Reference Guide

Ayla Product Features

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Ayla Networks

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Table of Contents

1 Introduction

Ayla Networks enables manufacturers and service providers to bring connected products to market quickly and securely using the industry's first end-to-end Agile IoT Platform.

The Ayla solution was designed to interoperate from the device to the cloud to the application. There is no development needed between these tiers. The Ayla IoT Platform is built for enterprise-scale and is architected to include device, cloud, and mobile components. By deploying specialized software at each of these locations, end-to-end, the Ayla solution is able to achieve both intelligent functionality and elegant simplicity, which is the foundation of great IoT products. Figure 1 illustrates the highlights of the Ayla solution:

- Embedded agents, cloud services, mobile libraries, and AMAP
- End-to-end Security
- End-to-end support and configurability
- Partners Ecosystem (Cloud + Technology + Integration Partners): Amazon Web Services, USI, Murata, Clickatell, mnubo, Qualcomm, Flextronics, Marvell, Powertech, STM, iTexico, Azurewave, Ampak, etc.
- End-to-end documentation:
    - Support website on ZenDesk.
    - Device docs for black box and white box solutions.
    - Web based documentation for all APIs.
    - Mobile libraries support.

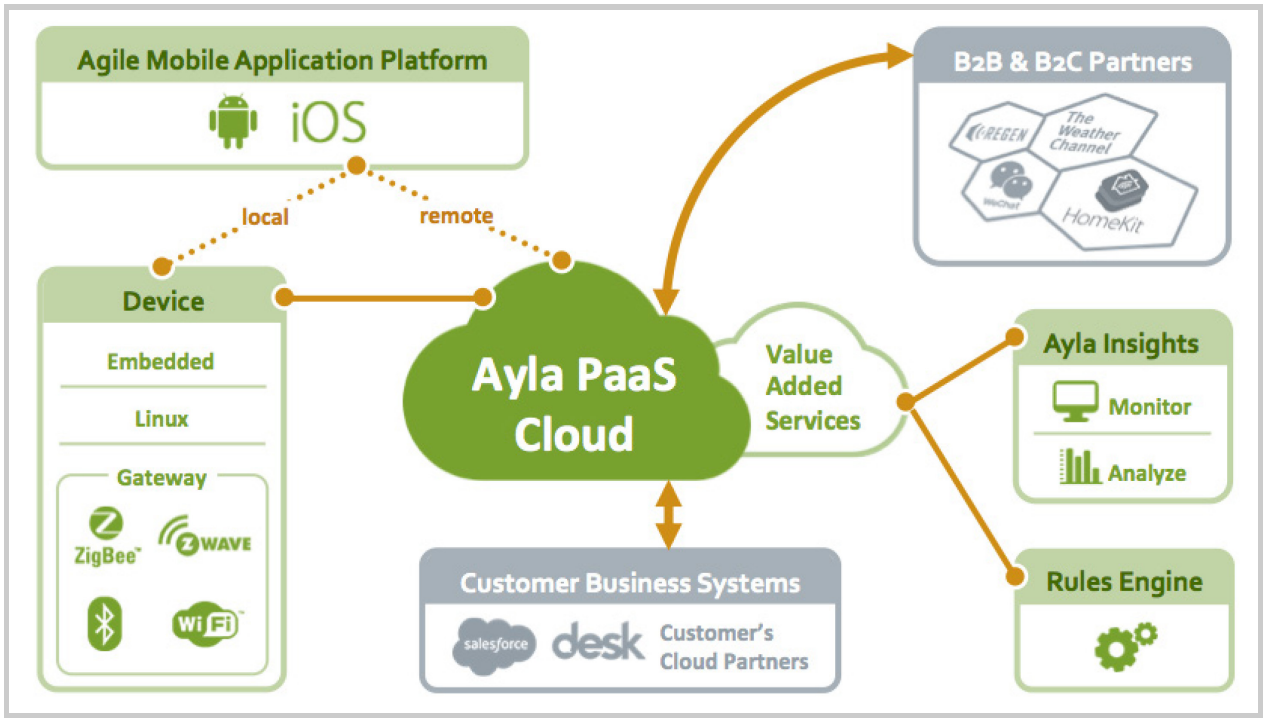

Figure 1: The Ayla Solution

1.1 About this Document

This document outlines the key features of the Ayla platform along with use case examples.

1.2 Intended Audience

This document is written for all customers of Ayla Networks.

1.3 Additional Resources

- Ayla Networks' website:

  https://www.aylanetworks.com
- Ayla Developer Portal:

  https://www.developer.aylanetworks.com
- Ayla OEM Dashboard in the development environment:

  https://dashboard-dev.aylanetworks.com
- Ayla OEM Dashboard in the field environment:

  https://dashboard.aylanetworks.com

1.4 Glossary

AMAP	Stands for Ayla Mobile App Platform, which is a licensable software platform built to jump start iOS and Android applications developed for IoT solutions using the Ayla Cloud.
API	Stands for Application Programming Interface, which specifies how software components interact.
API Calls	Each communication with Ayla's Cloud Services is identified as an API call; the volume of calls contributes to customer pricing.
Black Box	A software-offering model that is predicated on a locked, non-customizable offering.
Bluetooth	A wireless technology standard protocol for exchanging data over short distances. Bluetooth 4.0 is a recent version that focuses on low energy consumption.

Cloud Templates	Ayla Networks' predefined cloud templates that are designed to reduce the work requirement for a customer to create a product.
Cloud-to-Cloud	The communication between Ayla's Cloud Services and other service offerings. This could be a customer's service or a partner's service.
Clusters	Groups of nodes that are identified by the same Cluster ID, for example Smart light. Clusters have known abilities that contribute to a more uniform and seamless provisioning and control experience.
CRUD	Stands for Create Read Update Destroy operation, which is used for APIs.
Developer Portal	Ayla's Developer Portal is used to setup and register developer kits, define the details of a product, create and design device templates, and test, develop, and monitor devices.
Driver Porting	The process of adapting drivers to enable communication between different environments. At Ayla Networks, driver porting represents the communication between the host MCU and the Ayla-enabled MCU.
Embedded Agent	A block of code used to control machines or devices that are not considered computers.
Ethernet	Wired LAN networking protocol that requires a direct physical connection for connectivity.
Gateway	Used to interconnect network communications with different network protocols. The gateway acts as a translation box.
Host MCU	The product's microcontroller unit that communicates directly with the Ayla-enabled Wi-Fi module.
Mobile Libraries	Libraries that are designed to expedite and simplify the use of Ayla connected wireless devices.

Native Mobile Application	A mobile application that is coded in a specific programming language native to the hardware it is running, Objective C for iOS and Java for Android
OEM Dashboard	The portal that is used by OEMs to view, manage, and update Over the Air (OTA) units in the field.
Parent/Child Relationship	The network relationship between nodes.
Properties	Cloud-defined values that when aggregated define what and how product features and functionality are experienced by the end-user.
RBAC	Stands for Role-Based Access Control framework, which enables role-based access to users.
SDK	Stands for Software Development Kit, which is a set of tools that is used to develop software applications targeting a specific platform. APIs may be part of an SDK.
SPI	A synchronous serial communication interface specification used for short distance communication, primarily in embedded systems.
TCP	Stands for Transmission Control Protocol, which is a core internet protocol that provides reliable, ordered and error-checked delivery of a stream of octets between applications running on hosts communicating over an IP network.
UDP	Stands for User Datagram Protocol, which is a protocol used for applications that do not require reliable data stream services. Emphasizes reduced latency over reliability.
White Box	A software-offering model that is predicated on an open or partially open, customizable offering.
Wi-Fi Module	A hardware component that has an MCU containing the Ayla agent and Wi-Fi component used to allow connectivity to Ayla's Cloud Services.
WirelessHART	An open-standard wireless networking technology developed by the HART Communication Foundation. This protocol uses a time synchronized, self-organizing, and self-healing mesh architecture.

Zigbee	A specification for a suite of high-level communication protocols used to create personal area networks built from small, low-power digital radios.
ZWave	A wireless communications protocol designed for home automation, specifically for remote control applications in residential and light commercial environments.

1.5 Acronyms and Abbreviations

Following are acronyms used in this document (and not defined in the glossary).

AAA	Authentication / Authorization / Access Control
AES	Advance Encryption Standard
ELB	Elastic Load Balancing
FCC	Federal Communications Commission
MCU	Microcontroller unit
NFC	Near Field Communication
S3	Simple Storage Service (as in S3 client or S3 SDK)
SIP	Session Initiation Protocol
SMS	Short Message Service
SMTP	Simple Mail Transfer Protocol
SSL	Secure Sockets Layer
TLS	Transport Layer Security

2 Security

Ayla Networks implements the strongest levels of authentication and authorization available. Each device authenticates uniquely with the service. Every module is programmed with an individual RSA key used to authenticate with the cloud.

We use industry-standard, security technologies, like SSL/TLS, 2048-bit public/private key encryption, AAA, shared secrets, and secure registration flows, which provides enterprise-class security, authentication, and authorization. We also provide an embedded device agent, cloud platform, and mobile libraries that enable seamless and end-to-end security for final products.

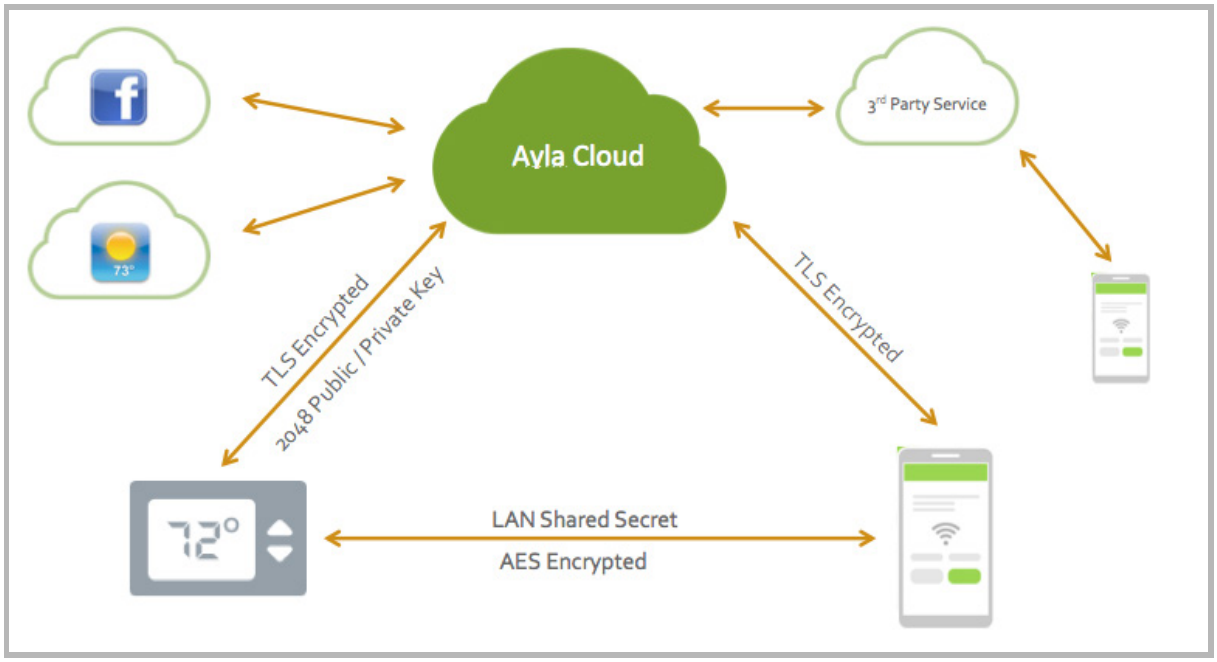

Figure 2: The Ayla Solution

2.1 Key Security Features

2048-bit public/private key encryption

Public/private key is device specific and is added during the manufacturing phase of device.

SSL/TLS

- All data transfers occur with Secure Sockets Layer (SSL) security.
- Certs stored on module for uncompromised security out of the box.

AAA (Authentication / Authorization / Access Control)

- Two factor authentication
- Token-based SSO

Secure Registration Flows

This provides OEMs with a choice of different levels of security during the device registration process. There are five registration methods available, all of which ensure secure access to the device through specific requirements, such as physical proximity or the use of a secret token.

LAN Share Secret

This is used in establishing a secure session for LAN mode communication between the mobile app and the physical device. The LAN secret key is per LAN session and uses AES 128 bit encryption for a high security standard.

3 Connectivity

Ayla's Black Box architecture leverages major chip manufacturers (locked and not customizable). The Ayla agent functions in an isolated environment from the host MCU on the Wi-Fi module's MCU. Code remains sterile. We can connect to host MCUs using SPI or UART interfaces depending on the chosen Black Box module; see Figure 3.

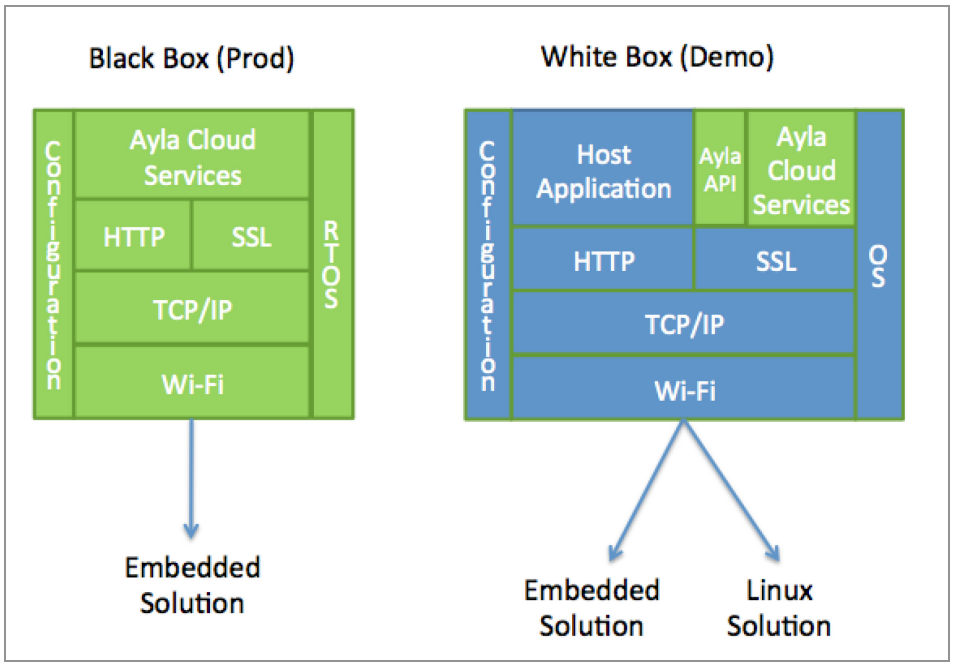

Figure 3: The Ayla Solution

3.1 Key Connectivity Features

Embedded and Linux Agents

- Fully tested and production ready
- Wi-Fi and Ethernet options
- Already programmed with a unique ID and security key (embedded only)
- FCC and SIP versions
- Global distribution
- Enables many Linux based applications including end devices and gateways

Seamless Networking Interfaces

- Support for Broadcom, Marvell, Qualcomm Wi-Fi
- Ethernet and Zigbee HA 1.2 gateway support
- Reference for connecting via a cellular modem on a Linux system

LAN Support

- Mobile apps automatically use local network when nearby
- Much faster mobile-to-device control (and reduces lag-time)

HomeKit and MFi WAC

- Support for Apple ease of use

NOTE Support available for selected Black Box modules only.

- Apple simplified user experience.

Gateway Management

Ayla's Generic Gateway library provides APIs that enable a Linux-based gateway to create a virtual representation of every node the gateway communicates with on the Ayla Cloud Service. The gateway software defines the data for each node by associating the node with one or more templates created by a developer in the Ayla Cloud Service. After the virtual nodes have been created in the Ayla Cloud Service, the gateway uses the Generic Gateway APIs to report changes in node state to the Ayla Cloud. These Ayla libraries also automatically fetch any property changes made in the Ayla Cloud through a mobile application or another external source.

4 Scalable and Global

Ayla's solution is highly scalable, including horizontal scaling and NoSQL databases to meet the IoT demands of businesses. Ayla has developer services in both the US and China to enable OEMs to develop in both of these regions. Ayla's cloud services also have three field services in the US, China (CN), and European (EU) regions.

4.1 Key Features of Ayla's Scalable and Global Solution

Ayla Services

- Distributed Architecture and designed for scalability
- Deployed on Amazon Web Services infrastructure
- Multi-tenant Platform
- RESTful API

Horizontal Scaling with High Performance

- Agility in introducing new services to migrate easily to different Ayla services
- Dynamic scale-up and scale-down provides the most cost effective and efficient means to manage traffic
- Feature rich and easy to manage, leveraging significant investments made by Amazon
- ELB – load balancing across available zones (sometimes referred to as AZs)

Cassandra NoSQL Database

- Highly scalable, distributed database system for unstructured data
- Very high write throughout, which is critical for IoT based applications
- Read and write throughput both increase linearly as new machines are added, with no downtime or interruption to applications

5 Configurability

The Ayla solution includes configurable user interfaces (dashboards) to manage your Ayla devices and users. The dashboards provide OEMs with crucial data visibility and control over how other users manage and configure the devices.

5.1 Key Configuration Options

Device Templating Mechanism

- Enables OEMs to define the functionality of the device for the ultimate end-user experience of product features.
- Allows certain device behaviors to be changed dynamically.

Registration Methods

There are five registration methods enabling you to choose a level of secure access that best fits the user requirements and key characteristics of your device. These methods are:

- Same LAN Method
- Button-Push Method
- AP-Mode Method
- Display Method
- DSN Method

Schedules

- Control over the timing of product activity
- Automatic operation of the device through a time-based schedule
- Ability to create custom schedules for device operation

Time Synchronization

- GMT and local time synchronization included
- Cloud-assisted automatic time synchronization and local time based on location
- User override available

Alerts and Notifications

- Customizable alerts and notifications for the best product experience

Device Sharing

- Registered users can share devices with others.
- Members of a family can share a device (read or write access).

Role Based Access Control (RBAC)

RBAC is a feature that allows access control of complete or partial device information as defined by specific user roles. Resources include device, user, OTA Image, etc. Some of the main aspects are:

- Addresses enterprise and consumer access security concerns.
- Provides flexible access to device data and device control based on roles
- Supports a hierarchy of roles. Predefined OEM Roles: OEM Admin, OEM Staff, OEM Developer, and End User.

Single Sign-On (SSO)

Ayla Sign Sign-On (SSO) is a feature that allows a user to sign in to the Ayla Cloud using third-party authentication. Some aspects of SSO are:

- Leverages a customer's authorized users system management.
- Offers a seamless account sign-up / sign-in experience from consumer apps.
- Avoids multiple sign-up, sign-in, and authorization prompts for end-users.
- Avoids web redirects for a smooth user experience.
- Permits a user to use one set of log-in credentials (e.g. email and password) to access multiple applications.

User Opt-In

User Opt-In is a feature that allows OEMs to pre-configure cloud-to-cloud connections for device reporting and control between the Ayla Cloud and another cloud service or system. The configurations can be enabled or disabled by end-users for their specific device(s). Some other details about this feature are:

- Cloud connections are created between the Ayla Cloud and an external service.
- The device properties to be controlled or reported on are selected by the OEMs from their templates.
- The OEM's mobile application or consumer dashboard is where the user-facing features are added to opt in or out.
- User Opt In can be used for REST API based connections and DSS based connections.

6 Real-Time Product Iteration

The Ayla solution enables OEMs to iterate product development continually. For instance, Over-the-Air (OTA) software updates can be pushed from the Ayla OEM Dashboard to the device in real-time.

6.1 Key Features for Iterative Product Development

Device Templates

Device templates enable you to define and set all device attributes to a group of devices on the service to create virtual devices, as illustrated in Figure 4. After an over-the-air update, the service automatically configures the device with a new template based on the device model and software version.

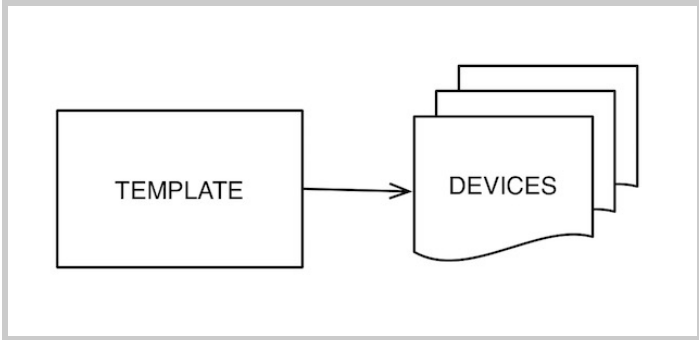

Figure 4: Device Templates for Efficient, Iterative Product Development

Over-the-air (OTA) Updates

- Able to upgrade firmware in the field.
- Available for module software/Ayla image, application MCU, and Linux.

7 Dashboards and Developer Tools

The Ayla solution provides OEMs with two user interfaces for configuration and management of devices, a robust portal for developers, and a toolkit for rapid prototyping, development, testing, and deployment of devices. These user interfaces are called the Ayla Developer Portal and the Ayla OEM Dashboard. This section highlights their key features.

7.1 Ayla Developer Portal

The Ayla Developer Portal is provided to all OEMs and developer partners. This user interface enables developers to complete the following activities and tasks:

- Register new devices.
- View and configure a device.
- Design and customize a device.
- Use an API Browser to significantly reduce the developer's ramp-up time. The API Browser provides live, accurate, fully detailed input and output to users.

Figure 5 shows the home page of the Ayla Developer Portal.

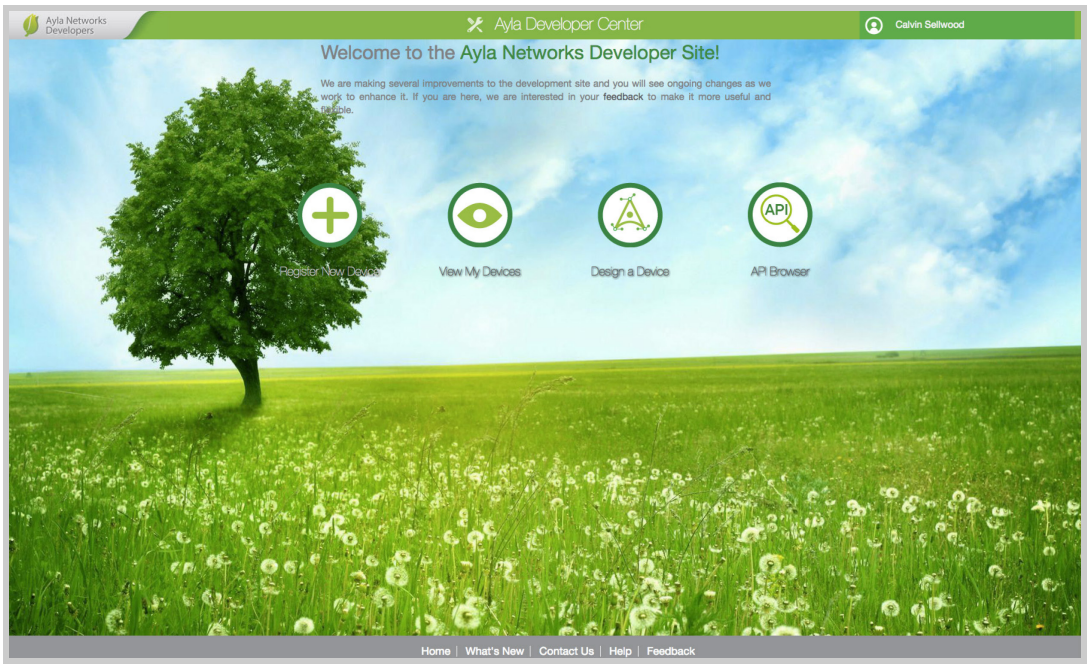

Figure 5: The Ayla Developer Portal

Templates

Ayla provides predefined cloud templates designed to reduce the work required for a customer to create a product. A template is a group of properties that are applied to a device in the Ayla Cloud. Template properties define the functionality of the device and consequently how the end-user experiences product features. Once the template properties are defined, OEMs can create schedules for those properties, which can include

triggers and notifications for specific actions in the schedule. This enables end-users to set up schedules that automatically trigger actions to occur and send custom notifications for a better product experience. The templates also allow OEMs to enable LAN mode for a device. The Ayla template is essentially an abstraction of a device in the Ayla Cloud. Product development begins by defining a device using the Ayla templates to enter properties within the Ayla Developer Portal. Templates can be shared between developers at the same company.

The device is associated with a template (and a template with the device) once the following are set up:

- Module name
- OEM ID
- Template version number

Template association is the process of applying all of the settings in the template to the Ayla device. Because the template and devices are associated in the Ayla Cloud, Ayla Services are informed of the properties available for the device. Template versioning is controlled in the Ayla Cloud by using the template version number. This enables OEMs to create as many templates and devices as needed without having to be concerned with source control tools.

Properties

These are cloud-defined values that when aggregated define what and how product features and functionality are experienced by the end user. OEMs have the ability to add, edit, or remove properties from templates whenever it is needed.

Property Triggers

These are basic conditions assigned to datapoints for a given template property. For example, if you have an On/Off property in your template, you may create a schedule that includes triggers to turn the device on or off at a specific time. You may also configure notifications and alerts to inform you of a property trigger in real time.

You can update and delete existing property triggers as needed.

Property Denied Roles

OEMs can grant or deny read/write permissions for specific users (i.e. end-user, dealer, developer, etc.) to create, modify, or view device properties.

Property Datapoints

OEMs can create specific datapoints for template properties. For example, if the product is a fan, one of its properties may be fan speed, which may have several datapoints for setting high and low speeds. Datapoints are therefore the results of a transaction; in this case, the transaction is the fan speed and the result is the actual speed (high or low). You can create any number of property datapoints.

Data Retention

Data retention refers to how long data is accessible to users within the Ayla platform. By default:

- Data is preserved for display in the Ayla Developer Portal and OEM dashboard for 30 days.
- Data is preserved for access using the data export feature for 1 year.

The Data Retention feature gives OEMs the ability to preserve their data in the Ayla platform for longer than the default time limit. Specifically, OEMs are able to display and report on trends for longer periods of time and to export data from the Ayla platform for longer time intervals. Once enabled, all data is preserved until the new expiration time is exceeded.

Devices Details

This feature enables you to configure and manage devices associated with your account. The Details page in the Developer Portal displays information associated with your device. Using device details, you can, for example, update and unregister a device, as well as place the device in set-up mode.

Module and Host Images

Module images are the actual firmware loaded on Ayla modules. Using the Ayla OEM Dashboard, you can view, search, and deploy the Ayla configured images.

Host Images are images that are deployed and communicate directly with Ayla-enabled Wi-Fi modules.

Notifications and Alerts

OEMs and users can set notifications based on the device activity that they want to monitor. The Notifications page in the Developer Portal enables OEMs and users to view all of different notification types set up for devices along with the threshold, URL, and a username. OEMs and users can also define alerts, like email, SMS, iOS Push, and Android Push. These are done in configurable templates that allow you to insert dynamic data into notifications. The support for push notification on both iOS and Android is through the Ayla mobile libraries.

Local Area Network (LAN) Option

LAN provides local communications between applications and devices when they are both on the same Wi-Fi network.

Schedules

Schedules are used to manage your device activity, for example, to automatically trigger property updates and other events on the Ayla device. You can configure schedules for local time or universal time (UTC) and for many other parameters, such as months and days of the year, start and end times of the day, intervals, durations, etc. Each schedule has the ability to support actions that can trigger various events related to individual properties defined in the Ayla Template.

Location

This feature shows the location of a device. Location information is shown by latitude and longitude.

Roles

This feature describes OEM roles and privileges (the access levels a user has to features in the Ayla Developer Portal). All users have access to devices registered to their account.

Groups

This feature enables you to create a group of devices that you can manage using the Ayla OEM Dashboard.

OEM SMTP and Email Templates

OEMs can customize and brand emails, SMS, or push notifications that are sent to end-users from the Ayla Services on behalf of the OEM. The Developer Portal has an OEM tab to set up and configure the SMTP server and email templates. OEMs can design HTML email templates that incorporate any logos or messages for the end-user. The messages can include placeholder strings for dynamic content.

7.2 Ayla OEM Dashboard

The OEM Dashboard allows Ayla OEM customers to manage the deployment of Ayla-connected devices. This dashboard provides a place to view users, devices, templates, and other information for review and updating. OEMs can assign roles and access privileges to seven different types of users, depending on their company's policies. The OEM Admin role, for example, provides a bird's eye view to all OEM devices and users. OEM Admins have complete control over everything in the dashboard, so OEMs most often limit the number of users assigned to this role. Some of the main features of the dashboard include debugging capabilities and management options for BI reports, OTA updates, and templates. We also provide two OEM Dashboard environments:

- The Development environment to create and test device configurations, functions, and features.
- The Field environment to manage devices already in the field.

Figure 6 shows the Ayla OEM Dashboard.

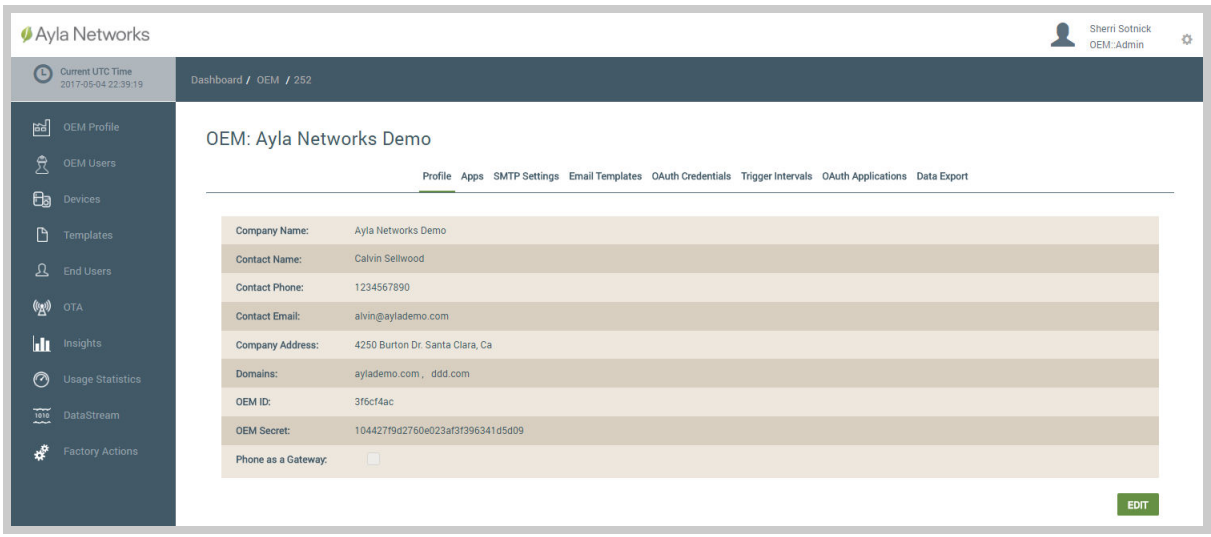

Figure 6: The Ayla OEM Dashboard

In Figure 6 (above), notice the navigation menu on the left side, which includes all of the main features of the dashboard:

- **OEM Profile** – This displays OEM specific information, such as OEM ID and OEM Secret, and enables you to manage (with view and/or edit capabilities) your applications, SMTP settings, Email Templates, OAuth Credentials, Trigger Intervals, and OAuth Applications.
- **OEM Users** – This provides a list of all your current OEM users, their roles, and access privileges. OEMs have the ability to create, edit or delete users from their dashboard. All users have access to devices registered to their account. OEM roles include OEM Admin, OEM Staff, OEM Developer or End User.

NOTE For more information, refer to the *OEM Roles and Privileges Reference Guide (AY006UR0)* on support.aylanetworks.com.

- **Devices** – This provides a list of all registered devices, individually or in assigned groups. From the Devices page in the OEM Dashboard, you can:
  - View and search for devices by device or groups
  - Create, edit, delete devices and device groups
  - Map devices
  - Create and manage virtual devices (in the Development environment)
- **Templates** – This provides a searchable list of the templates for every configured device. OEMs can view all of the details configured for each template (properties, triggers, LAN, schedules, roles, etc.) and edit the property retention setting.
- **End Users** – This provides a searchable list of all registered users. OEMs can search for users based on the users name or devices registered to the user. From the End User page, OEMs can also create, edit, or delete users.

- OTA – Ayla's Over-the-Air (OTA) feature enables OEMs to securely send device firmware updates to devices in the development and field environments. OTA can handle module software, application MCU, and Linux firmware updates. OTAs can be with Ayla-supplied Black Box images or OEM Host software images. OEMs can upload device firmware images in the Ayla platform, and then identify the group of device serial numbers (DSNs) for the images. (The images are pushed to that group of DSNs.) During the OTA process, OEMs are provided with real-time status updates of successful, pending, and failed OTAs. On the OEM Dashboard, OEMs can manage OTA tasks, which include creating, updating, and tracking all OTA images (firmware updates). OEMs can also view the list of available images (Ayla, Host MCU) and the status of past OTA Jobs.

  Some benefits of this feature are:

  - Rich user interface and capabilities.
  - Ability to create, run, and report on device update jobs.
  - Intuitive interface to initiate updates of OEM Host MCU firmware or Ayla Black Box firmware.
  - Firewall connection between the device and cloud initiated from the device.
  - Recovery from bricked devices — secure LAN OTA and OTA to device using the mobile app.
- Insights – This is a fully-integrated business intelligence and analytics platform that provides reports on how users are interacting with their products and how the products are being used on day-to-day basis. OEMs can sort, filter, and edit the reports. There are also features to create notifications and custom emails to be sent at specific times.
- Metering – This enables OEMs to track the usage of system resources per OEM Model over a selectable date range up to one year. System resources include:
  - The number of transactions per model.
  - The number of activated devices per model.
  - The number of transactions per activated devices per model per day.
- DataStream – Also referred to as DSS, this feature allows device data to be sent directly to a third-party cloud as the data is communicated to the Ayla Cloud. OEMs can create, update, or delete subscriptions for data that occurs in the Ayla Platform using a REST API. OEMs can also configure Role Based Access Controls (RBAC) to restrict which data is transmitted externally to partners. From the OEM Dashboard, OEMs can view, create, edit, and delete DSS subscriptions, create access rules for specific user roles and subscription types.
- Factory Actions – This provides an interface for OEMs to initiate the process of manufacturing their devices and synchronizing the results with the Ayla Platform prior to distribution to end-users. This includes reserving Ayla platform device serial numbers and updates from the manufacturing and provisioning stages of

production for both black box and white box devices. OEMs can also use Factory Actions to combine multiple data point requests into one API.

The remainder of this section highlights some of the other key features in the Ayla OEM Dashboard.

Logging/Debugging Tools

- Device logs can be pulled from OEM portal.
- Mobile libraries support sending logs.
- Other tools specifically on logging levels and debugging functions.

Device Controls

The Device Controls feature provides OEMs with various options to send commands to a specific device. Using Device Controls, OEMs can help troubleshoot and debug devices. OEMs are able to toggle values, enable Setup Mode on the device, perform a factory reset, or assign the device to a specific Ayla service.

Search

The search feature allows OEM Users to search for individual devices, end users, or employees through a variety of filters. When searching for devices, OEM users can filter by connection status, model, DSN, MAC Address, and other pertinent information. When searching for users, OEM employees can search email, UUID/ID, and first/last name.

Sharing

OEMs and end-users can share registered devices, which are configured using one of the Share APIs. When configuring this, you can set a specific timeframe to share the device. On the OEM Dashboard, you can view a searchable list of devices being shared among users along with the details of the shared configuration. This feature can, for example:

- Allow users to search for individual devices usage statistics
- Help troubleshoot issues.

Connection History

Device connection history shows a list of the connection events' time in UTC and the status of the device. Devices statuses include offline, online, or initializing.

Mapping and Device Location

This feature allows users to view the last known geographic locations of all their devices (latitude and longitude coordinates).

Log Levels

Log Levels specify what log information is stored for a specific device. OEM users are able to use this information to debug and retrieve device information. Types of logs are:

- Info – general messages (not errors or warnings)
- Debug – more detailed information as well as warnings and errors

- Debug2 - lower level detailed information as well as warnings and errors
- Metric – data on connections and internal performance information

Schedules

This feature allows OEMs to create custom schedules for their devices. OEMs can create new schedules as well as make updates or delete current schedules. Schedules are used to manage your device activity and define when an action takes place. OEMs can also view schedules created by end-users for their registered devices.

Time Zone

This enables you to view all time zones of specific devices. Depending on the device location, the time zone is associated with that region.

Commands

This enables you to view lists of commands associated with a single device and show history of device interactions like registration, connectivity history, etc.

Ayla Factory Service

This feature provides OEM users with the ability to control the Reservation and Manufacture process from Ayla APIs and the OEM Dashboard. OEMs can reserve, manufacture and provision Ayla devices without the need to wait for Ayla support to perform the action regardless of Black Box, White Box or Linux Solutions.

Virtual Devices

The Virtual Device feature provides an easy and efficient way for new OEM developers to configure artificial devices with templates in the Ayla OEM Dashboard. As an OEM developer, the Virtual Device features provide a way to start making REST APIs and testing your communication to the Ayla Cloud without requiring a physical device.

8 Mobile Applications

The Ayla mobile architecture consists of two parts: Mobile Libraries and the Agile Mobile Application Platform (AMAP).

8.1 Ayla Mobile Libraries

The Ayla Mobile Libraries are the easiest way for mobile developers to connect to the Ayla Cloud and Ayla connected devices. The libraries are available in native code for both Android (Java) and iOS (Objective-C). The iOS libraries also support the new Apple development language Swift.

The libraries are used by developers for integration into their mobile applications. The libraries provide easy integration paths for device registration and connectivity, including simple configuration for LAN mode connections between a mobile device and an Ayla connected product. The libraries also support the creation of triggers for notifications, schedules, and timer management and registration + account CRUD.

The libraries still require a developer to write the mobile application and design a user interface for users to interact with.

8.2 AMAP (Agile Mobile Application Platform)

AMAP is a built on top of the mobile libraries and provides a complete application, using functioning Objective C and Java source code. This is the fastest way for customers to get a mobile application to market that manages setup, interaction, and more advanced features associated with a connected product.

AMAP has a fully customizable user interface that allows Ayla customers to quickly change the look and feel of the application to match the company brand and add logos. AMAP allows developers to focus on just the unique features of the Ayla enabled device — creating pages to interact with and control it, which differentiate the device from competing products.

AMAP is available to download from both the Apple App store and Google Play store.

9 Optional Add-On Features

Ayla Networks offers the optional fee-based features in this section.

Multi-Region Service (China and European)

Ayla provides cloud services globally:

- Fast access to multiple geographies.
- Legal compliancy in US, China, and European markets.

Cloud-to-Cloud Streaming Service – Beta Status

- Stream APIs enable Ayla's cloud partners to subscribe in real time for interesting data using WebSockets.
- Ability to transfer data from the Ayla Cloud to other clouds.

File Transfer Service

This service provides the ability to transfer a file to and from the device to the Ayla Cloud.

Ayla Insights

This is a fully integrated business intelligence and analytics platform that provides manufacturers with real-world insights into how their connected products are being used. Insights provides an easy and affordable path for manufacturers to unlock the value of their data by offering a way to quickly visualize, analyze, and explore their data, regardless of the device or application type.

Integration with Amazon Alexa

The Ayla implementation of the Amazon Alexa adapter provides a back-end service so that end-users can control their Ayla devices with simple voice commands. This is accomplished using the Alexa Smart Home Skills API. The Alexa Smart Home Skills API makes it possible for OEMs to develop a functional Alexa voice-controlled product that requires little effort and no coding at all. Amazon defined specific device types and interactions that map to a substantial set of current Ayla customers. This includes definitions for how those products work and test plans for certification. Ayla's integration of Alexa therefore only supports Ayla devices that have Smart Home Skills defined and comply with Amazon's definition for these devices.

Data Export

OEM Data Export is a feature within the Ayla platform that allows OEMs to easily extract bulk amounts of device data from the Ayla Cloud using an S3 Client or S3 SDK. OEMs have the option to either populate their own data warehouses or can use third-party analytic tools to generate reports on their own.

Data Streaming Service (DSS)

Data Streaming Service (DSS) is a feature that allows device data to be sent directly to a third-party cloud as the data is communicated to the Ayla Cloud. OEMs must enable a DSS subscription for the target third-party cloud in the Ayla OEM Dashboard. Some other specific aspects are:

- Data streams can be configured to send some or all of the data points from the device to the third-party cloud.
- DSS requires the OEM customer to perform hands-on coding to Ayla's DSS API.

File Properties

File Properties are a unique type of property that gives a device the ability to exchange a much larger amount of data than allowed by the Ayla defined property. File Properties have no set schema and no fixed content. File Properties contain any type of data, whether an audio clip/recording, image, binary executables, string of variables, commands, etc.

Global Weather Feed – Beta Status

The Global Weather Feed service is a value-added feature that allows Ayla customers to incorporate a weather feed into their connected products. Ayla Networks is a partner of the Weather Underground (an IBM company) for the weather feed service, which provides two types of weather parameters: Temperature and Humidity. Ayla's Weather Feed Service is currently available in the U.S. and Canada.

Phone as a Gateway (PaaG)

Phone as a Gateway (PaaG) is a feature that uses the mobile device to act as a medium to enable connectivity to the Ayla Cloud using a native app. Some aspects of this feature are:

- Setup and registration of the device are done from the mobile device.
- Ability to maintain secure communication line between the device and cloud when the mobile app is running.
- Connection can be 1-to-1 (one device to one mobile) or many-to-1 (many devices to one mobile).
- Communication between the device and the phone is protocol agnostic (at minimum support at least NFC and Bluetooth).

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