



Mellanox WinOF VPI Windows Server 2016 Inbox Driver Release Notes

Rev 5.01.11548

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Release Update History

Table 1 - Release Update History

Release	Date	Description
Rev 5.01.11548	November 10, 2016	Initial release of this WinOF VPI Windows Server 2016 Inbox Driver version

1 Overview

These are the release notes for Mellanox WinOF VPI Drivers Rev 5.01.11548 for Windows, supporting Mellanox ConnectX®-3 and ConnectX®-3 Pro network adapters.

Mellanox WinOF is composed of several software modules that contain InfiniBand and Ethernet drivers and utilities for ConnectX®-3 and ConnectX®-3 Pro adapter cards.

1.1 Unsupported Functionality/Features

The following are the unsupported functionalities/features in WinOF Rev 5.01.11548:

- ND over WinVerbs provider
- SRP
- IPv6 over IPoIB Team ports
- VMQ over IPoIB team ports
- Configure IPoIB team through PowerShell
- ConnectX®-2 adapter cards

1.2 WinOF VPI Package Contents

The Mellanox WinOF Rev 5.01.11548 for Windows package contains the following components:

- Core and ULPs:
 - IB HCA low-level drivers (mlx4)
 - IB Access Layer (IBAL)
 - Ethernet driver (ETH)
 - IP over InfiniBand (IPoIB)

1.3 Supported Network Adapter Cards

Mellanox WinOF Rev 5.01.11548 supports the following Mellanox network adapter cards:

Table 2 - Supported Network Adapter Cards

NICs	Supported Protocol	Supported Link Speed
ConnectX®-3 Pro	InfiniBand (IB)	SDR, DDR, QDR, FDR10, FDR
	Ethernet	10, 40, 50 and 56 Gb/s
ConnectX®-3	InfiniBand (IB)	SDR, DDR, QDR, FDR10, FDR
	Ethernet	10, 40, 50 and 56 Gb/s



The speeds listed in the table above are according to the speeds supported by the device.

1.3.1 Firmware Versions

Mellanox WinOF Rev Rev 5.01.11548 provides the following firmware for Mellanox NICs:

Table 3 - Firmware Versions

NICs	Recommended Firmware Rev.	Additional Firmware Rev. Supported
ConnectX®-3 Pro / ConnectX®-3 Pro EN	Rev 2.36.5150	Rev 2.35.5100
ConnectX®-3 / ConnectX®-3 EN	Rev 2.36.5150	Rev 2.35.5100

1.4 RoCE Modes Matrix

The following is RoCE modes matrix:

Table 4 - RoCE Modes Matrix

Software Stack / Inbox Distribution	RoCE MAC Based (Layer 2) Supported as of Version	RoCE IP Based (Layer 2) Supported as of Version	RoCE v2 (Layer 3) Supported as of Version
Inbox Windows Server 2016	Supported	Supported	Supported (Default)

2 Changes and Fixes in Rev 5.01.11548

- Support for Single and Dual port Adapters
- Up to 16 Rx queues per port
- Rx steering mode (RSS)
- Hardware Tx/Rx checksum calculation
- Large Send off-load (i.e., TCP Segmentation Off-load)
- Hardware multicast filtering
- Adaptive interrupt moderation
- Support for MSI-X interrupts
- Support for Auto-Sensing of Link level protocol
- NDK with SMB-Direct¹
- VMQ for Hypervisor

Ethernet Only:

- Hardware VLAN filtering
- Header Data Split
- RDMA over Converged Ethernet (RoCE MAC Based)
- RoCE IP Based
- RoCEv2 in ConnectX®-3 Pro²
- DSCP over IPv4
- NVGRE hardware off-load in ConnectX®-3 Pro
- Ports TX arbitration/Bandwidth allocation per port
- Enhanced Transmission Selection (ETS)
- SR-IOV Ethernet Hypervisor with Windows Server 2012 and above guests.

InfiniBand Only:

- SR-IOV over KVM Hypervisor

1. NDK can only be enabled if QoS is configured.

2. Default RoCE mode is RoCEv2, and the default RoCE UDP port is 0x12B7 so it is compatible with IANA Specification document.

2.1 Beta Features

Table 5 - Beta Features

Category	Description
WinVerbs	WinVerbs is currently at beta level.
ibdump	ibdump is currently at beta level.
IPoIB	IPv6 support of IPoIB in an SR-IOV guest OS over KVM is at beta level.
	IPoIB teaming support is at beta level and it is supported only on native machine (and not in HyperV or SR-IOV).

3 Known Issues

3.1 Generic Issues

Table 6 - Generic Issues

Reference Number	Issue	Workaround
-	Pinning all the physical memory (used by RDMA operations, such as register memory, pin user memory) on the machine, on Operating Systems prior to Windows Server 2012, may cause the machine to hang.	Avoid pinning the whole machine memory in those Operating Systems.
-	When running applications that use ND or libibmad (such as OpenSM) the system might get to an unstable state when trying to shutdown/restart/hibernate it.	Close all applications that use ND or libibmad before performing shutdown/restart/hibernate.
-	The maximum values returned by the <code>ib_query_ca()</code> function (for example: <code>max_qp</code> , <code>max_mr</code>) are the upper limits of the supported resources by the device. However, it may be impossible to use these maximum values, since the actual number of any resource that can be created may be limited by the machine configuration, the amount of host memory, user permissions, and the amount of resources already in use by other users/processes.	-
-	Running <code>Ntttcp</code> without the <code>"-a X"</code> flag ($X > 1$) in a NIC configured with 10GbE, may cause low bandwidth in TCP single stream.	Run <code>Ntttcp</code> with <code>"-a 8"</code> for best performance
-	Active links disappear after changing the cable connectivity from Ethernet to InfiniBand or vice versa.	Disable and enable the <code>mlx4_bus</code> interface from the Device Manager.
-	On ConnectX®-2/ConnectX®-3 Ethernet adapter cards, there is a mismatch between the GUID value returned by firmware management tools and that returned by fabric/driver utilities that read the GUID via device firmware (e.g., using <code>ibstat</code>). <code>Mlxburn/flint</code> return <code>0xffff</code> as GUID while the utilities return a value derived from the MAC address. For all driver/firmware/software purposes, the latter value should be used.	Please use the GUID value returned by the fabric/driver utilities (not <code>0xffff</code>).

Table 6 - Generic Issues

Reference Number	Issue	Workaround
-	The UI displays the network interface's state incorrectly even after disabling and re-enabling the "disconnected" network interfaces.	To see the correct state and link speed, perform one of the following: <ul style="list-style-type: none"> • Run <code>Get-netadapter Power-shell cmdlet</code> or • Right click on that interface from "Network Connections" and click on status
401792	When running in SR-IOV mode and Hyper-V, the same driver version should be used on both the Hypervisor and the virtual machine.	-
-	Working with user space RDMA resources (i.e. ND) in parallel with hardware reset may cause unexpected behavior.	-
-	The drivers' functionality is limited up to 128 cores.	-
-	According to the hardware architecture, Mellanox NIC devices are presented in the registry as virtual devices and not as physical devices.	Any customer programs or scripts that look into the NIC registry values should not assume it is a physical device.
698291	A BSOD can happen when the driver is enabled and disabled in loops and without any pause.	Disable the driver only after the Ethernet or IPoIB adapter is started. Starting any of these adapters can be checked by pinging them.

3.2 InfiniBand Issues

Table 7 - InfiniBand Issues

Reference Number	Issue	Workaround
464449	IPv6 traffic between Hyper-V hosts over IPoIB v-Switch may experience traffic loss.	-
-	InfiniBand application that was compiled with an SDK version earlier than WinOF v4.90 is not binary compatible.	Recompile InfiniBand application with WinOF v4.90 and above. ND application is backward compatible and older applications over ND do not have to be recompiled.
186806	WinOF 4.40 and above IPoIB driver is not IPv6 compatible with earlier driver versions, including Window 8 Inbox driver. If WinOF 4.50 IPoIB node receives an icmpv6 message from the legacy IPoIB node, the following event will appear in the event log: "IPoIB driver detected a possible incompatibility with Windows 8 inbox IPv6 support due to which there is no IPv6 connectivity".	To enable compatibility mode, add: <ul style="list-style-type: none"> Win8InboxCompatibility-Mode REG_SZ registry key with the value of 1 in the IPoIB interface registry. Note: All IPoIB nodes must use the same mode to enable IPv6 compatibility with earlier driver versions. We recommend upgrading all hosts to the new driver version from http://mellanox.com or use Windows Server 8 compatibility mode
-	Without separate ports for each stream, WinSock multiplexes every packet to every subscriber socket and then filters it out.	Use different UDP ports to get higher performance when using multicast packets.
-	The "Packets Received Discarded" and "Packets Received Errors" counter may display wrong results.	-
-	Hibernate and Sleep are not functional when user-space is using its resources.	-
-	IPoIB does not support: <ul style="list-style-type: none"> MAC address change QoS (packet priority) Connected Mode 	-

Table 7 - InfiniBand Issues

Reference Number	Issue	Workaround
-	In an interoperability environment that has both Linux and Windows OSs, the MTU value must be the same, otherwise packets larger than the minimum will not go through. The default MTU for Linux is 2K and for Windows is 4K.	-
-	If an application which uses InfiniBand runs while the driver is being restarted, a blue-screen or an NMI may occur.	Stop all InfiniBand applications including OpenSM upon driver restart.
330284	If OpenSM is up during driver restart on the same machine, it might stop working, and an error message that reads “Another OpenSM is running” will pop up.	To resume operation, stop OpenSM and restart the driver while OpenSM is down.
-	Sometimes during traffic, the latency of the IPoIB can get higher (this behavior is inconsistent).	Set the following registry in the IPoIB network interface: RecvIntModTime=0 Please note, this action increases the CPU utilization.
-	No communication between the physical interface and a VM that uses vSwitch created over virtual IPoIB (Pkey), and vice versa.	-
90224	Burning a Firmware image with a "mtu_cap" value other than the default causes the driver load to fail.	Do not change the "mtu_cap" value
383460	Calling <code>ib_query_cq()</code> on a CQ which was created with 1 entry indicates that there are 0 entries in the CQ.	-

Table 7 - InfiniBand Issues

Reference Number	Issue	Workaround
439805	IPoIB ports report the configured MTU instead of the effective MTU. These MTUs differ when the corresponding InfiniBand partition is configured with a smaller MTU than the port's configured MTU. In such case, there may be communication failures and/or CPU work overhead on the communicating nodes (even if the peer node is configured correctly).	Make sure the configured adapter MTU (the "Jumbo packet" property in the adapter's advanced settings) is consistent with the corresponding InfiniBand partition MTU. Specifically, the default IPoIB adapter MTU is 4KB and the default OpenSM partition MTU is 2KB. Thus, the default MTU of adapters and OpenSMs is inconsistent. Therefore, the MTU of either all adapters or all OpenSMs (which may be on network switches) on the InfiniBand subnet needs to be changed. Note that the adapter's MTU can be configured through PowerShell.
-	The displayed MAC address in the DHCP server of virtual IPoIB I/F may display a wrong data (FF00.....) although the I/F is still fully functional.	-
489130	DHCP messages that IPoIB send are not fully spec complaint. The spec specifies that the 'chaddr' field must be zeroed, but WinOF IPoIB does not guarantee it.	-

3.3 Ethernet Issues

Table 8 - Ethernet Issues

Reference Number	Issue	Workaround
-	Disabling the “Priority & VLAN tag” in the UI which VLANID is configured, may result in sending packets with the configured VLANID.	Remove the VLANID before disabling the “Priority & VLAN tag”.
206528/ 206945	WakeOnMagicPacket registry key is not added to the registry although WoL is supported by the driver and by the NIC.	-
-	High multicast drop rate on multicast storming.	Use “Multicast traffic” tuning option under the performance tab. For further information, please refer to section “Tunable Performance Parameters” in the User Manual.
-	When there is a stress in TCP connection establishments, some of those connections may fail.	Increase the Ring queue sizes: <ul style="list-style-type: none"> • ReceiveBuffers - controls the receive ring size • TransmitBuffers - controls the transmit ring size
326885	Wake on Lan (WoL) cannot be disabled on NICs which supports it.	-
687328	When SR-IOV is turned on and the “Jumbo Packet” field under the “Advanced” tab of the Ethernet driver's properties (in Device Manager) is set to 9602 or more, IP fragmentation does not work.	N/A

3.4 Quality of Service Issues

Table 9 - Quality of Service Issues

Reference Number	Issue	Workaround
-	Running Quality of Service (QoS) commands without the parameter “-PolicyStore ActiveStore” may cause machines to load without Quality of Service policy.	Store the QoS policy in the ActiveStore

3.5 RoCE NVGRE Issues

Table 10 - RoCE NVGRE Issues

Reference Number	Issue	Workaround
-	RoCE does not support: <ul style="list-style-type: none"> Traffic cannot go through the router. It works in the same subnet only Multicast traffic VLAN Layer 3 feature 	-
327531	In machines with heterogeneous NICs: a NIC which supports RoCE v2, and a NIC which does not support RoCE v2 the following issues might raise: <ul style="list-style-type: none"> ConnectX®-3 Pro is loaded with the transport type RoCE v2 ConnectX®-3 Pro is loaded with the transport type RoCE 	-
-	When NVGRE off-load is enabled, the GRE traffic cannot be accepted as a regular L2 traffic and requires special L2_TUNNELING steering rules. In such case the GRE packets are dropped or directed to promiscuous queue.	-
193619	Using different versions of RoCE in your cluster is not supported.	Use the same RoCE version in all the cluster in the Ethernet ports.
-	GRE traffic steering by inner MAC and by outer MAC simultaneously is currently not supported.	Configure steering or by inner MAC, or by outer MAC.
-	If VMQ set filter requests are accepted without a GRE flag (i.e. requested steering by outer MAC), the GRE packets do not reach that VMQ.	<p>Set the bus driver registry <code>key-AcceptGREbyOuterMAC_P1/2</code> per port to accept GRE traffic by outer MAC and to duplicate L2 steering rule to L2_TUNNELING rule for each VMQ set filter request without GRE flag.</p> <p>Note: For regular NVGRE Hyper-V scenarios the value of the registry key below must be set to <code>0:AcceptGREbyOuterMAC_P1/2</code></p>

3.6 Performance Issues

Table 11 - Performance Issues

Reference Number	Issue	Workaround
206696	When using WinOF 4.40 or above, low throughput will be seen on 40GbE adapters when QoS is enabled.	Disable QoS when it is not in use: <ul style="list-style-type: none"> Open a PowerShell prompt. Run: <code>Disable-NetAdapterQos -name <Interface Name></code> where <Interface Name> is e.g. "Ethernet 1"
-	Running performance benchmarks for a short period of time (< 1 sec) may provide bad latency in IPoIB and Ethernet.	Set "Rx Interrupt Moderation Profile" and "Tx Interrupt Moderation Profile", to "Low Latency" to avoid bad latency. Note: This may increase CPU utilization.
-	The driver uses optimal interrupt moderation values for 10 GbE SR-IOV VF scenario. For other scenarios, the optimal values yet to be found.	-

3.7 Hyper-V Issues

Table 12 - Hyper-V Issues

Reference Number	Issue	Workaround
-	When the vSwitch is detached from the ETH\IPoIB device while the driver is disabled, the device does not reacquire the static IP it had before the attachment of the vSwitch. When the vSwitch is attached to the ETH\IPoIB device while there is no link, it will not receive the device IP when the link is back up.	-
-	After attaching the vSwitch to the ETH\IPoIB device, changing the "Jumbo Packet" registry key on the ETH\IPoIB device does not affect the vSwitch configuration and vice versa. For example, if the user sets the "Jumbo Packet" on the ETH\IPoIB device to X, and the "Jumbo Packet" on the vSwitch to X+Y, X+Y sized packets will be passed from NDIS down to the driver and they will be dropped by it.	Reattach the vSwitch to sync with the value set in the ETH\IPoIB device.

Table 12 - Hyper-V Issues

Reference Number	Issue	Workaround
-	Unexpected behavior might occur when running in a virtualized environment and creating two virtual switches bound to each of the ports of a dual port NIC and then using both of them with two vNICs from the same VM.	-
-	In IPoIB when using long Multicast traffic from a Virtual Machine (VM) to an external host there might be up to 0.5% loss in 5% bursts	-
-	In Ethernet to achieve better iperf TCP performance between a Linux VM and a Windows VM on different hosts, when using MS MUX over the Ethernet driver, use the non VMQ mode for the VMs.	-
-	After disabling and enabling a port on a guest, a ping to it may be renewed after a minute. The ARP requests sent by Windows are less frequent as the time passes. If the guest port was down for a while, it could take time until Windows decides to send another ARP request to it.	-
-	When VMQ is enabled after reset, the driver loads all the VMQs that existed before the reset. However, it is not guaranteed that each VMQ will receive the same QP number it had before the reset. This can cause some delay as a result of resetting before connectivity is reestablished. The delay is caused by the time it takes for the ARP table to update after initiating the Gratuitous ARP.	-
-	The IPoIB non-VMQ mode is supported only when the VMQ is enabled according to the registry values.	To use the non-VMQ mode for a VM, change its settings as follow: <ul style="list-style-type: none"> • Press “Settings” on the VM • Go to Network Adapter -> Hardware Acceleration • Un-check the “Enable virtual machine queue”

3.8 SR-IOV Issues

Table 13 - SR-IOV Issues

Reference Number	Issue	Workaround
448196	Working with Windows guest OS over non-Windows SR-IOV hypervisor may result with higher latency compared to Windows Hypervisor.	-
-	When working with OEM adapter cards in SR-IOV mode, the VF is identified as a Mellanox adapter. There is no other effect on the behavior of the VF.	Verify that the FW INI contains the parameter <code>vf_subsystem_id</code> with the OEM encoding in the [HCA] section.
-	An SR-IOV Virtual Machine is loaded in InfiniBand mode when no OpenSM is available in the subnet. The following event appears in the event log: “detected a null port GUID for port <NUMBER>. A Virtual Function device may have a null port GUID if there is no OpenSM instance on its network. Please make sure the network has an active OpenSM and restart the driver.”	Start the OpenSM and restart the driver.
418268	For InfiniBand SR-IOV guest, OpenSM Assigned GUIDs are not supported and may cause unexpected behavior	Work only with Administrator assigned GUIDs.
408734	For InfiniBand SR-IOV guest, ND traffic does not work on an SR-IOV adapter when a Para-Virtualization adapter configured on the same virtual machine and the same subnet as IPoIB.	Disable the Para-Virtualization adapter.
-	In SR-IOV mode over Hyper-V, all ports are in pure Ethernet mode and RDMA is not supported on either port.	-
342421	In SR-IOV mode, enabling SR-IOV in the BIOS may change the interfaces names. If any VSwitch is bounded to an interface whose name was changed, there will not be any way to perform any operation on them.	Unbond all Vswitches from the NIC's interfaces before enabling SR-IOV in the BIOS.
427038	In SR-IOV, 40Gbps interfaces of vSwitch interface on HyperV, and the VMNIC are identified as 10Gbps. Despite the incorrect speed identification, they still achieve 40Gbps performance.	-

Table 13 - SR-IOV Issues

Reference Number	Issue	Workaround
-	Device name in the Device Manager does not show the correct OEM branding for SR-IOV Virtual Function devices without the updated firmware.	-

3.9 Utilities Issues

Table 14 - Utilities Issues

	Issue	Workaround
-	Pcap file issues for RoCE IP Based: <ul style="list-style-type: none"> • The packets 'capture-time' field is wrong (may be 0 or negative numbers). • For every captured packet, an additional 0 size frame is added. This appears in Wireshark as a 'malformed Ethernet packet'. 	-
-	Sniffing over IB ports is currently not supported	-

3.10 ND Issues

Table 15 - ND Issues

Reference Number	Issue	Workaround
432674	There is an interoperability problem between NDK and ND in RDMA operations during the write and read operations. However, the send operation resumes working. This happens since ND uses remote token in a network order (big endian) while NDK uses remote token in CPU order (little endian). Therefore, an inconsistency is caused between ND and NDK in RDMA operations.	An ND application that works with NDK using RDMA operations must handle this issue by changing the remote token to the appropriate byte order before sending it to NDK.
-	When working with the default NDv1 and NDv2 providers, the following error message might be displayed: 0xC0000120 NT_STATUS_CANCELLED This error does not affect any functionality and can be safely ignored.	-
-	Changing the default ND providers may cause random errors, such as: 0xC0000238 (NT_STATUS_ADDRESS_ALREADY_ASSOCIATED) on Connect() or with 0xC0000236 (NT_STATUS_CONNECTION_REFUSED) on Accept(). These errors can be safely ignored.	-
-	ND is not supported unless ND provider is installed.	Install the full WinOF package.