s130_nrf51 release notes

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Introduction to the s130_nrf51 release notes

These release notes describe the changes in the s130_nrf51 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 s130_nrf51 migration document (normally available for major releases only).

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

s130_nrf51_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 with the latest nRF51 IC revision (revision 3). It is **not compatible with nRF51 IC revision 1**. Users of the SoftDevice **must verify the compatibility of their SoftDevice/IC combination** for development and for production. Compatibility information is found in the nRF51 Series Compatibility Matrix, which can be accessed at infocenter.nordicsemi.com.

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 1.0.2.
- 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).
- 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
  - 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 -40dBm setting, the minimum now being -30dBm (DRGN-2702).

Bug fixes

- 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.
  - On nRF51 series IC revision 2 and earlier, DC/DC converter operation controlled by the SoftDevice may interfere with radio function. As a result on any IC revision 2 and earlier, the DC/DC mode must not be set by the application to anything different than `NRF_POWER_DCDC_DISABLE` (DRGN-2420).
- 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.
- 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

- GAP
  - The number of connections is limited to 6 in this release. Connection establishment beyond 6 connections will fail with a timeout (DRGN-6638)

s130_nrf51_2.0.0-4.alpha

The main features of this release, compared to the 1.0.0 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.
- This SoftDevice version is compatible with the latest nRF51 IC revision (revision 3). It is **not compatible with nRF51 IC revision 1**. Users of the SoftDevice **must verify the compatibility of their SoftDevice/IC combination** for development and for production. Compatibility information is found in the nRF51 Series Compatibility Matrix, which can be downloaded from the Nordic Semiconductor web page.

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 1.0.2.
- The combined MBR and SoftDevice memory requirements for this version are as follows:
  - Flash: **112 kB** (`0x1C000` 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

- 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.
  - On nRF51 series IC revision 2 and earlier, DC/DC converter operation controlled by the SoftDevice may interfere with radio function. As a result on any IC revision 2 and earlier, the DC/DC mode must not be set by the application to anything different than `NRF_POWER_DCDC_DISABLE` (DRGN-2420).
- 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

- 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).
  - The number of connections is limited to 6 in this release. Connection establishment beyond 6 connections will fail with a timeout (DRGN-6638).

s130_nrf51_1.0.0

The s130 is based upon Nordic Semiconductor's existing S110 and S120 SoftDevices, extended to support concurrent LL (master and slave) and GAP (central and peripheral) roles.

The main features of this release, compared to the 0.9.0-1.alpha version, are the ability to set the size of the GATT Server Attribute Table when initializing the BLE stack. Changes to PPI channel allocations have been made to take advantage of the nRF51 series IC revision 3.
Notes:

- This is a major release which has changed the Application Programmer Interface (API), requiring applications to be recompiled.
- This SoftDevice version is Production tested on the latest nRF51 IC revision (revision 3). It is **not compatible with nRF51 IC revision 1**. Users of the SoftDevice **must verify the compatibility of their SoftDevice/IC combination** for development and for production. Compatibility information is found in the nRF51 Series Compatibility Matrix, which can be downloaded from the Nordic Semiconductor web page.

SoftDevice properties

- The SoftDevice Specification corresponding to this release is the S130 SoftDevice Specification version 1.0.
- This version of the SoftDevice contains the Master Boot Record (MBR) version 1.0.2.
- The combined MBR and SoftDevice memory requirements for this version are as follows:
  - Flash: **112 kB** (`0x1C000` bytes).
  - RAM: **10 kB** (`0x2800` bytes) (default value - dependent upon configured size of the GATT Server Attribute Table).

New functionality

- SoftDevice
  - The application can now configure the amount of memory reserved for the GATT Server Attribute Table when initializing the BLE stack (NRFFOETT-369, DRGN-3744, DRGN-5502).
    Configuration is optional. By default, the RAM reserved for the Attribute Table will be `0x600` bytes. This is `0x100` bytes less than in all other previous BLE SoftDevice production versions.
- GAP
  - Privacy 1.1 (central and peripheral): The SoftDevice is now able to generate and refresh resolvable and non-resolvable private addresses while advertising, broadcasting, scanning and observing. The application may set a custom IRK and an address cycle interval, but also retains the option to set addresses explicitly (DRGN-4636, DRGN-5240).

Changes

- MBR
- SoftDevice
  - 6 previously reserved PPI channels have been freed and may be used by the application (DRGN-5082).
- GAP
  - A Slave Security Request can now be cleanly rejected by the central if it does not desire to perform a security procedure at that time (DRGN-3954).
  - The `BLE_GAP_EVT_CONNECTED` event now includes the device's own address which allows the application to find out which address was used to establish a particular connection. This can be useful when using privacy features (DRGN-5016).
  - The `BLE_GAP_OPT_SCAN_REQ_REPORT` option structure now uses a standard bitfield instead of macros (DRGN-5162).
  - The Local Name AD Type (both short and long versions) can now be present in both the advertising packet and the scan response packet at the same time (DRGN-5686, NRFFOETT-995).
  - RSSI events can now be controlled by the application by setting a report frequency and threshold, and the RSSI value can be asynchronously polled by the application (DRGN-3598).
  - The SoftDevice can now accept an LTK distributed by a central during bonding (DRGN-4998).
  - Simultaneous pairing or bonding procedures for two different roles are now permitted (one procedure as a central and one procedure as a peripheral concurrently) (DRGN-5385).
- GATTS
  - The default GATT Server Attribute Table size is now `0x600` bytes instead of `0x700`.
  - Characteristic and descriptor values as well as system attributes can now be safely retrieved outside the lifetime of a connection (DRGN-5316, DRGN-5388).
  - The system attribute data (CCCDs) can now be separately retrieved and restored for user and system attributes (DRGN-5112).

Bug fixes

- MBR
  - Fixed a minor issue where the MBR would allow `bl_len` in `sd_mbr_command_copy_bl_t` to be higher than the total available flash on the chip. The MBR will now instead return `NRF_ERROR_INVALID_LENGTH`.
- SoftDevice
  - Fixed an issue where the SoftDevice current consumption could remain high (1 mA) after disabling the SoftDevice when running on RC LFCLOCK (DRGN-5472, NRFFOETT-968).
- BLE
  - Simultaneous protocol timeouts in multiple connections (for example ATT protocol timeouts) can no longer lead to a SoftDevice assert (DRGN-4665).
  - The connection handle field for the `BLE_EVT_USER_MEM_RELEASE` event is now correctly populated (DRGN-5630).
- LL
  - Fixed an issue where simultaneous connection parameter update and channel map update could lead to an assert (DRGN-5319).
  - After sending a connection parameter update, the radio events for the updated link can no longer block scheduled events for other links or flash operations (DRGN-5151).
  - The BLE stack can no longer assert if a connection parameter update procedure as a central took place while other radio or flash activity was going on (DRGN-5064).
  - The Access Address now always complies with the specification requirement of a minimum of two transitions in the most significant six bits (DRGN-5073).
  - Scanning and performing connection parameter update can no longer lead to an assert (DRGN-5276).
  - The scanner can no longer skip scan intervals if the scan window and the scan interval are of the same or similar size (DRGN-5338).
  - The SoftDevice will no longer assert if the channel map update procedure and either the connection parameter update procedure or the pairing/encryption procedures are initiated from the application in such a way that they execute at the same time (DRGN-5408).
  - Fixed an issue where a pair of S130 devices acting as master and slave in a scatternet configuration with other devices could get into lockstep and not be able to maintain the link (DRGN-5471).
  - Fixed an issue that could cause a SoftDevice assert when initiating RSSI reporting (DRGN-5526, NRFFOETT-962).
- GAP
  - The BLE stack now correctly returns `NRF_ERROR_NO_MEM` if trying to initiate a fourth connection with three peripherals already connected (DRGN-4741).
  - Connection establishment will no longer reset the timeout on an ongoing advertising or scanning procedure (DRGN-4980).
  - The SoftDevice will now send a Pairing Failed packet when performing a pairing procedure with a peripheral if the peer requests bonding or key distribution while the application is in non-bondable mode (DRGN-3922).
  - Encryption reestablishment using security request as a peripheral will no longer prevent additional security procedures from taking place on that connection (DRGN-5432).
  - Unexpected SMP packets received before the start of a pairing or bonding procedure can no longer cause an assert (DRGN-5439).
  - Invalid incoming Pairing Requests will no longer prevent the SoftDevice from generating the corresponding `BLE_GAP_EVT_AUTH_STATUS` event (DRGN-5696).
  - Setting an invalid or empty channel map using the `BLE_GAP_OPT_CH_MAP` option will no longer return `NRF_ERROR_INTERNAL`, but rather `NRF_ERROR_INVALID_PARAM` (DRGN-5498).
  - GAP control procedures (Connection Parameter Update and Encryption) will now be resumed correctly even when the pending one does not complete successfully due to disconnection (DRGN-5540).
- GATTS
  - Fixed an issue where the previous value of the CCCD would be returned on a new connection (NRFFOETT-663, DRGN-3746).
  - When adding an attribute with `vloc == VLOC_USER` the SoftDevice now correctly initializes its initial length to the one provided in the `init_len` parameter (DRGN-5216, NRFFOETT-936).
  - The `sd_ble_gatts_sys_attr_get()` call now returns an error if no system attributes exist in the GATT Server Attribute Table (DRGN-5506).
- L2CAP
  - Fixed an issue where the wrong LL PDU length was used for data over the air when an L2CAP command reject packet was sent (DRGN-5481).

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.
  - On nRF51 series IC revision 2 and earlier, DC/DC converter operation controlled by the SoftDevice may interfere with radio function. As a result on any IC revision 2 and earlier, the DC/DC mode must not be set by the application to anything different than `NRF_POWER_DCDC_DISABLE` (DRGN-2420).

- 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

No known issues at time of release.

s130_nrf51822_0.9.0-1.alpha

The s130 is based upon Nordic Semiconductor's existing S110 and S120 SoftDevices, extended to support concurrent LL and GAP roles.

s130_nrf51822_0.9.0-1.alpha memory resource requirements

- Flash: 116 kB
- RAM: 10 kB (plus 1.5 kB call stack) when enabled, 8 bytes when disabled

New functionality

- SoftDevice
  - The SoftDevice now contains a Master Boot Record (MBR), which enables Device Firmware Update (DFU) of the SoftDevice itself (in addition to the application and bootloader) over the air. The MBR API enables copying and comparing regions in flash memory, and interrupt forwarding.
- BLE
  - Using the options API `sd_ble_opt_set()`, it is possible for the application to configure whether the CPU can execute while the radio is active.
  - A new API call, `sd_ble_enable()` has been added. This must be called to initialize and enable the BLE stack after invoking `sd_softdevice_enable()` and previous to any BLE activity (DRGN-2879, NRFFOETT-215).
- GAP
  - The SoftDevice now supports broadcasting while in a active connection (DRGN-4534, DRGN-5685).
  - The application can now provide its own display passkey during a pairing procedure that uses the passkey entry algorithm.
  - Privacy 1.1 (peripheral only): The SoftDevice is now able to generate and refresh resolvable and non-resolvable private addresses while advertising or broadcasting. The application may set a custom IRK and an address cycle interval, but also retains the option to set addresses explicitly.
  - The application has the option to enable reports to be generated when an advertiser receives a SCAN REQUEST.
  - Added support for setting advertising channel map in ble_gap_adv_params.
- GATTS
  - The application can choose not to include the Service Changed characteristic within the GATT server by using the parameters in the new `sd_ble_enable()` API call.

Changes

- SoftDevice
  - The `sd_softdevice_forward_to_application()` call has been replaced with `sd_softdevice_vector_table_base_set()`, which takes the forwarding address as an argument (FORT-815, NRFFOETT-688).
  - The DCDC converter settings have been changed.
- BLE
  - The CPU can now, by default, execute while the radio is active. For nRF51 IC revision 2 silicon, the option API should be configured to prevent the CPU from executing while the radio is active.
- GAP
  - It is not permitted to change the white list while it is being used by an active role.
- GATTS
  - `sd_ble_gatts_value_set()` and `sd_ble_gatts_value_get()` API calls use ble_gatts_value_t structure instead of (uint8_t *) for attribute value set and get operations.

Bugfixes

- Fixed an issue where it was not possible to start advertising when already scanning (DRGN-4893).
- Fixed an issue where the SoftDevice might assert during connection parameter update (DRGN-5064).

Limitations

- SoftDevice
  - The DCDC converter should only be used with nRF51 revision 3 ICs. Revision 3 chips are available on the latest development kits from Nordic Semiconductor, the nRF51-DK.
  - The concurrent Multiprotocol Timeslot API is available but has not been functionally tested in this release.

Known issues

- The scanner can skip scan intervals if the scan window and the scan interval are of the same or similar size (DRGN-5013).
- After sending a connection parameter update, the radio events for the updated link may block scheduled events for other links or flash operations (DRGN-5151).

s130_nrf51822_0.5.0-1.alpha

The s130 is based upon Nordic Semiconductor's existing S110 and S120 SoftDevices, extended to support concurrent LL and GAP roles.

Update 1: s130_nrf51822_0.5.0-1.alpha memory resource requirements

- Flash: 112 kB
- RAM: 10 kB (plus 1.5 kB call stack) when enabled, 8 bytes when disabled

Bugfixes

(This is the first release, so no known bugs fixed)

Changes

(This is the first release, so no changes)

New functionality

- Link Layer
  - Concurrent Master, Slave, Advertiser and Scanner operation (DRGN-4353, DRGN-4358, DRGN-4360)
  - Up to 4 concurrent active links: up to 3 in the Master role, along with up to 1 in the Slave role.
- GAP
  - Concurrent Central, Peripheral, Broadcaster and Observer operation (DRGN-4354).
  - Up to 4 simultaneous active connections: up to 3 in the Central role, along with up to 1 in the Peripheral role.

Limitations

- Link Layer
  - Concurrent Slave and Advertiser roles not available in this release.
- GAP
  - Concurrent Peripheral and Broadcaster roles not available in this release.

Known Issues

- SoftDevice
  - Limited test coverage
  - Flash access during connection establishment can negatively affect the connection setup procedure.
- Link Layer
  - The peripheral role has priority over Central when it comes to keeping the links alive.