

EmberZNet Stack Release Notes

Product: Release Notes for EmberZNet PRO 5.10.1 GA

Release Date: June 9, 2017

1 Overview

This release contains the GA release of EmberZNet PRO 5.10.1.

It contains the following:

- Hardware Abstraction Layer (HAL) software provided as source code
- ZigBee PRO Networking stack
- Ember ZCL Application Framework (AFV2) including Sample Applications
- Application, Serial-uart-only and Serial-uart-ota Bootloaders
- Full set of Documentation including API guides and Application Notes

An installer for the Simplicity Studio development environment is available on the support portal.

It is our policy to certify EmberZNet PRO stack releases as ZigBee Certified Platforms. Note that ZigBee Certification may not be completed at the time of release, so please check with Support before relying on this release as the basis for ZigBee product certification.

1.1 Software Version

Stack Software: Version 5.10 build 80. The version number is defined as `SOFTWARE_VERSION` in the source code in the "stack/config/config.h".

This stack software release is intended to be used with the following versions of the other components:

- Simplicity Studio 4.0
- ISA3 Utilities Version 4.8.0.0 build 121, used with both EM3x and Mighty Gecko (EFR32MG) development environments
- Simplicity Commander 0.17.0 for interacting with the WSTK for Mighty Gecko platforms
- WSTK Firmware version 0v14p2b458
- IAR Embedded Workbench for ARM 7.80.2. If you are receiving this release as a product upgrade, the installer for IAR Embedded Workbench for ARM 7.80.2 is available at <ftp://files.iar.com/pub/silabs/EWARM-7802.exe>.
- ECC Library 1.0.1.20 (Available upon request via Silicon Labs support)

1.2 What's New

1.2.1 What's New in EmberZNet 5.10.1.0:

- Updates to support Green Power Proxy Basic for Zigbee 3.0 compliance
- Minor bug fixes

1.2.2 What's New in EmberZNet 5.10.0.0:

- MISRA checking for stack and application layer code
- zigbee 3.0 support for the following reference designs
 - Occupancy Sensor
 - Contact Sensor
 - Outlet
 - Light
 - Dimmer Switch
 - Gateway
- EM4 support for zigbee Sleepy device support
- Minor bug fixes
- New HAL configuration file format replaces old board headers - see <http://community.silabs.com/t5/Mesh-Knowledge-Base/Migrating-to-the-new-HAL-Config-file-format-for-EFR32/ta-p/200751> for additional details about this transition.

1.2.3 Deprecated Items in EmberZNet 5.10.0.0:

- RF4CE support will be deprecated for EM35x, EM358x, EM359x (non-EM34x platforms)
 - Only support for EM34x devices
 - No support for EFR32
 - Will be removed in the Q3'17 Gecko SDK Suite
- SPI Host support for non-POSIX(STM32) will be removed in the Q3'17 Gecko SDK Suite
- Legacy Bootloader support for EFR32 is not recommended for new EFR32 designs
 - Only legacy bootloader support for EM358x / EM35x
 - Gecko Bootloader is now available for EFR32 designs
 - EFR32MG1 customers are encouraged to migrate to the new Gecko Bootloader
- USB-NCP support will be deprecated for EM3588/6/2 and EM3598/6/2
 - EM3588/6/2 and EM3598/6/2 devices are not recommended for new designs due to USB silicon errata
 - USB-NCP support will be removed in the Q3'17 Gecko SDK
 - If you have questions or concerns, please contact support
- Moving forward, prebuilt NCP firmware images will no longer be provided except for radio boards that are included in the EFR32 Mesh Networking Kit. Customers will be required to build custom NCP images (xNCP) for EmberZNet and Thread using Appbuilder NCP Frameworks. This applies to both EFR32MGx and EM35x devices. Please contact support if you have any questions or concerns.

1.3 Support

Development Kit customers are eligible for training and technical support. You can use the Silicon Laboratories web site <http://www.silabs.com/zigbee> to obtain information about all Silicon Labs Zigbee products and services, and to sign up for product support.

You can contact Silicon Laboratories support at <http://www.silabs.com/support>

2 Using This Release

2.1 First Time Users

See QSG106, Getting Started with EmberZNet PRO, for step-by-step instructions on installing software, configuring the Simplicity Studio development environment, and building and flashing an example application.

- **EM35x Development Kit:** Refer to the Quick Start Guide included in your Development Kit for detailed step-by-step instructions about initially setting up your kit.
- **EFR32MG Mesh Networking Kit:** see QSG106, Getting Started with EmberZNet PRO, for instructions.

2.2 Accessing Documentation

- To view the full set of documentation, click on:
Start → All Programs → Silicon Labs → EmberZNet Stack 5.10.1 GA → Documentation
Or open the "documentation/Index.html" file from the root directory of the installed Ember stack. The documentation includes HTML pages describing the Ember Stack API and the Ember HAL API, along with a Development Kit Users Guide, an Application Developers Guide, the chip data sheet, and various Application Notes.
- **To view information on the ISA3 and associated utilities, click on:**
Start → All Programs → Ember → ISA3 Utilities → Documentation
Or open the "docs/index.html" file from the root directory of the installed ISA3 Utilities. This includes explanations of how to use the ISA3 Command line utilities, how to program certificates and install codes, as well as general documentation about the operation and use of the ISA3.
- **To view documentation for IAR Embedded Workbench, click on:**
Start → All Programs → IAR Systems → IAR Embedded Workbench for ARM → Release Notes

2.3 The File Layout

When the EmberZNet PRO stack software is installed, the following directories are present:

- **app**
 - **esf_common:** Contains template files used by Appbuilder to generate projects
- **hardware**
 - **kit:** Contains source code and header files for utilizing Silicon Labs Development Kits
 - **reference_design:** Contains source code and header files for utilizing custom reference designs
- **platform**
- **base:** Contains HAL source code
- **CMSIS:** Contains an implementation of ARM standard CMSIS
- **Device:** Contains Device headers for Silicon Labs micros
- **emdrv:** Contains Gecko peripheral drivers
- **emlib:** Contains Gecko peripheral libraries
- **middleware:**

- **glib**: Contains graphics library for Geckos
- **rail.lib**: Silicon Labs RAIL for use in Silicon Labs stack products
- **kit**:
- **protocol**
 - **zigbee_5.7**: Contains ZigBee stack and application framework code
 - * **app**: Contains Application framework code and sample apps.
 - * **build**: Contains stack libraries, and sample application binaries such as Nodetest
 - * **documentation**: Contains documentation about how to develop ZigBee applications. Please refer to Index.html to see a list of all documentation files.
 - * **ncp-images**: Contains prebuilt Network Coprocessor images
 - * **stack**: Contains header files necessary to build ZigBee applications
 - * **tool**: Contains the AppBuilder configuration settings, bootloader images and project files and bootloader Java application.
 - **appbuilder**: Contains project templates, xml files and properties files for Application Builder tool.
 - **image-builder**: Contains image-builder upgrade file used by ZigBee OTA Bootload cluster.
 - **bootloader-{Chip Designation}**: Contains the pre-built bootloader images and project files for building bootloaders with custom modifications.
 - **usb-host-drivers**: Contains drivers to allow customers to use USB to communicate with an EM358x product.

3 Known/Fixed Issues

3.1 Fixed Issues

3.1.1 Fixed Issues in EmberZNet 5.10.1

- Issue 262800: Prebuild Z3 sample applications target correct architecture
- Issue 258396: Thread EFR32 SPI NCP would sometimes fails to form network after initialization. EFR32 SPI NCP has been made more stable.

3.1.2 Fixed Issues in EmberZNet 5.10.0

- Issue 259387: Note that the Thunderboard Sense Connected Motion sample application only works when compiled with IAR. It does not currently work when compiled with GCC.
- Issue 243333: FLASH_SIZE and RAM_SIZE are set for the parts based on the architecture in case of GCC
- Issue 117894: Image Block Response does not properly handle the one time block request delay.
- Issue 237681: EmberZNet NCP firmware generated from AppBuilder via NCP Framework doesn't allow multi-network operations (non-0 network index) even if non-stub multi-network library is included. (Does not apply to pre-built NCP binaries found in the installer.)
- Issue 233037: NCP concentrator support code may initiate IEEE Address Requests even if Concentrator Support feature not enabled by host. Workaround: Always activate "Enable concentrator support at the NCP" if using the Concentrator Support plugin with an EmberZNet host application, or else build a custom NCP image via the NCP Framework and choose "Concentrator Support Stub Library" to remove the concentrator support features from the EmberZNet NCP firmware.

- Issue 224877: Source route management code may mistakenly create routing loop when source route table is full and a new entry is added and the oldest entry is being overwritten
- Issue 258788: Pre-built Thread NCP UART binaries with Software (XON/XOFF) flow control have been removed as the WSTK does not support software flow control through the USB serial interface. However, software flow control is still supported for Thread NCP UART and may be enabled with a plugin option in the NCP UART Link plugin of the Thread framework.
- Issue 258728: Going into AppNote by Tim Rosa
- Issue 246957: The ip-driver-app can't detect and recover if the length field of an IPv6 packet written to the TUN driver is corrupt. The sender of the packet should check to make sure the IPv6 length matches the length of the packet being sent. Added an assert to verify that the length does not exceed EMBER_IPV6.MTU (1280), which will catch length field corruption some of the time.
- Issue 229757: To join a client, first obtain the client's join key with the "get-join-key" command, and supply the server with that join key using the "expect ¡key;" command. Then join the client using the "join" command.
- Issue 240601: EZSP-USB NCP firmware periodically terminates with Hard Fault reset cause
- Issue 159525: Fast data transfer from host to EM3588 USB without acknowledgement from EM3588 sometimes causes EM3588 firmware to crash.

3.2 Known Issues

- Issue 265682: Z3 Light app enables Concentrator Support plugin functionality by default, but this is not necessary if the device isn't forming a centralized network as the trust center. Workaround: Disable Concentrator Support plugin if not planning to form network as coordinator with the Z3 Light.
- Issue 260995: Building zigbee applications with PS Store plugin in IAR IDE results in build error about missing psstore-cli.c file
- Issue 258890: Legacy CLI (used by older plugins) is deprecated and will be removed in the next release.
- Issue 159611: ZCL attribute tokens creator codes likely to change if you add or remove one or more attributes. For instance, if you add an attribute whose cluster ID or attribute ID is not the largest numerically, then this attribute gets inserted into a list of creator codes and makes all creator codes after it to be different (shifted).
- Issue 119037: Packet-buffer.c Assert at line 352 occurs during rapid packet transmission and Partner-link-key-exchange.
- Issue 244182: Update ZCL metadata for device types and required clusters so they match the latest ZCL revision
- Issue 161027: There has been an issue reported where setting and getting the stack profile from a non-primary network does not work correctly. This issue does not affect single-network applications.
- Issue 162190: Fixed issue in packet reception that could cause misprocessing of non-ACK-requesting packets after an ACK with frame-pending bit set was sent.
- Issue 135649: Multi-networking can cause APS frame counter confusion between networks. Workaround: Use emberAfSecurityInitCallback to add EMBER_NO_FRAME_COUNTER_RESET to EmberInitialSecurityBitmask.
- Issue 121984: Turning off NCP concentrator support does not disable all stack concentrator logic.
- Issue 119939: ZDO IEEE Request's APS ACK proxied by parent incorrectly includes long source address.

- Issue 103833: Second energy scan request caught in first energy scan request knocks node out of network.
- Issue 82600: Setting a non-zero MAC Filter Table Size but no MAC Filter Table Entries causes NCP resets when joining a network
- Issue 61008: Scanning state machine (stack level or form-and-join util) can get stuck in "scanning" state indefinitely
- Issue 60975: EZSP_VALUE_TOKEN_STACK_NODE_DATA, EZSP_VALUE_UART_SYNCH_CALLBACKS, EZSP_VALUE_MAXIMUM_INCOMING_TRANSFER_SIZE, and EZSP_VALUE_MAXIMUM_OUTGOING_TRANSFER_SIZE ValueIDs are writable but not readable.
- Issue 60970: TC link key should be used for Transport Key to rejoining devices even if decision is Send Key In Clear
- Issue 60944: EZSP-SPI NCP may become unresponsive if callbacks are received during ECC operations.
- Issue 60868: Extra retries seen on ZDO requests; ZDO response going out before APS ACK.
- Issue 60858: Sleepy broadcast payload is sometimes corrupted when relaying to child
- Issue 60774: MTORR reception by concentrator neighbor sometimes causes assert in route-discovery.c (emHandleRouteCommand).
- Issue 60757: Indirect Transaction Expiry route error not being sent when TX failure count is reached on parent router.
- Issue 62126: Packet stream and non-Packet debug stream should be better synchronized by ISA3 in Ember Desktop event capture.
- Issue 106307: Nodetest calChannel command does not wake the radio to work properly.
- Issue 87700: Sometimes the MAC ACKs associated with a sleepy device's transmissions get a false CRC failure due to timing issues of PTI (packet trace interface) and the software when the radio is shutting down as the MAC ACK arrives, resulting in wrong interpretation of CRC while in fact it is correct on the chip.
- Issue 71020: emberSetRadioPower no longer defined in bootloader PHY context, use emSetPhyRadioPower() as a workaround in the bootloader.
- Issue 70851: System-timer implementation precludes runtime adjustment to GPIO wake handling
- Issue 70799: Overlay of RESETINFO on CSTACK causes IAR stack overflow warning

4 Deprecated APIs and Functionality in this Release

- N/a

5 Application Framework

Please refer to the Application Framework release notes for information.

6 Intended Behavior

Here are some commonly reported issues that can be misleading behavior but function as intended:

- Broadcasts with empty payload are not heard through the loopback by the sending node
 - **Problem:** When sending a broadcast with no payload, the sending node does not get an `emberIncomingMessageHandler()` call for the broadcast loopback. Other devices in the network will receive the broadcast as expected.
 - **Workaround:** add a 1 byte payload to a broadcast that the sender expects to hear through the broadcast loopback.
 - **Issue Reference:** 59946
- When a node hears one of its own messages, the `lastHopLqi` and `lastHopRssi` parameters should have invalid values.
 - **Problem:** the last read values for LQI and RSSI are used when a device hears a message from itself
 - **Workaround:** a device should not use LQI and RSSI values when the source address is itself.
 - **Issue Reference:** 59620
- Parent could allow a device rejoining with an in-use ID to cause a node on the network to change its ID
 - **Problem:** If a child attempts a rejoin using a `shortID` that is already assigned to another device, the parent does not allow the rejoin and sends an ID conflict message causing the joined device using the same ID to change it's ID.
 - **Workaround:** none, intended behavior.
 - **Issue Reference:** 62472
- A route discovery is not initiated if a source routed unicast is sent with the `EMBER_APS_OPTION_FORCE_ROUTE_DISCOVERY_APS` option
 - **Problem:** the source route option takes precedence over the route discovery option. This could be setup to return an error, but the designed behavior is to allow the source route option (the route being used is a many-to-one route) to take precedence over the route discovery option.
 - **Workaround:** none, intended behavior
 - **Issue Reference:** 62551
- Route Records are not sent to Trust Center from a router after it reboots
 - **Problem:** Route table data (such as the concentrator flag associated with route destinations that are concentrators) are stored in RAM, which is cleared upon reboot. When the router reboots, it has no Many-to-one Route [MTOR] to the Trust Center [TC], so it has no reason to send Route Records when communicating to the TC. Furthermore, routing to the TC becomes almost impossible because no known route exists; the exception to this is when the router in question is a neighbor of the TC, in which case a one-hop route is inferred by the router once it finds the destination in its neighbor table. However, even in the inferred, one-hop route case, there is no actual route entry and thus no concentrator status to be preserved yet, so no Route Record arrives for the TC to process.
 - **Workaround:** While it is possible for the TC (assuming its running our EmberZNet PRO stack) to infer a similar one-hop route back to the router in the neighboring case and thus route its replies, this wont work for routers that are non-neighbors of the TC. In order to properly correct the situation for all routers, the TC needs to be doing Many-to-one Route Requests [MTORR] periodically to advertise its status as a concentrator. Once the MTORR is received by the router, a route table entry for the TC will be created, and Route Records will resume when unicasting to the TC.
 - **Issue Reference:** 60750