Release Notes Linux OS Release 1.1.0 (we-wayland-qt6) for XD2

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1 Overview

This release contains the Linux OS 1.1.0 (we-wayland-qt6) for Topcon Electronics XD2 units. It is intended for all XD2 variants of series hardware revision. Details about the prerequisites to use this Linux OS release as well as the installation instructions are described in the following.

Purpose

This Linux OS release is a minor release for the XD2 hardware. This release supports prototype C and series hardware.

> ⚠ **Warning**
> Support for older XD2 prototype B and C samples has been dropped due to immense hardware changes. Do not install this Linux OS release on these units

Please refer to chapter "XD2 Linux OS release history 14" for a detailed list of changes.

Please refer to chapter "Known issues 23" for a list of known issues.

Audience

This Linux OS release is provided to all customers and Topcon Electronics development departments using XD2 units for development purposes.

This document is intended to all developers integrating software on an XD2 unit. It explains the steps how to update XD2 units to this new release and provides a list of known issues.

Scope

This Linux OS release contains a whole new operating system including a new Bootloader, Linux kernel and root file system for the supported XD2 units.

Applications are not part of this release. Updates to these packages are provided separately by Topcon Electronics.

Please refer to chapter "Supported Hardware 7" for a list of supported XD2 units.

References

This document is just a short description for the new features and changes of the corresponding Linux OS release. For details about the driver and API implementations as well as C/C++ programming samples and the FAQ please refer to the "XD2 C/C++ Developer Guide" provided along with this Linux OS release.

1.1 Safety instructions

> ✳ **Notice**
> Please read the complete document and these safety instructions carefully before applying any update to any XD2 unit.

> ⚠ **Warning**
> Please follow the instructions provided in this document carefully to update the Linux OS release on a XD2 unit. Wrong usage can lead to a none-operational state of the XD2 unit which can only be repaired by Topcon Electronics.

Warning
Only use software packages and files which are provided by Topcon Electronics and are contained in this release to update the Linux OS on any XD2 unit. The usage of wrong software packages can lead to a none-operational state of the XD2 unit which can only be repaired by Topcon Electronics.

Warning
The update process contains an MD5 checksum verification to check the integrity of each software package. Only use the provided MD5 checksum files along with the software packages. The usage of wrong MD5 checksum files can lead to a none-operational state of the XD2 unit which can only be repaired by Topcon Electronics.

Warning
Before applying any update to a XD2 unit please make sure that a possibly installed application package (e.g. PClient or CODESYS) is compatible with this Linux OS release. An update of the application package may be required to support this Linux OS release.

Notice
If a possibly installed application package is a self-developed C/C++ application, additional changes may be required to support this Linux OS release.

Warning
Before applying any update to a XD2 unit please make sure, that the XD2 hardware variant is supported by this Linux OS release.

Notice
If unsure on any of these points or in case that something goes wrong please contact Topcon Electronics for further information and support.

2 Platform

In general this Linux OS release is provided for the Topcon Electronics XD2 platform. All supported XD2 hardware variants as well as all older XD2 Linux OS releases supported for the update process are listed below.

> **⚠ Warning**
> All XD2 hardware variants not named here have to be treated as **not supported**!

2.1 Supported Hardware

This Linux OS release supports the following XD2 hardware variants:

- XD2 Small / Medium / Large / Widescreen Prototype C
- XD2 Small / Medium / Large / Widescreen series

2.2 Supported Linux OS releases for update process

This is a release for XD2 prototype devices. The described update process is only valid for the following XD2 Linux OS releases:

All the following older releases have support for series devices.

- XD2 Linux OS release 1.1.0 (Wayland/Qt6 (commercial or opensource))
- XD2 Linux OS release 1.0.0 (Wayland/Qt6)
- XD2 Linux OS release 0.5.x (Wayland/Qt6)
- XD2 Linux OS release 0.6.x (Wayland/Qt6)
- XD2 Linux OS release 0.5.x (Wayland/Qt6)

> **⚠ Warning**
> Older release versions do not support prototype C / series hardware. Using these releases will result in unexpected behavior on the XD2 unit.

3 Components

This Linux OS release contains a new operating system for the Topcon Electronics XD2 platform. The provided components of the release together with their version and license information are described below.

3.1 Versions

Release name and version

- XD2 Linux OS release 1.1.0 (Wayland/Qt6)

Component versions

- Bootloader: U-Boot 2022.04-xd2-1.1.0-1
- Linux kernel: Linux xd2 6.1.22-xd2-1.1.0-1
- Qt: 6.5.6   (commercial or opensource))
- COPRO: 1.0

3.2 License

This Linux OS release contains Free and open-source software (FOSS). According to the Open Source definition by the Open Source Initiative (https://opensource.org/osd) FOSS is software which is licensed by the respective holders of rights to everyone with extensive rights of use and without license fees and for which the source code is available. Please refer to the license folder provided along with this Linux OS release for a complete and detailed list of provided software packages and their corresponding licenses. Source code for FOSS components are delivered in the source folder provided along with this Linux OS release.

This Linux OS release also contains software components, which are licensed under commercial or proprietary licenses. These software components are also listed in the list of software components in the license folder.

This Linux OS contains a commercially licensed version of QT Framework. These software components are also listed in the list of software components in the license folder.

3.3 Directories and files

This Linux OS release contains the following directories and files.

3.3.1 Installation images

These images are intended to be installed directly to the XD2 target. They are located in the folder `images` within the Linux OS release folder.

Installation images	
File	**Description**
boot_xd2_1.1.0.bin	Boot container image for run-time OS provided by TELE in Linux BSP release.
boot_xd2_1.1.0.bin.md5	MD5 checksum file for boot container image.
copro_xd2_1.0.tar.gz	Firmware image package including the coprocessor images
copro_xd2_1.0.tar.gz.md5	MD5 checksum file for firmware image package
rootfs_xd2_1.1.0-we-wayland-qt6.tar.gz	Root file system package including the Linux kernel for XD2 and the Wayland/Qt6 components
rootfs_xd2_1.1.0-we-wayland-qt6.tar.gz.md5	MD5 checksum file for root file system package
service_xd2_1.1.0.bin	Software updater image. Provided by TELE in Linux BSP release.
service_xd2_1.1.0.bin.md5	MD5 checksum file for software updater image.
dev-tree_xd2_1.1.0.tar.gz	Device trees for the software updater image provided by TELE in Linux BSP release.
dev-tree_xd2_1.1.0.tar.gz.md5	MD5 checksum file fot the device-tree tarball.

3.3.2 Boot logos

This Linux OS release provides a set of default boot logo pictures. There are two types of pictures, a boot logo which is shown at start of normal operating mode and a recovery logo which is shown while loading the update RAMDISK during a software update. All provided default boot logo pictures are located in the folder `logo` within the Linux OS release folder.

Boot logo files	
File	**Description**
logo_xd2_large-tele-landscape.bmp	Standard Topcon logo with white font and black background for the XD2 large device
logo_xd2_large-tele-landscape.bmp.md5	MD5 checksum file for the logo
logo_xd2_medium-tele-landscape.bmp	Standard Topcon logo with white font and black background for the XD2 medium device
logo_xd2_medium-tele-landscape.bmp.md5	MD5 checksum file for the logo
logo_xd2_small-tele-landscape.bmp	Standard Topcon logo with white font and black background for the XD2 small device
logo_xd2_small-tele-landscape.bmp.md5	MD5 checksum file for the logo
logo_xd2_wide-tele-landscape.bmp	Standard Topcon logo with white font and black background for the XD2 widescreen device
logo_xd2_wide-tele-landscape.bmp.md5	MD5 checksum file for the logo
recovery_xd2_large-tele-landscape.bmp	Standard Topcon recovery logo with white font and black background for the XD2 large device
recovery_xd2_large-tele-landscape.bmp.md5	MD5 checksum file for the logo
recovery_xd2_medium-tele-landscape.bmp	Standard Topcon recovery logo with white font and black background for the XD2 medium device
recovery_xd2_medium-tele-landscape.bmp.md5	MD5 checksum file for the logo
recovery_xd2_small-tele-landscape.bmp	Standard Topcon recovery logo with white font and black background for the XD2 small device
recovery_xd2_small-tele-landscape.bmp.md5	MD5 checksum file for the logo
recovery_xd2_wide-tele-landscape.bmp	Standard Topcon recovery logo with white font and black background for the XD2 widescreen device
recovery_xd2_wide-tele-landscape.bmp.md5	MD5 checksum file for the logo

3.3.3 Toolchain

The Toolchain, which includes all host tools and the sysroot directory required to develop and build own applications for the XD2 platform, is located in the folder `toolchain` within the Linux OS release folder.

Toolchain	
File	**Description**
sdk_glibc-x86_64_we-wayland-qt6_we-image-production-xd2-1.1.0-toolchain.sh	Script to install the XD2 platform Toolchain (we-wayland-qt6) on a Linux host PC.
sdk_glibc-x86_64_we-wayland-qt6_we-image-production-xd2-1.1.0-toolchain.host.manifest	List of all packages included in the Toolchain/SDK package for the host machine.
sdk_glibc-x86_64_we-wayland-qt6_we-image-production-xd2-1.1.0-toolchain.target.manifest	List of all packages included in the Toolchain/SDK package for the target machine.

3.3.4 Documentation

All documentation is located in the main folder of the Linux OS release.

Documentation	
File	**Description**
XD2_Release_Notes_Linux_1.1.0-we-wayland-qt6.pdf	This document
XD2_C_C++_Developerguide.pdf	C/C++ Developer Guide for XD2 platform

3.3.5 Licenses

A list of all target packages, including version and license information as well as a collection of all license files for each target and built package is located in the folder `licenses` within the Linux OS release folder.

Licenses	
File	**Description**
license_xd2_1.1.0-we-wayland-qt6.manifest	List of all target packages including version and license information (we-wayland-qt6 specific)
licenses_xd2_1.1.0-we-wayland-qt6.tar.xz	A collection of all license files for each target package and build packages used to build the target root file system (we-wayland-qt6 specific)
package_xd2_1.1.0-we-wayland-qt6.manifest	List of all target packages included in the root file system (we-wayland-qt6 specific)

3.3.6 Sources

The source code of all software packages and the Yocto recipes used to build the Linux operating system are located in the folder `sources` within the Linux OS release folder. All source code is published under their corresponding license specified in license manifest.

Sources	
File	**Description**
sources_xd2_1.1.0-we-wayland-qt6-aarch64-poky-linux.tar.xz	Source code of all packages, including original source archives, patches and invoked Yocto build recipes (we-wayland-qt6 specific).
sources_xd2_1.1.0-we-wayland-qt6-allarch.tar.xz	
sources_xd2_1.1.0-we-wayland-qt6-allarch-poky-linux.tar.xz	Split in architecture specific parts due to file sizes. Files can be extracted to the same place.
sources_xd2_1.1.0-we-wayland-qt6-x86_64-linux.tar.xz	
sources_xd2_1.1.0-we-wayland-qt6-x86_64-pokysdk-linux.tar.xz	

3.3.7 CVE reports

Common Vulnerabilities and Exposures (CVE) is a system, which provides a reference method for publicly known information-security vulnerabilities and exposures. The yocto build system is capable of generating an automated check against the CVE database, whether a specific CVE identifier affects the running software. The report provides information which specific CVE identifiers are either 'Patched', i.e. fixed or 'Unpatched', i.e. the CVE affects the currently installed software on the unit.

The result of this check is stored in the folder `cve-checks` within the Linux OS release folder.

CVE reports	
File	**Description**
cve-check_xd2_1.1.0-we-wayland-qt6.cve	Result of the CVE check in plain text file
cve-check_xd2_1.1.0-we-wayland-qt6.json	Result of the CVE check in json format

3.3.8 SBOM

The software bill of materials (SBOM) declares the inventory of components used to build a software artifact. The yocto build system can generate SBOM information during its build process. The result is an SBOM, which includes all software components inside an image. The chosen exchange format is SPDX (System Package Data Exchange), which is an open standard and widely adopted in the industry.

The generated SBOM is stored in the folder `sbom` within the Linux OS release folder and consists of multiple files.

SBOM	
File	**Description**
sbom_xd2_1.1.0-we-wayland-qt6.spdx.json	Top level file of generated SBOM. Contains all components of the rootfs for xd2.
sbom_xd2_1.1.0-we-wayland-qt6.spdx.index.json	Index file containing the list of all files in the spdx archive.
sbom_xd2_1.1.0-we-wayland-qt6.spdx.tar.zst	Archive containing all individual files referenced by the top level file.

4 Installation instructions

4.1 Prerequisites

Before installing software on an XD2 target, please make sure that it meets the requirements according to the hardware and software. These are specified in chapter "Platform 7".

In addition you need a clean USB Flash drive, an external power supply for powering the XD2 target and an XD2 connector cable with the connectors for power supply and ethernet.

This document only describes an update by using a USB Flash drive. For the usage of the internal file system for an update, please consult the developer guide.

4.2 Preparing a USB Flash drive

To prepare a USB Flash drive for software installation, please follow these instructions:

- Connect the USB Flash drive to your PC and copy the following files provided by this release to it. Each file has to be stored in the root directory without any sub-directories:

  o `we-wayland-qt5/images/boot_xd2_1.1.0.bin`
  o `we-wayland-qt5/images/boot_xd2_1.1.0.bin.md5`
  o `we-wayland-qt5/images/copro_xd2_1.1.0.tar.gz`
  o `we-wayland-qt5/images/copro_xd2_1.1.0.tar.gz.md5`
  o `we-wayland-qt5/images/dev-tree_xd2_1.1.0.tar.gz`
  o `we-wayland-qt5/images/dev-tree_xd2_1.1.0.tar.gz.md5`
  o `we-wayland-qt5/images/rootfs_xd2_1.1.0-we-wayland-qt6.tar.gz`
  o `we-wayland-qt5/images/rootfs_xd2_1.1.0-we-wayland-qt6.tar.gz.md5`
  o `we-wayland-qt5/images/service_xd2_1.1.0.bin`
  o `we-wayland-qt5/images/service_xd2_1.1.0.bin.md5`

- Optionally copy the installation packages, which contain the user application and data to the same USB Flash drive. You can also update or install these packages without the installation of the operating system, if it is already installed on the XD2 target. Replace `<version>` with a custom version string. The file `logo_xd2_<variant>.bmp` is the boot logo shown at regular start up, the file `recovery_xd2_<variant>.bmp` is the boot logo shown at start of the update RAMDISK, the file `user_xd2_<version>.tar.gz` contains the content which is extracted to directory `/opt` on the target. Additional user Tarball archives can be provided optionally, which are extracted to /opt in their numeric order. The files have to be named `user<1-9>_xd2_<version>.tar.gz` where `<1-9>` has to be replaced with a number between 1 and 9. The old content on `/opt` will only be deleted, if the `user_xd2` package is installed. This method can be used to split the user application into several packages for installation.

  o `logo_xd2_*.bmp`
  o `logo_xd2_*.bmp.md5`
  o `recovery_xd2_*.bmp`
  o `recovery_xd2_*.bmp.md5`
  o `user_xd2_<version>.tar.gz`
  o `user_xd2_<version>.tar.gz.md5`
  o `user<1-9>_xd2_<version>.tar.gz`
  o `user<1-9>_xd2_<version>.tar.gz.md5`

- Disconnect and remove the USB Flash drive safely from your PC.

4.3 Installation process

To install the operating software on a supported XD2 target, please follow these instructions:
- Connect the prepared USB Flash drive to the USB port of the XD2 target
- Make sure the XD2 target is correctly connected.
- Connect the Serv_EN pin of the main connector to supply voltage to enter the maintenance mode. For other methods to enable the service mode please have a look to the developer-guide.
- Power on the XD2 target.
- The update process will start automatically after entering the maintenance mode. During the update process the display is showing informational messages about the update progress.
- After successfully installing the files from USB Flash drive, the machine automatically performs a reboot and starts the new comic firmware and the new maintenance mode.
- The update process will start automatically after entering the maintenance mode. During the update process the display is showing informational messages about the update progress.
- Disconnect the Serv_EN pin from power supply after the display shows a message that the option bytes are updated.
- After successfully installing the files from USB Flash drive, the machine automatically performs a reboot and normal start up and the new Linux OS release is ready to use.

> **Notice**
> When a new root file system is installed on the XD2 target, both boot logos will be deleted during installation of the root file system. A re-installation of these packages is required in this case.

> **Notice**
> When a new user application package is installed on the XD2 target, all content on `/opt` except `/opt/data` will be deleted during the installation of the first user application package. Additional user application packages will be installed in addition to the first package.

> **Warning**
> Do not switch off power supply of the XD2 target or disconnect the USB Flash drive during the whole installation process. This can result in a loss of data or data inconsistency. Also make sure that the power supply of the XD2 is stable throughout the complete installation process to avoid unwanted resets.

5 XD2 Linux OS release history

5.1 Coprocessor firmware

5.1.1 Changes for XD2 stm32 firmware 1.0

- Rework frequency input driver to improve accuracy at low frequencies. Now the driver input accuracy is at 0.01Hz at low frequencies < 100Hz
- Fix a bug that the frequency input driver does no longer work after system reboot.
- Fix a bug where the system resets on very high CAN bus loads if the system is in sleep mode and wake on CAN is enabled.

5.1.2 Changes for XD2 stm32 firmware 0.7

- Enable the internal independent watchdog
- Switch from FreeRTOS to SafeRTOS
- Implement wake on CAN feature including partial networking
- Add support for runtime configuration of the power management behavior for the power button
- Add the hard reset on power button long press feature (Emergency stop)
- Fix a bug that the system does not react on the first ignition state change if the system boot was triggered by the power button
- Small changes / improvements on power sequencing
-

5.1.3 Changes for XD2 stm32 firmware 0.6

- Add additional handling for the 5V0_STDBY_PG signal
  The PG signal only enabled in a small voltage range. (PG = Power good signal)

5.1.4 Changes for XD2 stm32 firmware 0.5

- Add support for prototype C
- Remove support for prototype A
- Extend HWIDs from 4 to 8
- Add support for additional GPIO input channels (incl. spare channels)
- Improve flash memory handling used by the runtime firmware update mechanism
- Update toolchain to gcc 12.3.1-arm-none-eabi
- Reboot the system on unconditioned resets (like CPU watchdog reset)
- Fix a bug missing the first button trigger flag during shutdown
  - If the button wake source was triggered during the system shutdown sequence the first event was missed on several conditions. It only reacted on the 2nd trigger.
- Add handling of the power good (PG) signals (System reset on failure of a single PG signal)
- Save the reset reason and make this information available for the host system
- Add an overcurrent protection for the digital output 0 (DO1_high, High side switch)
- Improve board power on sequence to enter the serial update mode more reliable if it is set by the STM IPC stack

5.1.5 Changes for XD2 stm32 firmware 0.4

- Add wake source handling
- Add system power management
- Add basic internal power management
- Update pin configuration to reduce power consumption in off-mode
- Small fixes in de-initialization routines of internal drivers

5.1.6 Changes for XD2 stm32 firmware 0.3

- Add support for prototype B boards
- Add firmware update capability via IPC. Update is based on an A/B system
- Rework frequency input driver based on window clock counter method
- Improve frequency output driver accuracy for high frequencies
- Add hardware ID driver

5.1.7 Changes for XD2 stm32 firmware 0.2

- Improve accuracy of temperature calculation
- Add I2C and EEPROM driver
- Update SPI interface register stack for new drivers and driver changes
- Add eeprom access to SPI interface
- Update SPI interface pin configuration (improvement of signal quality)
- Switch GPIO read / write from ODR to BSRR to get atomic GPIO access
- Update fdcan routines to match with kernel driver optimizations to reduce the number of SPI bus accesses of the FDCAN message read/write

  …

5.1.8 Changes for XD2 stm32 firmware 0.1

- First version of firmware.

5.2 Bootloader change history

5.2.1 Changes for XD2 u-boot 1.1.0

Uboot

- None

SCFW

- None

5.2.2 Changes for XD2 u-boot 1.0.0

Uboot

- Fix wrong EEPROM initialization of the multicolor LED startup values

SCFW

- None

5.2.3 Changes for XD2 u-boot 0.7.0

Uboot

- Small boot time improvement by accelerating to boot container load
- Add possibility to skip the display initialization in u-boot

SCFW

- None

5.2.4 Changes for XD2 u-boot 0.6.0

Uboot

- xd2 bugfix kernel hang on shutdown
  If the console is set to zero (console=NULL; Console-mode is set to off)
  and earlycon is set in the kernel command line, the kernel will hang
  during shutdown.
  Remove Earlycon in the command line.

SCFW

- None

5.2.5 Changes for XD2 u-boot 0.5.0

Uboot

- Add support for prototype C devices
- Remove support for prototype A devices
- Add support to the NOR driver for a new 2nd source SPI-NOR-Flash
- Fix broken USB TCPC support preventing the system to boot from an USB stick
- Clean up board specific code, remove unused features and configurations
- Fix broken im_is_multi command
- Add support to enable service mode via service / debug connector
- Reduce default kernel loglevel to 3
- Update PCIE pin configuration
- Forward the default display brightness trough the fdt file to the kernel
- Set a minimum display brightness of 5 for system boot
- Keep the LED enabled during system boot
- Improve silent boot behavior
- Handling of the status LED
- Improve error handling for the EEPROM functions
- Disable the SSH_CONFIG EEPROM value during EERPOM initialization

SCFW

- Update system partitioning to make some additional GPIO pins accessible from the Linux system

5.2.6 Changes for XD2 u-boot 0.4.0

Uboot

- Update bootloader to version 2022.04
- Add handling of the EEPROM parameter EE_CONSOLE_MODE
- Improve SPI NOR handling (improvement in Read/write/erase speed)
- Add support for silent boot

SCFW

- Update imx-scfw-porting-kit to version 1.15.0
- Update reboot behavior as part of the power-management integration
- Add SCU_PWR_OFF_REQ signal handling as part of the power-management integration

5.2.7 Changes for XD2 u-boot 0.3.0

Uboot

- Add support for prototype B boards
- Add 4GiB RAM configuration
- Display Boot splash image on boot

- Enable status LED on boot
- Fix bug not detecting USB type C sticks
- Removed bootdelay

SCFW

- Add 4GiB RAM configuration

5.2.8 Changes for XD2 u-boot 0.2.0

Uboot

- Bugfix service enable, wrong pin setting
- Check-USB by boot
  If the
  o Boot mode (EE_BOOT_MODE) set of 0x01 into the EEPROM
  o or the service pin (Pin on the developer cable) is on 12V,
  o or a pin connected to the stm32 co-processor is set to high
  a RAM system is first searched on the USB stick (back usb port). If this is available, it is started.
  If there is no system on the USB stick, a RAM system (small Linux system) starts from the SPI-NOR Flash (Idea: include in this small linux system
  the update daemon from topcon (wesud or ?) , use in the future ?)

  If none of the options are set, the normal system starts directly without checking the USB!

- include Ethernet (BRR) support (tftp/nfs)

- include MAC address
  if you don't want to use the default MAC you can set the MAC address over econfig (over the bootloader) self.
  EE_ETH_MAC and use for the second phy the EE_BT_MAC
- include the setting of the DTB-File name environment variable (fdtname) with the eeprom
  entry (EE_DTB_NAME), the environment variable is to use
  the right dtb file by starting a system over USB

SCFW

- no changes

5.2.9 Changes for XD2 u-boot 0.1.0

- First release of bootloader for prototype A

5.3 Linux OS change history

5.3.1 Changes for XD2 Linux OS Release 1.1.0

Kernel

- Initialize pin configuration for new widescreen (15") display
- Include new panel driver for widescreen display
- Add new device tree variant for widescreen display: imx8qm-xd2_MBW04EA.dts
- Add support for Ilitek touch (15")
- Include sysid driver to read information from the application section in the EEPROM
- Update Axiom touch driver to support the touch control chip for XD2 small 7"

Root file system

- QT:
  - with QT v6.5.7-lts-lgpl (opensource)
  - or QT v6.5.6-lts (commercial)

- getty script:
  - sysvinit: start_getty: make script compatible with agetty

- stress-ng
  - include the tool in the rootfs

- packagegroup-we-image-production:
  - add client-service package

- add Touch Controller Axiom AX54A-3D support (7")
  - new dtb file imx8qm-xd2_MBW01EA.dtb

- update imx-scfw firmware (1.16)
  - support for new generation of NXP chip (clock change)

- include widescreen display support (15") ; variante 04

- Touch
  - TouchNetix_axutils_tool_update v4.9.3.0

- Kernel config:
  - Added CONFIG_USB_ACM ; USB-Modem support (Communication Device Class Abstract Control Model (CDC ACM))

SDK

- with QT v6.5.7-lts-lgpl (opensource) or QT v6.5.6-lts (commercial)

5.3.2   Changes for XD2 Linux OS Release 1.0.0

Kernel

- Increase the resolution of the frequency input driver
- Return -EINVAL for negative set values of the frequency output
- Make the service enable pin signal available on the GPIO interface (GPIO 3 IO 26)
- Modify the DPU and PCI driver to fix problems executing kexec
- Disable DMA for lpuart1due to transfer problems

Root file system

- WEHMD:
  - Fix wrong return value of command `WEHMD_CMD_EE_KEYPAD_COLOR` which is not supported on this platform
  - Fix a bug where the WEHMD cannot restart if the `SSH_CONFIG` feature is enabled.
- WEPMD:
  - Fix a bug where the silent on timeout does not start if the system boots to silent on mode while ignition is set.

- Update QT to lts-6.5.6

SDK

- Update to QT 6.5.6

5.3.3 Changes for XD2 Linux OS Release 0.7.0

Kernel

- Fix a bug on the proximity sensor driver. If both proximity sensor values a read in a high rate, the value that one of the sensors provides is stalled at a fixed value for a long time
- Make the display backlight brightness linear for the perception of the human eye based on the CIE1931 algorithm
- Fix a start log warning related to the display rotation of the 12" device
- Fix broken legacy USB device gadgets
- Fix broken acceleration sensor IIO buffer feature
- Fix broken modprobe of the xd2 copro fdcan driver
- Fix a wrong RTC hardware configuration which caused an increased power consumption in off mode

Root file system

- WEHMD:
  - Improve signal handling during initialization
  - Add possibility to configure the color and brightness of the multi color LED at system start
- WEPMD:
  - Support power management configuration of the power button
  - Add support for wake on CAN including partial networking
  - Add possibility to change the pm_state.conf path
  - Fix a bug that the multi color LED is not disabled in low-power mode
- Add a tool package for the axiom touch controller configuration
- Update QT to lts-6.5.5
- Add 24bit bmp support for bootlogo files
- Adapt weston.ini to new transform settings

5.3.4 Changes for XD2 Linux OS Release 0.6.0

Kernel

- copro can: Fix wrong kernel message causing a delay on print
- drm: changes on simple panel-simple driver
  - add additional delays for display sequencing
  - add support for more than one enable gpios
  - force suspend during shutdown
- drm: overwork the panel settings 10" and 12" display (display sequencing)
- dtb: Add LED color attribute to give the LED a label to sysfs
- copro: Add missing handling of a function return to get reset reason
- usb: cdns3: fix incorrect calculation of ep_buf_size when more than one config
- usb: gadget: call usb_gadget_check_config() to verify UDC capability
- usb: cdns3: set default buffer size for gadgets
- usb: tcpm/tcpci: rework handling of configurable vbus voltage

- usb: tcpci: add support for ilim pin for ptn5110
- touch: change driver 12" to read out from the config the resolution information
- bugfix usb: typec: tcpci: fix error handling and race condition during probe

Root file system

- Add libnsl2 package
- xd2-test: Add lib-gpiod as new dependency
- add os-release file
- add axiom tools into the rootfs to update the SW of the 12" touch (usr/bin/axiom) new packages install : axiom-touch-tools, axiom-pylib, python3, python3-smbus2, python3-luma-core

5.3.5 Changes for XD2 Linux OS Release 0.5.0

Kernel

- Add support for prototype C devices
- Remove support for prototype A devices
- Update kernel to NXP release lf-6.1.22-2.0.0
- Add support to the NOR driver for a new 2nd source SPI-NOR-Flash
- Fix wrong level of the type C mux reset pin
- Coprocessor
  - ○ Add support for the new additional digital input pins of the coprocessor
  - ○ Improve error handling of failures during probing the coprocessor sub-devices
  - ○ Improve error handling during suspend/resume routines
  - ○ Add statistics feature to make protocol error statistics available to the application
  - ○ Make the system reset reason information available at the kernel log
  - ○ Make the CAN data reception runtime configurable
- Axiom touch
  - ○ Add suspend resume functions to improve the 12" devices behavior during sleep mode
  - ○ Fix wrong data type conversion
  - ○ Suppress useless kernel messages
- Update PCIE pin configuration
- Improve backlight handling during system silent boot as well as initial brightness handling during boot
- Add delay timings for the display sequences
- Add support to shutdown the system on simple call of the poweroff command
- Make the CAN data reception runtime configurable
- Change the default sampling frequency of the acceleration sensor
- Remove debug prints on the proximity sensor
- Disable the I2C workaround limiting a single transfer to 256 bytes on prototype C hardware

Root file system

- Add psplash as package to display the bootlogo during system boot
- Create a board specific asound configuration
- Add full support for the WESUD service image and software update installation
- Add protobuf and grpc to production image and toolchain
- Add possibility to configure ethernet and ssh trough WEHMD for development use

5.3.6 Changes for XD2 Linux OS Release 0.4.0

Kernel

- Update kernel to version 6.1.1
- Modify BRR phy driver to become wake capable
- Replace custom microphone implementation by a generic one
- Driver modifications to support system power-management
- Add some small pin handling features required by power-management
- Add support for silent boot
- Rename some regulators for a more common naming convention
- Add possibility to enable BRR phy test modes for compliance testing
- Add mdt partitions to access the SPI NOR for bootloader / service image update
- Add possibility to enable service mode and serial update mode via sysfs
- Fix bug in error handling path of vcnl4035 (proximity sensor) causing driver deadlock
- Fix bug in rv3032 (RTC) driver causing sporadic system hang during boot
- Fix bug USB-C providing information for a bigger ampacity than supported by hardware
- Update some pin configuration (based on EMC improvements)
- Build FDCAN driver of Copro as module (this fixes the wrong order of the CAN devices, too)
- Enable VPU
- Enable USB-serial adapter support
- Enable USB-ethernet adapter support
- Enable USB-webcam support
- Enable EXFAT file system support

Root file system

- The whole rootfs has been ported to a new Yocto version 4.1.4 (langdale)
  - all packages in the rootfs have been updated to the verion the new Yocto version provides
- update QT to version 6.5.2
- Add WEPMD and its test tools
- Update and add new regulators in libhalopus
- Update WEHMD for full feature support
- Remove obsolete asound.conf
- Add support for software installer image (WESUD / service-image)
- Fix bug in qt only displaying 4 Bit color depth when using eglfs
- Fix a bug that display rotation does not work reliable with weston

5.3.7 Changes for XD2 Linux OS Release 0.3.0

Kernel

- Add support for prototype B boards
- Add XD2 copro firmware update interface
- Implement display rotation for the XD2 large device
- Add microphone support
- Implement backlight driver based on the backlight driver chip hardware
- Implement IIO device for backlight driver voltage / current monitoring
- Update analog inputs measured by the coprocessor
- Improve several IIO driver implementations for better identification via libiio
- Add power button keypad input driver
- Update GPIO inputs and outputs for the coprocessor device
- Add libhalopus support
- Add hardware ID support (via libhalopus)
- Enable WEHMD (only basic features are currently supported)
- Limit the speaker output power (old configuration could cause clipping)

- Remove not supported speaker amplifier features
- Update some pad configurations based on EMC
- Fix wrong temperature calculation on the ACC sensor
- Cleanup kernel configuration
- Add missing master/slave switch sysfs attribute for the 2nd BRR phy

Root file system

- Update partition scheme and split the whole system into several partitions for update, data, application, etc.
- Remove workarounds for backlight control from init scripts
- Update QT configuration
- Update udev rules for SSD partition auto mounting

5.3.8 Changes for XD2 Linux OS Release 0.2.0

Kernel

- Add basic pad configuration for spare I2C for debug/test use
- Add driver for the coprocessor EEPROM
- Add driver for the coprocessor update (disabled because fw-update incomplete)
- Add coprocessor firmware version attribute
- Enable register caching for the coprocessor core driver to reduce number of SPI bus accesses
- Update coprocessor driver for several improvements and firmware changes
- Improve coprocessor FDCAN driver to reduce number of bus accesses and increase performance
- Fix a bug on the SPI hardware driver irq which handled bus transfers wrong

Root file system

- Update kernel config to enable XD2 copro kernel configuration.
- Update kernel config and enable new XD2 copro CAN driver
- Add copro firmware update driver to kernel config

5.3.9 Changes for XD2 Linux OS Release 0.1.0

- First released version for prototype A

6 Known issues

- The STM32 FDCAN task hangs or causes system reset on active CAN transfers
  - o If the CAN data transfer feature between STM32 and i.MX8 is enabled then the RTOS kernel can reach an invalid state or may crash after a while. In this state either no further CAN data are transferred or the whole XD2 system will reset.
  - o By default the active data transfers the XD2 coprocessor FDCAN controllers between the STM32 and the i.MX8 are disabled. This feature is for debug use only.
  - o If the feature keeps disabled the system works as expected.
  - o OPUSSWDEV-3849
  - o Workaround: Do not use this feature / Do not enable the related interrupts
  - o Listed as a task at Topcon Electronics with the number OPUSSWDEV-3849

- The STM32 FDCAN reports one (first received) message after configuration although the data transfer feature is disabled
  - o Workaround: Drop / ignore the transferred data
  - o Listed as a task at Topcon Electronics with the number OPUSSWDEV-3856

- The system resets in sleep or off mode if wake on CAN is enabled and a bus error occurs
  - o If wake on CAN is enabled and the system is in sleep mode of off mode and a CAN bus error occurs the system is reset by watchdog.
  - o In this case the power management defaults are restored, wake on CAN gets disabled, the system starts debouncing all wake signals and reacts to their states.
  - o Depending on the wake signal states the system stays in off mode (i.e. if ignition / KL15 is disabled) or starts (i.e. if ignition / KL15 is enabled)
  - o Workaround: Do not use wake on CAN if this point is critical for your system setup
  - o Listed as a task at Topcon Electronics with the number OPUSSWDEV-4019

Please report all found bugs to Topcon Electronics to help to improve stability and reliability of future Linux OS releases.