NXP® Software Development Kit (SDK) for HomeKit™ Accessories

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HomeKit™ offers a set of common protocols that lets home accessories work together seamlessly. This hardware and software technology establishes a private interface between a user's iPhone®, iPad®, or iPod® touch and connected products, enabling users to better manage their homes simply by using Siri® on their iOS device.

HomeKit Overview

Built on a secure foundation with end-to-end encryption, HomeKit provides customers a secure connection. Data is always encrypted, so the only people with access to user information (such as lighting and thermostat timing) are the connected users within the household.

▸ Directly supports Internet Protocol (IP) (Wi-Fi® and Ethernet) and Bluetooth® Smart (4.0+) transports

▸ Works with multiple legacy transports (ZigBee®, Z-Wave®, and PowerLine®) via accessory bridges

▸ Multiple vendor accessories may be controlled by one or more iOS apps

▸ Multiple iOS apps may control each accessory

▸ HomeKit support available with iOS 8

▸ iOS 9 offers several new functions

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Users can create *scenes* to connect and control appliance settings in different combinations. For example, the user can create a scene named "leaving home" that turns off the lights, locks the doors, and lowers the thermostat in a single scene operation.

HomeKit also uses *voice commands* through Siri to turn appliances on and off, or to set scenes. Alternately, users can set up home products to turn on and off automatically based on other triggers. For example, a bathroom heater can be set to turn on at 6:00 a.m.—but only when the user is home. Without even giving commands, the home is always at the ready. Users can also set up certain appliances to trigger other connected products throughout the household. For instance, the garage door opener may turn on kitchen lights and adjust the automatic blinds—but only after sunset.
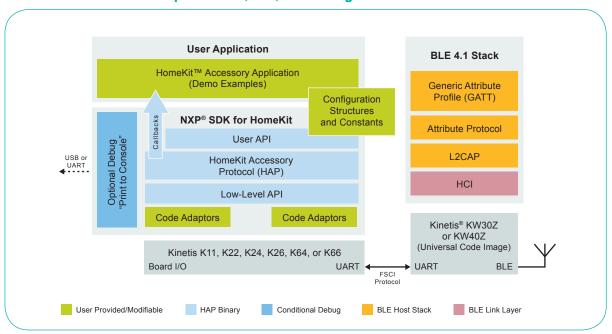
More than 50 brands worldwide have committed to providing products that work with HomeKit, and the number of available Apple®-approved accessories is expanding daily.

NXP Software Development Kit (SDK) for HomeKit

The NXP software development kit (SDK) for HomeKit applications offers professional-class support for accessory designers by providing exceptional performance, advanced security, and Bluetooth Smart® (BLE) connectivity.

This SDK implements the HomeKit Accessory Protocol (HAP) for integration with the accessory's application software on an ARM® Cortex®-M4-based high-performance Kinetis® K host MCU (e.g., K11, K22, K24, K26). Bluetooth Smart 4.1 (BLE) connectivity is provided by Kinetis KW40Z or KW30Z, or QN9020 wireless MCUs. Future NXP MCU and MPU models featuring integrated BLE will offer wireless HomeKit functionality in a single device. The HomeKit SDK package includes communication protocol stacks, so customers don't have to create the protocol themselves.

HomeKit Software Development Kit (SDK) Block Diagram

The NXP BLE solution for HomeKit is architected as a host processor to run the HAP with a wireless connectivity processor connected via serial interface (UART). NXP MCUs and MPUs based on ARM® Cortex®-M cores provide highly efficient processing to meet HomeKit cryptography requirements. They do this while incorporating a wide array of advanced security functions, including cryptographic keys storage, software and system protection options, hardware random number generator (RNG), and optional integrated system tamper detection. It also includes a royalty-free NXP Bluetooth Smart host stack with 20 GATT profiles, all fully compliant with the Bluetooth Smart 4.1 specification.

NXP Professional Services is available to help customers with hardware and software development, system integration and customization.
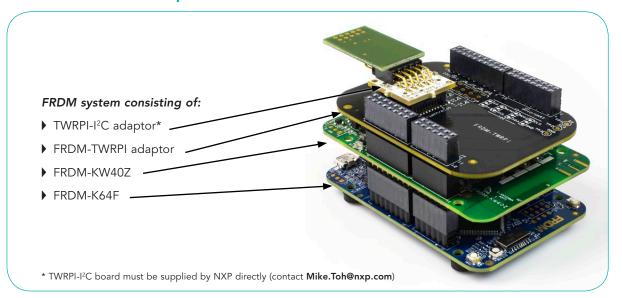
NXP® HomeKit™ SDK Features

• Hardware platform
  o Host processor: Kinetis® K ARM® Cortex®-M4- core- based MCU
  o BLE wireless connectivity MCUs: Kinetis KW30Z or KW40Z, or QN9020

• HomeKit™ Accessory Protocol (HAP)
• Bluetooth Smart® 4.1 (BLE) wireless connectivity
• Easy to setup configuration
• User API independent of communications transport
• Easy porting and adaptation to target platform
• Enables defined and custom accessory functions
• Includes application examples suitable for project starting point
• Debug support with conditional print to console
• Built-in firmware update
• Unlimited production license
• Two hours of professional support
• Additional professional support assistance available
• Planned support for IP (Wi-Fi® and Ethernet) transports

Hardware Development System

Flexible hardware development systems and a user interface support the HomeKit SDK. NXP designed the SDK for easy porting and adaption to a wide range of target platforms employing the concept of adaptors. The user API is independent of the communication transport selected; the code adaptors enable the use of alternative connectivity modules.

NXP's SDK for HomeKit accessories is easy to configure and works with a range of HomeKit-defined and application custom accessory functions. A built-in firmware update is included in the HomeKit SDK via an iOS application.
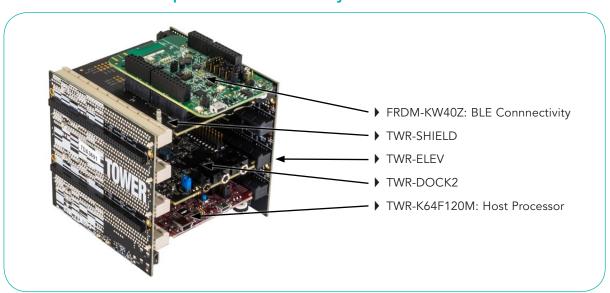
HomeKit Software Development with NXP Freedom Board

FRDM system consisting of:

▸ TWRPI-I^{2}C adaptor*

▸ FRDM-TWRPI adaptor

▸ FRDM-KW40Z

▸ FRDM-K64F

* TWRPI-I^{2}C board must be supplied by NXP directly (contact **Mike.Toh@nxp.com**)

The low-cost NXP Freedom development board platform is supported with the HomeKit software for easy evaluation, development, and rapid prototyping. Additional hardware details can be found in the SDK's documentation and release notes.

The HomeKit SDK also works with our NXP Tower® System Modular Development Board Platform. The TWR-DOCK2 module is required for HomeKit SDK development, and is designed to be combined and used with other modules in the Tower System and a wide range of other peripheral, sensor interface and MCU/MPU modules.

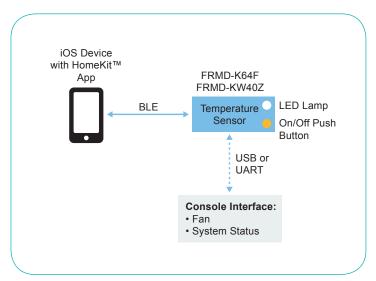## HomeKit Software Development with NXP Tower System

▸ FRDM-KW40Z: BLE Connnectivity

▸ TWR-SHIELD

▸ TWR-ELEV

▸ TWR-DOCK2

▸ TWR-K64F120M: Host Processor

Rapid Demo and Development

The HomeKit SDK from NXP offers two high-level configuration options:

1. Debug: Selected HAP status parameters are "printed" to console on a Mac or PC via Serial or USB interface for debug and testing

2. Release: Removes the print-to-console functionality and is suitable for the accessory production release

Console interface examples are available for all defined accessories and functions (e.g., light bulb, fan, temperature sensor, etc.). This accessory can be used as a starting point for accessory development, helping customers get a demo up and running quickly in order to customize and modify it to their own functionality needs.

The NXP SDK demo includes:

▶ Example HomeKit iOS app

▶ LED bulb, including brightness and hue control of RGB LED on FRDM-K64F

▶ Local On/Off push-button control on FRDM-K64F

▶ Simulated fan control shown on a Mac/PC console interface, connected via USB

▶ Temperature sensor showing temperature of onboard K64F sensor

The demo enables easy integration with the accessory so that customers can optimize the software to configure their own application. Targeted applications for HomeKit accessories (end-points) include lighting, power outlets, thermostats, security, door locks, sensors, smoke detectors, garage doors, and many others. Suitable application examples that customers can use as a starting point are included to facilitate easy and rapid development.

Target Applications
• Lighting: bulbs and fixtures
• Power outlets and switches
• Ceiling (and other) fans
• Relocatable and portable switches
• Security systems: cameras, sensors, control panels
• Door locks
• Garage doors and gates
• Chicken coop and pet doors
• Thermostats and HVAC control
• Windows and doors
• Window coverings: blinds and drapes
• Pool and spa control
• Weather stations
• Irrigation systems
• Water leak monitoring
• Appliances: dishwashers, washing machines, dryers, fridges, freezers, coffee machines
• Sensors: moisture, air quality, fire, smoke, CO_2 detectors
• Robot vacuum cleaners
• Pet feeders
• Multimedia equipment (e.g., home theater screen, projector, lens control)

NXP Provides a Better Quality Experience

NXP is continuously developing, expanding, and evolving the HomeKit SDK to work with new products and provide greater functionality. The HomeKit SDK from NXP has a $499 resale price. The download includes all current processor, transport, OS, and tool set options as well as:

▸ SDK software for HomeKit accessories

▸ User Manual

▸ Release Notes

▸ Unlimited production license

▸ **Two hours of professional support from NXP (via e-mail)**

Optional design customization and integration is available from NXP Professional Engineering Services. While there are free SDKs available for HomeKit accessory development from other sources, NXP offers a truly robust and professional-class kit. Most importantly, NXP's solution comes with included support and optional customization services to reduce development churn and to help customers achieve their business objectives in short order.

The HomeKit SDK and TWR-DOCK2 hardware boards are available to MFi® licensees from MFi-authorized distributors. The TWRPI-I2C board must be supplied by NXP directly (please contact Mike.Toh@nxp.com). Other hardware development boards are available on **www.nxp.com** and from authorized NXP distributors.

Contributor

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