CAN/LIN SDK for Windows

Release notes for the CAN/LIN SDK (Software Development Kit) supporting Windows 7/8/10/11 (32/64 bit). Related server versions of these desktop Windows operating systems are also supported. The package contains header files, libraries, language bindings, samples, documentation and tools utilizing the NTCAN architecture for Windows with the related API to successfully develop, debug and test applications using Classical CAN/CAN FD as well as LIN interfaces of esd electronics gmbh.

The following programming languages and environments are supported directly by the SDK:

- Microsoft® Visual C/C++
- Borland® C++ Builder
- MinGW (Minimalist GNU for Windows)
- Code::Blocks
- Microsoft® .NET Managed Code (C#, VB.NET, ...)
- Borland® Delphi
- Visual Basic 6
- PureBasic
- LabVIEW® 2010 / 2013 / 2014
- Python 3.9.x / 3.10.x / 3.11.x

In most cases creating language bindings to further programming languages which support the use of dynamic libraries can be easily implemented.

The following 3rd party applications are supported directly with wrapper libraries which integrate support for esd CAN hardware in these applications:

- CAN in Automation (CiA) CANopen Conformance Test (CCT) with an implementation of the CANopen Test Interface (COTI) as a NTCAN based dynamic library.
- Open DeviceNet Vendors Association (ODVA) DeviceNet Protocol Conformance Test Software with an implementation of a NTCAN based dynamic library.
  To work with your custom application or the SDK tools you either have to install the CAN hardware and operating system dependent device driver on the target machine and/or you choose to install the virtual CAN device driver which comes with this SDK.

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Microsoft ended the support to allow in-house cross-signing of device driver
code. For this reason it is no longer possible for esd to release new or updated
device drivers for Windows 7, Windows 8 and Windows 8.1 based systems starting
with CAN SDK V7.0.0 !
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Revision History

Listed below are the improvements, changes and fixes between different releases of the SDK in reverse chronological order.

Changes which are considered to be very important are highlighted.

Release 7.1.0

Release date: 2023-08-15

- **Installation:** Show explicit indication if the Virtual CAN driver is not installed because the Windows version is too old instead of skipping the installation silently.
- **Documentation:** Updated the NTCAN-API manual to version 5.7.
- **Tool:** Update of CANreal to revision 8.7.3.
  - Support to run as a LIN bus monitor for LIN enabled hardware.
  - Support to configure the *Disable Automatic Retransmission* (DAR) feature if the feature is available for the CAN hardware.
  - Improved logging support.
- **Tool:** Updated 'cantest to revision 3.1.10.
  - Indication of hardware order number and VCS version in overview.
  - Indication of TERM and GPIO mode in overview.
  - Support for additional transceiver types.
  - Fixed broken decoding of busload event.
- **Tool integration:** CANopen Test Interface (COTI) updated to revision 2.0.5.
  - Changed from blocking to non-blocking transmit operation in *COTI_TransmitObj()*.
  - Fixed calling *COTI_InitCan()* with index 5 (50 KBit/s), 6 (20 KBit/s) and 7 (10KBit/s) leads to the configuration of wrong bitrates.
- **Header:** Updated NTCAN-API Header.
  - New event EV_GPIO_DATA to leverage the GPIO support.
  - New type NTCAN_GPIO_CFG and defines NTCAN_GPIO_XXX to configure embedded GPIO channels with NTCAN_IOCTL_GET/SET_GPIO_CFG. The availability of this optional feature is indicated with feature flag NTCAN_FEATURE_GPIO.
  - New defines NTCAN_TERM_XXX to control the programmable bus termination with NTCAN_IOCTL_GET/SET_TERM_CFG. The availability of this optional feature is indicated with feature flag NTCAN_FEATURE_PROG_TERM.
  - New members *gpio_ver*, *gpio_cfg* and *gpio_cnt* in struct NTCAN_INFO to reflect the GPIO configuration.
  - New members *order_number* in struct NTCAN_INFO as additional hardware identification.
  - Additional defines for transceiver types.
- **Library:** PyNTCAN V 2.3.0
  - Added support for Python 3.11.x (32-/64-Bit).
  - Removed support for Python 3.8.x (32-/64-Bit).

- **Library:** Updated PureBasic wrapper to V 3.7.
    - Added new member variables to NTCAN_INFO and NTCAN_BITRATE.
    - Added defines and types for GPIO support and configurable bus termination.
    - Added new transceiver type.

Release 7.0.0

Release date: 2023-01-02

- **General:** Initial release with support for *Local Interconnect Network* (**LIN**) enabled hardware which comprises:
  - Shared library NTLIN.DLL V1.1.2 for 32- and 64-bit Windows
  - NTLIN Application Developers Manual V1.0.0
  - Header and library files for C/C++ based application development
  - CLI example applications as source code and precompiled binaries:
    - LINMaster (V1.0.2): Example application to use an interface in LIN master mode.
    - LINSlave (V1.0.2): Example application to use an interface in LIN slave mode.
    - LINlog (V1.0.2): Example application to use an interface as a simple LIN bus logger.
    - LINMsel (V1.0.1): Example application to enable/disable the internal pull-up.
- **Driver:** Updated the virtual CAN driver to V4.2.0 which now has a minimum requirement of Windows 10 or higher (see description of Microsoft's current driver signing policy at the top of this document).
- **Installation:** The consecutive installation of different or identical versions of the CAN-SDK on the same developer workstation without explicitly uninstalling the previous version caused every time the creation of a new instance of the virtual CAN driver (if this optional support is enabled). This behavior is fixed with this version of the SDK.
- **Documentation:** Updated the NTCAN-API manual to version 5.6.
- **Header:** Updated NTCAN-API Header.
  - Set NTCAN_MAX_TX_QUEUESIZE/NTCAN_MAX_RX_QUEUESIZE back from 0x4000 to 0x3FFF as this is the internal limit of V2.x driver.
  - New member *ports_lin* in struct NTCAN_INFO to indicate the number of supported physical LIN ports on LIN enabled hardware.
  - New commands NTCAN_IOCTL_SET_DAR_MODE and NTCAN_IOCTL_GET_DAR_MODE to configure DAR behavior individually for arbitration lost and CAN transmit errors.
  - Enhanced and corrected comments.
- **Tool:** Updated 'cantest to revision 3.1.6.
  - Improved bitrate details presentation (test 84)
  - Indication of autobaud / self-test mode in overview.
  - Indication of configured DAR mode in overview.
  - Fixed baudrate constant 'auto' is passed to driver as numerical baudrate value.
  - Fixed *msg_lost* counter of CMSG, CMSG_T and CMSG_X not handled properly in dumping message if data is received in Rx object mode.
- **Tool:** Update of CANplot to revision 2.8.1.
  - Support for a "Bare Plot View" option to show plots without window decoration.
  - Several UX enhancements.
- **Tool:** Update of CANreal to revision 8.7.1.

    - (CAN FD) bit rate 1000/8000 available in drop-down list
    - Bitrate Configurator
        - New configuration actions: "Restore default bitrates" and "Remove entries"
        - Bit rates 125 kBit/s und 250 kBit/s can now be selected for the CAN FD data phase.
        - Identical numerical bitrates possible (with warning)
    - Fixed errors importing send list.
    - Several UX enhancements and embedded manifest with "Visual Style" definition.
- **Library:** Updated PureBasic wrapper to V 3.4.
    - Added missing defines for new controller types
    - Use different NTCAN_MAX_RX_QUEUESIZE and NTCAN_MAX_TX_QUEUESIZE definitions for Windows and Linux.
    - Added defines for DAR support.
    - Added TDC macros.
    - Fixed using "ntcan64.dll" on 64-bit Windows.

Release 6.4.1

Release date: 2022-05-30

- **Documentation:** Updated the NTCAN-API manual to version 5.5.
- **Header:** Updated NTCAN-API Header.
  - Added new meta data flag NTCAN_DAR to enable frame based transmission without automatic retransmission if supported by the CAN hardware.
  - Added defines NTCAN_BAUDRATE_FLAG_DAR for *canSetBaudrateX()* to enable global transmission without automatic retransmission if supported by the CAN hardware.
  - Added defines NTCAN_FEATURE_DAR and NTCAN_FEATURE_DAR_FRAME.
- **Tool:** Updated 'cantest to revision 3.1.4.
  - Show configured TX TS window and TDC filter size.
  - Added support to configure TDC.
  - Added support transmitting CAN messages in DAR mode.
  - Fixed erroneous indication for required FW updates.

Release 6.4.0

Release date: 2021-12-16

- **Installation:** Updated InnoSetup installer to V6.x so this version of the CAN SDK can no longer be installed on Windows XP and Vista. Install a previous version of the SDK if you have to support these legacy Windows platforms.
- **Tools:** All binaries are no longer dual signed but only now only signed with a (SHA-2) EV certificate.
- **NTCAN.NET:** Updated to V 2.2.0
  - Added CAN FD support.
  - Assemblies are deployed for .NET Framework 3.5 and .NET Standard 2.0.
  - Migrated example project to a VS 2017 solution.
  - Installation: Instead using a separate MSI installer the binaries are stored in the CAN SDK installation folder and the example projects in the UserData folder.
  - Refer to the NTCAN.NET specific release notes for a detailed list of all changes.
- **Documentation:** Updated the NTCAN-API manual to version 5.4.
- **Tool:** Update of CANreal to revision 8.5.8.8.
  - Support to sort columns in log file viewer
  - Implemented "Find" dialog box non-modal and improved performance of search operations.
  - Fixed calculation of CAN FD statistical data.
  - Added additional tool tips in bitrate configurator dialog.
  - Improved performance, stability and robustness.
  - Improved internal plugin for CAN FD data.
  - Internal DBC-plugin:
    - Added support for tooltips with signal description.
    - Fixed errors decoding data.
    - Improved performance.
  - Fixed errors importing logfiles.
  - Improved consistency of GUI.
- **Tool:** Update of CANplot to revision 2.8.0.
  - Added CAN FD support (Live and offline charts)
  - Renamed `Data|Save/Open` into `Data|Load/Save Plot Snapshot` for clarification.
  - Several minor GUI Enhancements
- **Tool:** Update of CANrepro to revision 2.2.0.
  - CAN FD support
  - Several minor GUI Enhancements
- **Tool:** Updated COBview to revision 4.0.8.
  - New entry/option "Fill subindex list for write only access"
  - New configurable "Read back after write" option in write dialogue.

    - Several minor GUI Enhancements
- **Documentation:** Updated the (English/German) CANscript manual to version 1.4.
- **Header:** Updated NTCAN-API Header.
    - Include the <stdint.h> which comes with the installation for VS 2013 and later.
    - Prevent warnings if compiled with GCC7 and later and added CLANG support.
    - Include the <stdint.h> which comes with the installation for VxWorks 6.8 and later an added define NTCAN_CLEAN_NAMESPACE for VxWorks 6.x and later.
    - Added LIN specific canOpen() mode flags NTCAN_MODE_LIN_XXX.
    - Added defines define NTCAN_CANCTL_CAST, NTCAN_CANCTL_LIN, NTCAN_CANCTL_MSAM and NTCAN_TRX_SN65HVD230 to distinguish hardware on new devices.
    - Extended NTCAN_GET_TDC_XXX macros to support 7 instead of 6 bit values and added NTCAN_SET_TDC_F macro to support TDC filter configuration of MCAN based CAN FD controller.
    - Use reserved member in NTCAN_INFO for the frequency of the driver internal SW timestamp resolution.
    - Added defines NTCAN_BAUDRATE_FLAG_TXP/NTCAN_FEATURE_TX_PAUSE.
    - Added define NTCAN_FORMATEVENT_SHORT to format events.
    - Added defines NTCAN_TDC_FLAG_XXX and macros NTCAN_GET_TDC_XXX / NTCAN_SET_TDC_XXX for the TDC related IOCTLs.
    - Use reserved member of NTCAN_BAUDRATE_X for new member *tdc* of new data type NTCAN_TDC_CFG which is valid if new flag NTCAN_BAUDRATE_FLA_TDC is set to get/set the TDC configuration.
- **Tool:** Updated cantest to revision 3.1.0.
    - Support for additional transceiver and CAN controller types.
    - Added the platforms high resolution timestamp frequency in device overview.
    - Set default bitrate of CAN FD communication tests always to 500K:2M.
    - Improved presentation of configured/measured TDC values.
- **Library:** Updated PureBasic wrapper to V 3.0.
    - Added some missing defines.
- **Library:** LabVIEW®
    - Added LabVIEW® 2014 (64-Bit) support.
    - Added CANopen Tiny Manager for LabVIEW®2013 to support the CANopen protocol with LabVIEW.
- **Library:** Updated PyNTCAN support to V 2.3.0
    - Optimized output with a fix for an internal possible buffer overrun for CMSG_T::str()
    - Fixed initial value of CIF::ext_filter was undefined after creation of a CIF object.
    - Added support for Python 3.8.x, 3.9.x and 3.10.x (32-/64-Bit) and removed support for previous 3.x versions. Note: Starting with Python 3.10 the NTCAN-API support is packaged as *wheel* instead as a Windows based installer.
    - Phased out Python 2.x support.

Release 6.3.0

*Release date: 2019-07-25

- **Documentation:** Updated the NTCAN-API manual to version 5.3.
- **Library:** PyNTCAN
  - Added support for Python 3.7.x (32-/64-bit)
  - Removed support for Python 3.6.x.
- **Library:** Updated PureBasic wrapper to V 2.9.
  - CAN FD support added.
- **Tool:** Update of CANreal to revision 8.5.6.
  - GUI improvements.
  - Increased stability and robustness.
- **Tool:** Update of CANrepro to revision 2.1.3.
  - Minor GUI improvements/changes
  - Change to classic design on Windows 10 to prevent incompatibilities with latest releases.
- **Tool:** Update of CANplot to revision 2.7.2.
  - Data mask extended on all data types (and not just 8 bit values)
  - Save/restore of new/old projects
  - Indicate error position at startup if position + length exceeds Classical CAN frames payload
  - Missing data from old projects restored implicitly
  - Synchonization of time axis with first data source
  - Fixed problem with data plotted out of visible canvas with long-term measurements.
  - GUI improvements:
    - Start/Stop icons
    - Mouse click near a point shows index
    - Several minor improvements.
  - Change to classic design on Windows 10 to prevent incompatibilities with latest releases.
- **Tool:** Update of CANscript to revision 2.0.5.
  - Minor GUI improvements/changes
  - Change to classic design on Windows 10 to prevent incompatibilities with latest releases.
- **Documentation:** Updated the (English/German) CANscript manual to version 1.3.
- **Tool:** Updated cantest to revision 3.0.11.
  - Added warning if FD baudrate on cmdline is ignored
  - Don't show TDC for Classical CAN interfaces.
- **Header:** Updated NTCAN-API Header.
  - New defines NTCAN_BOOL and NTCAN_NO_HANDLE.
  - New feature flag NTCAN_FEATURE_LIN to indicate LIN supported hardware.

- If NTCAN_NO_AUTOLINK is defined at compile/link time on Windows and RTX/RTX64 the (default) implicit linkage with ntcan.lib is disabled.
- New mode flags NTCAN_MODE_LIN_XXX for canOpen().
- New commands NTCAN_IOCTL_TX_OBJ_DESTROY_X, NTCAN_IOCTL_GET_TX_MSG_COUNT and NTCAN_IOCTL_RESET_CTRL_EC for canIoctl().
- New defines NTCAN_ECC_XXX and NTCAN_ECC_ERROR_XXX macros to decode class, direction and detail of SJA1000/ESDACC Error Code Capture (ECC) values.
- New error codes NTCAN_NO_XXX_CAPABILTY returned if CAN net is opened in LIN mode and vice versa.
- New diagnostic variable dma_stall in struct EV_CAN_ERROR.

- **Library:** Updated PyNTCAN support to V 2.2.0
  - Added support for Python 3.6.x and removed support for all previous 3.x versions.
- **Sample:** Extended sample source code caneei.c with additional comments to generate errors with the ESDACC Error Injection Units.

Release 6.2.0

*Release date: 2018-06-15

- **Documentation:** Updated the NTCAN-API manual to version 5.2.
- **NTCAN.NET:** Updated to V 2.1.5
  - Fixed calling CanMessageTs.Identifier setter changed every message into the type 'CanMessage.Data'.
  - Added property CanMessageTs::InteractionMessage(), public member CanMessageTs::Clear() and CanMessageTs::Init() to make the API orthogonal to struct CanMessage.
- **Library:** Added support for Python 2.7.x and Python 3.6.x.
  - Initial support for 64-Bit versions of Python.
  - Phased out the support for all previous Python 2.x and 3.x versions.
- **CLI Tool:** Updated cantest to revision 3.0.7.
  - Send reference frame for tests 20/21 and 60/61 to validate initial Tx delay
  - Made compilable again with Linux non CAN-FD libs.
  - Support for additional transceiver types.
- **Library:** Updated PyNTCAN support to V 2.2.0
  - Added support for Python 3.6.x and removed support for all previous 3.x versions.
  - Added support for Python 2.7.x and removed support for all previous 2.x versions.
- **Header:** Updated NTCAN-API Header.
  - Added support for new C402 transceiver types.
  - Added missing prototyp for _rotl8() if compiled for x86 with WDK 7.1 header.

Release 6.1.0

*Release date: 2017-09-01

- **Installation and Tools:** All binaries are now signed with a (SHA-2) EV certificate using dual signing which With the support of CAN FD in addition to Classical CAN this version of the CAN SDK can no longer be installed on Windows 2000. Install a previous version of the SDK for support on this legacy Windows platform.
- **Tool:** Update of CANreal to revision 8.5.2.
  - New bitrate configurator dialog.
  - Application icon changed to a new modern flat design.
  - Added manifest to make application Visual styles aware.
  - Several visual, usability and stability improvements.
- **Documentation:** Updated the (English/German) CANreal manual to version 3.2.
- **Tool:** Updated COBview to revision 4.0.7.
  - Improved abort criteria for sub element listing.
  - Application icon changed to a new modern flat design.
  - Added manifest to make application Visual styles aware.
  - Internal changes and improvements.
- **Tool:** Updated CANrepro to revision 2.1.1.
  - Application icon changed to a new modern flat design.
- **Documentation:** Updated the (English/German) CANrepro manual to version 1.2.
- **Tool:** Updated CANplot to revision 2.6.1.
  - Support to define numerical bit rates and "No/Existing" bit rate.
  - Restore previous window position and configuration.
  - Support drag'n'drop to application window to open project of import file.
  - CAN network list adapted dynamically to changes during application runtime.
  - Currently unavailable CAN nets are kept unchanged in the project instead of being removed implicitly.
  - Reduced OS ressource (handles/threads) usage.
  - Application icon changed to a new modern flat design.
- **Documentation:** Updated the (English) CANplot manual to version 1.5.
- **Tool:** Updated CANscript to revision 2.0.3.
  - Application icon changed to a new modern flat design.
  - Example scripts use common code base for Python 2.x and Python 3.x
- **NTCAN.NET:** Updated to V 2.1.3
  - Fixed number of transmitted messages with canPort::canSend() / canPort::canSendT() and canPort::canWrite() canPort::canWriteT() are not copied back to calling application.

    - The assemblies are dual signed with a SHA-256 based signature (EV certificate) with a SHA-1 digest as well as a SHA-256 digest. User mode support for dual signed binaries requires Windows XP SP3 or later.
- **CLI Tool:** Updated cantest to revision 3.0.4.
    - Corrected meta data ASCII interpretation for object mode handle.
    - Added missing indication of data bitrate in initial overview message.
    - Wait before closing a handle for all non-blocking ransmissions and not just for test 0.
    - Support numerical values for bit rates.
    - Validate bit rate configuration for CAN FD tests.
    - Fixed format strings for object mode frame print.
- **Header:** Updated NTCAN-API Header.
    - Prevent include of <intrin.h> before VS2005.
    - Fixed include of <intrin.h> fails with some VS version if inside an extern "C" declaration.

Release 6.0.0

Release date: 2016-11-11

- **Installation:** With the support of CAN FD in addition to Classical CAN this version of the CAN SDK can no longer be installed on Windows 2000. Install a previous version of the SDK for support on this legacy Windows platform.
    - **Driver:** Updated the virtual CAN driver to V4.0.3 which now emulates a CAN FD controller (ESDACC) instead of a Classical CAN controller.
    - **Documentation:** Updated the NTCAN-API manual to version 5.0 with description of the CAN FD related API enhancements and changes.
    - **Tool:** Update of CANreal to revision 8.3.9.
        - New Search menu with Goto, Find and Bookmarks.
        - CANopen-Plugin now integrated into DBC-Plugin.
        - Enhanced statistic values for CAN FD.
        - Several improvements for the CAN FD support.
        - Fixed configuring wrong bit rate values on C331 family if 800KBit/s and 83.3 KBit/s are selected.
        - Check for bit rate errors of more than 0.5 % for calculated numerical bit rates.
        - New Search menu with Goto, Find and Bookmarks.
        - Some ECC register descriptions corrected.
        - Several visual, usability and stability improvements.
    - **CLI Tool:** Updated cantest to revision 3.0.0 with CAN FD support.
    - **Header:** Updated NTCAN-API Header to fully support CAN FD I/O.
        - Common header <ntcan.h> for all supported operating systems and compiler.
        - Definition of CMSG_X and EVMSG_X data types for CAN FD messages with up to 64 bytes of data.
        - Added canSendX() / canWriteX() / canTakeX() / canReadX() / canGetOverlappedResultX() to transmit and receive CAN FD messages.
        - Definition of NTCAN_BAUDRATE_X to get/set a CAN FD bit rate with canSetBaudrateX() / canGetBaudrateX().
        - Added new meta data flags in the len parameter of the CAN message structures for CAN FD.
        - Added NTCAN_BAUD_XXX defines for the CAN FD data phase (2 MBit/s, 4 MBit/s, 5 MBit/s, 8 MBit/s and 10 MBit/s).
        - Added support to get/set CAN FD Transmitter Delay Compensation with new defines NTCAN_TDC_XXX.
        - Use reserved member in NTCAN_INFO for number of open handles.
        - Use reserved member in NTCAN_BUS_STATISTIC to count number of received/transmitted FD messages.
        - Use reserved member in NTCAN_BITRATE for bit rate details of the CAN FD data phase configuration.

        - New macros NTCAN_IS_FD, NTCAN_IS_FD_WITHOUT_BRS, NTCAN_LEN_TO_DATASIZE and NTCAN_DATASIZE_TO_DLC.
    - **Library:** Updated C library files for Microsoft Visual C/C++ for ntcan.dll 5.0.x.
    - **Library:** Added LabVIEW® 2010 support.
        - Exported and validated LabVIEW® 2013 VI Set (V13.3.3) for LabVIEW® 2010 (as V10.3.3).

Release 5.2.0

*Release date: 2016-06-16

- **Driver:** Added support to install an (optional) virtual CAN device driver.
    - **Documentation:** Updated the (English) CANplot manual to version 1.4.
    - **Documentation:** Updated the (German) CANplot manual to version 1.5.
    - **Installation:** Changed default component selection from 'Full' to 'Typical'.

Release 5.1.0

*Release date: 2016-04-28

- **Documentation:** Updated the (German) CANreal manual to version 3.1.
  - **CLI Tool:** Updated cantest to revision 2.12.6.
  - **Library:** Added support for Python 3.4.x.
  - **Samples:** Added example project to build cantest with the open source cross platform IDE Code::Blocks.
  - **NTCAN.NET:** Updated to V 2.1.2
    - CanPortMode gets assigned the attribute [FlagsAttribute] to allow bitwise operation (OR) for the values of this enum.
    - Fixed calling CanMessage.Identifier setter changed every message into the type 'CanMessage.Data'.
    - Fixed exception in CanBitRate::BitRateValue() getter.
    - Fixed memory corruption during the implicit conversion of CanData into a byte[] array.
    - Fixed passing CanBitRate(CanBitRateTable.None) to CanPort::Bitrate() does not throw an exception.
    - Fixed possible race condition between CanPortAsync::Close() and worker thread which might cause an unhandled exception.

Release 5.0.0

Release date: 2015-11-25

- **Installation:** Restructured start menu layout which requires (implicit) removal of a previous version.
    - **Installation:** Application specific data now stored in AppData folder and example files in the UserData folder.
    - **Documentation:** Updated the (English) CANreal manual to version 3.1.
    - **Documentation:** Added the (English) Error Injection Tool manual version 1.0.
    - **Tool:** Added the ESDACC Error Injection Tool V1.14.
    - **Tool:** Added console application caneei V 0.1.5 (x86/x64)
    - **Sample:** Added sample source code caneei.c to use the ESDACC Error Injection Units.

Release 4.5.0

*Release date: 2015-10-15

- **Installation:** Update of the installer to support Windows 10.
  - **Documentation:** Updated the NTCAN-API manual to version 4.7.
  - **Tool:** Major update of CANreal to revision 8.2.3.
    - Support for CAN DBC files via an integrated internal plugin with a signal view.
    - Runtime of logging CAN messages is indicated in the status bar.
    - Load/Save profile settings are now separate entries of the menu.
    - New menu entry "Reset settings and view to default".
    - Improved the robustness of the CAN log file import or conversion.
    - Prevent that converting CAN log files implicitly overwrites existing files.
    - Support for modern visual style on Windows Vista and later.
    - Fixed number of indicated lost frames might be wrong in the status bar.
    - Internal changes and enhancements.
  - **CLI Tool:** Updated cantest to revision 2.12.5.
    - Adapted to previously wrong transceiver type indication.
    - Added LynxOS support.
    - Fixed regression in previous release which failed to execute on Windows XP x64 version.
  - **Header:** Updated NTCAN-API Header
    - Fixed transceiver constant SN65HVD265 must be SN65HVD255.
    - Fixed data type of member tx_pattern_recessive in NTCAN_EEI_UNIT must be CAN_FRAME_STREAM instead of an array of uint32_t.
  - **IRIG-B:** Minor update of library to V1.0.1 with improved documentation.

Release 4.4.0

*Release date: 2015-04-07

- **Documentation:** Updated the NTCAN-API manual to version 4.6.
  - **Tool:** Updated CANreal to revision 6.9.1.
    - Support for IRIG-B time as reference for the absolute time if supported by the CAN hardware.
    - Clock symbol in info area to reflect the current IRIG-B state
    - Added support to optionally show the complete date in the absolute time column.
    - Added support to optionally show the time zone in the absolute time column.
    - Added optional CAN-FD support (via Plug-In).
    - Internal changes and enhancements.
  - **CLI Tool:** Updated cantest to revision 2.12.4.
    - Support to indicate the CAN transceiver type if supported by the CAN device driver.
    - Indicate CAN device requires FW update in help() text if indicated by the CAN device driver.
  - **Header:** Updated NTCAN-API Header
    - Use reserved member in NTCAN_INFO for transceiver type.
    - Added definitions for CAN transceiver types NTCAN_TRX_XXX.
    - Added definitions for board status NTCAN_BSTATUS_XXX.
    - Use reserved member of NTCAN_EEI_UNIT to define a repeat count for the error injection unit.
    - Use reserved member of NTCAN_EEI_STATUS to return trigger timestamp and repeat count of the error injection unit.
  - **Library:** Updated PureBasic wrapper to V 2.7.
  - **IRIG-B:** Added VS2005 project file and missing header to build IRIG-B example.
  - **NTCAN.NET:** Updated to V 2.1.0
    - Support for the Tx object mode with the new classes CanTxObject and CanTxObjectCollection.
    - New properties CanPort.TimestampedTxWindow and CanPort.TimestampedTxTimeout
    - New methods CanPort.SendT(), canPort.WriteT() and canPort.ToTimestamp().
    - Added CanPortMode.TxObjectMode
    - CanMessageTs.Timestamp can now be set.
    - New CanPortFeatures flags 'Pxi' and 'CanFd'.
    - Added example code to demonstrate the support of the Tx Object Mode (Scheduling and Auto RTR) and the Timestamped Tx Mode.
    - Extend the CanMonitor example to optionally enable the listen only mode.
    - Renamed CanPortFeature 'IdRanges' into 'SmartIdFilter'.

Release 4.3.0

*Release date: 2014-09-12

- **Documentation:** Updated the NTCAN-API manual to version 4.5.
  - **Tool:** Updated CANreal to revision 6.8.0.
    - New option to include bus statistic in logfile.
    - Added send list with Timestamped Tx support.
    - The configuration to mark the sent CAN frames is now persistent between application starts
    - Fixed issues with CAN bus statistic on some devices.
    - Internal changes and enhancements.
  - **Documentation:** Updated the (German) CANreal manual to version 3.0.
  - **Tool:** Updated CANplot to revision 2.5.2.
    - Added support for the CAN baudrates 83,3 KBit/s, 800KBit/s and 1600 KBit/s.
    - Added support to configure CAN controller BTR register directly.
    - Support re-ordering of plots (via drag'n'drop in the row header)
    - Support to show/hide the legend.
    - Force dialog to save a modified project on exit.
    - Fixed new plot is not inserted correctly in 'Value' and 'Style'
    - Fixed selection via context menu.
  - **Documentation:** Updated the (German) CANplot manual to version 1.4.
  - **Tool:** Updated CANrepro to revision 2.1.0.
    - Added support for CAN hardware with Timestamped Tx capabilities for an improved timing accuracy.
    - Added support for the CAN baudrates 83,3 KBit/s, 800KBit/s and 1600 KBit/s.
    - Added support to configure CAN controller BTR register directly.
    - Column width made configurable.
    - Start with LRU directory in file dialogs.
  - **Tool:** Updated CANscript to revision 2.0.3.
    - Fixed a problem detecting the Python installation.
  - **Tool:** Updated COBview to revision 4.0.4.
    - Internal changes and improvements.
  - **CLI Tool:** Updated cantest to revision 2.12.2.
    - Support for NTCAN_INFO.
    - New tests for the forthcoming CAN FD support.
  - **Header:** Updated NTCAN-API Header
    - Definition of NTCAN_INFO type and new IOCTL NTCAN_IOCTL_GET_INFO for extended device and driver information.

        - Definition of new feature flag and IOCTLs for the forthcoming CAN FD support.
    - **Library:** Updated LabVIEW® support.
        - Update LabVIEW NTCAN VIs to Version 13.3.3
            - Fix in labview_can.dll for mixed VI usage with NTCAN VIs and signal based VIs.
            - Added new examples for PDO and simple SDO request.
            - New VI icons.
            - Added new VIs and examples for LabVIEW NTCAN Error Injection.
        - Updated LabVIEW IRIG-B VIs to version 13.2.0
            - New VI icons.

Release 4.2.0

*Release date: 2013-11-20

- **Tool:** Updated CANreal to revision 6.7.1.
  - Support for the Smart-ID Filter feature which allows CAN-ID filter configurations with individual non consecutive 29-bit IDs in the same way as for 11-bit IDs.
  - Drag'n'drop of a CANreal logfile creates a new instance.
  - Added example CANreal plugins with source code.
  - Documentation: Updated the (English) CANreal manual to version 3.0.
- **Tool:** Updated CANplot to revision 2.2.9.
  - Added command line option --start which monitors bus activity without further manual interaction.
  - Added 29-bit CAN-ID filter.
  - Fixed problems importing data.
  - Fixed problems with invalid re-scaling of data under certain conditions.
- **CLI Tool:** Updated cantest to revision 2.11.6.
  - Minor fixes.
- **Library:** Updated LabVIEW® support.
  - Updated to support LabVIEW® 2013 (Support for previous LabVIEW® versions on request)
  - Update LabVIEW NTCAN VIs to Version 13.2.0
    - Added new SubVIs for configuration and evaluation of CAN frames.
    - Updated example VIs
  - Added IRIG-B VIs with examples (Version 13.1.1).
- **Library:** Updated PureBasic wrapper to V 2.6.
- **NTCAN.NET:** Updated to V 2.0.1
  - Added definitions CanPortMode.NoData and CanPortMode.NoRTR.
  - Minor fixes (see product release notes for details).

Release 4.1.0

Release date: 2013-08-09

- Installer of the Microsoft® .NET class library NTCAN.NET included as component of the CAN SDK.
    - **Installation:** Prevent the installed shortcuts to the SDK documentation from being automatically pinned the Windows 8 Start screen.
    - **Documentation:** Updated the NTCAN-API manual to version 4.4.
    - **Documentation:** 3rd party licensor notice document updated.
    - **Tool:** Updated CANreal to revision 6.4.1.
        - Improved File/Goto dialogue to navigate in CAN bus log.
        - New dialogue File/Logfile Headers to display meta information of a CAN bus log file.
        - New dialogue CAN/Enable Protocol IDs/CANopen to simply configuration of the 11-bit ID filter for CANopen networks.
        - New dialogue CAN/Acceptance 29-bit to allow the configuration of a 29-bit CAN-ID filter based on a combination of an acceptance code and an acceptance mask.
        - Support to open saved log file in csplog format with double click in file manager or drag'n'drop of the file on the main window.
    - **CLI Tool:** Updated cantest to revision 2.11.3.
        - Add controller state information to CAN interface overview.
        - Support for new target platform On Time RTOS-32.
        - Change from static globals to dynamic memory allocation.
        - Added support for some more NTCAN API entries being loaded dynamically (if supported on the platform).
    - **Header:** Updated NTCAN-API Header
        - Increased definitions of NTCAN_MAX_TX_QUEUESIZE/NTCAN_MAX_RX_QUEUESIZE from 2047 to 16383 which reflects the internal driver limits.
        - Definition of new feature flags for Timestamped Tx and PXI support.
        - Definition of new mode flag for canOpen() to support Timestamped Tx.
        - Definition of new commands for canIoctl() to support the Timestamped Tx mode.
    - **Library:** Updated PyNTCAN support to V 2.1.0
        - Definition of missing NTCAN feature and mode flags.
        - Definition of constants for default bitrates NTCAN_BAUD_XXX.
        - Added support for Python 3.3.x and phased out support for versions before 2.6.x.
    - **Library:** Updated PureBasic wrapper to V 2.5.
    - **Library:** Updated LabVIEW® 2010 support to Rev. 1.0.

Release 4.0.0

Release date: 2012-12-12

- **Installation:** The change from the Qt3 to the Qt4 framework used by some tools forced an implicit uninstall of a previous installed SDK version.
    - **Installation:** With the change of the Qt framework and an update of the installer to support Windows 8 this version of the CAN SDK can no longer be installed on Windows 9x/ME and Windows NT. Install the previous version of the SDK for support on these legacy Windows platforms.
    - **Installation:** Fixed wrong link to NTCAN-API manual in Windows Start Menu.
    - **Tool:** Updated CANplot to revision 2.2.4.
        - Update of Qt framework.
    - **Tool:** Updated CANrepro to revision 2.0.1.
        - Update of Qt framework.
    - **Tool:** Updated CANscript to revision 2.0.2.
        - Update of Qt framework.
    - **Documentation:** Updated the NTCAN-API manual to version 4.2.
    - **Documentation:** Updated the (German) CANreal manual to version 2.5.
    - **CLI Tool:** Updated cantest to revision 2.11.1.
        - Add controller state information to CAN interface overview.
        - Support for new target platform On Time RTOS-32.
        - Change from static globals to dynamic memory allocation.
        - Added support for canSendT()/canWriteT().
    - **Header:** Updated NTCAN-API Header
        - Definition of new CAN controller types.
    - **Library:** Updated PureBasic wrapper to V 2.4.
    - **Library:** Removed LabVIEW® 6 support from SDK.

Release 3.1.0

*Release date: 2012-08-16

- **Tool:** Updated CANreal to revision 6.1.2.
  * More details about bus errors if extended diagnostic is supported by CAN hardware.
  * Restore last window position on startup.
  * Fixed display errors on Windows 7 and Windows Vista for designs with increased font size.
  * Fixed error in log file header.
  - **Tool:** Updated COBview to revision 4.0.3.
    - Restore last window position on startup.
    - Fixed display errors on Windows 7 and Windows Vista for designs with increased font size.
  - **Documentation:** Updated the English NTCAN-API manual from V3.0 to the completely revised version 4.1. Removed the German version of this manual.
  - **Documentation:** 3rd party licensor notice document updated.
  - **Header:** Updated NTCAN-API Header
    - Support for new macros NTCAN_DLC, NTCAN_DLC_AND_TYPE, NTCAN_IS_RTR and NTCAN_IS_INTERACTION
    - Fixed wrong signature of typedef PFN_CAN_FORMAT_EVENT.
  - **Library:** Integration of support for LabVIEW® 2010 into the SDK.
  - **Library:** Integration of support for PureBasic (Wrapper V 2.3) into the SDK.
  - **Tool integration:** CANopen Test Interface (COTI) updated to revision 2.0.3.
    - Use value configured with COTI_SetTimeout() as timeout for COTI_RequestObj().
  - **IRIG-B:** Integration of libraries, header and documentation into the SDK to support the IRIG-B time protocol hardware option on esd PMC-CAN/400 and CPCI-CAN/400.

Release 3.0.0

*Release date: 2012-03-18

- **Tool:** Updated CANreal to revision 6.0.2.
  - Changed and improved GUI usability and speed (Fast scroll option)
  - Improved list view
    - Maximum back scroll size increased to 5000000 messages.
    - Option to sort statistic view based on the columns.
    - Multiple row selection.
    - Extended context menu with "Copy to Clipboard", "Save Frames" and "Insert into Send List"
    - "Save Frames" without automatic text conversion.
    - Tool tips
  - Integrated statistic view
  - Integrated busload graph
  - Added 3rd party plugin support
  - Support to load log files.
  - Improved search with Goto dialog and new search criteria (ASCII text, NTCAN events, ID mask)
  - Improved trigger support with new trigger conditions (NTCAN events) and Auto-Restart-Trigger / Continuous Trigger.
  - Fixed several minor issues and increased overall performance.
  - **Tool:** Updated CANrepro to revision 1.0.7.
    - Fixed playback did not start with 1st frame.
  - **Tool:** Updated CANplot to revision 1.0.9.
    - Offset and scale of a plot can be configured dynamically.
    - Added support for baud rate selection based on BTR register.
    - Fixed several minor issues.
  - **Tool:** Provide example scripts for CANscript in Python 2.x and Python 3.x versions.
  - **Tool:** Updated COBview to revision 4.0.2.
    - Fixed SDO request to data type DOMAIN with more than 1024 bytes returned not all data.
  - **CLI Tool:** Updated cantest to revision 2.10.3.
    - Support for many new features of the ntcan.dll V 4.6.x.
    - Fixed linkage of 64-Bit binary version to non existed ntcan64.dll.
  - **Documentation:** Revised and updated most READMEs.
  - **Documentation:** 3rd party licensor notice document added.
  - **Header:** Updated NTCAN-API Header
    - Support for new features of ntcan.dll V 4.6.x

        - Added modifications to support the Minimalist GNU for Windows (MinGW) project.
    - **Library:** Updated C library files for Microsoft Visual C/C++ and Borland C/C++ for ntcan.dll 4.6.x.
    - **Library:** PyNTCAN support for Python 2.6.x, 2.7.x, 3.1.x and 3.2.x integrated into SDK.
    - **Library:** Fixed some issues in Borland Delphi support (V2009 and later).
    - **Tool integration:** CANopen Test Interface (COTI) updated to revision 2.0.2.
        - Synchronize Rx/Tx operations to prevent wrong sequence of request/response frames.
    - **Tool integration:** Added shared library (V0.3.2) to CAN-SDK to support esd CAN hardware in the official ODVA DeviceNet Protocol Conformance Test Software..

Release 2.0.1

*Release date: 2007-07-18

- **Tool:** Updated CANreal to revision 4.3.3.

Release 2.0.0

*Release date: 2007-06-14

- **Installation:** Changed installer to InnoSetup for Vista and Windows 64-bit support.
- **Installation:** Installation supported in English and German.
- **Installation:** Installed binaries, shared libraries and the installer itself are digitally signed.
- **Tool:** Replaced CAN-Bus monitor CANscope with improved version CANreal revision 4.3.2.
- **Tool:** Integrated new tool CANrepro revision 1.0.5 to 'play back' CAN communication 'recorded' with CANreal in SDK.
- **Tool:** Integrated new tool CANplot revision 1.0.1 for draw line graphs of CAN data in SDK.
- **Tool:** Integrated new tool CANscript revision 1.0.2 (Python based scripting front-end) in SDK.
- **Tool:** Updated COBview to revision 3.0.0.
- **CLI Tool:** Updated cantest to revision 2.8.9.
- **CLI Tool:** Integrated 64-bit version of cantest in SDK.
- **Tool:** Removed CANbatch and CANTestWin (GUI version) from SDK.
- **Documentation:** NTCAN-API documentation and all tool manuals included in CAN SDK.
- **Header:** Updated NTCAN-API Header to support new features of ntcan.dll V 4.1.x and type safe data types for 64-bit development.
- **Library:** Updated C library files for Microsoft Visual C/C++ and Borland C/C++ for ntcan.dll V 4.1.x.
- **Library:** Support for Borland Delphi integrated into SDK.
- **Library:** Support for LabVIEW® 6 integrated into SDK.
- **Library:** Support for Python 2.3.x, 2.4.x and 2.5.x integrated into SDK.
- **Tool integration:** CANopen Test Interface (COTI) compatible library (V2.0.0) according to CiA 310 added to CAN-SDK to support esd CAN hardware in the CANopen conformance test.
- **Samples:** Out of the box working projects for Visual Studio 6, Visual Studio 2003.NET, Visual Studio 2005 and Borland C++ Builder.

Release 1.3.0

Release date: 2002-06-12

- **Installation:** Switched to MSI based installation.
- **Tool:** Updated CAN-Bus monitor CANscope to revision 1.2.7
- **CLI Tool:** Updated cantest to revision 2.6.1
- **Tool:** New CANopen specific tool COBview in revision 2.1.0
- **Header:** Updated NTCAN-API Header to support ntcan.dll V 2.3.x feature and newer.
- **Library:** Updated C library files for Microsoft Visual C/C++ and Borland C/C++ for ntcan.dll V 2.3.x.

Release 1.2.0

*Release date: 2000-03-13

- **Tool:** Updated CAN-Bus monitor CANscope to revision 1.2.1
- **CLI Tool:** Updated cantest to revision 2.4.4
- **Header:** Updated NTCAN-API Header with support for CAN 2.0B and new entry canGetBaudrate()
- **Library:** Updated Visual C library file to ntcan.dll V 1.5.x
- **Library:** Updated Borland C library file to ntcan.dll V 1.5.x
- **Sample:** Extend Visual Basic example with stubs for canGetBaudrate()

Release 1.1.0

*Release date: 1999-10-29

- **Tool:** Integrated new tool CANbatch in revision 1.1.0
- **Tool:** Integrated new tool CANTestWin (GUI version) in revision 1.0.0
- **Sample:** Added Visual Basic example

Release 1.0.5

*Release date: 1999-03-17

- Initial installer based release which is common for Windows 9x and Windows NT
- **Tool:** CAN-Bus monitor CANscope revision 1.0.8
- **CLI Tool:** Added cantest revision 2.2.1
- **Header:** NTCAN-API header for ntcan.dll V 1.4.x
- **Library:** Library files supporting development with Microsoft Visual C/C++ and Borland C/C++.