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# BaseComps

## Release Notes

Version v2.10.3.1
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# Contents

# Chapter 1

# Introduction

This document contains the release notes for the GP *Base Components Library* v2.10.3.1. This library contains a set of commonly used building blocks to assemble a Qorvo LPS SW stack.

## 1.1 Highlights

This release matures the software support for GP712, GP570, GP870, QPG6095, QPG5071, QPG6100, QPG6105 and QPG7015M silicon.

# Chapter 2

# Known Issues

- General
- GP570, GP870 or QPG6095

  BLE When running the RT system from flash, a high load of NVM accesses can cause the chip to miss multiple connection events after each other. When aggressive window widening is active, the chance of missing connection events is higher. If the NVM accesses are running very frequent for a duration longer than the link supervision timeout, there is a small chance the connection will be dropped.

- QPG5071 or QPG6100

Temperature The 32 kHz LjRC oscillator has been validated with temperature compensation disabled, for temperature profiles that do not exceed 1K/8s. Therefor on this release, 32 kHz standby mode is supported within the boundaries of this temperature profile.

Audio High logging rate during voice recording results in interleaved sampling. This means we might miss data getting sampled at the beginning of the chain.

# Chapter 3

# Updates

## 3.1 v2.10.3.1

### 3.1.1 New Features

**Components**

| | |
|---|---|
| gpMacCore | Added support for Thread v1.2 in the MAC layer [SW-9652] |
| gpMacCore | Added support for Thread v1.2.1 in the MAC layer. [SW-9559] |
| qvOT | Updated the OpenThread stack to support Thred v1.3 [SW-9656] |

## 3.2 v2.10.3.0

### 3.2.1 Bug Fixes

**Components**

| | |
|---|---|
| halCortexM4 | Fixed an issue that could cause the chip to hang with ARM asleep and chip remaining awake while RC sleep mode is selected. Applicable for QPG6100, QPG5071, QPG5072 and QPG6105. [SW-9482] |
| qvOT | Enabled the otPlatUartFlush to avoid a CLI buffer exhaustion when too much logging was generated (QPG6095, QPG6100, QPG6105). [SW-9595] |
| gpHal | Fixed priority for extended scanning subevents and made sure they always precede background scanning. [SW-9600] |
| gpHci | Corrected the data_status parameter value in the HCI LE Extended Advertising Report event during active scanning state. [SW-9601] |
| gpBlePerAdvSync | Periodic Advertising Reports now always contain the TX Power from the AUX_SYNC_IND as required by test cases LLDdiScnBv79C and LLDdiScnBv81C. [SW-9602] |
| gpHal | Fix BLE background scanning resume after reception of a 802.15.4 packet before a channel switch. [SW-9604] |
| gpHal | Applied a ROM code patch to fix a missing SCN_RSP after a SCN_REQ on QPG5071 during undirected advertising when the SCN_REQ contained a public AdvA and a resolvable private ScanA when resolving was enabled and the resolving list was empty. [SW-9616] |
| gpBleScanner | Fixed the T_MAFS timing requirement on QPG6105 during BLE Extended Scanning. [SW-9619] |
| gpHal | Adapted the Tx power values to fit latest measurements on QPG5072. [SW-9147] |

halCortexM4 Fixed bug in which using the same counters for the PWM function caused the counters to saturate and not get updated on QPG5071, QPG6100, QPG5072 and QPG6105. [SW-9151]

gpMacCore Initialized the PAN coordinator field in MAC filter to disabled state. [SW-9346]

gpNvm Fixed a bufferoverflow which caused the gpNvm to access the incorrect flash page, resulting in incorrect and unreliable NVM behaviour. [SW-9596]

gpNvm Fixed undesired erase of factory data on NVM consistency error. [SW-9606]

### 3.2.2 New Features

#### Components

gpTls Enabled HMAC function for QPG6105 devices. [SW-9226]

gpMacCore Added an interoperability fix for a case where a beacon frame has a GTS Permit bit set and the beacon order is 0xF (no periodic beacons). [SW-9174]

halCortexM4 Improved accuracy of internal temperature measurement circuitry in QPG6105 by compensating for the systematic offset on the measured temperature. [SW-9310]

gpRadio Added the option to switch the FIR filter settings on QPG6100, QPG5071, QPG7015M and QPG6105. [SW-9373]

gpHal Extended the amount of retries from 7 to 15 MAC frame retries for all chip types when using SW based retries. [SW-9485]

gpUpgrade Enabled compilation of the bootloader with a GCC based compiler. [SW-9597]

lzma Enabled the use of compression with gcc and Segger compilers for QPG5071, QPG6100, QPG5072 and QPG6105. [SW-9605]

gpOta Made signature verification non-blocking. [SW-9598]

## 3.3 v2.10.2.0

### 3.3.1 Bug Fixes

#### Components

gpRf4ce Fixed a bug whereby a RF4CE target would select the wrong channel to transmit when the base channel had been changed. [SW-9153]

gpBleAddressResolver Bug fixed by letting QPG5072 and QPG6105 products use the private address resolver's patch file. [SW-9212]

halCortexM4 Fixed the watchdog interface to avoid disrupting ongoing watchdog actions (setting timeout, disable, reset) on GP570, GP870, QPG6095, QPG5071, QPG6100, QPG7015M, QPG5072 and QPG6105. [SW-9214]

halCortexM4 Allow usage of GPIO19 and GPIO20 on QPG5072 and QPG6105 when no 32kHz crystal is used. [SW-9215]

gpHal Added a reconfiguration of the registers on QPG7015M when DCDC enablement times out, so they indicated that DCDC is disabled. Resulting in correct sensitivity. [SW-9216]

gpUpgrade Fixed flash write lock of jumptables when selecting active application in the User Mode Bootloader. [SW-9074]

gpRf4ce Fixed and patched a bug in RF4CE ROM code on devices using NRT ROM and are configured as a RF4CE target using the indirect transmission feature. [SW-9134]

halCortexM4 Fixed a UART problem in sleep mode idle state on QPG5071, QPG6100 and QPG7015M. [SW-9217]

### 3.3.2 New Features

**Components**

BleController Added support for Broadcaster and Observer roles to BleController. Introduced new diversities: GP_DIVERSITY_BLE_OBSERVER, GP_DIVERSITY_BLE_BROADCASTER. [SW-9211]

gpBatteryMonitor gpBatteryMonitor used to do a blocking wait for radio to be granted so that loaded measurements can be done. gpBatteryMonitor supports a new API that implements non-blocking radio claim and measurements are indicated to application via a callback. This avoids potential timeouts waiting for radio to be granted to NRT system when radio is claimed by BLE for long duration. [SW-9003]

gpBleConfig Optimized static RAM use by moving supported commands bitfields to const array. [SW-9213]

halCortexM4 Made sure the chip does not go to sleep when PWM is enabled for an LED (all platforms). [SW-8476]

gpNvm Added an option to optimization RAM by differentiating number of TAGS and number of underlying TOKENS. This reduces required tracking area in static RAM. [SW-9085]

## 3.4 v2.10.1.0

### 3.4.1 Bug Fixes

**Components**

gpHal Fixed the setting of the global ldo refbits on GP570 and QPG6095 in case a negative setting was requested in the info page [SW-9041]

gphal Fixed the Bluetooth Low Energy Long Range settings that enable passing the RF-PHY receiver selectivity test RF-PHY/RCV/BV-29-C for QPG5071, QPG6100 and QPG7015M. These were not retained during sleep. [SW-9124]

gphal Improved sensitivity by 2dB at PER==30% in the presence of a Coded Phy [S=8] co-channel interferer for BLE certification test RF-PHY/RCV/BV-29-C on QPG5071, QPG6100 and QPG7015M. [SW-9125]

BleController Direct Test Mode PRBS9 TX sequence is corrected according to expectation of the EBQ TOOL tests. [SW-9126]

gpBle Fixed controller not indicating LEMeta events to HCI layer in builds that did not use encryption or the parameter connection request. [SW-9127]

halCortexM4 Fixed ADC measurements for pins ANIO4 and 5 . This issue impacted the QPG5072 chip. The ADC was unable to measure on channel ANIO 4/5, which resulted in a failing assert in hal_ADC.c [SW-9128]

gpBleLlcpProcedures Fixed assert during PHY update when the remote device does not support this procedure. [SW-9133]

halCortexM4 Fixed the ADC channel enumeration for QPG5072 to use the correct names for the ANIO pins. [SW-9057]

### 3.4.2 New Features

**Components**

gpHal Improved stability and performance on QPG5071, QPG6100, QPG7015M and QPG5072 by supporting asynchronous radio claims which avoids blocking wait for radio grant, freeing up CPU time and avoids asserts once max wait time is reached. [SW-8510]

gpHal Increased the maximum output on QPG5072 to 8dBm (from 7dBm) in the low-power output mode. [SW-9016]

BleController Adds Bluetooth Low Energy v5.2 support for products QPG5071 and QPG6100. Corresponding QDID allocated by the BT sig is 163591 (https://launchstudio.bluetooth.com/ListingDetails/123871). [SW-9129]

#### Applications

gpUpgrade Enabled secure UMB with OTA authentication based on AES-MMO hashing and x25519 verification support on the QPG5072. [SW-8965]

## 3.5 v2.10.0.0

### 3.5.1 New Features

#### Components

The folder hierarchy has been reorganized to combine logically linked components into a single folder resulting in a more modular representation of the component groups within the SW database. Following changes have been done:

- The gpPollingCom component has been discontinued and is no longer available. [SW-8697]
- The components that provide Board Support Packages and support code (BSP) moved to Components/Qorvo/BSP. [SW-8785]
- Low-level Operating System (OS) components moved to Components/Qorvo/OS. [SW-8787]
- Base utility code has moved from BaseComps to Components/Qorvo/BaseUtils. [SW-8788]
- The gpSecureBoot component has been moved to Components/Qorvo/Bootloader. [SW-8792]
- Various test components (gpTestIf, gpUnitTest, gpChipEmu, gpRFChannel) have been moved to Components/Qorvo/BaseUtils. [SW-8793]
- A number of components have been moved and renamed, and now exist under Components/Qorvo. It concerns these components: * BleAppComps, renamed to BleApplication * BleComps, renamed to BleController * BleMeshComps, renamed to BleMesh * BootloaderComps, renamed to Bootloader * ChipComps, renamed to ROM * IrDbComps, renamed to IrDb * RtComps, renamed to Rt * TestComps, renamed to Test * ZProComps, renamed to Zigbee * BaseAppComps, renamed to Coex * FtsInterface, not renamed * ProductionTests, not renamed [SW-8975]
- Components that implement the Hardware Abstraction Layers (HAL) have been moved to Components/Qorvo/802_15_4 (802.15.4 MAC), Components/Qorvo/HAL_RF (radio) and Components/Qorvo/HAL_PLATFORM (mcu platform). [SW-8996]

## 3.6 v2.9.15.0

### 3.6.1 Bug Fixes

#### Components

gpBleDataTx Fixed memory leak by releasing the buffer in case the connection no longer exists. [SW-8947]

halCortexM4 Remove pairing of USB endpoints 4,5 on QPG7015M to fix Host to device data corruption on fast systems [SDP006-2214]

### 3.6.2 New Features

**Components**

halCortexM4 Removed watchdog reset from the interrupt handler prologue. [SW-8480]

gpIrTx Expose ram sequence index match interrupt via a hal_ir callback. [SW-8894]

## 3.7 v2.9.14.0

### 3.7.1 Bug Fixes

**Components**

gpBle Fixed whitelist issue during simultaneous scanning and initiating using background scanning where an address whitelisted for scanning but not for initiating could still be connected to. [SW-8920]

gpCom Removed extra \0 terminator between output and \r\n in *no SYN* protocol case. [SW-8841]

gpTest Fixed an initialization issue when transmitting *BLE* packets for *QPG7015M* based gateway. [SW-8923]

gpLog Allowed the use of % without actual formatting specifiers in *gpLog_Printf()*. The character following a % was always interpreted as a format specifier, which returned wrong output for example URL strings: "data=CH:.81TM%20-00%200C9SS0". [SW-8924]

gpCom Improved protocol handling without SYN/CRC checks by only allocating buffers when required. Previously a handling buffer was held before parsing was started. [SW-8925]

### 3.7.2 New Features

**Components**

halCortexM4 Removed watchdog reset from the interrupt handler prologue. [SW-8480]

gpHal Tuning VDD RAM based on temperature has been enabled by default for QPG5071, QPG6100 and QPG7015M. Application can add GP_DIVERSITY_GPHAL_DISABLE_TRIM_VDD_RAM_TUNE to disable the algorithm. Advised is to leave it enabled. [SW-8562]

gpHal Added support for QPG7015A, with automatic detection of applicable chiptype. [SW-8717]

gpUpgrade Add secure boot/upgrade to compression builds on QPG5071, QPG6100 and QPG7015M. [SW-8914]

gpCom Added a new feature to allow gpCom to be used without the SYN/CRC wrappers. The goal of this is to also support standard terminal applications to be used with gpCom. Additionally this also contains a feature to disable the Timestamp and Component id in the logs to make the logging easier to parse by 3th party applications. [SW-8913]

gpEcc Added support for *P256_Cortex_ECDH* SW library. [SW-8917]

## 3.8 v2.9.13.0

### 3.8.1 Bug Fixes

**Components**

gpLog Fixed an issue with *gpLog_Flush()* on QPG5071, QPG6100 and QPG7015M when logging to the internal USB CDC device. [SW-8758]

halCortexM4 The event scheduler is not clocked during sleep in 16MHz sleep mode on GP570, GP870 and GP6095, which requires the time base needs to be refreshed. Since the reset handler is not used when waking up from the 16MHz sleep, the refresh is done immediately after the WFI instruction. This fix adds a wait after the WFI and before enabling interrupts with timeout that allows the timebase to sync again at that point before the software continues. [SW-8763]

gpJumpTables Fixed a bug that the jumptables wrongfully considered to use patched gpSched functions if gpCom was not used. It also improves readability by not having gpSched_patch.c compiled if gpCom is not enabled. [SW-8765]

gpHal Fixed an issue on GP570, GP870 and QPG6095 where the FLL RX out of range interrupts were not getting triggered. This was achieved by correctly setting the number of adjustments in the FLL RX out of range threshold register. [SW-8766]

gpBle Changed GP_ASSERT_DEV_INT() into GP_ASSERT_DEV_EXT() with same condition. Added graceful handling of buffer underruns: achieved by extending the *flow control* mechanism between gpBleDataRx and HCI layer to also consider WSF buffer underruns. [SW-8767]

gpBleLlcpFramework Fixed connection timeout when a local and remote termination procedure are overlapping by properly merging both procedures. [SW-8769]

gpBle Fixed an whitelist issue during simultaneous scanning and initiating using background scanning. An address whitelisted for scanning but not for initiating could still be connected to. [SW-8781]

halCortexM4 C++ static class constructors initialization code was not called in code compiled with GCC. Added the initialization call and necessary linker sections. [SW-8685]

gpBle Removed all *gpPoolMem_Malloc()* calls from ISR code, since *malloc()* is not reentrant. [SW-8780]

gpHal Improved performance on QPG5071, QPG6100 and QPG7015M by calling *gpHal_IpcStop* and *gpHal_IpcRestart* only when parts of the RT are in flash. [SW-8771]

### 3.8.2 New Features

#### Components

gpCom Added feature to remove the SYN / CRC checks from the gpCom protocol. Next to that it adds the functionality for a different parser that converts the first 3 bytes as ascii values to a module id. This is used to forward the remaining string up to the limiter char "\r" to the corresponding module. [SW-8762]

gpHal Added feature on GP570 , GP870 and QPG6095 to enable 125*C support by using a header in BSP instead of a Look up Table(LUT). This reduced the memory footprint by removing the LUT from fixed sector in flash. [SW-8764]

silexCryptoSoc Reduced the flash size on QPG5071, QPG6100 and QPG7015M by reducing the set of ECC crypto curves to the bare minimum by default. [SW-8520]

gpPd Introduced *gpPd_GetRxedChannel()* to return the 802.15.4 channel where a packets was received on. [SW-8538]

hal/gpHal Aligned ISR mask defines and defined them in one location to prevent wrong masking/unmasking across different ISR handlers, for GP570, GP870, QPG6095, QPG5071, QPG6100 and QPG7015M. [SW-8700]

gpRadio Added new attributes RXMS (Multistandard), RXHS (High Sensitivity) and RXMC (Multichannel) so user can select the chosen mode before enabling RX. Additionally, status messages are added so the user gets notified while trying to set a invalid combination. [SW-8747]

silexCryptoSoc Enabled multi-threaded use of the security engine by adding a mutex lock. [SW-8748]

gpExtStorage Added blocking function *gpExtStorage_EraseSector* for erasing sector and added non-blocking function *gpExtStorage_EraseSectorNoBlock* for erasing sector. [SW-8757]

gpUpgrade Enabled user license based upgrade approach for builds using external storage on QPG5071, QPG6100 and QPG7015M. [SW-8760]

gpUpgrade Enabled compression as an option on QPG5071, QPG6100 and QPG7015M [SW-8761]

gpBsp Added macro SPI_FLASH_SECTOR_SIZE for sector size, added macro SPI_FLASH_BLOCK_SIZE for block size, added macro SPI_FLASH_SECTORS_COUN for sectors count and added macro CMD_SE for Sector Erase command. [SW-8802]

gpHal The SW random generator is now used for CSMA/CA backoff calculations on QPG5071, QPG6100 and QGP7015M. The HW based entropy generator is now only used for the initial seeding instead each random calculation. [SW-8263]

**Platforms**

- Reworked linker script to maximize heap size instead of stack stack size. [SW-8751]
- Add support for heap allocation for GCC based compilation. [SW-8755]

## 3.9 v2.9.12.0

### 3.9.1 Bug Fixes

**Components**

gpZgp Stabilized *gpZgpStub_Reset* so it is robust against a second trigger while the previous one is not finished yet. This triggered an assert before. [SW-8644]

gpMacDispatcher Fixed an issue to not send the data confirm message from server to client if the marshalling failed on server side due to *pd no longer valid* (reset was triggered). This avoid the client side asserting for not having a valid pd. [SW-8645]

gpOta Improved error codes reporting in *gpOta* client. [SW-8651]

gpOta Improved aborting OTAU process on error. [SW-8652]

gpOta Improved OTA header validation on server side. [SW-8653]

gpHal Corrected the CCA threshold on GP570, QPG6095, QPG5071, QPG6100 and QPG7015M to ensure Zigbee compliancy. [SW-8582]

gpBleAddressResolver Fixed issue with reconnecting when at least one connection was active on another link. The problem existed only when nRT was placed in ROM. [SW-8641]

### 3.9.2 New Features

**Components**

halCortexM4 Enabled the Out Of Range feature in the ADC driver for QPG5071, QPG6100 and QPG7015M devices. [SW-7288]

gpTls Extended the supported size of encryption and decryption buffers up to 400 bytes. [SW-8262]

gpMacCore Improved association request flow with a retry mechanism when data poll fails. This makes association more robust under heavy RF interference. [SW-8372]

gpHal Increased the accuracy of the power control loop on QPG7015M by calibrating the VDet offset. [SW-8479]

gpUtils Updated the definition of *gpUtils_Pow* to *UInt32 gpUtils_Pow(UInt32 base, UInt16 exp)* to operate on larger integers. Added function *gpUtils_Log2* to calculate binary logarithm of integer. [SW-8654]

**Platforms**

- GCC Linkerscripts updated for QPG5071, QPG6100 and QPG7015M devices to use SYS and UCRAM areas as a unified area to allow efficient use of the full RAM amount. [SW-8655]

## 3.10 v2.9.11.0

### 3.10.1 Bug Fixes

**Components**

halCortexM4 Fixed spurious resets on QPG5071,QPG6100 and QPG7015M due to desense algorithm, by correctly restoring the desense fix overrides at wakeup. [SW-8458]

gpOta Fixed calculation of number of chunks of the OTAU process for specific images sizes. [SW-8489]

gpPoolmem Allow GP_POOLMEM_PD_AMOUNT to be specified from the buildconfig instead of redefining it. [SW-8494]

gpBleLlcpProcedures Fixed link supervision timeout during the termination procedure when controlled bandwidth was enabled. [SW-8497]

### 3.10.2 New Features

**Components**

gpCoex Added return status code to all APIs to inform if action was a success or not. Non success messages may include requests that are not supported by the platform or wrong parameters range. [SW-8495]

gpComLinkEvents Added *gpComLinkEvent_Ping()* on client/server interface, so client monitor applications can verify if the server is alive. [SW-8493]

gpHal Increased BLE scanning performance by allowing the radio to remain active during preparation for higher priority activities. [SW-8498]

gpNvm Optimized the NVM algorithm so non-corrupted NVM entries in a partly corrupted NVM sector are recovered instead of discarded. [SW-8410]

gpCoex Added *gpCoex_GetCapabilities()* to inform client side on the capabilities supported by the server. [SW-8492]

**Applications**

- Enabled the Secure Bootloader for QPG5071 and QPG6100. [SW-8195]

## 3.11 v2.9.10.0

### 3.11.1 Bug Fixes

**Components**

halCortexM4 Enhanced *hal_ASP* module with proper init/deinit functionality covering for all audio configurations. [SW-8370]

gpTest Fixed a corruption of Tx packet data. [SW-8404]

gpHal Fixed stability issues on QPG5071 by properly disabling closed loop measurements. [SW-8415]

gpHal Fixed an issue with software CSMA-CA where the back off delay was not applied to the first transmit attempt on GP570, GP870, QPG6095, QPG5071, QPG6100 and QPG7015M. [SW-8417]

gpOta Fixes in CRC and erase of *gpOta* component: CRC and erase functions changed to non-blocking implementation; Fixed CRC calculation by not including CRC sub-element header to CRC input. [SW-8421]

### 3.11.2 New Features

**Components**

gpHal Addded *gpHal_Set_MAC_CcaRetriesTreshold* and *gpHal_Set_MAC_MacRetriesTreshold* APIs implementation. These functions allow the dynamic boost of COEX priority after consecutive CCA or MAC retries for 802.15.4 on QPG5071, QPG6100 and QPG7015M. [SW-8416]

gpHal Enabled calibration tasks to be triggered based on systick timer on QPG5071, QPG6100 and QPG7015M. This will ensure that various calibrations are performed while chip is awake even if microprocessor is asleep. [SW-8095]

gpHal Added option to enable tuning of 32MHz crystal trim caps and AGC based on temperature for QPG5071, QPG6100 and QPG7015M. [SW-8114]

gpHal Added option to tune VDD_RAM_TUNE based on temperature which will improve RAM retention at high temperatures for QPG5071, QPG6100 and QPG7015M. [SW-8180]

gpHal Enabled override of default RC sleep clock calibration parameters by specifying non-zero parameter values in info page of QPG5071, QPG6100 and QPG7015M. [SW-8318]

gpUpgrade Improved secure bootloader implementation to include post-update verification of loaded image on QPG5071, QPG6100 and QPG7015M. [SW-8413]

gpExtStorage Enabled encrypted SPI data transfer to the external flash for OTA update process on QPG5071, QPG6100 and QPG7015M. [SW-8414]

gpOta Added *ImageNotify* command to OTAU flow to allow OTA Server to initiate update procedure. [SW-8420]

gpOta Added serial-api driven OTA server side implementation. [SW-8423]

gpHci Updated event reporting of Whitelist modifications. When the VSD event is masked, every modification will generate an event. [SW-8429]

gpNvm Imporved NVM wear leveling. The update is designed to extend the durability of flash memory pages used by NVM. [SW-8424]

gpHal Improved RC sleep mode on QPG5071, QPG6100 and QPG7015M. Optimized aggressive window widening based on the worst-case sleep clock accuracy. Dynamically lower the slave latency in case the worst-case SCA becomes large. [SW-8428]

## 3.12 v2.9.9.0

### 3.12.1 Bug Fixes

**Components**

gpNvm Fixed an issue where a removed NVM entry could reappear during the internal garbage collection in the *gpNvm* module. [SW-7829]

gpHal Replaced assert by return failure *gpHal_ResultInvalidParameter* to upper layer for error handling in *gpHalSec_CCMbase()*. [SW-8360]

gpRf4ceVoice Fixed the intermittent reset experienced if the Voice key is not released within 30 seconds of being pressed in RF4CE mode. [SW-8362]

gpHal Fixed gain compensation on GP712 when using external FEM. During an energy detection scan the FEM gain was being compensated twice in software, causing the software to see higher power than what was actually there. [SW-8365]

gpHal Fixed issue by increasing RAM retention voltage to maximum value above 60*C. This avoids retained RAM loses some of its state at higher temperatures for GP570, GP870 and QPG6095. [SW-8289]

### 3.12.2 New Features

#### Components

gpRadio Introduced new component *gpRadio* to configure global (across all stacks) radio settings like RX mode options and antenna selection. [SW-8217]

gpHal Reduced 32MHz spurs on QPG7015M. [SW-8357]

## 3.13 v2.9.8.0

### 3.13.1 Bug Fixes

#### Components

gpHal Fixed the implementation of *gpHalDCDC_IsActive()* so it returns the actual DCDC state on QPG5071, QPG6100 and QPG7015M. [SW-8282]

gpTest Updated implementation of *gpTest_BleSetAntenna()* so it has an immediate effect. [SW-8320]

halCortexM4 Fixed a bug with upgrade incompatibility for GP570, GP870 and QPG6095. In releases 2.9.6.* and 2.9.7.* a change was present to the layout of the binary format, moving the vpp from offset 0x1c to offset 0x00. This caused upgrade incompatibility when using a bootloader, where upgrading from any release prior to 2.9.6.0 to release 2.9.6.0 or higher would causing the device to not boot anymore. [SW-8322]

gpHal Avoided undefined behavior of the DCDC when going to sleep on QPG5071, QPG6100 and QPG7015M. This undefined behavior could lead to a spike in the current consumption. [SW-8340]

gpSched/kernel Moved the claim of lock to keep the system awake to the ISR routine of the GPIO interrupt. Taking the lock in the scheduled thread introduced a race condition where the system can go back to sleep. [SW-8327]

### 3.13.2 New Features

#### Components

halCortecM4 Improved DMA configuration by separating the enabling of UART TX DAM and UART TX DMA. This allows better matching of the DMA configuration with the intended usecase. [SW-8277]

ucHal Removed the *file* and *line* parameters from the default function declaration of *hal_AtomicOff()* to reduce flash footprint. The GP_HALCORTEXM4_DIVERSITY_WMRK_ATOMIC compile time switch re-enables the old behavior. [SW-8319]

halCortexM4 Added support to enable DMA on UART TX on QPG5071, QPG6100 and QPG7015M. [SW-7777]

gpHal Added option to specify a minimum threshold for the Closed Loop Power Control power detector voltage for GP712. For values below this threshold the device will be forced into open loop, if issues are detected in the feedback path. [SW-8324]

gpOsal Moved the Linux PM callback registration from *gpOsal* Sleep to *gpOsal* SPI, since these needs to be registered with the driver linked to a HW bus line. [SW-8330]

gpHal Optimized BLE RX validation settings for advertising and direct test mode on QPG5071, QPG6100 and QPG7015M. [SW-8332]

gphal Added *Closed Loop Power Control* overflow correction on GP712, GP570, GP870 and QPG6095 to avoid too high power variation when the CLPC feedback path is broken (not receiving correct power detector voltage). [SW-8268]

## 3.14 v2.9.7.0

### 3.14.1 Bug Fixes

**Components**

gpHal Fixed an issue in BLE on QPG5071, QPG6100 and QPG7015M where connection events are missed by slave when slave is busy performing a FLL calibration that is triggered asynchronously by temperature change. [SW-7782]

gpTest Ensured MAC TX requests with data length greater than 125 bytes are all treated as invalid. [SW-7975]

gpIrTx Updated the IR LED configuration so it takes GP_BSP_IR_ACTIVE_LOW into account for QPG5071, QPG6100 and QPG7015M based platforms. This avoids increased power consumption while the IR communication is idle for platforms where IR LED is active low. [SW-8036]

halCortexM4 Improved fractional clock exactness for the use case of 3072kHz. [SW-8212]

halCortexM4 Fixed GPIO initialization issue for QPG5071, QPG6100 and QPG7015M. [SW-8246]

halCortexM4 Fixed global interrupt leak by removing stray HAL_ENABLE_GLOBAL_INTERRUPT. [SW-8247]

gpMacCore Fixed the association response mechanism. The association response packet is sent as an indirect data, in case of no ACK failure after the data poll, no MAC retries are triggered, and the packet is sent again on the next data poll until timeout expires. [SW-8256]

gpHal Disabled desense fix clock overrides before going to sleep on QPG5071, QPG6100 and QPG7015M. [SW-8231]

gpCom Added missing initialization of the *BLE Communication Id*. [SW-8249]

**Platforms**

- Fixed gcc out of memory error by reverting *max()* macro to the version of v4.14 Linux kernel. [SW-8245]
- Fixed wrong offset in bootloader native user license PUF configuration for QPG5071, QPG6100 and QPG7015M. [SW-8248]

### 3.14.2 New Features

**Components**

gpRf4ceKickOutLru Extended *Least Recently Used* algorithm to not only take packet receptions into account but also packet transmissions. [SW-8232]

gpCoex Added support for compile time specification for GPIO pins used for COEX REQUEST and COEX GRANT. [SW-8019]

gpHal Optimized power curve for QPG6095J based on latest characterization data. [SW-8092]

halCortexM4 Implemented I2C Slave functionality for QPG5071, QPG6100 and QPG7015M. [SW-8210]

gpBle Added support for Bluetooth LE Direct Test Mode on QPG5071, QPG6100 and QPG7015M. [SW-8234]

gpMacDispatcher Improved stack registration. When an additional stack with an existing string identifier is registered, the original registered stack will receive a driver reset indication callback. This avoids the same stack registrations can be in use at the same moment from 2 different applications. [SW-8254]

gpStateMachine Added a generic state machine component to allow easy implementation of state machines where needed. It provides API to define the states and state transitions, including managing of the state transitions upon certain conditions. [SW-8257]

## 3.15 v2.9.6.0

### 3.15.1 Bug Fixes

**Components**

gpAudio Ensured a consistent ASP CLK state by properly shutting down the ASP module. [SW-8110]

gpNvm Added GP_NVM_BACKGROUND_DEFRAG_RATIO and GP_NVM_BACKGROUND_DEFRAG_SECTOR_INTERVAL_US flags to change behavior of the background defragmentation algorithm. [SW-8130]

gpMacDispatcher Removed an assert from *gpMacCore_cbAssociateCommStatusIndication()* that was triggered when an invalid stack confirmation arrived. This is a normal behavior as the stack can be unregistered during an ongoing association request. [SW-8139]

gpMacDispatcher Changed retrun value of *gpMacDispatcher_GetBeaconPayloadLength()* to 0 if no stack is registered, this to avoid memory corruption on marshaling code when get payload function is triggered without a valid stack. [SW-8140]

gpMacCore Adapted the behavior of *gpMacCore_DataRequest()* method when no channel is configured to the following stack by returning *gpMacCore_ResultInvalidParameter*. This avoids asserts in *gpHal*. [SW-8141]

halLinux Improved the kernel driver to properly handle assertions when initializing/de-initializing the open/close handlers. [SW-8148]

gpRf4ceBurst Fixed a bug that caused the gpRf4ce module to become unresponsive following a failure on the part of an RF4CE target to complete a burst. [SW-8161]

gpHal Fixed IPC assert during flash accesses on QPG5071, QPG6100 and QPG7015M. [SW-8164]

gpHal Added extra length check during reception of BLE packets on QPG5071, QPG6100 and QPG7015M. All packets that exceed the preconfigured buffer size will be dropped. [SW-8165]

gpMacCore Fixed the order of *DataIndication* and *AssociationConfirm* callbacks to be in line with their over the air order. In the past the order was inverted if the incoming packet were received quickly after the last association packet. [SW-8143]

gpMacCore Fixed an issue that *Beacon Notifications* were not forwarded to upper layers outside of the *Scanning behaviour*. [SW-8173]

halLinux Updated kernel driver to not only assert on a NULL pointer checks, but also return. This avoid accessing NULL pointers. [SW-8104]

**Applications**

- Fixed the IAR project settings to debug an IAR project containing a *User Mode Bootloader*. A wrong value for –drv_vector_table_base caused the debugger to run into the hard fault handler. This value directs the debugger to the first vector table to use to boot the application in case multiple vector tables are provided in the project. This is the case when a *User Mode Bootloader* is flashed along with the application. [SW-8160]
- Fixed unpredictable behavior on floating CFG1 and CFG2 pins for QPG7015M. [SW-8155]

### 3.15.2 New Features

**Components**

gpLed Added support for *blinking* color LED. [SW-8132]

gpLog Added support to log via android *LogCat* tool for android based applications. [SW-8142]

gpCoex Added support for statistic counters per priority level on COEX REQ and COEX GRANT. [SW-7881]

gpBsp Enabled an additional TX mode for QPG5071 and QPG6100 with 10dBm output power. [SW-8021]

gpZgp Added support for install-code derived link-key based on the Matyas-Meyer-Oseas hash function. [SW-8043]

gpOsal Made an addition to add a device name to *Osal_Module_Init_cdev*, to automatically create the linux kernel module node. This avoids manual creation is required after insmodding a kernel module [SW-8146]

gpOsal Added support for linux system power locks and linux power management system callbacks triggered when the Host is going to sleep and has waken from it. [SW-8150]

gpSched Added option *gpSched_cbGoToSleepNotification(...)* to enable callbacks every time the system is entering sleep and when it wakes up. [SW-8152]

gpNvm Changed the behavior when trying to allocate a new TAG on a full NVM. An error value is returned now instead of triggering an assert. [SW-8174]

## 3.16 v2.9.5.0

### 3.16.1 Bug Fixes

**Components**

halCortexM4 Fixed audio captures for multiple audio recordings in combination with deep sleep for QPG5071 and QPG7051M. [SW-8020]

gpSched Ensured the scheduler thread, when used in kernel context, will sleep indefinitely if no events or external ISR is present. In the past the thread was periodically awakened. [SW-8035]

gpMacDispatcher When *gpMacDispatcher_Reset()* is triggered in a serialized interface, in-flight requests do no longer generate a *confirm* at the client side when they complete. [SW-8053]

### 3.16.2 New Features

**Components**

gpHal_Ble Optimized BLE whitelist implementation by only storing a single entry per device address. [SW-8074]

gpHal Closed Loop power control has been implemented for single-stack MAC applications on QPG7015M. [SW-7710]

gpCoex Added support for *gpCoex_MAC_TX_Packet_DelayedStart* as *txNotGrantedAction* parameter in *gpCoex_Set_MAC_TX_Packet(...)* for QPG5071 and QPG7015M. This will extend the COEX request until the delayed COEX grant is asserted. [SW-7839]

gpCoex Added *gpCoex_Set_MAC_ReRequest(...)* to enable a COEX request re-toggles in order to capture a changed value of the COEX arbiter in case that value is only sampled when the COEX request is changed. [SW-7840]

gpHal The DCDC configuration has been made more robust by removing the dependency on the Vbat measurement on QPG6095 and GP570. [SW-8023]

gpHal The DCDC configuration has been made more robust by removing the dependency on the Vbat measurement on QPG5071. [SW-8029]

gpCom Added *gpCom_cbKernelQueuedPacket()* callback to signal if *gpCom* in kernel space is idle or not. [SW-8054]

gpSched Added *gpSched_cbThreadMonitorNotification()* callback to check the main kernel thread behavior. This allows integration of standby mechanisms of the host platform. [SW-8055]

gpPd Added *gpPd_cbGetFree()* callback to allow monitoring of the PD handle usage. [SW-8056]

gpBleLLcpProcedures Implemented strict length checking for all link layer control PDUs. PDUs with an incorrect length will be rejected. [SW-8080]

gpPd Added *gpPd_DeInit()* to free any possible pending PD claimed. This avoids memory leaking on RAM based PD applications. [SW-8034]

## 3.17 v2.9.4.0

### 3.17.1 Bug Fixes

**Components**

gpNvm Adjusted the default GP_NVM_MAX_PAYLOADLENGTH to 255 for QPG5071 and QPG7015M to support bigger flash page sizes. [SW-7640]

gpHal Updated the default TX power at startup to the maximum for GP570, GP870, QPG6095, QPG5071 and QPG7015M as is required by BLE standard. [SW-7826]

gpOsal Fixed a corruption in *gpOsal_cbuf.c* by improving the mutex usage. [SW-7919]

gpMacDispatcher Fixed issue that could block a second stack to send any data to the MAC layer if the first stack had received an orphan notification from a non-associated member. [SW-7960]

gpCom Fixed overwriting of the *commId* for BLE over USB. [SW-7965]

gpMacCore Fixed an issue where devices polling would no longer receive any message if a second data poll would be received while the first indirect data was not sent yet. [SW-8013]

### 3.17.2 New Features

**Components**

gpHal The pulse shaping filter has been enabled to reduce out-of-band spurs on QPG7015M. [SW-7661]

gpMacCore Improved the direct transmission queue to also add MAC command (coordinator realignment, association response...) packets instead of only data packets to the queue when the HW buffers are depleted. [SW-7962]

gpHal Added an option to enable CSMA-CA algorithm to be handled by SW for GP712. By handling the CSMA-CA algorithm in SW, RX window can stay on during the CSMA-CA backoff delay, removing the receiver blind window created when the HW solution is running the backoff delay. [SW-7963]

gpHal Improved sensitivity of desense channels for QPG5071 and QPG7015M. [SW-7970]

gpBleDirectionFinding Added support for the *BLE direction finding* feature. [SW-8010]

gpHal Modified COEX related APIs names. Changed the *802_15_4* to MAC in the APIs and variable types, to be inline with APIs from other components. [SW-7961]

gpCoex Modified COEX related APIs names. Changed the *802_15_4* to MAC in the APIs and variable types, to be inline with APIs from other components. [SW-7976]

gpBleLlcp Optimized timing of first anchor point in a BLE connection. Previously, deviations up to 1250 us from the expected anchor point were possible. This is only relevant when multiple BLE links are used. [SW-8011]

gpHal Improved the SPI usage on GP712 by reducing the number of access needed for data indication (packet RX) and data confirm (Packet TX) by using a RAM based caching system. [SW-8012]

**Platforms**

- Firmware hex files now contain all addresses and values from the user license, whereas previously only the *program loaded magic word* and *vpp* where present. [SW-7981]

## 3.18 v2.9.2.0

### 3.18.1 Bug Fixes

**Components**

gpBleScanner Fixed coex request settings for BLE scanning. Previously the settings were not applied. [SW-7901]

gpHal Adjusted the fixed location of the trimming mechanism for the 125*C support to a variable reserved section location. This avoids the overlap with the currenltly reserved sections of the Light application. [SW-7910]

### 3.18.2 New Features

**Components**

gpHal Implemented GPIO input control (enable/disable) for the internal attenuator setting on QPG7015M. [SW-7634]

gpHal Disabled the mid-level AGC attenuation by default on QPG7015M CS3 and QPG5071 to allow applications to enable it depending on the use case. Qorvo recommends enabling this feature when there is co-located Wi-Fi interference. [SW-7812]

gpHal Improved sensitivity of BLE desense channels for QPG7015M CS3 and QPG5071 in case RT code is running from flash. [SW-7902]

gpCoex Updated all SW components to use unified gpCoex API for coexistence functionality. [SW-7905]

gpHal Added an option to perform a first CSMA/CA backoff to the SW based CSMA . Previously the first packet sent out used the SW execution variation as random backoff. However, when sending multiple packets back to back, the delay became deterministic. [SW-7906]

gpHal Added statistics counters for CCA failures, MAC unicast retries and failures. [SW-7907]

gpHal Added statistics for coexistence signaling (REQ/PRIO/GRANT) behavior. [SW-7908]

**Platforms**

GP712 Enabled SW based CMSA/CA by default to optimize receiving behavior. [SW-7866]

GP712 Optimized the coexistence interface GRANT response time in order to disable external PAs faster. [SW-7903]

## 3.19 v2.9.1.0

### 3.19.1 Bug Fixes

**Components**

gpHal Fixed a problem for QPG7015M where the ACK was always transmitted on the 2nd external antenna. It is now transmitted on the antenna the packet was originally received. [SW-7838]

### 3.19.2 New Features

**Components**

gpMacCore Extended the MAC layer to handle multiple association requests in parallel allowing concurrent associations. This improves situations where multiple devices are trying to join at the same time. Previous implementation allowed only one association response to be pending, so extra associations requests received would be ignore until the pending one have been sent. [SW-7765]

gpMacCore Introduced a direct transmission queue to cope with applications requesting multiple back to back *DataRequests*. Typical applications will wait for the *DataConfirm* before requesting a new transmission. [SW-7787]

gpHal Added support for *Timed TX* in combination with SW-CSMA for QPG5071, QPG7015M. [SW-7745]

gpHal Made RF improvements on the QPG5071 and QPG7015M by reducing spurious signals in the TX spectrum. [SW-7828]

halCortexM4 Updated *hal_initI2S_m()* and added *hal_configI2S_m()* to ensure applications reuse the underlying DMA instance in between I2S start/stop invocations. This API change is applicable for GP570, GP870, QPG6095, QPG5071 and QPG7015M. [SW-7832]

gpBle Improved stability by replacing a dynamic buffer by a static allocated buffer for all solicited HCI events. This includes the *HCI Command Complete*, *HCI Command Status* and *HCI LE Connection Complete* event. [SW-7858]

**Platforms**

- Obtained USB certification for QPG7015M [SW-7711]

## 3.20 v2.9.0.0

### 3.20.1 Bug Fixes

**Components**

gpMacDispatcher Fixed a PD administration issue where server and client could get out of sync on disconnection of the client. [SW-7763]

gpMacCore Fixed clearing of data pending information when using *gpMacCore_DataPendingModeForNonNeighbourDevices*. The table with addresses is now cleared irrespective of the mode. [SW-7770]

gpMacDispatcher Fixed the PD administration for indirect transmissions (in-flight or still pending) and their corresponding stack when the stack was de-registration or reset. This avoids premature *TransactionOverflow* results when performing new requests. [SW-7771]

gpMacDispatcher Improved MAC stability when the stack is reset or de-registered by avoiding calling a *DataConfirm* linked to a direct transmission that was in-flight. [SW-7772]

gpMacDispatcher Improved MAC stability when the stack is reset or de-registered by avoiding calling a *DataConfirm* linked to an in-direct transmission that was in-flight. Queued packets were already correctly cleared. [SW-7773]

gpKeyboard Solved potential infinitely retransmissions in case a 2nd key is pressed while a push of a *gpKeyboard_SetupKeys* key is ongoing. [SW-7814]

gphal Fixed a bug in *gpHal_Set_802_15_4_TX_Packet()*, where the *gpHal_Coex_802_15_4_TX_Packet_CSMA_CA_Fail* bit in the *actionMask* argument was used to configure the ACK_SKIP setting instead of TREAT_AS_CCA_FAIL. [SW-7815]

gpHal Fixed a problem when 2 different extended addresses where set on GP712. The listening channel of the different stacks was not taken into account. Packets with both extended address were acknowledged. [SW-7685]

gpHal Solved a problem with the output power of MAC acknowledge packets on QPG5071. In case the design has an external switch, a wrong value could be used. [SW-7746]

gpBleLlcpProcedures Fixed an issue where update complete events from the link layer are sent too early. The new behavior waits until the procedure is fully completed before sending the complete events to the host. [SW-7800]

### 3.20.2 New Features

**Components**

gpHal Added a 32MHz XTAL trimming algorithm for GP570, GP870 and QPG6095 based devices. This allows support for 125ÂřC. [SW-7593]

gpCom Added USB support for QPG5071. [SW-6823]

gpHal Added a *gpHal_FlashWriteLockFineCoarse* method to enable fine and coarse flash write lock bits on QPG5071. [SW-7167]

halCortexM4 Moved the BSP sleep retention list to the linker section lower_ram_retain for GP570, GP870 and QPG6095. This allows for less error-prone extension of the retention list, since the linker section will now automatically scale with size of that retention list. [SW-7625]

gpHal Simplified existing API by removing obsoleted functions *gpHal_ParseAttr*, *gpHal_Get_CM_CalibrationData* and *gpHal_FlashReadInf* for QPG5071. Corresponding *GP_WB_READ_NVR_...()* methods are available to get the requested information. [SW-7684]

gpUtils Added on-the-fly calculation of CRC-16 CCITT(Kermit). [SW-7699]

gpHal Improved Continuous Wave mode on GP570, GP870, QPG6095 and QPG5071 by handling FLL recalibration during this mode. [SW-7735]

cordioBleHost Added support for the *LE Directed Advertising Report Event*. [SW-7799]

gpBleLlcpFramework Improved link layer control procedure handling by not starting a procedure if we know the remote does not support it. [SW-7801]

gpHal Added support for IEEE 802.15.4 based propriety protocols on GP570, GP870 or QPG6095. [SW-7816]

gpHal Added an additional coex mode for GP712 that halts the TX state machine till the grant is given. This mode will also retoggle the request when required. [SW-7817]

gpHal Added possibility to configure coex on GP712 so the impact of the coex mechanism on an external PA is identical to the impact on the internal PA. [SW-7818]

gpHal Added support for statistics on the internals of the coex mechanism on GP712. [SW-7819]

**Platforms**

- Upgraded the bootloader of QPG5071 to use the fields from the application user license for select the active application. This was achieved by a shared table between application and bootloader in the past. [SW-7169]
- Upgraded the CMSIS library to version 5.5.1 for GCC-compiler based applications. [SW-7681]
- Added support for QPG7015M [SW-7707]

## 3.21 v2.8.9.0

### 3.21.1 Bug Fixes

**Components**

halCortexM4 Fixed stack corruption when using 32 MHz XTAL sleep mode on QPG5071. [SW-7506]

gpNvm Reset watchdog during initialization of *gpNvm* component so that watchdog will not be triggered when loading large NVM content. [SW-7566]

gpMacDispatcher Fixed release of the packet handle of an in-flight MAC indirect transmission when the expiry timeout was reached. [SW-7580]

gpSched Overruling the default value of GP_SCHED_DEFAULT_GOTOSLEEP_THRES in an application build, was ignored. The problem was only seen when *gpSched* code from the ROM was being used. [SW-7501]

### 3.21.2 New Features

**Components**

gpBle Added support for *link layer privacy* on QPG5071. [SW-7683]

gpMacDispatcher Support for *MultiChannel* duty cycling was added. Note that this is only available for single-stack applications. [SW-7252]

gpHal Updated the RC sleep clock calibration algorithm on QPG5071. It now takes parameters specified in the info page into account. This improves the accuracy of the algorithm. [SW-7524]

gpSched Instead of flushing any TX COM data when processor is going to idle, *gpSched* now checks if any TX COM data is pending. If data is pending, the scheduler loop keeps running, so that COM data can be pushed out in a normal way. This avoids long-blocking atomic flush operations. [SW-7544]

gpHal Enabled periodic temperature measurements as part of the calibration routine. [SW-7568]

halCortexM4 Introduced support for I2S communication on GP570, GP870, QPG6095 and QPG5071. [SW-7632]

gpHal Updated the initial 32KHz XTAL calibration algorithm to improve robustness against interference GP570, GP870 and QPG6095. It is advised to enable GP_DIVERSITY_GPHAL_32KHZ_CALIBRATION_DONE_CB. This will require an additional the application callback *gpHal_cb32kHzCalibrationDone()*. [SW-7682]

**Platforms**

- When DCDC functionality is enabled, the DCDC will auto-start after POR when benchmarking is done on GP570, GP870, QPG6095 and QPG5071. [SW-7511]

## 3.22 v2.8.8.0

### 3.22.1 Bug Fixes

**Components**

gpBleLlcp Do not allow new PDUs to be enqueued after starting *Link Termination* procedure. [SW-7522]

gpBleLlcp Fixed *Link Supervision Timeout* handling when no radio packets are received. [SW-7521]

gpMacCore Fixed re-insertion in indirect queue of packet that failed transmission. Packets were pushed to the end of the queue with full expiration time. [SW-7306]

halCortexM4 Fixed a bug where the PWM threshold percentage was incorrectly fetched on QPG5071. [SW-7269]

silexCryptoSoc Fixed the invalid usage of ECC curves from ROM in certain use cases on QPG5071. [SW-7238]

### 3.22.2 New Features

**Components**

gpHal Improved the optimized window widening feature. Now it is ensured that the listening window is as long as possible for every connection event. [SW-7520]

gpHal Removed unnecessary dependency on flash decoupling capacitor at GPIO19 for QPG5071. [SW-7274]

gpMacDispatcher Single stack MAC-based applications on QPG5071 are now also compatible with the multi-stack *gpMacCore* ROM code. [SW-6966]

gpNvm Removed the redundancy copy of the attribute for QPG5071 as the journaling approach doesn't require it. This reduces the required NVM significantly. The same can be done for GP580, GP870 and QPG6095 by specifying GP_NVM_NBR_OF_REDUNDANT_SECTORS=1 in the build configuration. Changing the value of this buildfag creates backwards incompatibiliy so it is advised to only overrule the default for new projects. [SW-7322]

gpSched Added assert to prevent events being scheduled at the extreme limits of the scheduler as that can cause a time wrap-around. [SW-7214]

halCortexM4 Improved calibration for ADC on QPG5071. [SW-7097]

halCortexM4 Made improvements to detect power dips for QPG5071 during start-up by enabling brown out detection as soon as possible and increase the VMT sample rate. [SW-7235]

## 3.23 v2.8.6.0

### 3.23.1 Bug Fixes

**Components**

gpHal Fixed a bug that the *Antenna Diversity* variant instead of the *Single Antenna* variant of RX-modes was used on platforms with GP_HAL_DIVERSITY_SINGLE_ANTENNA specified for GP570, GP870 and QPG6095 based applications. [SW-7125]

gpNvm Fixed issue when using a wildcard to lookup multiple NVM attributes while removed attribues also matched the lookup criteria on GP570, GP870 and QPG6095.[SW-7129]

gpPd Added check on NULL pointer during buffer allocation. [SW-7254]

gpBleAdvertiser Avoided that *Ble_SetAdvertiseChecker* mistakenly returns *command disallowed* when advertising is already disabled. [SW-7070]

gpHal Fixed a bug in the BLE whitelist where it was possible to add the same address more than once. [SW-7292]

gpBleLlcpProcedures Fixed invalid value of *preferredPeriodicity* in the *LL_CONNECTION_PARAM_REQ* and *LL_CONNECTION_PARAM_RSP* PDUs. [SW-7297]

gpActionControl Ensure *bindingId* parameter in *gpRf4ceActionControl_TxActionRecordRequest()* is only used when it has a valid value. [SW-7298]

halCortexM4 Corrected the initialization of PWM channels to be disabled until first operation to avoid spikes. [SW-7299]

### 3.23.2 New Features

**Components**

gpHal Enabled basic COEX interface for GP570, GP870 and QPG6095. [SW-7040]

gpHal Renamed diversity GP_DIVERSITY_GPHAL_DCDC_SWITCH_CAPACITOR_ONLY to GP_DIVERSITY_GPHAL_DCDC_POWER_SWITCH_ACTIVE_CLOSED to better reflect what this feature is. [SW-7052]

gpNvm Improved the flash protection enabled by GP_DIVERSITY_GPHAL_FLASH_USE_MPU on GP570, GP870 and QPG6095. The improvement is based on guaranteeing the (un)locking and protection mechanism is used in the correct order. This implied that the existing *gpHal_cbFlashWriteEnable()* API is split up into *gpHal_cbFlashWriteEnable()* and *gpHal_cbFlashAddressCheck()*. [SW-7149]

**Platforms**

ucHal Made improvements to detect power dips for GP570, GP870 and QPG6095 during start-up by enabling brown out detection as soon as possible and increase the VMT sample rate. [SW-7198]

## 3.24 v2.8.5.0

### 3.24.1 New Features

**Components**

gpHal Extra protection was added on GP565, GP691, GP570, GP870, QPG6095 and QPG7014 to assure that *gpHal_GetTime()* will only be called after the timer is stable. [SW-7035]

cordioBleHost Upgraded to ARM cordio stack to version r2p4-00rel0. This ARM includes:

- WBUSW-999 Add L2CAP Command Reject indication to scripts
- WBUSW-2278 Support advData with Ext Connectable Directed Advertising
- WBUSW-2469 Add Flow Control to WriteCommand data path
- WBUSW-2742 BLE Host apps should call Ext Advertising/Scanning init functions when BT_VER=9
- WBUSW-1697 IUT doesn't discover the User Data Service after clearing the bonding information
- WBUSW-2261 SMP Responder Mishandles Flow Control Enabled Callback
- WBUSW-2434 App on SMP Responder is not notified when failing SMP Pairing Request
- WBUSW-2440 LESC does not return Repeated Attempts Error
- WBUSW-2473 Incorrect Max Data Length of Periodic Advertising Report Event
- WBUSW-2477 Device Random Address incorrectly Set when Scanning, Initiating or Advertising
- WBUSW-2479 Directed Advertising not blocked when Master is using RPA and LL Privacy not enabled
- WBUSW-2499 Host restricts access of Local DeviceâĂŹs Private Key
- WBUSW-2641 Thin-HCI Events are not passed to HCI Task for processing
- WBUSW-2645 Unsafe pointer usage with LL callback events
- WBUSW-2698 Enable Advertising Sometime Failed due to DmAdvSetRandAddr called before DmAdvConfig completes
- WBUSW-2722 Register set advertising set random address callback should use a direct call
- WBUSW-2736 Host sends HCI AE Adv commands after switching to legacy mode
- WBUSW-2782 Repeated Attempts Failed To Trigger With Legacy Passkey Entry

More details are described in the ARM documentation. [SW-7171]

gpAudio Extended *gpAudio_LoadEqParams()* API to take in *IIR_EQ_HeadRoom* parameter to safely protect for saturation. [SW-7173]

gpAudio IIR filter is enhanced with protection against saturation [SW-7174]

## 3.25 v2.8.4.0

### 3.25.1 Bug Fixes

**Components**

gpHal Fixed a timeout assert in *gpHal_IpcStop()* caused by an ongoing EDScan blocking the claim on the radio arbiter on GP570, GP870 and QPG6095. It is not required to wait for the claim to be granted in this case. [SW-7084]

gpHal Fixed an issue on GP570, GP870 and QPG6095 where BLE PBMs were freed before being completely transmitted. This caused the transmitted packet to become corrupt. [SW-7085]

gpBleLlcpFramework Fixed problem where the termination procedure writes to unallocated memory. This caused the connection handle in the disconnection complete event to become corrupted [SW-7086]

### 3.25.2 New Features

**Components**

gpHal Enhanced the register write macros for GP570, GP870 and QPG6095 by adding extra compile time checks to verify that the variable type matches with the register size. [SW-7030]

gpBleLlcp Optimized slave latency handling. Previously, slave latency was only applied after one instant of the link supervision timeout. With the fixes, slave latency is started after all (initial) link layer control procedures are finished. [SW-7089]

cordioBleHost Extended component to modify the cordio stack initialization sequence so as to have a uniform initialization for single chip and dual-chip solutions. [SW-7090]

gpAudio Enhanced *gpAudio* component with functionality to switch sample rates for voice recording at runtime. Sample rate for voice can be switched to 8kHz or 16kHz. [SW-7091]

gpHal The DCDC max loopgain was increased to improve overall ripple on the power supply. [SW-7044]

## 3.26 v2.8.3.0

### 3.26.1 Bug Fixes

**Components**

gpMacCore Added a check to ignore malformed *CoordinatorRealignment* command packets. [SW-6898]

halCortexM4 Fixed possible missing DMA trigger during UART reception on GP570, GP870 and QPG6095. [SW-6995]

gpBleScanner Fixed *gpPoolMem assert during scanning (when there are a lot of advertisers) [SW-6999]*

### 3.26.2 New Features

**Components**

gpAudio Enhanced *gpAudio* component with functionality to inject external biquad filter coefficients. [SW-7017]

gpAudio Enhanced *gpAudio* component with run-time samplerate selection. Both 8khz and 16khz samplerate are supported. [SW-7018]

gpPd Incremented the datatype definition of *gpPd_Length_t* and *gpPd_Offset_t* from 8 bit to 16 bit to support larger data buffers. [SW-6930]

gpVersion Extend API with *gpVersion_GetBaseCompsVersion()*, *gpVersion_GetBleCompsVersion()*, *gpVersion_GetZproCompsVersion()*, *gpVersion_GetIrDbCompsVersion()*, to retrieve the corresponding version of the used component-libraries. [SW-6961]

gpHal Ensured the internal digital subsystem and the ARM processor are kept in sync on, even when the ARM processor is resetted on GP570, GP870 or QPG6095. This could cause the oscillator benchmark algorithm to assert in the past. [SW-6981]

cordioBleHost Upgraded to ARM cordio stack to version r2p3-02rel0. This ARM release fixes:

- WBUSW-2296 Doxygen API documentation
- WBUSW-2310 Increased default SF_MAX_HANDLER to support applications with larger tasks

More details are described in the ARM documentation. [SW-6997]

gpSched Moved radio and file descriptor handling out of *hal_Sleep()* into the *gpSched_Main_Body()*. This guarantees cleaner responsibilities and avoids applications implicitly relay on side effects of *hal_Sleep()* . [SW-6838]

gpBleDataCommon Fixed an issue where the controller returned *gpHci_ResultUnsupportedFeatureOrParameterValue* in case the host provided valid data in the LE set data length command [SW-7001]

gpAudio Extended API of *gpAudio* component with *gpAudio_LoadEqParams()* function to inject external EQ biquad filter coefficients at runtime. [SW-7092]

## 3.27 v2.8.2.0

### 3.27.1 Bug Fixes

**Components**

halCortexM4 Improved accuracy of *HAL_WAIT_US()* and *HAL_WAIT_MS()* blocking wait calls for GP570, GP870 and QPG6095. Impact of specified timeout period, clock frequency of processor or used compiler are reduced. [SW-6257]

gpVersion Fixed implementation of *GP_VERSION_VERSIONS_EQUAL/SMALLER/GREATER* macros as before all versions comparisons with versions different from v0.0.0.0 where evaluated as EQUAL. [SW-6811]

halCortexM4 Fixed a bug where the wakeup-on-GPIO function was not correctly enabled for GPIOs 36 and 37 on GP570, GP870 and QPG6095. [SW-6832]

gpNvm Fixed an assert occurring when *gpNvm_Remove()* was called and garbage collection has run for GP570, GP870 and QPG6095 based platforms. [SW-6835]

gpMacCore Fixed issue where an active scan could report a *BeaconNotifyIndication* with incorrect channel number if an unsolicited beacon was received by another stack during the scan. [SW-6836]

### 3.27.2 New Features

**Components**

gpHal Enabled support for multi-channel listening with antenna diversity on GP570, GP870 and QPG6095. [SW-5822]

gpHal Refactored the *gpHal_InitVersionInfo()* method to reduce memory footprint and increase readability. As a side effect the global variables *gpHal_ChipId, gpHal_ChipVersion and gpHal_RomBlVersion* were obsoleted and replaced by the getter methods: *gpHal_GetChipId(), gpHal_GetChipVersion(), gpHal_GetRtSystemVersion() and gpHal_GetRomBlVersion()*. [SW-6775]

gpAudio Enhanced *gpAudio* component with new FIR filter coefficients in order to support ultrasound in combination with 2Mhz ASP clock. [SW-6867]

gpAudio Made general improvements to the default DC-removal IIR filter: upgraded from Q15 to Q31 format to allow removal of DC signals with low input level; changed the cut-off frequency from 100Hz down to 50Hz to allow more speech bandwidth; moved in filter chain behind FIR filter and before biquad and digital volume control to have more headroom before applying digital gain by removing any DC offset. [SW-6894]

gpSched Increased the accuracy of the internal implementation of *gpSched* from 32us to 1us. This improvement also reduces the memory footprint of the *gpSched* component. Further simplifications were made by obsoleting
GP_SCHED_DIVERSITY_SCHEDULE_INSECONDSANDMICROSECONDSAPI
diversity by migration the *gpSched_GetRemainingTimeArgInSecAndUs()* method under the
GP_SCHED_DIVERSITY_SCHEDULE_INSECONDSAPI
diversity. [SW-6565]

## 3.28 v2.8.1.0

### 3.28.1 Bug Fixes

**Components**

cordioBleHost Fixed bug in which some command-complete events were not properly handled. [SW-6756]

gpBleLlcpFramework Fixed problem with queueing the termination procedure (as a slave) when the master has started the encryption procedure. Before this fix, the termination procedure was blocked until the encryption procedure finishes. Now, the termination procedure can be launched while the encryption procedure is ongoing. [SW-6901]

gpBleLlcpFramework Fixed a problem where the execution order of LLCP procedures was not the same as the queueing order. It could happen that a non-instant procedure was executed before an instant procedure, even if the non-instant procedure was queued later. [SW-6902]

gpBleLlcpProcedure Fixed a problem where the termination procedure writes to unallocated memory. [SW-6903]

gpBleLlcpFramework Added a proper cleanup for active remote procedures. This fixes an assert when the LL_TERMINATE_IND PDU was received while both a local and remote procedure were active. The assert was triggered because there were three procedures active, while only one local and one remote are allowed at any time. [SW-6904]

### 3.28.2 New Features

**Components**

cordioBleHost Upgraded to ARM cordio stack to version r2p3-00eac0. This ARM release fixes:

- WBUSW-1904 Datc crashes if Streaming stopped after 5 seconds.
- WBUSW-1942 Incorrect WSF buffer sizes for EXACTLE=1 builds.
- WBUSW-1949 Correctly initialize medc_wsp service discovery.
- WBUSW-2105 Tag uses wrong peer address type with directed advertising.

Be aware that in comparison with previous ARM distributions, the folders and files have been reorganised as described in the ARM documentation. [SW-6905]

gpNvm Decreased LUT size to lower heap requirements. [SW-6776]

## 3.29 v2.7.2.0

### 3.29.1 Bug Fixes

**Components**

gpHal Fixed an ACK packet is transmitted on the unused antenna in case of a single antenna platforms. This affected GP570, GP870 or QPG6095 based platforms and resulted in ACK packets not received by transmitter of the original packet. [SW-6566]

gpNvm Ensured an incomplete NVM initialisation is caugth by the check consistency mechanism for GP570, GP870 and QPG6095. Incomplete NVM erases caused inconsistent NVM data. This resulted in potential random data read form NVM, which finally caused undefined and unexpected behavior in the application. [SW-6581]

gpNvm Added blank checking a sector used for NVM data storage for GP570, GP870 and QPG6095 based platforms. Using partly erased sectors for NVM storage caused inconsistent NVM data. This resulted in potential random data read form NVM, which finally caused undefined and unexpected behaviour in the application. [SW-6583]

gpNvm Added a handle *gpNvm_cbInstanceCounterWraparound()* to recover from an overflow of the internal instance counter in the NVM v1 implementation for GP570, GP870 and QPG6095. The counter overflows after 0xffff writes and this legacy implementation can not recover from it automatically. All new NVM write requests will be ignored unless the complete NVM content is cleared. [SW-6588]

ucHal Fixed incorrect UART baudrate calculation causing instable communication for 115200 baudrates and higher. This affected GP570, GP870 and QPG6095 platforms. [SW-6608]

gpHal Added the missing initialization of *gpHal_RomBlVersion* to support future chip versions with a single software build. This affected GP570, GP870 and QPG6095 platforms. [SW-6686]

gpHal Fixed inaccuracy in *gpHal_BleSetTxPower* function to ensure empty PDU packets are also send with the specified power setting. The update impacts the power consumption correspondently. [SW-6748]

gpBleLlcp Fixed bug when applying slave latency after a connection update. Values greater than 255 where truncated to the lowest 8bit causing more RX windows than specified. This had a corresponding impact on the power consumption. [SW-6749]

gpNvm Ensured an NVM clear procedure is recontinued when it is interrupted by a POR on GP570, GP870 and QPG6095. An interrupted NVM clear procedure caused inconsistent NVM data. This resulted in potential random data read form NVM, which finally caused undefined and unexpected behaviour in the application. [SW-6578]

gpRf4ceBurst Fixed the multichannel retransmission of a *gpRf4ceBurst_CommandIdBurstStopRequest* packet in case the connection with the target is lost. This fix avoids an assert causing the application to restart. [SW-6747]

### 3.29.2 New Features

#### Components

gpHal Made GP570, GP870 and QPG6095 builds agnostic for the chips ROM version. This allows to reuse the same SW build on different metal fixes of the same silicon. [SW-6505]

gpIRDatabase Extended the encryption mechanism to support multiple silicon versions for the same IR database. [SW-6721]

gpHal Added functionality that calculates the sleep clock frequency (by comparing it to the accurate 32 MHz clock) on GP570, GP870 and QPG6095. [SW-6750]

gpBleTestMode Added diversity *GP_DIVERSITY_BLE_DIRECTTESTMODE_SUPPORTED* to select direct test mode functionality in an application. [SW-6751]

gpHal Improved the algorithm to calculate the RX validation parameters on desense channels for GP570, GP870 and QPG6095. The updated algorithm lowers the PER on desense channels. [SW-6753]

## 3.30 v2.7.0.0

### 3.30.1 Bug Fixes

#### Components

gpRf4ceActionControl Fixed duplicate call to *gpRf4ceActionControl_cbTxActionRecordConfirm()* when no update is needed in *Rf4ceActionControl_updateTxKeyState()*. [SW-6340]

gpHal Fixed issue in underlaying routines to clear flash sectors for GP570, GP870 and QPG6095 chips. This issue could lead in rare circumstances to incomplete cleared flash sectors. [SW-6462]

halCortexM4 Wait function for TWI access was not taking correct clock delay into account on GP570, GP870 and QPG6095 chips. Status of an action is now retrieved after proper wait times. [SW-6487]

gpSched Fixed internal counter overflow that could result in events scheduled in the past instead of the future. As side effect the existing *gpSched_GetTime()* returning the internal time of the scheduler in units or 32us has been replaced by *gpSched_GetCurrentTime()* returning the internal time in units of 1us. Also the arguments of *gpSched_TimeCompareLower()* are now interpreted in 1us while this was 32us in the past. To avoid events to be scheduled with in the past, an additional assert protection has been added when the *rel_time* argument of *gpSched_ScheduleEvent()* and *gpSched_ScheduleEventArg()* is bigger than 0x7FFFFFFF. [SW-6495]

gpRf4ce Other none RF4CE activity on the processor could introduce a delay between the start of the listening window for discovery responses and the actual transmission of the discovery request packet. This has been fixed by starting the listening window after a successfull transmission of the discovery request packet. [SW-6515]

gpHal Ensured the watchdog timer is reseted during waitloops monitored by a timeout mechanism. [SW-6516]

gpHal Fixed the incorrect address references used by the AES decryption algorithm for the product and users keys for GP570, GP870 and QPG6095 chips. [SW-6520]

gpHal SW based CSMA, used only during BLE and 802.15.4 concurrency, had different queuing behavior as the HW. Queuing mechanism is aligned. [SW-6530]

gpHal Fixed a bug in the backup/restore mechanism for the clock settings when going to sleep and waking up. The bug is valid for GP570, GP870 and QPG6095 chips. The fast clock source configuration was retained during sleep, which could mean it was enabled during the backup routine before the 32MHz external crystal was stable. As the HW is designed to only use the fast clock source when the 32MHz crystal is stable this could lead to the wakeup from sleep to fail and the application to assert. This is fixed by always disabling the fast clock source before going to sleep and restoring it during the wake up routine (if is was enabled before sleep) only after the 32MHz crystal is stable. [SW-6569]

gpRf4ceBound Fixed access to freed memory that potentially causing an assert when triggering an ZRC2.0 pairing. [SW-6570]

gpRf4ceActionControl Fixed bug in which first element of *txAttributes* list was used instead of one specified by the given *bindingId*. [SW-6571]

gpBleLlcpProcedures Fixed bug where slave latency could not be disabled after a connection update. [SW-6573]

ucHal Fixed unexpected POR when the current is below VLT threshold at startup for GP570, GP870 and GP6095. [SW-6574]

gpHal Fixed issue with BLE aggressive window widening by making sure that the RX window duration + processing is smaller than the connection interval. [SW-6575]

### 3.30.2 New Features

#### Components

gpMac Extended the RSSI and Absolute Interference scan types with support for minimal gpHal scanning. This is configured by specifiying 0xFF as scanDuration in the *gpMacCore_ScanRequest()* call. [SW-6509]

gpHal Started using the MPU to protect the content of the flash for unintentional triggers of *gpHal_FlashWrite[NoVerify]()* and *gpHal_FlashEraseSector[NoVerify]()*. This feature need to be enabled with the *GP_DIVERSITY_GPHAL_FLASH_USE_MPU* build flag. [SW-6606]

gpZgp Made *gpZgp_SetDefaultTransmitPowers()* function public. [SW-5530]

gpZgp The *gpZgp_StartCommissioningRequest()* method updated with a *txPower* parameter. This parameter defines the transmit power of the commissioning and application description frames during commissioning. [SW-5534]

gpAudio Adapted FIR filter cut-off frequency to better align with frequency response specifications for voice recognition. [SW-6430]

gpAudio Output module is introduced including features to play 8 bit PCM sounds. [SW-6448]

gpTxMonitor *gpTxMonitor* capability added for GP570, GP870 and QPG6095. [SW-6472]

gpHal Improved symbol startup tuning algorithm for GP570, GP870 and QPG6095 chips. Lockups are now avoided by adding a min and a max value for the startup symbol time. [SW-6482]

gpMac Extended the RSSI and Absolute Interference scan type with support for Regional Domain Settings to blacklist channels. [SW-6510]

ucHal Implemented a calibration routine for the 2048kHz PDM MIC clock for GP570, GP870 and QPG6095. This clock is used when connecting the Qorvo chip to an external PDM microphone. The calibration routine will select at start-up the optimal value for the 2048kHz coarse bank. The calibration routine is triggered from the reset handler before the main routine is called. The routine is enabled by setting the diversity HAL_DIVERSITY_CALIBRATE_2048KHZ. [SW-6541]

gpNvm Reworked the GP570, GP870 and QPG6095 NVM implementation.

- The amount of required (data) memory is significantly reduced by introcuding mechanisms to reuse unused areas of sectors and to recover sparely used sectors.
- Protection against instance counter overflows has been added.
- Taking the update frequency into account got removed.

Remark: These updates introduce incompatibility with NVM data created by the legacy implementation. [SW-6576]

gpAudio Allow chip to go to sleep in between audio interrupts. [SW-6153]

gpMacCore Changed default setting for *gpMacCore_SetMinInterferenceLevels()* to -127 dBm. [SW-6524]

gpHal Extended the *hal_MeasureADC* methods with a return value. Returning *false* indicates the ADC is already in use for another measurement. [SW-6543]

## 3.31 v2.6.5.0

### 3.31.1 Bug Fixes

#### Components

gpMac Fixed a race condition when calling *PollRequest()* from within *gpMacCore_cbAssociationConfirm()*. [SW-6360]

gpNvm Fixed the wrong status report *gpNvm_Result_Error* when a successful write used all specified retries on GP570 and GP870. [SW-6408]

gpNvm Fixed possible recursive assert when NVM_DUMPINFO development diversity is set. [SW-6409]

gpHal Updated the procedures to trigger channel change calibrations on GP570 and GP870. This ensures the calibration is never skipped as this occasionally happened before. [SW-6435]

gpBleLlcpProcedures Fixed problem where a connection update in RC mode resulted in a connection drop. This was fixed by lowering slave latency in case the total sleep time would become too big. [SW-6415]

gpHal Fixed assert during the IPC stop command on GP570 and GP870. This was done by stopping all RX/TX activities before stopping the RT system. [SW-6416]

gpHal Fixed a bug where ZigBee packets were accidentally processed by the BLE event manager on GP570 and GP870. [SW-6417]

ucHal Going to sleep while transmission is ongoing was not blocked on GP570 and GP870. The status of the TX queue is now checked before going to sleep. [SW-6473]

gpHal ZigBee packet parsing was blocked during flash accesses. Flash access will wait now until all ZigBee and/or BLE activity has passed. [SW-6475]

### 3.31.2 New Features

#### Components

gpHal Implemented robustness for failure of the 32 kHz crystal on GP570 and GP870. The software will switch to RC sleep mode in case of crystal failure. [SW-6418]

gpHal Implemented extra protection against connection loss on the GP570 and GP870. This is achieved by using a larger RX window after a configurable amount (default 3) connection events without correlation. [SW-6419]

gpMacDispatcher Extended API with *gpMacDispatcher_SetAutoTxAntennaToggling()* to enable/disable automatic switching between TX antennas in response to failed transmission (no ACK). [SW-6478]

gpRf4ce Enabled non-acked multichannel transmission for GP570 and GP870. [SW-6479]

gpPoolMem Introduced the *POOLMEM_TRYMALLOC()* variant for memory allocation which puts the responsibility of NULL pointer checking to the caller of the method. In the existing *POOLMEM_MALLOC()* the NULL pointer protection is handled by an assert. [SW-6325]

ucHal Improved 2048 kHz audio clock accuracy by using dedicated calibration settings for GP570 and GP870. [SW-6337]

gpMacDispatcher Introduced *RSSI* and *Absolute Interference* scan types. The *RSSI* scan type does an energy scan and returns the measured (signed) RSSI values. The *Absolute Interference* scan type will convert the measured RSSI value in a (unsigned) chip agnostic value: 0 for RSSI values smaller than -95dBm; linear conversion between -95dBm and -45dBm; 254 for RSSI values greater than -45dBM. Both scan types can be masked by the RSSI values specified with *gpMacDispatcher_SetMinInterferenceLevels()* [SW-6480]

gpMacDispatcher Changed the interpretation of *gpMacDispatcher_SetMinInterferenceLevels()*. The method now expects the interference levels to be specified as RSSI values. This implies the *UInt8* pInterferenceLevels* argument is replaced by *Int8* pInterferenceLevels*. [SW-6481]

## 3.32 v2.6.4.0

### 3.32.1 Bug Fixes

#### Components

uchal Improved stability by disabling interrupts during early start up for GP570 and GP870. [SW-6078]

gpBle Resolved issue where the device was not re-added to the white list after disconnect. [SW-6106]

gpNvm Fixed behaviour of *gpNvm_GetNextTokenKey()* for GP570 and GP870. It now returns the lowest unused key instead of highest+1. [SW-6159]

gpZgp *ReadAttributeResponse* is constructed despite the status while this was only done in case of success in the past. [SW-6163]

gpNvm Improved stability for GP570 and GP870 by fixing bugs in initialisation at reboot and in the garbage collection algorithm. [SW-6181]

gphal Fix timing inaccuracies during DPI mode on GP712 by recalibrating for thermal changes when DPI mode is active. [SW-6182]

gpNvm Removed NVM elements re-appeared after a reboot on GP570 and GP870. This is fixed. [SW-6188]

gpNvm Optimized the check consistency recovery on GP570 and GP870 by only erasing the related NVM pool instead of the complete NVM. [SW-6191]

gpCompression Fixed an overflow in the internal algorithm in the component. [SW-6238]

gpNvm Fixed reuse of space occupied with outdated data on GP570 and GP870. [SW-6273]

gpNvm Fixed a crash when calling *gpNvm_ReadNext()* on GP570 and GP870. [SW-6276]

gpNvm Improved check consistency erase mechanism on GP570 and GP870 to avoid an endless assert loop. [SW-6279]

gpNvm Updated behaviour of *gpNvm_Remove()* on GP570 and GP870, so it returns an error when the NVM element does not exist. [SW-6281]

gpZgd Fixed issue where gateway could use incorrect channel mask after restarting. [SW-6357]

gpHal Fixed an issue on GP570 and GP870 where the array for the desense fix state could be placed in the wrong memory region. [SW-6350]

gpAudio Updated the behaviour of asserts which get triggered when the systems load is too high. Only when the GP_DIVERSITY_DEVELOPMENT flag is set at compile time, the impact on audio recording performance is flagged. Otherwise the audio recording session will be halted while the system remains functional. [SW-6105]

gpHal Postponed the activation of the DCDC for GP570 and GP870 to avoid influence on the initial 32kHz crystal calibration. [SW-6242]

gpNvm Avoided constant data is placed in RAM when using IAR compiler. [SW-6250]

gpRf4ceDispatcher Avoided constant data is placed in RAM when using IAR compiler. [SW-6251]

gpNvm Fixed *gpNvm_BuildLookup()* by correct count for removed NVM elements on GP570 and GP870. [SW-6280]

### 3.32.2 New Features

#### Components

gpHal Added UART support for GP712. [SW-5393]

gpAudio Added a runtime switch to configure the start of a mono voice, stereo voice or ultrasound recording. [SW-6224]

gpHal Introduced GPHAL_MINIMAL_MF_VERSION as build optimization flag for GP570 and GP870. The flag defines the minimal HW version supported by the SW. HW versions smaller than the specified number will no be supported and will trigger an assert at start up. The default setting is 4. [SW-6330]

cordioBleHost Upgraded to ARM cordio stack version r2p1. This exposes features like *flow control* and *zero copy*. [SW-6347]

gpZgp Added mechanism to warn OSHS devices via direct backchannel when gateway switches to a different channel; this allows the devices to follow the gateway to the new channel and keep the direct backchannel active. [SW-6348]

gpBle Enabled the capability to combine the BLE host stack with a direct test mode UART interface. [SW-5579]

gpZgp Extended API with *gpZgp_GetSecurityFrameCounter()* to provide access to the security frame counter. [SW-6021]

gpZgp Corrected cluster list present bit in application information. [SW-6072]

gpZgp Improved compliance with green power specification. In case of a device supporting only the default commands; then the *no* commandId list is present in the commissioning frame and in case of non-default commandIds *all* commandIds are present in the commissioning frame. [SW-6088]

gpBle Updated *Ble_PpmToScaField()* so it returns the max sca instead of BLE_MASTER_SCA_INVALID. [SW-6109]

gpHal Reduced timing errors introduced when realigning the timebase before going to sleep on GP570 and GP870. [SW-6110]

uchal Optimized handling of low battery interrupt (standby vlt status interrupt) on GP750 and GP870 by processing it in the ISR instead of being polled from the main loop later. [SW-6172]

ucHal Improved sensitivity to BOD during interrupt service routines for GP570 and GP870 by incrementing the priority of the STBC interrupt. [SW-6190]

gpPoolMem Upgraded the *nbytes* argument from *UInt8* to *UInt16* in the *gpPoolMem_Malloc()* API to allow allocation of bigger memory chunks. [SW-6328]

gpZgd Added mechanism for gateway to read/write ZCL attributes in OSHS devices via direct or indirect backchannel. [SW-6349]

gpBleLlcpProcedures Implemented extra robustness for instant PDU handling. Check for RX timestamp to determine the event counter to avoid processing delays. [SW-6352]

gpHal Reduced the blind window for BOD by reducing the number of disabled interrupts to the strict minimum when writing to the flash on GP570 and GP870. [SW-6226]

gpAudio Improved CPU efficiency by using a simplified biquad chain while maintaining the same level of quality. [SW-6233]

gpHal Added possibility to configure 32kHz crystal clock accuracy and the parameters for periodic recalibration at compile time for GP570 and GP870. [SW-6356]

## 3.33 v2.6.3.0

### 3.33.1 Bug Fixes

#### Components

gpOsal Modified the destroy functions so they properly reset the specified handle to NULL. [SW-5162]

halCortexM4 Reduced the *gpBatteryMonitor* measurement error from 200mV to 20mV and fixed *gpBatteryMonitor_MeasurementTypeLoaded* mode as it was acting as an unloaded measurement in the past. [SW-5795]

gpNvm Fixed bug introduced since BaseComps v2.6.1.0 for GP570 and GP870 that cause potential loss of stored data in NVM. [SW-5873]

gpHal Fixed bug that SW based MAC retries could be sent on a different channel with every retry. Now retries are always sent on the same channel. [SW-5935]

gpHal Fixed a bug in the encryption/decryption routine on GP570 and GP870 where the SW incorrectly assumed that the procedure was successfully finished by the hardware. [SW-6005]

gpAudio Retain *gpAudio* component's configurations during sleep while preserving fast access to performance critical buffers and variables. [SW-6008]

gpHal Incremented maximal TX power settings back to 7 dBm for GP502 and GP712 as it was wrongly limited to 6 dBm since BaseComps v2.6.2.0. [SW-6044]

gpRf4ceBindGdp Fixed bug that ignored the LQI value in the procedure that ordens the bind candidates. This fix will make the procedure more predictable in case devices with the same classification are discovered. [SW-6055]

gpHal Improved RX sensitivity on desense BLE channels by activating the desense fix at start-up for GP570 and GP870. [SW-6073]

gpBleScanner Added an aging mechanism to the duplicate filtering to make sure new advertisers are still reported to the host. [SW-6082]

halCortexM4 Fixed an issue where an offset to the time was added right before going to (32 kHz crystal or RC) sleep on GP570 and GP870. This resulted in BLE connection drops. [SW-6095]

gpHal Improved BLE performance (*dF2*). [SW-5975]

gpHal MAC filtering updated so it allows the same extended MAC address in different panids on GP570 and GP870. [SW-6133]

### 3.33.2 New Features

#### Components

gpHal Disabled IO ring when the voltage drops below an acceptable level on GP570 and GP870. [SW-6094]

gpAudio Enhanced with functionality to enable saturation for incoming signals with a very high input level. [SW-5960]

gpHal Implemented possibility to relocate the RT system on GP570 and GP870 in case it is configured to run from flash. [SW-6043]

gpMacDispatcher Added support for hardware-timed transmission. [SW-5220]

gpZgpStub Added support for hardware-timed transmission for improved timing accuracy when talking back to ZGP source via *RxAfterTx*. [SW-5223]

gpCom Improved 64/32 bit compatibility between userspace and kernel code. [SW-5538]

gpRf4ceBindValidation Added *gpRf4ceBindValidation_UnicastBindRequest()* to perform a Unicast bindrequest. This API allows the remote to pair and start validation with an already discovered target. [SW-5820]

gpBle Reworked *BleComps* and split off functionality in multiple components. [SW-5823]

gpHal On GP570 and GP870, optimized processing time after connection event done interrupts. This was achieved by implementing a mechanism to read metrics from the RT system without a fixed wait. [SW-5910]

gpHal Made the RSSI, LQI and ED values specified in received packets attributes or scan results on GP570 and GP870 more accurate by taking the production calibration data into account. [SW-5943]

gpHal Disabled conversion for 32 kHz crystal sleep mode during the active phase on GP570 and GP870. This gives more stable timing, as sleep clock inaccuracies are not taken into account. [SW-5967]

gpHal Made the DCDC current regulator on GP570 and GP870 more accurate by taking the production calibration data into account. [SW-5973]

gpBleLlcpProcedures Improved anchor point selection during connection updates by using timing info from *gpBleSchedUleManager*. [SW-6000]

gpMacDispatcher Added support for retrieving *Regional Domain Settings* (RDS) including a maximum TX power setting for all channels and a list of blocked channels. [SW-6207]

gpHal Improved accuracy of MAC filtering by taking information on panid and channel into account for extended MAC addresses on GP570 and GP870. [SW-5974]

gpHal Improved overall power consumption for BLE by combining wake up cycle for *Enabling Slave Latency* in wake up cycle of *Actual Connection Event*. [SW-5978]

gpBle Introduced power optimizations for single BLE activity and slave latency sleep behaviour. [SW-6138]

**Platforms**

- To ensure compatibility, added exchange and check for compatibility of version numbers between userspace applications and kernel modules during application start-up. [SW-5749]
- Optimized the content of the serial data used to communicate between userspace applications and kernel modules by skipping the dummy data inserted when referring to NULL pointers. The version of serial wrappers deploying this optimisation is updated to v2.0.0.0. [SW-6071]

## 3.34 v2.6.2.0

### 3.34.1 Bug Fixes

**Components**

gpHal Enabled datapending bit during ZigBee 3.0 Association Procedure for GP501 and GP711. [SW-5319]

gpHal Fixed bug in waking up from 16MHz sleep mode for GP570 and GP870. [SW-5593]

halCortexM4 Fixed bug where BLE controller was not put into sleep. [SW-5707]

gpHal Fixed offset in time base introduced by clock calibration for GP570 and GP870. [SW-5717]

gpBle Fixed issue preventing the GP570 and GP870 to going to sleep when claiming a PBM. [SW-5784]

gpOshs An OSHS gateway was also accepting commissioning from generic GreenPower devices. This blocked commissioning by ZGDD. Commissioning requests from generic GreenPower devices are ignored now. [SW-5793]

gpHal When *gpHal_EDRequest()* could not claim the needed resources for the scan, it would always return *gpHal_ResultBusy* afterwards. Fixed by updating state machine handling. [SW-5803]

halCortexM4 Fixed a bug where a pending interrupt was not processed in time (by ignoring any unused interrupt masks) for GP570 and GP870. [SW-5838]

halCortexM4 UART blocks 1 and 2 where disabled after sleep. Updated code to allow use of 1 and 2 as well over sleep cycles. [SW-5858]

gpZgp Fixed the bug that channel requests didn't increment the MAC sequence number. [SW-5862]

gpHal Extended the retained settings during sleep with registers relevant for RF performance on GP570 and GP870. [SW-5864]

gpAudio To prevent scheduler overloading, the *gpAudio* component is updated so only one sample processing sub routine is queued. [SW-5883]

gpNvm Fixed a backwards compatibility issue introduced in v2.6.0.0 by reverting GP_NVM_MAX_NUM_LUT_ELEMENTS back to 15 in backward and forward compatible *elemIf* implementation of the *gpNvm* component. [SW-5892]

gpHal Additional accuracy improvement made to open loop TX power curve for GP502 and GP712. [SW-5902]

gpAudio Removed transient response from biquad chain in recording by discarding the first X recorded samples. [SW-5583]

gpHal Updated the TX power settings for GP502 and GP712 to match the characteristics of radioboard version R1.01. [SW-5770]

gpHal Updated the TX power settings for Continuous Wave mode to align them with the settings for data transmission on GP565, GP691,GP570 and GP870. [SW-5622]

gpAudio Changed CIC hardware configuration to provide more headroom to the CIC output signal. [SW-5766]

### 3.34.2 New Features

#### Components

gpNvm Switched the default NVM implementation to the backward and forward compatible *elemIf* for GP570 and GP870. [SW-5245]

gpZgp *VendorSpecific Id* mode added. [SW-4781]

gpBle Optimized the validation algorithm for 2Mbit mode. [SW-5001]

gpHal Added support for timed transmission on GP502 and 712. [SW-5222]

gpZgp Added possibility to specify the ZGP source ID as part of the user license page instead of the info page. [SW-5385]

gpMac Added support for sending authenticated *DataRequests*. [SW-5491]

gpZgp Added method *gpZgp_SetChannelMask()* to allow users to configure the channel mask. [SW-5522]

gpHal Optimized the duration of BLE receive windows on the slave side by using a more accurate value for the sleep clock accuracy. [SW-5565]

gpAssert Updated assert handling to make sure interrupts are disabled. This prevents other assertions to occur. [SW-5569]

gpZgp *Application Description* content is now saved in NVM per device entry. [SW-5587]

gpAudio Added new API call to configure the master volume after equalization. [SW-5595]

gpBle Moved customer related constants to *gpBle_Configuration.c* to allow customisation. [SW-5597]

gpAudio Reduced memory footprint. [SW-5611]

gpBle GP_DIVERSITY_BLE_MASTER added to have master functionality only and GP_DIVERSITY_BLE_SLAVE added to have slave functionality only. These diversities corresponds to GP_DIVERSITY_BLE_CENTRAL and GP_DIVERSITY_BLE_PERIPHERAL respectively. [SW-5612]

gpBle GP_DIVERSITY_BLE_EXCLUDE_DATA_LENGTH_UPDATE added to exclude the *Data Length Procedure* update. [SW-5613]

gpHal Implemented possibility use an overloaded version of the RT system in flash for GP570 and GP870. [SW-5691]

gpHal Improved RX sensitivity during direct test mode on GP570 and GP870. [SW-5706]

gpZgp Delay added to avoid collisions in the GreenPower infrastructure as described in CCB221 of GreenPower specification. [SW-5713]

gpZgp *gpZgp_GenericCommandRequest()* added which sends a command with the corresponding data. [SW-5715]

gpZgp Extended the *gpZgp_DecommissioningRequest()* method with 2 parameter; *repeats* i.e. the number that the request needs to be repeated and the *interval* the interval the request needs to be repeated in ms. [SW-5723]

halCortexM4 Implemented wrappers around interrupt handlers to ensure correct use of *hal_IntHandlerPrologue()*, *hal_IntHandlerEpilogue()* in all cases. [SW-5747]

gpZgp Support added for ZCL TX Tunneling (0xA6) and when applicable also RX ZCL Tunneling (0xF6). [SW-5802]

gpZgp Made the number of retries regarding *ApplicationDescription* and *Compact Attribute Reporting* configurable. [SW-5871]

gpHal Enabling the 32KHz sleepmode when the external crystal is not stable yet could have impact on the sleep current. Added precautions in to prevent this. [SW-5903]

gpZgp Enhanced the write attribute callback function to show whether the end of attribute is written. [SW-5915]

halCortexM4 Optimized power consumption by using less bytes for the CRC RAM calculation for GP570 and GP870. [SW-5925]

halCortexM4 Implemented power optimisation by avoiding unneeded iterations of the SW main loop before going to sleep for GP570 and GP870. [SW-5926]

gpBle Improved the random number generation to make sure the *gpBle* component meets the security requirements of the Bluetooth v4.2 specification. [SW-3667]

gpNvm Added new interface to the *gpNvm* component to support multi dimensional token identification. [SW-5629]

gpAudio Provided Matlab/Octave scripts to generating C header file defining biquad coefficients. [SW-5631]

gpAudio Added flexibility to configure at compile time the number of decimation buffers used. [SW-5633]

gpAudio Simplified usage of the *gpAudio* component by processing right and left audio sample in same subroutine. [SW-5638]

gpAudio Decoupled IIR filter and gain/volume in order to make them independently selectable. [SW-5687]

gpAudio The filterchain of *gpAudio* component extended with optional IIR filter. [SW-5712]

gpAudio Added basic EQ chain: low pass, high pass and bass shelf filter to improve voice quality. [SW-5788]

## 3.35 v2.6.1.0

### 3.35.1 Bug Fixes

#### Components

gpRf4ceBurst Introduced aborting state for burst originator to ensure a stop request is sent. This prevents a potential a lock up of the device due to multiple active start requests. [SW-4757]

gpHal Improved open loop TX power curve for GP502 and GP712. [SW-5182]

gpHal Fixed an assert during indirect transmission for GP501 and GP711. [SW-5269]

gpCom Fixed a race condition which could cause an assert in case *gpCom_DataRequest* was called simultaneously from multiple threads. [SW-5270]

gpBle Fixed an assert when a procedure that does not need a PRST was interrupted by the termination procedure. [SW-5325]

gpHal Added extra protection when freeing PBMs to avoid race conditions with RT system. [SW-5405]

gpHal Avoided potential lock up of the GP570 when an interrupt is fired during an uninterruptable HW routine. [SW-5442]

gpZgpStub A *gpZgpStub_Reset()* call also influenced the packet queue of other stacks. This is fixed now. [SW-5602]

gpIrTx Fixed casting overflow for symbols with a SET or CLEAR period greater than 0x7FFF. [SW-5605]

gpMacCore An altered extended address was not reset to its factory default in the HW when a stack unregistered or *gpMacCore_Reset()* was called with *setDefaultPib* set. [SW-5650]

gpHal When 2 different extended addresses are set on GP712, the listening channel of the different stacks was not taken into account. Packets with either extended address were acknowledged. [SW-5652]

gpHal The *address* parameter in all *gpHal_Flash...()* methods are now uniformed and expected to be in the uncompressed format. [SW-5655]

gpMac *gpMacCore_GetRxOnWhenIdle()* now returns the RX state of the specific stack instead of the state of the entire chip. [SW-5680]

gpHal Improved accuracy of the GP570 TX power conversion table. [SW-5423]

gpRf4ceOta Fixed an issue which caused an unexpected confirmation. [SW-5011]

gpBle Fixed a problem where procedure timeouts are triggered after an unsuccessful encryption procedure. [SW-5364]

gpNvm Made miscellanious critical fixes and optimisations to improve stability of the *gpNvm* component. [SW-5432]

gpHal Catched spurious read exceptions on ARM AHB to proprietary Qorvo membus converter of the GP750. [SW-5447]

halCortexM4 Fixed issue where ES block was enabled before having a stable clock on GP570. [SW-5484]

gpBle Fixed a bug that causes a zero-length data packet to be sent in case multiple links have data queued for transmission. Note that such zero-length data packets also got a MIC, causing confusion on the receiver side w.r.t. the length of that packet, leading to decryption failures, which in turn caused an immediate disconnect of the link. [SW-5689]

### 3.35.2 New Features

#### Components

gpRf4ce Fixed invalid Deep Packet Inspection (DPI) configuration by disabling software DPI algorithm when hardware DPI algorithm is active. [SW-4035]

gpOsal Added the *gpOsal_SpiGetBlockSize()* function to the SPI OEM driver to supply the platform specific amount of blocks supported in an SPI transaction. [SW-4472]

gpHal Enabled miscellaneous optimizations for the radio configuration of GP570. [SW-5426]

gpOsal Additional dependencies removed from *gpOsal* API towards linux/errno.h. [SW-5679]

gpHal Added DCDC functionality for GP570. [SW-5380]

halCortexM4 Improved reliability of start-up current by starting up from the ring oscillator by default for GP570. [SW-5476]

gpZgp Simplified commissinoing as a target now sends new channel config/commissioning reply frames in case the first was missed during a commissioning attempt. [SW-5586]

halCortexM4 Implemented further optimizations on the dual DMA support on GP570 for use with stereo audio. [SW-5678]

gpHal Added ADC support for GP570. [SW-4178]

gpBleHost Enabled saving *Bonding* database to NVM. [SW-4770]

gpRf4ceOta Added support for multi-device. [SW-4775]

gpBle Implemented enhanced transmitter and receiver test commands. [SW-4875]

halCortexM4 Enabled the 2.048MHz clock for the Audio Signal Processor (ASP) of the GP570. [SW-5085]

gpHal Implemented support for 32kHz crystal sleep mode on GP570. [SW-5154]

gpZgp Greenpower target extended with support for multi sensor and generic switch messages. [SW-5192]

gpZgp Introduced GP_DIVERSITY_VS_COMMISSIONING to skip channel request and channel config in the commissioning process. [SW-5275]

gpAudio *gpAudio* component enhanced with support for Stereo. The mode selection between Mono or Stereo is configurable at compile time. [SW-5301]

gpBle Implemented more accurate guard time calculation by taking extra idle time and packet duration into account. [SW-5313]

gpHal Limited the supported sleep modes on GP502 and GP712 to 16MHz mode only. [SW-5340]

gpHal Improved RC accuracy on GP570 by using averaging of benchmark measurements to calibrate the sleep clock. [SW-5358]

gpBle Optimized slave latency settings when using RC sleep mode. [SW-5360]

gpHal Optimized sleep duration on GP570. [SW-5383]

gpAudio Updated decimation filter for GP570. [SW-5433]

gpZgp *gpZgp_StopCommissioning()* added to abort an ongoing commissioning attempt on a device. Stopping is only possible in the channel request/configuration phase. [SW-5440]

gpZgd Introduced the Zigbee Gateway Device component (*gpZgd*) to support interaction with*Qorvo Enhanced Green Power* end devices on Zigbee gateways. [SW-5450]

gpBle Added company identifier to software. [SW-5463]

gpMacCore An option added to set the indirect transmit persistence time to infinite. [SW-5464]

gpOsal Support added for older kernel versions. [SW-5474]

gpBle Implemented throughput optimisations in link layer. [SW-5498]

gpAudio Optimized audio data flow by decoupling the *gpAudio* component from the *gpCompression* component and using data buffers at *gpAudio* level. [SW-5511]

gpZgp Made *gpZgp_SetDefaultTransmitPowers()* function public. [SW-5530]

gpZgp Introduced an operational channel mask which allows to disable particular channels for communication. [SW-5532]

gpZgp The *gpZgp_StartCommissioningRequest()* method updated with a *numberOfSuccessRetries* parameter. This parameter defines the number transmitted successful responses during bidirectional commissioning. [SW-5533]

gpZgp The *gpZgp_StartCommissioningRequest()* method updated with a *txPower* parameter. This parameter defines the transmit power of the commissioning and application description frames during commissioning. [SW-5534]

gpHal Enabled PIP support for GP570. [SW-5557]

gpZgp Commissioning flow adjusted to cope with missed channel config/commissioning reply frames. It will re-queue the frame on a new request. [SW-5585]

gpLog Diversity *GP_LOG_BUFFERED_COMPID* option added to buffer up logging until a newline character is given. [SW-5606]

gpNvm Added the *Nvm_DumpInfo()* debug API to get visibility on the internals of the storage algorithm. [SW-5695]

gpNvm Confusing API *gpHal_FlashWriteRandomAddress(...)* renamed into *gpHal_FlashWrite(...)*. [SW-5681]

## 3.36 v2.5.2.0

### 3.36.1 Bug Fixes

#### Components

gpZgpStub Added protection against purging an in-flight packet. Purging attempt will return a *cbPurgeConfirm* with invalid handle now. [SW-5121]

gpHal Improved the *continuous wave* mode for the GP570. [SW-5247]

gpHal Enabled multichannel RX mode when using different RX channels on GP502/GP712. [SW-5122]

gpHal Fixed problem with disabling a modulated *continuous wave* on GP502/GP712. Disabling *continuous wave* caused the device to be unable to receive any packets until the chip got reset. This is fixed so that packet reception is now possible after disabling *continuous wave*. [SW-4920]

gpHal Increased performance of FEM register writes on GP502/GP712. [SW-4946]

gpHal Fixed assert in ISR function during BLE connections. [SW-5338]

### 3.36.2 New Features

#### Components

gpDpi Added support for deep packet inspection filter on GP502/GP712. [SW-3806]

gpCom Added SIGIO signal handler to detect driver init/re-init. Will assert on detection of a driver signal. [SW-4959]

gpOsal Removed dependency from *gpOsal* API towards linux/errno.h [SW-5095]

gpHal Added channel index write into the PBM for GP565/GP691/GP502/GP712/GP570. [SW-5081]

gpHal Implemented *gpHal_GoToSleepWhenIdle* for GP502/GP712. [SW-5104]

halCortexM4 Added dual DMA support on GP570 for use with stereo audio. [SW-5257]

gpOsal Added possibility for multiple userspace clients to connect to a kernel module. [SW-4585]

gpBle Enabled antenna diversity during BLE activities. [SW-4627]

gpHal Implemented optimized validation settings for BLE connections. [SW-4902]

gpHal Added support for multiple receiver modes on GP502/GP712. [SW-5065]

gpMacDispatcher Updated API to allow different Extended Addresses per stack (if possible on the product). [SW-5110]

gpHal Implemented possibility to sleep during slave latency events. [SW-5123]

gpHal Implemented *gpHal_SetSleepMode* for GP502/GP712. [SW-5156]

gpNvm Added support for NVM on GP570. [SW-5350]

#### Applications

- Implemented functionality to increase throughput on combined BLE and 15.4 applications. [SW-4941]

## 3.37 v2.5.1.0

### 3.37.1 Bug Fixes

**Components**

| | |
|---|---|
| gpBindValidation | A race condition was fixed that could cause the LRU list not clean up a previous binding. [SW-4497] |
| gpSched | Fixed issue with sleeptime calculation when the clock has wrapped [SW-4746] |
| gpMacDispatcher | Fixed a bug in the DataRequest confirm flow. Triggering a Direct DataRequest while a Indirect DataRequest was pending caused a mixup in the DataConfirm handling. [SW-4805] |
| gpRf4ceBindGdp | Fixed a bug in transmission of the unpair request command frame after pairing a new device triggering a transaction overflow. [SW-4865] |
| gpMacCore | NULL pointer exception during association flow fixed. Could occur when 2 data requests were received in rapid succession. [SW-4912] |
| gpHal | The GP570 radio settings are optimized and the receive mode *gpHal_RxModeAttenuatorDiverse* was fixed. [SW-4469] |
| gpBle | Fixed asserts when instant procedures are interrupted by termination. [SW-4736] |
| gpBle | Fixed max BLE payload length to 240 bytes. [SW-4821] |
| gpBle | Fixed connection drop during data streaming. [SW-4854] |
| gpCom | A pointer initialization was added which, if missing, could cause an assert for linux user space applications in *gpCom_Rx.c* in the *Com_FreePacket()* function. [SW-4930] |
| halCortexM4 | Fixed hang during restore after sleep on GP570 chips. [SW-4949] |
| gpHal | Compenstation of calculcated RSSI added when using a FEM for GP502/GP712. [SW-5105] |

### 3.37.2 New Features

**Components**

| | |
|---|---|
| gpHal | Fixed warnings when using min/max macros. [SW-4545] |
| gpZgpStub | *gpZgp_cbFailedSecurityDataIndication()* added to indicate the different fail conditions and provide the MAC payload for further processing. [SW-4788] |
| gpOshsStub | Basic Oshs functionality split-off in separate component [SW-4790] |
| gpHal | Antenna selection for CW functionality added for GP570. [SW-4909] |
| halCortexM4 | GP570 sleepmode restores BSP-specific registers [SW-4184] |
| gpHal | Added Coexistence modes for GP712/Xi6 [SW-4776] |
| gpZgpStub | GreenPower Stub functionality split-off in separate component [SW-4036] |
| gpHal | Enabled PBM of 256 bytes. [SW-4602] |
| halCortexM4 | GP570 unused RAM banks are disabled during low power sleep mode based on the linker RAM usage. [SW-4732] |
| gpBle | Move wait for empty queue functionality from individual procedures to the framework [SW-4750] |
| gpOsalOem | Split up gpOsal kernel driver into a generic part and an OEM specific part. The OEM specific part is controlling SPI/GPIO/UART/NVM. This code will be compiled into a separate module, allowing OEM agnostic code in gpOsal. [SW-4759] |
| gpHal | Implemented validation algorithm that reduces the PER for poor access codes on GP570 chips [SW-4786] |
| gpTest | Add support for GP570. [SW-4793] |

gpTest Extend support with BLE primitives for GP570. [SW-4794]

gpBle *gpHal_BleGetCurrentConnEventCount* waits for GPHAL_BLE_CONNECTION_METRICS_UPDATE_TIME [SW-4817]

gpZrcRecipient The sending of seperate client notifications per binding id was enabled and a additional callback was added to inform the application of overflows. [SW-4868]

gpMacDispatcher *gpMacDispatcher_SetCsmaMode()* and *gpMacDispatcher_GetCsmaMode()* API added to manipulate the *collission avoidance* mode of packets sent by a stack. [SW-4899]

gpMacDispatcher Support for responding to DataRequests of unknown devices was added. [SW-5079]

gpHal Possibility to reuse PBM memory for IR buffers implemented for GP570. [SW-4768]

## 3.38 v2.5.0.0

### 3.38.1 Bug Fixes

**Components**

gpMacCore Channel range check [11,26] added to *gpMacCore_SetCurrentChannel()* and *gpMacCore_Start()*. [SW-4516]

gpIrTx Release frame generation for IR codes with non-continuous repeat mode is now scheduled after the transmission of the last release frame. This prevents asserts in the *gpIrTx* component due to unavailability of memory buffers. [SW-4533]

gpHal RSSI compensation for LNA settings was added for GP501/GP565/GP691/GP651/GP711. [SW-4539]

halXap5 GP565/GP691/GP651 The *HAL_TWI_CLK_SPEED* value was interpreted incorrectly. It now sets the clock speed (in Hz) for the TWI block correctly. [SW-4607]

gpMacDispatcher *gpPd_GetTxTimestamp()* using the pdHandle of *gpMacDispatcher_cbDataConfirm()* did not work. The txTimestamp was not transferred over the *gpCom* interface (ioctl, uart, socket, ...). [SW-4764]

gpHal Enable *gpHal_Flash* API for GP570. [SW-4382]

gphal GP565/GP691/GP651 *gpHal_FlashErase()*: corrected blank check that went beyond the selected sector/page if the address was not sector/page aligned. [SW-4470]

gpCom Kernel variant of *gpCom* now clears pending packets and signals server components on close of module. [SW-4515]

gpAudio Filter implementation moved from q15 to q31 filter functions to avoid singularities in High-Pass filters. [SW-4526]

gpCom The ioctl flavor of *gpCom* did not check on the sizes of the supplied buffers between user and kernel space. The kernel side will now limit its data to GP_COM_MAX_PACKET_PAYLOAD_SIZE_PROTOCOL bytes. The userspace side will use a buffer of GP_COM_MAX_PACKET_PAYLOAD_SIZE_PROTOCOL for the initial read-out. Checks have been added to check if the data fits in the Rx buffers of size GP_COM_MAX_PACKET_PAYLOAD_SIZE. [SW-4590]

gpHal Ack Tx power using correct power bits for GP570. [SW-4605]

gpRxArbiter Channel range check [11,26] added to *gpRxArbiter_SetStackChannel()* functions. [SW-4778]

### 3.38.2 New Features

**Components**

gpTest Added the *gpTest_GetLastUsedTxPower()* function to retrieve the last used transmit power of the chip. [SW-4342]

gpHal Minimum, maximum and default transmit powers definitions in dBm are now available for each chip. [SW-4353]

gpHal GP502/GP712 Enabled support for a UART based interface. [SW-4365]

gpRf4ceOta Over-the-air (OTA) RF4CE profile is added. Limited to one remote/target. [SW-4489]

gpMacDispatcher A *gpMacDispatcher_cbPollNotify()* callback was added to inform the stack on the poll recipient that a DataRequest was received (and if any packet was send as response). [SW-4494]

gpRf4ceRib Removed return value for *gpRf4ceRib_cbGetRibCommStatusIndication_t* and *gpRf4ceRib_cbSetRibCommStatusIndication_t* callbacks. [SW-4517]

gpMacDispatcher Support for responding to DataRequests of unknown devices was added. [SW-4580]

gpPoolMem GP_POOLMEM_DIVERSITY_MALLOC can also be used for kernel space compilations to have the benefit of dynamic memory allocation. [SW-4632]

gpBle Support added for BLE on GP570. [SW-4780]

## 3.39 v2.4.9.0

### 3.39.1 Bug Fixes

**Components**

gphal Fixed a bug in TX power level compensation caused by an issue in the closed loop TX power setting. This caused the TX output power of the device not to match the level requested by the application. The bug was present for GP501 and GP711 for applications using an external Front-End Module (FEM). The bug was introduced in release v2.4.1.0. [SW-4082]

gpHal Changed default CCA mode to mode 1 *only based on energy* for the GP540, GP541 and GP561. [SW-4183]

gpHal Avoided accessing a PBM in cases where it was already freed in the higher layers of the stack. [SW-4269]

gpRf4ceActionControl Fixed a bug in scheduling the transmission of new *ActionControl* frames after a transmit failure. This bug could cause new key press/repeat/release frames not to be sent until after a power-cycle. [SW-4398]

gpDpi Avoided an assert when enabling Deep Packet Inspection (DPI) when no paired devices are available. [SW-4200]

gpEncryption Fixed handling of Packet Descriptor (PD) data by improving serial server- and clientwrappers. [SW-4306]

### 3.39.2 New Features

**Components**

gpZrc Added a new notification message called *gpZrc_MsgId_cbRecipientMappableActionsNotifyIndication* to indicate the recipient when a list of mappable actions is pushed from the originator. [SW-3474]

gpHal Added the functions *gpHal_MinTransmitPower(...)* and *gpHal_MaxTransmitPower(...)* to specify the minimum and maximum available TX power. The specified TX power will be clipped between the chip specific constants *GPHAL_MIN_TRANSMIT_POWER* and *GPHAL_MAX_TRANSMIT_POWER*. [SW-4097]

gpHal Implemented the following RX modes for GP502 and GP712:

- Normal mode
- Low Power Listening
- Multichannel
- Attenuator diversity
- Antenna diversity

[SW-4145]

gpOsal Updated the *gpOsal* module API to allow concurrent use by multiple modules. [SW-4188]

gpRf4ceVoice Simplified the integration of the voice profile into the user application by queuing audio data in the voice profile code. [SW-4273]

gpTxMonitor Added functions *gpTxMonitor_Enable()* and *gpTxMonitor_Disable* to enable and disable TX-monitor. Disabling the TX-monitor is required in cases the timing of the data transmissions is critical as the TX-monitor introduces additional delay. [SW-4363]

global Introduced new datatypes *UQ2_6* and *UQ2_14* to explicitly refer to unsigned fixed point numbers with respectively following representations: *xx.xxxxxx* ($1/2^6$ accuracy) and *xx.xxxxxxxxxxxxxx* ($1/2^{14}$ accuracy) [SW-4338]

## 3.40 v2.4.8.0

### 3.40.1 Bug Fixes

**Components**

gpHal Applicable to GP565, GP691, GP651. After the chip goes to sleep, the pointers for the DMA buffers are not valid anymore. Fixed by disabling DMA when the chip goes to sleep. At wake up DMA is enabled again, and pointers are re-initialized. [SW-4023]

gpRf4ceActionControl Fixed the race conditions when buttons are pressed faster than frames can be transmitted. [SW-4216]

halLinux Closing a socket connection unregistered the handler to the stack for all connections causing long delays for new connections. The handler is now kept open/active, allowing normal servicing of incoming data. [SW-4222]

gpIrTx The *GP_IR_TX_DIVERSITY_USE_LOCAL_BUFFERS* variant of the *gpIrTx* component uses PBM area to store IR timing data. This area is now claimed to prevent other components using the same area and overwriting the IR timing data. [SW-4270]

gpRf4ceBindGdp The radio is not disabled anymore when interactive validation is disabled. [SW-4203]

gpRf4ce The default *GP_RF4CE_MAX_DISCOVERY_PROFILEID_LIST_SIZE* is updated according the RF4CE specification and is now 7 instead of 4. [SW-4258]

### 3.40.2 New Features

**Components**

gpRf4ceActionControl A new callback *gpRf4ceActionControl_cbEarlyRepeatIndication()* is implemented to indicate the ongoing transmission of action control frames. [SW-3441]

gpRf4ceCmd Extended filtering in *gpRf4ceCmd* by explicitly taking the profile id into account. [SW-4181]

gpBsp Improved the GP710 BSP to pull down GPIO22, this avoids unintended current in active mode. [SW-4268]

## 3.41 v2.4.7.0

### 3.41.1 Bug Fixes

**Components**

| | |
|---|---|
| gpHal | When using a FEM on GP565 and GP691, the correct RSSI is now returned. [SW-3826] |
| gpBsp | BSP generation for GP565 or GP691 based platforms, will now require assignment of defined behavior to the flash programming pin to avoid a floating pin. [SW-3930] |
| gpHal | Stability issues with the ED scan on GP502 and GP712 were fixed. [SW-3950] |
| gpMacCore | Indirect TX will now not perform retries when attempting an acked transmission and keep the packet in queue in case of a failed TX attempt. [SW-3965] |
| gpBsp | The GP501 and GP711 BSP now set GPIO0..5 to float, previously buskeeper or pullups were in place. [SW-4025] |
| gpHal | Fix possible NULL dereference when calling *gpHal_EDRequest()* with an invalid channel mask. [SW-4028] |
| gpNvm | For GP565 and GP691, an assert was fixed in case where old page content was not deleted. The new code detects this scenario and correctly removes the old page. [SW-4073] |

### 3.41.2 New Features

**Components**

| | |
|---|---|
| halXap5 | Added *hal_InitRamRetention()* interface to optimize the ram retention settings at application level. [SW-3169] |
| gpRf4ceBindGdp | Made ZRC2.0 pairing procedure more robust against delays in the NVM access time. NVM access delays could cause an assert in *gpRf4ceBindGdp* during ZRC2.0 pairing. [SW-3616] |
| gpHal | Added a function for enabling/disabling external LNA. [SW-3849] |
| gpRf4ceVoice | Created the RF4CE voice profile. The voice profile is based on the generic *gpRf4ceBurst* profile. [SW-3935] |
| gpMac | Added Get/Set API for maxBE setting. [SW-4061] |
| gpCom | SYN protocol maximum length is extended to 4095 bytes data. [SW-4062] |

## 3.42 v2.4.6.0

### 3.42.1 Bug Fixes

**Components**

| | |
|---|---|
| gpClassification | Avoid false negatives in expected remote/userstring comparisons. [SW-3627] |
| gpHal | On GP502 and GP712 the minimal period for ED scan is 144 us.Software is forcing this in case a lower value is provided. [SW-3852] |
| gpHal | Fixed out-of-order processing of secured packets on GP500 [SW-3853] |
| gpTxMonitor | On GP565 and GP691, ignore requests for an unloaded voltage measurement while a previous measurement is still ongoing. [SW-3906] |
| gpMacCore | After the *gpMacCore_Reset()* call, the short address is now set to 0xFFFE (unallocated) iso 0xFFFF (broadcast). [SW-3916] |

gpHal Multichannel retries could stop when CCA failed on the current channel attempted. Now retries will continue, returning NoAck when none of the packets were acked. [SW-3997]

gpNvm Element Interface NVM implementation did not properly parse the LUT table describing the existing NVM map. This could cause the *Element Interface* to flag correct NVM data as being corrupt. [SW-4022]

### 3.42.2 New Features

**Components**

gpKeyScan *gpKeyScan_TriggberBlockingScan()* API removed. [SW-855]

gpPd Convenience functions *gpPd_AppendWithUpdate()*, *gpPd_PrependWithUpdate()*, *gpPd_ReadWithUpdate()* added. All write/read and update length and offset of a *gpPd_Loh_t* structure. [SW-3466]

gpHal Some HW polling loops could create infinite loops in case MSI access always fails. A timeout was added to all HW polling loops. Correct follow-up action is possible now. [SW-3558]

gpHal Enabled sleep modes other than RC mode for GP565 and GP691. [SW-3587]

gpZgp Security Frame Counter is now stored in NVM [SW-3644]

gpHal *gpHal_CheckMsi()* function added to check basic access by performing a read-out of a known register value. [SW-3822]

gpEncryption The 3rd parameter in *gpEncryption_AESEncrypt()* was ignored before. From this release on wards it is used to specify encryption options. Details of the *options* settings can be found in the *gpEncryption_API_Manual*). This extension may break backward compatibility as in the past the 2nd parameter *pAesKey* being NULL, specified hardening should be used for the encryption. To have the same behavior *options* should be *gpEncryption_Hardened* | *gpEncryption_KeyIdUnspecified*, the *pAesKey* can still be NULL as it will be ignored in this case. [SW-3854]

gpHal rfx2411: allow *GP_HAL_DIVERSITY_EXT_ANTENNA_SWITCH* to be disabled. [SW-3905]

gpHal *gpHal_SetRxChannel()* function was removed. A channel parameter was added to *gpHal_SetRxOnWhenIdle()* to provide the same functionality. [SW-3911]

gpNvm gpNvm_RW_OEM variant added. Variant allows integration of an OEM NVM implementation. Only 2 functions need to be implemented: *gpNvm_oem_Read/WriteBlock()*. [SW-3926]

gpHal *gpHal_Enable/DisableDutyCycling()* functions added to enable a periodic RX window. [SW-3946]

gpHal The 3rd parameter in *gpHal_AESEncrypt()* was ignored before. From this release on wards it is used to specify encryption options. The specifications of this *options* parameter are imported from *gpEncryption* details of the settings can be found in the *gpEncryption_API_Manual*). This extension may break backward compatibility as in the past the 2nd parameter *pAesKey* being NULL, specified hardening should be used for the encryption. To have the same behavior *options* should be *gpEncryption_Hardened* | *gpEncryption_KeyIdUnspecified*, the *pAesKey* can still be NULL as it will be ignored in this case. [SW-4030]

## 3.43 v2.4.5.0

### 3.43.1 Bug Fixes

**Components**

gpHal Limit the input power (max 3dBm) for designs with RfAxis 2411. [SW-3166]

gpIrTx Made sure the pressed sequence is only transmitted once on GP565 and GP691. [SW-3576]

gpHal Perform tx calibration for continuous wave (resolves no responding RfEval application for GP565 and GP691). [SW-3605]

gpCom Handling queue was not updated correctly when fetching a specific packet from the queue. [SW-3628]

gpMacCore Usage of an uninitialized buffer has been fixed (it could cause the frame pending bit not to be set during indirect transmission). [SW-3669]

gpRf4ceMsoVoice Fixed issue where a second voice request terminated the original session. [SW-3741]

gpRf4ceGdp20Voice Fixed issue where a second voice request terminated the original session. [SW-3742]

gpHal Corrected output power for GP565 and GP691 with FEM in closed loop mode [SW-3750]

gpHal On GP565 and GP691 the minimal period for ED scan is 144 us. Software is forcing this in case a lower value is provided. [SW-3643]

gpBsp Bug fixed in the BSP IO initialization. When the SIF pins are configured in a project, these are now initialized with a pull-up/pull-down to prevent floating pins when the SIF probe would not be connected to the chip. [SW-3665]

gpBsp Bug fixed in the LED macro's defined in the BSP's of GP691 and GP565 products. The maximum output can be max. 0xFF, so this value is now used. [SW-3673]

gpRf4ceGdp20Voice Use correct RX listening time and duration [SW-3809]

### 3.43.2 New Features

#### Components

gpPd The *gpPd_GetTxTimestamp()* function returned time in the chip time base. It will now return timing in the time base of the host. This is consistent with the *gpPd_GetRxTimestamp()* function. [SW-3471]

gpCom Ioctl support has been implemented. [SW-3554]

gpZgp Stub will handle duplicate MAC sequence numbers (in GPFS) and ZGP security frame counter checks. Incoming secured packets are dropped if the security frame counter is not higher then the one stored in the *gpZgp_StubTableEntry_t* . See A.3.6.1.3 of the GreenPower specification. [SW-3562]

gpRf4ceActionControl The application is now allowed to press or release keys with an invalid binding id. This avoids problems when the application needs to release a key, after the binding validation has failed and the binding id became invalid. [SW-3611]

gpRf4ceActionControl The transmission of Action Controls is now internally retried, if the lower layers are temporarily busy (e.g. with sending the *CheckValidationRequest*). [SW-3614]

gpZgp One can now specify an infinite lifetime for queued packets by issuing a lifetime of 0xFFFF [SW-3638]

gpHal New functions *gpHal_GetAbsoluteEvent()*, *gpHal_FreeAbsoluteEvent()* have been added to replace the static allocation of absolute event ids via the gpHal_ES.h headers. [SW-3647]

gpHal Added *gpHal_SetCoexMode()* API to enable slave co-existence interface on GP501 and GP711. [SW-3695]

gpRf4ceBound In case the reception of a 'start' frame for an action control is missed, the first 'repeat' frame is converted into a 'start' frame. [SW-3719]

gpNvm The Element Interface version of gpNvm could not be used without an initial NVM base lookup table. Functionality is now extended to support Element Interface only NVM's. [SW-3794]

halXap5 Support second UART interface for debug for GP565 and GP691. [SW-3584]

gpRf4ceBound The component now stores the link between *actionMapping* (defined by actionmapping server) and *mappableActions* (defined by the actionmapping client) in NVM, enabling the actionmapping server to reboot/reset between the push of the *mappableActions* and the pull of the *actionMappings*. The application on the actionmapping server still needs to restore the *actionMapping* data up on reboot. [SW-3709]

halStm32f4xx Option for active high leds added. [SW-3542]

gpRf4ce In case multi-channel retries are being performed, settings done through the functions *gpRf4ce_SetMaxFirstAttemptCSMABackoffs()* and *gpRf4ce_SetMaxFirstAttemptFrameRetries()*, will be applied after multi-channel retries have finished. [SW-3625]

gpRf4ceConfigurationZid Implement blackout time before configuration in profile layer. [SW-3648]

gpHal *gpHal_EDRequest()* now receives a *UInt16 channelMask* param instead of a *UInt8 channel* param. *gpHal_cbEDConfirm()* now receives a list of protoED values for all channels listed in the mask. [SW-3777]

gpTest *gpTest_SetCoexMode()* API to enable slave co-existence interface added for GP501 and GP711. [SW-3845]

## 3.44 v2.4.4.0

### 3.44.1 Bug Fixes

#### Components

gpRf4ceBindValidation The filtering on incoming packets is relaxed to allow coexistence with other RF4CE profiles. [SW-3565]

gpBsp PMUD registers added to SM restore for boards based on GP565 or GP691. [SW-3608]

gpRf4ceActionControl Action code releases now also work reliably when the *KeyRepeat* indications are enabled. [SW-3610]

gpRf4ceActionControl A corruption of the action code state variables was fixed. [SW-3559]

### 3.44.2 New Features

#### Components

halXap5 The gp0, gp1 and gp2 RAM areas have been optimized for GP565 and GP691. [SW-3532]

halXap5 Moved retention area to top of stack for GP565 and GP691. [SW-3533]

gpIrTx A new diversity *GP_DIVERSITY_GPHAL_REUSE_PBM_MEMORY* was introduced to allow the IrTx buffers to be collocated with the PBM area. [SW-3540]

gpHal Enabled sleep modes other than RC mode for GP565 and GP691. [SW-3587]

gpHal *gpHal_SetRxChannel()*, *gpHal_GetRxChannel()* and *gpHal_SetRXOnWhenIdle()* functions received an additional *gpHal_SourceIdentifier_t* parameter to facilitate multi-channel RX. [SW-2573]

gpRf4ceActionControl Enabled the *gpRf4ceActionControl* component to send atomic MSO keys using the same states as in ZRC2.0 (but with a different profile). [SW-3365]

## 3.45 v2.4.3.0

### 3.45.1 Bug Fixes

**Components**

| | |
|---|---|
| gpMacCore | Fixed timing issue in handling association response. [SW-3231] |
| gpRf4ce | Asserts added for an invalid pairingRef parameter in *gpRf4ce_IsLinkSecure()*, *gpRf4ce_SetPairingTableEntry()* and *gpRf4ce_GetPairingTableEntry()*. [SW-3385] |
| gpPoolMem | Added assert check on the return value of the *malloc()* call in the heap implementation of the *gpPoolMem* component. [SW-3386] |
| gpRf4ce | Fixed backward compatibility issue introduced in v2.2.1.0 on the serial interface of the *gpRf4ce_GetUserString()* call. [SW-3392] |
| gpRf4ceBindGdp | Fixed the NVM access for the backup pairing entry. [SW-3417] |
| gpMac | Fixed assert when *gpMacDispatcher_SetDefaultTransmitPowers()* was called if the radio chip was in sleep mode. [SW-3422] |
| gpRf4ceBound | Fixed the allocation of *actionMappings*. [SW-3437] |
| gpMacCore | Active scan confirm should return *gpMacCore_ResultNoBeacon* if no beacon was received. [SW-3478] |
| halXap5 | *HAL_UART_COM_POWERDOWN()/UP()* macro's updated for correct dis/enabling behavior of the UART interface. [SW-3363] |
| gpZrc | Corrected the *actionMapping* array length. [SW-3379] |

### 3.45.2 New Features

**Components**

| | |
|---|---|
| gpHal | Settings made by *gpHal_SetAntenna()* function are ignored in case *GP_HAL_DIVERSITY_SINGLE_ANTENNA* is specified. [SW-3243] |
| gpHal | Fine tuned the calculation of the RSSI and LQI values for GP565 and GP691. [SW-3253] |
| ucHal | Added function *hal_GoToBootloader()* to jump from user application to the bootloader for GP565 and GP691. [SW-3322] |
| gpRf4ceActionControl | Updated state machine for generating *ActionControl cbConfirm* messages. [SW-3367] |
| halXap5 | To reduce power consumption, GP565 an GP 691 will use RC mode when going to sleep. [SW-3369] |
| gpIrTx | Support for the ZRC based IR-description format is added. [SW-3395] |
| gpRf4ceActionControl | Added support for receiving multiple MSO/ZRC1.1 keys in short time without explicit release. [SW-3418] |
| gpNvm | Optimized RAM usage for the paged flash implementation of the *gpNvm* component. [SW-3472] |
| gpKeyScan | When no *CheckLowVoltageCallback* is registered with the *gpKeyScan_RegisterCheckLowVoltageCallback()* function on GP565 and GP691 chips, low voltage (<1.8) will be detected. [SW-3151] |
| hal | A callback ISR can be registered for the IR interrupt. This ISR will report the type of IR interrupt (start, repeat, end) as parameter. [SW-3359] |
| gpRf4ce | Implemented indirect transmission using MAC-polling. [SW-3445] |
| gpRf4ce | Reworked synchronous *gpRf4ce_DpiEnable()* interface to an asynchronous request confirm pair. [SW-3232] |

gpRf4ceActionControl Parameter consistency testing is only done when the number of actions is not zero. [SW-3364]

gpZrc Added new setter functions for *KeyRepeatWaitTime* on the recipient and *KeyRepeatInterval* on the originator. [SW-3382]

gpZrcRecipient Added callbacks to indicate the end of validation phase. [SW-3410]

gpMsoRecipient Added message(s) to allow sending unbind via *gpMsoRecipient*. [SW-3450]

gpRf4ce Depricated *gpRf4ce_SetInPowerSave()* got removed. [SW-3531]

## 3.46 v2.4.2.0

### 3.46.1 Bug Fixes

**Components**

gpBaseComps Made sure the *gpTxMonitor* is initialized before *gpFgtDut* is launched. [SW-3310]

gpHal Channel switching during radio activity (TX/RX) could fail on GP500, GP501 and GP711. Fixed by waiting for end of radio activity added before adjusting channel. [SW-3340]

gpRf4ceActionControl Fixed return value when retrieving *KeyRepeatWaitTime*. [SW-3360]

gpRf4ceBound Fixed the processing of ZRC2.0 and GDP capabilities which was causing the originator to skip the transmission of the *actionBanks*. [SW-3391]

gpRf4ceBindGdp Added missing call to *gpRf4ceKickOutLru* on the target side (in case a ZRC1.1 remote binds with it). [SW-3403]

gpCom Support for in order execution is extended for more than 8 RX buffers. [SW-3380]

### 3.46.2 New Features

**Components**

gpRf4ceGdp20Voice Introduced an GPD2.0 based RF4CE profile for voice transmisison. [SW-3237]

gpZrc The messages of the *gpZrc_cbRecipientBindingIndication()*, *gpZrc_cbRecipientBindingConfirm()* and *gpZrc_cbOriginatorBindConfirm()* callbacks are extended with a list of bound profile identifiers. [SW-3300]

gpSched *gpSched_GetRemainingTime()* and *gpSched_GetRemainingTimeArg()* functions added to get the remaining time before a scheduled event is executed. [SW-3404]

gpRf4ceBindValidation Added *gpKickoutLru* to *gpRf4ceBindValidation*. [SW-3306]

halLinux Implemented a monotonic clock as reference clock. This creates robustness against system time changes. [SW-3316]

gpRf4ceBindGdp The parameters of the *gpRf4ceBindGdp_cbInitiatorConfirm()*, *gpRf4ceBindGdp_cbRecipientConfirm()* and *gpRf4ceBindGdp_cbRecipientIndication()* calbacks are extended with a list of bound profile identifiers. [SW-3383]

gpZrcRecipient The parameters of the *gpZrcRecipient_cbBindingConfirm()* and *gpZrcRecipient_cbBindingIndication()* calbacks are extended with a list of bound profile identifiers. [SW-3384]

**Applications**

- New components *gpMsoRecipient*, *gpValidation* and *gpClassification* were introduced to enable a combined MSO and ZRC2.0 recipient. [SW-3225]

## 3.47 v2.4.1.0

### 3.47.1 Bug Fixes

**Components**

halXap5 Fixed the incomplete restoring of registers when using the default SM restore file. [SW-3197]

gpZrc Made the API consistent in usage of *request-confirm* pairs. [SW-3238]

gpRf4ceCmd Fixed reporting of multiple sets of action codes. [SW-3260]

gphal Reworked flash sector erase so it takes remapped pages into account. [SW-3288]

gpRf4ceActionControl Fixed issue with dynamic memory management. [SW-3298]

gpCom Received packets are now handled in the order that they are received. Out of order execution could occur during long handling phases. [SW-2787]

### 3.47.2 New Features

**Components**

gpZrc Enabled target to target communication. [SW-2853]

gpFa *gpFa_PostponeActivity()* is added to delay any activity of the FA. When multiple *postpone* requests are made while the previous delay is still pending, the longest pending delay is pursued. [SW-3060]

gpRf4ceDispatcher Radio sleep/wakeup functions are removed. The *gpHal* layer maintains radio sleep/wake state where necessary. [SW-3194]

gpRf4ce As data buffers are modelled with *gpPd* object which are cyclic by design, the constant GP_RF4CE_MIN_PBM_PAYLOAD_OFFSET got obsoleted. It was removed. [SW-3257]

gpZrc : Made general program memory optimizations. [SW-3265]

gpHal Update made to the ADC measurement algorithm to take calibration value into account. [SW-3317]

## 3.48 v2.4.0.0

### 3.48.1 Bug Fixes

**Components**

gpHal RfAxis default PA gain changed to 24 dBm. [SW-2793]

gpKeyScan Fixed the incorrect triggering the external interrupt for key scanning and removed potential invalid clear of external interrupt event. [SW-2973]

gpMac Fixed unexpected *gpMacCore_DataConfirm()* when empty frame could not be send. [SW-3156]

gpRf4ce Made sure FA algorithm is started properly after an active scan. [SW-3181]

gpRf4ceRib The payload of a RIB response now has a variable length depending on the size of the requested attribute. [SW-3205]

gpZgp ZGP device now correctly separates between applications on top of it based on source ID or endpoint (when in IEEE addressing mode). [SW-3030]

gpZgp ZGP device interface functions now return a status, indicating whether an operation was successful or not. [SW-3002]

#### Platforms

gpMac Removed erroneous obligation to define the indirect tx queue. [SW-3078]

### 3.48.2 New Features

#### Components

gpRxArbitter Introduced single stack variant to save code space. [SW-2789]

gpPd The *ram* variant of the *gpPd* component is now based on *gpPoolMem* buffers. [SW-2878]

gpRxArbiter Notifications sent to correct communication channel based on the *stackId* supplied in the *gpRxArbiter_ResetStack()* function. [SW-2968]

gpHal Extended the mechanism to allow compatibility of older firmware on newer silicon. [SW-3083]

gpMac Different scan type functions are now conditionally compiled in to save code space. [SW-3095]

gpNvm Added power failure and wear-leveling to paged flash implementation of *gpNvm* component. [SW-3101]

halXap5 Added new IR modes (pattern-based, register-based). [SW-3102]

gpHal Implemented follow-up actions when a GP565 or a GP691 triggers a low battery event. [SW-3119]

gpRf4ceDispatcher Moved *Rf4ceDispatcherTable* to the *gpRf4ceDispatcher* component as a code cleanup. [SW-3129]

gpZrc Support for ZRC2.0 is added. [SW-3209]

gpHal Added support for external PA/LNA for GP565 and GP691. [SW-3135]

gpHal Enabled TWI master for GP565 and GP691. [SW-3207]

## 3.49 v2.3.0.0

### 3.49.1 Bug Fixes

#### Components

gpZgp Ensured the width and opening time of the ZGP device listen period is according to the latest changes to the GreenPower specification. [SW-2612]

gpRf4ce Converted the asynchronous *gpRf4ce_DpiEnableRequest() gpRf4ce_cbDpiEnableConfirm()* pair into *gpRf4ce_DpiEnable()* with the status as return value. [SW-2856]

gpMac The ED scan confirm in the MAC layer now takes the status of *gpHal_EDRequest()* into account. This allows the *gpFa* component to check the status of a requested ED scan and to avoid the FA algorithm is disabled forever. [SW-2934]

gpZgp Ensured Read Attributes commands will not reply with attribute value if a failure acquiring the value has occurred. Corrected the type of the attributes of the relative humidity cluster. [SW-3003]

gpZgp Implemented change to GreenPower specification mandating that when sending a frame with auto commissioning enabled, the listen window of the device cannot be used. [SW-3012]

gpHal Directly apply default transmit power settings at startup or change. [SW-3092]

### 3.49.2 New Features

**Components**

gpPoolMem Added a dynamic memory allocation flavor. This flavor uses the stdlib *malloc() / free()* functions instead of a preallocated of set memory pools. It can only be used on platforms supporting this stdlib functionality. [SW-1909]

gpFa Distributed enable control of the FA algorithm was added. The *gpFa_SetMode()* is extended with a *componentId* parameter. The *gpFa_GetMode()* function is removed. All components which ever call *gpFa_SetMode()* with their corresponding *componentId* are implicitly registered in the *gpFa* component. If one of the components calls *gpFa_SetMode()* the with *gpFa_ModeDisabled*, the FA algorithm will be disabled. So all implicitly registered components need to call the functions with *gpFa_ModeEnabled* to enable the FA algorithm. [SW-2981]

gpHal Support for GP565 and GP691 was added. [SW-3091]

gpRf4ceRib Added functions to query local RIB attributes. [SW-2991]

gpReset Added *gpReset_WatchDogReset()* to trigger reset by watchdog timeout. [SW-3016]

## 3.50 v2.2.1.0

### 3.50.1 Bug Fixes

**Components**

gpHal Fixed wrong initialization of the external antenna at start-up for gp501/gp711 platforms with external PA/LNA. [SW-2975]

gpTest Changing the transmit power will also affect the transmit power of the acknowledge packages. [SW-2987]

### 3.50.2 New Features

**Components**

gpFa Added multi-stack frequency agility support. [SW-2966]

gpRxArbiter Added multi-stack frequency agility support. [SW-2976]

## 3.51 v2.2.0.0

### 3.51.1 Bug Fixes

**Components**

gpMacCore Unregistration of one stack will no longer affect running requests of another stack. [SW-2565]

gpPd Fixed potential wrong RSSI and LQI values when using the *PBM* flavor of an *gpPd* object on a platform with an LNA. [SW-2611]

halStm32f4xx Fixed corruption of the STM32 EEprom emulation driver. [SW-2716]

- Enable GP710 DPI and RF4CE duty-cycling combination. [SW-2754]

gpHal Fixed incorrect PBM option during scanning. [SW-2804]

gpHal Added channel and transmit power to the *gpHal_SetContinuousWaveMode(...)* api. [SW-2859]

gpDpi Fixed a bug in the *gpDpi* component that could exhaust the available PBMs. [SW-2936]

gpHal Fixed assert in *gpHal* for GP501 and GP711 on fast embedded platforms. [SW-2947]

gpBsp GP501 and GP711 GPIO settings updated to meet datasheet specifications. [SW-2860]

### 3.51.2 New Features

**Components**

gpMac Optimizations made in the init and reset flows. [SW-2529]

gpHal Obsoleted *gpHal_GetFP()* function is deleted. [SW-2777]

gpMac The amount of performed SPI accesses (during transmission and reception of RF packets and during CCM encryption or decryption) is optimized to increase speed. [SW-2813]

- Type definitions of base types *UIntX* are now using ANSI C typedefs *uintX_t* instead of *char/short/long* types. [SW-2824]

gpMac The functionality of the *gpNwkMacDataTx* component is incorporated in the *gpMacCore* and *gpMacDispatcher* components as a speed optimization. This implies the *gpNwkDataTx* component got obsoleted. [SW-2876]

gpRf4ceRib Component now uses dynamic callback system. [SW-2917]

gpHal Added PWM support. [SW-2718]

gpRace Added authentication for GP565. [SW-2724]

gpFa Improved the FA algorithm for beter robustness in collocated WIFI environments. [SW-2746]

gpHal The default transmit power is used to send acknowledge packages when the radio is in listening mode. The *gpHal_SetDefaultTransmitPowers(...)* function is introduced to configure this default transmit power for each channel. This function should be accessed by calling *gpMacDispatcher_SetDefaultTransmitPowers(...)*. To transmit data packages, the transmit power of the corresponding *gpPad* object will be used. The value of this transmit power is specified by *gpMacDispatcher_SetTransmitPower(...)* function. [SW-2775]

gpRf4ceBindAuto The buffers pointed by the *pOrgInfo* parameter in the *gpRf4ceBindAuto_OriginatorBindRequest()* and the *pRecDiscParams* parameter in the *gpRf4ceBindAuto_RecipientBindRequest()* , no longer need to be statically allocated. [SW-2949]

gpRf4ceRib The buffers pointed by the *pRibData* parameter in the *gpRf4ceRib_GetRibRequest()* and *gpRf4ceRib_SetRibRequest()* , not longer need to be statically allocated. [SW-2950]

gpRf4ceBindGdp The buffers pointed by the *pOrgInfo* parameter in *gpRf4ceBindGdp_OriginatorRequest()* and in *gpRf4ceBindGdpo_bindingProxyInitiatorRequest()* , no longer need to be statically allocated. [SW-2951]

gpMacDispatcher Loss of a socket connection to a registered client in the server wrapper will trigger automatic unregistration of that stack. Loss of a socket connection to the server in a client wrapper will automatically trigger the driver's *reset-indication* callbacks. [SW-2953]

## 3.52 v2.1.1.0

### 3.52.1 Bug Fixes

**Components**

gpMacCore Miscellaneous updates and improvements in MAC related components. [SW-2349]

gpRf4ceBindValidation Fixed multi-profile handling. [SW-2358]

gpHal Disabled unneeded interrupts when using synchronous encryption. [SW-2360]

gpRf4ceBindValidation Fixed bug in watchdog implementation. [SW-2379]

gpMacCore Use RSSI based LQI value in the pan descriptor of received beacons. [SW-2544]

gpIrTx The API of the *gpIrTx* component expects now IRDB records with structure revision 1. In comparison with structure revision 0, this format omits 2 redundant bytes in the header. Details can be found in the *GP_P215_AS_03407_Generic_IRDB_structure.pdf* specification document rev 0.10. [SW-2569]

### 3.52.2 New Features

#### Components

gpHal The *gpHal_ResendRequest()* function was removed. The resend functionality is made available in the normal *gpHal_DataRequest()* API. [SW-1704]

gpRf4ce RF4CE deep packet inspection implemented. This feature allows the target to go to standby mode while the Greenpeak radio will block all incoming packets except the predefined RF4CE packets to wake up the target. [SW-2269]

gpPad *gpPad* was introduced to bundle all Tx related options. A handle can be claimed and freed to store and re-use the Tx options. [SW-2330]

gpNwkDataTx Miscellaneous code optimizations were implemented to increase the performance of the component and to decrease the required code size. [SW-2396]

gpMacDispatcher Improved the stack registration mechanism. This implies added support for run time registration of stacks and extending the ıtgpMacDispatcher_RegisterNetworkStack() method with an *char* stackIdentifier* argument to make the re-registration of same stack possible. [SW-2397]

gpUim Added support for *JadeLogger* in *gpUim* component. [SW-2401]

gpDataPending To increase code efficiency, the API of *gpDataPending_QueueAdd()* and *gpDataPending_QueueRemove()* got extened with a *stackId* argument. The *gpDataPending_QueueRemove()* method now also returns a status. [SW-2428]

gpNwkMacDataTx Added support for multiple indirect data requests. [SW-2429]

gpMacCore The software queue feature in the *gpMacCore* component is no longer supported. [SW-2522]

gpDta The weighting algorithm is updated. An empty pairing table is no longer a factor in the algorithm. Matching device id's can be specified with a weight per device. [SW-2540]

gpAssert Splittted reporting and action behavior of asserts. [SW-2388]

gpRf4ceBindValidation At the controller side, the *gpRf4ceBindValidation_ValidationRequest()* call was added to enable the possibility to skip the discovery and pair phase and start immediately with validation. For targets, the *gpRf4ceBindValidation_SetValidatedEntry()* call was added to allow precommissioned validation based on a pairing table entry. [SW-2387]

gpTxMonitor FEM power control loop implement to have stable output power on different supply voltage levels. [SW-2433]

gpReset A watchdog timeout will also be reported, if the uC has the information available. [SW-2504]

#### Applications

- Added preliminary support for multi-executable variants of mac layer and network applications. [SW-2162]

## 3.53 v2.1.0.0

### 3.53.1 Bug Fixes

#### Components

gpHal The timestamp specified in the data confirm callback of the *gpHal* for GP500, was wrongly fetched from the radio chip. The correct TX-timestamp is now used. *REMARK:* Depending on the used HW platform, TX-timestamps for packets smaller then 16 bytes can have an inaccuracy of 1ms. [SW-1861]

gpNvm *gpNvm_CheckConsistency()* will set the NVM to the default state using *gpNvm_ClearNvm()* if inconsistency is detected. This forces the NVM in a stable recoverable state. [SW-1984]

gpTxMonitor The power detector measurement in *gpTxMonitor* gave wrong values for one specific packet length. Additional conditions are added to the algorithm to drop these incorrect measurements. [SW-2308]

gpNvm The *ElemIf* flavor of the *gpNvm* got extended with a consistency check on CRC calculated on the initial NVM elements structure. [SW-2354]

gpHal Increased accuracy of RSSI measurements on battery powered devices. [SW-2193]

#### Applications

Mac General stabilization updates have been made to components like *gpMacCore*, *gpMacDispatcher* and *gpDataPending*. Especially areas like association, indirect transmission and multi-stack support were modified. [SW-2353]

### 3.53.2 New Features

#### Components

gpRxArbitter Introduced new component *gpRxArbitter* as a central place in software which controls the status of the listening mode of the radio. This implies on which channel the radio should listen. [SW-1968]

gpEncryption Introduced *gpEncryption* as abstracted API for en/decryption to avoid direct calls to *gpHal*. [SW-2087]

gpMacDispatcher The *gpMacDispatcher* component now supports single executable multi-stack applications. [SW-2351]

gpIrTx IR transmission is now supported. [SW-2352]

gpHal Extended support for a wide range of external AntennaSwitch/PA/LNA/FEM modules. [SW-2086]

gpIrTx Cisco IR protocol timings updated with minor adjustments to support Matsushita specification. [SW-2206]

#### Applications

Sleep In 1.5.x.x. releases the sleep behavior was handled at application or high stack layer level. This explicit sleep mechanism as been replaced by an implicit mechanism. The radio chip is now by default in sleep mode. When required the lower level layers like *gpHal*, *gpPd* and *gpRxArbitter* will automatically wake up the radio chip. [SW-2247]

## 3.54 v2.0.0.0

### 3.54.1 New Features

The enhanced GP SW stack pushes the exising *gpPd* object used in APIs on the network level of 1.5.x.x releases down to the gphal level. This allows:

- more flexibility in the sw stack.
- matching API types which avoid memcpy actions.
- a broader range of radio chips to be supported.

As the *gpPd* object is introduced through the complete stack, lots of API's are changed. This implies that release is not compatible with older releases from an API point of view. From an RF point of view, the release is compatible with devices running SW build from older SW releases.

# Chapter 4

# Components Overview

This chapter gives an overview of the key components in the software stack.

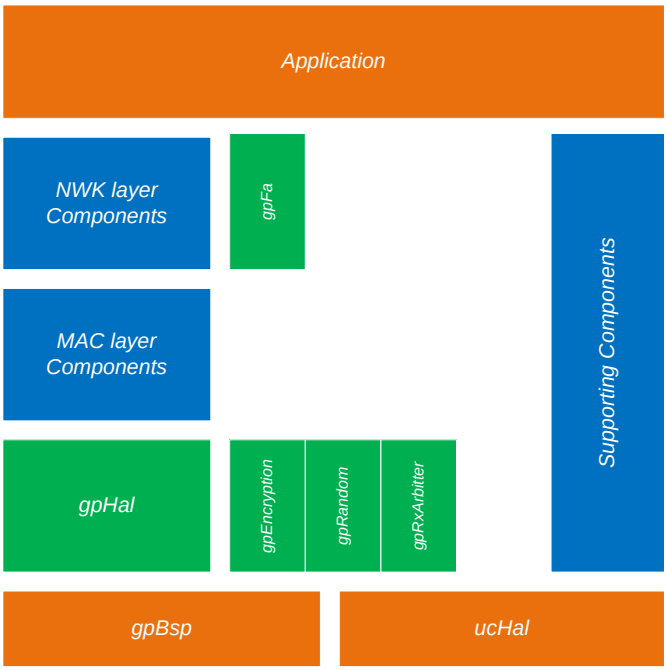


Figure 4.1: Component Overview

Figure 4 gives a brief overview of the components of the Qorvo LPS SW stack

- green: These blocks in the diagram refer to individual components provide by Qorvo
- blue: These blocks in the diagram refer groups of components
  - The *Supporting Components* refer to components like *gpSched*, *gpNvm*, *gpAssert*, *gpReset*, ... which fulfil specific generic features on which other components can relay.
  - The *MAC layer Components* combine all components implementing the *IEEE 802.15.4* specification. The user level interface to the *MAC layer Components* is build on top of the *gpMacDispatcher* component. Details on this API can be found in *gpMacDispatcher_API_Manual.pdf*.

  - The *NWK layer Components* combine all components implementing the network layer of a specific stack. An example of such a network stack is RF4CE as described in *Zigbee RF4CE Specification*. Details on the RF4CE spec and its profile implementations can be found in the corresponding *gpRf4ce_xxxxx* components.

- orange: These blocks in the diagram refer to customer and/or platform specific components like *gpBsp* and *ucHal* and the *Application* itself.