



Dolphin Interconnect Solutions

eXpressWare

Software release notes

for MX products

5.17.0

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Definitions

Release categories

The following definitions are used for the eXpressWare software.

Prototype:

Only parts of the full functionality is implemented. No or little error handling. The purpose of a prototype release is to demonstrate some limited important functionality to a selected number of customers. Should normally not be made generally available.

Alpha:

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

Beta:

Error handling and performance optimization completed. Very close to the final product. Can be made available on a general basis.

GA:

General Availability. Well tested product that can be shipped 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 5.13.1).

MAJOR_VER

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

MINOR_VER

Changes to the software that significant improve functionality. Minor changes and improvements that does not affect general usage of the product. Fixes to support new versions of operating systems. Bug fixes.

BUGFIX_VER

Minor Bug fixes to a previously released software. No functionality or general improvements are allowed.

The letter “d” should always be added to the version string while the code is being implemented to specify that the running code is an internal development version. Snapshot releases should always display the letter “d”.

Types of releases

Two types of releases are used by Dolphin to satisfy rapid development, concurrent external testing and stability and long term test requirements. The ideas are collected from and widely used within the Linux community. These two types applies to Prototype, Alpha, Beta and GA releases.

Release candidate

A release candidate is a release that is still undergoing testing and qualification. The purpose of distributing release candidates is to enable customers and partners to have access to updated drivers without having to wait for the final release. The only difference between a release candidate and a release is the amount of testing performed. The release note should specify if this is a release candidate or a completely tested release. Critical bugs found during release candidate testing may cause the release to be canceled. In such cases, the version date/string of the release must be changed before a new release candidate can be produced following the general release engineering steps.

Release

A release is a product that have completed the full release procedure.

Normally a release candidate will be renamed to a release if all tests are passing and no new critical bugs are found. This will be reflected in the release note.

Dolphin eXpressWare

The eXpressWare software suite includes the following components. Please note that all combinations of components, PCIe cards and operating systems may not be supported. Please refer to the release note for each operating system and card for details.

IRM	Interconnect Resource Manager
SISCI	Software Infrastructure for Shared-Memory Cluster Interconnects. This includes binaries , sources, documentation and development tools.
SuperSockets	Socket accelerator for PCIe
IPoPCIe	TCP-IP driver for PCIe. Windows NDIS driver or Linux DISip.
SmartIO	Sharing and access to IO management and control. Includes Device Lending and SISCI SmartIO management. Supports Hot-Add with 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.

SuperSockets User-space Library for Windows and 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. We have verified and supports the following socket calls:

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

For Windows OS, specific functions are implemented: closesocket, WSASendDisconnect, ioctlsocket, WSAAsyncSelect, WSAGetOverlappedResult, WSAIoctl, WSARcv, WSASend and WSASendDisconnect.

For Linux OS, normal file operations are implemented: close, ioctl.

SuperSockets Kernel Space library for 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 (decimal value 27). 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 groups is supported. The number of available groups is hardware dependent.

More details on the eXpressWare software can be found at: <https://www.dolphinics.com/software>

Dolphin technical support and documentation

We do take software development and product testing seriously, please let us know your experience or any issue by sending an email to pci-support@dolphinics.com.

Additional information, installation manuals, adapter users guide etc can be found at <http://www.dolphinics.com/mx>

SISCI API resources can be found at www.dolphinics.com/products/embedded-sisci-developers-kit.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 and configurations

Supported Dolphin products

This software release supports the following PCIe adapter cards.

The NTB software supports the following Dolphin adapter cards

- MXH930 (initial support)
- MXH940 (initial support)
- MXH830
- MXH832, MXH833 (As transparent target only, PCIe hot add)

The Transparent Board Management software supports the following adapter cards

- MXH932 (initial support)
- MXH942 (initial support)
- MXH832

Please chose another software download if you are using a not listed adapter card.

Supported Dolphin PCI Express switches

- MXS824

Configurations supported by this release

The is software release support the following configurations.

General use with MXH830:

- 2 nodes using 1, 2, 4 (x4, x8, x16) PCIe 3.0 / PCIe 4.0 cables.

General use with MXH840:

- 2 nodes using 1, 2, 4 Samtec Gen4 FireFly / cables.

General use with MXH830:

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

Reflective memory use with with MXH830 and MXS824:

- 2 nodes using 1, 2, 4 (x4, x8, x16) MiniSAS-HD or 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.

NOTE: Customers using MXS824 switches to build a 24 node topology must upgrade to MXS824 Management firmware version 1.4.2. Please consult the MXS824 users guide for more details.

NOTE: Configurations up to 60 nodes can be supported, please contact Dolphin.

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 MXH930 and MXH940

MXH930 and MXH940 hot add, Linux systems, will be supported by eXpressWare 5.18

MXH930 and MXH940 hot add, Windows systems, will be added in eXpressWare 6.0

Please contact Dolphin for more information.

Standard firmware revisions, MXH83x

DIS release / Adapter	MXH83x
5.17.0	8.12
5.16.0	8.10
5.15.0	8.10
5.14.0	8.10
5.13.1	8.8

Standard firmware revisions, MXH93x

DIS release / Adapter	MXH93x
5.17.0	1.0

Support for OEM hardware

This version of Dolphin eXpressWare has general support for the Microsemi PFX Switchtec Gen3 and Gen4 chipsets in various configurations and topologies. Please contact Dolphin for 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

- SISI 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 how to tune eXpressWare parameters.

Dolphin eXpressWare MX release 5.17.0 Linux

Description of content: Clustering package for Linux.

Release category: GA

Target audience: Production systems.

Release date: 24th September 2020.

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

New in DIS MX 5.17.0:

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

Changes in previous releases

DIS MX 5.16.0:

- Added support for system DMA with IOMMU ON (Off already supported)
- Added support for Linux kernel >= 5.5.3. Tested on Linux kernel 5.5.8
- SISI API
 - Added support for using multiple DMA channels.
 - Added support for registering more than one PCIe requester ID per SISI 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 other 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 MX 5.15.2:

- SmartIO – fixed potential assert in device scanning process

DIS MX 5.15.1:

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

DIS MX 5.15.0:

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

DIS MX 5.14.0:

- Supports up to kernel 5.3
- Added support for Debian 10
- Added support for Ubuntu 18.04 with HWE kernel
- SmartIO 2.4
 - Added support for reflective memory
 - Fixed scan speed regression in NT-Transparent mode
 - Fixed problem with Nvidia Persistence mode
 - Device Lending improvements.
- Fixed problem with Device Lending not working on AMD Ryzen due to DPC interference.
- SuperSockets:
 - Fixed problem with crash during accept() if NO_NATIVE_CONN is use inconsistently across the cluster.
- General bug fixes and improvements.

DIS MX 5.13.1:

- SmartIO 2.1
 - Fixed issue with device lending NVIDIA GPUs with newer GPU drivers. Confirmed working with 418.39
 - MSI-X not working on kernel >= 4.4. Workaround implemented. Fix planned for eXpressWare 5.12
 - SISI SmartIO API Extension revisited and stabilized.
 - Added support for Concurrent Hot add operations while already added devices are being utilized.
 - Device Lending improvements.
 - Support for remote I2C device access through MXH832 target added in eXpressWare 5.9 – improved in eXpressWare 5.11.
 - General improvements and bugfixes.
- SISI
 - SISI virtual devices can now hold up to 32 instances of each resource type.
 - Added function to retrieve information about SmartIO devices.
- Improved support for MXS824 switches.
- Fixed bug preventing MXH830 interrupts in loopback.
- Fixed problem doing firmware upgrade on some supported kernels.
- Improved SIA installers for all platforms. Added advanced configuration option allowing only required modules to be installed.
- Added support for Nvidia Xavier and NXP BLBX2-T1B
- Fixed problem compiling eXpressWare from tarball source.
- General improvements and bugfixes.

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 support local IP and localhost 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 proves a limited number of socket functionality. Currently only TCP.
 - Support communication to Windows SuperSockets.
- SISI 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 2.1
 - Device Lending
 - Device Hot Add
 - SISI 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 strive to support all major Linux distributions and kernels from 2.6.32 and up. This release has been tested on these 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 - 5.5.8

- CentOS 8 x86_64
- CentOS 7 x86_64
- CentOS 6 x86_64
- CentOS 5 x86
- OpenSUSE Leap 15.1
- Ubuntu 14.04 x86_64
- Ubuntu 16.04 x86_64
- Ubuntu 18.04 x86_64
- Debian 7 x86_64
- Debian 8 x86_64
- Debian 9 x86_64
- Debian 10 x86_64
- Fedora 25 x86_64

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.

Installation and management:

- RPM based via Self Installing Archive (SIA).
- Automatic configuration via Interconnect manager.
- Centralized monitoring and diagnostic.
 - Both Linux and Windows supported as GUI platform.

High availability features:

- Unplugging a cable will cause SuperSockets to fail over to Ethernet for all connections affected. SuperSockets will automatically re-establish communication when cable is inserted.

Bundled (major) management tools:

- dis_diag (diagnostic tool)
- dis_admin (cluster monitor and manager GUI)
- networkmanager (cluster configuration and maintenance demon)
- dis_netconfig (configuration editor GUI)

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)
- 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). Please upgrade by running `/opt/DIS/sbin/upgrade_eeprom.sh`. A reboot is required after firmware upgrade.

Dolphin eXpressWare MX release 5.16.0 Windows

Description of content: Clustering package for Windows.

Release category: Production systems

Release date: 21th April 2020.

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

Please note: 5.17.0 is not released due to a regression test issue. Please use eXpressWare 5.16.0 until eXpressWare 5.18 is available.

New in DIS MX 5.16.0:

- SISI API
 - Added support for using multiple DMA channels.
 - Added support for registering more than one PCIe requester ID per SISI descriptor.
- Prevent Board Management Software installation on Compute nodes.

Changes in previous releases:

DIS MX 5.15.1:

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

DIS MX 5.15.0:

- 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.

DIS MX 5.14.0:

- Transparent driver support for MXH832
- Improved allocation of large memory areas
- Fixed IRM failure to load on certain runtime contexts
- Fixed detection of RootPort's BDF on some systems
- Fixed deadlock or crash due to improper computation of CompletionTimeout offset inside PCIe AER capability
- General bug fixes and improvements.

DIS MX 5.13.1:

- Improved support for MXH830 error handling.

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 localhost address).
 - Connectivity to other systems running Linux user space SuperSockets.
- SISI API V2.0
 - Shared memory (DMA, PIO, RDMA, Interrupts)
 - 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)

- Transparent Board Management
 - Transparent board management software for transparent card MXH832.

Dolphin SuperSockets

The Dolphin SuperSockets 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 supports fail-over from single adapter card to Ethernet. SuperSockets version 5.2 and newer adds support for connectivity to the new Linux SuperSockets user space library. We have verified and supports the following socket calls:

accept, bind, closesocket, connect, WSASendDisconnect, getpeername, getsockname, getsockopt, ioctlsocket, listen, recv, WSAREcv, WSAAsyncSelect, send, WSASend, setsockopt, shutdown, closesocket, ioctlsocket, WSAGetOverlappedResult, WSAIoctl, WSASendDisconnect.

Supported OS platforms:

Windows Vista - 32 bit
 Windows Vista - 64 bit
 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 7 - 32 bit
 Windows 7 - 64 bit
 Windows 8 - 32 bit
 Windows 8 - 64 bit
 Windows 8.1 – 64 bit
 Windows 10 – 64 bit

Cluster installation requirements:

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

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 Express network is unavailable during application startup.

Bundled (major) management tools:

- dis_diag (diagnostic tool)
- dis_admin (cluster monitor and manager GUI)
- networkmanager (cluster configuration and maintenance demon)
- dis_netconfig (configuration editor GUI)

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)
- latency_bench (TCP latency benchmark, runs on any IP network including SuperSockets)

Firmware upgrade:

MXH cards may need a firmware update. After installing the drivers, please run the command:

```
C:\Program Files\Dolphin Express MX\Util\upgrade_eeprom.cmd --upgrade
```

to upgrade the firmware. A reboot is required after upgrading the firmware. Please contact pci-support@dolphinics.com if you have any problems.

Dolphin eXpressWare MX release 5.17.0 RTX

Description of content: Clustering package for RTX

Release category: Beta

Release date:

Current status: Please contact Dolphin for updated status.

New in DIS MX 5.17.0:

- SISI
 - 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.
- General bug fixes and improvements.
-

Changes in previous releases:

DIS MX 5.15.2:

- Increase max number of adapters from 4 to 5.
- Fixed problem with slot AER errors not being logged.

DIS MX 5.14.0:

- Improved allocation of large memory areas
- General bug fixes and improvements.

DIS MX 5.13.1:

- Support for MXH830.

Included software:

- SISI API V2.0.2
 - 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 Server 2008 R2 - 64 bit

Windows Server 2012 R2 – 64 bit

Windows Server 2016 – 64 bit

Windows 7 - 64 bit

Windows 8.1 – 64 bit

Windows 10 – 64 bit

Installation and management:

- Windows MSI Installer package.

Bundled (major) management tools:

- dis_diag (diagnostic tool)

Bundled (major) demo tools:

- Scibench2 (SISI 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:

MXH cards may need a firmware update. After installing the drivers, please run the command:

```
C:\Program Files\Dolphin Express RTSS\Util\upgrade_eeeprom.cmd --upgrade
```

to upgrade the firmware. A reboot is required after upgrading the firmware. Please contact pci-support@dolphinics.com if you have any problems.

Dolphin eXpressWare MX release 5.17.0 VxWorks

Description of content: Clustering package for VxWorks

Release category: Beta

Release date: 24th September 2020.

Current status: Please contact Dolphin for updated status.

New in DIS MX 5.17.0:

- Added support for VxWorks 7 SR0640
- SISI
 - 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.
- General bug fixes and improvements.

Changes in previous releases:

DIS MX 5.16.0:

- Added support for VxWorks 7 SR0620 with LLVM/Clang compiler
- Fixed VxWorks initialization ordering
- Added CDF parameter EXPRESSWARE_SLOT_0_NODEID to explicitly define the auto-configuration NodeId if the geographical address (slot number) is reported as 0 by the BSP.
- SISI API
 - Added support for using multiple DMA channels.
 - Added support for registering more than one PCIe requester ID per SISI descriptor.

DIS MX 5.15.2:

- Increase max number of adapters from 4 to 5.
- Verbosity control for driver output.
- Fixed problem with slot AER errors not being logged.

DIS MX 5.15.1:

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

DIS MX 5.14.0:

- Improved allocation of large memory areas
- General bug fixes and improvements.

DIS MX 5.13.1:

- Support for MXH830.

Included software:

- SISI API V2.0.2
 - 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.

Supported OS platforms:

VxWorks 6.9 Intel x64 SMP

VxWorks 6.9 Intel x86 SMP

VxWorks 7.0 Intel x64 SMP

VxWorks 7.0 Intel x86 SMP

Note: AMP and UserSpace 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)

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:

MXH cards may need a firmware update. After installing the drivers, please run the command:

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

to upgrade the firmware. A reboot is required after upgrading the firmware. Please contact pci-support@dolphinics.com if you have any problems.