

Broadcom Limited
Broadcom Ethernet Controllers Software Kit
BCM5741X/5750X Release
RELEASE 231.1.162.1b

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Summary

- Gold Release for the Broadcom Software Release 231.1 project.
- This is a Gold Release of 5750x(Thor) and 5741x(Whitney+) software kit for single host adapters.
- This release is based on SIT build 231.1.162.1b
- Certified EFI, Windows, SUSE and VMWare ESX drivers are marked with an asterisk in the 'Release Version Information' Table.
 - SUSE signed packages are available in '**Driver**' → 'Broadcom NetXtreme-E Linux Installer' under 'drivers_linux/bundle/sles_signed' folder
 - ESXi signed drivers are available in '**Driver**' → 'Broadcom NetXtreme-E ESXi Drivers'
Note: ESXi signed drivers until 230 release are to be downloaded from VMware.com
 - Windows signed drivers are available in '**Driver**' → 'Broadcom NetXtreme-E Windows Drivers'

Feature Support

The features listed below may not be supported for both 5750x(Thor) and 5741x(Whitney+)
Please contact the local Broadcom support team if additional clarification is needed.

The features below are supported in this release.

New features (in addition to the features of the last Gold Release 230.1) are marked with 'NEW'.

Core support

- 5750X (Thor) B2 Support
- Base Ethernet Functionality (L2 drivers)
- Link Establishment & Maintenance: Auto Negotiation, Auto Detect, Link Training
- Pre-Boot: uEFI, iPXE, uEFI iSCSI stack

GPU support

- AMD GPUs support
- Nvidia GPUs support

Poll mode drivers

- DPDK release 20.11, 21.11, 22.11, 23.11 support

- Windows NDIS Poll Mode Support
- ENS driver support for VMware Enhanced Data Path
 - ESXi 8.0 ENS Hardware LRO support
 - ESXi 8.0 ENS RSS support
- OVS 3.1 Support for Thor and Whitney+

Virtualization

- SR-IOV
 - Small VFs based SR-IOV support for Thor
- MultiQueue

Offload

- NIC stateless offload features such as checksum & tunneling
- Configurable Flow Acceleration - CFA
- Tunneling offload such as: NVGRE, VxLAN
- DPDK 20.11, 21.11, 22.11, 23.11 TruFlow Offload
- Linux TC offloads
- DPDK Flow Mirroring Offload Support
- DPDK Flow Meter Offload Support
- DPDK L2 Rewrite Offload Support
- TruFlow Generic Template
 - Flow update performance optimization
 - Generic application support
 - Flow template DB size optimization
 - Flow scale improvement
 - OVS DPDK/TC application migration to generic template
 - Action template unification
 - Flow scale query
 - Phase 3 support (Thor) (NEW)
- PPP over GRE Support

RoCE (Thor)

- RoCE drivers
- RoCE Mirroring
- RoCE @ Scale improvements including many performance optimizations
- Guest Mode RDMA support (Linux and Windows only)
- VSAN over RDMA
- Multi-Root RoCE + SR-IOV
- RoCE performance profiles
- Support Error Recovery for RoCE

- RoCE Userlib Benchmark Performance Optimization when Message Size <= 4K
- RoCE SR-IOV scalability improvement for FLR -- POC
- RoCE DCQCN Testing
- Linux auxiliary driver support (Driver re-arch for RoCE)
- RoCE Performance tuning
- RoCE Userlib Performance Optimization
- Add dmabuf support to OOB Linux RoCE Driver
- RoCE Control Plane Performance Improvements for Thor
 - batching, exception handling, and operations/second for register/deregister
- Windows user mode RDMA support - NDSPI
- FreeBSD RoCE v2 support
- FreeBSD RoCE features Phase II
- RoCE statistics accessible to non-root users
- RoCE SRIOV resource configuration improvements
- RoCE Modify QP + CMDQ/CREQ Scalability Improvements - Phase I
- RoCE Data Plane Latency Scalability Improvements - Phase 2 AI/ML Applications (NEW)
- Upstream FreeBSD RoCE Drivers -- Phase 1 (NEW)

RoCE (Whitney+)

- RoCE drivers
- VSAN over RDMA
- RoCE performance profiles
- Windows user mode RDMA support - NDSPI

Management

- System manageability (NC-SI)
- NC-SI Enhancements
 - NC-SI 1.2 Phase 2 for Thor and Whitney+
 - Enhancements for multiple physical mediums (Thor) (NEW)
- Update to Reporting of DMTF Specifications Versions (Thor/Whitney+) (NEW)

Tools

- Devlink improvements
- Support CMIS 4.0 using ethtool
- Linux Installer
 - Error handling and display improvements
 - GPU Direct and hosts with multiple NICs support (Thor) (NEW)
- NICCLI configuration management utility
 - Vmware ESXi support for NICCLI
 - bnxtqos integration into NICCLI

- Linux installer NICCLI support
- NICCLI syntax (help/error/failure/etc) improvements
- ESXi 8.0 esxcli plugin support
- NVM PKG query commands improvements
- PKG Log view command
- Sliff driver dependency removal in Linux (NEW)
- UEFI support (NEW)
- Broadcom SOSReport (Preview) (NEW)

Reliability, Accessibility, Serviceability (RAS)

- Health check
- Coredump and Crashdump enhancements
- Prevent single point of failure in FW upgrade
- Error recovery support
- Various stability and Stateless error recovery improvements (Generic Adapters only)
- Enhanced FW update error codes
- Crash dump copy to host SDRAM
- Unified certificates for tools & Driver RPMs

Security

- Secure boot
- Secure FW Update
- Firmware lockdown
- SPDM 1.1 Support

Misc

- Network Partitioning NPAR 1.2 Phase I
- OEM specific vSwitch feature enhancements
- PTP
 - Enhanced PTP support
 - Multi-Host PTP (Sink Mode only) support
 - PTP support on Whitney+
- Performance tuning and Stress/Boundary Tests
- MSI-X, 802.1q VLAN, Ethernet Statistics
- Dual Rate (10G/25G) transceivers (select boards only)
- Port shutdown for Whitney+ and Thor
- NIC Thermal Shutdown Fixes and Improvements
- IRQ coalescing API in the kernel extended with "EQE vs CQE mode"
- XDP Single Buffer Validation and XDP Multibuffer PoC
- Onboarding NVM Configurations for LOM (Thor)
- 200G PAM-4 Support

- NVMe/TCP Support (VMWare cert)
- Method to control the activation of the attestation feature
- Enable "Filter Mode" for non-PTP packets
- Generic UCX Support
 - UCX 1.14.x Support
 - UCX 1.15.x Support (Thor) (NEW)
- Live patching for Whitney+
- Validation of SyncE on Thor B2 Silicon
- Add support for simultaneous update of NICs - Deprecated
- Adaptive Interrupt Coalescing Enhancements
- Enhancement for Linux Default Number of Queues
- Feature simplification for Thor and Whitney+
- NVM parameter simplification for Thor and Whitney+
- Netmap Support (Thor)
- Deprecate Legacy BIOS configuration for Thor and Whitney+
- QoS Enhancements Phase 2 (Thor)
- QoS Enhancements for Mbuf configuration (Thor)
- SFP28 25Gbps transceivers through QSFP28-to-SFP28 adapter support (Thor)
- Deprecate Live firmware upgrade feature for Thor and Whitney+
- Netmap Support with Jumbo Frames
- Enhance ARM Support for Thor and Whitney+
- Enable Transmit Packet Steering (XPS) by default on Thor and Whitney+
- Multi-host platform support with N2100G - Phase 2
- NIC thermal threshold and shutdown logging and handling by host driver
- PLDM for FRU Data (DSP0257) support
- Windows HW-QoS support on Thor - Phase I POC support
- Supported and advertised link modes - KR for Thor and Whitney+
- 40G support in Linux (Thor)
- Adaptive QoS algorithm improvements and niccli support
- Adaptive QoS niccli tuning parameters support (Thor) (NEW)
- Default number of rings increase (Thor)
- Hot-Plug support for OCP 3.0 (Thor)
- PAM4 speeds are enabled by default (Thor)
- VMWare RSS and NetQ enhancement for ENS mode
- Kubernetes SR-IOV Network Device Plugin support with RoCE (Thor) (NEW)
- BCM957508-N2100GDQ - Thor Quality Improvements with VR support
- BCM957504-N1100G, BCM957504-N1100GD and BCM957508-N2100GD - Thor Quality Improvements with MPS and TI VR support
- BCM957504-N425G Thor 4x25G OCP3 - Thor Quality Improvements with MPS and TI VR support (NEW)
- Local node memory allocation - Page pool per NUMA node support
- L2 driver reduce usage of RTNL as a slowpath lock - POC
- ADQ (Application Device Queues) Support (Thor) - Phase I
- QP Scanning Performance Improvement for up to 64K QPs (Thor)

- Adapter Discovery Support (Thor)
- HII menu update for Link Configuration (Thor/Whitney+)
- HII menu 'Restore Defaults' option removal (Thor/Whitney+)
- Adaptive QoS Phase 3 (Thor) (NEW)
- AMD rocm-smi tool support PoC (Thor) (NEW)

Supported Devices

This release of software supports:

- Broadcom BCM57412 NetXtreme-E 10Gb Ethernet Controller
- Broadcom BCM57414 NetXtreme-E 10Gb/25Gb/50Gb Ethernet Controller
- Broadcom BCM57416 NetXtreme-E 10GBASE-T Ethernet Controller
- Broadcom BCM57502 NetXtreme-E 10Gb/25Gb/50Gb Ethernet Controller
- Broadcom BCM57504 NetXtreme-E 25Gb/50Gb/100Gb Ethernet Controller
- Broadcom BCM57508 NetXtreme-E 25Gb/50Gb/100Gb/200Gb Ethernet Controller

Supported Operating Systems

Please refer to the following guide for the list of supported Operating Systems:

[Supported Operating Systems for Ethernet Network Adapters](#)

- NEW OS in this release
 - RHEL 9.5 GA Inbox
 - ESXi 9.0 Inbox
 - Oracle 9 UEK R7U3 Inbox

 - RHEL 8.10, 9.4 GA OOB
 - Ubuntu 22.04.4 LTS, 23.10 GA OOB
 - Debian 11.9, 12.5, 12.6 GA OOB
 - FreeBSD 13.3, 14.1 GA OOB
 - ESXi 8.0 U3 GA OOB
 - SLES 15 SP6 GA OOB

 - Ubuntu 24.04 LTS GA
 - Windows Client 11 24H2

Supported Cables

Please refer to the following guide for the list of supported cables and transceivers:

[Supported Cables for Broadcom Ethernet Network Adapters](#)

These cables and transceivers were tested and deemed interoperable with Broadcom's Ethernet network adapters. Note this list does not imply full qualification of the cables.

User Guide

Please refer to the following user guide for configuring Broadcom Ethernet Adapters:
[Broadcom Ethernet Network Adapter User Guide](#)

Notes

Repaving Feature:

- The repaving feature is new with the 220.0 release. It currently supports restoring the firmware only to revision 220.0 or later.
- Attempting a repaving action to firmware older than 220.0 might result in card corruption.

SW/FW:

- The SW/FW versions listed in the "Release Version Information Table" are the only supported combinations at this point.

Linux ethtool:

- The "rx_errors" output of "ethtool -S ethX" is for diagnostic/debugging purposes only. This counter reflects all invalid packets including the frames that are not destined for the current MAC addresses.

RoCE and SR-IOV:

- Whitney+ support for RoCE over SR-IOV VFs is deprecated in this release. RoCE PF operation can co-exist with SR-IOV VFs on the same PF/Device, but SR-IOV is explicitly prevented from operating on VFs as of this release.

RoCE Related:

- Starting in release 223, the default RoCE congestion control algorithm is changed to DCQCN-P from DCTCP. The switch ECN settings for RoCE packets therefore need to be modified. Please refer to the user guide for recommended switch configuration settings.
- The IPv4 RoCE v2 GID index for a typical case is 3. Please refer to the User guide for best practices in determining GID type using the Linux sysfs interface.
- Different MTU size are not supported across different nodes of RoCE Cluster
- ETS has limitations in the RoCE LAG environment in port toggle scenarios
- RoCE Oversubscription is not supported

- Starting with release 231, the default RoCE congestion control has been changed from DCQCN-P to DCQCN-D. (Thor) (NEW)

Generic UCX Support for Single Host non-virtualized environments:

- OpenMPI with UCX PML
- OSU microbenchmarks with OpenMPI/UCX
- UCX perfest
- RDMA Transport
- Note: Atomic operations with UCX are not supported

RoCE and NPAR:

- If NPAR is enabled, RoCE and ENS cannot be used together

Linux Automated Installer:

- Linux Automated Installer might fail with secure boot on SLES15 SP3
Before running the installer, all existing *bnx* packages must be removed first. Run the following commands before install
 - `rm /tmp/ansible.*`
 - `bash uninstall.sh`
 - `rpm -qa | grep bnx | rpm -e`

Usage and Release folder structure

Starting from the 230 release, the folder structure has been changed as indicated below:

Component	Old Directory	New Directory
Firmware		
NVRAM Images	NVRAM_Images	board_sku_files
Linux Drivers Source		
L2	Linux/Linux_Driver	drivers_linux/bnxt_en
RoCE	Linux/Linux_RoCE	drivers_linux/bundle
RoCE Library	Linux/Linux_RoCE	drivers_linux/bnxt_rocelib
GPU Driver	Linux/GPU_Driver	drivers_linux/peer_mem
Linux Driver Binary		
DKMS RPMs L2	Linux/KMP-L2-Only	drivers_linux/bnxt_en
DKMS RPMs RoCE	Linux/KMP-RoCE-Only	drivers_linux/bnxt_re
KMP RoCE Lib RPM	Linux/KMP-RoCE-Lib	drivers_linux/bnxt_rocelib
KMP L2 + RoCE RPM	Linux/KMP-L2-RoCE	drivers_linux/bundle

Tools

Linux Installer	Linux/Linux_Installer	utils/linux_installer
Niccli	niccli	utils/niccli
Nictune	Linux/nictune	utils/nictune

Firmware NVRAM Images:

- Pre-built NVRAM package files are available in the 'board_sku_files' folder under '**Driver**' → 'Broadcom NetXtreme-E Linux Installer'
- NVRAM package files are also available in the '**Firmware**' tab on the respective Ethernet Adapter product page.

Linux:

- There are several Linux related drivers/packages in the 'drivers_linux' folder under '**Driver**' → 'Broadcom NetXtreme-E Linux Installer'
 - bundle: Bundle for L2 and RoCE drivers source and DKMS packages. This also contains SUSE signed driver packages
 - bnxt_en: L2 driver source and DKMS packages
 - bnxt_re: RoCE driver DKMS packages
 - bnxt_rocelib: RoCE library source and RPM
 - peer_mem: GPU Direct driver
- DCSG00411462.self.cert.der: Secure boot openssl certificate
- readme_secure_boot.txt: Secure boot readme
- There are 2 tarballs in the drivers_linux folder, the "bnxt_en-x.x.xx.tar.gz" is the L2 driver only and the "netxtreme-bnxt_en-x.xx tar.gz" file is the package combined with L2 and RoCE drivers.
- For the Linux driver included as part of the SW package please refer to the "Readme.txt" file included in the driver tarball for commands, driver settings and other important information.

Tools:

- Linux Installer:
 - Tool to assist the user in easily installing the Linux and RoCE drivers and upgrade Firmware.
 - This installer is available in the 'utils/linux_installer' folder under '**Driver**' → 'Broadcom NetXtreme-E Linux Installer'.
 - Refer to 'README.md' file in utils/linux_installer folder on details of how to use the installer.
- niccli:
 - Tool used for updating NVRAM, including firmware updates and configuration parameters.

- This tool is available in the 'utils/niccli' folder under '**Driver**' → 'Broadcom NetXtreme-E Linux Installer' for Linux OS.
- The tool for different OSes is available under the '**Firmware**' tab.
- nictune: GA for Thor
 - Tool used for automating performance tuning of Broadcom NetXtreme Ethernet Network Interface Cards.
 - This tool is available in the 'utils/nictune' folder under '**Driver**' → 'Broadcom NetXtreme-E Linux Installer'.
- nicgui: POC
 - Standalone GUI wrapper for niccli
 - This tool is available in the 'utils/nicgui' folder under '**Driver**' → 'Broadcom NetXtreme-E Linux Installer'.
- bcm_sosreport: Preview (NEW)
 - Tool used for collecting system information for support purposes
- bnxtnm: (Deprecated starting from 228 release)
 - Tool used for updating NVRAM, including firmware updates and configuration parameters. Replaced by niccli.
- bnxtqs: (Deprecated starting from 228 release)
 - Tool used for managing DCB parameters ETS, PFC and AppTLV in Linux OS without using lldptool. Replaced by niccli.

FreeBSD: FreeBSD drivers are available in '**Driver**' → 'Broadcom NetXtreme-E FreeBSD Driver'

VMware: ESXi signed drivers are available in '**Driver**' → 'Broadcom NetXtreme-E ESXi Drivers'

Windows: Windows signed drivers are available in '**Driver**' → 'Broadcom NetXtreme-E Windows Drivers'

Release Version Information Table

Product	Version	Previous Version
Firmware NVM Package	231.1.162.1	<< 230.1.116.0
dpdk_20.11-brcm-lts	231.0.151.1	<< 230.0.148.0
dpdk_21.11-brcm-lts	231.0.151.1	<< 230.0.148.0
dpdk_22.11-brcm-lts	231.0.151.1	<< 230.0.148.0
dpdk_23.11-brcm-lts	231.0.151.1	<< 230.0.148.0
Linux L2 Driver	1.10.3-231.0.162.0	<< 1.10.3-230.0.132.0
Linux RoCE Driver	231.0.162.0	<< 230.0.132.0
Linux RoCE Library	231.0.162.0	<< 230.0.132.0
Linux GPU Driver	231.0.162.0	<< 230.0.132.0
Win Srv 2022 x64 Driver	231.0.158.0*	<< 230.0.162.0*
Win Srv 2025 x64 Driver	231.0.158.0*	<< 230.0.162.0*
Win 10 x64 Driver	231.0.158.0*	<< 230.0.162.0*
Win 11 x64 Driver	231.0.158.0*	<< 230.0.162.0*
VMware ESX7.0 L2/RoCE Driver	231.0.153.0*	<< 230.0.136.0*
VMware ESX8.0 L2/RoCE Driver	231.0.153.0*	<< 230.0.136.0*
FreeBSD BNXT Driver	231.0.129.0	<< 230.0.133.0
Linux Installer	231.0.162.1	<< 230.0.157.0
Niccli	231.0.162.1	<< 230.0.163.0
Nictune	231.0.123.0	<< 230.0.149.0
Broadcom SOSReport	231.0.131.0	<< N.A.
**** 5750x (Thor) NVM component version ****		
Boot Code	231.0.154.0	<< 230.0.156.0
MBA Driver	231.0.159.0	<< 230.0.158.0
UEFI UNDI	231.0.159.0*	<< 230.0.158.0*
**** 5741x (Whitney+) NVM component version ****		
NCSI	231.0.153.0	<< 230.0.157.0
RoCE Firmware	231.0.153.0	<< 230.0.157.0
Boot Code	231.0.153.0	<< 230.0.157.0
MBA Driver	231.0.159.0	<< 230.0.158.0
UEFI UNDI	231.0.159.0 *	<< 230.0.158.0*

Note: An asterisk (*) following a version number represents a certified driver.
Arrows (<<) between versions indicate the component has been updated from the previously released software kit.