

RS9116W IoT Software 2.3 Release Notes – RS9116.WSC.2.3.0.0001

Friday, February 12th, 2021

RS9116 wireless connectivity products are a family of SoC's and modules providing a comprehensive 2.4/5 GHz Wi-Fi and dual-mode Bluetooth 5 wireless connectivity. The RS9116 WiSeConnect™ offers a full network offload option for embedded systems with low-end host microcontrollers running an RTOS or bare metal OS. The RS9116W connects to a host MCU using UART, SPI or SDIO interfaces. A complete set of wireless, networking and security stacks run on the RS9116W device, however the networking stack can be bypassed if required. Communication with the host MCU is achieved with AT Commands, or alternately a simple binary API referred to as SAPI. Also, the software supports the Multi-Protocol Co-Existence Manager, Power Manager and Host Manager entities.



2.3 Release Highlights

- Support for XTAL Good time configuration for Chip Customers

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Introduction

This document offers users of Silicon Labs software with an understanding of changes found between different releases.

Guide Reference

New Features	These items are new to this release
Changes/Issues Fixed	<p>These are</p> <ul style="list-style-type: none"> • Changes made to existing features found in previous releases of the software. • Enhancements to existing product flow and feature set. • Bug fixes done in the Release
Deprecated Items	Features or functions or APIs that are removed from the distributed release to align with the software roadmap
Known Issues	Features or functions that do not work as planned at time of release. Work arounds may be offered to meet short term development goals, but longer-term solutions will be added in future software releases
Limitations/ Recommendations	Describes what are the limitations on usage of product and recommendations for optimal use cases

Supported Products Present in This Release

- RS9116 WiSeConnect Software

Documentation References

RS9116 WiseConnect software documentation is available online at <https://docs.silabs.com/rs9116/>
The online documentation includes:

- *Evaluation Kit User's Guide*
- *AT-Command Programmers Reference Manual*
 - File names: rs9116w-wi-fi-at-command-programming-reference-manual
rs9116w-bt-classic-at-command-programming-reference-manual
rs9116w-ble-at-command-programming-reference-manual
- *SAPI Guides and SAPI Reference Manuals*
 - File names: rs9116w-sapi-programming-reference-manual
rs9116w-sapi-porting-guide
an1282-rs9116w-guide-for-sapi-application-examples
- *Application Notes*

Support

- <https://www.silabs.com/support>

Release Notes – RS9116.WSC.2.3.0.0001

Friday 12th February 2021

Release Type

- Test
- Alpha
- Beta
- Production

Release Details

- API Version (SAPI) : 1610.2.3.0.0001
- Firmware Version : 1610.2.3.0.0001
- Package Name : RS9116.NB0.WC.GENR.OSI.2.3.0.0001
- Supported RTOS : FreeRTOS
- Hardware Modules/chipsets : Q7, B00, C00, CC1, AB0, AB1, AA0, AA1
- Operating Modes Supported: Wi-Fi STA, Wi-Fi AP, Wi-Fi STA+BLE, Wi-Fi STA+BT, BT+BLE, Wi-Fi STA+BT+BLE

Information for Upgrading to Latest RS9116 Release

RS9116W 2.3 release consists of 2 main components

- Firmware
- SAPI Library

This release has bug-fixes, enhancements, and new features in SAPIs and Firmware together. Most of the new features will have associated APIs, which are available in the latest SAPIs only. Hence, it is strongly recommended to upgrade SAPI and Firmware together.

New Features

Wi-Fi

- Crystal good time configuration default value changed to 1000us from 600us, trim value to 3
- Support for Configuration of Crystal Good time to values 600us, 1000us, 2000us and 3000us in the opermode. Refer Section 5.1 in PRM for Configure Feature Bit Map.

Bluetooth – Common

-

Bluetooth – Classic

-

Bluetooth – LE

-

Power Save

-

Changes/Issues Fixed

- Changes in BLE length parameter. Refer BLE PRM section
- Fix for module not going to sleep when TCP/IP Bypass is enabled
- Fix for failure indication not going to application when data size exceeds MSS in case of SSL, as a result packets get dropped on exceeding MSS as application unable to handle the same.

- Fix for LTCP Stability issue where in data transfer stop with Firefox browser on doing refresh(ctrl+F5)
- Removed unnecessary M4 defines in de-init API
- Fix for peripheral/central disconnects in AT mode on write command
- Fix for memory leaks in SAPI during de-init
- Fix for occasional BT Crash when connected to Android phone

Deprecated Items

None

Newly added APIs

-

Modified APIs:

-

Recommended Configurations and Application Development Options

- **Wi-Fi**
 - It is recommended to enable bit 16 of “Extended TCP IP Feature” bit map in opermode command for all Wi-Fi Socket Operations from host to ensure graceful handling during asynchronous closures from Peer
 - Aggregation (bit 2 of feature_bit_map) recommended to be enabled in the opermode
 - TCP retransmission count value is recommended to be 30 or higher, so that TCP doesn’t disconnect while Rejoin happens
 - For restarting the module, application needs to call rsi_driver_deinit followed by rsi_driver_init and rsi_device_init. For OS cases, additionally needs to call rsi_task_destroy(driver_task_handle) to delete the driver task before calling rsi_driver_deinit and should create again after rsi_device_init using rsi_task_create(..)
 - Register “Join Fail Callback” function every time when join is called, as in the rejoin failure path the callback is deregistered. If not done, this might result in scan not functioning on rejoin failure
- **BT/BLE**
 - In BLE, recommended range of Connection Interval in
 - Power Save (BLE Only) - 100ms to 1.28sec.
 - BT Classic + BLE Dual Mode is ≥ 200 ms.
 - Wi-Fi + BLE coex - 30ms to 250ms
 - In BLE, during Connection, configuration of Scan Interval and Scan Window with same value is not recommended
 - In BT Classic, recommended Sniff Interval configuration during Power Save is limited to 100ms (≤ 100)
 - In BLE, if device is acting as Master/Slave, scan window (in set_scan_params and create_connection command) shall be less than the existing Connection Interval
 - In BLE mode, if scanning and advertising is in progress and subsequently it gets connected and moves to master role, then scanning and advertising stops. To further establish connection to another slave device or to a master device, application should give command for starting advertising and scanning again
- **Co-Ex**
 - In Wi-Fi + BLE, during Wi-Fi connection, lesser BLE scan Window and larger BLE scan Interval are recommended
 - For Wi-Fi+BT+BLE, Wi-Fi+BT, Wi-Fi+BLE operating modes, recommendation is to connect Wi-Fi ahead of BT/BLE connections, to ensure seamless stable connection of all 3 protocols
 - For Wi-Fi+BT+BLE, Wi-Fi+BT, Wi-Fi+BLE operating modes, if BT/BLE needs to be connected ahead of Wi-Fi connection, recommendation is to use with high supervision timeout and high connection interval for BLE; and high sniff interval for BT, to ensure seamless stable connection. This configuration will also ensure stable BT/BLE connection in the scenario where Wi-Fi connects/disconnects/rejoins.

- **System**
 - For User Store configuration and Configuration Save, it is recommended that power save is not enabled and saved as configuration. Otherwise, if power save is enabled and saved as configuration, module upon boot up will come up with the saved configuration and will go to power save without any indication to host.
 - Set Optimization level to “O0” in project settings for IDE (KEIL, CUBE)
 - Memory Configuration is mandated to be 384K for BT/BLE and Co-Ex Operating Modes
 - Usage of Low Power Flash mode bit (Bit 19 in Extended customer feature bitmap)
 - Disable this bit for High Wi-Fi throughput use cases
 - Enable this bit for Ultra low power standby associated scenarios. This results in about 20uA lower Wi-Fi standby associated current consumption.
 - It is recommended not to enable this bit for 384k Memory configuration for this release
 - Memory Configuration in SAPIs: Default memory configuration is 384k. User can configure it to 256/320/384k by changing the macros defined in below two files
 - In rsi_wlan_config.h : RSI_EXT_CUSTOM_FEATURE_BIT_MAP →EXT_FEAT_256K_MODE or EXT_FEAT_320K_MODE or EXT_FEAT_384K_MODE
 - In rsi_common.c : rsi_uint32_to_4bytes(rsi_opermode->ext_custom_feature_bit_map, (EXT_FEAT_256K_MODE (or) EXT_FEAT_320K_MODE (or) EXT_FEAT_384K_MODE | RSI_EXT_CUSTOM_FEATURE_BIT_MAP));
 - For additional details please refer to “Configuration parameters” in SAPI Reference Manual

Known Issues

- **Network Stack**
 -
 - MQTT disconnection is observed while firmware upgrade using OTAF, when power save is enabled. Advised to disable power save during firmware upgrade and re-enable on upgrade completion
 - Issues observed with TCP long data transfer for memory configurations greater than 256kbytes. However, the issue not seen with Low power mode bit (Bit 19 in Extended Customer feature bit map) disabled
 - Recommended to avoid usage of same UDP socket port number while it is being used.
 - Issues might be observed with bi-directional SSL data stream with WPA2-AES security mode.
 - Recommended MQTT Publish payload is 1kbytes
 - If HTTP Server is configured in the module, MQTT client port should not be port 80
 - Recommend randomizing client port if Rapid connect/disconnect of MQTT session on the same client port with power save is used.
 - Secure SSL Renegotiation not supported in Embedded Networking Stack
 - IPv6 support is not available in this release
 - Issue with connectivity to FTP server when power save is enabled
 - HTTP(S) based OTAF not reporting proper error for wrong file type or empty file, however no issues with system stability by issuing such commands
- **Wi-Fi**
 - For Dual Band (2.4 & 5GHz) mode, selective scan in 5GHz channel fails. Workaround is to issue an all channel scan by specifying NULL as SSID for scan api and then go for connect command with the specific SSID
 - If station in concurrent mode (Wi-Fi STA+AP) performs scan, there is possibility for stations connected to AP getting disconnected.
 - Limited Wi-Fi scan results obtained in the Android BLE Provisioning APP
 - Connectivity issues observed in channel 149, 157, 161 & 167 in 5GHz Access Point Mode.
 - Autojoin Feature with GPIO based power save works with UULP_VBATT_GPIO_2 (HOST_BYP_ULP_WAKEUP) and UULP_VBATT_GPIO_3 (SLEEP_IND_FROM_DEV). UULP_VBATT_GPIO_0 usage as SLEEP_IND_FROM_DEV doesn't work
 - For Max Join Retry count, the failure indication code is incorrectly shown as 0Xffffffd6
 - If BG Scan is enabled along with custom feature bit map bit (8) configuration of DFS Channel support, there might be issues in getting IP address for the Wi-Fi STA
- **BT/BLE**
 - Wake on Wireless not supported for BLE
 - BT-HID might not inter-operate with Apple devices

- In Wi-Fi + BT/BLE Co-Ex mode, high Wi-Fi broadcast traffic, might cause BT/BLE disconnections
- BT PER Continuous mode support requires proper command sequence when run in multiple iterations

- **Co-Ex**
 - In Co-Ex Mode if power save is enabled, it stays in enabled state even after Wi-Fi disconnection. Recommended procedure in Co-Ex mode, is to disable power save after every radio_init() and enable it when intended by application
 - Wi-Fi + BLE operating mode configuration, BLE might disconnect with connection interval higher than 250ms
 - BLE disconnection might be observed with Wi-Fi + BLE configuration with Wi-Fi continuous data transfer for low BLE supervision timeout configured. For Supervision timeout configured with value 16 seconds no disconnections are observed
 - In WiFi+BT/BLE configuration, with Wi-Fi disconnects, BT/BLE reconnection issue is observed (refer to earlier section “Recommended Configurations and Application Development options” in this document)
 - Wi-Fi+BLE/BLE only mode: For SPI as host interface, continuous BLE Tx Notification might result in hang of host interface needing a h/w reset. Issue not seen with discrete burst BLE data

- **System**
 - There is a known issue with FAST-PSP mode, recommended to use MAX-PSP power save
 - Wake on Wireless support tested only for UART AT command interface.
 - For BT/BLE and Co-Ex Opermodes, in unconnected state, message-based power save is not supported
 - Power Save without RAM retention is not working for SPI interface.

Limitations/Feature Not Supported

- **Wi-Fi/Network Stack**
 - AMSDU TX is not supported
 - Fragmentation is not supported
 - AMSDU's within AMPDU is not supported
 - Currently module does not support Radio Measurement Requests feature of CCX V2
 - 802.11k is not supported.
 - Short GI is not supported
 - 802.11w is not supported
 - 40Mhz bandwidth in 2.4GHz band is not supported.
 - 802.11J channels less than 16 are not supported.
 - USB host interface and USB Power save not supported.
 - Total MQTT Command Length, apart from MQTT Publish, should not exceed 150 bytes. This includes at+rsi (start of command) to (end of command)\r\n
 - User needs to configure MQTT_VERSION in rsi_mqtt_client.h based on server configuration, only version 3 and 4 are supported.
 - 3SSL, One TCP and 2 SSL, connections are supported concurrently in Wi-Fi only mode
 - SSL Curve id supported are 15-28. SSL handshake with 3rd party clients depends on this SSL Curve id

- **BT/BLE**
 - BT Sniff mode does not work if BT multiple slaves feature is enabled
 - When BT multiple slaves feature is enabled, Master to Slave role switch does not happen
 - For BLE, if connection is established with small connection interval (< 15ms), simultaneous roles (i.e. Master/Slave + Advertising/Scanning) are not supported
 - BLE maximum 2 concurrent connections are supported. It can be either connection to two peripheral devices or to 1 central and 1 peripheral device
 - For BT Classic only 1 connection is supported at any time
 - For BT Classic Simultaneous Slave & Master roles (Scatter-net) is not supported.

- **Co-Ex**
 - In Wi-Fi + BLE, during Wi-Fi connection, if both BLE scan interval and window are same then there will be issue in successfully making the Wi-Fi connection.

- For AT commands, Wi-Fi+BT+BLE (Opermode 9) BT+BLE(Opermode 8) are not working. However, BT, WiFi+BT modes (Opermode 5) works fine. Also, all combinations work fine with SAPI
- WiFi STA + BT + BLE multi-protocol cases require detailed understanding of use cases and associated configurations, please contact Silabs Support for more details.
- Wi-Fi AP+BLE/Wi-Fi AP+BT/Wi-Fi AP +BT+BLE modes are not supported

Folder Structure Changes

-

Notes – RS9116.WSC.2.1.1.0003

Thursday 24th December 2020

Release Type

- Test
- Alpha
- Beta
- Production

Release Details

- API Version (SAPI) : 1610.2.1.1.0003
- Firmware Version : 1610.2.1.1.0003
- Package Name : RS9116.NB0.WC.GENR.OSI.2.1.1.0003
- Supported RTOS : FreeRTOS
- Hardware Modules/chipsets : Q7, B00, C00, CC1, AB0, AB1, AA0, AA1
- Operating Modes Supported: Wi-Fi STA, Wi-Fi AP, Wi-Fi STA+BLE, Wi-Fi STA+BT, BT+BLE, Wi-Fi STA+BT+BLE

Information for Upgrading to Latest RS9116 Release

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- Firmware
- SAPI Library

This release has bug-fixes, enhancements, and new features in SAPIs and Firmware together. Most of the new features will have associated APIs, which are available in the latest SAPIs only. Hence, it is strongly recommended to upgrade SAPI and Firmware together.

New Features

Wi-Fi

- AT Command Based HTTP/HTTPS Over the Air Firmware (OTAF) Upgrade Support

Bluetooth – Common

-

Bluetooth – Classic

-

Bluetooth – LE

-

Power Save

-

Changes/Issues Fixed

- Kr00K Vulnerability Counter Measures fixes
- Fix for full duplex hang up issue
- Fix for specific channel scanning issue in Dual Band for 5 GHz
- Fix for SSL Handshake failure by exchanging supported Curve ids
- Fix for DUT Hang issue while doing continuous start and stop for PER CWMODE

- Enhancements for ability to set RTC timer at any time from host. The previous support was only having capability to start before INIT command.
- Fix for TCP Keepalive configuration to take effect
- Fix for DNS and MQTT functionality with listen interval based power save
- Changes for registering missing call back wlan_async_stats()
- Fix for Shadow error during commissioning
- Updated user gain table values for all regions
- Fix for 2Mbps mode setting for rsi_ble_setphy and rsi_ble_readphy
- Fix for BLE active scan response issue where BLE device name is not found all the time during device discovery
- Async() function support for rsi_connect()

Deprecated Items

None

Newly added APIs

-

Modified APIs:

-

Recommended Configurations and Application Development Options

- **Wi-Fi**
 - It is recommended to enable bit 16 of “Extended TCP IP Feature” bit map in opermode command for all Wi-Fi Socket Operations from host to ensure graceful handling during asynchronous closures from Peer
 - Aggregation (bit 2 of feature_bit_map) recommended to be enabled in the opermode
 - TCP retransmission count value is recommended to be 30 or higher, so that TCP doesn’t disconnect while Rejoin happens
 - For restarting the module, application needs to call rsi_driver_deinit followed by rsi_driver_init and rsi_device_init. For OS cases, additionally needs to call rsi_task_destroy(driver_task_handle) to delete the driver task before calling rsi_driver_deinit and should create again after rsi_device_init using rsi_task_create(..)
 - Register “Join Fail Callback” function every time when join is called, as in the rejoin failure path the callback is deregistered. If not done, this might result in scan not functioning on rejoin failure
- **BT/BLE**
 - In BLE, recommended range of Connection Interval in
 - Power Save (BLE Only) - 100ms to 1.28sec.
 - BT Classic + BLE Dual Mode is ≥ 200 ms.
 - Wi-Fi + BLE coex - 30ms to 250ms
 - In BLE, during Connection, configuration of Scan Interval and Scan Window with same value is not recommended
 - In BT Classic, recommended Sniff Interval configuration during Power Save is limited to 100ms (≤ 100)
 - In BLE, if device is acting as Master/Slave, scan window (in set_scan_params and create_connection command) shall be less than the existing Connection Interval
 - In BLE mode, if scanning and advertising is in progress and subsequently it gets connected and moves to master role, then scanning and advertising stops. To further establish connection to another slave device or to a master device, application should give command for starting advertising and scanning again
- **Co-Ex**
 - In Wi-Fi + BLE, during Wi-Fi connection, lesser BLE scan Window and larger BLE scan Interval are recommended

- For Wi-Fi+BT+BLE, Wi-Fi+BT, WiFi+BLE operating modes, recommendation is to connect Wi-Fi ahead of BT/BLE connections, to ensure seamless stable connection of all 3 protocols
- For Wi-Fi+BT+BLE, Wi-Fi+BT, WiFi+BLE operating modes, if BT/BLE needs to be connected ahead of Wi-Fi connection, recommendation is to use with high supervision timeout and high connection interval for BLE; and high sniff interval for BT, to ensure seamless stable connection. This configuration will also ensure stable BT/BLE connection in the scenario where Wi-Fi connects/disconnects/rejoins.
- **System**
 - For User Store configuration and Configuration Save, it is recommended that power save is not enabled and saved as configuration. Otherwise, if power save is enabled and saved as configuration, module upon boot up will come up with the saved configuration and will go to power save without any indication to host.
 - Set Optimization level to "O0" in project settings for IDE (KEIL, CUBE)
 - Memory Configuration is mandated to be 384K for BT/BLE and Co-Ex Operating Modes
 - Usage of Low Power Flash mode bit (Bit 19 in Extended customer feature bitmap)
 - Disable this bit for High Wi-Fi throughput use cases
 - Enable this bit for Ultra low power standby associated scenarios. This results in about 20uA lower Wi-Fi standby associated current consumption.
 - It is recommended not to enable this bit for 384k Memory configuration for this release
 - Memory Configuration in SAPIs: Default memory configuration is 384k. User can configure it to 256/320/384k by changing the macros defined in below two files
 - In rsi_wlan_config.h : RSI_EXT_CUSTOM_FEATURE_BIT_MAP →EXT_FEAT_256K_MODE or EXT_FEAT_320K_MODE or EXT_FEAT_384K_MODE
 - In rsi_common.c : rsi_uint32_to_4bytes(rsi_opermode->ext_custom_feature_bit_map, (EXT_FEAT_256K_MODE (or) EXT_FEAT_320K_MODE (or) EXT_FEAT_384K_MODE | RSI_EXT_CUSTOM_FEATURE_BIT_MAP));
 - For additional details please refer to "Configuration parameters" in SAPI Reference Manual

Known Issues

- **Network Stack**
 - MQTT disconnection is observed while firmware upgrade using OTAF, when power save is enabled. Advised to disable power save during firmware upgrade and re-enable on upgrade completion
 - Issues observed with TCP long data transfer for memory configurations greater than 256kbytes. However, the issue not seen with Low power mode bit (Bit 19 in Extended Customer feature bit map) disabled
 - Recommended to avoid usage of same UDP socket port number while it is being used.
 - Issues might be observed with bi-directional SSL data stream with WPA2-AES security mode.
 - Recommended MQTT Publish payload is 1kbytes
 - If HTTP Server is configured in the module, MQTT client port should not be port 80
 - Recommend randomizing client port if Rapid connect/disconnect of MQTT session on the same client port with power save is used.
 - Secure SSL Renegotiation not supported in Embedded Networking Stack
 - IPv6 support is not available in this release
 - Issue with connectivity to FTP server when power save is enabled
 - HTTP(S) based OTAF not reporting proper error for wrong file type or empty file, however no issues with system stability by issuing such commands
- **Wi-Fi**
 - For Dual Band (2.4 & 5GHz) mode, selective scan in 5GHz channel fails. Workaround is to issue an all channel scan by specifying NULL as SSID for scan api and then go for connect command with the specific SSID
 - If station in concurrent mode (Wi-Fi STA+AP) performs scan, there is possibility for stations connected to AP getting disconnected.
 - Limited Wi-Fi scan results obtained in the Android BLE Provisioning APP
 - Connectivity issues observed in channel 149, 157, 161 & 167 in 5GHz Access Point Mode.
 - Autojoin Feature with GPIO based power save works with UULP_VBATT_GPIO_2 (HOST_BYP_ULP_WAKEUP) and UULP_VBATT_GPIO_3 (SLEEP_IND_FROM_DEV). UULP_VBATT_GPIO_0 usage as SLEEP_IND_FROM_DEV doesn't work

- For Max Join Retry count, the failure indication code is incorrectly shown as 0Xffffffd6
- If BG Scan is enabled along with custom feature bit map bit (8) configuration of DFS Channel support, there might be issues in getting IP address for the Wi-Fi STA

- **BT/BLE**
 - Wake on Wireless not supported for BLE
 - BT-HID might not inter-operate with Apple devices
 - In Wi-Fi + BT/BLE Co-Ex mode, high Wi-Fi broadcast traffic, might cause BT/BLE disconnections
 - BT PER Continuous mode support requires proper command sequence when run in multiple iterations

- **Co-Ex**
 - In Co-Ex Mode if power save is enabled, it stays in enabled state even after Wi-Fi disconnection. Recommended procedure in Co-Ex mode, is to disable power save after every radio_init() and enable it when intended by application
 - Wi-Fi + BLE operating mode configuration, BLE might disconnect with connection interval higher than 250ms
 - BLE disconnection might be observed with Wi-Fi + BLE configuration with Wi-Fi continuous data transfer for low BLE supervision timeout configured. For Supervision timeout configured with value 16 seconds no disconnections are observed
 - In WiFi+BT/BLE configuration, with Wi-Fi disconnects, BT/BLE reconnection issue is observed (refer to earlier section “Recommended Configurations and Application Development options” in this document)
 - Wi-Fi+BLE/BLE only mode: For SPI as host interface, continuous BLE Tx Notification might result in hang of host interface needing a h/w reset. Issue not seen with discrete burst BLE data

- **System**
 - There is a known issue with FAST-PSP mode, recommended to use MAX-PSP power save
 - Wake on Wireless support tested only for UART AT command interface.
 - For BT/BLE and Co-Ex Opermodes, in unconnected state, message-based power save is not supported
 - Power Save without RAM retention is not working for SPI interface.

Limitations/Feature Not Supported

- **Wi-Fi/Network Stack**
 - AMSDU TX is not supported
 - Fragmentation is not supported
 - AMSDU's within AMPDU is not supported
 - Currently module does not support Radio Measurement Requests feature of CCX V2
 - 802.11k is not supported.
 - Short GI is not supported
 - 802.11w is not supported
 - 40Mhz bandwidth in 2.4GHz band is not supported.
 - 802.11J channels less than 16 are not supported.
 - USB host interface and USB Power save not supported.
 - Total MQTT Command Length, apart from MQTT Publish, should not exceed 150 bytes. This includes at+rsi (start of command) to (end of command)\r\n
 - User needs to configure MQTT_VERSION in rsi_mqtt_client.h based on server configuration, only version 3 and 4 are supported.
 - 3SSL, One TCP and 2 SSL, connections are supported concurrently in Wi-Fi only mode
 - SSL Curve id supported are 15-28. SSL handshake with 3rd party clients depends on this SSL Curve id

- **BT/BLE**
 - BT Sniff mode does not work if BT multiple slaves feature is enabled
 - When BT multiple slaves feature is enabled, Master to Slave role switch does not happen
 - For BLE, if connection is established with small connection interval (< 15ms), simultaneous roles (i.e. Master/Slave + Advertising/Scanning) are not supported
 - BLE maximum 2 concurrent connections are supported. It can be either connection to two peripheral devices or to 1 central and 1 peripheral device

- For BT Classic only 1 connection is supported at any time
- For BT Classic Simultaneous Slave & Master roles (Scatter-net) is not supported.

- **Co-Ex**
 - In Wi-Fi + BLE, during Wi-Fi connection, if both BLE scan interval and window are same then there will be issue in successfully making the Wi-Fi connection.
 - For AT commands, Wi-Fi+BT+BLE (Opermode 9) BT+BLE(Opermode 8) are not working. However, BT, WiFi+BT modes (Opermode 5) works fine. Also, all combinations work fine with SAPI
 - WiFi STA + BT + BLE multi-protocol cases require detailed understanding of use cases and associated configurations, please contact Silabs Support for more details.
 - Wi-Fi AP+BLE/Wi-Fi AP+BT/Wi-Fi AP +BT+BLE modes are not supported

Folder Structure Changes

-

Release Notes – RS9116.WSC.2.1.0.0010

Friday 27th November 2020

Release Type

- Test
- Alpha
- Beta
- Production

Release Details

- API Version (SAPI) : 1610.2.1.0.0010
- Firmware Version : 1610.2.1.0.0010
- Package Name : RS9116.NB0.WC.GENR.OSI.2.1.0.0010
- Supported RTOS : FreeRTOS
- Hardware Modules/chipsets : Q7, B00, C00, CC1, AB0, AB1, AA0, AA1
- Operating Modes Supported: Wi-Fi STA, Wi-Fi AP, Wi-Fi STA+BLE, Wi-Fi STA+BT, BT+BLE, Wi-Fi STA+BT+BLE

Information for Upgrading to Latest RS9116 Release

RS9116W 2.1 release consists of 2 main components

- Firmware
- SAPI Library

This release has bug-fixes, enhancements, and new features in SAPIs and Firmware together. Most of the new features will have associated APIs, which are available in the latest SAPIs only. Hence, it is strongly recommended to upgrade SAPI and Firmware together.

New Features

Wi-Fi

- AT Command Based HTTP/HTTPS Over the Air Firmware (OTAF) Upgrade Support

Bluetooth – Common

-

Bluetooth – Classic

-

Bluetooth – LE

-

Power Save

-

Changes/Issues Fixed

- Changed HTTP OTAF Response Message Format with reduced parameters
 - OTAF Success Message: AT+RSI_HTTPOTARSP=Upgrade Success<CR><LF>

- OTAF Failure Message: ERROR <error code> <CR><LF>
AT+RSI_HTTPOTARSP=Upgrade Failed<CR><LF>
- Fix for Length field in BLE Events for GATT Write, Notify and Indication to reflect the actual length and followed by the correct set of values.
- Fix for Auto Join with Power Save not working for UULP_GPIO_2&UULP_GPIO_0 combination
- Fix for select() functionality not working due to Timeout issues related to select()
- Fix for select with shutdown in loop giving error 0x15 in the select callback
- Fix for Stored AP profile is getting cleared after Firmware Update
- Fix for additional select response coming after WLAN disconnect indication
- Fix for unable to close socket after downloading file
- Fix for Posting Send Semaphore during remote terminate is getting Assertion in OS
- Fix for rsi_dns_req() api returns success even semaphore timeout happening resulting in junk data save for dns server ip

Deprecated Items

None

Newly added APIs

-

Modified APIs:

-

Recommended Configurations and Application Development Options

- **Wi-Fi**
 - It is recommended to enable bit 16 of “Extended TCP IP Feature” bit map in opermode command for all Wi-Fi Socket Operations from host to ensure graceful handling during asynchronous closures from Peer
 - Aggregation (bit 2 of feature_bit_map) recommended to be enabled in the opermode
 - TCP retransmission count value is recommended to be 30 or higher, so that TCP doesn’t disconnect while Rejoin happens
 - For restarting the module, application needs to call rsi_driver_deinit followed by rsi_driver_init and rsi_device_init. For OS cases, additionally needs to call rsi_task_destroy(driver_task_handle) to delete the driver task before calling rsi_driver_deinit and should create again after rsi_device_init using rsi_task_create(..)
 - Register “Join Fail Callback” function every time when join is called, as in the rejoin failure path the callback is deregistered. If not done, this might result in scan not functioning on rejoin failure
- **BT/BLE**
 - In BLE, recommended range of Connection Interval in
 - Power Save (BLE Only) - 100ms to 1.28sec.
 - BT Classic + BLE Dual Mode is >= 200ms.
 - Wi-Fi + BLE coex - 30ms to 250ms
 - In BLE, during Connection, configuration of Scan Interval and Scan Window with same value is not recommended
 - In BT Classic, recommended Sniff Interval configuration during Power Save is limited to 100ms (<= 100)
 - In BLE, if device is acting as Master/Slave, scan window (in set_scan_params and create_connection command) shall be less than the existing Connection Interval
 - In BLE mode, if scanning and advertising is in progress and subsequently it gets connected and moves to master role, then scanning and advertising stops. To further establish connection to another slave device or to a master device, application should give command for starting advertising and scanning again
- **Co-Ex**

- In Wi-Fi + BLE, during Wi-Fi connection, lesser BLE scan Window and larger BLE scan Interval are recommended
 - For Wi-Fi+BT+BLE, Wi-Fi+BT, WiFi+BLE operating modes, recommendation is to connect Wi-Fi ahead of BT/BLE connections, to ensure seamless stable connection of all 3 protocols
 - For Wi-Fi+BT+BLE, Wi-Fi+BT, WiFi+BLE operating modes, if BT/BLE needs to be connected ahead of Wi-Fi connection, recommendation is to use with high supervision timeout and high connection interval for BLE; and high sniff interval for BT, to ensure seamless stable connection. This configuration will also ensure stable BT/BLE connection in the scenario where Wi-Fi connects/disconnects/rejoins.
- **System**
 - For User Store configuration and Configuration Save, it is recommended that power save is not enabled and saved as configuration. Otherwise, if power save is enabled and saved as configuration, module upon boot up will come up with the saved configuration and will go to power save without any indication to host.
 - Set Optimization level to "O0" in project settings for IDE (KEIL, CUBE)
 - Memory Configuration is mandated to be 384K for BT/BLE and Co-Ex Operating Modes
 - Usage of Low Power Flash mode bit (Bit 19 in Extended customer feature bitmap)
 - Disable this bit for High Wi-Fi throughput use cases
 - Enable this bit for Ultra low power standby associated scenarios. This results in about 20uA lower Wi-Fi standby associated current consumption.
 - It is recommended not to enable this bit for 384k Memory configuration for this release
 - Memory Configuration in SAPIs: Default memory configuration is 384k. User can configure it to 256/320/384k by changing the macros defined in below two files
 - In rsi_wlan_config.h : RSI_EXT_CUSTOM_FEATURE_BIT_MAP →EXT_FEAT_256K_MODE or EXT_FEAT_320K_MODE or EXT_FEAT_384K_MODE
 - In rsi_common.c : rsi_uint32_to_4bytes(rsi_opermode->ext_custom_feature_bit_map, (EXT_FEAT_256K_MODE (or) EXT_FEAT_320K_MODE (or) EXT_FEAT_384K_MODE | RSI_EXT_CUSTOM_FEATURE_BIT_MAP));
 - For additional details please refer to "Configuration parameters" in SAPI Reference Manual

Known Issues

- **Network Stack**
 -
 - MQTT disconnection is observed while firmware upgrade using OTAF, when power save is enabled. Advised to disable power save during firmware upgrade and re-enable on upgrade completion
 - Issues observed with TCP long data transfer for memory configurations greater than 256kbytes. However, the issue not seen with Low power mode bit (Bit 19 in Extended Customer feature bit map) disabled
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- Autojoin Feature with GPIO based power save works with UULP_VBATT_GPIO_2 (HOST_BYP_ULP_WAKEUP) and UULP_VBATT_GPIO_3 (SLEEP_IND_FROM_DEV). UULP_VBATT_GPIO_0 usage as SLEEP_IND_FROM_DEV doesn't work
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 - BT PER Continuous mode support requires proper command sequence when run in multiple iterations

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 - Wi-Fi+BLE/BLE only mode: For SPI as host interface, continuous BLE Tx Notification might result in hang of host interface needing a h/w reset. Issue not seen with discrete burst BLE data

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 - When BT multiple slaves feature is enabled, Master to Slave role switch does not happen

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 - BLE maximum 2 concurrent connections are supported. It can be either connection to two peripheral devices or to 1 central and 1 peripheral device
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- **Co-Ex**
 - In Wi-Fi + BLE, during Wi-Fi connection, if both BLE scan interval and window are same then there will be issue in successfully making the Wi-Fi connection.
 - For AT commands, Wi-Fi+BT+BLE (Opermode 9) BT+BLE(Opermode 8) are not working. However, BT, WiFi+BT modes (Opermode 5) works fine. Also, all combinations work fine with SAPI
 - WiFi STA + BT + BLE multi-protocol cases require detailed understanding of use cases and associated configurations, please contact Silabs Support for more details.
 - Wi-Fi AP+BLE/Wi-Fi AP+BT/Wi-Fi AP +BT+BLE modes are not supported

Folder Structure Changes

- Following are the Directory Structure change under .../host/
 - sapis(no change except the directory 'platforms' pulled out)
 - platforms
 - STM32
 - Drivers
 - hal
 - Reference_Projects
 - Cube_Baremetal
 - Core
 - Projects
 - Cube_Freertos
 - Core
 - Projects
 - Keil_Baremetal
 - Core
 - Projects
 - SPI
 - AWS_IoT
 - BT_Alone
 - eap
 - Firmware_upgrade
 - Power_save
 - sample_project
 - Throughput
 - wlan_sta_ble_bridge
 - wlan_sta_ble_provisioning
 - UART
 - udp_client
- Keil_Freertos
 - Core
 - Projects
 - SPI
 - mqtt_client
 - sample_project
 - wlan_https_bt_spp_ble_dual_role
 - wlan_https_bt_spp_ble_provisioning
 - wlan_throughput_bt_spp_ble_dual_role
 - UART
 - UDP_Client

Release Notes – RS9116.WSC.2.0.0.0024

Monday 19th October 2020

Release Type

- Test
- Alpha
- Beta
- Production

Release Details

- API Version (SAPI) : 1610.2.0.0.0024
- Firmware Version : 1610.2.0.0.0024
- Package Name : RS9116.NB0.WC.GENR.OSI.2.0.0.0024
- Supported RTOS : FreeRTOS
- Hardware Modules/chipsets : Q7, B00, C00, CC1, AB0, AB1, AA0, AA1
- Operating Modes Supported: Wi-Fi STA, Wi-Fi AP, Wi-Fi STA+BLE, Wi-Fi STA+BT, BT+BLE, Wi-Fi STA+BT+BLE

Information for Upgrading to Latest RS9116 Release

RS9116W 2.0 release consists of 2 main components

- Firmware
- SAPI Library

This release has bug-fixes, enhancements, and new features in SAPIs and Firmware together. Most of the new features will have associated APIs, which are available in the latest SAPIs only. Hence, it is strongly recommended to upgrade SAPI and Firmware together.

New Features

Wi-Fi

- QoS1 Support for Embedded MQTT stack
- SAPI Support for Embedded MQTT stack (SPI interface only)
- Support to add “comma” as part of Publish and Subscribe messages in MQTT
- Support for Specifying Client Port to be used for MQTT connection
- TLS1.2 Support for Enterprise Security
- 3 SSL Certificate Support for 3 Concurrent SSL sessions in Wi-Fi only mode
- Wi-Fi Statistics (idleBeaconStateMachineStats, busyBeaconStateMachineStats) Support in Wi-Fi only Operating Mode
- Support for communicating HTTP(S) response status info to host
- API support to configure User Gain Table for customer specific antenna
- Support for configurable Active high or active low interrupt for Wake-On-Wireless in UART-AT mode

Bluetooth – Common

- Enhancements to internal buffer management handling

Bluetooth – Classic

- Enhancements to SPP profile
- Fixes to GPIO based and Message based power save modes.

Bluetooth – LE

- Sweyntooth Security Vulnerability Fixes

Power Save

- When sleep clock source is configured to use 32KHz external clock on UULP_VBAT_GPIO_3
 - use UULP_VBAT_GPIO_0 for SLEEP_IND_FROM_DEV
 - set RS9116_SILICON_CHIP_VER in 'RS9116.NB0.WC.GENR.OSI.X.X.X\host\sapis\include\rsi_user.h' to CHIP_VER_1P4_AND_ABOVE
- If internal RC mode is used for sleep clock i.e. not using external clock on UULP_VBAT_GPIO_3 as sleep clock source, then below settings can be used in addition to the above
 - use UULP_VBAT_GPIO_3 for SLEEP_IND_FROM_DEV
 - set RS9116_SILICON_CHIP_VER in 'RS9116.NB0.WC.GENR.OSI.X.X.X\host\sapis\include\rsi_user.h' to CHIP_VER_1P3

Note:

Refer to section 'Set Operating Mode-ext_custom_feature_bit_map' in [RS9116W Wi-Fi AT Command Programming Reference Manual](#) for sleep clock source configuration details

Changes/Issues Fixed

- Changed Maximum Packet Length PER Transmit for BLE to 240 bytes
- Change in supported memory configuration for BLE/BT and CoEx modes to 384k only
- Fixed SAPI driver Hang Issue on Enable/Disable of Power Save
- Support for configuring Tx Power on Set Region of Access Point
- Fixed variation in throughput when AP is in Auto Channel Mode
- Removed Content Length from default Header of HTTP POST
- Fix for rsi_dns_update () API failure
- Fix for HTTPS Example, get request was failing
- Fix for issue where module was unable to create SPP connection as Master after deinitialization and initialization
- Fix for Hang issue after Rejoin Failure
- Change to Limit BT Transmit Power to 10dB for EU region

Deprecated Items

None

Newly added APIs

For understanding backward compatibility of Release 2.0, refer to section “Changes/Enhancements in APIs, Configurations and Mechanisms” in *AT-Command Programmers Reference Manual* and *SAPI Reference Manual*

API	Description
Wi-Fi	
<pre>int32_t rsi_wlan_get_socket_status(int32_t sockID)</pre>	It is used to get status for socket API, as in new driver is storing errors for each socket id, it will take sock id as input and returns error codes.

<pre>void rsi_update_wlan_cmd_state_to_progress_state(void)</pre>	<p>This function is used by wireless library to update the WLAN command state to progress state.</p>
<pre>int32_t rsi_wlan_get_nwk_status(void)</pre>	<p>This function returns the WLAN Network Status</p>
<pre>int32_t rsi_wlan_scan_with_bitmap_options(int8_t *ssid, uint8_t chno, rsi_rsp_scan_t *result,uint32_t length,uint32_t scan_bitmap)</pre>	<p>This function is used to scan the access points available and posts the scan response to application. Application should call this function to get the scan results. Synchronous call</p>
<p>BT/BLE APIs</p>	
<pre>int32_t rsi_ble_start_scanning_with_values(void *rsi_ble_scan_params)</pre>	<p>This function requests the local device to start scanning</p>
<pre>int32_t rsi_ble_set_local_irk_value(uint8_t *l_irk)</pre>	<p>This function is used to set the local irk value</p>
<pre>int32_t rsi_ble_set_wo_resp_notify_buf_info(uint8_t *dev_addr,uint8_t buf_mode,uint8_t buf_cnt)</pre>	<p>This function is used to configure the buf mode for Notify and WO resp commands</p>
<pre>int32_t rsi_ble_gatt_write_response(uint8_t *dev_addr,uint8_t type)</pre>	<p>This function is used to send the local attribute value to remote device</p>
<pre>int32_t rsi_ble_gatt_prepare_write_response(uint8_t *dev_addr,uint16_t handle,uint16_t offset,uint16_t length,uint8_t *data)</pre>	<p>This function is used to send the local attribute value to remote device</p>

<pre>int32_t rsi_bt_change_pkt_type(uint8_t *remote_dev_addr, uint16_t pkt_type)</pre>	<p>This function is used to change the packet types in the controller after connection only.</p>
<pre>int32_t rsi_bt_set_bd_addr(uint8_t *dev_addr)</pre>	<p>This function is used to set the device BD addr</p>
<pre>int32_t rsi_memory_stats_enable (uint8_t protocol, uint8_t memory_stats_enable, uint32_t memory_stats_interval_ms)</pre>	<p>This function is used to issue vendor specific command for setting memory stats enable in controller on given inputs.</p>
<pre>void update_modified_mtu_size (uint16_t rem_mtu_size)</pre>	<p>This function is used to modify MTU size</p>
<pre>int32_t rsi_bt_per_cw_mode(struct rsi_bt_per_cw_mode_s *bt_cw_mode)</pre>	<p>This function is used to keep the device in continuous wave mode.</p>
<pre>void rsi_bt_pkt_change_events_registe r_callbacks (rsi_bt_pkt_change_stats_t bt_pkt_change_stats_event)</pre>	<p>This function registers the packet change indication Event callbacks</p>
<pre>void rsi_bt_on_chip_memory_status_cal lbacks_register (rsi_bt_on_chip_memory_stats_han dler_t bt_on_chip_memory_stats_event)</pre>	<p>This function registers the memory utilization Event callbacks</p>
<p>Driver</p>	

<pre>int32_t rsi_check_and_update_cmd_state(u int8_t cmd_type,uint8_t cmd_state)</pre>	<p>This API is used by wireless library to check and update the cmd state to progress state.</p>
----------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------

Modified APIs:

For understanding backward compatibility of Release 2.0, refer to section “Changes/Enhancements in APIs, Configurations and Mechanisms” in *AT-Command Programmers Reference Manual* and *SAPI Reference Manual*

<pre>rsi_wlan_get_status()</pre>	<p>Earlier implementation: Single API was used to get the return status of any SAPI command in case for a failure. The same API was used to get socket API status as well.</p> <p>Current implementation: A new API is added to get return status for socket APIs based on socket ID input. Latest SAPI driver stores response for each socket id.</p>
<pre>BD Address Format change in Application</pre>	<p>BD address input to SAPI changed from ASCII to HEX. Backward compatibility maintained through compile macro <code>BD_ADDR_IN_ASCII</code> in <code>rsi_bt_config.h/rsi_ble_config.h</code> by user.</p>
<pre>Powersave API Sequence Changes</pre>	<p>Optional for backward compatibility</p>

Recommended Configurations and Application Development Options

• Wi-Fi

- It is recommended to enable bit 16 of “Extended TCP IP Feature” bit map in opermode command for all Wi-Fi Socket Operations from host to ensure graceful handling during asynchronous closures from Peer
- Aggregation (bit 2 of feature_bit_map) recommended to be enabled in the opermode
- TCP retransmission count value is recommended to be 30 or higher, so that TCP doesn’t disconnect while Rejoin happens
- For restarting the module, application needs to call `rsi_driver_deinit` followed by `rsi_driver_init` and `rsi_device_init`. For OS cases, additionally needs to call `rsi_task_destroy(driver_task_handle)` to delete the driver task before calling `rsi_driver_deinit` and should create again after `rsi_device_init` using `rsi_task_create(..)`
- Register “Join Fail Callback” function every time when join is called, as in the rejoin failure path the callback is deregistered. If not done, this might result in scan not functioning on rejoin failure

• BT/BLE

- In BLE, recommended range of Connection Interval in
 - Power Save (BLE Only) - 100ms to 1.28sec.
 - BT Classic + BLE Dual Mode is ≥ 200 ms.
 - Wi-Fi + BLE coex - 30ms to 250ms
- In BLE, during Connection, configuration of Scan Interval and Scan Window with same value is not recommended
- In BT Classic, recommended Sniff Interval configuration during Power Save is limited to 100ms (≤ 100)
- In BLE, if device is acting as Master/Slave, scan window (in `set_scan_params` and `create_connection` command) shall be less than the existing Connection Interval
- In BLE mode, if scanning and advertising is in progress and subsequently it gets connected and moves to master role, then scanning and advertising stops. To further establish connection to another slave device or to a master device, application should give command for starting advertising and scanning again

• Co-Ex

- In Wi-Fi + BLE, during Wi-Fi connection, lesser BLE scan Window and larger BLE scan Interval are recommended
- For Wi-Fi+BT+BLE operating mode, recommendation is to connect Wi-Fi ahead of BT/BLE connections, to ensure seamless stable connection of all 3 protocols

- For Wi-Fi+BT+BLE operating mode, if BT/BLE needs to be connected ahead of Wi-Fi connection, recommendation is to use with high supervision timeout and high connection interval for BLE; and high sniff interval for BT, to ensure seamless stable connection. This configuration will also ensure stable BT/BLE connection in the scenario where Wi-Fi connects/disconnects/rejoins.
- **System**
 - For User Store configuration and Configuration Save, it is recommended that power save is not enabled and saved as configuration. Otherwise, if power save is enabled and saved as configuration, module upon boot up will come up with the saved configuration and will go to power save without any indication to host.
 - Set Optimization level to "O0" in project settings for IDE (KEIL, CUBE)
 - Memory Configuration is mandated to be 384K for BT/BLE and Co-Ex Operating Modes
 - Usage of Low Power Flash mode bit (Bit 19 in Extended customer feature bitmap)
 - Disable this bit for High Wi-Fi throughput use cases
 - Enable this bit for Ultra low power standby associated scenarios. This results in about 20uA lower Wi-Fi standby associated current consumption.
 - It is recommended not to enable this bit for 384k Memory configuration for this release
 - Memory Configuration in SAPIs: Default memory configuration is 384k. User can configure it to 256/320/384k by changing the macros defined in below two files
 - In rsi_wlan_config.h : RSI_EXT_CUSTOM_FEATURE_BIT_MAP →EXT_FEAT_256K_MODE or EXT_FEAT_320K_MODE or EXT_FEAT_384K_MODE
 - In rsi_common.c : rsi_uint32_to_4bytes(rsi_opermode->ext_custom_feature_bit_map, (EXT_FEAT_256K_MODE (or) EXT_FEAT_320K_MODE (or) EXT_FEAT_384K_MODE | RSI_EXT_CUSTOM_FEATURE_BIT_MAP));
 - For additional details please refer to "Configuration parameters" in SAPI Reference Manual

Known Issues

- **Network Stack**
 - MQTT disconnection is observed while firmware upgrade using OTAF, when power save is enabled. Advised to disable power save during firmware upgrade and re-enable on upgrade completion
 - Issues observed with TCP long data transfer for memory configurations greater than 256kbytes. However, the issue not seen with Low power mode bit (Bit 19 in Extended Customer feature bit map) disabled
 - Recommended to avoid usage of same UDP socket port number while it is being used.
 - Issues might be observed with bi-directional SSL data stream with WPA2-AES security mode.
 - Recommended MQTT Publish payload is 1kbytes
 - If HTTP Server is configured in the module, MQTT client port should not be port 80
 - Recommend randomizing client port if Rapid connect/disconnect of MQTT session on the same client port with power save is used.
 - Secure SSL Renegotiation not supported in Embedded Networking Stack
 - IPv6 support is not available in this release
 - Issue with connectivity to FTP server when power save is enabled
- **Wi-Fi**
 - For Dual Band (2.4 & 5GHz) mode, selective scan in 5GHz channel fails. Workaround is to issue an all channel scan by specifying NULL as SSID for scan api and then go for connect command with the specific SSID
 - If station in concurrent mode (Wi-Fi STA+AP) performs scan, there is possibility for stations connected to AP getting disconnected.
 - Limited Wi-Fi scan results obtained in the Android BLE Provisioning APP
 - Connectivity issues observed in channel 149, 157, 161 & 167 in 5GHz Access Point Mode.
 - Autojoin Feature with GPIO based power save works with UULP_VBATT_GPIO_2 (HOST_BYP_ULP_WAKEUP) and UULP_VBATT_GPIO_3 (SLEEP_IND_FROM_DEV). UULP_VBATT_GPIO_0 usage as SLEEP_IND_FROM_DEV doesn't work
 - For Max Join Retry count, the failure indication code is incorrectly shown as 0Xfffffd6
 - If BG Scan is enabled along with custom feature bit map bit (8) configuration of DFS Channel support, there might be issues in getting IP address for the Wi-Fi STA
- **BT/BLE**
 - Wake on Wireless not supported for BLE

- BT-HID might not inter-operate with Apple devices
- In Wi-Fi + BT/BLE Co-Ex mode, high Wi-Fi broadcast traffic, might cause BT/BLE disconnections
- BT PER Continuous mode support requires proper command sequence when run in multiple iterations

- **Co-Ex**
 - In Co-Ex Mode if power save is enabled, it stays in enabled state even after Wi-Fi disconnection. Recommended procedure in Co-Ex mode, is to disable power save after every radio_init() and enable it when intended by application
 - Wi-Fi + BLE operating mode configuration, BLE might disconnect with connection interval higher than 250ms
 - BLE disconnection might be observed with Wi-Fi + BLE configuration with Wi-Fi continuous data transfer for low BLE supervision timeout configured. For Supervision timeout configured with value 16 seconds no disconnections are observed
 - In WiFi+BT/BLE configuration, with Wi-Fi disconnects, BT/BLE reconnection issue is observed (refer to earlier section “Recommended Configurations and Application Development options” in this document)
 - Wi-Fi+BLE/BLE only mode: For SPI as host interface, continuous BLE Tx Notification might result in hang of host interface needing a h/w reset. Issue not seen with discrete burst BLE data

- **System**
 - There is a known issue with FAST-PSP mode, recommended to use MAX-PSP power save
 - Wake on Wireless support tested only for UART AT command interface.
 - For BT/BLE and Co-Ex Opermodes, in unconnected state, message-based power save is not supported
 - Power Save without RAM retention is not working for SPI interface.

Limitations/Feature Not Supported

- **Wi-Fi/Network Stack**
 - AMSDU TX is not supported
 - Fragmentation is not supported
 - AMSDU's within AMPDU is not supported
 - Currently module does not support Radio Measurement Requests feature of CCX V2
 - 802.11k is not supported.
 - Short GI is not supported
 - 802.11w is not supported
 - 40Mhz bandwidth in 2.4GHz band is not supported.
 - 802.11J channels less than 16 are not supported.
 - USB host interface and USB Power save not supported.
 - Total MQTT Command Length, apart from MQTT Publish, should not exceed 150 bytes. This includes at+rsi (start of command) to (end of command)\r\n
 - User needs to configure MQTT_VERSION in rsi_mqtt_client.h based on server configuration, only version 3 and 4 are supported.
 - 3SSL, One TCP and 2 SSL, connections are supported concurrently in Wi-Fi only mode
 - SSL Curve id supported are 15-28. SSL handshake with 3rd party clients depends on this SSL Curve id

- **BT/BLE**
 - BT Sniff mode does not work if BT multiple slaves feature is enabled
 - When BT multiple slaves feature is enabled, Master to Slave role switch does not happen
 - For BLE, if connection is established with small connection interval (< 15ms), simultaneous roles (i.e. Master/Slave + Advertising/Scanning) are not supported
 - BLE maximum 2 concurrent connections are supported. It can be either connection to two peripheral devices or to 1 central and 1 peripheral device
 - For BT Classic only 1 connection is supported at any time
 - For BT Classic Simultaneous Slave & Master roles (Scatter-net) is not supported.

- **Co-Ex**
 - In Wi-Fi + BLE, during Wi-Fi connection, if both BLE scan interval and window are same then there will be issue in successfully making the Wi-Fi connection.

- For AT commands, Wi-Fi+BT+BLE (Opermode 9) BT+BLE(Opermode 8) are not working. However, BT, WiFi+BT modes (Opermode 5) works fine. Also, all combinations work fine with SAPI
- WiFi STA + BT + BLE multi-protocol cases require detailed understanding of use cases and associated configurations, please contact Silabs Support for more details.
- Wi-Fi AP+BLE/Wi-Fi AP+BT/Wi-Fi AP +BT+BLE modes are not supported

Folder Structure Changes

- Following are the Directory Structure change under .../host/
 - sapis(no change except the directory 'platforms' pulled out)
 - platforms
 - STM32
 - Drivers
 - hal
 - Reference_Projects
 - Cube_Baremetal
 - Core
 - Projects
 - Cube_Freertos
 - Core
 - Projects
 - Keil_Baremetal
 - Core
 - Projects
 - SPI
 - AWS_IoT
 - BT_Alone
 - eap
 - Firmware_upgrade
 - Power_save
 - sample_project
 - Throughput
 - wlan_sta_ble_bridge
 - wlan_sta_ble_provisioning
 - UART
 - udp_client
 - Keil_Freertos
 - Core
 - Projects
 - SPI
 - mqtt_client
 - sample_project
 - wlan_https_bt_spp_ble_dual_role
 - wlan_https_bt_spp_ble_provisioning
 - wlan_throughput_bt_spp_ble_dual_role
 - UART
 - udp_client

Release Notes – RS9116.WSC.1.2.24.0014

Date: Monday 8th June 2020

Release Type

- Test
- Alpha
- Beta
- Production

Release Details

- API Version (SAPI) : 1610.1.2.24.0014
- Firmware Version : 1610.1.2.24.0014
- Package Name : RS9116.NB0.WC.GENR.OSI.1.2.24.0014
- Supported RTOS : FreeRTOS
- Hardware Modules/chipsets : Q7, B00, C00, CC1, AB0, AB1, AA0, AA1

New Features

Wi-Fi

- AT Command Support for MQTT (Embedded MQTT Stack Support)
- MQTT Publish command: Maximum payload length is increased to 1KB for Embedded MQTT Stack
- `socket select()` API support
- Added support for user configurable HTTP header content
- Added support for user configurable memory allocation for SSL sockets in extended TCP/IP feature bitmap
- Enhancements to LTCP Multiple Client connection
- Support for Amazon FreeRTOS wrappers for SAPI for Interoperability
- Gain Table Enhancements for Certification
- Module Initialization fix for 1.8v
- Enhancement to SAPI Library - SAPIs added for WLAN/Systems
- GRAT ARP changes done to proactively send response for missed Broadcast ARPs
- Added support for SDIO pad selection and NPSS GPIO pin configuration in case of 1.8v for SDIO

Bluetooth - Common

- Added Support for BT MAC Spoofing

Bluetooth – Classic

-

Bluetooth – LE

- Added support for whitelist feature based upon advertising payload
- Added ADV data whitelist support in core files
- Added ADV data whitelist parameters
- Bluetooth LE Stack Enhancements for BT-SIG Certification for Stack
- Bluetooth LE MTU Size negotiation with Peer Device

Changes/Issues Fixed

- Support to sustain long silent TCP connection
- Improvements for Wi-Fi connectivity in Co-Existence mode
- Issue with low power mode resulting in occasional Module Hang
- Issue in channel-144 in 5GHz band of transmitting in a wrong frequency
- Issue with SSL certificate loading with index
- Hang Issue with SSL data stream with low power mode enabled.

- Issue of `rsi_socket_connect` API returning without unlocking mutex in error path, sometime resulting in application Hang.
- Connectivity issues with LTCP socket
- WoWLAN GPIO handshake issue during power save
- Corrected default HT capabilities in WLAN Config Files
- TCP Tx Throughput Dip Issue due to Retransmission (frequent in high traffic)
- Renewed SSL Certificates included in the package
- MQTT Disconnect not working with SSL
- Default Memory Configured to 384k
- MQTT Remote Terminate happening while entering PSM2 and when Keep Alive Time is up
- Multithread Synchronization Issue with Socket `select()` Functionality
- Firmware Hang-up Issue when Bluetooth EDR PER Stop command is issued.
- Modified the Support for FreeRTOS. Now one needs to Enable `FREERTOS` Macro if FreeRTOS library is used. Also need to make “driver task handle” global in case of OS

Deprecated Items

None

Driver and Host APIs

- For Linux platform the Kernel versions supported are 3.6.10 to 4.5.5

New added APIs

<code>rsi_ble_conn_param_resp()</code>	Function to request connection params update with remote device.
<code>rsi_ble_white_list_using_adv_data()</code>	Function to issue vendor specific command for setting the advertise report filter in the controller based on the advertise payload.
<code>rsi_ble_indicate_confirm()</code>	Function to send indicate confirmation to remote device.
<code>rsi_ble_mtu_exchange_event()</code>	Function to Send MTU exchange request.
<code>rsi_bt_get_bt_stack_version()</code>	Function to know the RSSI of the connected BT/BLE device.
<code>rsi_gpio_pininit()</code>	Function for GPIO pin initialization.
<code>rsi_gpio_writepin()</code>	Function to write the TA GPIO's high or low using Command from host.
<code>rsi_gpio_readpin()</code>	Function to read the TA GPIO's using Command from host.
<code>rsi_driver_process_rcv_data_non_rom()</code>	Function to processes data receive packet
<code>rsi_getsockopt()</code>	Function to get socket option
<code>rsi_ip_to_reverse_hex()</code>	IP to Reverse Hex value

`rsi_port_yield_from_isr()`

This API is used to Yield the task

Modified APIs

`rsi_mutex_destroy()`

Modified `mutex_destroy` for `select_mutex`.

`rsi_mutex_create()`

Modified `mutex_create` for `select_mutex`.

`rsi_ble_gap_register_callbacks()`

Updated callback with
`ble_on_remote_conn_params_request_event`

`rsi_ble_smp_register_callbacks()`

Update callback with `ble_on_cli_smp_response_event`

`rsi_ble_callbacks_handler()`

Updated function with case

- `RSI_BLE_EVENT_CLI_SMP_RESPONSE`
- `RSI_BLE_EVENT_REMOTE_CONN_PARAMS_REQUEST`

`rsi_bt_prepare_common_pkt()`

Updated function with case

- `BLE_VENDOR_WHITELIST_USING_ADV_DATA_PAYLOAD`

`rsi_bt_prepare_le_pkt()`

Updated function with case

- `RSI_BLE_CMD_INDICATE_CONFIRMATION`
- `RSI_BLE_CONN_PARAM_RESP_CMD`
- `RSI_BLE_MTU_EXCHANGE_REQUEST`

`rsi_driver_process_common_rcv_cmd()`

Updated function with case

- `RSI_COMMON_RSP_GPIO_CONFIG`

`rsi_driver_process_wlan_rcv_cmd()`

Updated function with case

- `RSI_WLAN_RSP_SELECT_REQUEST`

`rsi_select()`

Updated function with general enhancements and bug fixes

`rsi_get_rtc_timer()`

Modified for generic usage, also removed length from API

`rsi_driver_init()`

Updated `rsi_socket_select_info`

`rsi_driver_deinit()`

Modified for generic usage.

`rsi_wireless_init()`

To resolve struck issue when auto config is enabled

`rsi_rx_event_handler()`

Added check for configure GPIO from host

`rsi_http_client_put_start()`

Added Macro for servers which give webpage as response to http put

<code>rsi_task_notify_from_isr()</code>	Removed API argument <code>eAction</code> (An enumerated type that specifies how to update the receiving task's notification value)
<code>rsi_task_notify()</code>	Removed API argument <code>eAction</code> (An enumerated type that specifies how to update the receiving task's notification value)
<code>ROM_WL_rsi_set_event_from_isr()</code>	Added check with FREERTOS

Known Issues

- There is a known issue with FAST-PSP mode, so it is advised not use this mode.
- Issues with SSL bi-directional data stream with WPA2-AES security mode.
- Soft reset does not work, need to call `rsi_device_init` after `rsi_wireless_deinit`.
- If station in concurrent mode perform scan, there is possibility for stations, connected to AP might disconnect.
- In 40MHz issue in PER mode.
- In Wi-Fi + BT/BLE coex mode, high Wi-Fi broadcast traffic, might cause BT/BLE disconnections.
- IPv6 support has issues.
- Issues with BT PER Continuous mode transmission
- Power Save without RAM retention is not working for SPI interface.
- Publishing of MQTT Max Payload (8884 bytes) might cause stability issues. Max supported publish payload is 1Kbytes
- Total MQTT Command Length, apart from MQTT Publish, should not exceed 150 bytes. This includes `at+rsi` (start of command) to (end of command)\r\n
- Limited Wi-Fi scan results in the Redpine Connect App running on the Android device for BLE provisioning application.
- Comparatively Lower SSL Tx throughput observed for SPI interface
- Intermittently Packet loss observed in SSL Rx with SPI interface
- Secure SSL Renegotiation not supported in Embedded Networking Stack

Wi-Fi/Network Stack Limitations/Feature Not Supported

- AMSDU TX is not supported
- Fragmentation is not supported
- AMSDU's within AMPDU is not supported
- Currently module does not support Radio Measurement Requests feature of CCX V2
- 802.11k is not supported.
- 40Mhz bandwidth in 2.4GHz band is not supported.
- 802.11J channels less than 16 are not supported.
- USB Power save not supported.
- Low power mode is not supported in 40MHZ mode
- ZigBee & Thread are not supported
- Power save using SDIO host interface is not supported with 1.8 V power supply.
- After `rsi_wireless_deinit`, user needs to call `rsi_driver_init` and `rsi_device_init`
- User needs to configure `MQTT_VERSION` in `rsi_mqtt_client.h` based on server configuration, only version 3 and 4 are supported.

BT/BLE Recommendations

- In BLE, recommended range of Connection Interval in
 - Power Save - 100ms to 1.28sec.
 - BT Classic + BLE Dual Mode is ≥ 200 ms.
 - Wi-Fi + BLE coex - 30ms to 4sec
- In BLE, during Connection, same values of Scan Interval and Scan Window is not recommended.
- In BT Classic, recommended value of Sniff Interval during Power Save is limited to 100ms (≤ 100).
- In Wi-Fi + BLE, during Wi-Fi connection, recommending the lesser BLE scan Window and larger BLE scan Interval.

BT/BLE Limitations/Features Not Supported

- BT Sniff mode does not work if BT multiple slaves feature is enabled
- BT A2DP Source Power Save + Coex is supported only for the SBC Pass through Mode.
- When BT multiple slaves feature is enabled, Master to slave role switch will not happen
- In BLE, if Advertising/Scanning are in progress, and the device moves to Slave/Master role, Advertising/Scanning will be stopped. Provide respective commands to start Advertising/Scanning while being in Slave/Master role.
- In Wi-Fi + BLE coex, if BLE Connection is established with small Connection Interval (< 15ms), simultaneous roles (i.e. Master/Slave + Advertising/Scanning) are not supported.
- In Wi-Fi + BLE, during Wi-Fi connection, if both BLE scan interval and window are same then there will be issue in successfully making the Wi-Fi connection.
- Simultaneous Slave & Master roles (Scatter-net) is not supported.
- In BLE, if device is acting as Master/Slave, scan window (in `set_scan_params` and `create_connection` command) shall be less than the existing Connection Interval.
- In BLE, if Advertising/Scanning are in progress, and the device moves to Slave/Master role, Advertising/Scanning will be stopped. Provide respective commands to start Advertising/Scanning while being in Slave/Master role.
- In BLE, if BLE Connection is established with small Connection Interval(< 15ms), simultaneous roles (i.e. Master/Slave + Advertising/Scanning) are not supported.

Folder Structure Changes

- Added following directories under `.../host/sapis/platforms`
 - `STM_32_FreeRTOS_Projects`
 - `STM32_DMA`
- Added following directories under “docs” folder
 - `app_notes`
 - `cloud_webserver_guides`
 - `program_manuals`
 - `quick_start_guide`
 - `sapis_user_guides`

Release Notes – RS9116.SW.1.2.23

Monday 2nd March 2020

Release Status

- Test
- Alpha
- Beta
- Production

New Features

Wi-Fi

- Added example application to load two SSL certs to RAM and establish two ssl connections
- Added support for rsi_connect API to be called in asynchronous manner, by registering a callback
- Added multiple STM32 based reference projects
- Added support to configure UART hardware flow control for working with Baudrate > 115200
- Added support to get RTC time.
- Added support to modify listen interval (powersave duration) dynamically

Bluetooth - Common

-

Bluetooth – Classic

-

Bluetooth – LE

-

Changes/Issues Fixed

- Resolved issue with hidden ssid scan/connectivity.
- Resolved issue with driver init by updating the GLOBAL_BUF_LEN to 15000
- Increased Global Buffer Size
- Resolved issues with multiple connections to LTCP socket
- BLE SCAN results improvements
- Improvements for calculating the RSSI for BLE scan results
- Fixed disconnection issue in BLE pairing
- BLE RX Performance improvements
- WLAN Tx EVM improvement for through
 - Updated Tx gain table and DPD enabled with per chip trained coefficients used from manufacturing RF calibration map.
 - PLL parameters update
- Temperature correction enabled.
- Added makefile for wlan_station_ble_provisioning application.

Deprecated Items

None

Driver and Host APIs

- For linux platform the Kernel versions supported are 3.6.10 to 4.5.5

Known Issues

- Issues with SSL data stream with low power mode enabled.
- Issues with SSL bi-directional data stream with security.

- Soft reset does not work, after `rsi_wireless_deinit` need to call `rsi_device_init`.
- If station in concurrent mode perform scan, there is possibility for stations, connected to AP might disconnect.
- 40MHz issue in PER mode.
- In WLAN + BT/BLE coex mode if high Wi-Fi broadcast throughput might cause. BT/BLE disconnections.
- Issues with IPV6.
- Issues with BT PER Continuous mode transmission happen

Limitations/Feature Not Supported

- AMSDU TX is not supported
- Fragmentation is not supported
- AMSDU's within AMPDU is not supported
- IPV6 is not supported is not present in SAPI
- Currently module does not support Radio Measurement Requests feature of CCX V2
- 802.11k is not supported.
- 2G 40Mhz is not supported.
- 11J channels less than 16 are not supported.
- Thread is not supported
- USB Power save not supported.
- BT A2DP Source Power Save + Coex is supported only for the SBC Pass through Mode.
- Low power mode is not supported in 40MHZ mode
- ZigBee & Thread is not supported
- Power save using SDIO host interface is not supported with 1.8 V power supply.
- After `rsi_wireless_deinit`, user needs to call `rsi_driver_init` and `rsi_device_init`
- User needs to configure `MQTT_VERSION` in `rsi_mqtt_client.h` based on server configuration, only version 3 and 4 are supported.

Folder Structure Changes

-

Release Notes – RS9116.SW.1.2.20

Friday 23rd December 2019

Release Status

- Test
- Alpha
- Beta
- Production

New Features

Wi-Fi

-

Bluetooth - Common

-

Bluetooth – Classic

-

Bluetooth – LE

- Added support to set the MTU size for BLE in AT mode

Changes/Issues Fixed

- Enhanced BLE Scanning Functionality

Deprecated Items

None

Driver and Host APIs

- For linux platform the Kernel versions supported are 3.6.10 to 4.5.5

Known Issues

- Issues with SSL data stream with low power mode enabled.
- Issues with SSL bi-directional data stream with security.
- Soft reset does not work, after `rsi_wireless_deinit` need to call `rsi_device_init`.
- If station in concurrent mode perform scan, there is possibility for stations, connected to AP might disconnect.
- 40MHz issue in PER mode.
- In WLAN + BT/BLE coex mode if high Wi-Fi broadcast throughput might cause. BT/BLE disconnections.
- Issues with IPV6.
- Issues with BT PER Continuous mode transmission happen

Limitations/Feature Not Supported

- AMSDU TX is not supported
- Fragmentation is not supported
- AMSDU's within AMPDU is not supported
- IPV6 is not supported is not present in SAPI
- Currently module does not support Radio Measurement Requests feature of CCX V2
- 1k is not supported.
- 2G 40Mhz is not supported.
- 11J channels less than 16 are not supported.

- Thread is not supported
- USB Powersave not supported.
- BT A2DP Source Power Save + Coex is supported only for the SBC Pass through Mode.
- Low power mode is not supported in 40MHZ mode
- ZigBee & Thread is not supported
- Powersave using SDIO host interface is not supported with 1.8 V power supply.
- After `rsi_wireless_deinit`, user needs to call `rsi_driver_init` and `rsi_device_init`
- User needs to configure `MQTT_VERSION` in `rsi_mqtt_client.h` based on server configuration, only version 3 and 4 are supported.

Release Notes – RS9116.SW.1.2.17

Friday 19th December 2019

Release Status

- Test
- Alpha
- Beta
- Production

New Features

Wi-Fi

- Added support for comma in SSID for AT command mode

Bluetooth - Common

-

Bluetooth – Classic

-

Bluetooth – LE

- Added CW Mode support in AT mode

Changes/Issues Fixed

- Enhanced BLE Scanning Functionality

Deprecated Items

None

Driver and Host APIs

- For linux platform the Kernel versions supported are 3.6.10 to 4.5.5

Known Issues

- Issues with SSL data stream with low power mode enabled.
- Issues with SSL bi-directional data stream with security.
- Soft reset does not work, after `rsi_wireless_deint` need to call `rsi_device_init`.
- If station in concurrent mode perform scan, there is possibility for stations, connected to AP might disconnect.
- 40MHz issue in PER mode.
- In WLAN + BT/BLE coex mode if high Wi-Fi broadcast throughput might cause. BT/BLE disconnections.
- Issues with IPV6.
- Issues with BT PER Continuous mode transmission happen

Limitations/Feature Not Supported

- AMSDU TX is not supported
- Fragmentation is not supported
- AMSDU's within AMPDU is not supported
- IPV6 is not supported is not present in SAPI
- Currently module does not support Radio Measurement Requests feature of CCX V2
- 802.11k is not supported.
- 2G 40Mhz is not supported.
- 11J channels less than 16 are not supported.
- Thread is not supported
- USB Powersave not supported.

- BT A2DP Source Power Save + Coex is supported only for the SBC Pass through Mode.
- Low power mode is not supported in 40MHZ mode
- ZigBee & Thread is not supported
- Powersave using SDIO host interface is not supported with 1.8 V power supply.
- After `rsi_wireless_deinit`, user needs to call `rsi_driver_init` and `rsi_device_init`
- User needs to configure `MQTT_VERSION` in `rsi_mqtt_client.h` based on server configuration, only version 3 and 4 are supported.

Release Notes – RS9116.SW.1.2.14

Friday 05th December 2019

Release Status

- Test
- Alpha
- Beta
- Production

New Features

Wi-Fi

-

Bluetooth - Common

-

Bluetooth – Classic

- Added HID reconnect command in AT mode

Bluetooth – LE

- Added authorization support for attributes/services in add_attribute command for AT mode.

Changes/Issues Fixed

- Enhanced BLE Scanning Functionality

Deprecated Items

None

Driver and Host APIs

- For linux platform the Kernel versions supported are 3.6.10 to 4.5.5

Known Issues

- Issues with SSL data stream with low power mode enabled.
- Issues with SSL bi-directional data stream with security.
- Soft reset doesn't work, after rsi_wireless_deint need to call rsi_device_init.
- If station in concurrent mode perform scan, there is possibility for stations.connected to AP might disconnect.
- 40MHz issue in PER mode.
- In WLAN + BT/BLE coex mode if high Wi-Fi broadcast throughput might cause. BT/BLE disconnections.
- Issues with IPV6.
- Issues with BT PER Continuous mode transmission happen

Limitations/Feature Not Supported

- AMSDU TX is not supported
- Fragmentation is not supported
- AMSDU's within AMPDU is not supported
- IPV6 is not supported is not present in SAPI
- Currently module does not support Radio Measurement Requests feature of CCX V2
- 1k is not supported.
- 2G 40Mhz is not supported.
- 11J channels less than 16 are not supported.
- Thread is not supported
- USB Powersave not supported.

- BT A2DP Source Power Save + Coex is supported only for the SBC Pass through Mode.
- Low power mode is not supported in 40MHZ mode
- ZigBee & Thread is not supported
- Powersave using SDIO host interface is not supported with 1.8 V power supply.
- After rsi_wireless_deinit, user needs to call rsi_driver_init and rsi_device_init
- User needs to configure MQTT_VERSION in rsi_mqtt_client.h based on server configuration, only version 3 and 4 are supported.

Release Notes – RS9116.SW.1.2.1

Friday 04th September 2019

Release Status

- Test
- Alpha
- Beta
- Production

New Features

Wi-Fi

-

Bluetooth - Common

-

Bluetooth – Classic

-

Bluetooth – LE

-

Changes/Issues Fixed

- Updated BT Feature bitmap for Sniff feature and Noise figure feature configurations

Deprecated Items

None

Driver and Host APIs

- For linux platform the Kernel versions supported are 3.6.10 to 4.5.5

Known Issues

- Issues with SSL data stream with low power mode enabled.
- Issues with SSL bi-directional data stream with security.
- Soft reset does not work, after `rsi_wireless_deint` need to call `rsi_device_init`.
- If station in concurrent mode perform scan, there is possibility for stations, connected to AP might disconnect.
- 40MHz issue in PER mode.
- In WLAN + BT/BLE coex mode if high Wi-Fi broadcast throughput might cause. BT/BLE disconnections.
- Issues with IPV6.
- Issues with BT PER Continuous mode transmission happen

Limitations/Feature Not Supported

- AMSDU TX is not supported
- Fragmentation is not supported
- AMSDU's within AMPDU is not supported
- IPV6 is not supported is not present in SAPI
- Currently module does not support Radio Measurement Requests feature of CCX V2
- 802.11k is not supported.
- 2G 40Mhz is not supported.
- 11J channels less than 16 are not supported.
- Thread is not supported
- USB Powersave not supported.

- BT A2DP Source Power Save + Coex is supported only for the SBC Pass through Mode.
- Low power mode is not supported in 40MHZ mode
- ZigBee & Thread is not supported
- Powersave using SDIO host interface is not supported with 1.8 V power supply.
- After `rsi_wireless_deinit`, user needs to call `rsi_driver_init` and `rsi_device_init`
- User needs to configure `MQTT_VERSION` in `rsi_mqtt_client.h` based on server configuration, only version 3 and 4 are supported.

Release Notes – RS9116.SW.1.2.0

Friday 30th August 2019

Release Status

- Test
- Alpha
- Beta
- Production

New Features

- Added support for 40MHz Bandwidth and continuous wave Tx in PER mode
- Added Support for soft reset in PER mode for BT Classic
- Firmware version convention is modified to have customer id
- Added support for Apple iPod Accessory Protocol 2 (iAP2)
- Added support for invalid firmware handling in SAPI arch
- Added a reference example for A2DP sink SBC
- Added chip manufacturing utility example application for NXP FRDM platform
- Added firmware version info in RPS header
- Added Ethernet to Wi-Fi bridge application
- Added example for socket select - callback implementation
- Added support for TCP Window scaling feature
- Added support for 16K SSL record handling
- Added support for IPv6 in SAPIs
- Added example for RAM dump collection for debugging
- Added firmware version in RPS header for firmware image
- Added BT profile/protocol enhancements
- Added HID profile and GATT enhancements

Changes/Issues Fixed

- Stabilized TCP RX throughput in STA + BLE coex mode
- Fixed issues with Multiple firmware upgradation through OTAF AT Command
- Added error handling for sntp command
- Added description for all the bits in feature bitmap configs
- Updated Timeout verification to be generic
- Corrected quick start guides for NXP and RS12100 platforms
- DUT is not able to send data over SPP profile when power save is enabled
- Fixed the opermode failure for BT/BLE Dual mode example
- Fixed the BLE connection issue with dual mode (Added LE L2CAP Signalling checks)
- Fixed EDR Tx Power Limit Issue & BT UART Debug Prints
- Fixed connectivity issues with server socket in UDP client and TCP client
- Resolved compilation errors for STM32 project
- Resolved compilation errors ip6 app
- Fixed the issue of fixed supervision timeout of 32 seconds in case of coex mode, even respective coex nodes are not initialized
- Increased BT_CFG_HCI_CMD_TIMEOUT to wait more time for consecutive HCI Tx commands in case of power save
- Modified ble_notify & ble_indicate value SAPIs for proper mac address handling
- Fixed issue with GATT read request from remote device to host for an attribute that is created with config_bitmap set
- Resolved connectivity issues with Azure cloud
- Added error handling for zero length BLE indications
- Resolved issue with TCP ACK indication feature.
- Resolved connectivity issues after socket close command is issued
- Corrected dependencies for SAPI SDIO layer

- Fixed issue with received data for SNTP example in SAPIs
- Resolved connectivity issues with AWS server if bitmap TCP_IP_FEAT_SINGLE_SSL_SOCKET is enabled
- Enhanced stability of data transfer, when BG scan and PS are enabled.
- Stabilized BLE connection state while in powersave
- Resolved connectivity issues with Azure cloud
- Fixed hang issue when diconnect is sent after TCP socket close
- Fixed issues with deinit SAPI
- Changed bt_feature_bit_map 12 to 13 for bt_sniff_disable feature enabling

Deprecated Items

None

Driver and Host APIs

- For linux platform the Kernel versions supported are 3.6.10 to 4.5.5

Known Issues

- Issues with SSL data stream with low power mode enabled.
- Issues with SSL bi-directional data stream with security.
- Soft reset does not work, after `rsi_wireless_deinit` need to call `rsi_device_init`.
- If station in concurrent mode perform scan, there is possibility for stations, connected to AP might disconnect.
- 40MHz issue in PER mode.
- In WLAN + BT/BLE coex mode if high Wi-Fi broadcast throughput might cause. BT/BLE disconnections.
- Issues with IPV6.
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Limitations/Feature Not Supported

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- Powersave using SDIO host interface is not supported with 1.8 V power supply.
- After `rsi_wireless_deinit`, user needs to call `rsi_driver_init` and `rsi_device_init`
- User needs to configure `MQTT_VERSION` in `rsi_mqtt_client.h` based on server configuration, only version 3 and 4 are supported.

Release Notes – RS9116.SW.1.1.1

Friday 18th April 2019

Release Status

- Test
- Alpha
- Beta
- Production

New Features

- Support for the BLE Gatt Async Call backs.
- Support for the SMP Keys storage in the host.
- Added support to show firmware version in BLE provisioning mobile app.
- A2DP Power Optimization and the Coex Enhancements.
- Added support for sending upto 8KB on TCP/IP socket.
- Added configurability to enable/disable WLAN keep alive packet transmission.
- Added support to receive large http post data.
- Added support for secondary dns server configurations in SAPIs.
- Added Certificate Bypass feature.
- Added support to configure RTS Threshold
- Added support for user to configure Gain table
- Added a dummy hal file (`rsi_hal_platform_init.c`) for ease of porting SAPIs

Changes/Issues Fixed

- Resolved glitches observed when RSI BT module is A2DP source initiator.
- Resolved issues with preauthentication in WLAN.
- Resolved kernel crashes when SDIO connector is removed
- Fixed issues with station ping example.
- Fixed hang issue when dual band BG scan with powermode 2 is used.
- Added error check for WLAN PER mode length in continuous mode.
- Fixed stack corruption issue in BT/BLE + WLAN coex mode.
- Resolved issues with higher TCP data length.
- Path for all songs is corrected in A2DP source AVRCP.
- Correct HT info field when 11J mode is used.
- Incorrect firmware version sent to host is fixed in SDIO.
- Stabilized connectivity with 16 clients in AP mode
- Resolved issues with CMD53 r/w after DUT wakes up from powersave
- Resolved issues with ULP power save in mode 8 and mode 9.
- Improved stability of BT A2DP source device
- Fixed issues with soft reset
- In AP mode corrected the number of STBC spatial stream
- Fixed issues with ACS in AP mode
- Fixed issues with BG scan during roaming
- Resolved issues with Coex performance
- Fixed issues with Wi-Fi-Direct connection in 5GHz band (Dual band module)
- In BT PER mode, RSSI value in receiver stats is updated correctly
- Fixed issues with BT/BLE powersave
- Resolved issues with DNS responses being consumed even if DNS client is disabled
- Resolved issues with AP creation when ACS is enabled for Japan and Europe region
- Resolved issues with all channel scan when 802.11J is enabled
- Stabilized HTTP put request when sent multiple times
- Corrected MGMT sequence number in Association request packet
- Improved DNS resolution time
- Fixed stability issue with wireless firmware upgradation

- Fixed issue with http data transfer with window feature enabled
- Fixed issue related to EDCA contention params configuration
- Fixed stability issue with continuous PER mode
- Improved power consumption by restricting compiler generated RO data to RAM
- Resolved issues with ARP response during powersave
- Resolved error thrown by LTCP command after disconnection & connection
- Added support for Firmware query command before rsi_wireless_init

Deprecated Items

None

Driver and Host APIs

- Added RS12100 platform support for SDIO host interface in SAPIs.
- Added RS12100 platform support for SPI companion card.
- Added FRDM-K28 platform board based applications.
- Added SDIO support for Linux Platform, verified from Kernel version 3.6.10 to 4.5.5
- Added support for rsi_device_deinit() and rsi_driver_deinit() API's.

Known Issues

- Issues with SSL data stream with low power mode enabled.
- Issues with SSL bi-directional data stream with security.
- Soft reset doesn't work, after rsi_wireless_deinit need to call rsi_device_init.
- If station in concurrent mode perform scan, there is possibility for stations, connected to AP might disconnect.
- 40MHz issue in PER mode.
- In WLAN + BT/BLE coex mode if high Wi-Fi broadcast throughput might cause. BT/BLE disconnections.
- Issues with IPV6.

Limitations/Feature Not Supported

- AMSDU TX is not supported
- Fragmentation is not supported
- AMSDU's within AMPDU is not supported
- IPV6 is not supported is not present in SAPI
- Currently module does not support Radio Measurement Requests feature of CCX V2
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- Thread is not supported
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- BT A2DP Source Power Save + Coex is supported only for the SBC Pass through Mode.
- Low power mode is not supported in 40MHZ mode
- ZigBee & Thread is not supported
- Powersave using SDIO host interface is not supported with 1.8 V power supply.

Release Notes – RS9116.SW.1.0.5

Thursday 1st November 2018

Release Status

- Test
- Alpha
- Beta
- Production

New Features

- Added support for SPP, A2DP continuous play and continuous download

- ZigBee is supported

Changes/Issues Fixed

- Resolved issues with WLAN, BT coex functionality
- Resolved issues with Windows 10 client connecting to redpine AP
- Fixed issues with http put request response to get webpage

Deprecated Items

None

Driver and Host APIs

-

Known Issues

- If station in concurrent mode perform scan, there is possibility for stations connected to AP might disconnect
- AP + BLE , WLAN + Bt Dual Mode are Supported in 256KB TA Mode only.
- 40MHz issue in PER mode
- In WLAN + BT/BLE coex mode if high Wi-Fi broadcast throughput might cause BT/BLE disconnections

Limitations/Feature Not Supported

- AMSDU TX is not supported
- Fragmentation is not supported
- AMSDU's within AMPDU is not supported
- IPV6 is not supported in concurrent mode
- IPV6 is not supported is not present in SAPI
- Currently module does not support Radio Measurement Requests feature of CCX V2
- 1k is not supported.
- Thread is not supported
- USB Power save is not supported
- In BLE, if Advertising/Scanning are in progress, and the device moves to Slave/Master role, Advertising/Scanning will be stopped. Provide respective commands to start Advertising/Scanning while being in Slave/Master role.
- In WLAN + BLE coex, if BLE Connection is established with small Connection Interval (< 15ms), simultaneous roles (i.e. Master/Slave + Advertising/Scanning) are not supported.
- In BLE, if device is acting as Master/Slave, Scan Window (in `set_scan_params` and `create_connection` command) shall be less than the existing Connection Interval.
- In BLE, if BLE Connection is established with small Connection Interval (< 15ms), simultaneous roles (i.e. Master/Slave + Advertising/Scanning) are not supported.
- BT Sniff mode does not work properly in Wi-Fi + BT Co-ex Mode.
- Directed Advertising is present in the Standalone- BLE Mode.
- BLE Power Save for the Longer Duration (more than 500msec) regression issues.
- BT A2DP Source role with AVRCP target role.
 - For input audio file formats has below limitations
 - MP3(.mp3) with Constant bitrate, sampling frequency of 44.1kHz
 - PCM(.wav) with sampling frequency 44.1kHz
- In BT A2DP profile source role, SBC Encoder capabilities supported for Joint Stereo & sampling frequency 44.1 KHz.
- A2DP source supported for USB and SPI interfaces only.
- While playing MP3 song will be muted for ~5 sec in between playback.
- BT A2DP profile supported configurations for the sbc bit pool is upto 35(229kbps).
- BT A2DP Power Save + Coex is supported only for the SBC Pass through Mode.

Release Notes – RS9116.SW.1.0.4

Thursday 18th October 2018

Release Status

- Test
- Alpha
- Beta
- Production

New Features

- In BLE added support for Multiple Master & Multiple Slave

Changes/Issues Fixed

-

Deprecated Items

None

Driver and Host APIs

-

Known Issues

- If station in concurrent mode perform scan, there is possibility for stations connected to AP might disconnect
- AP + BLE , WLAN + Bt Dual Mode are Supported in 256KB TA Mode only.
- 40MHz issue in PER mode
- In WLAN + BT/BLE coex mode if high Wi-Fi broadcast throughput might cause BT/BLE disconnections

Limitations/Feature Not Supported

- AMSDU TX is not supported
- Fragmentation is not supported
- AMSDU's within AMPDU is not supported
- IPV6 is not supported in concurrent mode
- IPV6 is not supported is not present in SAPI
- Currently module does not support Radio Measurement Requests feature of CCX V2
- 1k is not supported.
- Thread is not supported
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- In BLE, if Advertising/Scanning are in progress, and the device moves to Slave/Master role, Advertising/Scanning will be stopped. Provide respective commands to start Advertising/Scanning while being in Slave/Master role.
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- In BT A2DP profile source role, SBC Encoder capabilities supported for Joint Stereo & sampling frequency 44.1 KHz.
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- BT A2DP profile supported configurations for the sbc bit pool is upto 35(229kbps).
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