AWS IoT Getting Started Guide for Renesas RX63N

Getting started guide

Introduction

AWS IoT is a platform that enables you to connect devices to AWS Services and other devices, secure data and interactions, process and act upon device data, and enable applications to interact with devices even when they are offline. For more information on AWS IoT visit http://aws.amazon.com/iot.

This document will guide you through connecting your YRDKRX63N board, ensuring the board has established a connection with AWS IoT and direct you to a web page to allow you to interact with your YRDKRX63N. Because of the way AWS IoT provisions security certificates, this demo will initially connect to a Micrium controlled AWS account. This allows us to have a web page that interacts with your demo kit. To connect the YRDKRX63N to your own AWS account, you will need to go through the steps for setting up an AWS account, provision your own certificates and compile them into the code. To get this guide and the required software please visit http://www.micrium.com/awsiot and fill out the contact form to obtain the software.

Objectives

After completing this getting started guide, you will be able to:

- See your YRDKRX63N-based AWS IoT device establish a connection to the AWS IoT platform
- Understand how the Smart Home Gateway simulation is set up and how it connects to AWS IoT
- See and use bidirectional communication to and from the YRKDRX63N from a web page
1. Getting the board connected

1-1. Powering and connecting the YRDKRX63N

First, connect the ethernet cable to ethernet jack on the YRDKRX63N as shown above.

Next plug in the included USB mini cable into the J-Link USB as shown in the image above.

At this point the LCD screens should light up and you should see it attempting to obtain an IP address via DHCP. Once it receives an IP address it will attempt to establish a connection to AWS IoT.

Initially it may read out “MQTT Not Connected” but that is just displayed while it attempts to connect to AWS IoT. Once that changes to “Pub: 0 Sub: 0” you have sucessfully established a connection with AWS IoT.

1-2. Troubleshooting:

The LDC screen reads “Unable to start” “Error code: 30”.

Check the ethernet cable. Ensure the cable is connected to an active network connection. This error code means the DHCP client was unable to obtain a IP address on the network. Once you have corrected the problem, hit the reset button.

The LCD Screen reads “MQTT Not Connected”

The YRDKRX63N connects to AWS IoT via port 8883. Ensure that port is is not blocked by a firewall. Once you have corrected the problem, hit the reset button.
2. Using the Smart Home Gateway Simulation

2-1. Smart Home Gateway Overview

The Smart Home Gateway simulation shows how the RX63N could be used as a gateway device to handle the interaction between appliances and temperature sensors to AWS IoT. The idea is an appliance or temperature sensor may have Personal Area Network connection (Bluetooth, ZigBee, Wireless USB, etc.) instead of a Local Area Network connection that provides a connection to the internet. This gateway would be the connection point all of the devices on the PAN to connect to the internet. In this simulation the PAN is simulated by the buttons and potentiometer on the YRDKRX63N.

The connection between the YRDKRX63N and AWS IoT is done via a protocol call MQTT. More information on MQTT can be found on the AWS IoT website, as well as here http://www.mqtt.org.
The Smart Home Gateway has a few different components to it. Currently two features are implemented:

- Appliances
- Temperature sensors

In the future the ability to trigger alarms based on the temperature sensor values will be implemented, as well as more control over how often messages are sent.

2-2. Appliances

The Smart Home Gateway simulation has three appliances: Dishwasher, Lamp and a Dryer. As shown in the image above you can scroll through the appliances and change their state using Switch 1 and Switch 2 on the YRDKRX63N. Anytime an appliance’s state is changed a MQTT message is immediately published to AWS IoT.

2-3. Temperature Sensors

The Smart Home Gateway simulation also has three temperature sensors: Kitchen, Family Room and Garage. You can change the temperature sensor using Switch 3, and you can use the potentiometer to change the actual temperature value. Similar to the appliances, any time a temperature value is changed it is immediately published to AWS IoT.
3. Interacting with the Smart Home Gateway

3-1. Connecting from the web to the YRDKRX63N

Open up a web browser to the following address: http://mqtt.micrium.com. You will be presented with a page that looks similar to the image below.

In the Thing ID box, enter the MAC address as shown on the YRDKRX63N's LCD screen. The notification boxes on the right side of the screen will turn green when it is receiving data from the YRDKRX63N. It can take up to half a minute to establish a connection with the board because it is waiting for the status update from the Smart Home Gateway. If you see your publish counter increasing on the LCD screen but the boxes are not turning green, check the Thing ID you have entered.
3-2. Controlling the Smart Home Gateway

On the appliance page you will be presented with a page similar to the one below. You can toggle the appliance state, or if you change the state on the YRDKRX63N you should see that state change reflected on the web page.

On the temperature page, you can not set the temperature but you can see the current temperature values and any change made to the temperature via the potentiometer is immediately reflected on the web.
4. Moving beyond the Smart Home Gateway

The Smart Home Gateway is a simple example that shows connectivity to AWS IoT and just the beginning of what can be accomplished. Once the data is passed into AWS IoT it is possible to route that information to different AWS services such as DynamoDB, Lambda, SNS, Kinesis, S3 or even back into AWS IoT.

As mentioned in the overview, for you to be able to use this demo with your own AWS account you will need to contact Micrium for a copy of the source code and a detailed guide on provisioning a certificate and adding it to the source code for the YRDKRX63N. The web page portion of this project will not be able to connect to your own AWS account but Micrium can provide the web portion of the project as well for you to set up in your own AWS cloud.

Please visit http://www.micrium.com/awsiot for more information.