User Guide

Manufacturing Guide

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Ayla Networks

Referenced Documents

Ayla Networks does not supply all documents that are referenced in this document with the equipment. Ayla Networks reserves the right to decide which documents are supplied with products and services.

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1 Introduction

This document describes:

- The steps in manufacturing with an Ayla Enabled Module
- The steps for moving from Development to Ayla Field Service

NOTE The steps for Linux-based (devd/appd) solutions are not included in this document.

1.1 Audience

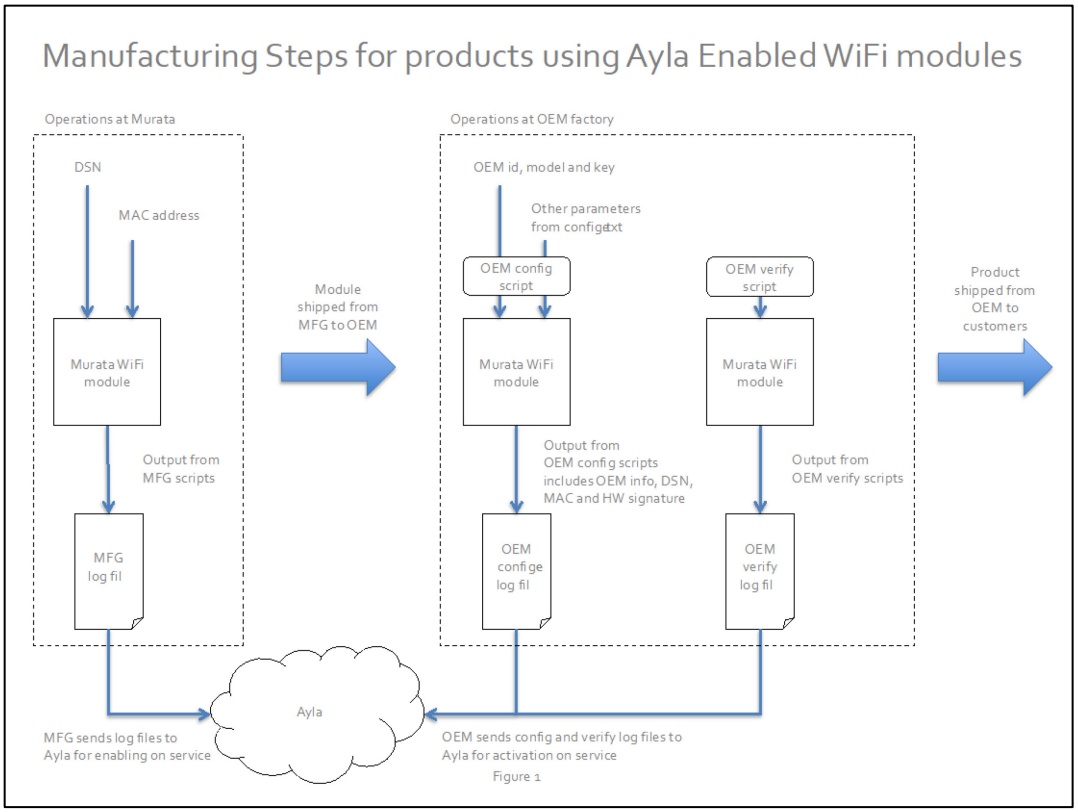
This document is written to the individual(s) responsible for performing, or overseeing, the manufacturing process and move to the Ayla Field Service. The information in this document is specific to the Ayla Enabled Wi-Fi modules.

1.2 Related Documentation

- OEM Package Setup and Installation Quick Start (AY006GOP3)
- Module Firmware Update Manual (AY006MUU0)
- Ayla Customer Dashboard User's Guide (AY006UDB3)
- OEM Installation Guide (AY006DSU0)

2 Overview

Figure 1. Manufacturing Process for Using Ayla Enabled Modules



This document is focused on providing detail for each of the steps illustrated above in Figure 1. Ayla's customers should understand the entire process from module vendor -> to OEM Production facility > to the final finished product.

Important: Each component of this process must be performed in sequence to ensure accuracy and reliability in production runs.

2.1 Requirements

The following items are required.

- An Ayla Enabled Module or SIP
- An Ayla Developer account – required if you choose to perform tests that connect the module to the Ayla service and/or you want to verify device connectivity with the service portal
- A Windows PC (or Virtual Windows PC)– to run the TCL scripts in the OEM package with the appropriate TCL version installed

- An FTDI TTL-232R-3V3 USB to TTL Serial Cable (part # 895-TTL-232R-3V3) for communicating with the module and to enable module or SIP configuration
- A wireless AP (access point) to test connectivity

3 Ayla Cloud Services

The Ayla Cloud Service consists of two independent services, the Ayla Developer Service, and the Ayla Field Service. Details about each service is provided below.

3.1 Developer Service – Developers Portal

The Ayla Developer Service provides a secure and stable environment for creating, building, and testing devices. The Developer Portal, which allows access to the developer service and is used for device creation, as well as the developer OEM Dashboard, includes a suite of tools and production-ready components. Devices visible on the Ayla Developer Portal are connected to the Ayla Developer Service. This environment is a complete separation from the Ayla Field Service described later in this document. Ayla encourages our customers to maximize their use of the Ayla Developer Service, customers are strongly encouraged to test, break, and repeat until a quality production template is created on stability, feature performance, and end-to-end connectivity using the developer service.

The Ayla Developer Portal is located at: https://developer.aylanetworks.com

3.2 Field Service

The Ayla OEM Dashboard is the only portal that is used for the Field Service. However, The Developer Portal provides for production-quality field tests and completion of final end user devices. Once a customer has received approval from Ayla, the device is "pushed" to the Ayla Field Service.

Field Service does not have a Developer Portal associated with it.

The OEM Dashboard is used for all monitoring, maintenance, control, and deployments to devices in the field. The *Ayla OEM Dashboard User Guide* (AY006UDB3) provides information about using the OEM Dashboard.

Ayla strongly recommends customers maintain testing units on the Ayla Developer Portal beyond mass production to continue iterative product improvements while allowing for testing of new Ayla features and products as released.

The Ayla OEM Dashboard is located at: https://dashboard-dev.aylanetworks.com

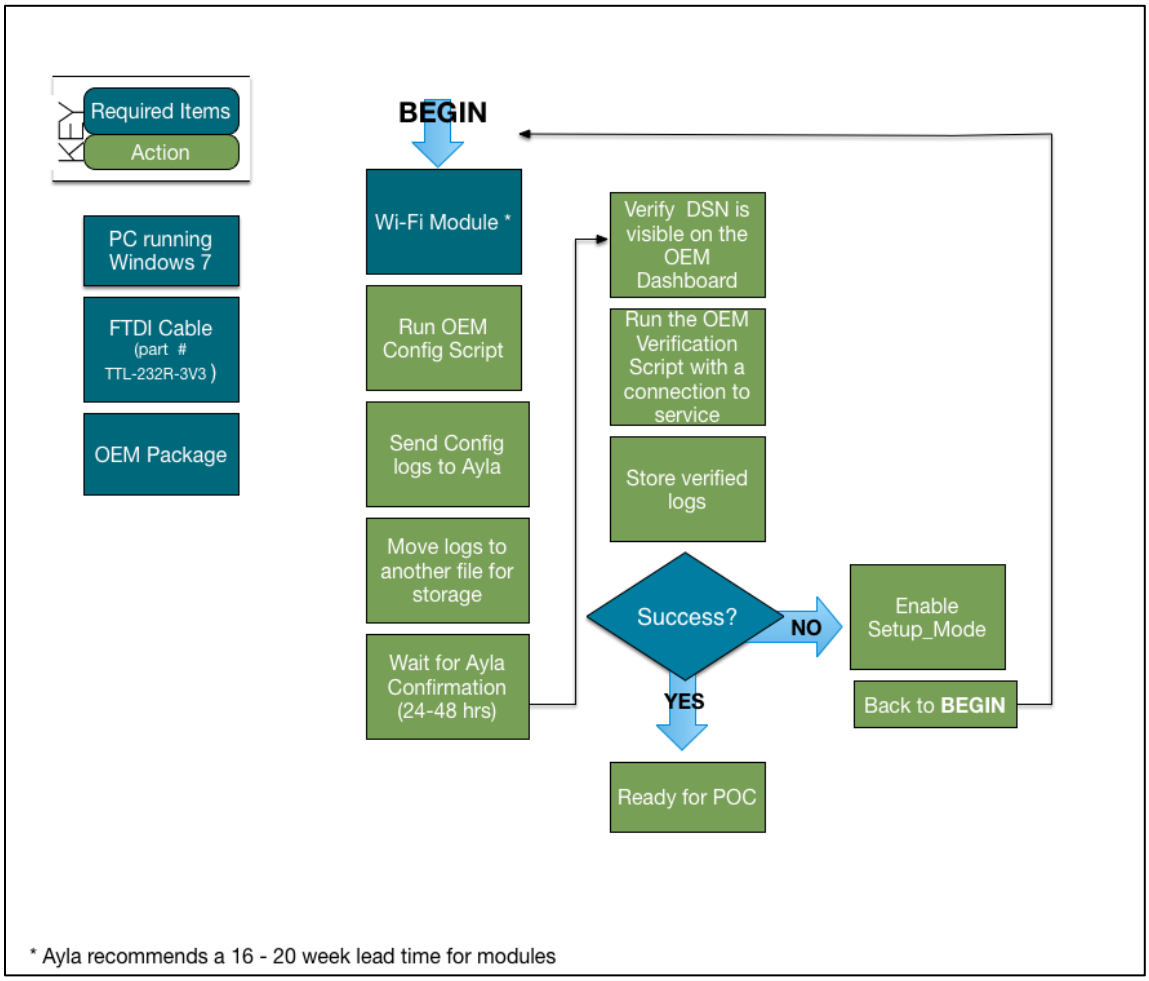
4 Steps to Production

4.1 Production Materials

The minimum resources required for production are listed and described below.

- Ayla Enabled Wi-Fi module
- Target Hardware
- Test equipment
- PC for running scripts
- OEM package
- FTDI TTL-232R-3v3 USB to TTL Serial Cable connections

Figure 2. Production Workflow



4.1.1 Modules

The most critical component of the entire process is the Ayla Enabled Wi-Fi modules, which should be sourced from one of the confirmed Ayla module vendors. Customers should expect 16-22 weeks of lead time for production quantity orders, any order over 250 module units should be planned in advance to minimize impact on production timeline and development progress. If required Ayla will ensure customers are in communication with the appropriate resource from our module vendors.

Beyond procurement, the production line should allow customers to directly connect to the debugging port on the module to run the appropriate commands as outlined below.

- OEM's need a sufficient number of Ayla-enabled modules to do a production run. The number needed is very highly dependent on the production requirements of the manufacturer. Ayla typically suggest a first trial run of from 25 to 100 units to make sure the process is working well.
- OEM's must be able to connect to the debugging port on the module.

4.1.2 Target Hardware

You should have the OEM device board ready for installation of the modules or have already installed the modules. If you are using an SIP with a board, it will already be mounted on the device board.

4.1.3 Test Equipment

Test equipment includes any test equipment unique to your product. For example, a control panel that allows testing to simulate control and input from the device.

4.1.4 PC to run scripts

The scripts that are delivered in the OEM package are based on TCL. However, several .exe files, including Kermit, are used to move the data across the serial link to the module. Currently, these will only run on a Windows PC or Windows VM running Windows 7.

4.1.5 OEM Package

The OEM package includes executable files in a zip folder that look something like this: oem_pkg-XXXX-X.X.zip.

Refer to the *Quick Start OEM Package Setup and Installation* (AY006GOP3) for details of the OEM package installation.

4.1.6 FTDI TTL-232R-3V3 USB to TTL Serial Cable (3.3volt) (Part # + Link)

The only required connections are `tx/rx` and ground for this to function correctly. The control lines are not used and the cable can be re-pinned so that it has only the three needed lines. This allows use of a smaller three-pin header instead of a six-pin header.

4.2 Build the Hardware and Install the Module

Build up the board as is necessary. Once you install the SIP or module onto the board, it is ready for power up testing.

4.3 Connect to the module debug port

Connect the FTDI TTL-232R-3V3 USB to TTL Serial Cable (part # 895-TTL-232R-3V3) + Mouser Electronics for purchase) to the debugging port using the tx/rx and gnd pins on the module.

4.4 Module Factory Setup Mode

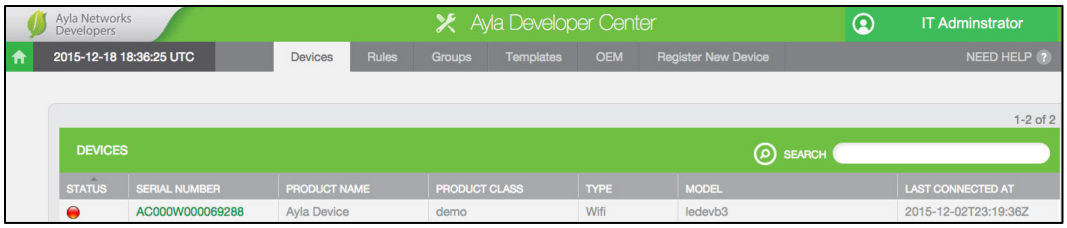
When you power up the board and can see the data from the module at 115200 baud, 8-N-1, you will see a prompt that indicates Setup mode is active on the module.

NOTE	The Ayla embedded module is delivered in Setup mode from the module-manufacturing partners.

CAUTION	In *very rare* cases the module will need to be put into Setup mode. Placing the module in setup mode is only required if the module is not in setup mode when received from the module vendor or if a failure during the loading of the OEM package that requires a process restart. Follow the directions below to set manually the module into Setup mode.

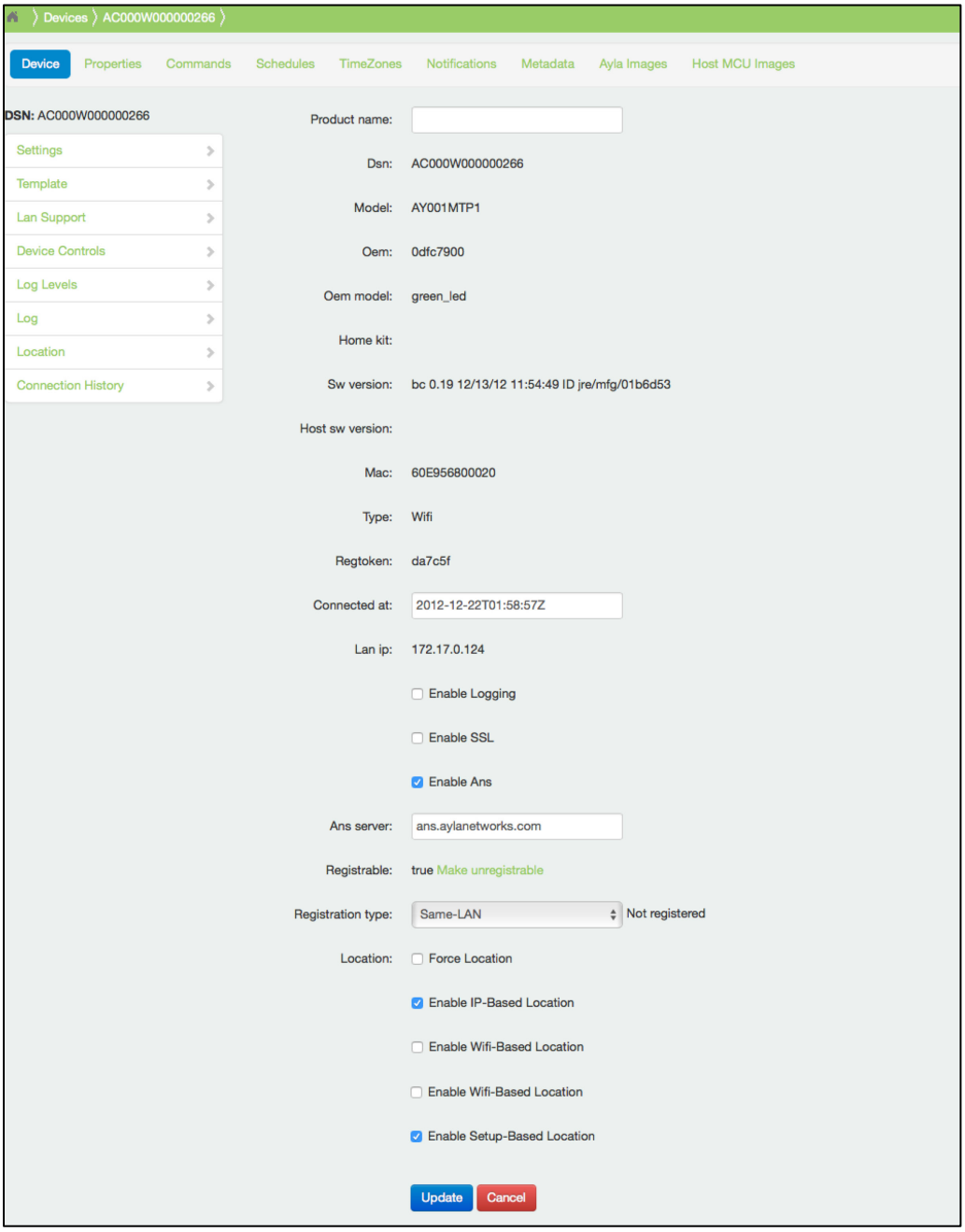
1. Navigate to https://developer.aylanetworks.com/
2. Click the **Device tab** to display a list of the registered devices you can manage.
3. Navigate to the device(s) you want to control, as shown in Figure 3:

Figure 3. Ayla Developer Center



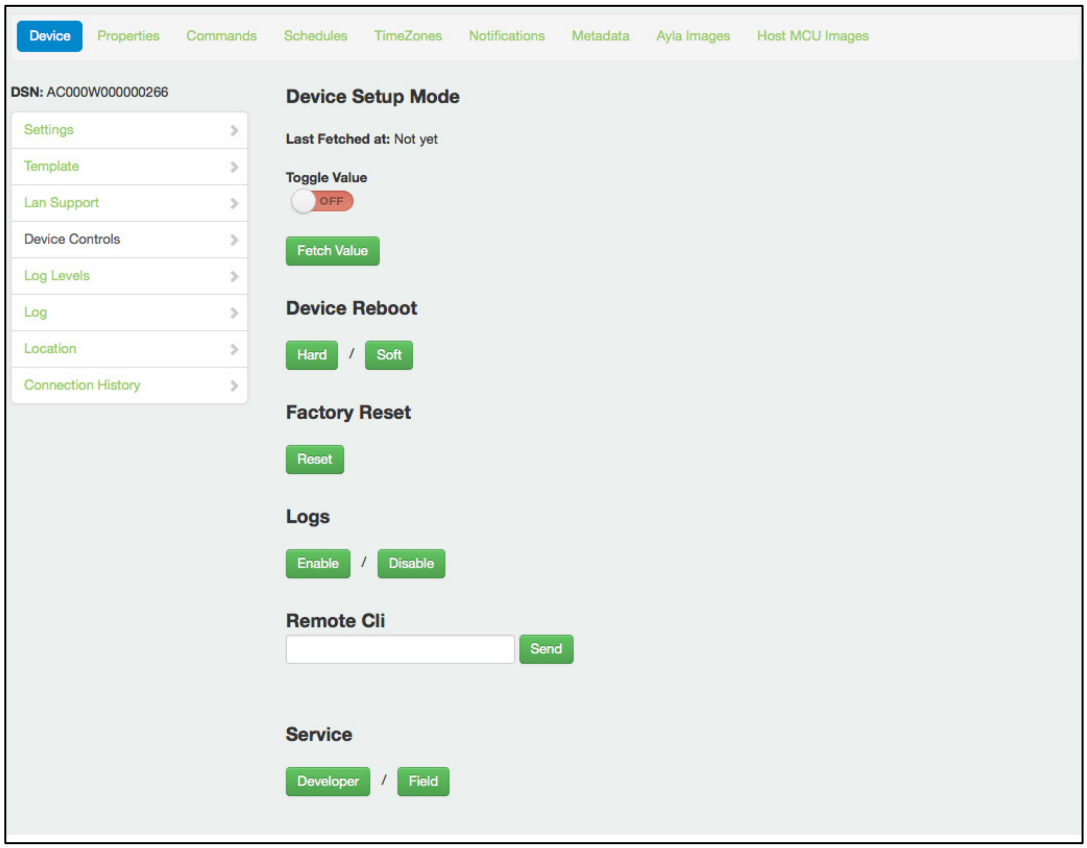
4. Select the **Device Controls** tab option on the row at the top of the left side of the screen, as shown in Figure 3.

Figure 4. Ayla OEM Dashboard – Device Setup



5. Press the **Update** button to continue.
6. Under **the Device Setup Mode**, move the **Toggle Value** button to the **ON** position.

Figure 5. Ayla OEM Dashboard – Device Mode Setup



7. Run the appropriate **OEM Package** to start the process from the beginning. The OEM Package is a package of bundles software and configuration files that are used to configure the module and update it to the latest firmware image.

Next you should proceed with updating the module with the correct firmware. The latest firmware is part of the OEM Package and is typically run as a single command that does everything from updating the software to configuring the module and then verifying it's functionality.

4.6 Update Module to Desired Firmware Version

With the assumption the module is correctly enabled in Setup mode, it is ready to have the proper firmware loaded. Refer to the *Module Firmware Update Manual* (AY006MUU0) for details regarding firmware updates.

NOTE The Module does not have to be in setup mode for a firmware upgrade. It only needs to be in setup mode for changing the configuration. Once the OEM package is applied, the OEM Package will automatically take the module out of setup mode after the configuration is put into the module.

4.7 Apply the Module Scripts

Module scripts are unique to each product on the Ayla service, contained within is the complete feature set and capabilities as developed and tested in the months leading up to production.

Once the module has been configured, the script automatically runs a verification script to ensure all necessary items have been properly configured, including:

- The OEM Model
- The OEM name
- Property Settings
- GPIO's
- Variables
- The device
- The region in which it will be deployed
- The configuration

4.8 Save and Send the Config Log File

The scripts provided in the OEM package will automatically append the results of the module's configuration to a log file. This log file is critical for enabling the modules in the Ayla services. The Config file must be sent to Ayla before the Verification logs. The Config file and verification logs work as a redundant check system, the initial Config file should be sent to Ayla for activation of DSNs on the Ayla service. The verification script will confirm the DSNs in any one-production run. These may or may not be an exact match of the Config file depending on the customer-manufacturing plan. For instance, multiple modules may be configured in advance of a production runs utilizing a smaller run of units to be deployed as part of an initial production run.

The log files should be saved and then sent to your Ayla Customer Success Representative so they can be activated in the Ayla service. The logs should be separated by region of operation, once a region is set for a device it will be associated with that region only. Each log file will be pushed to the service in the appropriate region. For customers intending for a product to be launched in multiple regions simultaneously, please work with your Ayla support team to ensure the appropriate details have been considered.

Send the verification logs **after** the production run is completed but **before** shipping units to customers to ensure modules can be activated on the Ayla service. Ayla strongly recommend each customer save all log files submitted to Ayla as a measure of redundancy in the chance any information is lost in transfer or in the chance of some other unforeseen issue requiring resubmission of customer log files.

NOTE	If Ayla recommends on-site connectivity test, the log files should be sent to Ayla before customer shipments.

4.8.1 Log Files Used for Activating DSN's on the Service

The log files are used to push the DSNs onto the service in which they will be used. The service that will be used is not part of the log file's metadata; therefore it is important for the customer to keep the log files separated by production run and region that the DSN's will be activated in.

4.8.2 Log files used for Accounting

Log files are used by Ayla to keep accurate count of total units on service from our customers. Ayla asks each customer to reliably communicate log files containing complete list of DSNs, these lists are held by Ayla to validate any applicable service fees are received for DSN activation.

4.8.3 Level of Testing

Ayla highly recommends our customers perform connectivity and out of the box user flow testing within their manufacturing facilities. Testing at each stage of development including manufacturing can reduce bugs, when done at each stage, any recorded bugs are potentially found much nearer to the root cause. Please reach out to Ayla for support instituting connectivity testing and other testing methodology best practices and guidance.

4.8.4 Tradeoffs

Each customer must consider the tradeoffs when creating test plans; there are unavoidable costs, time impacts and training requirements for staff to consider at a minimum. Ayla knows testing is a critical component to success and we encourage our customers to balance the right approach for each unique product. Please reach out to Ayla for support instituting connectivity testing and other testing methodology best practices and guidance.

4.9 Power up the System

Powering up the system should allow the module to power up and begin communicating with the host MCU (if there is a host MCU used in the design). This allows you to see the module is powering up, communicating, and running the code.

4.10 Establish a Connection to the AP

If you want to verify the RF side of the module, have it access a local AP during the manufacturing process. This allows you to ascertain the level of functionality.

4.11 Establish a Connection to Cloud Services

Generally, if the module can connect to the AP, it will then connect to the service. You can test this if you want by having the module connect to the associated service.

Remember, some services may be in a different geographic region than the region where the manufacturing is located. This can cause issues with the test. For example, manufacturing devices in China, and testing them against the United States Service can be problematic if the Chinese firewall is currently running slowly or at full capacity.

4.12 Submit Verification Log Files to Ayla for DSN Activation

Once the devices have been manufactured and configured, send the log files to your Ayla Customer Success Representative to activate them. When sending files to Ayla clearly indicate the region and service the devices will be activated on.

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