




SILICON LABS SRN14930-7.21.0.0 Z-Wave and Z-Wave Long Range User Guide

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Z-Wave and Z-Wave Long Range 700/800
SDK 7.21.0 Pre-Certified GA
Gecko SDK Suite 4.4
December 13, 2023

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Z-Wave and Z-Wave Long Range 700/800 are designed to meet the demands of the future smart home, where increasing needs for more sensors and battery-operated devices require both long range and low power. Context-aware environments are the next evolution in the smart home market, and they require technologies that have been optimized specifically for these applications.

100% Interoperable: Every product in the Z-Wave ecosystem works with every other product, regardless of type, brand, manufacturer or version. No other smart home/IoT protocol can make this claim.

Best-In-Class Security: Z-Wave's Security 2 (S2) framework provides end-to-end encryption and the most advanced security for smart home devices and controllers. Homes with S2 Z-Wave devices are virtually unhackable.

SmartStart Easy Installation: SmartStart radically simplifies the installation of smart devices by using QR code scans for uniform, trouble-free setup. Devices and systems can be pre-configured dramatically easing deployments.



KEY FEATURES

- BRD2705 Explorer kit includes new applications
- Various quality improvements
- Z-Wave PC-based Zniiffer v6.48 released with CSV export feature

Backwards-Compatible: Z-Wave certification mandates backward-compatibility. The first Z-Wave devices on the market, more than ten years old, still perform as intended in networks with the latest Z-Wave technologies.

For more information about the certification status of Z-Wave and Z-Wave Long Range 700/800 SDK v7.21.0.0 Pre-Certified GA, see section 12 Product Life Cycle and Certification.

These release notes cover SDK version(s):

7.21.0 GA released December 13, 2023

Compatibility and Use Notices

For more information about security updates and notices, see the Security chapter of the Gecko Platform Release notes installed with this SDK or on the [Silicon Labs Release Notes page](#). Silicon Labs also strongly recommends that you subscribe to Security Advisories for up-to-date information. For instructions, or if you are new to the Z-Wave 700/800 SDK, see section 11 Using This Release.

Compatible Compilers:

GCC (The GNU Compiler Collection) version 12.2.1, provided with Simplicity Studio.

Supported Radio Boards

This section describes the radio boards supported by the certified and pre-certified applications for the 700 and 800 Series, respectively.

Table 1-1. Supported Radio Boards

Series	Radio Board	Description	Z-Wave Long Range	Tx Power	Secure Vault
800	BRD2603A	ZGM230SB: SiP	yes	14 dBm	High
800	BRD2705A	EFR32ZG28B: SoC	yes	14 dBm	High
800	BRD4204A	EFR32ZG23A: SoC	yes	14 dBm	Mid
800	BRD4204B	EFR32ZG23A: SoC	yes	14 dBm	Mid
800	BRD4204C	EFR32ZG23B: SoC	yes	14 dBm	High
800	BRD4204D	EFR32ZG23B: SoC	yes	14 dBm	High
800	BRD4205A	ZGM230SA: SiP	yes	14 dBm	Mid
800	BRD4205B	ZGM230SB: SiP	yes	14 dBm	High
800	BRD4210A	EFR32ZG23B: SoC	yes	20 dBm	High
800	BRD4400C	EFR32ZG28B: SoC	yes	14 dBm	High
800	BRD4401B	EFR32ZG28B: SoC	yes	20 dBm	High
800	BRD4401C	EFR32ZG28B: SoC	yes	20 dBm	High
700	BRD4200A	ZGM130S: SiP	–	14 dBm	–
700	BRD4201A	EFR32ZG14: SoC	–	14 dBm	–
700	BRD4202A	ZGM130S: SiP & no SAW filters	–	14 dBm	–
700	BRD4206A	EFR32ZG14: SoC	yes	14 dBm	–
700	BRD4207A	ZGM130S: SiP	yes	14 dBm	–
700	BRD4208A	EFR32ZG14: SoC	yes	20 dBm	–
700	BRD4209A	ZGM130S: SoC	yes	20 dBm	–

The applications in the above table need a radio board in combination with BRD4002A – Wireless Starter Kit Mainboard (WSTK) and BRD8029A – Buttons and LEDs Expansion Board. Notice that BRD4002A is compatible with the old BRD4001A mainboard that is going to be deprecated. The Serial APIs in the above table only need a radio board and a BRD4002A – Wireless Starter Kit Mainboard (WSTK). Refer to [INS14278: How to Use Certified Apps](#) and [INS14816: How to Use Pre-Certified Apps](#), for details.

ZW-LR indicates that the radio board supports both Z-Wave and Z-Wave Long Range. 14/20 dBm indicates the transmit power of the radio board. Secure Vault is an industry-leading suite of state-of-the-art security features that address escalating Internet of Things (IoT) threats.

Table 1-2. Radio Boards versus OPNs.

Series	Radio Board	OPN Description
800	BRD2603A	ZGM230SB27HGN3
800	BRD2705A	EFR32ZG28B312F1024IM48-A
800	BRD4204A	EFR32ZG23A010F512GM48
800	BRD4204B	EFR32ZG23A010F512GM48
800	BRD4204C	EFR32ZG23B010F512IM48
800	BRD4204D	EFR32ZG23B010F512IM48
800	BRD4205A	ZGM230SA27HNN0
800	BRD4205B	ZGM230SB27HGN2
800	BRD4210A	EFR32ZG23B020F512IM48
800	BRD2603A	ZGM230SB27HGN3
800	BRD4400C	EFR32ZG28B312F1024IM68-A
800	BRD4401B	EFR32ZG28B322F1024IM68-A
800	BRD4401C	EFR32ZG28B322F1024IM68-A
700	BRD4200A	ZGM130S037HGN2
700	BRD4201A	EFR32ZG14P231F256GM32
700	BRD4202A	ZGM130S037HGN2
700	BRD4206A	EFR32ZG14P231F256GM32
700	BRD4207A	ZGM130S037HGN2
700	BRD4208A	EFR32ZG14P731F256GM32
700	BRD4209A	EFR32ZG13P531F512GM48

The table above shows the Radio Boards and OPN relation. This table can be used to clarify the compatibility of the prebuilt binaries offered in the GSDK. The prebuilt binaries are built targeting boards and not OPNs. More OPNs are available than the ones listed above. For those OPNs the prebuilt binaries will not work. The desired application must be built targeting the specific OPN instead.

Upcoming GSDK Changes

This release of the Gecko SDK (GSDK) will be the last with combined support for all EFM and EFR devices, except for patches to this version as needed. Starting in mid-2024 we will introduce separate SDKs:

- The existing Gecko SDK will continue with support for Series 0 and 1 devices.
- A new SDK will cater specifically to Series 2 and 3 devices.

The Gecko SDK will continue to support all Series 0 and 1 devices with no change to the long-term support, maintenance, quality, and responsiveness provided under our software policy. The new SDK will branch from Gecko SDK and begin to offer new features that help developers take advantage of the advanced capabilities of our Series 2 and 3 products.

This decision aligns with customer feedback, reflecting our commitment to elevate quality, ensure stability, and enhance performance for an exceptional user experience across our software SDKs.

Z-Wave Protocol

Be aware that 800 products based on SDK v7.17.x do not support upgrade of Secure Element firmware over the air (OTA). However, a migration path exists to upgrade both main bootloader and Secure Element firmware to enable support of this feature. See INS14895: Instruction for How to Use Tiny App regarding the upgrade path. The 800-based SDK v7.18.x supports upgrade of Secure Element firmware over the air (OTA).

The 8 kB reduction of the Z-Wave protocol NVM3 file system has an impact when making OTA firmware update on 800-based applications deployed on version 7.17.2 and earlier. To make an OTA firmware update from 7.17.2 to 7.18.1/2 requires that 7.18.1/2 is modified to keep the same NVM3 protocol size as 7.17.2. This can be configured by the define NVM3_DEFAULT_NVM_SIZE when building 7.18.1/2.

Note that due to the introduction of Secure Key Storage on the 800 series, having externally supplied key pairs is no longer supported. To ensure that security is not compromised, keys are generated internally on first boot and the private key kept only in secure storage. The public key and the QR code can be read out in production.

3.1 New Items

None

3.2 Improvements

ID #	Description
1203123	Compiler version updated to GCC12
1175968	Refactoring to improve packet header management

3.3 Fixed Issues

Fixed in release 7.21.0.0 GA

ID #	Description
1209748	Address an issue where the Z-Wave stack was not able to successfully reach the EM4 energy mode.
1210023	FUNC_ID_ZW_SEND_TEST_FRAME caused the controller SerialAPI NCP to become unresponsive.
1209882	Improve NVM repack to avoid watchdog reset during this process.
1166462	Fix a race condition that can lead to a lock-up in the priority queue.
1165981	Added ZAF module for retention registers.
1142774	DoorLock did not respond with S2 message encapsulation with the SPAN extension to S2 Nonce Report.
1134377	NodeID Length configuration was not persistent in SerialAPI NPC memory.

3.4 Known Issues in the Current Release

Issues in bold were added since the previous release. If you have missed a release, recent release notes are available on [Silicon Labs Release Notes page](#)

ID #	Description	Workaround
753756	Network Wide Inclusion (NWI) of 500-based apps doesn't work through 700/800 repeaters.	NWI works at second attempt.
1228675	700 controller is incompatible with the Z/IP gateway solution. With this configuration, an inclusion won't succeed	No workaround
1227385	The 700/800 controller can lock itself up. The controller is not able to send acknowledgements and the data transmitted is corrupted	No workaround

3.5 Deprecated Items

None

3.6 Removed Items

Removed in release 7.21.0.0 GA

ID #	Description
1217971	Remove the portable controller feature from the SDK

Z-Wave Plus V2 Application Framework

4.1 New Items

Supported applications on BRD2705 Explorer Kit: Serial API Controller, Ziffer NCP, LED Bulb, Multilevel Sensor, Power Strip, Sensor PIR, Switch On/Off, Wall Controller. Due to limited buttons, some features are limited on this board. Details can be found in the applications' readme files.

The source code of the two Ziffer application variants are published and available as sample applications. The two variants are the ZifferPTI and the Ziffer (non PTI).

4.2 Improvements

For a detailed description of application development using the Z-Wave Plus V2 Framework, refer to [INS14259: Z-Wave Plus V2 Application Framework GSDK](#).

A porting guide is also available for customers who want to migrate to the 800 platform. The guide contains a detailed example of how to port a non-component/700-based Switch On/Off App (7.16.3) to a component/800-based Switch On/Off App (7.17.0). See

APL14836: Application Note for Porting Z-Wave Appl. SW from 700 to 800 hardware.

More mandatory logic was moved from the application to ZAF. This contributed to bringing down the total number of lines in the application. This should decrease time to market for new products.

ID #	Description
1221005	Revert sl_app_properties changes for Serial API Controller. It resolves the OTW update compatibility issue for Serial API Controller introduced in 7.20.0 SDK version. More details can be found in the application readme file and in important_changes.md.

4.3 Fixed Issues

Fixed in release 7.21.0.0 GA

ID #	Description
1224435	DoorLock did not send battery report -every five minutes.
1224468	Report for Lifeline association was missing.
1224474	Basic command class report was incorrect.
1224476	Powerlevel timeout value was too short.
711346	Sensor PIR throws some undefined garbage to the connected port.

4.4 Known Issues in the Current Release

Issues in bold were added since the previous release. If you have missed a release, recent release notes are available on the [Silicon Labs Release Notes page](#)

ID #	Description	Workaround
369430	All S2 multicast frames are sent using verified delivery S2_TXOPTION_VERIFY_DELIVERY whether or not a response is expected.	Change source code depending on the frame sent.
1062482	OTA firmware update gets stuck when a Timer interrupt is triggered to toggle a GPIO frequently.	Currently not available.
1080416	The ASSERT macro does not print the file and line when it is used in the ApplicationTask function.	Prints after disabling all interrupts.
1172849	On series 800, sleep will no longer take advantage of EM1P current savings.	Currently not available.

4.5 Deprecated Items

None

4.6 Removed Items

Removed in release 7.21.0.0 GA

The Key Fob Controller has been removed.

Certified Applications

The certified applications based on v7.x.1+ will be formally certified by a certification house. However, the first release (v7.x.0) will only contain pre-certified applications based on a certification test using CTT v3. Refer to [INS14278: How to Use Certified Apps](#) for details.

The LED Bulb application has been removed from the Certified Applications and moved to Pre-Certified Applications.

5.1 Door Lock Key Pad

5.1.1 New Items

None

5.1.2 Improvements

None

5.1.3 Fixed Issues

None

5.1.4 Known Issues in the Current Release

None

5.1.5 Deprecated Items

None

5.1.6 Removed Items

None

5.2 Power Strip

5.2.1 New Items

None

5.2.2 Improvements

None

5.2.3 Fixed Issues

None

5.2.4 Known Issues in the Current Release

None

5.2.5 Deprecated Items

None

5.2.6 Removed Items

None

5.3 Sensor PIR

5.3.1 New Items

None

5.3.2 Improvements

None

5.3.3 Fixed Issues

None

5.3.4 Known Issues in the Current Release

None

5.3.5 Deprecated Items

None

5.3.6 Removed Items

None

5.4 Switch On/Off

5.4.1 New Items

None

5.4.2 Improvements

None

5.4.3 Fixed Issues

None

5.4.4 Known Issues in the Current Release

None

5.4.5 Deprecated Items

None

5.4.6 Removed Items

None

5.5 Wall Controller

5.5.1 New Items

None

5.5.2 Improvements

None

5.5.3 Fixed Issues

None

5.5.4 Known Issues in the Current Release

None

5.5.5 Deprecated Items

None

5.5.6 Removed Items

None

Pre-Certified Applications

The pre-certified applications will not be formally certified, but certification tests have been performed based on CTT v3. Refer to [INS14816: How to Use Pre-Certified Apps](#) or details.

The LED Bulb application has been removed from the Certified Applications and moved to Pre-Certified Applications.

6.1 Multilevel Sensor

6.1.1 New Items

None

6.1.2 Improvements

None

6.1.3 Fixed Issues

None

6.1.4 Known Issues in the Current Release

None

6.1.5 Deprecated Items

None

6.1.6 Removed Items

None

6.2 LED Bulb

6.2.1 New Items

None

6.2.2 Improvements

None

6.2.3 Fixed Issues

None

6.2.4 Known Issues in the Current Release

None

6.2.5 Deprecated Items

None

6.2.6 Removed Items

None

Serial API Applications

Beginning with version 7.16, when backing up and restoring a SerialAPI end node via the FUNC_ID_NVM_BACKUP_RESTORE, the SerialAPI end node will automatically upgrade the protocol non-volatile memory (NVM) to the latest version. Any backup made of a 7.16 or later SerialAPI end node can be restored to its original version or to a later version of the SerialAPI end node without any manual upgrade of the protocol NVM being necessary.

The serial interface is unchanged in version 8.

As of SDK version 7.18.x, Serial API end node is available as source code as well as binary. This opens the possibility for building customized versions of Serial API end node with different pin configuration or additional hardware utilization. A use case might be to use SPI instead of UART for serial communication.

No application using Serial API End Device is available in the GSDK.

7.1 Serial API Controller

7.1.1 New Items

None

7.1.2 Improvements

None

7.1.3 Fixed Issues

None

7.1.4 Known Issues in the Current Release

None

7.1.5 Deprecated Items

None

7.1.6 Removed Items

None

800 SDK

8.1 BRD2603

800 SDK improvements:

- MultilevelSensor App improved by supporting ambient light sensor and motion sensor. The periodic timer for sensor data reports is configurable.
- Supported new apps on 800 DevKit: SensorPIR, WallController, PowerStrip, Zniffer
- Improved the usage of the 800 DevKit demo with the Unify Portable Environment by adding the ability to identify the application firmware on the boards. This makes preparation of the Dev Kit for the demo simpler and faster.

8.2 BRD2705

Support new applications for BRD2705A:

- SerialAPI Controller
- ZnifferPTI
- SwitchOnOff
- SensorPIR
- WallController
- PowerStrip
- MultilevelSensor
- LEDBulb

Important Changes

Starting in version 7.19, API-breaking changes have been documented in “Important_changes.md” available in the GSDK. Check it for a detailed description of changes introduced in the latest release.

HTML documentation has been added to the GSDK and can be found in Simplicity Studio, Documentation section, under “Z-Wave zipped doxygen documentation”. Location of this document is <SDK>/protocol/z-wave/studio-docs/z-wave-html-docs.zip.

Open Source Software

Z-Wave is using FreeRTOS as the underlying OS, and it is based on FreeRTOS Kernel V10.4.3.

Using This Release

This release contains the following

- Z-Wave Plus V2 Application Framework
- Z-Wave Certified Applications for a broad range of smart home applications
- Z-Wave Protocol and Serial API Applications

If you are a first-time user, Z-Wave documentation is installed with the SDK. See [INS14280: Z-Wave Getting Started for End Devices](#), [INS14278: How to Use Certified Apps in Z-Wave](#), and [INS14281: Z-Wave Getting Started for Controller Devices](#) for instructions.

This SDK depends on a Gecko Platform. The Gecko Platform code provides functionality that supports protocol plugins and APIs in the form of drivers and other lower layer features that interact directly with Silicon Labs chips and modules. Gecko Platform components include EMLIB, EMDRV, RAIL Library, NVM3, PSA, and mbedTLS. Gecko Platform release notes are available through Simplicity Studio's Launcher Perspective.

11.1 Installation and Use

Order a Z-Wave Wireless Starter kit. The kit offers the easiest and fastest way to start evaluation and development of your own ZWave mesh application. It provides a single world-wide development kit for both end devices and gateways with multiple radio boards, with which developers can create a mesh network and evaluate the Z-Wave module.

The Z-Wave and Z-Wave Long Range 700/800 SDK is provided as part of the Gecko SDK (GSDK), the suite of Silicon Labs SDKs.

To quickly get started with the GSDK, install [Simplicity Studio 5](#), which will set up your development environment and walk you through GSDK installation. Simplicity Studio 5 includes everything needed for IoT product development with Silicon Labs devices, including a resource and project launcher, software configuration tools, full IDE with GNU toolchain, and analysis tools. Installation instructions are provided in the online [Simplicity Studio 5 User's Guide](#).

Alternatively, Gecko SDK may be installed manually by downloading or cloning the latest from GitHub. See https://github.com/SiliconLabs/gecko_sdk for more information.

Simplicity Studio installs the GSDK by default in:

- (Windows): C:\Users\<NAME>\SimplicityStudio\SDKs\gecko_sdk
- (MacOS): /Users/<NAME>/SimplicityStudio/SDKs/gecko_sdk

To implement a specific application, Silicon Labs recommends starting with one of the existing pre-certified apps with the desired Role Type.

11.2 Security Information


Secure Vault Integration

This version of the stack is using secure vault interface for key management of asymmetric keys (ECC Curve 25519) and Symmetric keys (AES).

Security Advisories

To subscribe to Security Advisories, log in to the Silicon Labs customer portal, then select Account Home. Click HOME to go to the portal home page and then click the Manage Notifications tile. Make sure that 'Software/Security Advisory Notices & Product

Change Notices (PCNs)' is checked, and that you are subscribed at minimum for your platform and protocol. Click Save to save any changes.


Update Preference

WHAT EMAILS WOULD YOU LIKE TO RECEIVE?

Newsletters

☐ Community Monthly Newsletter

☐ Sales Newsletter

☐ Micrium Newsletter

Product Specific Notifications

☐ Product Information and Newsletter

☒ Software/Security Advisory Notices & Product Change Notices (PCNs)

☐ Technical Document Updates (Release Notes, Data Sheets, etc.)

SELECT THE PRODUCTS TO RECEIVE UPDATES FOR

☐ Select/Unselect All

☐ Audio and Radio

☐ Interface

☐ Isolation

☐ Modems and DAAs

☐ Microcontrollers

☐ 8-bit MCUs

☒ 32-bit MCUs

☐ Timing

☐ Clocks

☐ Buffers

☐ Oscillators

☐ CDR and PHY

☐ Power over Ethernet

☐ Sensors

☐ TV and Video

☐ Voice

☐ Wireless

☐ Bluetooth Classic

☐ Bluetooth Low Energy

☒ Proprietary

☐ Wi-Fi

☐ ZigBee and Thread

☐ Z-Wave

11.3 Support

Development Kit customers are eligible for training and technical support.

See support resources and contact Silicon Laboratories support at <https://www.silabs.com/support>.

Product Life Cycle and Certification

Silicon Labs will add new features based on market requirements and continuously improve the Z-Wave Protocol to position the ZWave Ecosystem. The Z-Wave Protocol Life Cycle is a process to provide rapid innovation, new features and robust matured protocol release to Z-WavePartners. The Z-Wave Protocol Life Cycle defines the maturation process of Z-Wave Protocol generations and consist of three phases divided in five Life Cycle stages. A change in the Z-Wave SDK utilized for a specific device does require recertification; however, the type of certification required, the amount of testing needed, and the associated fees depend on the scope of the change. Refer to Z-Wave Alliance home page <https://z-wavealliance.org/> for details.

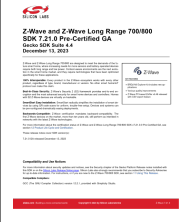
Table 12-1. Z-Wave SDK Release History

Series	SDK Version	Release Date [DD-MMM-YYYY]
700/800	7.21.0 GA	15-DEC-2023
700/800	7.20.2 GA	9-OCT-2023
700/800	7.20.1 GA	26-JUL-2023
700/800	7.20.0 Pre-Certified GA	07-JUN-2023
700/800	7.19.3 GA	03-MAY-2023
700/800	7.19.2 GA	08-MAR-2023

700/800	7.19.1 GA	01-FEB-2023
700/800	7.19.0 Pre-Certified GA	14-DEC-2022
700/800	7.18.8 GA	13-SEP-2023
700/800	7.18.6 GA	28-JUN-2023
700/800	7.18.4 GA	18-JAN-2023
700/800	7.18.3 GA	19-OCT-2022
700/800	7.18.2 GA	28-SEP-2022
700/800	7.18.1 GA	17-AUG-2022
700/800	7.18.0 Pre-Certified GA	08-JUN-2022
700/800	7.17.2 GA	09-MAR-2022
700/800	7.17.1 Pre-Certified GA	28-JAN-2022
700/800	7.17.0 Pre-Certified GA	08-DEC-2021
700	7.16.3 GA	13-OCT-2021
700	7.16.2 GA	08-SEP-2021
700	7.16.1 GA	21-JUL-2021
700	7.16.0 Pre-Certified GA	16-JUN-2021
700	7.15.4 GA	07-APR-2021
700	7.15.2 Pre-Certified GA	27-JAN-2021
700	7.15.1 Pre-Certified GA	09-DEC-2020
700	7.14.3 GA	14-OCT-2020
700	7.14.2 GA	09-SEP2020
700	7.14.1 GA	29-JUL-2020
700	7.14.0 Beta	24-JUN-2020
700	7.13.12 GA	21-SEP-2023
700	7.13.11 GA	02-NOV-2022
700	7.13.10 GA	18-AUG-2021
700	7.13.9 GA	03-MAR-2021

700	7.12.2 GA	26-NOV-2019
700	7.12.1 GA	20-SEP-2019

Documents / Resources

	<p>SILICON LABS SRN14930-7.21.0.0 Z-Wave and Z-Wave Long Range [pdf] User Guide SRN14930-7.21.0.0 Z-Wave and Z-Wave Long Range, SRN14930-7.21.0.0, Z-Wave and Z-Wave Long Range, and Z-Wave Long Range, Long Range, Range</p>
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References

- [Silicon Labs](#)
- [Overview - latest - Simplicity Studio 5 Users Guide Silicon Labs](#)
- [GitHub - SiliconLabs/gecko_sdk: The Gecko SDK \(GSDK\) combines all Silicon Labs 32-bit IoT product software development kits \(SDKs\) based on Gecko Platform into a single, integrated SDK.](#)
- [Gecko Software Development Kit \(GSDK\) - Silicon Labs](#)
- [Technical Support - Silicon Labs](#)
- [User Manual](#)