

Connect Armadillo-IoT GW A6 DoorsMonitor device to your Azure IoT services

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Introduction

About this document

This document describes how to connect Armadillo-IoT GW A6 DoorsMonitor to Azure IoT Hub using the Azure IoT Explorer with certified device application and device models.

IoT Plug and Play certified device simplifies the process of building devices without custom device code. Using Solution builders can be integrated quickly using the certified IoT Plug and Play enabled device based on Azure IoT Central as well as third-party solutions.

This getting started guide provides step by step instruction on getting the device provisioned to Azure IoT Hub using Device Provisioning Service (DPS) and using Azure IoT Explorer to interact with device's capabilities.

Armadillo-IoT GW A6's "doors monitor" configuration has capabilities:

1. Receive the door open/close notification from open/close sensors via EnOcean and send the door's state as telemetry.
2. Reboot by Cloud2Device message.

Prerequisites

You should have the following items ready before beginning the process:

For Azure IoT Central

- [Azure Account](#)
- [Azure IoT Central application](#)

For Azure IoT Hub

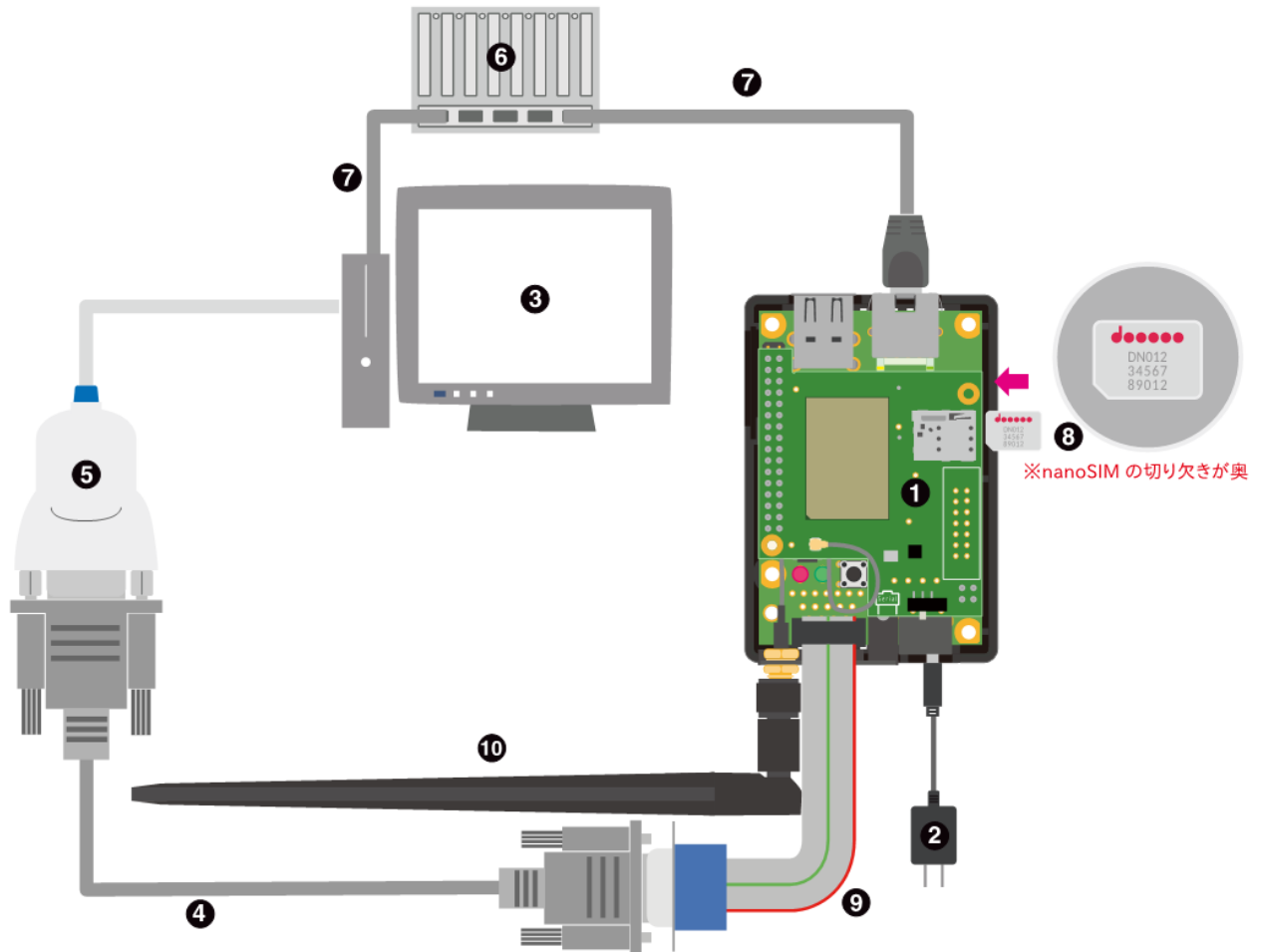
- [Azure IoT Hub Instance](#)
- [Azure IoT Hub Device Provisioning Service](#)

- [Azure IoT Public Model Repository](#)

Prepare the Device.

Hardware Environmental Setup (Estimated time: 10-20 minutes)

- Prepare Armadillo-IoT GW A6. See below figure. (1) is the Armadillo-IoT GW A6.



- (1): Armadillo-IoT GW A6
- (2): power adaptor (accessory of the Armadillo-IoT GW A6)
- (3): your PC
- (4): RS-232C cross cable (accessory of the Armadillo-IoT GW A6)
- (5): USB-Serial adaptor (accessory of the Armadillo-IoT GW A6)
- (6): LAN Hub
- (7): LAN cable
- (8): nanoSIM card
- (9): serial conversion cable (D-Sub 10 to 9 pin)
- (10): LTE antenna

- Connect PC to Armadillo-IoT GW A6 with RS-232C cross cable and USB-Serial adaptor, and serial conversion cable. (Above figure's (4) and (5), and (9). The detailed description is [here \(in Japanese\)](#))
- Prepage the software for serial communication such as Tera Term (for Windows), minicom (for Linux). The detailed descriptions is [here \(in Japanese\)](#)
- Connect power adaptor with the device (Above figure's (2)).
- Connect LAN cable with the device (Above figure's (7)).

- Prepare Armadillo-IoT GW A6 DoorsMonitor device. See below picture.



In the picture, the EnOcean receiver ([EnOcean USB 400J](#)) is attached to Armadillo-IoT GW A6's USB port. The receiver communicates with the door open/close sensor ([EnOcean EMCSJ](#)) via 928MHz radiowave of EnOcean protocol. You can purchase both USB 400J and EMCSJ from listed vendors on these product's page or resellers. [This page](#)'s picture shows how to install EMCSJ and the magnet wich pairs to the EMCSJ to door.

Software Environmental Setup (Estimated time: 30-50 minutes)

Armadillo-IoT GW A6's "doors monitor" configuration has capabilities:

1. Sense the environment with attached environmental sensor and send measured values as telemetry.
2. Reboot by Cloud2Device message.

The setup instruction is:

- Login to the device from PC using the software for serial communication.
- Update the installed package using apt. (*Estimated time: 2 minutes*)

```
# apt update  
# apt upgrade
```

- Install Python 3 (version 3.7.3) and pip3

```
# apt install python3  
# apt install python3-pip
```

- Install Azure IoT device SDK for Python

```
# pip3 install azure-iot-device
```

- Install pyserial for USB-CDC (USB-Serial) communication with python

```
# pip3 install pyserial
```

- Install git for setup the devie code

```
# apt install git
```

- Install the device application

```
# cd  
# mkdir work  
# cd work  
# git clone https://github.com/atmark-techno/Azure-IoT-samples.git
```

Prepare IoT Hub and DPS configuration

Please refer to [this tutorial](#) to complete the following procedures:

1. Use [Azure CLI](#) or Azure portal to create a Resource Group, and an IoT Hub, a DPS (Device Provisioning Service). Azure CLI can be installed and run on your PC. Please refer [this guide](#) to install it. When you use Azure CLI locally (i.e. on your PC), you should [sign in](#) at first.
2. Link the DPS instance to your IoT Hub instance.
3. Create a device by individual device enrollment in your DPS instance.
4. Make a note of the DPS information (DPS ID Scope, Device ID, Symmetric Key)
5. Set the DPS information got from the former step in work/Azure-IoT-samples/Armadillo-IoT_GW/a6_doorsmon_config.json

```
{
  "auth": {
    "IOTHUB_DEVICE_DPS_ENDPOINT": "global.azure-devices-provisioning.net",
    "IOTHUB_DEVICE_DPS_ID_SCOPE": "",
    "IOTHUB_DEVICE_DPS_DEVICE_ID": "",
    "IOTHUB_DEVICE_DPS_DEVICE_KEY": ""
  },
  "send_interval": 2,
  "thermalsense_interval": 2,
  "disable_reboot": false,
  "disable_whitelist": false
}
```

Run the device application

```
# python3 ./azure_a6_doorsmon.py
```

Try to using Azure IoT explorer with your IoT Hub. You can see the status of your device and telemetry, etc. Please refer to [this guide](#).

If you'd like to stop the application, type 'Q' and Enter.

Connect to Azure IoT Central

1. Create an application

You can create an IoT Central application using the Azure CLI.

```
az iot central app create -n <app name> -g <resource group name> -s <subdomain name; equal with appname> -p ST0 -l <location; e.g. "japan">
```

Or please refer to [this tutorial](#) to create a "Custom application" template. After create the IoT Central app, you can navigate to it from the Resource Group at Azure portal.

2. Get connection information

To configure a device connect to Azure IoT Central you need the following

- ID scope: In your IoT Central application, navigate to Administration > Device Connection. Make a note of the ID scope value.
- Group primary key: In your IoT Central application, navigate to Administration > Device Connection > SAS-IoT-Devices. Make a note of the shared access signature Primary key value.

To generate a device specific key from the group SAS key you just retrieved using the Azure CLI

```
az extension add --name azure-iot
az iot central device compute-device-key --primary-key <the group SAS primary key value> --device-id <device ID>
```

Make a note of the generated device key, and the ID scope for this application and set it to the a6_doorsmon_config.json file.

3. Run the device application

If running, stop the device application, and start it with new setting (for IoT Central app). When the device application start sending telemetry, you will see the device at your IoT Central App's "Armadillo-IoT GW A6 doors monitor" device group. See properties with IoT Central App's view. (Unfortunately, IoT Central's "Overview" page couldn't show the door sensor's telemetry. You need use [the Analytics UI](#).)

Additional information

With Azure CLI, you can change the writable property of the device which connecting your IoT Central app. Try following procedure:

1. Get your access token for IoT Central and note it. Note the value of 'accessToken' from the command response.

```
az account get-access-token --resource https://apps.azureiotcentral.com
```

2. If not running, run the device application
3. Invoke REST API with access token you retrieved at former step

```
az rest --method PATCH --url https://{IoT Central app name}.azureiotcentral.com/api/preview/devices/{Device ID}/properties --body "{ \"051aa981\": 1, \"051aa982\": 1}" --headers "{ \"Authorization\": \"Bearer <access token>\"}"
```

It must be replace '{IoT Central app name}', '{Device ID}', '{access token}' with the name of your IoT Central app, the device ID, and access token respectively. When the REST API invocation succeeded, the white list of door open/close sensors will change to includes '051aa981' and '051aa982'. If the setting file's "disable_whitelist" is false, the doors monitor ignores notification from sensor which is not included in white list.

Additional Links

Please refer to the below link for additional information for Plug and Play

- [Manage cloud device messaging with Azure-IoT-Explorer](#)
- [Import the Plug and Play model](#)
- [Configure to connect to IoT Hub](#)
- [How to use IoT Explorer to interact with the device](#)
- [How to analyze each item of the complex telemetry data](#)
- [How to set up email notification in your IoT Central application](#)