NHS3152 SDK Release Notes

> NXP public
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Release 12.5 - 2022-01-31

> NOTE: THIS IS THE STABLE RELEASE IN THE SDK 12.X SERIES.
> UPGRADING FROM OLDER SDKS IS RECOMMENDED FOR ALL USERS.

NEW FEATURES

- The NTAG SmartSensor ICs have a guaranteed accuracy of 0.3 °C in the temperature range from 0 °C to 45 °C. This improved temperature accuracy applies for all NHS31xx products produced after January 1, 2020. For customers in production with these IC's: no action is required and there is no need to requalify, adapt or modify any software. NXP did not change its production to achieve this better accuracy.
- The pre-flashing service offering has been expanded and now includes the possibility to pre-flash UK versions as well
  (WLCSP25 package). See AN12251 "NHS31xx customer firmware flashing", present in the SDK.
- The one-time *NHS31xx NFC Program Loader* app has been rewritten. It is now available on both Android and Windows, and has a new modern and easier-to-use interface.
- New application notes are made available: AN13041 *NFC program downloader interface* and AN13042 *Firmware flashing via direct SWD access*.

INCOMPATIBILITIES

- Support for the LPCXpresso IDE v8.2.2 is now fully dropped. The MCUXpresso IDE v10.2.1 is now the only supported IDE.
  Only the MCUXpresso IDE v10.2.1 is supported, not any later version.
- The module `diag` has been removed. There is no effect on your code base if you were not using this piece of code. If you were, contact us to work out a solution.

KNOWN ISSUES

- NEW The macOS installer for the *NTAG SmartSensor Automator* tool is not present in the SDK. A Win10 installer is available.
  Work ongoing. For now, switch to a Win10 machine to use this tool.
- Waking up from Deep Power Down after a timeout can cause a spurious RTC interrupt.
  HW issue. Can not be fixed. SW workaround available and present in `RTC_IRQHandler` *of the demo applications since SDK 12.1.*
- The pin configuration is lost after a reset.
  HW issue. Can not be fixed. SW workaround available and present in `Board_Init` *of the respective boards since SDK 11.1.*
- The Watchdog reset status is cleared on system reset.
  HW issue. Can not be fixed.

CHANGES

- The MCUXpresso IDE v10.2.1 is now the only supported IDE.
- Re-implementated the one-time *NHS31xx NFC Program Loader* app.
- Reworked the example application `app_example_dp_ssp`
- Removal of module `diag`

BUG FIXES

- Host apps:
  - Several bug fixes in the *NTAG SmartSensor Automator* tool, notably in the string formatting of the NDEF responses.
  - Updated libraries and target OS version of all XF applications. In addition, various smaller issues with the NFC communication and the user interface have been addressed.
- In firmware:
  - Bug fixes in demo applications `app_demo_dp_tlogger` and `app_demo_dp_tadherence`
  - Bug fixes in modules `msg` and `storage`

  Notably, there was a bug in the temperature logger demo application, where the very first cached value was not always correctly stored, in case there was no start delay. Fixed.
- In the documentation:
  - Documentation updates and refresh of contents throughout the SDK.

Release 12.4 - 2020-10-21

> NOTE: THIS IS THE STABLE RELEASE IN THE SDK 12.X SERIES.
> UPGRADING FROM OLDER SDKS IS RECOMMENDED FOR ALL USERS.

NEW FEATURES

- All XF host applications have been significantly improved.
  - All code is upgraded to use the MS Visual Studio 2019 IDE. MS Visual Studio 2017 is no longer supported.
  - The XF `Ndef` library has been improved, allowing easier integration and usage.
  - The Therapy Adherence app has been re-implemented using XF. It is now more user friendly and cross-platform.
  - New versions of the existing host applications have been released for Android, iOS, macOS and Win10. The old implementations of
    - `Temperature Logger` (Android: java, iOS: objective C, macOS: objective C)
    - `Therapy Adherence` (Android: java)

    are now obsolete and have been removed.

    All demo applications can now be deployed with feature parity on multiple platforms: iOS, Android, macOS and Win10.
    Note: not all XF projects are targeting all 4 platforms. There is no technical obstacle preventing this.
    Note: the only exception is the binary-only NHS31xx NFC Program Loader. This app is available on Android only.
- All logger and monitor firmware applications now include the module `batimp`. This module checks whether the battery can supply sufficient voltage during a more severe load. The firmware applications are now ready to react on battery state questions.
  Note: the mobile and PC host projects currently do not use this functionality.
- Documentation throughout the SDK has been improved and extended. This includes the HW User Manual, the application notes and the Software documentation.
- All python code now requires Python3. Python2 is no longer supported.
- Internal testing using the LPCXpresso IDE v8.2.2 will be stopped.
  The MCUXpresso IDE *v10.2.1* is now the preferred IDE.
  Note: currently both the LPCXpresso IDE v8.2.2 and the MCUXpresso IDE v10.2.1 can be equally used. A next version will no longer support the LPCXpresso IDE v8.2.2.
- Internal testing using Windows 7 has been stopped.
  Note: currently there is no issue using this SDK in combination with Windows 7. Next versions may or may no longer work with Windows 7.

INCOMPATIBILITIES

- No new incompatibilities have been introduced.

KNOWN ISSUES

- Documentation - most notably *UM11153 NTAG SmartSensor getting started: A guide to start developing using an NHS31xx* - is not yet updated to reflect the preferred IDE to use.
- Waking up from Deep Power Down after a timeout can cause a spurious RTC interrupt.
  HW issue. Can not be fixed. SW workaround available and present in `RTC_IRQHandler` *of the demo applications since SDK 12.1.*
- The pin configuration is lost after a reset.
  HW issue. Can not be fixed. SW workaround available and present in `Board_Init` *of the respective boards since SDK 11.1.*
- The Watchdog reset status is cleared on system reset.
  HW issue. Can not be fixed.

CHANGES

- Removal of `sw/android/startstoptherapy`
- Removal of `sw/android/tlogger`
- Removal of `sw/ios/tlogger`
- Removal of `sw/macos/tlogger`
- Addition of `sw/nss/lib_board_label`
- Addition of `sw/XF/TAdherence`

BUG FIXES

- In all host apps, correcting:
  - graphs
  - time annotations
  - export of data
  - GUI usability issues
  - NFC error handling
  - a few crashes
- In firmware:
  - All logger and monitor firmware demo applications now include the `batimp` module
  - Module `ndeft2t` received a few bug fixes
  - Driver `eeprom` received a few bug fixes
  - Optimizations throughout the code
- In the documentation:
  - Smaller changes throughout the HW UM
  - Format updates and content refresh of the application notes AN12328, AN12768 and AN12769.
  - Smaller changes throughout the firmware documentations `firmware.html`, `communication.html` and `storage.html`

Release 12.3 - 2020-01-17

> WARNING - THIS IS A BETA RELEASE

This release is a continuation of Release 12.2 BETA. All topics listed there apply here as well.

NEW FEATURES

- The storage module has received 2 major new features, without changing API.
    - Data corruption due to a failing power supply during operation can now be detected and be recovered from including full data retrieval.
    - Samples can now be cached, reducing the need to write to EEPROM. The cache is kept intact during the deep power down mode, and is automatically cleared and committed to non-volatile memories EEPROM and FLASH when full.
      New diversity settings are introduced to cover the new functionalities, allowing a better tailoring to your use case.
      This is a significant addition and enhances the behavior and stability of all logger applications. Updating to this release is therefore highly recommended.
- A battery impedance check is now added as module `batimp`. This allows to query the IC to check whether the battery can supply sufficient voltage during a more severe load.
  An application is advised to use this check *before* a monitoring session starts. Note that the viabillity of the battery cannot be guaranteed even when the check fully passes.
- Die information that can be visually detected and extracted from the RO part of the EEPROM is now documented and explained. Wafer information and temperature calibration timestamps can now be determined for each individual IC.
  It is available in the SDK under `<SDK>/tools/NHS31xx_die_info.ods`
- Changed caching of data written to EEPROM. Reading no longer enforces the cache to be committed, resulting in less flushing operations.

INCOMPATIBILITIES

- The changes to the storage module introduce no new incompatibilities. You may want to change the diversity settings for the storage module, to take advantage of the new features.

KNOWN ISSUES

- Waking up from Deep Power Down after a timeout can cause a spurious RTC interrupt.
  HW issue. Under investigation. SW workaround available and present in RTC_IRQHandler of the demo applications since SDK 12.1.
- The pin configuration is lost after a reset.
  HW issue. Can not be fixed. SW workaround available and present in `Board_Init` *of the respective boards since SDK 11.1.*
- The Watchdog reset status is cleared on system reset.
  HW issue. Can not be fixed.

CHANGES

(void)

BUG FIXES

- tlogger demo application
- batimp module
- msg module
- storage module
- eeprom driver
- documentation

Release 12.2 - 2019-10-02

> WARNING - THIS IS A BETA RELEASE

This release is a continuation of Release 12.1 BETA. All topics listed there apply here as well.

NEW FEATURES

- The host application `tlogger` has been re-implemented using a single code base targeting multiple platforms. The platform specific implementations (Android, iOS, macOS) are now deprecated and will be removed in a later release.

INCOMPATIBILITIES

(void)

KNOWN ISSUES

- The demo monitoring app `app_demo_dp_tlogger` assumes EEPROM writes always succeed. However, when using failing batteries with high impedance, the EEPROM write action can result in a voltage drop causing a reset. If this happens, the contents of the affected page can be corrupted. The consequence can be that
  the firmware cannot retrieve any or all measurements.
- Waking up from Deep Power Down after a timeout can cause a spurious RTC interrupt.
  HW issue. Under investigation. SW workaround available and present in RTC_IRQHandler of the demo applications since SDK 12.1.
- The pin configuration is lost after a reset.
  HW issue. Can not be fixed. SW workaround available and present in `Board_Init` *of the respective boards since SDK 11.1.*
- The Watchdog reset status is cleared on system reset.
  HW issue. Can not be fixed.

CHANGES

(void)

BUG FIXES

- tlogger demo application
- led module
- uarttx module
- spi driver

Release 12.1 - 2019-07-05

> WARNING - THIS IS A BETA RELEASE

NEW FEATURES

- This is a maintenance release, focusing on general quality improvement of the chip library, board library, and high-level abstraction modules.
- Temperature logging and monitoring application `app_demo_dp_tlogger` now exposes more information. Via the NFC interface, all events - execution state changes and asynchronous anomaly detections - can be retrieved.
- Fixed a corner case when using the Deep Power Down mode in combination with the WAKEUP pin. If your application uses this combination, we highly encourage you to check the updated documentation for `Chip_PMU_PowerMode_EnterDeepPowerDown` and the software fix employed in `main()` and `DeInit()` in the temperature logger firmware application (and other monitoring applications).
- The temperature logger applications `tlogger` and `tloggerucode` have received various small improvements. Most notably, the automatic readout is improved, which allows a much faster readout when using iOS based phones.
- A new module has been added, called `diag`, as part of the chip library. It stores minimal usage information about the IC and its behavior, aiding in diagnosing failures during development and initial production batches.
- The demo monitoring app `app_demo_dp_tlogger` assumed all FLASH memory is erased when monitoring starts, which does not hold true for wireless firmware downloads. **Fixed**.

INCOMPATIBILITIES

- The API call `Storage_Reset` in the storage module has changed: its prototype remains the same, but the single argument has changed meaning and now causes a small difference in the implementation.

KNOWN ISSUES

- Waking up from Deep Power Down after a timeout can cause a spurious RTC interrupt.
  HW issue. Under investigation. SW workaround available and present in RTC_IRQHandler of the demo applications since SDK 12.1.
- The pin configuration is lost after a reset.
  HW issue. Can not be fixed. SW workaround available and present in `Board_Init` of the respective boards since SDK 11.1.
- The Watchdog reset status is cleared on system reset.
  HW issue. Can not be fixed.

CHANGES

- The modules `i2cio` and `trace` have been removed. The `i2c` driver and the `uarttx` module each cover part of the removed functionality; contact us if your use case suffers because of this.
- The Android host application `comm` has been removed. The PC-based NTAG SmartSensor Automator APP replaces this and offers more functionality.
- A lot of attention has been given to all documentation. A lot of 'paper cuts' have been resolved in the data sheet, the HW user manual, the firmware documentation and the example code snippets.
- The example applications for I2C and NDEF have been reworked and simplified greatly.
- Several modules are no longer application-specific and are moved to the mods folder: `compress`, `event`.

BUG FIXES

- comm host app
- NTAG SmartSensor Automator
- tlogger demo application
- blinky application
- nvmeraser application
- example applications
- compress module
- diag module
- event module
- i2cio module
- msg module
- ndeft2t module
- storage module
- trace module
- uarttx module
- ucode module
- board libraries
- eeprom driver
- PMU driver
- tsen driver
- documentation

Release 11.2 - 2018-06-27

> NOTE: THIS IS THE STABLE RELEASE IN THE SDK 11.X SERIES. UPGRADING FROM OLDER SDKS IS RECOMMENDED FOR ALL USERS.

This release is a continuation of Release 11.1 BETA. All topics listed there apply here as well.

NEW FEATURES

- Temperature logger demo
  - Smaller bug fixes and code improvements throughout the board, modules and application code.
  - The macOS APP has received a few bug fixes and is available in the SDK with full sources.
    A ready-made build is wrapped in an installer and can be immediately deployed.
    Currently temperatures are listed in Celsius only.
- NTAG SmartSensor Automator
  Added a script to control the Therapy Adherence demo.
- The modules `i2cio` and `trace`, and the Android APP `comm` are marked as obsolete and will be removed in a future SDK release. If this affects you, contact us to work out a mitigation plan.

KNOWN ISSUES

- The pin configuration is lost after a reset.
  HW issue. Can not be fixed. SW workaround available and present in `Board_Init` *of the respective boards since SDK 11.1.*
- The Watchdog reset status is cleared on system reset.
  HW issue. Can not be fixed.

INCOMPATIBILITIES

(void)

CHANGES

(void)

BUG FIXES

- All bug fixes from Release 11.1 BETA
- tlogger demo ios and macos apps
- tlogger demo application
- ndeft2t module
- storage module
- documentation

Release 11.1 - 2018-04-06

> WARNING - THIS IS A BETA RELEASE

NEW FEATURES

- Temperature logger demo
  - event reporting
    The reported configuration (`APP_MSG_ID_GETCONFIG`) contains new fields which removes the need for the tag reader to implement convoluted logic and a bit of guesswork to determine the correct state of the IC and the firmware.
  - text reporting
    The standard text reports, which can be read out by any Android NFC-enabled phone without the need for an APP to be installed, have been reworked and are now more complete and accurate.
  - start delay
    It is now possible to configure the IC to start monitoring after an arbitrary delay, not correlated to the measurement interval.
  - debugging flow
    An additional way to 'break-in' and enforce an SWD connection has been added in `ResetISR`.
    It is now possible to avoid the use of the Deep Power Down and Power-off modes and maintain an SWD connection at all times (`APP_MAINTAIN_SWD_CONNECTION`).
  - Android
    The Android APP has been updated, containing bug fixes and adjustments to handle the new event reporting. The APP remains backwards compatible.
  - iOS
    A new iOS APP has been added, which allows iOS users using an iPhone 7 or higher a similar experience as on Android.
  - macOS
    A new macOS APP has been added, which allows macOS users to run the full temperature logger demo, including configuring and starting a temperature monitoring session. iOS users can only read NDEF messages; this APP can be used to start a label.
    This release is at this moment binary-only.
- NTAG SmartSensor Automator
  A new PC based application has been created, which allows bi-directional communication with any firmware application running on an NHS31xx, as long as the `NDEFT2T` and `msg` modules from the SDK are used for communication. Running on both Windows and macOS, this tool can be used to demonstrate specialized firmware in advance of a finished corresponding APP; and to quickly pinpoint problems while testing the full communication sequence.
  This release is binary-only.
- Debug builds are now built using `-Og`, freeing up space without harming the debugging abilities.

- The `UartTx` module has been expanded with a few convenience API calls. It can now be readily used for debug traces.
- The modules `i2cio` and `trace`, and the Android APP `comm` are now marked as obsolete and will be removed in a future SDK release. If this affects you, contact us to work out a mitigation plan.
- Gang programming
  Flash possibilities have been expanded with the latest version of Flash Magic. A new tool has been added to the SDK as an example how gang programming could be implemented on a programming PC in a production environment.
- The SDK now is supported on the PC platforms Windows (7), macOS (High Sierra), and Linux (Ubuntu 17.04), using the LPCXpresso IDE v8.2.2.

KNOWN ISSUES

- The pin configuration is lost after a reset. Firmware must re-initialize the pins after power-up. Failure to correctly initialize the pins can result in reduction of functionality and an increase in power consumption. For example: measuring current consumption for `app_demo_dp_blinky` can yield figures up to 400 uA. After correctly initializing pins, this is reduced to 150 uA (running @500kHz).
  HW issue. Can not be fixed. SW workaround available and present in `Board_Init` of the respective boards since SDK 11.1.
- The storage module requires at least one empty FLASH page. It cannot be used with a firmware image that occupies all available FLASH space.
- The Watchdog reset status is cleared on system reset.
  HW issue. Can not be fixed.

INCOMPATIBILITIES

- Temperature logger demo: `app_demo_dpu_tlogger`
  The fields the messages `APP_MSG_ID_GETCONFIG` and `APP_MSG_ID_SETCONFIG` have been changed.
  A new message `APP_MSG_ID_START` has been added.
- Temperature logger demo: APP
  The Android `tlogger` APP now requires OS 5.0 Lollipop or higher to run.
- modules: `msg`
  Two new messages `MSG_ID_GETNFCUID` and `MSG_ID_GETDEVICEID` have been added.
  `MSG_API_MAJOR_VERSION` has been bumped to 6.
- chip: `wwdt`
  The Windowed WatchDog Timer has been reworked. It now offers a highly simplified API to easily execute the single
  purpose the HW block is meant for.

CHANGES

- tlogger demo application
- i2cbbm module
- ndeft2t module
- uarttx module
- wwdt driver

BUG FIXES

- tlogger demo android app
- tlogger demo application
- msg module
- ndeft2t module
- tmeas module
- board drivers
- eeprom driver
- wwdt driver
- documentation

Release 10.1 - 2017-06-28

NEW FEATURES

- Fix for NFC communication lock-out
  - See *Customer Advisory Note* for full details.
    . A setting in the NFC interface where memory pages can be locked via NFC results in any NFC reader/NFC-enabled phone being able to change the setting and lock pages
    . NHS31XX chips produced after week 1724 are not affected, as production is corrected since.
    . For older ICs: with a specific NFC command, this communication lock-out can be avoided.
  - Example code has been prepared to insert in your APPs. Each time a tag is connected through NFC, call the function `BlockLockBits`, which will check and - if necessary - correct this specific setting in the NFC interface. This function is present in both the `tlogger` and the `startstoptherapy` Android sources.
- Fix for error in demo firmware for temperature logging
  - See *Customer Advisory Note* for full details.
    . The example source code and corresponding firmware of the temperature logger contains an error, causing a wrong status feedback when one or both of the boundaries are negative values.
    . All temperatures are logged as expected, across the specified temperature ranges of the NHS31XX.
  - The fields `validMinimum` and `validMaximum` in structures `APP_MSG_CMD_SETCONFIG_T` and `MEMORY_CONFIG_T` need to have the correct type for the validation to run. This is fixed in the `tlogger` firmware.

KNOWN ISSUES

- The storage module requires at least one empty FLASH page. It cannot be used with a firmware image that occupies all available FLASH space.
- The Watchdog reset status is cleared on system reset.
  HW issue. Can not be fixed.

INCOMPATIBILITIES

(void)

CHANGES

- tlogger demo android app

BUG FIXES

- tlogger demo application

Release 10 - 2017-04-05

NEW FEATURES

- Constraints to the MIME string length that can be given to the tag reader and / or the tag are removed.
  This fix necessitated a change in the API of the `NDEFT2T` module. See the incompatibilities below.
- Updated `tlogger` firmware
  - The status information returned to the phone now includes a notification when all storage space is full.
  - Added usage of the watchdog timer to guarantee hangups do not drain the battery.
    Note: A developer may want to disable this while debugging.
  - Fixed a rare corner case, where the start of the first measurement could be delayed indefinitely.
  - Several smaller code and documentation improvements.
- Updated `tlogger` Android application to v14.
  - Improved CSV export: improved both the code resulting in complete exports, and the file format and contents resulting in readily usable data.
  - Simplified the code to correct timestamps which improve the RTC accuracy.
    This also fixes a logic error made in the code.
  - When changing the configuration on a tag, all older data is now cleared. This should help to reduce confusion.
  - Reading out all data from the NHS31xx will now always be resumed, and not started from the beginning again, even when the NFC connection was interrupted.

KNOWN ISSUES

- The `storage` module requires at least one empty FLASH page. It cannot be used with a firmware image that occupies all available FLASH space.
- The Watchdog reset status is cleared on system reset.
  HW issue. Can not be fixed.

INCOMPATIBILITIES

- The `NDEFT2T` module now implements the interrupt handler (function `NFC_IRQHandler`) for the NFC interrupts: when using `NDEFT2T`, you can no longer access them in your own application. Instead, you can use the newly added diversity settings `NDEFT2T_FIELD_STATUS_CB` and `NDEFT2T_MSG_AVAILABLE_CB` to get notified of all relevant changes regarding NFC.
  To use them define them in your `app_sel.h` header file, and implement the corresponding functions in your application code. This also hides away all technical difficulties in interpreting the different interrupts in the correct order, simplifying application logic.
- The diversity setting `NDEFT2T_COLLISION_DETECTION` in the `NDEFT2T` module is now disabled by default.

Only if your application relied on this feature explicitly, the diversity setting `NDEFT2T_COLLISION_DETECTION` has to be defined to `1` in your `app_sel.h` header file. Applications based on the `tlogger` firmware do not require any change.

CHANGES

- ndeft2t module
- tlogger demo application

BUG FIXES

- tlogger demo application
- wwdt driver
- documentation