NVIDIA DOCA

Release Notes

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Chapter 1. Introduction

DOCA 2.2.0 introduces enhancements for high-performance AI and bare metal clouds.

With programmable congestion control and data path acceleration, DOCA SDK provides an extensive framework for developers.

Chapter 2. New Features, Updates, and Enhancements

Important: This release only supports NVIDIA® BlueField®-2. For BlueField-3 please refer or upgrade to DOCA 2.2.1.

Important: Upgrading to this BSP version installs a new version of Ubuntu GRUB. This version of GRUB revokes the old UEFI secure boot certificates and install new ones. The new certificates will not validate older images and boot will fail. Therefore, to roll back to older software versions, users must disable UEFI secure boot.

- NIC mode enhancements for BlueField-3 – Higher performance and lower latency at scale using local DPU memory; performant RDMA with programmable congestion control (PCC)
- Added support for DPA with NIC mode
- Enabled PCC over BlueField-3 DPA (including in NIC mode) while allowing for up to 400Gb/s speeds
- Added support for a new DOCA profile, doca-ofed, for installing MLNX_OFED with the DOCA package
- Added improvements and enhancements for DOCA Flow library
- Added beta-level support for OVS-DOCA, a highly optimized virtual switch for NVIDIA network services
- Redfish management – UEFI secure boot settings at scale, remotely, and securely
- DPU OS support – added Anolis OS 8.6 with kernel 5.10 support in BlueField-3 Arm
- Host OS support – added OS support: Debian 10.13, Allinux 3.2, OL 8.7, Ubuntu 22.04 (aarch64 host)

Important: No updates were made to the DOCA RegEx and DOCA DPI libraries in DOCA 2.2. Please refer to DOCA 2.5 for a note regarding future RegEx and DPI updates.

Chapter 3. Installation Notes

Refer to the NVIDIA DOCA Installation Guide for Linux for information on:

- Setting up NVIDIA DOCA SDK on your BlueField DPU
- Supported BlueField platforms

3.1. Embedded DOCA Libraries

Component	Version
doca-apps	2.2.0080-1
doca-grpc	2.2.0080-1
doca-libs	2.2.0080-1
ucx	1.15.0-1.2304052
gpunetio	2.2.0080-1

3.2. Embedded DOCA Drivers

Component	Version	Description
BlueField-3 firmware	32.38.1002	Firmware is used to run user programs on the device which allow hardware to run
BlueField-2 firmware	24.38.1002	Firmware is used to run user programs on the device which allow hardware to run
ATF	v2.2(release):4.2.0-80-g0ad5a0e	Arm-trusted firmware is a reference implementation of secure world software for Arm architectures
UEFI	4.2.0-56-ge28fcb7	UEFI is a specification that defines the architecture of the platform firmware used for booting and its interface for interaction with the operating system

Component	Version	Description
doca-base (MLNX_OFED)	23.07-0.5.0.0	NVIDIA® MLNX_OFED is a single software stack that operates across all NVIDIA network adapter solutions
MFT	4.25.0-62	NVIDIA® MFT is a set of firmware management and debug tools for NVIDIA devices
mlnx-dpdk	22.11.2307.2.0	Equivalent to DPDK upstream. The versioning of MLNX_DPDK indicates which upstream DPDK it is compatible with it (e.g., 22.11 is compatible with upstream DPDK 2022.11).
mlx-regex	1.2-ubuntu1	RegEx is a library that provides RegEx pattern matching to DOCA applications using the regular expression processor (RXP) or software-based engines when required
virtio-net-controller	1.6.14-1	Virtio-net-controller is a systemd service running on the DPU, with a user interface front-end to communicate with the background service
collectx-clxapi	1.13.2	A library which exposes the CollectX API, which allows any 3rd party to easily use CollectX functionality in their own programs
libvma	9.8.31-1	The NVIDIA® VMA library accelerates latency-sensitive and throughput-demanding TCP and UDP socket-based applications by offloading traffic from the user-space directly to the NIC, without going through the kernel and the standard IP stack (kernel-bypass)
libxlio	3.10.5-1.2307050	The NVIDIA® XLIO software library boosts the performance of TCP/IP applications based on NGINX (CDN, DoH, etc.) and storage solutions as part of the SPDK
dpcp	1.1.40-1.2307050	DPCP provides a unified flexible interface for programming IB devices using DevX

Component	Version	Description
mlnx-snap	3.7.4-2	BlueField SNAP for NVMe and virtio-blk enables hardware-accelerated virtualization of local storage
mlnx-libsnap	1.5.4-7	Libsnap is a common library designed to assist common tasks for applications wishing to interact with emulated hardware over BlueField DPUs and take the most advantage from hardware capabilities
spdk	23.01-11	SPDK provides a set of tools and libraries for writing high performance, scalable, user-mode storage applications
flexio	23.7.1694	FlexIO SDK exposes an API for managing the device and executing native code over the DPA processor
dpacc	1.5.0	DPACC is a high-level compiler for the DPA processor which compiles code targeted for the data-path accelerator (DPA) processor into a device executable and generates a DPA program
rxp-compiler	23.07.1	NVIDIA® RXP® is a processor developed to efficiently process data to detect matches for a set of user-defined string and regular expression (RegEx) based rules and is used to compile regular expressions into a format that can be executed by the RXP
rxpbench	2.2.0080-1	RXPBench is a tool that allows for the performance comparison between the NVIDIA® RXP® hardware RegEx acceleration engine found in the BlueField DPU and the Intel® Hyperscan software library. It provides a comprehensive set of options and can facilitate ingress of data from live network ports or previously recorded PCAP files.

Component	Version	Description
Rivermax	1.31	NVIDIA® Rivermax® is an optimized networking SDK for media and data streaming applications
RShim	2.0.9.gb35835f_amd64	The user-space driver to access the BlueField SoC via the RShim interface, providing ways to push boot stream, debug the target, or login via the virtual console or network interface

3.3. DOCA Packages

Device	Component	Version	Description
Host	DOCA SDK	2.2.0	Software development kit package for developing host software
	DOCA Runtime	2.2.0	Runtime libraries required to run DOCA-based software applications on host
	DOCA Tools	2.2.0	Tools for developers and administrators on host
	DOCA Extra	2.2.0	Contains helper scripts (doca-info, doca-kernel-support)
	DOCA OFED	2.2.0	Single software stack which operates across all NVIDIA network adapter solutions
	Arm emulated (QEMU) development container	4.2.0	Linux-based BlueField Arm emulated container for developers
Target BlueField DPU (Arm)	BlueField BSP	4.2.0	BlueField image and firmware
	DOCA SDK	2.2.0	Software development kit packages for developing Arm software
	DOCA Runtime	2.2.0	Runtime libraries requied to run DOCA-

Device	Component	Version	Description
			based software applications on Arm
	DOCA Tools	2.2.0	Tools for developers and administrators for Arm target

3.4. Supported Operating System Distributions

The default operating system of the BlueField DPU (Arm) is Ubuntu 22.04.

The supported operating systems on the host machine are the following:

Note: Only the following generic kernel versions are supported for DOCA local repo package for host installation (whether by SDKM or manually).

OS	Kernel	x86	aarch64
Alinux 3.2	5.10	#	
BCLinux 21.10 SP2	4.19.90	#	#
CTyunOS 2	4.19.90	#	#
Debian 10.13	5.10.135	#	
	5.4.210		
Debian 10.8	4.19.0	#	
Kylin 10 SP2	4.19.90	#	#
openEuler 20.03 SP3	4.19.90	#	#
openEuler 22.03	5.10.0	#	#
Oracle Linux 8.7	5.10/5.15	#	
RHEL/CentOS 7.6	3.10	#	
	4.14		#
RHEL/CentOS 8.0	4.18	#	
RHEL/CentOS 8.2	4.18	#	
RHEL/Rocky 8.6	4.18	#	
RHEL/Rocky 9.1	5.14.0	#	#
Ubuntu 18.04	4.15	#	
Ubuntu 20.04	5.4	#	
Ubuntu 22.04	5.15	#	#
UOS 20 1040d	4.19.0	#	#
Windows	DOCA support for Windows is on DOCA's roadmap. For Windows driver support, refer to WinOF-2 Release Notes.		

Chapter 4. Technical Support

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- E-mail: enterprisesupport@nvidia.com
- Enterprise Support page: https://www.nvidia.com/en-us/support/enterprise

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Chapter 5. Known Issues

The following table lists the known issues and limitations for this release of DOCA SDK.

Reference	Description
3566042	Description: Virtio hotplug is not supported in GPU-HOST mode on the NVIDIA Converged Accelerator.
	Workaround: N/A
	Keyword: Virtio; Converged Accelerator
	Reported in version: 2.2.0
3546474	Description: PXE boot over ConnectX interface might not work due to an invalid MAC address in the UEFI boot entry.
	Workaround: On the DPU, create `/etc/bf.cfg` file with the relevant PXE boot entries, then run the command `bfcfg`.
	Keyword: PXE; boot; MAC
	Reported in version: 2.2.0
3393316	Description: When LSO is enabled, if the header and data appear in the same fragment, the following warning is given from tcpdump: `truncated-ip - 9 bytes missing`
	Workaround: N/A
	Keyword: Virtio-net; large send offload
	Reported in version: 2.2.0
3549785	Description: NVMe and mlx5_core drivers fail during BFB installation. As a result, Anolis OS cannot be installed on the SSD and the `mlxfwreset` command does not work during Anolis BFB installation.
	Workaround: N/A
	Keyword: Linux; NVMe; BFB installation
	Reported in version: 2.2.0
3561723	Description: Running `mlxfwreset sync 1` on NVIDIA Converged Accelerators may be reported as supported although it is not. Executing the reset will fail.
	Workaround: N/A
	Keyword: mlxfwreset
	Reported in version: 2.2.0

Reference	Description
3306489	Description: After rebooting a BlueField-3 DPU running Rocky Linux 8.6 BFB, the kernel log shows the following error: `[ 3.787135] mlxbf_gige MLNXBF17:00: Error getting PHY irq. Use polling instead` This message indicates that the Ethernet driver will function normally in all aspects, except that PHY polling is enabled.
	Workaround: N/A
	Keyword: Linux; PHY; kernel
	Reported in version: 2.2.0
3306489	Description: When performing longevity tests (e.g., mlxfwreset, DPU reboot, burning of new BFBs), a host running an Intel CPU may observer errors related to "CPU 0: Machine Check Exception".
	Workaround: Add `intel_idle.max_cstate=1` entry to the kernel command line.
	Keyword: Longevity; mlxfwreset; DPU reboot
	Reported in version: 2.2.0
3529297	Description: Enhanced NIC mode is not supported on BlueField-2 DPUs.
	Workaround: N/A
	Keyword: Operation; mode
	Reported in version: 2.2.0
3538486	Description: When removing LAG configuration from the DPU, a kernel warning for `uverbs_destroy_ufile_hw` is observed if virtio-net-controller is still running.
	Workaround: Stop virtio-net-controller service before cleaning up bond configuration.
	Keyword: Virtio-net; LAG
	Reported in version: 2.2.0
3527302	Description: Failure occurs on `doca_mmap_start()` if the memory range is from dmabuf (i.e., if mmap is created with `doca_mmap_set_dmabuf_memrange()` call).
	Workaround: N/A
	Keyword: Memory
	Reported in version: 2.2.0
3541010	Description: In case of an asynchromous wait, submitting a `doca_sync_event_job_wait` job is limited to a Sync Event with a value in the range [0, 254] and is limited to a wait threshold in the range [0,254]. Other scenarios result in anomalous behavior.
	Workaround: N/A
	Keyword: Sync-event; kernel
	Reported in version: 2.2.0
3511313	Description: On BlueField-3, the MAC addresses of Arm ports (p0 and p1) do not match the value on DPU sticker.
	Workaround: N/A
	Keyword: Port; MAC address

Reference	Description
	Reported in version: 2.2.0
3533508	Description: OVS-dpdk is not supported if grub is used to allocate hugepages.
	Workaround: N/A
	Keyword: Hugepages; OVS-DPDK
	Reported in version: 2.2.0
3533850	Description: PCC is not supported when operating in DPU mode.
	Workaround: N/A
	Keyword: PCC
	Reported in version: 2.2.0
3534219	Description: On BlueField-3 devices, from DOCA 2.2.0 to 32.37.1306 (or lower), the host crashes when executing partial Arm reset (e.g., Arm reboot; BFB push; mlxfwreset).
	Workaround: Before downgrading the firmware: 1. Run: `echo 0 > /sys/bus/platform/drivers/mlxbf-bootctl/large_icm` 2. Reboot Arm.
	Keyword: PCC; hang
	Reported in version: 2.2.0
3530300	Description: DOCA_PCC application may be terminated due to a false hang monitor alarm when running traffic.
	Workaround: N/A
	Keyword: PCC; hang
	Reported in version: 2.2.0
N/A	Description: The NVIDIA DOCA East-West Overlay Encryption Application (and the underlying DPU OS Kernel driver IPsec functionality) is not supported. User space DOCA IPsec is not impacted.
	Workaround: N/A
	Keyword: IPsec
	Reported in version: 2.2.0
3382740	Description: Fragmented packets are not supported in Application Recognition, Intrusion Prevention, and URL Filtering reference applications.
	Workaround: N/A
	Keyword: Fragmented packets; DOCA applications
	Reported in version: 2.2.0
3444073	Description: `mlxfwreset` is not supported in this release.
	Workaround: Power cycle the host.
	Keyword: mlxfwreset; support
	Reported in version: 2.0.2

Reference	Description
3448841	Description: While running CentOS 8.2, switchdev Ethernet DPU runs in "shared" RDMA net namespace mode instead of "exclusive".
	Workaround: Use `ib_core` module parameter `netns_mode=0`. For example: `echo "options ib_core netns_mode=0" >> /etc/modprobe.d/mlnx-bf.conf`
	Keyword: RDMA; isolation; Net NS
	Reported in version: 2.0.2
3365363	Description: On BlueField-3, when booting virtio-net emulation device using a GRUB2 bootloader, the bootloader may attempt to close and re-open the virtio-net device. This can result in unexpected behavior and possible system failure to boot.
	Workaround: N/A
	Keyword: BlueField-3; virtio-net; UEFI
	Reported in version: 2.0.2
3232444	Description: After live migration of virtio-net devices using the VFE driver, the `max_queues_size` output from the `virtnet list` may be wrong. This does not affect the actual value.
	Workaround: N/A
	Keyword: Virtio-net; live migration
	Reported in version: 2.0.2
3441287	Description: Failure occurs when attempting to raise static LAG with `ifenslave_2.10ubuntu3` package.
	Workaround: Use `ifenslave_2.9ubuntu1`.
	Keyword: `ifenslave`; bonding
	Reported in version: 2.0.2
3373849	Description: Different OVS-based packages can include their own systemd services which prevents `/sbin/mlnx_bf_configure` from identifying the right one.
	Workaround: Use a specific service name in `/sbin/mlnx_bf_configure`.
	Keyword: OVS; systemd
	Reported in version: 2.0.2
2706803	Description: When an NVMe controller, SoC management controller, and DMA controller are configured, the maximum number of VFs is limited to 124.
	Workaround: N/A
	Keyword: VF; limitation
	Reported in version: 2.0.2
3380586	Description: Public key acceleration is not enabled on OpenEuler BFB due to missing configurations in the `openssl.cnf` file.
	Workaround: N/A
	Keyword: PKA; OpenSSL
	Reported in version: 2.0.2
3273435	Description: Changing the mode of operation between NIC and DPU modes results in different capabilities for the host driver which might cause unexpected behavior.
	Workaround: Reload the host driver or reboot the host.

Reference	Description
	Keyword: Modes of operation; driver
	Reported in version: 2.0.2
3438222	Description: On BlueField DPU running Rocky, openEuler or Centos8.2 with default huge page size not equal to 2M, rxpbench fails to initialize as no mounted `hugetlbfs` is found for the 2M size.
	Workaround: N/A
	Keyword: rxpbench
	Reported in version: 2.0.2
3377199	Description: After installing OpenEuler 20.03sp1 BFB, the 2nd port may raise configured with legacy mode.
	Workaround: Reboot the DPU.
	Keyword: OpenEuler; legacy
	Reported in version: 2.0.2
3362822	Description: Running the gRPC firewall application in interactive mode and trying to add and remove the same entry leads to a failure on the server side which severs the connection to the server.
	Workaround: N/A
	Keyword: gRPC; firewall; interactive; connection
	Reported in version: 2.0.2

3264749	Description: In Rocky and CentOS 8.2 inbox-kernel BFBs, RegEx requires the following extra huge page configuration for it to function properly:
	`sudo hugeadm --pool-pages-min DEFAULT:2048M`
	`sudo systemctl start mlx-regex.service`
	`systemctl status mlx-regex.service`
	If these commands have executed successfully you should see `active (running)` in the last line of the output.

	Workaround: N/A
	Keyword: RegEx; hugepages
	Reported in version: 1.5.1
3240153	Description: DOCA kernel support only works on a non-default kernel.
	Workaround: N/A
	Keyword: Kernel
	Reported in version: 1.5.0
3217627	Description: The `doca_devinfo_rep_list_create` API returns success on the host instead of `Operation not supported`.
	Workaround: N/A
	Keyword: DOCA core; InfiniBand
	Reported in version: 1.5.0

Chapter 6. API Backward Compatibility

This section lists changes to the DOCA SDK which impacts backward compatibility.

6.1. DOCA Core doca_buf

Up to DOCA 2.0.2, the data length of the buffer is ignored when using the buffer as an output parameter, and the new data was written over the data that was there beforehand. From now on, new data is appended after existing data (if any) whileupdating the data length accordingly.

Because of this change, it is recommended that a destination buffer is allocated without a data section (data length 0), for ease of use.

In cases where the data length is 0 in a destination buffer, this change would go unnoticed (as appending the data and writing to the data section has the same result).

Reusing buffers requires resetting the data length when wishing to write to the same data address (instead of appending the data), overwriting the existing data. A new function, `doca_buf_reset_data_len()`, has been added specifically for this need.

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