



MCHP Cloud Gateway Rick Dudley



## Agenda

- What is a cloud gateway?
- Why use a cloud gateway?
- What's the difference between Alexa/Google home automation and a cloud gateway?
- What markets are adopting cloud data acquisition
  and local processing
- Secure the cloud gateway registration
- How to create an AWS cloud gateway and AWS nodes with MCHP MPU's and CPU's



### Edge computing terms and definitions

- Edge:
  - What the edge is depends on the use case.
- Edge computing:
  - The buildout of edge computing systems in telecommunications systems.
- Edge devices:
  - These can be any device that produces data or controls a physical device.

#### • Edge gateway:

- A gateway is where edge computing processing is done and a buffer to the broader network.
- Also known as cloud edge computing

#### • Lambda, Docker:

- A function that can be executed on the cloud edge gateway.
- Fat client:
  - Software that can do some data processing in edge gateway. This is opposed to a thin client, which would merely transfer data (Router).



## What is a cloud gateway?

#### Goes by many names

- Greengrass, IoT Hub, Google IoT, MS Azure, Edge computing
- In the end it is "Edge computing"

#### • Edge computing

- Think Globally, act locally
- Allows data produced by internet of things (IoT) devices/nodes to be processed closer to where it is created. Unlike Alexa, Cortana or Google home devices.
- Collect data locally, act on it local, data sent to the cloud occasionally

#### • Is it a router?.....

- But it does have network connectivity....
- Is Alexa or Google home a gateway?



### Is Alexa/Google home a cloud gateway?

#### • Today No...

- Currently still requires constant connectivity
- Recognition and responses are still currently processed in the cloud.
- Control of end node devices is from the cloud
- While retail consumers tolerate the reliability of Alexa and its kind, industrial and commercial customers will not.



## Functions of a cloud gateway?

- Network connectivity
- Local data repository (storage)
- Local Compute functions
  - Machine learning
  - Artificial intelligent
  - Local Compute functions
- System resilience
  - Will continue to support local actions with no cloud connectivity
- Edge device management
  - Node registration
  - Update (application and compute function today)





























































## Why use a cloud gateway?

#### • Connectivity isn't a constant and it's not cheap.

- While consumers might be willing to trade the reliability of Alexa and its ilk, enterprises and industrial conglomerates are not.
- 3 Laws
  - Law of Physics. Customers want to build applications that make the most interactive and critical decisions locally, such as safety-critical control. .
  - Law of Economics. In many industries, data production has grown more quickly than bandwidth, and much of this data is low value.
  - Law of the Land. In some industries, customers have regulatory or compliance requirements to isolate or duplicate data in particular locations.

#### • Ease of development, test and deploy

- Build a local function in the cloud environment
- Test in the cloud
- Deploy to one or many





### Benefits of a cloud gateway?

- Scalable computing
- Open Architecture:
- Efficiency:
- Data management:
- Resiliency:
- Low Latency:
- Connectivity Security:





### **Greengrass Gateway security**

#### Not to be confused with device security





AWS Greengrass Group









At the start, the core will load the config file indicating to use the HSI interface







Request the public core key, using the HSI and the PKCS#11 protocol



Public-Key Cryptography Standards





Public Corekey is transferred to Greengrass Core







with the corekey







Greengrass Core Authenticates to the cloud with the corekey

NOTE: Only has to initially connect to the cloud once











Greengrass core requests serverkey for MQTT node server







#### Greengrass core starts MQTT server







#### Greengrass core starts MQTT server













### Markets



## What markets

### Industrial/Factory

- Automation
- Environmental control
- lighting control
- Fire detect
- Access control

### • Agriculture

- Irrigation control (herbicides, pesticides insertion)
- Weather
- Equipment management

### Medical

- Environmental control
- lighting control
- Presence detection

### Construction

- Presence detection
- Site management
- Security
- Equipment management
- Oil field services
  - Measurement and control



## Single GW sensor function



## Single GW control function MICROCHIP





## Peer to peer solution





## **Cloud Edge Irrigation control**





## **Cloud Edge Irrigation control**

#### **Local Edge Compute Functions**

Moisture detection Is water needed Irrigation valve control Open-Close Pump motor control On-off, Speed Speed based on req volume Rate and Volume monitor How much at what rate Total usage per cycle Pump Power monitoring Power vs. rate/Volume Power used per cycle Run time, TOD

Tank level monitoring Motor control input Store Raw and Compute data





## **Cloud Edge Irrigation control**

#### **Cloud connection update**





## How to build your cloud edge environment



### Your cloud gateway



With the SAMA5D2-XULT board you are ready to develop your cloud gateway today!



### FreeRTOS PIC32MZ-EF

- PIC32MZ2048EFM100 32-bit MCU
- ATWINC1500 IoT network controller
- LAN8720A PHY Daughter Board







Λ

1 in / 2.5 cm

V