



eXpressWare release for MX products

Dolphin Interconnect Solutions

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Contents

1	Definitions	1
	Product PCIe Chipset	1
	Release categories	1
	Release Version Scheme	2
	Types of Releases	2
2	Dolphin eXpressWare Overview	3
	Components	3
	SuperSockets	3
	Documentation & Support	4
3	Supported Hardware & Configurations	5
	Dolphin PCIe Adapter Cards supported by the NTB software	5
	Dolphin PCIe Adapter Cards supported by the Dolphin Board Management Software	6
	Third-Party Devices Supported by Dolphin Software	6
	Dolphin PCIe Switches supported	7
	Supported Configurations	7
	Standard BMC firmware revisions	9
	Microchip PFX Configuration File Revisions	11
	Support for OEM hardware	14
	General eXpressWare defaults and settings for MX	14
	Known Limitations	14
4	Change log for Linux Software	16
	New in DIS Release 5.25.2	16
	Changes in previous releases	17
	DIS Release 5.25.1	17
	DIS Release 5.25.0	18
	DIS Release 5.24.0	21
	DIS Release 5.23.0	24
	DIS Release 5.22.0	25
	DIS Release 5.21.4	26
	DIS Release 5.21.3	26
	DIS Release 5.21.2	26
	DIS Release 5.21.1	26
	DIS Release 5.21.0	26

DIS Release 5.20.1	27
DIS Release 5.20.0	28
DIS Release 5.19.2	29
DIS Release 5.18.0	30
DIS Release 5.17.0	31
DIS Release 5.16.0	31
DIS Release 5.15.2	32
DIS Release 5.15.1	32
DIS Release 5.15.0	32
Included software	32
Supported architectures	33
Tested and supported OS platforms	33
Cluster installation requirements	34
Installation and management	34
High availability features	34
Bundled (major) management tools	34
Bundled (major) demo tools	35
Firmware upgrade	35
5 Change log for Windows Software	36
New in DIS Release 5.25.2	36
Changes in previous releases	36
DIS Release 5.25.1	36
DIS Release 5.25.0	37
DIS Release 5.24.0	39
DIS Release 5.23.0	41
DIS Release 5.22.0	41
DIS Release 5.21.4	42
DIS Release 5.21.3	42
DIS Release 5.21.2	42
DIS Release 5.21.0	42
DIS Release 5.20.1	42
DIS Release 5.20.0	43
DIS Release 5.19.2	43
DIS Release 5.18.0	43
DIS Release 5.17.0	43
DIS Release 5.16.0	43
DIS Release 5.15.1	44
DIS Release 5.15.0	44
Included software	44
Supported OS platforms	44
Cluster installation requirements	45
Installation and management	45
High availability features	45
Bundled (major) management tools	45
Bundled (major) demo tools	45
Firmware upgrade	46
6 Change log for RTX Software	47
New in DIS Release 5.25.2	47
Changes in previous releases	47
DIS Release 5.25.1	47
DIS Release 5.25.0	48
DIS Release 5.24.0	50

DIS Release 5.23.0	52
DIS Release 5.22.0	52
DIS Release 5.20.1	52
DIS Release 5.20.0	52
DIS Release 5.19.2	52
DIS Release 5.18.0	52
DIS Release 5.17.0	52
DIS Release 5.15.2	52
Included software	53
Supported OS platforms	53
Installation and management	53
High availability features	53
Bundled (major) management tools	53
Bundled (major) demo tools	53
Firmware upgrade	53
7 Change log for VxWorks Software	54
New in DIS Release 5.25.2	54
Included software	54
Supported OS platforms	55
Installation and management	55
High availability features	55
Bundled (major) management tools	55
Bundled (major) demo tools	55
Firmware upgrade	55
8 Change log for QNX Software	57
New in DIS Release 5.25.2	57
Changes in previous releases	57
DIS Release 5.25.1	57
DIS Release 5.25.0	58
Included software	60
Supported architectures	60
Supported OS platforms	60

Definitions

Product PCIe Chipset

MX products are based on the Microchip PFX Switchtec PCIe 3.0, 4.0 and 5.0 chipsets in various configurations and topologies.

In general, but not always (see the specific product page for details):

- **MXH**: Host adapter
- **MXC**: CompactPCI Serial adapter
- **MXP**: PXIe adapter
- **MX*8XX**: PCIe 3.0 adapter
- **MX*9XX**: PCIe 4.0 adapter
- **MX*5XX**: PCIe 5.0 adapter

Release categories

The following definitions are used for the eXpressWare software.

Prototype

Only parts of the full functionality are implemented. Minimal error handling. Intended to demonstrate limited functionality to selected customers. Not for general availability.

Alpha

All functionality is implemented. Limited error handling. Can be released to collaborating partners.

Beta

Complete with error handling and performance optimization. Nearly final product. Can be made generally available.

GA

General Availability. Fully tested and ready for shipment to OEM customers and end users.

Snapshot

A snapshot release (or code drop) can be done at any of the above defined release categories. Code distributed by an individual, as a part of an agreed collaboration etc. for the purpose of testing a fix or new functionality requested by

the other party. Snapshot releases are generally not supported by Dolphin, but used as an important part of the test and qualification of new code. The person doing the snapshot is responsible for making sure the letter «d» (for development) is added to the version string before distributing the software and to make sure the other party understands the terms (not supported) and conditions of the software release. The person doing the snapshot release should make sure to keep an exact copy of the release (by a private copy or source control tag), no other formal steps are required.

Release Version Scheme

All eXpressWare components have a version string that easily can be retrieved by users to identify the product and the release version. The version string is constructed using decimal numbers formatted like MAJOR_VER.MINOR_VER.BUGFIX_VER (E.g. DIS 5.23.1).

- **MAJOR_VER:**

Major software changes. Significant improvements or changes that may require changes to how the product is used.

- **MINOR_VER:**

Changes to the software that significantly improves functionality. Enhancements, OS support, non-breaking improvements.

- **BUGFIX_VER:**

Minor fixes of previously released software. No functional changes.

Types of Releases

Dolphin uses two types of releases to satisfy rapid development, long-term test requirements and concurrent external testing and stability.

Release Candidate

A pre-release version that is still undergoing final testing and qualification. It is made available to customers and partners to provide early access to updated drivers and features, without requiring them to wait for the official release. The primary distinction between a release candidate and a final release is the level of testing completed. If critical issues are discovered during release candidate testing, the release may be withdrawn. In such cases, the version string and date must be updated before a new release candidate is issued, in accordance with standard release engineering procedures.

Release

Has completed all test procedures. Typically a renamed release candidate that passes all tests, and with no new critical bugs found.

Dolphin eXpressWare Overview

The eXpressWare software suite includes the following components. Not all combinations of software, hardware and OS are supported. Refer to release note section for compatibility.

Components

- **DIS-MX**: Low-level MX device driver
- **IRM**: Interconnect Resource Manager
- **SISCI**: Shared-memory cluster interconnect infrastructure
- **SuperSockets**: Socket accelerator for PCIe
- **IPoPCIe**: TCP/IP over PCIe (Windows NDIS or Linux DISip)
- **SmartIO**: IO sharing and control. Supports Device Lending and Hot-Add (Linux)

SuperSockets

Dolphins SuperSockets is a family of Berkeley Sockets API compliant libraries that will accelerate embedded applications written to standard networking functionality. The functionality depends on the implementation approach.

User-space Library (Windows/Linux)

The Dolphin SuperSockets user space library is currently provided for the purpose of supporting embedded applications. The Windows Winsock2 environment contains a rich set of socket functions and options. SuperSockets version 5.2 and newer adds support for connectivity to the new Linux SuperSockets user space library.

Supports:

accept, bind, connect, getpeername, getsockname, getsockopt, listen, recv, select, send, setsockopt(TCP_NODELAY), socket, shutdown

Windows-specific:

closesocket, WSASendDisconnect, ioctlsocket, WSAAsyncSelect, WSAGetOverlappedResult, WSAIoctl, WSAREcv, WSASend

Linux-specific:

close, ioctl

Kernel-space Library (Linux)

The SuperSockets Kernel-space library is our standard recommendation for most standard applications. It implements a new socket address family AF_SSOCKS, and support virtually all networked Linux applications. The software is also compliant with the Linux Kernel Sockets API and can also be used by kernel services that can be configured to use AF_SSOCKS. This version of SuperSockets includes automatic fail-over to Ethernet if there is a failure with the PCIe network.

UDP multicast is supported if the underlying PCIe hardware and topology supports multicast. Currently, only a single receiver per node for a specific multicast group is supported. The number of available groups is hardware dependent.

More Info: <https://www.dolphinics.com/software>

Documentation & Support

We do take software development and product testing seriously, please let us know your experience or any issue by contacting us at: <https://www.dolphinics.com/support>

- **Additional info and manuals:**

- <https://www.dolphinics.com/mx>
- <https://docs.dolphinics.com>

- **SISCI API resources:**

- <https://docs.dolphinics.com/sisci/guides/index.html>
- <https://www.dolphinics.com/products/embedded-sisci-developers-kit.html>

- **SmartIO resources:**

- <https://docs.dolphinics.com/smartio/introduction.html>

This release note contains a summary of the important changes made to eXpressWare. Please contact Dolphin for a complete list of changes.

Supported Hardware & Configurations

Dolphin PCIe Adapter Cards supported by the NTB software

- **MXH830**: PCIe 3.0 NTB Host Adapter, x16, SFF-8644
- **MXH910**: PCIe 3.0 NTB Host Adapter, x8, iPass
- **MXH912**: PCIe 3.0 NTB Host Adapter, x8, iPass
- **MXH914**: PCIe 4.0 NTB Host Adapter, x4, SFF-8644
- **MXH916**: PCIe 4.0 NTB Host Adapter, x16, SFF-8644
- **MXH918**: PCIe 4.0 NTB Host Adapter, x8, SFF-8644
- **MXH930**: PCIe 4.0 NTB Host Adapter, x16, SFF-8644
- **MXH940**: PCIe 4.0 NTB Host Adapter, 2 x8 FireFly modules, 2 x8, x16
- **MXH941**: PCIe 4.0 NTB Host Adapter, 1 x8 FireFly module, x8
- **MXH943**: PCIe 4.0 NTB Host Adapter, 2 x4 FireFly modules, 2 x4, x8
- **MXH944**: PCIe 4.0 NTB Host Adapter, 1 x4 FireFly module, x4
- **MXH949**: PCIe 4.0 NTB Host Adapter, 4 x4 FireFly module, 4 x4, 2 x8, x16
- **MXH950**: PCIe 3.0 NTB Host Adapter, 2 x8 FireFly modules, 2 x8, x16
- **MXH951**: PCIe 3.0 NTB Host Adapter, 1 x8 FireFly module, x8
- **MXH953**: PCIe 3.0 NTB Host Adapter, 2 x4 FireFly modules, 2 x4, x8
- **MXH954**: PCIe 3.0 NTB Host Adapter, 1 x4 FireFly module, x4
- **MXH959**: PCIe 3.0 NTB Host Adapter, 4 x4 FireFly module, 4 x4, 2 x8, x16
- **MXP908**: PXIe PCIe 4.0 NTB Peripheral Module, x8, SFF-8644
- **MXC948**: PCIe 4.0 NTB / Transparent Adapter, x16, CompactPCI Serial PCIe
- **MXC960**: PCIe 4.0 NTB Adapter, x16, CompactPCI Serial PCIe
- **MXH530**: PCIe 5.0 NTB Host Adapter, x16, SFF-8614
- **MXH570**: PCIe 5.0 NTB Host Adapter, x16, CDFP CopprLink

Dolphin PCIe Adapter Cards supported by the Dolphin Board Management Software

- **MXH832**: PCIe 3.0 Transparent Host / Target Adapter, x16, SFF-8644
- **MXH833**: PCIe 3.0 Transparent Host / Target Adapter, x16, SFF-8644
- **MXH912**: PCIe 4.0 Transparent Host / Target Adapter, x4, iPass
- **MXH915**: PCIe 4.0 Transparent Host / Target Adapter, x4, SFF-8644
- **MXH917**: PCIe 4.0 Transparent Host / Target Adapter, x16, SFF-8644
- **MXH919**: PCIe 4.0 Transparent Host / Target Adapter, x8, SFF-8644
- **MXH932**: PCIe 4.0 Transparent Host / Target Adapter, x16, SFF-8644
- **MXH942**: PCIe 4.0 Transparent Host / Target Adapter, 2 x8 FireFly modules, 2 x8, x16
- **MXH945**: PCIe 4.0 Transparent Host / Target Adapter, 4 x4 FireFly module, 4 x4, 2 x8, x16
- **MXH946**: PCIe 4.0 Transparent Host / Target Adapter, 1 x8 FireFly module, x8
- **MXH947**: PCIe 4.0 Transparent Host / Target Adapter, 2 x4 FireFly modules, 2 x4, x8
- **MXH948**: PCIe 4.0 Transparent Host / Target Adapter, 1 x4 FireFly module, x4
- **MXH952**: PCIe 3.0 Transparent Host / Target Adapter, 2 x8 FireFly modules, 2 x8, x16
- **MXH955**: PCIe 3.0 Transparent Host / Target Adapter, 4 x4 FireFly module, 4 x4, 2 x8, x16
- **MXH956**: PCIe 3.0 Transparent Host / Target Adapter, 1 x8 FireFly module, x8
- **MXH957**: PCIe 3.0 Transparent Host / Target Adapter, 2 x4 FireFly modules, 2 x4, x8
- **MXH958**: PCIe 3.0 Transparent Host / Target Adapter, 1 x4 FireFly module, x4
- **MXP909**: PXIe PCIe 4.0 Transparent Peripheral Module, x8, SFF-8644
- **MXP924**: PXIe PCIe 4.0 Switch Module, x16, SFF-8644
- **MXC962**: PCIe 4.0 Transparent Adapter, x16, CompactPCI Serial PCIe
- **MXH532**: PCIe 5.0 Transparent Host / Target Adapter, x16, SFF-8614
- **MXH572**: PCIe 5.0 Transparent Host / Target Adapter, x16, CDFP CopprLink

Third-Party Devices Supported by Dolphin Software

- MCH663
- MVH100
- MVH126
- MVH222
- MVH242
- MVH260
- MVH270
- MVH300
- MVH308
- MVH309

Note

If you are not using a listed adapter card, please use another software download.

Dolphin PCIe Switches supported

- MXS824
- MXS924

Supported Configurations

Note

See the *Known Limitations* section about support for Intel Xeon Scalable 3rd, 4th and 5th gen processors if you plan to use any of these in a switch configuration.

General use with MXH840:

- 2 nodes using 1, 2, 4 Samtec PCIe 3.0 FireFly / cables

General use with MXH850:

- 2 nodes using 1, 2, 4 Samtec PCIe 3.0 FireFly / cables

General use with MXH940:

- 2 nodes using 1, 2, 4 Samtec PCIe 4.0 FireFly / cables

General use with MXH950:

- 2 nodes using 1, 2, 4 Samtec PCIe 4.0 FireFly / cables

General use with MXH910:

- 2 nodes using 1 x8 iPass cable

General use with MXH830:

- 2 nodes using 1, 2, 4 (x4, x8, x16) PCIe 3.0 cables
- 3 nodes using 1, 2 (x4 or x8) PCIe 3.0 cables
- 5 nodes using 1 (x4) PCIe 3.0 cables

General use with MXH930:

- 2 nodes using 1, 2, 4 (x4, x8, x16) PCIe 4.0 cables
- 3 nodes using 1, 2 (x4 or x8) PCIe 4.0 cables
- 5 nodes using 1 (x4) PCIe 4.0 cables

General use with MXH530:

- 2 nodes using 1, 2, 4 (x4, x8, x16) PCIe 5.0 cables
- 3 nodes using 1, 2 (x4 or x8) PCIe 5.0 cables
- 5 nodes using 1 (x4) PCIe 5.0 cables

General use with MXH570:

-
- 2 nodes using 1 PCIe 5.0 CDFP CopprLink cable

Reflective memory use with MXH830 and MXS824:

- 2 nodes using 1, 2, 4 (x4, x8, x16) PCIe 3.0 cables
- Up to 6 nodes x16 using one **MXS824** switch
- Up to 12 nodes x8 using one **MXS824** switch
- Up to 24 nodes x4 using one **MXS824** switch
- Up to 30 nodes x16 using multiple **MXS824** switches

Reflective memory use with MXH930 and MXS924:

- 2 nodes using 1, 2, 4 (x4, x8, x16) PCIe 4.0 cables
- Up to 6 nodes x16 using one **MXS924** switch
- Up to 12 nodes x8 using one **MXS924** switch
- Up to 24 nodes x4 using one **MXS924** switch
- Up to 30 nodes x16 using multiple **MXS924** switches

Reflective memory use with MXH530 and MXS924:

- 2 nodes using 1, 2, 4 (x4, x8, x16) PCIe 4.0 cables
- Up to 6 nodes x16 using one **MXS924** switch
- Up to 12 nodes x8 using one **MXS924** switch
- Up to 24 nodes x4 using one **MXS924** switch
- Up to 30 nodes x16 using multiple **MXS924** switches

PCI Express Hot Add with MXH830 (Linux only):

- MXH830 connected to MXH832 transparent target cards and endpoints
- MXH830 connected to MXS824, fan out to max 5 MXH832 transparent cards and endpoints

PCI Express Hot Add with MXH530, MXH570, MXH930, MXH940 and MXH950 (Linux only):

- **MXH530** connected to any transparent target cards and endpoints
- **MXH570** connected to any transparent target cards and endpoints
- **MXH930** connected to any transparent target cards and endpoints
- NTB **MXH94x** connected to any transparent target cards and endpoints
- NTB **MXH95x** connected to any transparent target cards and endpoints

Standard BMC firmware revisions

Table 1: Standard BMC firmware revisions for MXH83x

Release	MXH83x
5.25.2	8.12
5.25.1	8.12
5.25.0	8.12
5.24.0	8.12
5.23.0	8.12
5.22.0	8.12
5.21.x	8.12
5.20.1	8.12
5.20.0	8.12
5.19.2	8.12
5.18.0	8.12
5.17.0	8.12
5.16.0	8.10
5.15.x	8.10

Table 2: Standard BMC firmware revisions for MXH93x, MXH94x, MXH95x

Release	MXH93x	MXH94x	MXH95x
5.25.2	2.11	2.11	2.11
5.25.1	2.11	2.11	2.11
5.25.0	2.11	2.11	2.11
5.24.0	2.11	2.11	2.11
5.23.0	2.10	2.11	2.11
5.22.0	2.10	2.10	2.10
5.21.4	2.8	2.8	2.8
5.21.3	2.8	2.8	2.8
5.21.2	2.8	2.8	2.8
5.21.1	2.8	2.8	2.8
5.21.0	2.8	2.8	2.8
5.20.1	2.8	2.8	2.8
5.20.0	2.8	2.8	2.8
5.19.3	2.1	2.1	2.1
5.19.2	2.1	2.1	2.1
5.19.1	2.1	2.1	2.1
5.19.0	2.1	2.1	2.1
5.18.1	1.5	1.5	1.5
5.18.0	1.5	1.5	1.5

Table 3: Standard BMC firmware revisions for MXP90x, MXP924

Release	MXP908	MXP909	MXP924
5.25.2	3.7	3.7	3.7
5.25.1	3.7	3.7	3.7
5.25.0	3.6	3.6	3.6
5.24.0	3.4	3.2	3.4
5.23.0	3.2	3.2	3.2
5.22.0	2.8	-	3.2
5.21.4	2.8	-	2.8
5.21.3	2.8	-	2.8
5.21.2	2.8	-	2.8
5.21.1	2.8	-	2.8
5.21.0	2.8	-	2.8
5.20.1	2.8	-	2.8
5.20.0	2.8	-	2.8
5.19.3	-	-	2.4
5.19.2	-	-	2.4
5.19.1	-	-	2.2
5.19.0	-	-	2.1
5.18.1	-	-	2
5.18.0	-	-	2

Table 4: Standard BMC firmware revisions for MXC94x, MXC96x

Release	MXC948	MXC96x
5.25.2	3.6	3.6
5.25.1	3.6	3.6
5.25.0	3.6	3.6
5.24.0	3.2	3.4
5.23.0	3.2	3.2
5.22.0	3.2	3.1
5.21.4	3.1-rc7	3.0-rc1
5.21.3	3.1-rc7	3.0-rc1
5.21.2	3.1-rc7	3.0-rc1
5.21.1	3.1-rc7	3.0-rc1
5.21.0	3.1-rc7	3.0-rc1
5.20.1	3.0-rc1	3.0-rc1
5.20.0	2.8	2.8

Table 5: Standard BMC firmware revisions for MXH53x, MXH57x

Release	MXH53x	MXH57x
5.25.2	3.7	3.8-rc3
5.25.1	3.6	3.7
5.25.0	3.6	3.6
5.24.0	v3.4	v3.4
5.23.0	v3.3	-

Table 6: Standard BMC firmware revisions for MXP52x

Release	MXP523	MXP526
5.25.2	3.7	3.7
5.25.1	3.7	3.7
5.25.0	3.6	3.6
5.24.0	-	v3.4

Microchip PFX Configuration File Revisions

The PFX configuration file version of the different adapters are listed below. For more details see the “Firmware Release Notes” document for your adapter: [MX Firmware Release Notes](#)

Table 7: PFX configuration file revisions for MXH83x

Release	MXH83x
5.25.2	VER15
5.25.1	VER15
5.25.0	VER15
5.24.0	VER14
5.23.0	VER14
5.22.0	VER14
5.21.4	VER16
5.21.3	VER16
5.21.2	VER16
5.21.1	VER16
5.21.0	VER14
5.20.1	VER14
5.20.0	VER14
5.19.3	VER14
5.19.2	VER14
5.19.1	VER14
5.19.0	VER14
5.18.1	VER14
5.18.0	VER14
5.17.0	VER14
5.16.0	VER14
5.15.2	VER14
5.15.1	VER14
5.15.0	VER14

Table 8: PFX configuration file revisions for MXH93x, MXH94x, MXH95x

Release	MXH93x	MXH94x	MXH95x
5.25.2	VER14	VER12	VER9
5.25.1	VER14	VER12	VER9
5.25.0	VER14	VER12	VER9
5.24.0	VER14	VER12	VER9
5.23.0	VER13	VER12	VER9
5.22.0	VER13	VER12	VER9
5.21.4	VER12	VER11	VER7
5.21.3	VER12	VER11	VER7
5.21.2	VER12	VER11	VER7
5.21.1	VER12	VER11	VER7
5.21.0	VER12	VER11	VER7
5.20.1	VER11	VER10	VER6
5.20.0	VER11	VER10	VER6
5.19.3	VER10	VER8	VER4
5.19.2	VER10	VER8	VER4
5.19.1	VER10	VER8	VER4
5.19.0	VER10	VER8	VER4
5.18.1	VER8	VER7	VER3
5.18.0	VER8	VER7	VER3
5.16.0	VER1	-	-
5.15.2	VER1	-	-
5.15.1	VER1	-	-
5.15.0	VER1	-	-

Table 9: PFX configuration file revisions for MXH91x

Release	MXH910	MXH912	MXH914 / MXH915	MXH916 / MXH917	MXH918 / MXH919
5.25.2	VER6	VER3	VER6	VER5	VER6
5.25.1	VER6	VER3	VER6	VER5	VER6
5.25.0	VER6	VER3	VER6	VER5	VER6
5.24.0	VER6	VER3	VER5	VER5	VER5
5.23.0	VER6	VER3	VER4	VER4	VER4
5.22.0	VER6	VER3	VER4	VER4	VER4
5.21.4	VER1	-	VER2	VER1	VER1
5.21.3	VER1	-	VER2	VER1	VER1
5.21.2	VER1	-	VER2	VER1	VER1
5.21.1	VER1	-	VER2	VER1	VER1
5.21.0	VER1	-	VER2	VER1	VER1

Table 10: PFX configuration file revisions for MXP90x, MXP924

Release	MXP908	MXP909	MXP924
5.25.2	VER5	VER5	VER9
5.25.1	VER5	VER5	VER9
5.25.0	VER5	VER5	VER9
5.24.0	VER5	VER4	VER9
5.23.0	VER4	VER4	VER9
5.22.0	VER3	-	VER8
5.21.4	VER3	-	VER7
5.21.3	VER3	-	VER7
5.21.2	VER3	-	VER7
5.21.1	VER3	-	VER7
5.21.0	VER3	-	VER7
5.20.1	VER3	-	VER7
5.20.0	VER3	-	VER7
5.19.3	-	-	VER6
5.19.2	-	-	VER6
5.19.1	-	-	VER6
5.19.0	-	-	VER6
5.18.1	-	-	VER2
5.18.0	-	-	VER2

Table 11: PFX configuration file revisions for MXC9xx

Release	MXC948	MXC96x
5.25.2	VER9	VER4
5.25.1	VER9	VER3
5.25.0	VER9	VER3
5.24.0	VER9	VER2
5.23.0	VER9	VER2
5.22.0	VER9	VER1
5.21.4	VER8	VER1
5.21.3	VER8	VER1
5.21.2	VER8	VER1
5.21.1	VER8	VER1
5.21.0	VER8	VER1
5.20.1	VER7	VER1
5.20.0	VER6	VER1

Table 12: PFX configuration file revisions for MXH5xx

Release	MXH53x	MXH57x
5.25.2	VER7	VER4
5.25.1	VER6	VER3
5.25.0	VER5	VER2
5.24.0	VER3	VER1
5.23.0	VER2	-

Table 13: PFX configuration file revisions for MXP5xx

Release	MXP523	MXP526
5.25.2	VER1	VER3
5.25.1	VER1	VER2
5.25.0	VER1	VER2
5.24.0	-	VER1

Table 14: PFX configuration file revisions for MXB5xx

Release	MXB585
5.25.2	VER2
5.25.1	VER2

Support for OEM hardware

This version of Dolphin eXpressWare has general support for the Microchip PFX Switchtec PCIe 3.0, PCIe 4.0 and PCIe 5.0 chipsets in various configurations and topologies. Please contact Dolphin for details and licensing information if you would like to run eXpressWare on your own hardware.

If you already are running eXpressWare on non-Dolphin hardware, please contact your hardware vendor for additional information on how to upgrade your software.

General eXpressWare defaults and settings for MX

eXpressWare is tuned for general use and operations. In some cases, you need to tune some parameters to optimize resources for our use case.

SISCI Multicast

- **Default setting:** 4 groups, 2 Megabyte per segment
- **Max setting:** 16 groups, 128 Gigabyte per segment

Please consult the “Dolphin eXpressWare Installation and Reference Guide”, section “Managing PCIe and eXpressWare Resources” for information on how to tune eXpressWare parameters.

Known Limitations

Support for 3rd, 4th and 5th gen Intel Xeon Scalable processors

Intel Xeon Scalable 3rd, 4th and 5th gen processors are mostly supported in back-to-back configurations.

SmartIO is not yet supported on these processors.

Certain configurations of Intel Xeon Scalable 3rd, 4th and 5th gen processors require special configurations. Please contact Dolphin support at <https://www.dolphinics.com/csp> if you plan to use Intel Xeon Scalable 3rd, 4th and 5th gen processors in the following ways:

- You plan on connecting more than six Intel Xeon Scalable processors to a **MXS824** or **MXS924** switch in x8 or x4 mode
- **You plan on using any of the following Intel Xeon Scalable 3rd, 4th and 5th gen Xeon Platinum processors in x8 or x4 mode**

-
- Intel Xeon Platinum 8380
 - Intel Xeon Platinum 84xx
 - Intel Xeon Platinum 85xx

Change log for Linux Software

Description of content: Clustering package for Linux.

Release category: GA.

Target audience: Production systems.

Current status: Available for download from <https://www.dolphinics.com/mx>

Note

See the *Known Limitations* section about support for Intel Xeon Scalable 3rd, 4th and 5th gen processors if you plan to use any of these.

New in DIS Release 5.25.2

Dis_diag

- (#8344) Implement proper CSR value printout fix
- (#8373) MXH57x: Fixed an issue where the CDFP cable temperature could get stuck

General

- (#8411) MXH57x: Fixed error messages from the IRM driver reading cable ports out of range: *MXH Cable info failed: 0x3*

Platform support

- (#8305) Add support for Linux kernel v6.19

SISCI

- (#8365) Reduce CPU usage of server node in *reflective_write* example
- (#8375) Fix edge cases in AVX2 copy function
- (#8378) Reduce CPU usage of server node in *reflective_bench* and *reflective_dma_bench* benchmarks

SmartIO

- (#8302) Solves issue where a disconnected lender results in IOMMU faults on borrower

-
- (#8353) Fix issue where *smartio_tool list* would show an NT-Transp device incorrectly as *in use, lender disconnected*
 - (#8357) Give warnings from *smartio_tool* if GPU is active while trying to return

Supersockets

- (#8379) Fix bug that caused config files */etc/dis/supersockets_*.conf* to not be loaded
- (#8389) Add support for *accept4()*, type flags in *socket()*, *SO_REUSEPORT* (partial)
- (#8419) Fix segfault when *epoll_ctl()* is called with *event=NULL*

Changes in previous releases

DIS Release 5.25.1

Arm64

- (#8263) Add installation of 12-2 cuda toolkit for Jetson 36.3

General

- (#7617) Fixed problem with DMA pull failing between some nodes in Dual D-Switch topology
- (#7617) Fixed problems with interference of nodes in Dual D-Switch topology
- (#8133) Added initial MXS924 configs for Dual D-Switch topology. See *MXS924_eeprom_versions.txt* for details
- (#8274) *dis_diag* now correctly prints the root port's BDF
- (#8288) Extended PFX configuration image for MXB585
- (#8289) Added support for MXH570-B and MXH572-B Revision
- (#8291) Fixed NTB 3-nodes, 4-nodes and 5-nodes topology for MXH530. Firmware PFX configuration version 6 required
- (#8291) Release of PFX config, VER6 for MXH530 and MXH532
- (#8293) Added support for upgrading the firmware on the MXB585 ebox with *upgrade_eeprom* script
- (#8298) Fixed updating the serial number for MXH910 and MXH912 adapters with *dis_firmwaretool*
- (#8302) Virtual PCIe devices are cleaned up when remote node is lost
- (#8329) Fix issue where the build date for certain programs on RPM-based systems would show *Jan 28 2008*
- (#8342) Fixed CSR value printouts

Installer

- (#8266) Fix warning in installer output: 'grep: warning: stray \ before white space'

Platform support

- (#8258) Add support for Debian 13
- (#8285) Add support for Redhawk 9.6

SISCI

- (#8207) *SCICreateMapSequence* returns error when used on map of local segment
- (#8280) Improved performance for *memcpy_nt_avx2*

-
- (#8341) Fix arithmetic overflow inside SISCI testlib, on systems where CPU frequency is 4GHz+

SmartIO

- (#8172) Fix issue where *smartio_tool unavailable* does not make devices unavailable
- (#8249) Fixed issue where CUDA programs would fail with the assertion *Assertion failed: 0 == (physAddr & (RM_PAGE_SIZE_HUGE - 1))*
- (#8301) Add information to *smartio_tool list* when session to borrower is disconnected
- (#8302) Add information to *smartio_tool list* when session to lender is disconnected
- (#8302) Fix some bugs related to lender rebooting while borrowed device is in use
- (#8303) Report DMA window size during borrow in a more consistent way
- (#8316) Fixed a bug where mapping table entries would not be properly cleaned up after repeated borrows and returns
- (#8325) *smartio_tool connect* now persists after a borrower is rebooted

DIS Release 5.25.0

Arm

- (#7068) Fixed a cache-coherency issue with DMA transfers and user allocated memory on Nvidia AGX Orins
- (#7870) Added parsing of device tree and dump useful info in *dmesg*
- (#7872) Improved handling of MSI interrupt addresses on ARM
- (#7873) Added initial support for LX2160 (with iommu disabled)

Benchmarks

- (#7882) Adds check for div by zero when *walltime* is used for *dma_bench* or *scibench*
- (#7997) Creates a benchmark analogous to *reflective_bench* but which uses DMA for sending
- (#8063) *dma_bench* regression fixed so *-veclen* parameter can be used again
- (#8075) Added *-vl* argument to *reflective_dma_bench* which can be used to increase DMA transfer vector length
- (#8094) The *sisci_benchmarks.sh* script now also runs the vectorized version of *dma_bench*

Demos

- (#7851) Added performance demo, video transfer demo, and *rfm* wrapper to DIS example programs

Dis_diag

- (#7636) MXH570/MXH572: Added support in *dis_diag* for reading temperature, voltage, max power consumption and other cable info from CDFP cables
- (#7817) New json output when *-json* option is used
- (#7893) *dis_diag* output reorganized to print info per adapter
- (#8123) Make the report of the upstream link more generic in *dis_diag*

General

- (#6713) Fixed issue in the downstream cable port for MXC962
- (#6980) Fixed doorbell performance spikes by removing an unneeded loopback doorbell

-
- (#7317) The configuration files of DIS hosts no longer supports 'STRIPE' and 'REDUNDANT' socket adapters. A socket adapter specified with this mode will be ignored
 - (#7359) Fixed issue where *_setup scripts would not exit with an error code on failure
 - (#7550) Improved Dual D-Switch support: up to 15 hosts per switch, no power sequencing requirements
 - (#7792) Added support for MXE expansion board MXB585
 - (#7845) Improved stability with multi-socket Icelake configurations
 - (#7887) Require that endpoint devices in same group as dolphin device is not attached by other drivers
 - (#7891) Fixed problem with driver crash during dis_config for adapters with invalid hardware configurations
 - (#7939) MXH530 and MXH532 PFX config release VER4
 - (#7968) Fixed issue where *dis_services stop* would fail if there is no adapter installed in the system
 - (#7977) Fixed a bug where a node would end up in a livelock with no session, spamming *getAliveCnt - mbxMsgQ_localHeader == NULL* to the kernel buffer
 - (#7981) Improved error handling in *dis_firmwaretool*
 - (#7982) Added driver support for MXP523
 - (#8003) Added MXS924 DSWITCH configuration files with 2 DSPs
 - (#8026) Fix issue where old versions of the *dis_intel_dma* kernel module would be loaded, even if the driver is not compiled with *-enable-intel-dma*
 - (#8027) Fixed a bug where multicast would fail when IOMMU is enabled and the system contains a transparent adapter
 - (#8029) Improve the virtual dip solution and add support for non-config virtual dips
 - (#8031) Vastly improved PIO performance for the Zen3 architecture
 - (#8042) Added DUAL NTB Switch support for MXS924
 - (#8052) Added flag *-skip-distro-check* to eXpressWare installers
 - (#8065) Added support for MXH992
 - (#8083) Converted firmware to MR3 for MXH530 and MXH532. Version 5
 - (#8084) Converted MXH570 and MXH572 VER2 to PFX MR3
 - (#8085) Converted MXP526 to MR3
 - (#8121) Released NXP firmware 3.6 and PFX configuration image VER5 for MXH530 and MX532
 - (#8122) Release of MXH570-AA and MXH572-AA with PFX configuration VER2
 - (#8156) Improved the detection of adapter types in *dis_firmwaretool*
 - (#8162) Performance enhancements for SuperSockets
 - (#8173) Fixed bug in MXS824 NTB DUAL configs that prevented version 10 of the configs from working
 - (#8175) Resolved potential crash when mapping table is exhausted
 - (#8203) *dis_intel_dma* is now enabled by default if the driver is built with the flag *-enable-intel-dma*
 - (#8221) Adds support for SFF-86xx AOC voltage readout
 - (#8221) Fixed bug where SFF-86xx temperature could be wrong in *dis_diag*
 - (#8222) Fixed serial numbers printouts in *dis_firmwaretool* for adapters with custom serial numbers

-
- (#8237) Improved support for Granite Rapids Xeon Scalable CPUs

Platform support

- (#7790) Added support for Linux kernel 6.16
- (#8001) Added proper support for Linux kernel 6.15
- (#8182) Added support for Debian 12
- (#8182) Added support for Linux kernel 6.17
- (#8182) Added support for Linux kernel 6.18

SISCI

- (#7336) Multi-threading is now required to compile eXpressWare
- (#7501) Add “gpudirect” SISCI example using CUDA
- (#7879) Fixed off by one error in `reflective_bench`
- (#8001) Fix issue where SISCI would fail to load kernel modules for Linux kernel \geq 6.15
- (#8044) `_REENTRANT` no longer has to be defined for SISCI-features that require multi-threading
- (#8230) Fixed a bug in `SCICreateDeviceSegment` where it would fail if called with either of the flags `SCI_FLAG_LOCAL_ONLY` or `SCI_FLAG_DEVICE_SIDE_ONLY`

SmartIO

- (#7522) Improved default DMA window size
- (#7547) Add `disable-p2p` command to `smartio_tool`. Mappings set up by `enable-p2p` are now properly cleaned up
- (#7597) Add experimental support for virtualization. See SmartIO documentation for more details
- (#7616) Fix issue where borrowed GPUs would fail to initialize CUDA with nvidia-drivers \geq 575
- (#7823) Fixed a small memory leak on initialization
- (#7877) Allow local borrow of other devices in an IOMMU group when a device in that group is already locally borrowed
- (#7911) Add virtualization support for Linux kernel 5.15-5.19. See the SmartIO documentation for details
- (#7941) Identified issue with AMD EPYC lenders. See the SmartIO documentation for details
- (#7953) Fix regression where `smartio_tool enable-p2p` would fail for two remote devices located in the same lender
- (#7984) Added support for Device Lending on Linux kernels \geq v6.12
- (#7998) Fixed issue borrowing SR-IOV virtual functions
- (#8113) Add support for a proposed Linux patch regarding AMD EPYC lenders
- (#8175) Resolved issue with NT-Transparent causing repeated borrow/return to fail
- (#8186) Fixed an issue where two lenders borrowing each others’ devices would fail with IOMMU disabled
- (#8208) Fixes bug where `smartio_tool` does not properly blacklist MX memory controller
- (#8226) Fixed issue with automatic DMA windows size calculation with NT-Transparent
- (#8230) Fixed a bug in `SCICreateDeviceSegment` where it would fail if called with either of the flags `SCI_FLAG_LOCAL_ONLY` or `SCI_FLAG_DEVICE_SIDE_ONLY`

Supersockets

-
- (#7350) Systemd unit file for `dis_supersocket.service` changed to make it start after `dis_nodemgr.service`
 - (#7629) Sockperf: 1 second walltime is standard measurement
 - (#7629) Sockperf: Improved explanation of measurement options
 - (#7878) Fixed issue where SuperSockets failed to build on RHEL/centos 10
 - (#7980) Add a `-size` flag to `network_benchmarks.sh`
 - (#8005) Added UDP mode to Network Benchmarks
 - (#8005) Improved usability for `network_benchmarks.sh`
 - (#8009) Fixed a memory leak related to the usage of DMA channels
 - (#8071) Improvements to `network_benchmarks.sh`
 - (#8114) Solved issue with `dis_ssocks_diag` that could cause segfaults on newer kernels

DIS Release 5.24.0

BMC

- (#7830) Added support for the MXP526
- (#7830) Improved support for MXC products
- (#7830) Power on on upstream `power_enable` is now implemented. Can be turned on with dip 3 on dip-switch bank 2
- (#7830) Updated BMC firmware for MXH530 and for all MXC and MXP products

Benchmarks

- (#7644) Added `-wt` (walltime) option for `dma_bench` and `scibench2`
- (#7801) Added warmup loops to `scibench2`, `dma_bench` and `dma_user_bench`
- (#7801) Fixed potential sending of too large sizes for `scibench` if offset is used
- (#7801) Made usage text more consistent for `scibench2` and `dma_bench`

General

- (#7164) Added support for MXC960
- (#7164) Added support for MXC961 - NTB version
- (#7164) Added support for MXC962
- (#7164) Release of PFX config VER2 for MXC960 and MXC962
- (#7387) Extended internal bitmap from 64 to 256 bits to accommodate larger cluster topologies. Fixes potential bug in large architectures
- (#7402) Added support for Stamford PFX Gen4 chip MVH103. Microchip EVB-PCI1003 Stamford Evaluation board
- (#7446) Fixed reset option for MXS924, Port 5 in DSWITCH mode
- (#7468) Added support for PXIe Gen5 MXP526 adapter
- (#7468) Fixed patch table entries for MXP526
- (#7515) Added support for reading fan information (rpm, duty cycle) of MXH530 with `dis_diag` (under adapter status)

-
- (#7518) Added option to configure processor I/O requester IDs manually in the configuration files. Particularly useful for heterogenous Intel Xeon Scalable clusters
 - (#7526) Fixed bug in example_to_json script
 - (#7536) Check that any linux NTB drivers (e.g. switchtec for MX) are stopped before starting driver
 - (#7539) Minor fixes in installer scripts
 - (#7552) Removed NXP bootloader for adapters with NXP version > Ver3.0
 - (#7569) Fix installer counting the wrong number of adapters
 - (#7572) Improved the IRM error handling in case a critical chip error occur. Avoid any session IOCTLs before the driver is properly initialized
 - (#7581) Fixed a bug where dis_services would yield undefined behavior in some environments
 - (#7586) Converted MXH930 to MR6
 - (#7586) Increased the Link BAR2 from 1TB to 64TB
 - (#7593) Fixed issue with make commands not always using the correct compiler if --host supplied
 - (#7608) Converted MXH530 to MR2
 - (#7608) Fixed GPIO 32 REFCLK_OE (from low to high) for TARGET config 4, ,5 and 6
 - (#7608) MXH530 and NXH532 PFX configuration VER3 release, September 2nd, 2025
 - (#7609) Fixed clock GPIO setting in configuration
 - (#7609) Split MXH530 and MXH532 PFX configuration images and firmware
 - (#7609) Updated upgrade_eeprom.sh and upgrade_eeprom.ps1 scripts after splitting MXH530 and MXH532
 - (#7636) Added support for MXH570 and MXH572
 - (#7654) Disabled DMA poll thread for MX on Linux and VxWorks as default
 - (#7703) Updated configuration image for MXH916 to VER5. Fixes PCIe connections for all link ports
 - (#7707) Added NTB support for MXH914, MXH916 and MXH918
 - (#7718) General connectivity fix for multi direct topology with different MXH5xx and MXH9xx adapter types
 - (#7719) Updated configuration file for MXH918 to VER5 with MR6
 - (#7721) MXH914 - MXH919 config release VER5, August 20th 2025
 - (#7721) MXH914, VER5 MR6 configuration with 64TB link BAR2
 - (#7723) Avoid unnecessary load of PFX CPU when doing sequence checks
 - (#7726) Removed use of deprecated kernel function *flush_scheduled_work()*. Fixes kernel warning when stopping driver on kernels >= 5.19
 - (#7752) Added driver support for combined NTB and TRANSP configuration for MXH930 adapters
 - (#7763) Release of PFX configuration image VER5 for MXP908 and MXP909
 - (#7764) Fixed bug where dis_diag reports incorrect cable capabilities when using PCIE5 cables
 - (#7771) Updated NXP version to v3.4-rc13.bin to fix the fan control
 - (#7777) Added dis_firmwaretool support for MVH126
 - (#7781) Fixed a bug where DMA read operations would sometimes fail in clusters with Gen4 adapters connected by a Gen3 switch

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- (#7784) Stop building and loading *dis_intel_dma* kernel module by default
 - (#7786) Added support for MXC960 and MXC962
 - (#7786) Improvements to the MXC960 D-SWITCH config
 - (#7800) Added TARGET x2x2x2x2x2x2x2x2 (edge) in config 15 for MXH830
 - (#7808) Added support for connecting different adapter types by an NTB switch
 - (#7811) Added support for newer Jetson releases (Tested with 36.3)
 - (#7831) Fix installer bug related to shell output redirection

Platform support

- (#7451) Added support for Linux kernel 6.13
- (#7507) Dropped support for Debian 7
- (#7507) Dropped support for Ubuntu 14.04
- (#7556) Added support for debian9-rt and debian10-rt
- (#7588) Added support for GCC 15
- (#7679) Added support for Rocky Linux / RHEL 10
- (#7686) Added support for kernel 6.15
- (#7768) Added support for Concurrent RedHawk 9.2

SISCI

- (#6917) Added documentation for DIS_BROADCAST_NODEID_GROUP_ALL constant for SCISegment
- (#7558) Return code fixes for SCIQuery
- (#7578) Fixed issue where requester ID added to adapter was not added to NTB switch table
- (#7591) Simplified SISCI API header file

SmartIO

- (#6092) Fixed issue with borrowing multiple NVIDIA GPUs
- (#6451) Support Device lending of devices in the same IOMMU group as the Dolphin NTB adapter
- (#7044) Add support for device lending NVIDIA 5000-series / Blackwell GPUs
- (#7044) Fixed issue with borrowing the Physical Function (PF) of an SR-IOV device. “Failed to export bar7: 22”
- (#7231) Added experimental support for peer-to-peer between borrowed- and local devices. Users of this experimental feature should be aware that P2P mappings set up with *smartio_tool enable-p2p* are not properly cleaned up until all dolphin drivers are restarted
- (#7295) Fixed issue with NVIDIA GPUs and “Can’t find an IRQ for your NVIDIA card!”
- (#7394) Fixed assertion failure when disabling interrupts on some devices
- (#7394) Fixed issue where lspci showed <broken chain> for borrowed devices
- (#7452) Added initial support for hot-add on Tegra platforms
- (#7485) SmartIO now works on Linux kernels >= 5.19 when IOMMU is enabled
- (#7530) Support drivers that use dma_alloc_pages including *xhci_hcd*

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- (#7542) Fixed a bug that could cause interrupts to be missed on some systems
 - (#7553) Fixed bug that allowed users to lend out boot VGA devices
 - (#7559) Added support for borrowing local devices
 - (#7628) Fixed issue where the MPS was incorrectly downgraded after borrowing a device, causing a fatal AER error
 - (#7727) Added `-force` option to `smartio_tool` available
 - (#7762) Added initial support for device lending on Tegra platforms
 - (#7811) Added initial support for Hot-add and Device lending on Orin platform
 - (#7815) Add support for NVIDIA A100 and NVIDIA RTX 4500 PRO Blackwell
 - (#7815) Add support for modern GPUs where all BAR regions are occupied

Supersockets

- (#7645) Supersocket fix for kernel versions 6.0 and higher, fixes crash that occurred when incorrectly interpreting user memory as kernel memory

DIS Release 5.23.0

General

- Added support for Gen 5 adapter MXH530 in the driver and tools
- Added support for MXC960
- Added driver support for MXS924 cascade
- Added support for license file
- Bug fix: Fix issue with MXP924 reporting “Hot Plug Capability”
- Bug fix: IOMMU now works as expected on kernels ≥ 6.3
- Bug fix: Driver configuration now correctly exits if IOMMU initialization fails

Improved `dis_diag`

- Bug fix: No longer prints invalid temperature
- Bug fix: Fixed info readout for all firefly adapters

Improved `dis_nodemgr`

- Unresolvable hosts are skipped and no longer stop cluster configuration

Improved `dis_services`

- Bug fix: `dis_services` now properly handles services that end up in a failure state

Improved installer

- Better error messages are printed if something goes wrong
- Bug fix: No longer loops if the `-batch` option is passed when no configuration file is present

SISCI

- Added interrupt support for SISCI SmartIO
- Enabled possibility for non-zero offset when calling `SCIMapRemoteSegment` for multicast segments
- Bug fix: Fix for `SCISStartDMATransferMem` deadlock

SmartIO

- Added interrupt support for SISI SmartIO
- Added support for RHEL9-based Linux distributions
- Fixed regression for devices with IO BARs
- Improved support for device lending of GPUs
- Improved smartio_tool
- Now makes all devices in the same IOMMU group available when a device in the group is made available
- Prevent adding devices upstream from a Dolphin device
- Bug fix: Match hexadecimal BDF

DIS Release 5.22.0

General

- Added support for Intel Xeon Scalable 5th gen (“Emerald Rapids”)
- Added support for Linux kernel 6.8
- Added support for Ubuntu 24.04
- Added support for Ubuntu 22.04 HWE
- Added support for pre-retbleed Centos 7
- Added support for Centos 9 and Centos 9 RT
- MXS924: New firmware version 5
- MXS824: New firmware version 10
- MXH91x: Applied newest Microchip patch to resolve boot issues in certain systems
- Improved dis_status script, now retrieves more information
- SmartIO: Increased default maximum read request size
- Added support for sanitization in upgrade-efrom

Improved dis_diag

- Added support for json-output
- Added support for showing root port link capabilities
- Improved reporting for central PFX switch being reset
- Throttling events are now separated into relevant categories
- Improved link error detection
- Now shows temperature information for Firefly

Improved dis_firmwaretool

- Added support for virtual configurations
- Various bugfixes

Improved dis_networkmanager

- Added support for limiting maximum log file size

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- Fixed CPU usage issue related to large log file sizes

Improved installer

- Bugfix in transparent configurations for Rocky 8
- Various bugfixes

Improved support for intel xeon scalable 3rd

- Requester IDs for the CPU and link are now determined dynamically by the NTB driver
- Added support for requester ID scaling with hyperthreading disabled
- Added support for requester ID scaling with different NUMA node configurations

Mxp924: upgraded to nxp version 3.2

- Added support for 4x4 configuration

DIS Release 5.21.4

General

- Driver now recalibrates to support both older and newest MXS824 and MXS924 switch configurations

DIS Release 5.21.3

General

- Improved device detection for MX adapters

DIS Release 5.21.2

General

- Identical to 5.21.1 for Linux

DIS Release 5.21.1

General

- Added support for all Intel Xeon Ice Lake and Sapphire Rapids Bronze and Silver CPUs
- Added support for all Intel Xeon Ice Lake and Sapphire Rapids Gold and Platinum CPUs with up to two sockets, three UPI links and 36 cores

DIS Release 5.21.0

Eeprom firmware version updates

- Extended the requester ids table for Ice Lake and Sapphire Rapids
- Added 64GB NTB configuration
- Added 128GB NTB configuration
- MXH930 updated to VER12
- MXH940-C updated to VER11

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- MXH950-C updated to VER7

General

- Added support for MXH914, MXH915, MXH916, MXH917, MXH918 and MXH919
- Added support for MXH910 and MXH912 adapter with IPASS connector
- Added support for Linux kernel 5.19
- Added support for Linux kernel 6.0
- Added support for MXH833 in dis_firmwaretool
- Added support for AGX ORIN
- Added configurations for adapter DSWITCH topology for MXH930, MXH940 and MXH950
- Improved session handling after re-plugging cables
- Added preliminary support for Intel Ice Lake and Sapphire Rapids Xeon CPUs in DIRECT topology. Limited support for MXS824/MXS924 switches
- Added support for Secure Boot
- Fixed MSI-X support regression for device lending on newer kernels (4.15 and earlier)
- Improved installer functionality
- Fixed x86 Spectre Mitigation V2-2 breaking compilation for Centos/Ubuntu/Debian with symbol `__x86_return_thunk`. This will affect all RHEL7 before kernel-3.10.0-1160.83.1 using installer built with a kernel-3.10.0-1160.83.1 or newer
- Fixed installer issue related to Cuda support on RHEL7
- Fixed installer issue for Fedora related to broken RUNPATH
- Improved Xavier/Ubuntu/Debian package platform-integration
- Fixed 'cache line size' detection in NT-Transparent topology

Mxs924

- Eeprom version updated to VER5
- Updated throttling values for DSWITCH topology

SmartIO

- Fixed SmartIO showing "Illegal Vendor ID" 0xFF for virtual functions
- Fixed kernel warning 'proc_dir_entry already registered'

DIS Release 5.20.1

Bug fixes and improvements

- Fixed SuperSockets build_RPM failure with certain distros due to missing Module.symvers from GX
- Fixed GUI tools regression with QString .arg() usage
- Fixed problem with SuperSockets getsockopt causing kernel error
- Fixed regressions from 5.20.0 causing crash during driver load or link reset on some systems
- Fixed dis_config reordering issue during configuration
- Fixed an issue with cancelling callback threads that caused SISI applications to deadlock

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- Fixed DISIP not working in D-Switch topology with transparent MX host card

General

- Initial support for CentOS 9
- Added 'make' package as required dependency
- Added support for Ubuntu 22.04
- Added support in the upgrade_eeprom script to prevent an upgrade for customer specific adapters, e.g. (-0101-)
- Improved platform integration for CentOS 8 and CentOS 9 (SELinux)
- Added support for -Os optimization level
- Add support for IPv4-mapped IPv6 addresses in kernel SuperSockets
- SmartIO: Added implementation of dma_mmap_coherent
- Extended dis_diag with register information

DIS Release 5.20.0

Added support for mxs924 switch topologies

- NTB
- Transparent
- D-SWITCH

Bug fixes and improvements

- Fixed incorrect BDF being used for outbound DMA RID entry when P2P is not enabled in USP
- Fixed problem with transparent MXS924 switch being erroneously detected as adapter
- Fixed GPIO reset pin assignment for MXH940 and MXH950 adapters for 2x8 NTB and 4x4 NTB configuration
- Fixed problem with traffic interruption to downstream devices when the driver is being loaded by preventing BME from being cleared
- Fixed problem with unbinding of DMA functions from plx_dma driver not working on Ubuntu
- Fixed problem with module parameter ntb_mcast_alloc_groups not working as expected
- Improved handling of memory allocation failures during driver startup
- Fixed problem with MPS exceeding device capabilities under rare conditions
- Made changes to the installer to install QT5 for Ubuntu 20.04 and newer
- Made changes to the installer to install libgcc-s1 instead of libgcc1 for Debian 10 and newer
- Reinsert outbound DMA RID during link setup to avoid Gen4 DMA proxyid collision
- Created workaround to solve issue with IOMMU attachment for Linux 5.8
- Fixed regression with driver not loading properly on PowerPC
- Added p2p_keeper in sysfs
- RTSS: implement osif_kmem_get_contig2 on top of RtAllocateContiguousMemorySpecifyCache to improve large memory alignment and allocation
- RTSS: update build files to Visual Studio 2019
- Added handling of AER events for type GX_EVENT_LINK_RECEIVER_ERROR

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- Improved link status output for `dis_diag`
 - Fixed problem with shared segments not being unexported when removed.(SCIPrepareSegment failed with `SCI_ERR_BUSY` for multicast segments.)
 - Fixed problem with “`dis_firmwaretool pci:`” not working with Linux 5.15
 - Added TTY access mode to `dis_firmwaretool`
 - Fixed problem with `dis_firmwaretool` showing the wrong version for the running PFX IMG under certain conditions
 - Fixed problem with STM firmware update and log dump not working for MXH83x adapters since release 5.19.1

General

- Added support for MXH941, MXH943, MXH944, MXH945, MXH946, MXH947, MXH948 and MXH949
- Added support for MXH951, MXH953, MXH954, MXH955, MXH956, MXH957, MXH958 and MXH959
- Changed the adapter serial number format from `MXH9xx-AA-123456` to `MXH9xx-AA-0001-123456`
- Updated configuration files for MXH930, MXH94x, MXH95x to MR4
- Added support for MXC960
- Added support for Linux 5.16
- Added support for Linux 5.18
- Added support for MXH330 adapter
- Add support for NXP 2.8 for MXH9xx, MXP9xx and MXC9xx adapters
- Added support for MXP908 and MXP909
- Added support for MVH222
- Added support for MVH242
- Added support for `dis_firmwaretool` on the MXS924 switch
- Added support for proxy id changes in PFX Gen4 MR4 firmware release
- Added driver support for evaluation board from Microchip PM42100-KIT
- Added support for 3-slot and 5-slot backplane configuration for MXH930, MXH94x, MXH95x
- Added support for MXH330 in DIRECT topology
- Added support for 12 port x8 in DSWITCH mode for MXS924
- Added support for MCU PFX config format version 2
- Add SW lock synchronize partition operations
- Added option “`-userid`” for example programs `reflective_write` and `reflective_bench` to allow multiple concurrent instances
- `dis_firmwaretool`: Added option to patch IDEEPROM files

DIS Release 5.19.2

General

- Added support for direct 3 and 5 node NTB topology for MXH930, MXH940, MXH950
- Added support for NT-only D-Switch ports

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- Added support for multicast receivers on D-Switch Downstream ports
 - Fixed incorrect reporting of correctable errors
 - Added support for adapters MXP924, MXC948, MCH663

General bug fixes and improvements

- Fixed crash due to missing check in DSWITCH mode
- Added -link-speed to Linux installer
- Made link watchdog ignore transparent and virtual (D-Switch) links
- Added optical support for MXS824 x4 configuration
- Fixed bug that caused local io address to be set incorrectly when using System DMA + IOMMU
- Fixed 32-bit compilation on 64-bit kernel
- Improved SISI callback status for DMA
- Fixed aborting GX/osif sysdma transfers triggering crashes
- More conservative MPS handling by default (ntb_set_mps=1) to prevent automatic increase
- Fixed problem with multicast not working in Gen3 D-Switch configurations
- Fixed AER Correctable Error Status offset definition
- Fixed problem on certain systems where BME in P2P is not set
- Fixed Multicast only working with group 0 on Gen3 D-Switch
- Fixed Problem with NMI on some systems when cable is unplugged
- Fixed potential small memory leak when using CUDA segments
- Linux installer for el7 accepts fedora22-24
- MSI: install Gen4 firmware files with Transparent setup option
- Improved parameter checking for IRM tools to prevent crash

Updated configuration files for mxh930, mxh940, mxh950

- MXH930 - VER10
- MXH940-B - VER8
- MXH940-C - VER8
- MXH950-B - VER4
- MXH950-C - VER4

DIS Release 5.18.0

General

- Improved support for Gen4 adapters MXH930, MXH932, MXH940, MXH942, MXH950, MXH952. New firmware bundle
- Initial support for MXP924, MXC940 and MXC948
- dis_diag: Added reporting of board firmware versions and temperatures
- Applied copy function patch for an unaligned crash issue on some ARM platforms

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- General bug fixes and improvements

SISCI

- Adjusted the number of dev nodes from 4096 to 255

DIS Release 5.17.0

General

- Added support for Gen4 adapters MXH930, MXH932, MXH940, MXH942
- Fixed Ubuntu 18.04 installation issue
- Add BDF information in dis_diag and dis_tool
- General bug fixes and improvements

SISCI

- Added support for send-only multicast configurations
- Fixed bug in segment cleanup for shared segments that could cause segment to be unavailable for all users
- Increased max multicast segment size to 128 GB. Fixed 32 bit size limitations with internal copy function. Tested up to 4GB
- Fixed bug related to local DMA (memory to memory) with systems with IOMMU ON

DIS Release 5.16.0

General

- Added support for system DMA with IOMMU ON (Off already supported)
- Added support for Linux kernel $\geq 5.5.3$. Tested on Linux kernel 5.5.8

Sisci api

- Added support for using multiple DMA channels
- Added support for registering more than one PCIe requester ID per SISCI descriptor
- Fixed a crash when an invalid fdid was given to SCIBorrowDevice()
- Allow SCIBorrowDevice() of PCI-PCI bridges in NT-Transp

SmartIO

- Fixed issue when some devices are behind an IOMMU, but others are not
- Fixed issues with rescan when link goes up / down with multiple adapters
- More robust scanning
- Fixed crash during device lending when amd_iommu was enabled
- Fixed issue with RedHat 8 / new kernels Assertion (vdev->orig_dma_ops != NULL)
- Fixed issue in NT-Transp detecting directly connected endpoints

DIS Release 5.15.2

General

- SmartIO - fixed potential assert in device scanning process

DIS Release 5.15.1

General

- Fixed bug in SISI supporting larger than 4GB segments
- Fixed multi endian issue with reflective memory test program

DIS Release 5.15.0

General

- Transparent driver support for MXH832
- Increased maximum number of adapters from 4 to 5
- Support for GUI on Centos/RHEL 8 (Qt5)
- Fixed problem with slot AER errors not being logged
- SIA Installer: Fixed problem with the `-install-all` option

Smartio 2.5

- SmartIO SISI functions stabilized
- Add support for `smartio_tool remove`
- Show ethernet device in `smartio_tool show`
- Support for multi-link in NT-Transp
- Fixed bug disabling NVidia persistence mode
- Fixed issue affecting SR-IOV VFs

User-space supersockets

- Fixed problem with maximum number of connections decreasing over time

Included software

SuperSockets (kernel)

- Ultra-fast, low latency Berkeley Sockets API (TCP, UDP, UDP multicast) for PCIe
- Local and remote socket communication acceleration (accelerated loop-back device supports local IP and local-host address)
- This version of SuperSockets only supports communication to other Linux systems

SuperSockets user space

- User space version of SuperSockets
- Provides lower latency than the kernel version but provides a limited number of socket functionalities.
- Currently only TCP supported

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- Supports communication to Windows SuperSockets

SISCI API 2.0.2

- Shared memory (DMA, PIO, RDMA, Interrupts)
- Reflective memory/multicast
- SmartIO Extension 2.0
- PCIe peer-to-peer communication (FPGAs, GPUs, NVMe, etc.)
- Full connectivity to other systems running Windows, RTX, or VxWorks

SmartIO 2.5.1

- Device Lending
- SmartIO Hot-Add
- SISCI API SmartIO Extension

TCP/IP driver

- Full IP networking over PCIe to other nodes running Linux

Network Installer (SIA)

- Installs the above software on a cluster of computers interconnected with Ethernet

Supported architectures

The software supports the following architectures and platforms:

- Intel x86 / x64
- ARM64
- Nvidia Xavier (only supported by MXH93x, MXH94x cards)
- NXP BlueBox

Tested and supported OS platforms

Dolphin strives to support all major Linux distributions and kernels from 2.6.32 and up. This release has been tested on the following platforms but are expected to work on many more. Please let us know if you run into problems or need another kernel.

- Linux Kernel 2.6.32 - 6.19

Supported Distributions:

- Ubuntu 24.04 x86_64
- Ubuntu 22.04 x86_64
- Ubuntu 20.04 x86_64
- Rocky / RHEL 10
- Rocky / RHEL 9
- Rocky / RHEL 8
- Debian 13 x86_64
- Debian 12 x86_64

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- Debian 11 x86_64

EOL Distributions With Available Builds:

- Ubuntu 18.04 x86_64
- Ubuntu 16.04 x86_64
- CentOS 8 x86_64
- CentOS 7 x86_64
- CentOS 6 x86_64
- Debian 10 x86_64
- Debian 9 x86_64
- Debian 8 x86_64

Note

RedHawk Linux from Concurrent Real-Time is supported. Please contact Concurrent for access to drivers.

We also provide OpenRC init scripts as used by Gentoo and other distributions; please contact Dolphin Support for more detailed information.

Cluster installation requirements

- All nodes connected and properly configured with Ethernet
- Non-Ethernet configurations optional, contact Dolphin for assistance

Installation and management

- RPM-based installation via Self Installing Archive (SIA)
- Automatic configuration via Interconnect Manager
- Centralized monitoring and diagnostic - Both Linux and Windows supported as GUI platforms

High availability features

- Nodes can join and leave cluster (node reboot, power cycled) any time without disturbing communication between other nodes
- Power cycling the switch will cause SuperSockets to fail over to Ethernet while cluster is automatically reconfiguring
- Unplugging a cable will cause SuperSockets to fail over to Ethernet for all affected connections. SuperSockets will automatically re-establish communication when the cable is reinserted

Bundled (major) management tools

- **dis_diag**: diagnostic tool
- **dis_services**: driver service manager
- **dis_config**: configuration tool

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- **dis_mkconf**: configuration file generator

Bundled (major) demo tools

- **Scibench2**: SISI-based PIO throughput benchmark
- **scipp**: SISI-based ping-pong benchmark
- **dma_bench**: SISI-based DMA benchmark
- **interrupt_bench**: SISI-based remote system interrupt benchmark
- **reflective_bench**: SISI-based reflective memory benchmark
- **latency_bench**: TCP latency benchmark (runs on any IP network including SuperSockets)

Firmware upgrade

The driver installer will detect and suggest to automatically update the firmware during installation if an update is required (new firmware may be included in software distribution).

For further instructions, please see the “Firmware Release Notes” of your adapter: [MX Firmware Release Notes](#)

Please file a support request at <https://www.dolphinics.com/csp> if you have any problems.

Change log for Windows Software

Description of content: Clustering package for Windows.

Release category: Production systems.

Current status: Available for download from <https://www.dolphinics.com/mx>.

New in DIS Release 5.25.2

Dis_diag

- (#8344) Implement proper CSR value printout fix
- (#8373) MXH57x: Fixed an issue where the CDFP cable temperature could get stuck

General

- (#8411) MXH57x: Fixed error messages from the IRM driver reading cable ports out of range: *MXH Cable info failed: 0x3*

SISCI

- (#8365) Reduce CPU usage of server node in *reflective_write* example
- (#8378) Reduce CPU usage of server node in *reflective_bench* and *reflective_dma_bench* benchmarks

Changes in previous releases

DIS Release 5.25.1

General

- (#7617) Fixed problem with DMA pull failing between some nodes in Dual D-Switch topology
- (#7617) Fixed problems with interference of nodes in Dual D-Switch topology
- (#8133) Added initial MXS924 configs for Dual D-Switch topology. See *MXS924_eeprom_versions.txt* for details
- (#8274) *dis_diag* now correctly prints the root port's BDF
- (#8288) Extended PFX configuration image for MXB585

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- (#8289) Added support for MXH570-B and MXH572-B Revision
 - (#8291) Fixed NTB 3-nodes, 4-nodes and 5-nodes topology for MXH530. Firmware PFX configuration version 6 required
 - (#8291) Release of PFX config, VER6 for MXH530 and MXH532
 - (#8293) Added support for upgrading the firmware on the MXB585 ebox with upgrade_eeprom script
 - (#8298) Fixed updating the serial number for MXH910 and MXH912 adapters with dis_firmwaretool
 - (#8302) Virtual PCIe devices are cleaned up when remote node is lost
 - (#8342) Fixed CSR value printouts

SISCI

- (#8207) SCICreateMapSequence returns error when used on map of local segment
- (#8280) Improved performance for *memcpy_nt_avx2*
- (#8341) Fix arithmetic overflow inside SISCI testlib, on systems where CPU frequency is 4GHz+

DIS Release 5.25.0

Arm

- (#7068) Fixed a cache-coherency issue with DMA transfers and user allocated memory on Nvidia AGX Orins

Benchmarks

- (#7882) Adds check for div by zero when walltime is used for dma_bench or scibench
- (#7997) Creates a benchmark analogous to *reflective_bench* but which uses DMA for sending
- (#8063) *dma_bench* regression fixed so *-veclen* parameter can be used again
- (#8075) Added *-vl* argument to *reflective_dma_bench* which can be used to increase DMA transfer vector length

Demos

- (#7851) Added performance demo, video transfer demo, and rfm wrapper to DIS example programs

Dis_diag

- (#7636) MXH570/MXH572: Added support in dis_diag for reading temperature, voltage, max power consumption and other cable info from CDFP cables
- (#7817) New json output when *-json* option is used
- (#7893) dis_diag output reorganized to print info per adapter
- (#8074) Windows Hot-Add information is displayed in dis_diag
- (#8105) Added support for reading cable temperature for supported cables with MXH93x
- (#8123) Make the report of the upstream link more generic in dis_diag

General

- (#6713) Fixed issue in the downstream cable port for MXC962
- (#6980) Fixed doorbell performance spikes by removing an unneeded loopback doorbell
- (#7317) The configuration files of DIS hosts no longer supports 'STRIPE' and 'REDUNDANT' socket adapters. A socket adapter specified with this mode will be ignored
- (#7550) Improved Dual D-Switch support: up to 15 hosts per switch, no power sequencing requirements

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- (#7753) Windows Hot-Add support
 - (#7792) Added support for MXE expansion board MXB585
 - (#7845) Improved stability with multi-socket Icelake configurations
 - (#7891) Fixed problem with driver crash during `dis_config` for adapters with invalid hardware configurations
 - (#7939) MXH530 and MXH532 PFX config release VER4
 - (#7968) Fixed issue where `dis_services stop` would fail if there is no adapter installed in the system
 - (#7977) Fixed a bug where a node would end up in a livelock with no session, spamming `getAliveCnt - mbxMsgQ_localHeader == NULL` to the kernel buffer
 - (#7981) Improved error handling in `dis_firmwaretool`
 - (#7982) Added driver support for MXP523
 - (#8003) Added MXS924 DSWITCH configuration files with 2 DSPs
 - (#8019) Initial MXH530 Windows Hot-Add support. Known issue: When cable is present to host and target at power cycle, power-on of the chassis might not trigger Hot Plug event. Scan for hardware changes in device manager to resolve
 - (#8020) Improved stability in driver startup
 - (#8031) Vastly improved PIO performance for the Zen3 architecture
 - (#8042) Added DUAL NTB Switch support for MXS924
 - (#8065) Added support for MXH992
 - (#8083) Converted firmware to MR3 for MXH530 and MXH532. Version 5
 - (#8084) Converted MXH570 and MXH572 VER2 to PFX MR3
 - (#8085) Converted MXP526 to MR3
 - (#8121) Released NXP firmware 3.6 and PFX configuration image VER5 for MXH530 and MX532
 - (#8122) Release of MXH570-AA and MXH572-AA with PFX configuration VER2
 - (#8152) Added Windows Hot-Add support for MXH914
 - (#8156) Improved the detection of adapter types in `dis_firmwaretool`
 - (#8173) Fixed bug in MXS824 NTB DUAL configs that prevented version 10 of the configs from working
 - (#8175) Resolved potential crash when mapping table is exhausted
 - (#8204) Added Windows Hot-Add support for MXH918
 - (#8221) Adds support for SFF-86xx AOC voltage readout
 - (#8221) Fixed bug where SFF-86xx temperature could be wrong in `dis_diag`
 - (#8222) Fixed serial numbers printouts in `dis_firmwaretool` for adapters with custom serial numbers
 - (#8237) Improved support for Granite Rapids Xeon Scalable CPUs
 - (#8240) During **MSI** upgrade, the internal configuration files must be preserved. `_dishosts.conf_` is kept, while **`dis_<adapter>.conf`** and **`dis_irm.conf`** are overwritten

SISCI

- (#7336) Multi-threading is now required to compile eXpressWare
- (#7879) Fixed off by one error in `reflective_bench`

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- (#8230) Fixed a bug in *SCICreateDeviceSegment* where it would fail if called with either of the flags *SCI_FLAG_LOCAL_ONLY* or *SCI_FLAG_DEVICE_SIDE_ONLY*

SmartIO

- (#8175) Resolved issue with NT-Transparent causing repeated borrow/return to fail
- (#8186) Fixed an issue where two lenders borrowing each others' devices would fail with IOMMU disabled
- (#8226) Fixed issue with automatic DMA windows size calculation with NT-Transparent
- (#8230) Fixed a bug in *SCICreateDeviceSegment* where it would fail if called with either of the flags *SCI_FLAG_LOCAL_ONLY* or *SCI_FLAG_DEVICE_SIDE_ONLY*

Supersockets

- (#7629) Sockperf: 1 second walltime is standard measurement
- (#7629) Sockperf: Improved explanation of measurement options
- (#8009) Fixed a memory leak related to the usage of DMA channels

DIS Release 5.24.0

BMC

- (#7830) Added support for the MXP526
- (#7830) Improved support for MXC products
- (#7830) Power on on upstream power_enable is now implemented. Can be turned on with dip 3 on dip-switch bank 2
- (#7830) Updated BMC firmware for MXH530 and for all MXC and MXP products

Benchmarks

- (#7644) Added *-wt* (walltime) option for *dma_bench* and *scibench2*
- (#7801) Added warmup loops to *scibench2*, *dma_bench* and *dma_user_bench*
- (#7801) Fixed potential sending of too large sizes for *scibench* if offset is used
- (#7801) Made usage text more consistent for *scibench2* and *dma_bench*

General

- (#7164) Added support for MXC960
- (#7164) Added support for MXC961 - NTB version
- (#7164) Added support for MXC962
- (#7164) Release of PFX config VER2 for MXC960 and MXC962
- (#7387) Extended internal bitmap from 64 to 256 bits to accommodate larger cluster topologies. Fixes potential bug in large architectures
- (#7402) Added support for Stamford PFX Gen4 chip MVH103. Microchip EVB-PCI1003 Stamford Evaluation board
- (#7446) Fixed reset option for MXS924, Port 5 in DSWITCH mode
- (#7468) Added support for PXIe Gen5 MXP526 adapter
- (#7468) Fixed patch table entries for MXP526
- (#7491) Verify presence of IOMMU OS mitigation for PCIe devices

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- (#7505) Fix buffer overrun resulting in potential Requester ID corruption
 - (#7515) Added support for reading fan information (rpm, duty cycle) of MXH530 with dis_diag (under adapter status)
 - (#7518) Added option to configure processor I/O requester IDs manually in the configuration files. Particularly useful for heterogenous Intel Xeon Scalable clusters
 - (#7552) Removed NXP bootloader for adapters with NXP version > Ver3.0
 - (#7572) Improved the IRM error handling in case a critical chip error occur. Avoid any session IOCTLS before the driver is properly initialized
 - (#7586) Converted MXH930 to MR6
 - (#7586) Increased the Link BAR2 from 1TB to 64TB
 - (#7608) Converted MXH530 to MR2
 - (#7608) Fixed GPIO 32 REFCLK_OE (from low to high) for TARGET config 4, ,5 and 6
 - (#7608) MXH530 and NXH532 PFX configuration VER3 release, September 2nd, 2025
 - (#7609) Fixed clock GPIO setting in configuration
 - (#7609) Split MXH530 and MXH532 PFX configuration images and firmware
 - (#7609) Updated upgrade_eeprom.sh and upgrade_eeprom.ps1 scripts after splitting MXH530 and MXH532
 - (#7636) Added support for MXH570 and MXH572
 - (#7667) Fix connection issue between adapter and switch on IceLake+ systems
 - (#7703) Updated configuration image for MXH916 to VER5. Fixes PCIe connections for all link ports
 - (#7707) Added NTB support for MXH914, MXH916 and MXH918
 - (#7718) General connectivity fix for multi direct topology with different MXH5xx and MXH9xx adapter types
 - (#7719) Updated configuration file for MXH918 to VER5 with MR6
 - (#7721) MXH914 - MXH919 config release VER5, August 20th 2025
 - (#7721) MXH914, VER5 MR6 configuration with 64TB link BAR2
 - (#7723) Avoid unnecessary load of PFX CPU when doing sequence checks
 - (#7752) Added driver support for combined NTB and TRANSP configuration for MXH930 adapters
 - (#7763) Release of PFX configuration image VER5 for MXP908 and MXP909
 - (#7764) Fixed bug where dis_diag reports incorrect cable capabilities when using PCIE5 cables
 - (#7771) Updated NXP version to v3.4-rc13.bin to fix the fan control
 - (#7777) Added dis_firmwaretool support for MVH126
 - (#7781) Fixed a bug where DMA read operations would sometimes fail in clusters with Gen4 adapters connected by a Gen3 switch
 - (#7786) Added support for MXC960 and MXC962
 - (#7786) Improvements to the MXC960 D-SWITCH config
 - (#7800) Added TARGET x2x2x2x2x2x2x2 (edge) in config 15 for MXH830
 - (#7808) Added support for connecting different adapter types by an NTB switch

SISCI

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- (#6917) Added documentation for DIS_BROADCAST_NODEID_GROUP_ALL constant for SCICConnectSegment
 - (#7558) Return code fixes for SCIQuery
 - (#7578) Fixed issue where requester ID added to adapter was not added to NTB switch table
 - (#7591) Simplified SISI API header file

DIS Release 5.23.0

Bug fix: no longer prints invalid temperature

- Bug fix: Fixed info readout for all firefly adapters

General

- Added support for Gen 5 adapter MXH530 in the driver and tools
- Added support for MXC960
- Added support for MXS924 cascade
- Bug fix: Driver configuration now correctly exits if IOMMU initialization fails
- Bug fix: Updated BAR computation on transparent devices
- Bug fix: Fix issue with MXP924 reporting “Hot Plug Capability”
- Bug fix: IOMMU now works as expected on kernels ≥ 6.3
- Bug fix: Driver configuration now correctly exits if IOMMU initialization fails

Improved dis_diag

- Show PCIe parent link capability

Improved dis_nodemgr

- Unresolvable hosts are skipped and no longer stop cluster configuration

SISI

- Enabled possibility for non-zero offset when calling SCIMapRemoteSegment for multicast segments
- Bug fix: Fix for SCISStartDMATransferMem deadlock

DIS Release 5.22.0

General

- Added support for Intel Xeon Scalable 5th gen (“Emerald Rapids”)
- Added support for Windows 11, Server 2022
- Improved support for daisy chain configurations
- MXH930: Fixed a bug where Windows 10 Enterprise LTSC occupies BAR0 for the DMA
- Improved dis_status script, now retrieves more information
- Fixed logging issue with dis_networkmanager
- Added support for virtual configuration through dis_firmwaretool
- Added support for sanitization in upgrade-EEPROM

Improved dis_diag

- Improved link error detection
- Now shows temperature information for Firefly
- Added support for json-output

Improved installer

- Fixed bug for transparent install on GUI installer
- Various bugfixes

DIS Release 5.21.4

General

- The driver now recalibrates to support both older and newest MXS824 and MXS924 switch configurations

DIS Release 5.21.3

General

- Improved device detection for MX

DIS Release 5.21.2

General

- Added support for all Intel Xeon Ice Lake and Sapphire Rapids Bronze and Silver CPUs
- Added support for all Intel Xeon Ice Lake and Sapphire Rapids Gold and Platinum CPUs with up to two sockets, three UPI links and 36 cores

DIS Release 5.21.0

General

- Removed dis_coinstaller from the driver package
- Fixed internal DMA channels being improperly computed
- Fixed BAR2 mapping on systems where a bogus BAR1 is allocated
- Fixes to prevent potential leaks during driver failure
- Enable option to sign drivers with a self-sign certificate
- Remove dishosts.conf during uninstallation of Windows drivers

DIS Release 5.20.1

Bug fixes and improvements

- Reset the Completion Timeout on root ports in cases where more than 1 transparent adapter are installed
- Fixed initial adapternv value for IRM transparent inf files

DIS Release 5.20.0

Bug fixes and improvements

- Generate .nupkg for MX Windows x64 builds
- Added TTY access mode to dis_firmwaretool

DIS Release 5.19.2

Dis_firmwaretool

- Added support for 'pci:' communicator

General

- Increased max number of transparent adapters from 5 to 20

General bug fixes and improvements

- Fixed crash on management EP if there is not enough contiguous memory
- Reset completion timeout on Root Port for transparent adapters
- Firmware upgrade

DIS Release 5.18.0

General

- Improved support for Gen4 adapters MXH930, MXH932, MXH940, MXH942, MXH950, MXH952
- General bug fixes and improvements

DIS Release 5.17.0

General

- 5.17.0 for Windows was not released due to a regression test issue
- Added support for Gen4 adapters MXH930, MXH932, MXH940, MXH942

SISCI

- Added support for send-only multicast configurations
- Fixed bug in segment cleanup for shared segments that could cause segment to be unavailable for all users
- Increased max multicast segment size to 128 GB. Fixed 32 bit size limitations with internal copy function

DIS Release 5.16.0

General

- Prevent Board Management Software installation on Compute nodes

Sisci api

- Added support for using multiple DMA channels
- Added support for registering more than one PCIe requester ID per SISCI descriptor

DIS Release 5.15.1

General

- Fixed bug in SISI supporting larger than 4GB segments
- Fixed multi endian issue with reflective memory test program

DIS Release 5.15.0

General

- Increase max number of adapters from 4 to 5
- Fixed problem with slot AER errors not being logged
- User-space SuperSockets: added a listen thread to accept incoming connections

Included software

SuperSockets

- Ultra-fast, low latency WinSock2 Sockets API (TCP) for PCIe
- Local and remote socket communication acceleration (accelerated loop-back device support local IP and local-host address)
- Connectivity to other systems running Linux user space SuperSockets

SISI API 2.0.2

- Shared memory (DMA, PIO, RDMA, Interrupts)
- Reflective memory/multicast
- PCIe peer to peer communication (FPGAs, GPUs etc.)
- Full connectivity to other systems running Linux, RTX or VxWorks

TCP/IP driver (IPoPCIe, only included in installers for Windows Vista and newer)

- Private network to other nodes running Windows
- Routing to other network (Connect your PCIe cluster to a 10G Ethernet up-link)

Supported OS platforms

- Windows Server 2008 - 32 bit
- Windows Server 2008 - 64 bit
- Windows Server 2008 R2 - 64 bit
- Windows Server 2012 R2 - 64 bit
- Windows Server 2016 - 64 bit
- Windows Server 2019 - 64 bit
- Windows Server 2022 - 64 bit
- Windows 7 - 32 bit
- Windows 7 - 64 bit

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- Windows 8 - 32 bit
 - Windows 8 - 64 bit
 - Windows 8.1 - 64 bit
 - Windows 10 - 64 bit
 - Windows 11 - 64 bit

Cluster installation requirements

- All nodes connected and properly configured with Ethernet
- Non-Ethernet configurations optional, contact Dolphin for assistance

Installation and management

- Windows MSI Installer package
- Automatic configuration via Interconnect manager
- Centralized monitoring and diagnostic
- Both Linux and Windows supported as GUI platform

High availability features

- SuperSockets will fail-over to Ethernet if Dolphin eXpressWare network is unavailable during application startup

Bundled (major) management tools

- **dis_diag**: diagnostic tool
- **dis_services**: driver service manager
- **dis_config**: configuration tool
- **dis_mkconf**: configuration file generator

Bundled (major) demo tools

- **Scibench2**: SISI-based PIO throughput benchmark
- **scipp**: SISI-based ping-pong benchmark
- **dma_bench**: SISI-based DMA benchmark
- **interrupt_bench**: SISI-based remote system interrupt benchmark
- **reflective_bench**: SISI-based reflective memory benchmark
- **latency_bench**: TCP latency benchmark (runs on any IP network including SuperSockets)

Firmware upgrade

The driver installer will detect and suggest to automatically update the firmware during installation if an update is required (new firmware may be included in software distribution).

For further instructions, please see the “Firmware Release Notes” of your adapter: https://www.dolphinics.com/download/MX/RELEASE/PW_DOC/download-mx-doc.html

Please file a support request at <https://www.dolphinics.com/csp> if you have any problems.

Change log for RTX Software

Description of content: Clustering package for RTX (64-bit only).

Release category: Beta.

Current status: Please contact Dolphin for updated status.

Currently supported versions:

- IntervalZero RTX64 v4.2+
- IntervalZero RTX64 v3.7

New in DIS Release 5.25.2

Dis_diag

- (#8344) Implement proper CSR value printout fix
- (#8373) MXH57x: Fixed an issue where the CDFP cable temperature could get stuck

General

- (#8411) MXH57x: Fixed error messages from the IRM driver reading cable ports out of range: *MXH Cable info failed: 0x3*

SISCI

- (#8365) Reduce CPU usage of server node in *reflective_write* example
- (#8378) Reduce CPU usage of server node in *reflective_bench* and *reflective_dma_bench* benchmarks

Changes in previous releases

DIS Release 5.25.1

General

- (#7617) Fixed problem with DMA pull failing between some nodes in Dual D-Switch topology
- (#7617) Fixed problems with interference of nodes in Dual D-Switch topology

-
- (#8133) Added initial MXS924 configs for Dual D-Switch topology. See MXS924_eeprom_versions.txt for details
 - (#8274) *dis_diag* now correctly prints the root port's BDF
 - (#8288) Extended PFX configuration image for MXB585
 - (#8289) Added support for MXH570-B and MXH572-B Revision
 - (#8291) Fixed NTB 3-nodes, 4-nodes and 5-nodes topology for MXH530. Firmware PFX configuration version 6 required
 - (#8291) Release of PFX config, VER6 for MXH530 and MXH532
 - (#8293) Added support for upgrading the firmware on the MXB585 ebox with *upgrade_eeprom* script
 - (#8298) Fixed updating the serial number for MXH910 and MXH912 adapters with *dis_firmwaretool*
 - (#8302) Virtual PCIe devices are cleaned up when remote node is lost
 - (#8342) Fixed CSR value printouts

SISCI

- (#8207) SCICreateMapSequence returns error when used on map of local segment
- (#8280) Improved performance for *memcpy_nt_avx2*
- (#8341) Fix arithmetic overflow inside SISCI testlib, on systems where CPU frequency is 4GHz+

DIS Release 5.25.0

Arm

- (#7068) Fixed a cache-coherency issue with DMA transfers and user allocated memory on Nvidia AGX Orins

Benchmarks

- (#7882) Adds check for div by zero when *walltime* is used for *dma_bench* or *scibench*
- (#7997) Creates a benchmark analogous to *reflective_bench* but which uses DMA for sending
- (#8063) *dma_bench* regression fixed so *-veclen* parameter can be used again
- (#8075) Added *-vl* argument to *reflective_dma_bench* which can be used to increase DMA transfer vector length

Demos

- (#7851) Added performance demo, video transfer demo, and rfm wrapper to DIS example programs

Dis_diag

- (#7636) MXH570/MXH572: Added support in *dis_diag* for reading temperature, voltage, max power consumption and other cable info from CDFP cables
- (#7817) New json output when *-json* option is used
- (#7893) *dis_diag* output reorganized to print info per adapter
- (#8123) Make the report of the upstream link more generic in *dis_diag*

General

- (#6713) Fixed issue in the downstream cable port for MXC962
- (#6980) Fixed doorbell performance spikes by removing an unneeded loopback doorbell

-
- (#7317) The configuration files of DIS hosts no longer supports 'STRIPE' and 'REDUNDANT' socket adapters. A socket adapter specified with this mode will be ignored
 - (#7550) Improved Dual D-Switch support: up to 15 hosts per switch, no power sequencing requirements
 - (#7792) Added support for MXE expansion board MXB585
 - (#7845) Improved stability with multi-socket Icelake configurations
 - (#7891) Fixed problem with driver crash during dis_config for adapters with invalid hardware configurations
 - (#7939) MXH530 and MXH532 PFX config release VER4
 - (#7968) Fixed issue where *dis_services stop* would fail if there is no adapter installed in the system
 - (#7977) Fixed a bug where a node would end up in a livelock with no session, spamming *getAliveCnt - mbxMsgQ_localHeader == NULL* to the kernel buffer
 - (#7981) Improved error handling in *dis_firmwaretool*
 - (#7982) Added driver support for MXP523
 - (#8003) Added MXS924 DSWITCH configuration files with 2 DSPs
 - (#8031) Vastly improved PIO performance for the Zen3 architecture
 - (#8042) Added DUAL NTB Switch support for MXS924
 - (#8065) Added support for MXH992
 - (#8083) Converted firmware to MR3 for MXH530 and MXH532. Version 5
 - (#8084) Converted MXH570 and MXH572 VER2 to PFX MR3
 - (#8085) Converted MXP526 to MR3
 - (#8121) Released NXP firmware 3.6 and PFX configuration image VER5 for MXH530 and MX532
 - (#8122) Release of MXH570-AA and MXH572-AA with PFX configuration VER2
 - (#8156) Improved the detection of adapter types in *dis_firmwaretool*
 - (#8173) Fixed bug in MXS824 NTB DUAL configs that prevented version 10 of the configs from working
 - (#8175) Resolved potential crash when mapping table is exhausted
 - (#8221) Adds support for SFF-86xx AOC voltage readout
 - (#8221) Fixed bug where SFF-86xx temperature could be wrong in *dis_diag*
 - (#8222) Fixed serial numbers printouts in *dis_firmwaretool* for adapters with custom serial numbers
 - (#8237) Improved support for Granite Rapids Xeon Scalable CPUs

SISCI

- (#7336) Multi-threading is now required to compile eXpressWare
- (#7879) Fixed off by one error in *reflective_bench*
- (#8230) Fixed a bug in *SCICreateDeviceSegment* where it would fail if called with either of the flags *SCI_FLAG_LOCAL_ONLY* or *SCI_FLAG_DEVICE_SIDE_ONLY*

SmartIO

- (#8175) Resolved issue with NT-Transparent causing repeated borrow/return to fail
- (#8186) Fixed an issue where two lenders borrowing each others' devices would fail with IOMMU disabled
- (#8226) Fixed issue with automatic DMA windows size calculation with NT-Transparent

-
- (#8230) Fixed a bug in *SCICreateDeviceSegment* where it would fail if called with either of the flags *SCI_FLAG_LOCAL_ONLY* or *SCI_FLAG_DEVICE_SIDE_ONLY*

Supersockets

- (#7629) Sockperf: 1 second walltime is standard measurement
- (#7629) Sockperf: Improved explanation of measurement options
- (#8009) Fixed a memory leak related to the usage of DMA channels

DIS Release 5.24.0

BMC

- (#7830) Added support for the MXP526
- (#7830) Improved support for MXC products
- (#7830) Power on on upstream power_enable is now implemented. Can be turned on with dip 3 on dip-switch bank 2
- (#7830) Updated BMC firmware for MXH530 and for all MXC and MXP products

Benchmarks

- (#7644) Added *-wt* (walltime) option for *dma_bench* and *scibench2*
- (#7801) Added warmup loops to *scibench2*, *dma_bench* and *dma_user_bench*
- (#7801) Fixed potential sending of too large sizes for *scibench* if offset is used
- (#7801) Made usage text more consistent for *scibench2* and *dma_bench*

General

- (#7164) Added support for MXC960
- (#7164) Added support for MXC961 - NTB version
- (#7164) Added support for MXC962
- (#7164) Release of PFX config VER2 for MXC960 and MXC962
- (#7387) Extended internal bitmap from 64 to 256 bits to accommodate larger cluster topologies. Fixes potential bug in large architectures
- (#7402) Added support for Stamford PFX Gen4 chip MVH103. Microchip EVB-PCI1003 Stamford Evaluation board
- (#7446) Fixed reset option for MXS924, Port 5 in DSWITCH mode
- (#7468) Added support for PXIe Gen5 MXP526 adapter
- (#7468) Fixed patch table entries for MXP526
- (#7491) Implement *iommu_verify.exe* as precondition for driver start
- (#7505) Fix buffer overrun resulting in potential Requester ID corruption
- (#7515) Added support for reading fan information (rpm, duty cycle) of MXH530 with *dis_diag* (under adapter status)
- (#7518) Added option to configure processor I/O requester IDs manually in the configuration files. Particularly useful for heterogenous Intel Xeon Scalable clusters
- (#7552) Removed NXP bootloader for adapters with NXP version > Ver3.0

-
- (#7572) Improved the IRM error handling in case a critical chip error occur. Avoid any session IOCTLS before the driver is properly initialized
 - (#7586) Converted MXH930 to MR6
 - (#7586) Increased the Link BAR2 from 1TB to 64TB
 - (#7608) Converted MXH530 to MR2
 - (#7608) Fixed GPIO 32 REFCLK_OE (from low to high) for TARGET config 4, ,5 and 6
 - (#7608) MXH530 and NXH532 PFX configuration VER3 release, September 2nd, 2025
 - (#7609) Fixed clock GPIO setting in configuration
 - (#7609) Split MXH530 and MXH532 PFX configuration images and firmware
 - (#7609) Updated upgrade_eeprom.sh and upgrade_eeprom.ps1 scripts after splitting MXH530 and MXH532
 - (#7636) Added support for MXH570 and MXH572
 - (#7703) Updated configuration image for MXH916 to VER5. Fixes PCIe connections for all link ports
 - (#7707) Added NTB support for MXH914, MXH916 and MXH918
 - (#7718) General connectivity fix for multi direct topology with different MXH5xx and MXH9xx adapter types
 - (#7719) Updated configuration file for MXH918 to VER5 with MR6
 - (#7721) MXH914 - MXH919 config release VER5, August 20th 2025
 - (#7721) MXH914, VER5 MR6 configuration with 64TB link BAR2
 - (#7723) Avoid unnecessary load of PFX CPU when doing sequence checks
 - (#7752) Added driver support for combined NTB and TRANSP configuration for MXH930 adapters
 - (#7763) Release of PFX configuration image VER5 for MXP908 and MXP909
 - (#7764) Fixed bug where dis_diag reports incorrect cable capabilities when using PCIE5 cables
 - (#7771) Updated NXP version to v3.4-rc13.bin to fix the fan control
 - (#7777) Added dis_firmwaretool support for MVH126
 - (#7781) Fixed a bug where DMA read operations would sometimes fail in clusters with Gen4 adapters connected by a Gen3 switch
 - (#7786) Added support for MXC960 and MXC962
 - (#7786) Improvements to the MXC960 D-SWITCH config
 - (#7800) Added TARGET x2x2x2x2x2x2x2x2 (edge) in config 15 for MXH830
 - (#7808) Added support for connecting different adapter types by an NTB switch
 - (#7810) Minor update on RtssStack.ps1 to keep support for RTX64 v3.7

SISCI

- (#6917) Added documentation for DIS_BROADCAST_NODEID_GROUP_ALL constant for SCICConnectSegment
- (#7558) Return code fixes for SCIQuery
- (#7578) Fixed issue where requester ID added to adapter was not added to NTB switch table
- (#7591) Simplified SISCI API header file

DIS Release 5.23.0

General

- General bug fixes and improvements

DIS Release 5.22.0

SISCI

- General bug fixes and improvements

DIS Release 5.20.1

General

- General bug fixes and improvements

DIS Release 5.20.0

General

- General bug fixes and improvements

DIS Release 5.19.2

General

- General bug fixes and improvements

DIS Release 5.18.0

General

- General bug fixes and improvements

DIS Release 5.17.0

General

- General bug fixes and improvements

SISCI

- Added support for send-only multicast configurations
- Fixed bug in segment cleanup for shared segments that could cause segment to be unavailable for all users
- Increased max multicast segment size to 128 GB. Fixed 32 bit size limitations with internal copy function

DIS Release 5.15.2

General

- Increase max number of adapters from 4 to 5

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- Fixed problem with slot AER errors not being logged

Included software

SISCI API 2.0.2

- Shared memory (DMA, PIO, RDMA, Interrupts)
- PCIe peer to peer communication (FPGAs, GPUs etc.)
- Full connectivity to other systems running Linux, Windows or VxWorks

Supported OS platforms

- Windows 10 - 64 bit
- Windows 11 - 64 bit

Installation and management

- Windows MSI Installer package

High availability features

- Nodes can join and leave cluster (node reboot, power cycled) any time without disturbing communication between other nodes

Bundled (major) management tools

- **dis_diag**: diagnostic tool
- **dis_config**: configuration tool

Bundled (major) demo tools

- **Scibench2**: SISCI-based PIO throughput benchmark
- **scipp**: SISCI-based ping-pong benchmark
- **dma_bench**: SISCI-based DMA benchmark
- **interrupt_bench**: SISCI-based remote system interrupt benchmark
- **reflective_bench**: SISCI-based reflective memory benchmark

Firmware upgrade

The driver installer will detect and suggest to automatically update the firmware during installation if an update is required (new firmware may be included in software distribution).

For further instructions, please see the “Firmware Release Notes” of your adapter: https://www.dolphinics.com/download/MX/RELEASE/PW_DOC/download-mx-doc.html

Please file a support request at <https://www.dolphinics.com/csp> if you have any problems.

Change log for VxWorks Software

Description of content: Clustering package for VxWorks.

Release category: GA.

Current status: Contact Dolphin.

New in DIS Release 5.25.2

Dis_diag

- (#8344) Implement proper CSR value printout fix
- (#8373) MXH57x: Fixed an issue where the CDFP cable temperature could get stuck

General

- (#8295) Added support for SR640, SR660, 23.03 with Clang
- (#8411) MXH57x: Fixed error messages from the IRM driver reading cable ports out of range: *MXH Cable info failed: 0x3*

SISCI

- (#8365) Reduce CPU usage of server node in *reflective_write* example
- (#8378) Reduce CPU usage of server node in *reflective_bench* and *reflective_dma_bench* benchmarks

Included software

SISCI API 2.0.2

- Shared memory (DMA, PIO, RDMA, Interrupts)
- Reflective memory/multicast
- PCIe peer-to-peer communication (FPGAs, GPUs, NVMe, etc.)
- Full connectivity to other systems running Linux, RTX or Windows

Supported OS platforms

- VxWorks 23.03
- VxWorks 7 SR0640
- VxWorks 7 SR0660

Note

VxWorks 7 SR0640/SR0660 are expected to work, but have not been validated by Dolphin. Please contact Dolphin support for specific platform support: <https://www.dolphinics.com/csp>

Note

AMP and User-Space communication not supported.

Installation and management

- Windows MSI Installer package
- Linux ZIP file

High availability features

- Nodes can join and leave cluster (node reboot, power cycled) any time without disturbing communication between other nodes

Bundled (major) management tools

- **dis_diag**: diagnostic tool
- **dis_config**: configuration tool

Bundled (major) demo tools

- **Scibench2**: SISI-based PIO throughput benchmark
- **scipp**: SISI-based ping-pong benchmark
- **dma_bench**: SISI-based DMA benchmark
- **interrupt_bench**: SISI-based remote system interrupt benchmark
- **reflective_bench**: SISI-based reflective memory benchmark

Firmware upgrade

The driver installer will detect and suggest to automatically update the firmware during installation if an update is required (new firmware may be included in software distribution).

Please run the command

```
upgrade_eeprom.cmd --upgrade
```

to upgrade the firmware. A reboot is required after upgrading the firmware.

Please file a support request at <https://www.dolphinics.com/csp> if you have any problems.

Change log for QNX Software

Description of content: Clustering package for QNX.

Release category: GA.

Current status: Contact Dolphin.

New in DIS Release 5.25.2

Dis_diag

- (#8344) Implement proper CSR value printout fix
- (#8373) MXH57x: Fixed an issue where the CDFP cable temperature could get stuck

General

- (#8411) MXH57x: Fixed error messages from the IRM driver reading cable ports out of range: *MXH Cable info failed: 0x3*

SISCI

- (#8365) Reduce CPU usage of server node in *reflective_write* example
- (#8378) Reduce CPU usage of server node in *reflective_bench* and *reflective_dma_bench* benchmarks

Changes in previous releases

DIS Release 5.25.1

General

- (#7617) Fixed problem with DMA pull failing between some nodes in Dual D-Switch topology
- (#7617) Fixed problems with interference of nodes in Dual D-Switch topology
- (#8133) Added initial MXS924 configs for Dual D-Switch topology. See *MXS924_eeprom_versions.txt* for details
- (#8274) *dis_diag* now correctly prints the root port's BDF
- (#8288) Extended PFX configuration image for MXB585

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- (#8289) Added support for MXH570-B and MXH572-B Revision
 - (#8291) Fixed NTB 3-nodes, 4-nodes and 5-nodes topology for MXH530. Firmware PFX configuration version 6 required
 - (#8291) Release of PFX config, VER6 for MXH530 and MXH532
 - (#8293) Added support for upgrading the firmware on the MXB585 ebox with upgrade_eeprom script
 - (#8298) Fixed updating the serial number for MXH910 and MXH912 adapters with dis_firmwaretool
 - (#8302) Virtual PCIe devices are cleaned up when remote node is lost
 - (#8342) Fixed CSR value printouts

SISCI

- (#8207) SCICreateMapSequence returns error when used on map of local segment
- (#8280) Improved performance for *memcpy_nt_avx2*
- (#8341) Fix arithmetic overflow inside SISCI testlib, on systems where CPU frequency is 4GHz+

DIS Release 5.25.0

Arm

- (#7068) Fixed a cache-coherency issue with DMA transfers and user allocated memory on Nvidia AGX Orins

Benchmarks

- (#7882) Adds check for div by zero when walltime is used for dma_bench or scibench
- (#7997) Creates a benchmark analogous to *reflective_bench* but which uses DMA for sending
- (#8063) *dma_bench* regression fixed so *-veclen* parameter can be used again
- (#8075) Added *-vl* argument to *reflective_dma_bench* which can be used to increase DMA transfer vector length

Demos

- (#7851) Added performance demo, video transfer demo, and rfm wrapper to DIS example programs

Dis_diag

- (#7636) MXH570/MXH572: Added support in dis_diag for reading temperature, voltage, max power consumption and other cable info from CDFP cables
- (#7817) New json output when *-json* option is used
- (#7893) dis_diag output reorganized to print info per adapter
- (#8123) Make the report of the upstream link more generic in dis_diag

General

- (#6713) Fixed issue in the downstream cable port for MXC962
- (#6980) Fixed doorbell performance spikes by removing an unneeded loopback doorbell
- (#7317) The configuration files of DIS hosts no longer supports 'STRIPE' and 'REDUNDANT' socket adapters. A socket adapter specified with this mode will be ignored
- (#7550) Improved Dual D-Switch support: up to 15 hosts per switch, no power sequencing requirements
- (#7554) Added support for QNX
- (#7689) Minor improvements for multi-cpu systems

-
- (#7792) Added support for MXE expansion board MXB585
 - (#7845) Improved stability with multi-socket Icelake configurations
 - (#7881) Minor improvements
 - (#7891) Fixed problem with driver crash during `dis_config` for adapters with invalid hardware configurations
 - (#7939) MXH530 and MXH532 PFX config release VER4
 - (#7968) Fixed issue where `dis_services stop` would fail if there is no adapter installed in the system
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 - (#8083) Converted firmware to MR3 for MXH530 and MXH532. Version 5
 - (#8084) Converted MXH570 and MXH572 VER2 to PFX MR3
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 - (#8122) Release of MXH570-AA and MXH572-AA with PFX configuration VER2
 - (#8156) Improved the detection of adapter types in `dis_firmwaretool`
 - (#8173) Fixed bug in MXS824 NTB DUAL configs that prevented version 10 of the configs from working
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SISCI

- (#7336) Multi-threading is now required to compile `eXpressWare`
- (#7879) Fixed off by one error in `reflective_bench`
- (#8230) Fixed a bug in `SCICreateDeviceSegment` where it would fail if called with either of the flags `SCI_FLAG_LOCAL_ONLY` or `SCI_FLAG_DEVICE_SIDE_ONLY`

SmartIO

- (#8175) Resolved issue with NT-Transparent causing repeated borrow/return to fail
- (#8186) Fixed an issue where two lenders borrowing each others' devices would fail with IOMMU disabled
- (#8226) Fixed issue with automatic DMA windows size calculation with NT-Transparent
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Supersockets

- (#7629) Sockperf: 1 second walltime is standard measurement
- (#7629) Sockperf: Improved explanation of measurement options
- (#8009) Fixed a memory leak related to the usage of DMA channels

Included software

SISCI API 2.0.2

- Shared memory (DMA, PIO, RDMA, Interrupts)
- Reflective memory/multicast
- PCIe peer-to-peer communication (FPGAs, GPUs, NVMe, etc.)
- Full connectivity to other systems running Linux, Windows, RTX, or VxWorks

Supported architectures

The software supports the following architectures and platforms:

- ARM64

Supported OS platforms

- QNX 7.1
- QNX 8.0