Introduction to the S210_nrf51422 release notes

These release notes describe the changes in the S210_nrf51422 from version to version.

This is how the document is laid out:

- There is one main section per new version of the S210_nrf51422. This section will describe the changes from the previous version.
- Within each main section, there are sections for:
    - Bugfixes
    - Changes
    - New functionality
    - Limitations
    - 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 S210_nrf51422 migration document.

Note: No migration document is included with this release

S210_nRF51422_3.0.0

This is the first web release of the S210 SoftDevice, implementing ANT stack on the nRF51422 IC

Bugfixes

- Fixed issue where calling `sd_ant_stack_reset` or `sd_softdevice_disable` or `ant_cw_test_mode_init` after closing all running ANT channels may cause a softdevice freeze. Issue could only occur if the last channel closed is a master channel or a non-tracking slave channel.
- Fixed issue where `sd_ant_stack_reset` did not properly end ANT CW test mode (started by `sd_ant_cw_test_mode`).
- Fixed issue where `sd_ant_burst_handler_request` did not accept a single START & END segment and prevented the application from requesting bursts with less than 2 segments.
- Added missing `RADIO_TX_POWER_LVL4` to ANT parameters header file. This mode was supported in v1 S210; however it was missing in the header file.
- Fixed issue where ANT tx and rx burst transfer did not work with ANT ARCT test box.

- Fixed issue where ANT receivers could not alter peer transmit timing behaviour when required.
- Fixed issue where ANT rx scanning channel timestamps did not report extended rx timestamp values correctly.
- Fixed issue where ANT broadcast data may be corrupted if changed by sd_ant_broadcast_message_tx exactly upon radio preparation time.

Changes

- **Code and RAM region Changes**

	OLD	NEW
	v1 S210 (ANT AXX1.06B00)	V3 S210 (ANT AXX3.02B00)
SoftDevice Reserved Code	40kB (0x00000000 – 0x00009FFF)	48kB (0x00000000 – 0x0000BFFF)
SoftDevice Reserved RAM	2kB (0x20000000 – 0x200007FF)	2.25kB (0x20000000 – 0x200008FF)
SoftDevice Callstack	400bytes(*)	1kB(*)
Application Start Code	0x0000A000	0x0000C000
Application Start RAM	0x20000800	0x20000900

(*) maximum estimation based on simulation

- **Softdevice Protected Peripherals**

OLD	NEW
v1 S210 (ANT AXX1.06B00)	V3 S210 (ANT AXX3.02B00)
POWER_CLOCK	POWER_CLOCK
RADIO	RADIO
RTC0	RTC0
RNG	RNG
ECB	ECB
CCM_ARR	CCM_ARR
PPI	PPI
SWI4_IRQn	SWI4_IRQn
SWI5_IRQn	SWI5_IRQn
	TIMER0
	NVMC
	TEMP

  - Timer0 is now protected by the SoftDevice and used for internal timing operations. It cannot be directly accessed by the application.
  - NVMC is now protected by the SoftDevice. It cannot be directly accessed by the application. Flash write / erase procedures must be done through the newly provided flash access APIs in v3 S210 SoftDevice.

- TEMP is now protected by the SoftDevice. It can be only accessed via the newly provided temperature read API.

- **ANT SVC Base Change**
  - ANT SVC stack base changed from `0x50` to `0xC0`
    (Aligned with ANT SVC stack base used by S310 for cross compatibility)

- **ANT Event Software Interrupt**
  - ANT event software interrupt moved from `SWI3_IRQn` to `SWI2_IRQn`
    (Aligned with interrupt scheme used by S310 for cross compatibility)

- **ANT API SVC Changes**
  - `sd_ant_channel_radio_tx_power_set`
    - Additional parameter to specify custom (non-ANT indexed) TX power value. See API documentation for more information on usage.
  - `sd_ant_cw_test_mode`
    - Additional parameter to specify custom (non-ANT indexed) TX power value. See API documentation for more information on usage.

- **ANT API SVC Additions**
  - Reserved APIs to house future API calls. None currently assigned.
    - `SVC_ANT_RESERVED0`
    - `SVC_ANT_RESERVED1`
    - `SVC_ANT_RESERVED2`
  - Extended APIs to house future API calls using extended messages IDs
    - `SVC_ANT_EXTENDED0`
    - `SVC_ANT_EXTENDED1`
    - `SVC_ANT_EXTENDED2`

- **SOC API SVC Changes**
  - `sd_power_perpower_set / sd_power_perpower_clr / sd_power_per_power_get / sd_power_perrdy_get`
    - Removed. PERPOWER register is not available on next generation (XLR2) NRF51 chip; therefore the SVC function has been removed. Refer, to PAN documentation (PAN-028 v1.6) “System: Manual setup is required to enable use of peripherals” for workaround to enable peripherals for current (XLR1) generation NRF51 chips.

- **SOC API SVC Additions**
  - `sd_power_gpregret_set / sd_power_gpregret_clr / sd_power_gpregret_get`
    - APIs added for access to general purpose retention register

- `sd_power_dcdc_mode_set`
  - Note: DCDC converter may interfere with radio function. As a result, this API should not be modified by the application. The mode must not be set to NRF_POWER_DC_DC_MODE_AUTOMATIC or NRF_POWER_DCDC_MODE_ON at any time.
- `sd_radio_notification_cfg_set`
  - Configures SoC Radio Notification feature. When enabled, signals application radio activity/inactivity.
- `sd_ecb_block_encrypt`
  - The ECB block is a SoftDevice protected peripheral. This API allows the application to use the encryption engine when the SoftDevice is enabled
- `sd_radio_session_open / sd_radio_session_close / sd_radio_request`
  - Radio disabling scheduling feature. APIs allow the application to schedule pockets of time to run activities that do not overlap on top of radio activity. Useful for offsetting peak current draw activity. Radio protocol priority may override or delay this request.
- `sd_evt_get`
  - SOC generated events are deposited into the SoC event queue. This API must be called by the application to retrieve the event when signaled by the softdevice via `SWI2_IRQn`
- `sd_temp_get`
  - API call to retrieve the temperature measured on the chip
- `sd_flash_erase_page / sd_flash_write / sd_flash_protect`
  - New APIs have been introduced to improve concurrent behavior of flash write and erase activities during radio and stack protocol operations. Radio protocol priority may override or delay requested flash operation.

- **Softdevice API SVC Changes**
  - Addition of 5 more options for LFCLK source. **Please note, if running RC option, LFCLK source for ANT should be set to NRF_CLOCK_LFCLKSRC_RC_250_PPM_250MS_CALIBRATION**. The new RC options are as follows:
    - NRF_CLOCK_LFCLKSRC_RC_250_PPM_500MS_CALIBRATION
    - NRF_CLOCK_LFCLKSRC_RC_250_PPM_1000MS_CALIBRATION
    - NRF_CLOCK_LFCLKSRC_RC_250_PPM_2000MS_CALIBRATION
    - NRF_CLOCK_LFCLKSRC_RC_250_PPM_4000S_CALIBRATION
    - NRF_CLOCK_LFCLKSRC_RC_250_PPM_8000MS_CALIBRATION
  - `sd_softdevice_forward_to_application`
    - Added to support bootloader feature. Used to forward interrupts to the application and must be called before the bootloader starts the application.

- **SOC Event Software Interrupt**
    - SoftDevice SOC features will now generate certain events when enabled. For a full list of generated events, refer to NRF_SOC_EVTS in `nrf_soc.h` and `nrf_radio_disable.h`. Signals new events to application using `SWI2_IRQn`. Events must be serviced by the application by calling `sd_evt_get` or else the device may not be able to be put into low power mode using `sd_app_evt_wait`

New functionality

- **ANT Improvements**
    - Enabled 60kbps encrypted burst transfers mode. This was previously restricted to 40kbps.
    - Prevent ANT RFActive Notifications from being enabled if ANT Async transmit channel is assigned. Done in order to avoid false notifications.
    - Added ANT enhanced channel spacing feature to prevent continuous consecutive channel collisions events for multiple tracking channels.
    - Added requested custom tx power level

- **SOC Radio Notification Interrupt**
    - V3 S210 SoftDevice introduces radio notification feature for alerting the application of radio activity/inactivity. A dedicated software interrupt (`SWI1_IRQn`) is used to signal the application of these events
        - Note: ANT RFActive notification feature is still available for use through the ANT API set. However, it is recommended that the SoC Radio Notification be used instead due to the following reasons:
            - SoC Radio Notification uses dedicated software interrupt for immediate notification to the application. ANT RFActive Notification uses the ANT event queue for notification and could be subjected to application event processing delay.
            - Using SoC Radio Notifications is forward compatible with S310 where multiple concurrent protocols may be active. ANT RFActive Notification only applies to synchronous ANT channel protocol events.

- **Softdevice Bootloader**
    - Support for bootloader has been added. Please refer to S210 SDS for more information.

Limitations

- No known Limitations

Known issues

- No known issues