Alexa, how do I build voice-enabled products

EBOOK

Alexa Voice Service (AVS) Integration for AWS IoT

aws partner network

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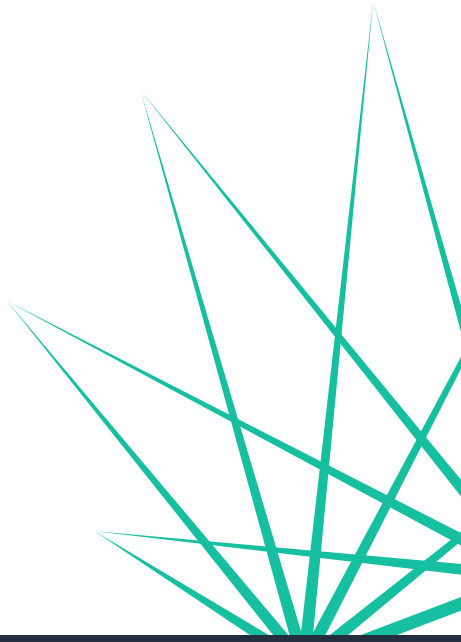


Alexa, turn up the smart home market

Voice-enabled devices have moved in and made themselves at home. From light switches to coffee pots to security controls, manufacturers have found creative ways to make nearly every device more helpful around the house. And consumers are loving it!

According to an IDC study, the market for smart home devices is on track to double from 2019, reaching 1.46B units by 2023.[1] The growth comes from an increased comfort level among customers with voice-enabled devices, which results from increased exposure to devices such as Alexa speakers. The uptick also stems from manufacturers using voice user interface (VUI) to differentiate their products.

However, device makers walk a fine line between increasing customer value and increasing their operating costs and complexity. To embed voice capabilities in their devices, they must navigate:

1. **Choosing the underlying technology:** Building and managing smart devices requires a chipset, an application, and connectivity cloud services. While any one of these areas can be challenging to develop on its own, combining all three can be prohibitively complex.
2. **Coordinating services across vendors:** In lieu of running an in-house team, companies may hire vendors for application development, IoT platform management, and post-deployment support. This can become complicated and time consuming quickly.
3. **Maximizing profit in a price-sensitive market:** Manufacturers in highly competitive segments are looking for ways to improve the user experience of their devices without investing heavily in new technology so that they can keep prices low.

Device makers need a comprehensive, cost-effective solution to reduce the complexity of building voice-enabled smart devices.

Highest Growth Segment for Smart Home Devices

The Other Devices category, including thermostats, lights, and plugs has a CAGR growth rate of **over 25%**, making it the highest growth segment for smart home devices.

Source: IDC Worldwide Quarterly Smart Home Device Tracker, June 25, 2019

[1] Source: IDC Worldwide Quarterly Smart Home Device Tracker, June 25, 2019
https://www.idc.com/getdoc.jsp?containerId=prUS45303919

Alexa, run my device too

Amazon Web Services (AWS) reduces the complexity and cost of adding voice technology to connected devices with the Alexa Voice Service (AVS) Integration for AWS IoT Core. AWS IoT solutions make it easy for device makers to build and manage scalable IoT applications that collect, process, analyze, and act on data generated by smart consumer products without having to manage any infrastructure. AWS IoT Core enables you to easily and securely connect your devices to the cloud and reliably scale to billions of devices and trillions of messages. The AVS Integration for AWS IoT Core enables you to make any of these connected devices an Alexa Built-in device.

By building with AVS Integration for AWS IoT Core, you can quickly, easily, and securely build differentiated consumer products that allow customers to control their devices with voice commands through Alexa. You can even connect products with one another to create a truly ambient experience in which customers can talk directly to Alexa to control many devices and experiences within their surroundings.

The AVS Integration for AWS IoT Core makes it possible for you to produce these voice-enabled experiences on low-cost devices by offloading compute and memory intensive tasks from physical devices to the cloud. Now, device makers can produce Alexa Built-in functionality even on the most resource-constrained devices that have very little space for additional hardware, such as light switches and bulbs, thermostats, and home appliances. Deployment solutions include built-in microphones and speakers capable of playing back dialog, alerts, and the news.

Whether you're new to smart devices or have experience building voice-enabled IoT devices, AVS Integration for AWS IoT Core reduces the development complexity and cost and can help you get to market faster than ever before with entirely new categories of Alexa Built-in products. The pre-qualified NXP EdgeReady turnkey solution for Alexa built in is based on NXP's i.MX RT106A MCU, and with its SLN-ALEXA-IOT development kit, makes it easy for you to add Alexa built in to your IoT products.

Lower your cost and footprint

By offloading compute and memory intensive workloads to the cloud, AVS Integration for AWS IoT Core lowers the Alexa Built-in production costs up to 50% and lowers the hardware requirements from 100MB to 1MB of RAM, opening up new possibilities for Alexa Built-in device types.

Alexa Built-in is a category of devices created with the Alexa Voice Service (AVS) that have a microphone and speaker. Customers can use the wake word "Alexa" to receive voice responses and content instantly from any Alexa Built-in device, and to execute commands to other devices in their surroundings that are certified as Works With Alexa (WWA). Alexa Built-in devices can receive the Alexa Built-in badge to show they deliver high-quality Alexa experiences, and become eligible for exclusive marketing opportunities with Amazon.

Alexa, give me the highlights on AVS

With AVS Integration for AWS IoT Core, you can turn any device into an Alexa Built-in device and differentiate your offering. Leveraging AWS IoT Core — a managed cloud service that lets connected devices easily and securely interact with cloud applications and other devices — brings simplicity, flexibility, and consistency to the end user experience. Make your product part of your consumer's ambient experience in the home, office, or hotel by using AVS Integration for AWS IoT Core to:

Lower the cost of producing an Alexa Built-in device

- Simplify firmware development using AVS interfaces, now accessible via a single, secure AWS IoT reserved topic for MQTT (Message Queuing Telemetry Transport)
- Offload compute and memory intensive workloads to the cloud and lower the hardware requirements on a device
- Reduce the engineering cost of producing an Alexa Built-in device up to 50%

Get to market faster with help from AWS Partners

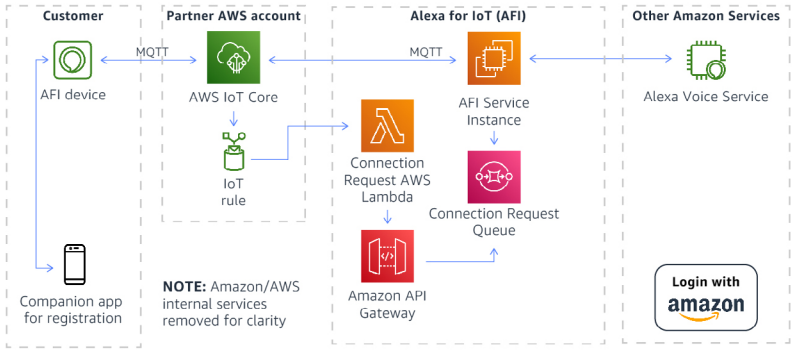
- Select pre-qualified hardware kits from AWS Partners that work with AWS IoT Core by default
- Use AWS Partner service integrations for connectivity and to help with environment considerations

Apply Alexa Voice to devices of all shapes and sizes

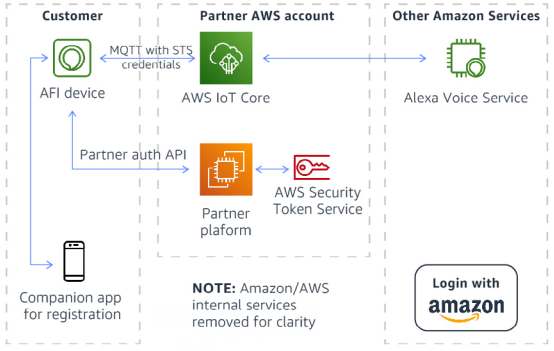
- Rely on cloud resources to overcome device resource limitations such as size or weight
- Become the first voice-enabled product in your category

A customer can use digital certificates or tokens for service authentication with AWS IoT Core. Standard implementation uses AWS IoT Core to manage certificates and policies directly. Alternatively, you can authenticate with a pre-signed credential from AWS Security Token Service (STS) that AWS IoT Core can trust.

Standard implementation



Alternate implementation



Alexa, tell me about NXP Semiconductors

The NXP EdgeReady solution for Alexa Voice Service (AVS) Integration for AWS IoT Core leverages the i.MX RT106A crossover MCU, delivering an AVS-qualified turnkey hardware and software reference design that minimizes development effort, enabling production in less than six months.

- Out-of-box-experience leverages Amazon's Frustration Free Setup (FFS) to simplify Wi-Fi® network connectivity and Alexa account provisioning
- Leverages Amazon's Common Software (ACS) middleware, enabling easy deployment of future Amazon innovations
- Built on FreeRTOS, enabling easy connectivity to AWS IoT Core
- AVS qualified far field audio front end (AFE) uses self-tuning Machine Learning (ML) technology, significantly simplifying the audio design process compared to a traditional DSP based AFE
- Integrates Amazon's wake word engine with Alexa locales, making it easy for device makers to offer any language or dialect spoken by Alexa, today or in the future
- BOM cost optimized hardware reference design based on a high performance i.MX RT106A MCU with available CPU bandwidth and peripherals to run other applications concurrently with Alexa. E.g. The user interface of a smart appliance, thermostat, or other smart home device
- Separate Wi-Fi/BLE module, allows choice of single band Wi-Fi for the lowest cost, or dual band to maximize compatibility and throughput

Eaton Wi-Fi smart voice dimmer

Challenge

Eaton already had smart Wi-Fi dimmers, switches, and receptacles in their portfolio that were compatible with Alexa. To differentiate themselves in an ever-changing technology world, they decided to develop a new dimmer with Alexa Built-in and offer unbeatable ease of installation. Not only did Eaton identify that ease of installation is a major challenge for many users, they also required supporting multiple languages to serve all customers in North America. In order to meet the product requirements, Eaton needed to expand their resource base as this was their first voice or Alexa Built-in product development.

Solution

NXP's EdgeReady turnkey Alexa for IoT solution, running on a high performance microcontroller, made it easier for Eaton to design a dimmer switch with Alexa Built-in. No audio expertise was required due to the included self-tuning machine learning (ML) audio front end (AFE) enabling far field voice. Eaton used the latest updates to NXP's software development kit (SDK). The SDK updates included support for Amazon's Frustration-Free Setup (FFS), enabling users to connect new devices to their Wi-Fi networks and Alexa accounts without having to type in any IDs, passwords, or Alexa locales, providing access to all the languages, dialects, and accents supported by Alexa.

Outcomes

Eaton successfully launched their Wi-Fi smart voice dimmer in early 2021, one of the first Alexa for IoT dimmer switches and third party Alexa Built-in devices offering FFS. By introducing the Eaton Wi-Fi smart voice dimmer with Alexa Built-in, Eaton delivered to homeowners seamless integration with Alexa, Frustration-Free Setup, lighting control, and reliability with no additional hubs required - all in one sleek device.

"NXP's Alexa for IoT solution helped support Eaton to successfully achieve our objective of launching a smart Wi-Fi dimmer switch with Alexa Built-in, Frustration-Free Setup, and multi-language support."

Matt Alexander
VP of Marketing - CRDS
Eaton

Alexa, get this party started

Follow the Getting Started Guide to jumpstart using the AVS Integration for AWS IoT Core.

NXP's EdgeReady SLN-ALEXA-IOT development kit for the i.MX RT106A MCU solution for Alexa for IoT

Out of the box, Frustration-Free Setup (FFS) enables the ability to connect automatically the NXP kit to the user's Wi-Fi network and Alexa account. This solution's turnkey AVS Integration for AWS IoT Core application code is built on Amazon Common Software (ACS) and FreeRTOS, with connectivity to AWS IoT Core. It's AVS qualified far field AFE is based on ML technology, simplifying the audio design process, and in many cases eliminating the need to engage system integrators or consulting services providers.