s132_nrf52 release notes

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Introduction to the s132_nrf52 release notes

These release notes describe the changes in the s132_nrf52 from version to version.

The release notes are intended to list all relevant changes in a given version. They are kept brief, to make it easy to get the overview. More details regarding changes and new features may be found in the s132_nrf52 migration document (normally available for major releases only).

Issue numbers in parentheses are for internal use, and should be disregarded by the customer.

s132_nrf52_2.0.0-7.alpha

This release adds features and fixes going towards the production v2.0.0 release.

Notes:

- This release has changed the Application Programmer Interface (API), requiring applications to be recompiled.
- This SoftDevice version is compatible **only** with the latest nRF52 IC revision (Engineering B).

SoftDevice properties

- An updated SoftDevice Specification document is not available for this alpha release.
- This version of the SoftDevice contains the Master Boot Record (MBR) version 2.0.0-1.alpha.
- The combined MBR and SoftDevice memory requirements for this version are as follows:
  - Flash: **108 kB** (`0x1B000` bytes). This number is subject to change before the production release.
  - RAM: **4.5 kB** (`0x1230` bytes) (minimum required memory - actual requirements are dependent upon the configuration chosen at `sd_ble_enable()` time).

New functionality

- SoftDevice
  - The `sd_ecb_block_encrypt()` SV call now puts the CPU to sleep while waiting for the encryption to complete. In addition, a new SV call, `sd_ecb_blocks_encrypt()`, has been added to perform multiple block encryptions in a single call (DRGN-6359).
- BLE
  - A new `BLE_COMMON_OPT_PA_LNA` option supports enable/disable switching of external Power Amplifiers and Low Noise Amplifiers using GPIO pins (DRGN-6478).
- GATTS
  - Write Commands (Write Without Response) are now subject to attribute authorization. The incoming data will not be written into the Attribute Table, requiring the application to do so itself by using `sd_ble_gatts_value_set()` (DRGN-2460).

Changes

- SoftDevice
  - A new MBR (2.0.0-1) is included with this release. The size has been reduced to 4KB in code memory (DRGN-6134, DRGN-6609, DRGN-5436). In order to issue the `SD_MBR_COMMAND_COPY_BL` and `SD_MBR_COMMAND_VECTOR_TABLE_BASE_SET` commands to the bootloader `UICR.NRFFW[1]` must be set to an address corresponding to a page in the application flash space. This page will be cleared by the MBR and used to store parameters before reset. When the `UICR.NRFFW[1]` field is set the page it refers to should not be used by the application. If the `UICR.NRFFW[1]` is set to `0xFFFFFFFF` (the default) all MBR commands will return `NRF_ERROR_NO_MEM` and DFU will be unavailable.
  - The CPU Cache is now turned on when enabling the SoftDevice (DRGN-6479).
  - SoftDevice assert handling has been completely overhauled. The application now provides a pointer to the new `nrf_fault_handler_t` callback type that handles all types of unrecoverable errors. The file name and line number parameters to this callback have been replaced by parameters including the program counter of the instruction that triggered the error (DRGN-6587).
  - The SV call handler has been optimized to reduce overhead when invoking SV calls from the application (DRGN-6692).
- BLE
  - The documentation for the `sd_ble_uuid_vs_add()` SV call has been extended and corrected (DRGN-6169).
- GAP
  - The `sd_ble_gap_tx_power_set()` SV call no longer accepts a -30dBm setting, the minimum now being -40dBm (DRGN-2702).

Bug fixes

- SoftDevice
  - The whole of the RAM is no longer configured not to go into low-power mode when entering either CPU idle (WFE, WFI) or SYSTEM OFF (DRGN-6635).
  - The DebugMonitor interrupts are now correctly forwarded by the MBR (DRGN-6242).

- Fixed an issue where the application did not return from a call to `sd_ble_app_evt_wait()` when waking up from IRQ numbers above 31 (DRGN-6205).
  - Pointers addressing the Code RAM section are now permitted as parameters to the SoftDevice (DRGN-6535).
- BLE
  - The `p_app_ram_base` pointer passed to `sd_ble_enable()` is now NULL-checked (DRGN-6719).
  - Specifying a total connection count of 0 (0 peripheral connections and 0 central connections) in `sd_ble_enable()` no longer leads to a SoftDevice assert (DRGN-6613).
- GAP
  - Fixed an issue which could cause peers to reject or drop connection parameter update requests sent by the local device if the signalling identifier was set to 0x00 (invalid value) (DRGN-6354).
- GATTS
  - The pointer checking for the system attribute access functions has been corrected. The `sd_ble_gatts_sys_attr_get()` SV call now only allows pointers to RAM and the `sd_ble_gatts_sys_attr_set()` SV call now allows pointers to both RAM and Flash memory (DRGN-6532).

Limitations

- SoftDevice
  - If Radio Notifications are enabled, flash write and flash erase operations initiated through the SoftDevice API will be notified to the application as Radio Events (FORT-809).
  - Synthesized low frequency clock source is not tested or intended for use with BLE stack.
- BLE
  - Only the bandwidth configurations `BLE_CONN_BW_MID` for connections as a central and `BLE_CONN_BW_HIGH` for connections as a peripheral are currently allowed (DRGN-6371).
- LL
  - The peripheral role has priority over the central role when it comes to keeping the links alive.
- GAP
  - The maximum amount of concurrent connections is limited to 8, with an additional broadcaster **or** scanner active. (DRGN-6543).
- GATTS
  - To conform to the Bluetooth specification there shall not be a secondary service that is not referenced somehow by a primary service. The SoftDevice does not enforce this (DRGN-906, DRGN-2260).

Known Issues

- SoftDevice
  - The SoftDevice does not use optimal Radio configuration values for the current chip version that results in a loss of 3dB of RX sensitivity. This limitation will not be present in the S132 Production version (DRGN-6000).
  - Temperature based calibration of the RC low frequency clock source does not work. (DRGN-5429).
  - Due to nRF52832 Errata-73, the SoftDevice leaves TIMER0 running at all times which results in 5uA increased average current between BLE events (DRGN-6647).

s132_nrf52_2.0.0-4.alpha

This release changes the major version number from 1 to 2, compared to the previous alpha (1.0.0-3). This is done just to align the major number with the one of the s130 SoftDevice, as these are functionally very similar.

The main features of this release, compared to the 1.0.0-3.alpha version, are the ability to set the number, role and bandwidth of connections when initializing the BLE stack.

Notes:

- This is a major release which has changed the Application Programmer Interface (API), requiring applications to be recompiled.

SoftDevice properties

- An updated SoftDevice Specification document is not available for this alpha release.
- This version of the SoftDevice contains the Master Boot Record (MBR) version 1.1.0-2.alpha.
- The combined MBR and SoftDevice memory requirements for this version are as follows:
  - Flash: **124 kB** (`0x1F000` bytes).
  - RAM: **4.6 kB** (`0x1268` bytes) (minimum required memory - actual requirements are dependent upon the configuration chosen at `sd_ble_enable()` time).

New functionality

- BLE
  - The application can now configure the number of connections and their roles when initializing the BLE stack (DRGN-4669). A range of 0 to 8 connections can be specified, one of which may be of the peripheral role type.
  - The application can now configure the bandwidth requirements of connections when initializing the BLE stack (DRGN-4670).
    Bandwidth configuration is optional. By default, the BLE stack will assign typical bandwidth settings to all connections depending on their role. See the Limitations section for additional information.
  - The application can now configure the number of vendor specific UUIDs when initializing the BLE stack (DRGN-6257). UUID count configuration is optional. By default, the BLE stack will reserve memory for 10 UUIDs .
- GATTS
  - A new SV call, `sd_ble_gatts_attr_get()`, has been added to allow retrieval of a local attribute's UUID and metadata (DRGN-6203).
  - A new SV call, `sd_ble_gatts_initial_user_handle_get()`, has been added to allow retrieval of the first valid user attribute handle in the Attribute Table (DRGN-5152).
- GATTC
  - A new SV call, `sd_ble_gattc_attr_info_discover()`, has been added to allow retrieval of remote attribute information including full 128-bit UUIDs (DRGN-6195).

Changes

- BLE
  - The public API header files now require C99 compiler support. In particular, flexible array members must be supported to correctly parse array definitions in the SoftDevice header files (DRGN-4662).
  - The documentation has been revamped and improved with additional links between functions, events and MSCs (DRGN-6366).
  - The doxygen documentation for `ble_gap_adv_params_t` and `ble_gap_adv_ch_mask_t` has been corrected (DRGN-6363).
  - The doxygen documentation for `ble_evt_hdr_t` has been corrected (DRGN-6016).
  - `sd_ble_tx_buffer_count_get()` and `BLE_ERROR_NO_TX_BUFFERS` have been renamed to `sd_ble_tx_packet_count_get()` and `BLE_ERROR_NO_TX_PACKETS`, respectively (DRGN-4670).
    In addition, `sd_ble_tx_packet_count_get()` has been updated to take a connection handle as an input parameter and to return the total number of available guaranteed application transmission packets for a particular connection.
- GAP
  - Distribution of the identity keys (`ble_gap_id_key_t`) has been aligned with the rest of the keys and no longer constitutes an exception (DRGN-6279).
  - The default device name has been changed from "nRF51822" to "nRF5x" (DRGN-6262).
  - The documentation for `sd_ble_gap_adv_data_set()` has been corrected (DRGN-5396).
- GATTS
  - The default Attribute Table size has been reduced to `0x580` bytes. (DRGN-5797)
  - The SoftDevice now allows an application to reply with the `BLE_GATT_STATUS_ATTERR_INVALID_OFFSET` and the `BLE_GATT_STATUS_ATTERR_PREPARE_QUEUE_FULL` error codes as a response to an app-handled queued write request (DRGN-5994, DRGN-6187).
  - The format used for the system attribute data is now publicly documented for application developers (DRGN-5689).
  - The documentation for `sd_ble_gatts_service_changed()` has been corrected (DRGN-6202).
- GATTC
  - The documentation for `sd_ble_gattc_read()` has been corrected (DRGN-5728).

Bug fixes

- SoftDevice
  - Fixed a problem which prevented application from enabling the Floating-Point Unit (FPU) when running from the Process Stack Pointer (PSP) (DRGN-6556).
- GAP
  - Fixed a memory leak that could appear when authenticating with invalid security parameters and could prevent further authentication attempts from taking place (DRGN-6227).
- GATTS
  - The SoftDevice will now generate an `BLE_GATTS_EVT_RW_AUTHORIZE_REQUEST` event with opcode `BLE_GATTS_OP_EXEC_WRITE_REQ_CANCEL` upon receiving an execute write request that cancels all prepared writes (DRGN-6022, DRGN-6186, NRFFOETT-1048).

Limitations

- SoftDevice
  - If Radio Notifications are enabled, flash write and flash erase operations initiated through the SoftDevice API will be notified to the application as Radio Events (FORT-809).
  - Synthesized low frequency clock source is not tested or intended for use with BLE stack.
- BLE
  - Only the bandwidth configurations `BLE_CONN_BW_MID` for connections as a central and `BLE_CONN_BW_HIGH` for connections as a peripheral are currently allowed (DRGN-6371).
- LL
  - The peripheral role has priority over the central role when it comes to keeping the links alive.
- GAP
  - The maximum amount of concurrent connections is limited to 8, with an additional broadcaster **or** scanner active. (DRGN-6543).
- GATTS
  - To conform to the Bluetooth specification there shall not be a secondary service that is not referenced somehow by a primary service. The SoftDevice does not enforce this (DRGN-906, DRGN-2260).

Known Issues

- SoftDevice
  - Due to nRF52832 Errata-16, the whole of the RAM is configured not to go into low-power mode when entering either CPU idle (WFE, WFI) or SYSTEM OFF, which will result in higher power consumption than documented (FTPAN-16). This workaround will be removed for the S132 Production version as Errata-16 is no longer present in the current chip version.
  - When using the SoftDevice on nRF52832 revision Engineering B (current chip version) the device will not be able to wake up from SYSTEM OFF. The application therefore needs to avoid using SYSTEM OFF altogether (DRGN-6635).
  - The SoftDevice does not use optimal Radio configuration values for the current chip version that results in a loss of 3dB of RX sensitivity. This limitation will not be present in the S132 Production version (DRGN-6000).
  - Temperature based calibration of the RC low frequency clock source does not work. (DRGN-5429).
- GAP
  - Specifying a total connection count of 0 (0 peripheral connections and 0 central connections) in `sd_ble_enable()` leads to a SoftDevice assert (DRGN-6613).

s132_nrf52_1.0.0-3.alpha

The s132 SoftDevice for the nRF52 platform is based upon Nordic Semiconductor's s130 SoftDevice for the nRF51 platform, which in turn is based upon Nordic Semiconductor's S110 and S120 SoftDevices, extended to support concurrent LL (master and slave) and GAP (central and peripheral) roles.

This release contains several bug fixes and an updated license agreement.

New functionality

There is no new functionality in this release.

Changes

- Added the s132 SoftDevice to the license agreement (DRGN-5948).

Bug fixes

- SoftDevice
    - Fixed an issue where passing pointers to code memory above 256 kB as parameters to SoftDevice API calls would lead to an error being returned (DRGN-5834).
    - Temperature based calibration of the RC low frequency clock is now verified to work as expected (DRGN-5429).
    - Fixed an issue where the chip would not wake up via GPIO after calling SYSTEMOFF (DRGN-6001).
    - Fixed an issue where writing to the flash could cause the SoftDevice to not send packets to the peer or deliver events to the application (DRGN-5993).

Limitations

- MBR
    - The MBR in this release uses 12 kB of flash, meaning that the SoftDevice start address is 0x3000 and the SoftDevice info structure address is 0x5000. This is subject to change in future releases (DRGN-5436).
- SoftDevice
    - If Radio Notifications are enabled, flash write and flash erase operations initiated through the SoftDevice API will be notified to the application as Radio Events (DRGN-5197).
    - Synthesized low frequency clock source is not tested or intended for use with BLE stack.
- LL
    - The peripheral role has priority over the central role when it comes to keeping the links alive.
- GATTS
    - To conform to the Bluetooth specification there shall not be a secondary service that is not referenced somehow by a primary service. The SoftDevice does not enforce this (DRGN-906, DRGN-2260).

Known Issues

There are no known issues in this release.

s132_nrf52_1.0.0-2.alpha

The s132 SoftDevice for the nRF52 platform is based upon Nordic Semiconductor's s130 SoftDevice for the nRF51 platform, which in turn is based upon Nordic Semiconductor's S110 and S120 SoftDevices, extended to support concurrent LL (master and slave) and GAP (central and peripheral) roles. The s132_nrf52_1.0.0-2.alpha is the first alpha release of s132, and these release notes list the changes and differences from s130_nrf51_1.0.0.

Notes:

- This is a major release which has changed the Application Programmer Interface (API) from the s130 for nRF51, requiring applications to be recompiled.

SoftDevice properties

- There is no SoftDevice Specification corresponding to this release, but the S130 SoftDevice Specification version 1.0 should be applicable in large parts.
- This version of the SoftDevice contains the Master Boot Record (MBR) version 1.1.0.
- The combined MBR and SoftDevice memory requirements for this version are as follows:
    - Flash: **124 kB** (`0x1F000` bytes).
    - RAM: **10 kB** (`0x2800` bytes) (default value - dependent upon configured size of the GATT Server Attribute Table).

New functionality

Since this is the first release of this SoftDevice, this section is not applicable.

Changes

- API changes from **s130_nrf51_1.0.0**:
    - New event: `NRF_EVT_FLASH_OPERATION_VERIFY_FAILED`, only available on nRF52.
    - `sd_flash_protect()` has been changed to be compatible both with nRF52 and with future nRF51 releases.
    - Platform-specific declarations, definitions and macros split out and placed in subfolders with the platform name (e.g. 'nrf52').
- Call stack usage increased from s130_nrf51_1.0.0: The application should reserve 2 kB of stack space for the SoftDevice.

Bug fixes

There are no bug fixes in this release.

Limitations

- MBR
    - The MBR in this release uses 12 kB of flash, meaning that the SoftDevice start address is 0x3000 and the SoftDevice info structure address is 0x5000. This is subject to change in future releases (DRGN-5436).
- SoftDevice
    - If Radio Notifications are enabled, flash write and flash erase operations initiated through the SoftDevice API will be notified to the application as Radio Events (DRGN-5197).
    - Synthesized low frequency clock source is not tested or intended for use with BLE stack.
- LL
    - The peripheral role has priority over the central role when it comes to keeping the links alive.
- GATTS
    - To conform to the Bluetooth specification there shall not be a secondary service that is not referenced somehow by a primary service. The SoftDevice does not enforce this (DRGN-906, DRGN-2260).

Known Issues

- SoftDevice
    - Temperature based calibration of the RC low frequency clock source does not work. (DRGN-5429)