s110_nrf51822 release notes

Introduction to the s110_nrf51822 release notes

These release notes describe the changes in the s110_nrf51822 from version to version.

This is how the document is laid out:

- There is one main section per new version of the s110_nrf51822. This section will describe the changes from the previous version.
- Within each main section, there are sections for:
  - Bugfixes
  - Changes
  - New functionality
  - Known issues

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 available in the s110_nrf51822 migration document.

s110_nrf51822_4.0.0

This section describes the changes in s110_nrf51822_4.0.0 compared to s110_nrf51822_3.0.0.

Bugfixes

- SoftDevice
  - Using 32kHz RC-oscillator as clock source might cause hard fault has been fixed (FORT-771, NRFFOETT-200)
- Link layer
  - Average current is no longer higher than expected when using slave latency. (NRFFOETT-106, DRGN-1958, DRGN-823)
- GAP
  - Fixed an assert that occurred when certain timeout events triggered on a disconnected link (DRGN-2050)
  - Stack no longer asserts if a disconnect happens during pairing (DRGN-1893)
  - Characteristic properties of the device name are now updated when a new security mode is set (DRGN-2123)
- GATTC and GATTS
  - Expected throughput of six ATT packets per connection interval is no longer limited to five. (DRGN-2043)

Changes

- Documentation
  - The release now includes a "migration document" describing how to migrate to new versions of the s110_nrf51822
- Qualification
  - Host protocol layer has been tested according to the Bluetooth conformance test specification and has been listed as a Qualified Design (QDL) (Qualified Design ID B020552).
    (Link layer was qualified as of version 3.0.0.)
- SoftDevice
  - The SoftDevice flash requirements have changed from 128kB to 80kB (80 * 1024 bytes).
- All APIs
  - All functions that trigger Supervisor Calls are now prefixed with sd_
    - All nrf_* SVCs are now named sd_*
    - All ble_* SVCs are now named sd_ble_*
- SoftDevice
  - Modified APIs
    - sd_power_pof_enable() - No longer uses callback. But gives an event which can be retrived with sd_event_get()
    - sd_softdevice_enable() - Now gives error code NRF_ERROR_SDM_INCORRECT_CLENR0 if CLENR0 is not set. (Only for non-preprogramed SoftDevice)
    - sd_radio_notification_cfg_set() - Changed the definition of the values user can select for distance of active signal, see

SoftDevice specification for details (DRGN-2133, NRFFOETT-188)

- BLE
  - Added APIs
    - sd_ble_uuid_vs_add() - add a UUID to the BLE stack table, enabling the use of ble_uuid_t struct when handling UUIDs
    - sd_ble_uuid_encode() - encode ble_uuid_t structs to raw 16-bit or 128-bit UUID bytes
    - sd_ble_uuid_decode() - decode raw UUID bytes into ble_uuid_t structs
  - Removed APIs
    - ble_vs_uuids_assign() - replaced by sd_ble_uuid_vs_add()
- GAP
  - Added structs
    - ble_gatt_char_props_t - Providing bitfields for characteristic properties
    - ble_gatt_char_ext_props_t - Providing bitfields for extended characteristic properties
- GATTC
  - Removed APIs
    - ble_gattc_mtu_exchange()
  - Removed events
    - BLE_GATTC_EVT_MTU_XCHG_RSP
  - API changes
    - ble_gattc_char_t.char_props is now a bitfield instead of a raw byte
- GATTS
  - Removed APIs
    - ble_gatts_db_load()
    - ble_gatts_md_get()
    - ble_gatts_md_set()
  - Removed events
    - BLE_GATTS_EVT_MTU_UPDATE
  - API changes
    - ble_gatts_char_properties_t - Characteristic properties now use the common GATT type
    - Only a limited set of error codes can be used when handling deferred attributes

New functionality

- SoftDevice
  - Added APIs
    - sd_softdevice_forward_to_application() - Will make SoftDevice forward interrupts to application rather than bootloader.
    - sd_event_get() - Get events from hardware. Implemented events: NRF_EVENT_HFCLKSTARTED and NRF_EVENT_POWER_FAILURE_WARNING
    - sd_ecb_block_encrypt() - Encrypts a block according to specified parameters
  - Defines added to map software interrupt numbers used to signal the application to names
    - SD_EVENT_IRQn
    - SD_EVENT_IRQHandler
    - RADIO_NOTIFICATION_IRQn
    - RADIO_NOTIFICATION_IRQHandler
- BLE
  - UUID encoding and decoding is now handled inside the BLE stack (DRGN-1772, DRGN-2122, NRFFOETT-175)
- GAP
  - It is now possible to clear the advertising data and/or the scan response data (DRGN-2022)

Known issues

- SoftDevice
  - New added functionality of synthesized low frequency clock source is not tested to work with BLE stack. (DRGN-2140)
  - When advertising is stopped, either by explicit GAP API call or by GAP API configurable timeout, the CPU will remain in a busy-wait for up to one advertising interval time period. The consequence of this is that all threads at or below APP_LOW priority get blocked in this period and average current consumtpion is higher than expected. (DRGN-2018)

    - Testing of the nrf_power_dcdc_mode_set() is not complete (DRGN-2140)
    - The radio notification distance of 800 us is currently not available (DRGN-2133, NRFFOETT-188)
- GAP
    - sd_ble_evt_get() can, in rare cases (and while issuing a BLE_GAP_EVT_TIMEOUT event generated from advertising timing out), overwrite an invalid memory location (DRGN-2231)
    - Starting directed advertising twice without a connection and without the application polling the events will prevent further advertising (application event buffer overflow). Avoid this by calling sd_ble_event_get() before starting directed advertising. (DRGN-2024)
- GATTS
    - To conform to the Bluetooth specification there shall not be a secondary service that is not referenced somehow by a primary service. (DRGN-906, DRGN-2260)

s110_nrf51822_3.0.0 and earlier

<Release="3.0.0">

<Module>
S110 Softdevice
</Module>

<Overview>
Release of the S110 Softdevice, implementing a Bluetooth(r) Low Energy Stack on the nRF51822 IC.
</Overview>

<Requirements>
* nRF51822 IC
</Requirements>

<Compatibility>
* nRF51 SDK 3.0.0
* nRF51822
</Compatibility>

<Bugfixes>
* GAP:
- When using IRK and receiving scan requests, the filter policy BLE_GAP_ADV_FP_FILTER_BOTH does not work. (DRGN-1838)
- When using IRK, the filter policy BLE_GAP_ADV_FP_FILTER_SCANREQ does not work. (DRGN-1838)
* GATTS:
- It is currently not possible to achieve full data throughput using ble_gatts_hvx() with notifications if the connection interval is below 10ms. (DRGN-1433)
- To conform to the Bluetooth specification, no services or characteristics should be added or removed after bonding to a device (DRGN-1026)
- It is not possible to restrict attribute access based on the key size used during pairing. (DRGN-970)
* BLE
- The Softdevice will consume an event even if the application does not provide enough memory for it to fit. It is therefore strongly recommended when using this release to always call ble_evt_get() with enough memory to fit in any event that may come from the BLE stack. (DRGN-1844)
</Bugfixes>

<Changes>
Qualification:
- Link Layer is qualified, and have a QDL (Qualified Design ID: B020269).
* GATT:
- Updated BLE_GATT_STATUS_CODES defines, new status codes added
- Behaviour change: ATT timeout does not trigger disconnect anymore. Instead the ATT bearer is blocked as per the Bluetooth specification. (DRGN-1833)
* GATTC:
- Changed some structure member names and event defines
- Deprecated APIs, intended to be removed

- ble_gattc_mtu_exchange()
* GATTS:
- New APIs added
- ble_gatts_service_changed()
- Added BLE_GATTS_EVT_SC_CONFIRM event
- ble_gatts_rw_authorize_reply()
- Added BLE_GATTS_EVT_RW_AUTHORIZE_REQUEST event
- Removed APIs
- ble_gatts_rw_op_reply()
- Removed BLE_GATTS_EVT_READ_OP_REQUEST and BLE_GATTS_EVT_WRITE_OP_REQUEST event
- Deprecated APIs, intended to be removed
- ble_gatts_db_load()
- ble_gatts_md_get()
- ble_gatts_md_set()
- Renamed BLE_GATTS_SVC_TYPES to BLE_GATTS_SRVC_TYPES defines
- Renamed some BLE_GATTS_ATTR_TYPES defines
- Changed ble_gatts_attr_md_t, renamed some and added new structure members
- Renamed structure members in ble_gatts_attr_context_t
- ble_gatts_hvx() execution time has been optimized
* Softdevice:
- Added new header file, nrf_svc.h
- Changed lfclk oscillator sources values
- Added configurable RC oscillator calibration interval feature
- Removed APIs
- nrf_power_perpower_set()
- nrf_power_perpower_clr()
- nrf_power_perrdy_get()
- Added APIs
- nrf_power_gpregret_set()
- nrf_power_gpregret_clr()
- nrf_power_gpregret_get()
- nrf_power_dcdc_mode_set() (see Known issues)
- nrf_radio_notification_cfg_set()
</Changes>

<NewFunctionality>
* SOC:
- Radio Active notification. The application can receive interrupt notifications for radio activity.
* GATTS:
- Authorization (previously known as deferred operations). The application can individually authorize read and write operations per attribute.
- Service Changed Characteristic. Changes in the attribute table structure can be indicated to bonded clients.
- Attribute Value flexible location. The application can choose to place attribute values in its own memory space or continue using the stack's.
- Access restrictions based on LTK length can be achieved using authorization.
</NewFunctionality>

<Known Issues>
* Qualification:
- Host protocol layer has been tested according to the Bluetooth conformance test specification but has not yet been listed as a Qualified Design (QDL)
* Softdevice:
- Average current is higher than expected when using slave latency because the 16MHz XOSC is started each interval. (NRFFOETT-106, DRGN-1958)
- New added functionality of synthesized low frequency clock source is not tested to work with BLE stack.
- When advertising is stopped, either by explicit GAP API call or by GAP API configurable timeout, all threads at or below APP_LOW priority get blocked for advertising interval time period (DRGN-2018)
- Testing of the nrf_power_dcdc_mode_set() is not complete
* GATTS:
- To conform to the Bluetooth specification there shall not be a secondary service that is not referenced somehow by a primary service. (DRGN-906)
* GATT:
- Expected throughput of six notification/indications per connection interval is currently limited to five. (DRGN-2043)
</KnownIssues>

<MissingFeatures>
* Window Limiting as described in Softdevice Specification Document is not implemented
</MissingFeatures>

</Release>

<Release="2.0.0">

<Module>
S110 Softdevice
</Module>

<Overview>
Release of the S110 Softdevice, implementing a Bluetooth(r) Low Energy Stack on the nRF51822 IC.
</Overview>

<Requirements>
* nRF51822 IC
</Requirements>

<Compatibility>
* nRF518 SDK 2.0.0
* nRF51822
</Compatibility>

<Bugfixes>
* Softdevice
- PPI channel groups: Currently only PPI channel group 0 is available to the application. In the future, PPI channel groups 0 and 1 will be made available. (DRGN-1543)
* GATTS:
- When calling ble_gatts_characteristic_add and it fails, it might not remove all added attributes, depending on the error code. Thus the call to add
characteristics should never fail to make sure it works. (DRGN-791)
- Stack enters Busy state if transmission of indication fails due to buffer overflow. (DRGN-1619)
- CCCD/SCCD write permissions not checked in ble_gatts_characteristic_add(). Need to check for at least write permissions with no security (DRGN-1443)
* GAP:
- When directed advertising is used, a connected event always arrives from the softDevice even if there no connection (NRFFOETT-24, DRGN-1662)
- Assert happen if the APP has issued Disconnect Cmd and at the same radio instant LTK/encryption request arrives from the peer. (DRGN-1408)
- ble_gap_adv_data_set function does not return error when an invalid (all - zeros) advertisement data is passed as argument. (DRGN-1370)
- Assert when calling set advertising data right after calling disconnect. (DRGN-1364)
- Failed GATTS characteristic_add leaves database in inconsistent state. (DRGN-791)
- If 0 is supplied as the timeout parameter of ble_gap_adv_params_t, you still get a BLE_GAP_EVT_TIMEOUT with src BLE_GAP_TIMEOUT_TYPE_ADVERTISEMENT. (DRGN-1815)
* L2CAP:
- ble_l2cap.h has "@note Not yet implemented" for APIs already implemented. (DRGN-1795)
</Bugfixes>

<Changes>
* GAP:
- ble_gap_adv_start() now requires the advertising parameters for timeout and advertising intervals both to be set to 0 when using directed advertising.
- Updates related to returning NRF_ERROR_BUSY error code for following function(s):
- ble_gap_address_set()
- ble_gap_adv_data_set()
- ble_gap_conn_param_update()
- ble_gap_tx_power_set()
- ble_gap_sec_info_reply()
- ble_gap_rssi_start()
- ble_gap_rssi_stop()
- Updates related to returning NRF_ERROR_INVALID_STATE error code for following function(s):
- ble_gap_disconnect()
- Updates related to input parameters for the following function(s):
- ble_gap_device_name_set()
- ble_gap_device_name_get()

- ble_gap_authenticate()
- ble_gap_sec_params_reply()
- Updated Discovery Mode definitions.
* GATTS:
- char_user_desc_size added to ble_gatts_char_md_t.
- New event (BLE_GATTS_EVT_TIMEOUT) added.
- Updated behaviour for ble_gatts_hvx() and ble_gatts_sys_attr_set().
* BLE:
- ble_version_get() can return error codes other than NRF_SUCCESS.
- Updated BLE error codes
- Updated BLE_APPEARANCES defines.
* Softdevice:
- API "nrf_wait_for_app_event()" is renamed to "nrf_app_event_wait()".
</Changes>

<NewFunctionality>
* GATT Client. Note that signed write, write long and reliable write is not supported.
* Device filtering based on Identity Resolving Key (IRK).
</NewFunctionality>

<Unimplemented>
</Unimplemented>

<KnownIssues>
* Softdevice:
- Host and Link Layer are not yet qualified, i.e. do not have a QDL.
- Average current is higher than expected when using slave latency because the 16MHz XOSC is started each interval. (NRFFOETT-106)
- New added functionality of synthesized low frequency clock source is not tested to work with BLE stack.
* GATTS:
- To conform to the Bluetooth specification there shall not be a secondary service that is not referenced somehow by a primary service. (DRGN-906)
- To conform to the Bluetooth specification, no services or characteristics should be added or removed after bonding to a device (DRGN-1026)
- It is not possible to restrict attribute access based on the key size used during pairing. (DRGN-970)
* GAP:
- Currently there is no exponential backoff timer on SMP for repeated attempts, this can be implemented in the application to conform with the Bluetooth spec (DRGN-1123)
- It is currently not possible to achieve full data throughput using ble_gatts_hvx() with notifications if the connection interval is below 10ms. (DRGN-1433)
- When using IRK and receiving scan requests, the filter policy BLE_GAP_ADV_FP_FILTER_BOTH does not work. (DRGN-1838)
- When using IRK, the filter policy BLE_GAP_ADV_FP_FILTER_SCANREQ does not work. (DRGN-1838)
* BLE
- The Softdevice will consume an event even if the application does not provide enough memory for it to fit. It is therefore strongly recommended when using this release to always call ble_evt_get() with enough memory to fit in any event that may come from the BLE stack. (DRGN-1844)
</KnownIssues>

<MissingFeatures>
* Window Limiting as described in Softdevice Specification Document is not implemented
</MissingFeatures>

</Release>

<Release="1.0.0">

<Module>
S110 Softdevice
</Module>

<Overview>
This is the second release of the S110 Softdevice, implementing a Bluetooth(r) Low Energy Stack on the nRF51822 IC.
</Overview>

<Requirements>
* nRF51822 IC
</Requirements>

<Compatibility>
* nRF51 SDK
* nRF51822
</Compatibility>

<Bugfixes>
* GAP:
- ble_gap_authenticate() can not be called again until the procedure has completed (DRGN-1027)
- No longer asserts if the peer rejects the Connection Parameter Update Request (DRGN-1041)
- ble_gap_conn_params_update() can not be called again until procedure has either completed or timed out (DRGN-1118)
- Now allows pairing with MITM protection (DRGN-1150)
- Some SMP timers were not reset upon disconnect during pairing and could cause the device to disconnect the next connection (DRGN-1289)
- The timer for security request did not use correct resolution. (DRGN-1337)
- No longer asserts if ble_gap_adv_start() is called with invalid parameters (DRGN-1361)
- Softdevice always sends BLE_GAP_EVT_AUTH_STATUS event when paring is complete (DRGN-1363)
- ble_gap_conn_param_update() internal state did not get updated correctly if disconnected in the middle of the procedure (DRGN-1039)
- No longer asserts during encryption when master initiates with IO_CAPS_KEYBOARD_DISPLAY and pairing and slave responds with IO_CAPS_DISPLAY_ONLY and bonding (DRGN-1367)
- No longer asserts if ble_gap_tx_power_set() is called with the (valid) value -40 (DRGN-1407)
* Softdevice fixes:
- No longer loses connection with error code 0x3E when switching to RC clocksource (DRGN-1171)
</Bugfixes>

<Changes>
* GATTS:
- ble_gatts_md_set() and ble_gatts_value_set() are now restricted to characteristic values and descriptors added by the application only (DRGN-1125)
- Possibility for persistent protocol data (CCCD, Service Changed, SCCD) between connections (DRGN-967)
- ble_gatts_char_md_t has received a char_user_desc_max_size that need to be set to equal or longer than the char_user_desc length. (DRGN-900)
- The ble_gatts_characteristic_add() and ble_gatts_descriptor_add() have been modifed to include the parrent handle (could use BLE_GATTS_HANDLE_INVALID for old behavior) (DRGN-907)
* ble_evt_get() has been modified and prepared for longer mtu sizes than 23 (DRGN-1389)
* Softdevice:
- Application can set the clock accuracy when enabling the softdevice (DRGN-1278)
</Changes>

<NewFunctionality>
* GAP:
- Application can stop pairing from proceeding by replying with an error when receiving BLE_GAP_EVT_SEC_REQUEST (DRGN-1314)
- The ability to continue pairing if application requests bonding and peer sets bonding flag to zero. (DRGN-1129)
- Whitelist functionallity: With address or resolvable random address with IRK (received during bonding) (DRGN-983)
- The application can register for RSSI events (DRGN-1351)
* Vendor Specific UUIDs (128bit UUID support) (DRGN-550)
* L2CAP:
- Can register L2CAP channels for proprietary protocols (DRGN-1119)
* GATTS:
- New function calls for persistence: ble_gatts_sys_attr_set() and ble_gatts_sys_attr_get() (DRGN-967)
</NewFunctionality>

<Unimplemented>
* GATT support for MTU sizes larger than the default 23 octets.
* Signing of GATT PDUs (Bluetooth Core spec, Vol.3, Part H, section 2.4.5), is not supported.
* GAP Privacy (Bluetooth Core spec. Vol. 3, Part C, section 10.7) is not supported.
* Loading a GATT database image is not supported. A preliminary API specification is found in the file ble_gatts.h.
* Deferring GATT operations is not supported. A preliminary API specification is found in the file ble_gatts.h.
* GATT client functions are not supported. A preliminary API specification is found in the file ble_gattc.h.
</Unimplemented>

<KnownIssues>
* Some conformance tests not passing
* Softdevice
- PPI channel groups: Currently only PPI channel group 0 is available to the application. In the future, PPI channel groups 0 and 1 will be made available.
* GATTS:
- To conform with the bluetooth specification there shall not be a secondary service that is not referenced somehow by a primary service.

(DRGN-906)
    - To conform with the bluetooth specification, no services or characteristics should be added or removed after bonding to a device (DRGN-1026)
    - When calling ble_gatts_characteristic_add and it fails, it might not remove all added attributes, depending on the error code. Thus the call to add
      characteristics should never fail to make sure it works. (DRGN-791)
    - It is not possible to restrict attribute access based on the key size used during pairing. (DRGN-970)
  * GAP:
    - Currently there is no exponential backoff timer on SMP for repeated attempts, this can be implemented in the application to conform with the bluetooth spec (DRGN-1123)
    - It is currently not possible to achieve full data throughput using ble_gatts_hvx() with notifications if the conneciton interval is below 10ms. (DRGN-1433)
 </KnownIssues>

</Release>

<Release="0.6.0">

 <Module>
  S110 Softdevice
 </Module>

 <Overview>
  This is the first release of the S110 Softdevice, implementing a Bluetooth(r) Low Energy stack on the nRF51822 IC. The next release is planned for Sept. 2012.
 </Overview>

 <Toolchain>
  * Keil uVision 4.22.22.0
  * lint version 9.00h
  * python 2.7.2.amd64
  * pywin32-216.win32-py2.7
  * pyserial version not identified
  * doxygen 1.7.5
  * Nordic Tasks 0.2.5
  * nrf51 SDK 0.13.0 check before release.
 </Toolchain>

 <Requirements>
  * nRF51822 IC
 </Requirements>

 <Compatibility>
  * Netlist 18
  * nRF51 SDK
  * nRF51822
 </Compatibility>

 <Bugfixes>
   First release, no bug fixes.
 </Bugfixes>

 <Changes>
  First release, no changes.
 </Changes>

 <NewFunctionality>
  * This is the first release. All functionality is described in the online documentation.
 </NewFunctionality>

 <Unimplemented>
  * ble_vs_uuids_assign(), defining vendor specific UUIDs, is not supported. A preliminary API specification is found in the file ble.h.
  * GAP funcions for the central role are not supported (ble_gap_scan_start, ble_gap_scan_stop, ble_gap_connect, ble_gap_connect_cancel). A preliminary API specification is found in the file ble_gap.h.

* GATT supports only the default MTU size of 23 octets.
* Signing of GATT PDUs (Bluetooth Core spec, Vol.3, Part H, section 2.4.5), is not supported.
* GAP Privacy (Bluetooth Core spec. Vol. 3, Part C, section 10.7) is not supported.
* Loading a GATT database image is not supported. A preliminary API specification is found in the file ble_gatts.h.
* Deferring GATT operations is not supported. A preliminary API specification is found in the file ble_gatts.h.
* GATT client functions are not supported. A preliminary API specification is found in the file ble_gattc.h.
* Direct Test Mode (DTM, see Bluetooth Core spec, Vol. 6, Part G) will be implemented in the next release.
</Unimplemented>

<KnownIssues>
* Client Characteristic Configuration Descriptor values are not persistent across connections for bonded devices (see Bluetooth Core spec, Vol. 3, Part G, section 3.3.3.3).
* MITM protection is not supported when performing a pairing procedure without bonding.
* The function ble_gatts_hvx() can currently modify the GATT Server database and fail to send the corresponding notification or indication. Once this issue is resolved, the function will atomically write the new value to the database and send the packet.
* The fucntion nrf_softdevice_enable currently does not work with the clock_source set to NRF_CLOCK_LFCLKSRC_RC
* The application must turn on the 16 MHz clock source before the softdevice is started, and must not turn it off while the softdevice is running.
<KnownIssues>

<Release>