need to control devices for executing command
- Need to notify devices with some useful information/events



Think at «scale»

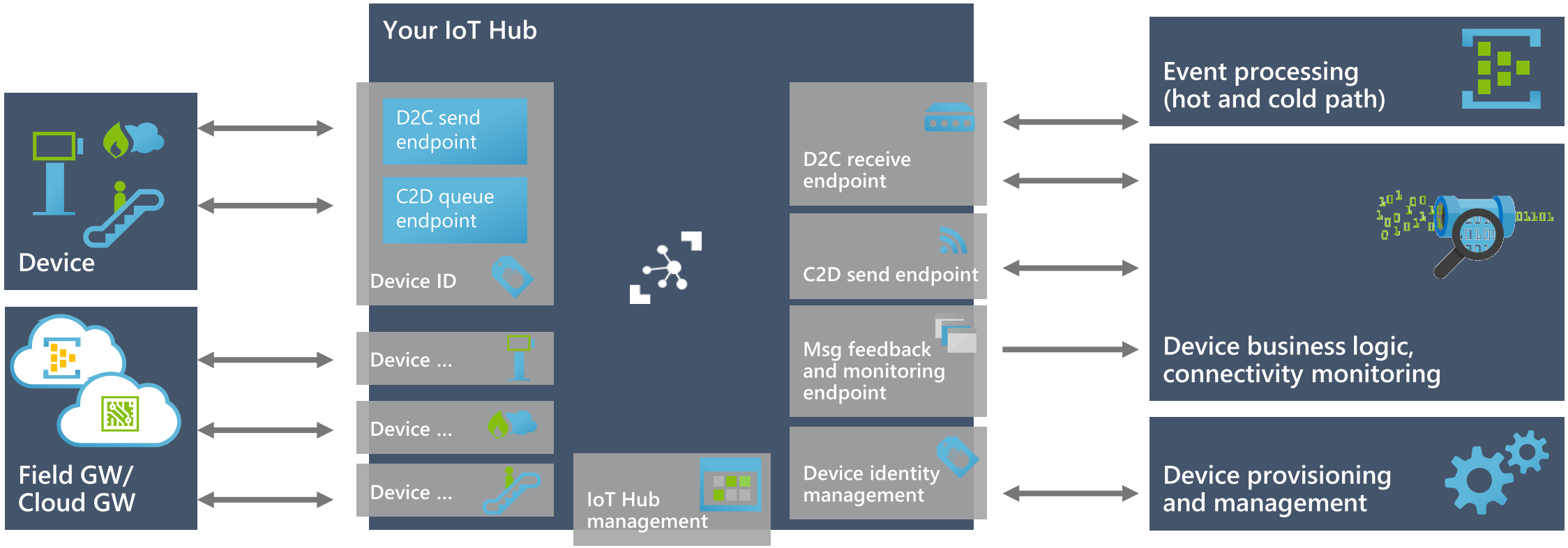
- Start «small» … to «big»
- Million clients
- Concurrent



Need for a “gate”

- Need for a «gate» to handle communication between :
  - Cloud services (and apps ?)
  - Devices

IoT Hub : the Azure IoT Cloud Gateway



IoT Hub : features

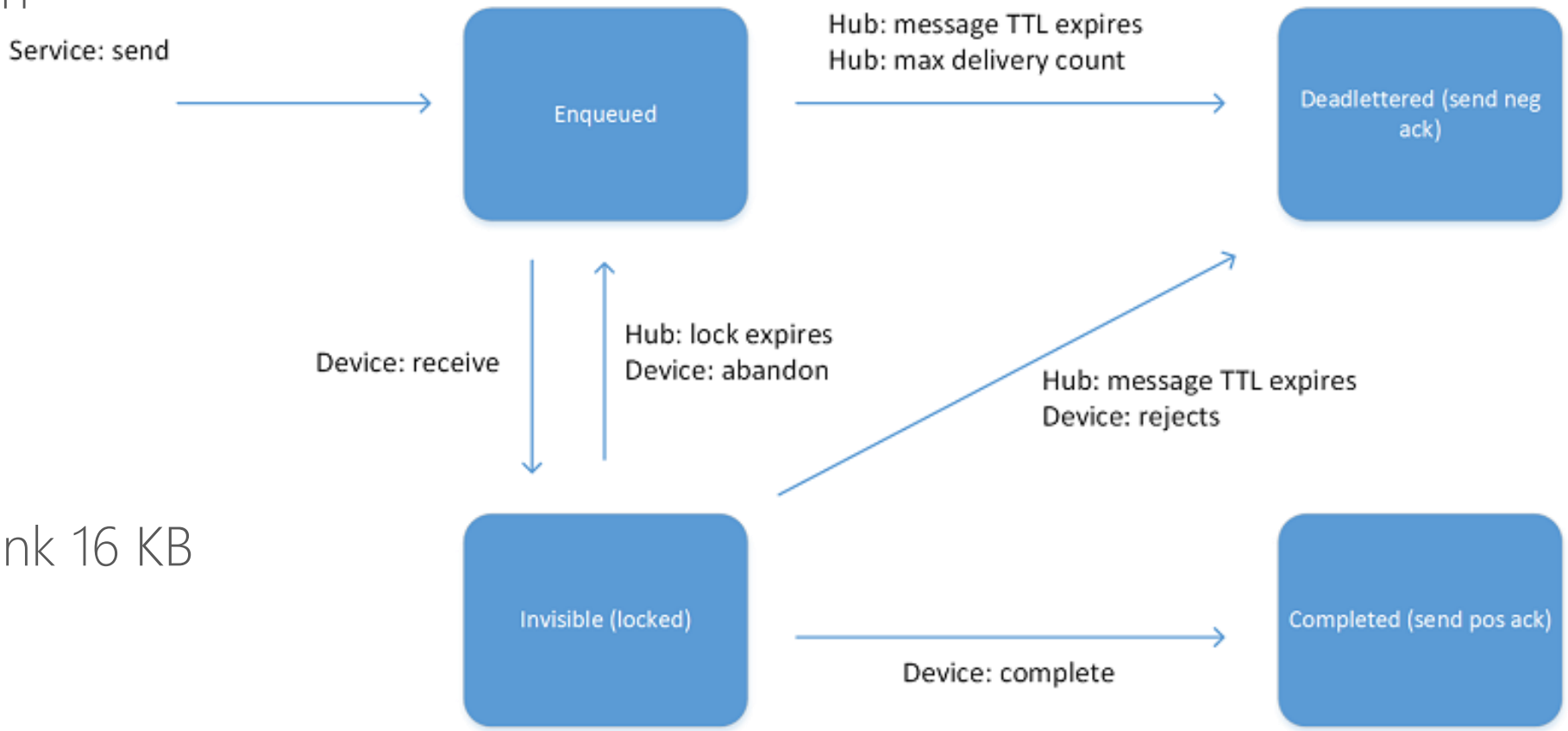
- Connection
  - bidirectional comunication
  - reliable & secure channel
  - per-device authentication
  - multiplexing
- Features
  - device to cloud telemetry
  - cloud to device commands and notifications (with TTL & feedback)
  - bulk uploads/downloads
  - monitoring devices (connection, activity, …)
  - multi protocols (AMQP, HTTP) → IoT Protocol Gateway (MQTT)

IoT Hub : endpoints

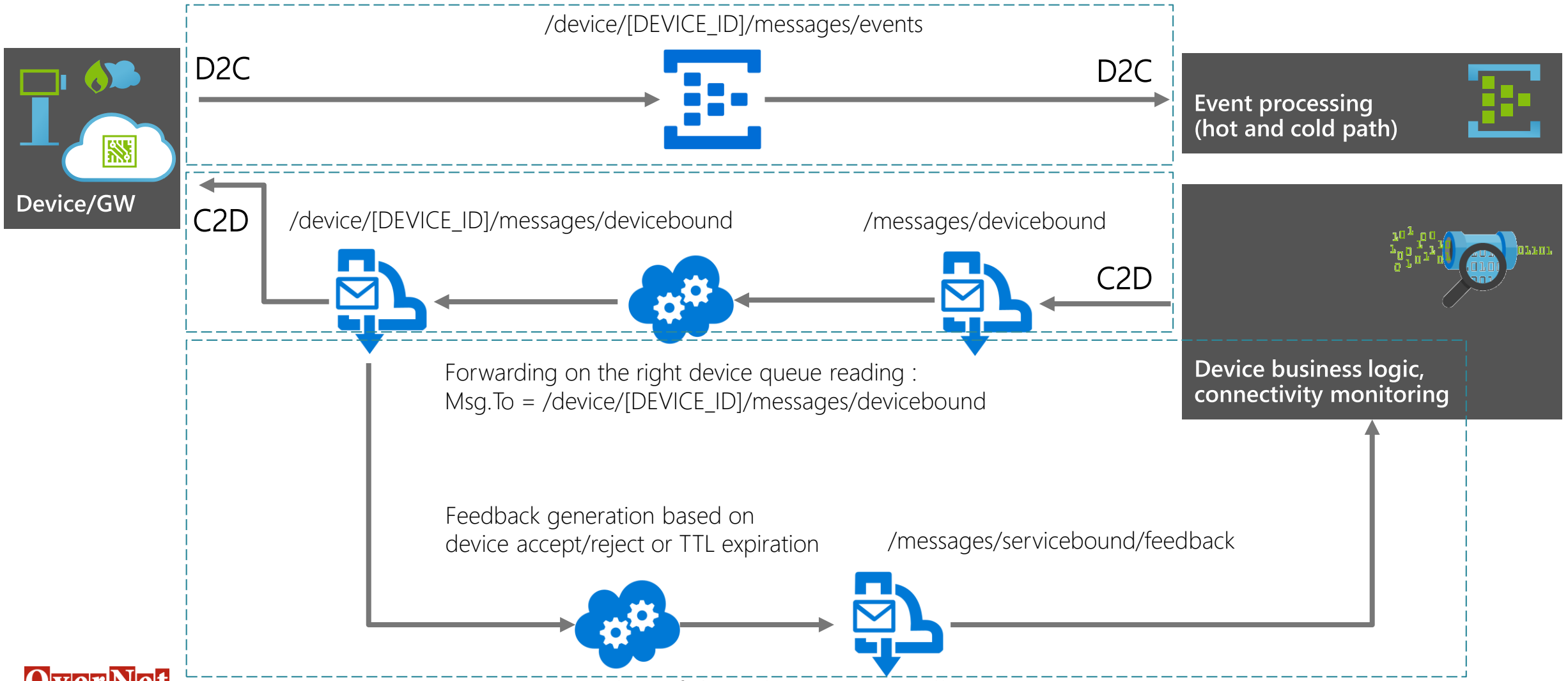
- Device To Cloud
  - D2C : **send messages to the cloud** (telemetry data, outcome for a received command or request for execution)
  - C2D : **receive commands** for executing the requested action. IoT Hub generates a feedback for the cloud
- Cloud To Device
  - C2D : **send messages** (ex. commands) **to the devices**. Like a queue and each message has a **TTL (Time To Live)**
  - D2C : **retrieve messages from device** (telemetry or outcome for commands). **Event Hubs compatible**. On a different path there are **feedbacks on command delivery**

IoT Hub : message lifecycle

- Service send
  - feedback (none, positive, negative, full)
  - feedback retention
  - message TTL
- Device receive
  - complete
  - abandon
  - reject
- Message size
  - Max 256 KB / chunk 16 KB



IoT Hub : internal architecture analogy



Developing on IoT Hub : SDKs

- For devices and field gateway
- Platforms
  - Windows
  - Linux
  - RTOS (freeRTOS), ARM mbed
  - Android, iOS
  - WEC2013 ? .Net MF ? Stay tuned !
- Languages
  - C#, C, Java, JavaScript (NodeJS)

- For back-ends and cloud gateway
- Languages
  - .Net C#
  - Java
  - JavaScript (NodeJS)

GitHub

No SDK for your platform ? Porting or … AMQP and HTTP directly !!

Developing on IoT Hub : Hardware

- Raspberry Pi 2
- MinnowBoard Max
- Dragonboard 410C
- Freescale FRDM-K64F
- TI CC3200
- …
- …
- Your board !!

Trusted partners to jumpstart your IoT project

The Microsoft Azure Certified for IoT program helps businesses get started on their IoT projects quickly by connecting them with an ecosystem of partners that have offerings that can easily connect to the Azure IoT Suite. Partners who are showcased in the Azure Certified for IoT program are trusted partners with tested and certified offerings who can help businesses with their IoT device and hardware needs.

Identity, Authentication & Security

- Identity
  - devices registry
  - provisioning APIs (create, delete, …)
  - monitoring (connection status, activity, …)
- Authentication
  - permission (r-only registry, r/w registry, device, service)
  - policy made with one or more permissions
  - per-device auth with SAS token (from device id and device key)
- Security
  - encrypted channel → SSL/TLS protocol

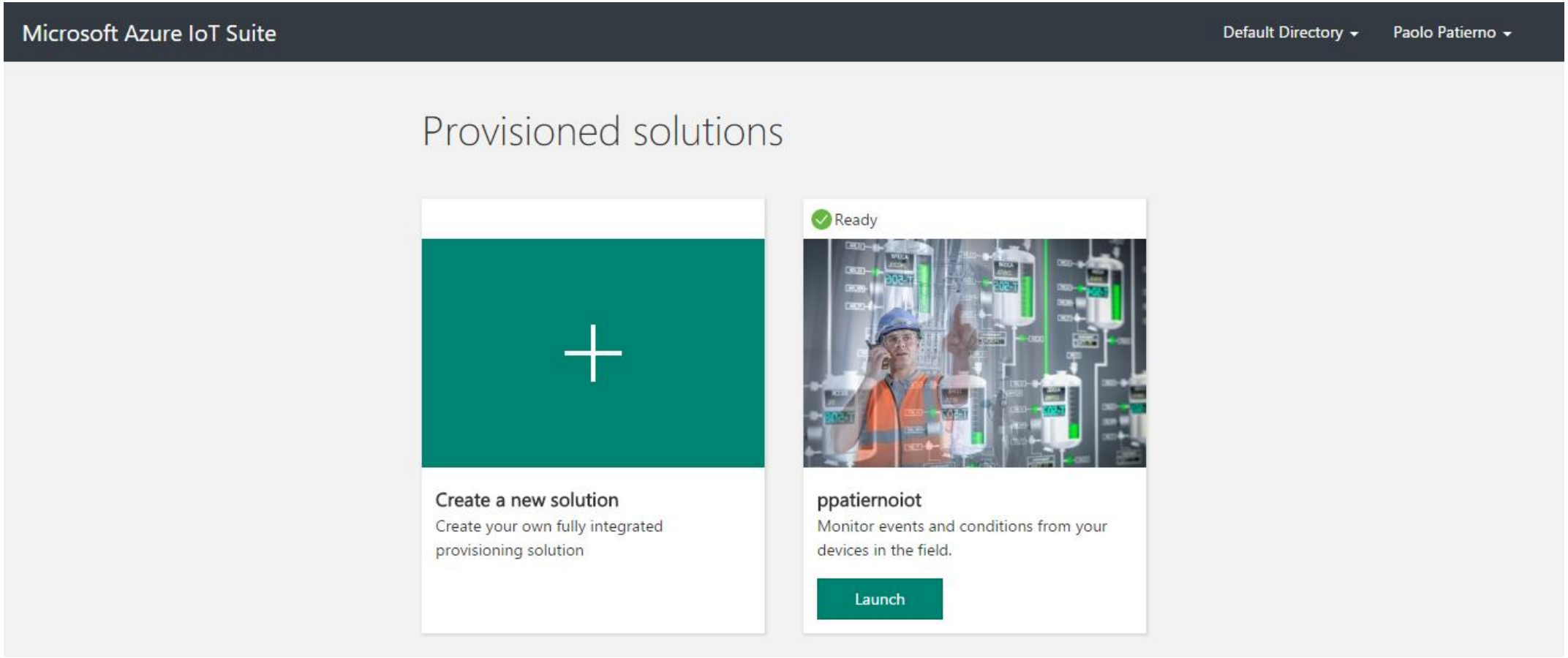
Prices, Quotas & Throttling

- prices based on :
  - IoT Hub units (up to 200 or … contact Microsoft Support)
  - number of devices
  - total number of messages/day
  - messages billed as 16 KB chunk
- throttling based on identity registry ops, device connections, D2C & C2D operations

EDITION TYPE	PRICE	NUMBER OF DEVICES	TOTAL NUMBER OF MESSAGES/DAY
Free	Free	10	3,000
S1 (Low Frequency)	€21.09	500	50,000
S2 (High Frequency)	€210.83	500	1,500,000

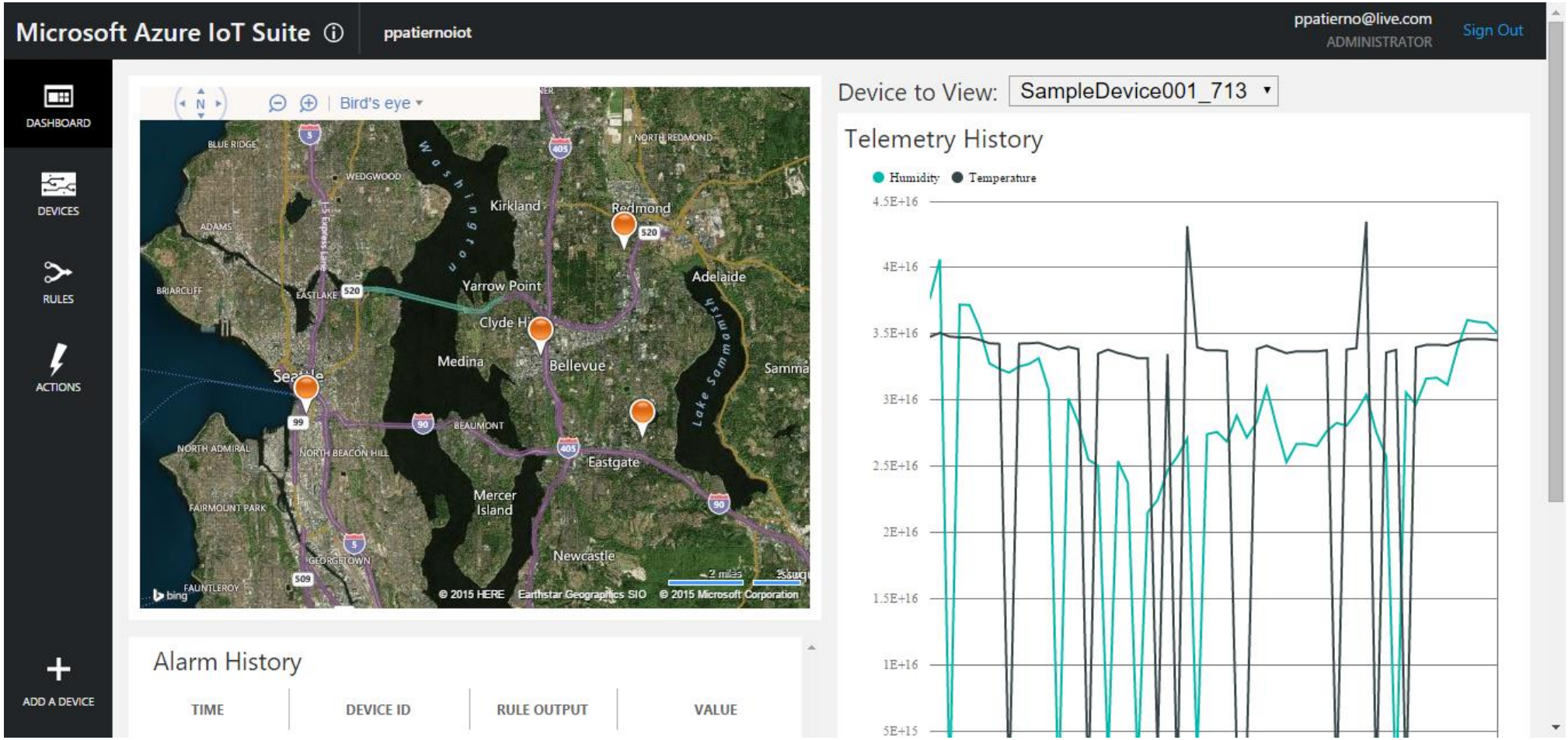
Provision a starting IoT solution : IoT Suite !

- Start from a preconfigured solution to customize …



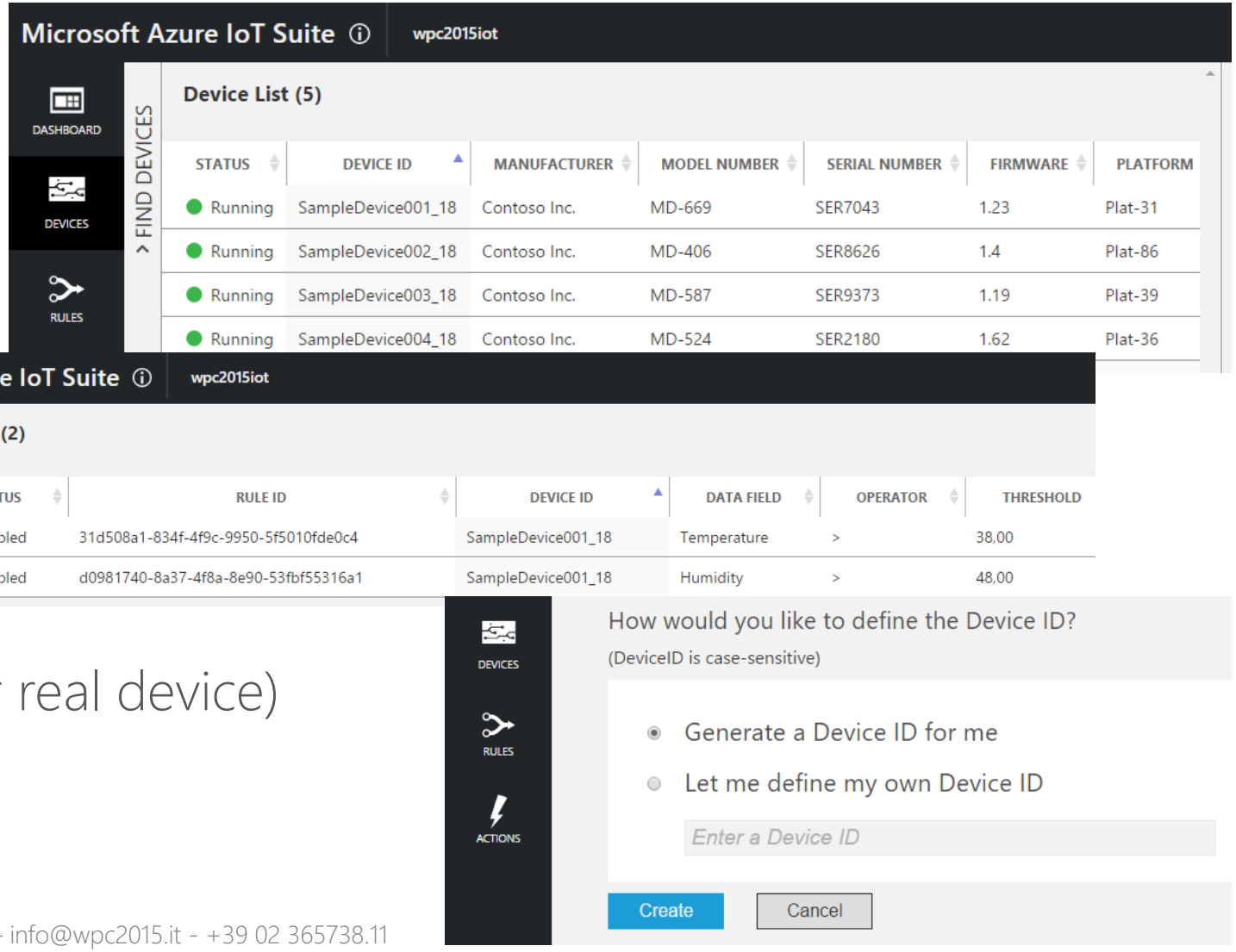
Azure IoT Suite Remote Monitoring

- http://www.azureiotsuite.com

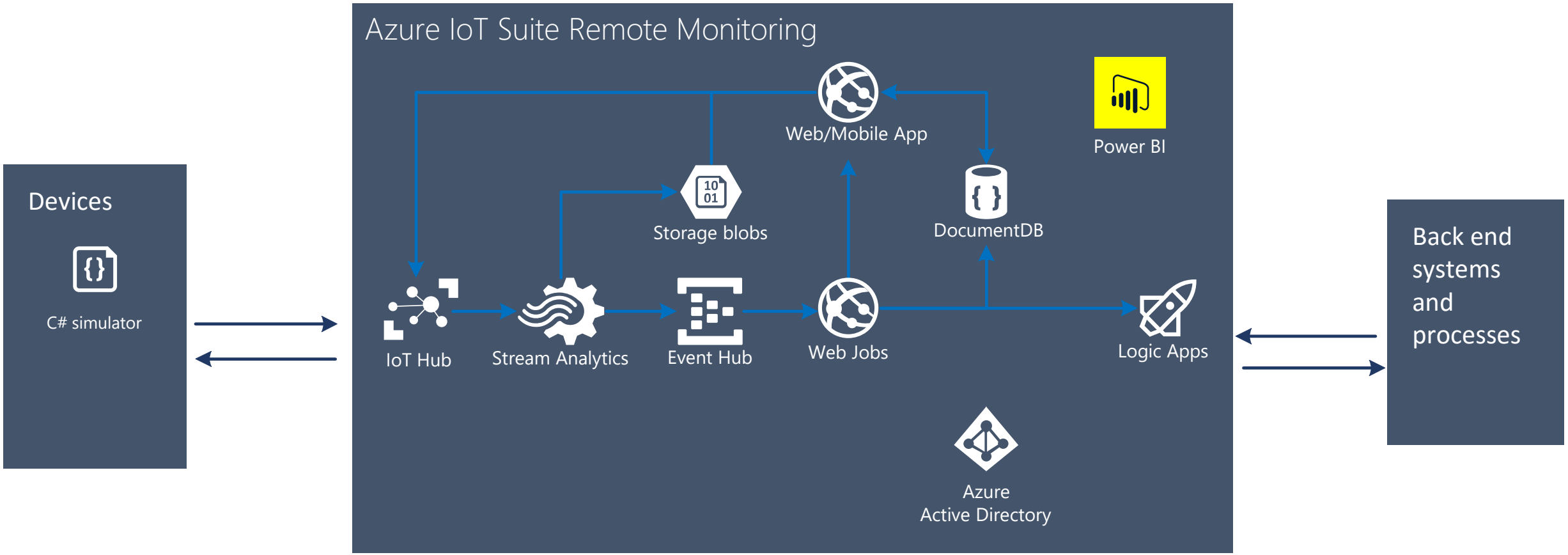


Azure IoT Suite Remote Monitoring

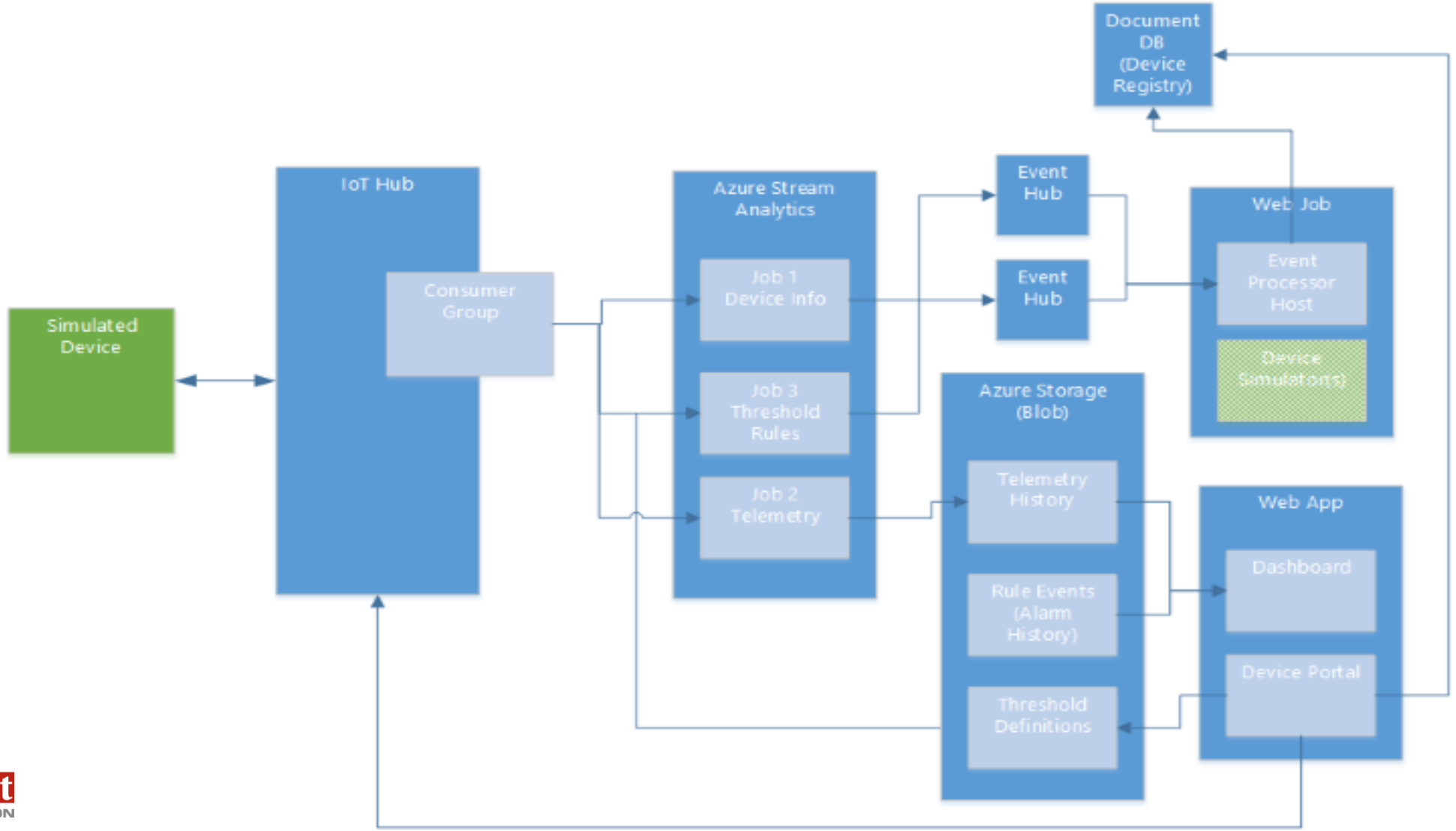
- Get started in few minutes
- Dashboard
  - devices location
  - data visualization in real time
  - alarm history
- Manage devices
  - enable/disable
  - commands
  - add your devices (simulator or real device)
- Modify rules and actions



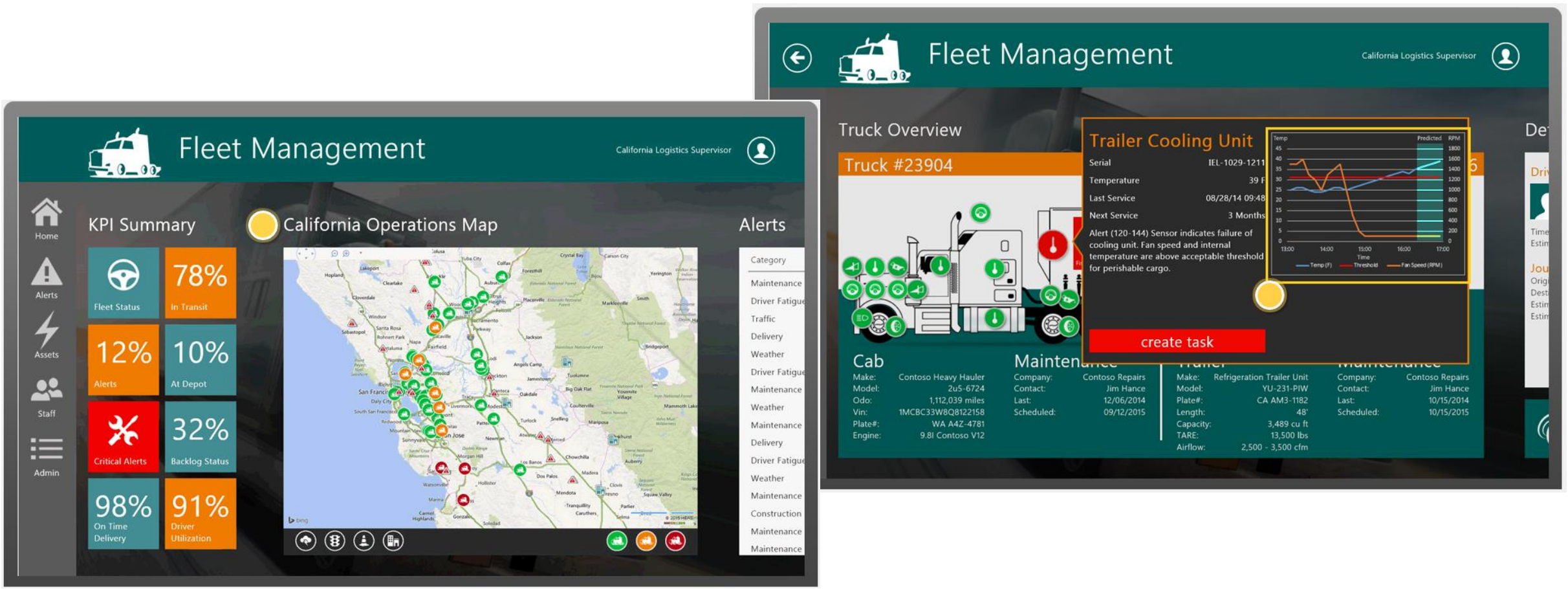
Azure IoT Suite Remote Monitoring : the services



Azure IoT Suite Remote Monitoring : the services



Azure IoT Suite Remote Monitoring Demo



References & Links

- Azure IoT Hub : https://azure.microsoft.com/en-us/services/iot-hub/
- Azure IoT Suite : http://www.azureiotsuite.com
- Azure IoT Dev center : http://www.azure.com/iotdev
- Azure IoT SDKs : https://github.com/Azure/azure-iot-sdks
- Azure Certified IoT : https://azure.microsoft.com/en-us/marketplace/certified-iot-program/
- Let's connect : https://azure.microsoft.com/en-us/develop/iot/get-started/
- IoT Protocol Gateway : https://github.com/Azure/azure-iot-protocol-gateway
- Azure IoT Remote Monitoring : https://github.com/Azure/azure-iot-remote-monitoring

References & Links

- IoT Hub vs AWS IoT : https://paolopatierno.wordpress.com/2015/10/13/an-iot-platforms-match-microsoft-azure-iot-vs-amazon-aws-iot/
- IoT Hub connection using AMQP stack :
  - https://paolopatierno.wordpress.com/2015/10/24/connecting-to-the-azure-iot-hub-using-an-the-amqp-stack/
  - https://paolopatierno.wordpress.com/2015/10/31/azure-iot-hub-commands-and-feedback-using-amqp-net-lite/
  - https://paolopatierno.wordpress.com/2015/11/02/azure-iot-hub-get-telemetry-data-using-amqp-stack-and-azure-sb-lite/

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