



# Mellanox FlexBoot for ConnectX<sup>®</sup>-3 /ConnectX<sup>®</sup>-3 Pro Release Notes

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Rev 3.4.746

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## Release Update History

*Table 1 - Release Update History*

Release	Date	Description
Rev 3.4.746	January 10, 2017	Initial release of this FlexBoot version for ConnectX-3/ConnectX-3 Pro adapter cards.

# 1 Overview

These are the release notes for "Mellanox FlexBoot", the software for Boot over Mellanox Technologies adapter devices supporting VPI. FlexBoot enables booting kernels or operating systems (OS) from remote servers in compliance with the PXE specification.

This package is based on the open source project iPXE available at <http://www.ipxe.org>.

## 1.1 Supported Adapter Cards and Firmware

*Table 2 - Supported Adapter Cards and Firmware*

Adapter Cards	Firmware Version
ConnectX-3 Pro	2.40.5030
ConnectX-3	2.40.5030

## 1.2 Supported Tools (MFT)

*Table 3 - Supported Tools (MFT)*

Tools	Version
MFT (Mellanox Firmware Tools)	4.5.0

## 1.3 Supported Operating Systems



All the Operating Systems below expect for RedHat 7.3 are supported in Ethernet protocol only. RedHat 7.3 is supported in both InfiniBand and Ethernet protocol.

*Table 4 - Supported Operating Systems*

OSs	Version
ESXi	5.5
ESXi	6.0
RHEL	6.4
RHEL	6.6
RHEL	7.0
RHEL	7.1
RHEL	7.2
RHEL	7.3
SLES	11.3
SLES	11.4
SLES	12

**Table 4 - Supported Operating Systems**

OSs	Version
SLES	12.1
Ubuntu	14.04
Ubuntu	15.4
Ubuntu	16.04
Windows Server	2012
Windows Server	2012 R2
Windows Server	2016

## 1.4 Tested Platforms

**Table 5 - Tested Platforms**

Server Vendor & Model	BIOS Manuf. & Version
DELL C6220	Dell Inc. 2.5.3
DELL C6220 II	Dell Inc. 2.4.2
DELL C7220N	2.1.11
DELL M630	Dell Inc. 1.4.4
DELL R720	Dell Inc. 2.5.2
DELL R730	Dell Inc. 1.5.4
HP BL460c Gen9	I36 v1.52
HP DL160 Gen9	U20
HP DL360 Gen9	P89 v1.50
HP DL380 Gen9	P89 v1.50
HP Moonshot Anders M710	HP systems – H03
HP ProLiant SE2140s Gen8 (MiniPooch)	P87
HP ProLiant XL230b Gen9	U13 v2.0
HP SE.02140s Gen8	P87
HP SE2160w Gen9	U16
HP SL230s Gen8	P75
HP XL230a Gen9	U13 v1.40
HP XL230b Gen9	U12 v1.30
KSE144BUS-1.61	KSE144BUS-1.61
IBM Flex system x240	B2E142AUS-1.50
IBM System x3650 M4	VVE146AUS-2.0
Quanta Winterfell	American Megatrends Inc. F03_3B07
Supermicro X9DRW	American Megatrends Inc. 3.0c

**Table 5 - Tested Platforms**

Server Vendor & Model	BIOS Manuf. & Version
ZT	American Megatrends Inc. 2.59



## 2 Changes and New Features in Rev 3.4.746

*Table 6 - Changes and New Features*

Category	Description
<b>SHELL CLI Commands</b>	<p>Added support for the following SHELL CLI commands:</p> <ul style="list-style-type: none"> <li>• Non-volatile option storage commands</li> <li>• SAN boot commands</li> <li>• Menu commands</li> <li>• Login command</li> <li>• Sync command</li> <li>• DNS resolving command</li> <li>• Time commands</li> <li>• Image crypto digest commands</li> <li>• Loopback testing commands</li> <li>• VLAN commands</li> <li>• PXE commands</li> <li>• Reboot command</li> </ul> <p>For further information, please refer to: <a href="http://ipxe.org/cmd">http://ipxe.org/cmd</a></p>
<b>Boot Menu</b>	Deprecated the option "rom enable" bit.
<b>iSCSI re-imaging</b>	Now the user can install a new image on an active iSCSI target
<b>Interrupts</b>	Enabled interrupt support.
<b>Banner time</b>	Set default banner timeout to 4.
<b>Link Status</b>	Removed link status line printout at boot time.
<b>UNDI network open wait time configuration</b>	When Network Boot Program (NBP) uses UNDI, the user can configure the awaiting time (up to 30 seconds) that is needed to raise a link.
<b>Upstream sync</b>	Synced the source with iPXE (upstream sync)

### 3 Known Issues

The following is a list of general limitations and known issues of the various components of this FlexBoot release.

**Table 7 - Known Issues**

Internal Ref.	Description
-	<p><b>Description:</b> Several BIOS vendors have limited boot-vector space and may not display FlexBoot in their boot menu.</p> <p><b>WA:</b> Disable the embedded NIC boot agent in BIOS</p> <p><b>Keywords:</b> BIOS</p>
-	<p><b>Description:</b> In several BIOS, the server might hang during FlexBoot booting due to wrong configuration of the PMM.</p> <p><b>WA:</b> N/A</p> <p><b>Keywords:</b> BIOS</p>
-	<p><b>Description:</b> Only EBX, ESI, DS, ES registers can be saved in Boot Entry.</p> <p><b>WA:</b> N/A</p> <p><b>Keywords:</b> BIOS</p>
-	<p><b>Description:</b> If a client returned control to the BIOS after a successful connection to an iSCSI target (but did not boot from it), then, unexpected behavior may occur.</p> <p><b>WA:</b> Follow the instructions described in the FlexBoot UM for the proper iSCSI boot/install</p> <p><b>Keywords:</b> BIOS</p>
673114/821899	<p><b>Description:</b> FlexBoot banner might not be shown in some BIOSes.</p> <p><b>WA:</b> N/A</p> <p><b>Keywords:</b> BIOS</p>
-	<p><b>Description:</b> Firmware 2.30.3000 and below does not support booting over Ethernet with VPI adapter cards when using QSFP cables (40GE, hybrid cables).</p> <p><b>WA:</b> N/A</p> <p><b>Keywords:</b> PXE Boot</p>
-	<p><b>Description:</b> Booting from WDS running on Windows 2008 R2 in InfiniBand mode, is currently not supported due to compatibility issues between FlexBoot 3.4.142 and Mellanox WinOF v4.40 and below.</p> <p><b>WA:</b> N/A</p> <p><b>Keywords:</b> PXE Boot</p>

**Table 7 - Known Issues**

Internal Ref.	Description
-	<b>Description:</b> In some cases, PXE boot will not work if the client was given only the file-name without next-server (siaddr).
	<b>WA:</b> N/A
	<b>Keywords:</b> PXE Boot
-	<b>Description:</b> PXE boot after iSCSI boot with static configuration is currently not supported.
	<b>WA:</b> N/A
	<b>Keywords:</b> PXE Boot
-	<b>Description:</b> Boot over VLAN with IB port is currently not supported.
	<b>WA:</b> N/A
	<b>Keywords:</b> PXE Boot
-	<b>Description:</b> Some faulty boot loaders do not close the underlying UNDI device which may result in unexpected behavior and possible system crash after the OS starts to load.
	<b>WA:</b> N/A
	<b>Keywords:</b> PXE Boot
-	<b>Description:</b> Chain-loading gPXE stack may result in undesirable behavior.
	<b>WA:</b> N/A
	<b>Keywords:</b> PXE Boot
647143	<b>Description:</b> Executing a partial boot loop while only downloading the NBP and selecting localboot is unsupported and may cause undefined behavior.
	<b>WA:</b> N/A
	<b>Keywords:</b> PXE Boot
670421	<b>Description:</b> Since only a single Boot Entry Vector (BEV) per PCI Physical Function is supported, disabling the first port causes the second port to disappear as well.
	<b>WA:</b> N/A
	<b>Keywords:</b> PXE Boot
-	<b>Description:</b> iSCSI over IB is not tested.
	<b>WA:</b> N/A
	<b>Keywords:</b> iSCSI

**Table 7 - Known Issues**

Internal Ref.	Description
-	<p><b>Description:</b> iSCSI over DCB is not supported.</p> <p><b>WA:</b> N/A</p> <p><b>Keywords:</b> iSCSI</p>
-	<p><b>Description:</b> FlexBoot supports only a single active iSCSI connection. Thus, when iSCSI-boot via Port 1 succeeds to connect but fails to boot, it will fail to connect via Port 2.</p> <p><b>WA:</b> N/A</p> <p><b>Keywords:</b> iSCSI</p>
-	<p><b>Description:</b> Boot retries is currently not functional when booting from iSCSI.</p> <p><b>WA:</b> N/A</p> <p><b>Keywords:</b> iSCSI</p>
655800	<p><b>Description:</b> IPv6 is not supported.</p> <p><b>WA:</b> N/A</p> <p><b>Keywords:</b> iSCSI</p>
-	<p><b>Description:</b> Boot menu is displayed as READ ONLY if the HCA card does not support flash configuration.</p> <p><b>WA:</b> N/A</p> <p><b>Keywords:</b> User Interface</p>
-	<p><b>Description:</b> FlexBoot Boot Menu will not be visible in serial output.</p> <p><b>WA:</b> N/A</p> <p><b>Keywords:</b> User Interface</p>
-	<p><b>Description:</b> Large Receive Offload (LRO) and iSCSI may not interoperate due to a bug in current Linux kernel distributions.</p> <p><b>WA:</b> Disable LRO in the IPoIB module when using iSCSI. See the Mellanox FlexBoot user's manual for details under the Diskless Machines chapter (InfiniBand Ports).</p> <p><b>Keywords:</b> Networking</p>
-	<p><b>Description:</b> FlexBoot supports only 2K MTU.</p> <p><b>WA:</b> N/A</p> <p><b>Keywords:</b> Networking</p>

**Table 7 - Known Issues**

Internal Ref.	Description
-	<b>Description:</b> 56Gb/s is currently not supported.
	<b>WA:</b> N/A
	<b>Keywords:</b> Link Speed
-	<b>Description:</b> Setting the number of Virtual Functions higher than the machine's memory capability may cause memory issues and system instability.
	<b>WA:</b> N/A
	<b>Keywords:</b> Virtualization
-	<b>Description:</b> SLAM, FTP, HTTPS and SRP are currently not supported.
	<b>WA:</b> N/A
	<b>Keywords:</b> Protocols
-	<b>Description:</b> Occasionally, using the Spanning Tree Protocol (STP) in the switches may cause packet drops and boot failure in the system.
	<b>WA:</b> Enable the "edgemode" if disabled on the switch, or use either portfast or edgemode functionality on the switch ports connected to the NICs.
	<b>Keywords:</b> Protocols
-	<b>Description:</b> FCoE, BCV are not supported.
	<b>WA:</b> N/A
	<b>Keywords:</b> Protocols
655800	<b>Description:</b> IPv6 can only run if a RADVD service is running in the network.
	<b>WA:</b> N/A
	<b>Keywords:</b> Protocols
-	<b>Description:</b> IPv6 over IB is not supported.
	<b>WA:</b> N/A
	<b>Keywords:</b> Protocols
655800	<b>Description:</b> IPv6 over WDS is not supported.
	<b>WA:</b> N/A
	<b>Keywords:</b> Protocols
655800	<b>Description:</b> Enabling IPv6 first and then IPv4 is currently not supported.
	<b>WA:</b> N/A
	<b>Keywords:</b> Protocols

**Table 7 - Known Issues**

Internal Ref.	Description
841198	<p><b>Description:</b> FlexBoot fails to boot when the following occurs:</p> <ul style="list-style-type: none"> <li>• Boot priority is set to iSCSI</li> <li>• The iSCSI TCP/IP parameters via DHCP is disabled</li> <li>• iSCSI boot fails or iSCSI boot to target configuration is set to disable</li> </ul> <p><b>WA:</b> N/A</p> <p><b>Keywords:</b> PXE boot, iSCSI</p>
843377/849223	<p><b>Description:</b> The physical MAC assigned via the boot menu is displayed as zeroes instead of the set MAC when ConnectX-4 VPI adapter card is configured as InfiniBand.</p> <p><b>WA:</b> N/A</p> <p><b>Keywords:</b> Physical MAC, Boot menu</p>
656001	<p><b>Description:</b> Booting from WDS and Windows DHCP server when only Option 66 is enabled (without Option 67), is not supported.</p> <p><b>WA:</b> N/A</p> <p><b>Keywords:</b> DHCP</p>
776057	<p><b>Description:</b> Citrix PVS boot is not supported.</p> <p><b>WA:</b> N/A</p> <p><b>Keywords:</b> Citrix PVS boot</p>
-	<p><b>Description:</b> Bootloaders that use interrupts will not function in ConnectX-5 on all ports, and in ConnectX-4 when booting form the second port.</p> <p><b>WA:</b> N/A</p> <p><b>Keywords:</b> Interrupts</p>

## 4 Bug Fixes History

*Table 8 - Fixed Bugs List*

Internal Ref.	Description
634794	<b>Description:</b> Enabled 'boot_pci_busdevfn' initialization when booting from UNDI loader.
	<b>Keywords:</b> UNDI loader
	<b>Discovered in Release:</b> 3.4.648
	<b>Fixed in Release:</b> 3.4.718
-	<b>Description:</b> Fixed HTTP boot over IPoIB
	<b>Keywords:</b> IPoIB
	<b>Discovered in Release:</b> 3.4.521
	<b>Fixed in Release:</b> 3.4.468
-	<b>Description:</b> Fixed BEV posting issue in hybrid BIOS
	<b>Keywords:</b> Hybrid BIOS
	<b>Discovered in Release:</b> 3.4.521
	<b>Fixed in Release:</b> 3.4.468
-	<b>Description:</b> Fixed transmission of IPoIB multicast packets as broadcasts
	<b>Keywords:</b> IPoIB multicast packets
	<b>Discovered in Release:</b> 3.4.521
	<b>Fixed in Release:</b> 3.4.468
-	<b>Description:</b> Fixed HTTP download over IPoIB
	<b>Keywords:</b> IPoIB
	<b>Discovered in Release:</b> 3.4.306
	<b>Fixed in Release:</b> 3.4.521
-	<b>Description:</b> Fixed completion with error handling process
	<b>Keywords:</b> Code completion
	<b>Discovered in Release:</b> 3.4.306
	<b>Fixed in Release:</b> 3.4.521

**Table 8 - Fixed Bugs List**

Internal Ref.	Description
-	<p><b>Description:</b> Fixed an issue for TLV with length 0</p> <p><b>Keywords:</b> TLV, Non-Volatile Configuration</p> <p><b>Discovered in Release:</b> 3.4.225</p> <p><b>Fixed in Release:</b> 3.4.306</p>
-	<p><b>Description:</b> Fixed an issue related to sync VLAN IRQ operation with trunk IRQ operation</p> <p><b>Keywords:</b> VLAN IRQ operation</p> <p><b>Discovered in Release:</b> 3.4.225</p> <p><b>Fixed in Release:</b> 3.4.306</p>
-	<p><b>Description:</b> Fixed an issue which enabled a netdevice (VLAN) to open/close twice</p> <p><b>Keywords:</b> VLAN</p> <p><b>Discovered in Release:</b> 3.4.225</p> <p><b>Fixed in Release:</b> 3.4.306</p>
-	<p><b>Description:</b> Fixed an issue which prevented the iSCSI initiator's name from being received from HII</p> <p><b>Keywords:</b> HII, iSCSI initiator</p> <p><b>Discovered in Release:</b> 3.4.225</p> <p><b>Fixed in Release:</b> 3.4.306</p>
-	<p><b>Description:</b> Fixed an issue related to dual port adapters; occasionally, booting from the second port resulted in TFTP download failure when the first port was already linked up with DHCP, and has received a TFTP address</p> <p><b>Keywords:</b> TFTP, DHCP, dual port adapters</p> <p><b>Discovered in Release:</b> 3.4.225</p> <p><b>Fixed in Release:</b> 3.4.306</p>
-	<p><b>Description:</b> Fixed an issue which caused PXE boot failure when using a filename if iSCSI rootpath is set.</p> <p><b>Keywords:</b> PXE boot</p> <p><b>Discovered in Release:</b> 3.4.225</p> <p><b>Fixed in Release:</b> 3.4.306</p>



**Table 8 - Fixed Bugs List**

Internal Ref.	Description
-	<b>Description:</b> Fixed an issue which prevented the device to PXE boot from the 2nd port if first port was already downloaded.
	<b>Keywords:</b> PXE boot
	<b>Discovered in Release:</b> 3.4.225
	<b>Fixed in Release:</b> 3.4.306
-	<b>Description:</b> Fixed compilation issue.
	<b>Keywords:</b> Code Compilation
	<b>Discovered in Release:</b> 3.4.225
	<b>Fixed in Release:</b> 3.4.306
-	<b>Description:</b> Fixed a broken VLAN issue.
	<b>Keywords:</b> VLAN
	<b>Discovered in Release:</b> 3.4.225
	<b>Fixed in Release:</b> 3.4.306
-	<b>Description:</b> Fixed a retry issue when the value is infinite.
	<b>Keywords:</b> General
	<b>Discovered in Release:</b> 3.4.225
	<b>Fixed in Release:</b> 3.4.306
-	<b>Description:</b> Fixed “Impossible to PXE boot from 2nd port if first port already downloaded.” issue.
	<b>Keywords:</b> PXE boot
	<b>Discovered in Release:</b> 3.4.000
	<b>Fixed in Release:</b> 3.4.225
-	<b>Description:</b> Fixed "no more network devices" issues.
	<b>Keywords:</b> network devices
	<b>Discovered in Release:</b> 3.0.000
	<b>Fixed in Release:</b> 3.4.000

## 5 Changes and New Feature History

**Table 9 - Changes and New Feature History**

Release	Changes
<b>Rev. 3.4.718</b>	
<b>IPv6</b>	<b>[Beta]</b> Added IPv6 support
<b>SHELL CLI</b>	Removed support for the following SHELL CLI commands: <ul style="list-style-type: none"> <li>• Non-volatile option storage commands</li> <li>• SAN boot commands</li> <li>• Menu commands</li> <li>• Login command</li> <li>• Sync command</li> <li>• DNS resolving command</li> <li>• Time commands</li> <li>• Image crypto digest commands</li> <li>• Loopback testing commands</li> <li>• VLAN commands</li> <li>• PXE commands</li> <li>• Reboot command</li> </ul> For further information, please refer to: <a href="http://ipxe.org/cmd">http://ipxe.org/cmd</a>
<b>Upstream sync</b>	Synced the source with iPXE (upstream sync)
<b>Rev. 3.4.648</b>	
<b>Image size</b>	Added support for .mrom images larger than 128kB
<b>Adapter Cards</b>	Added support for ConnectX-4 EN and ConnectX-4 Lx EN
<b>Flat real mode</b>	Moved to flat real mode when calling INT 1a,b101 to avoid BIOSes issues
<b>Spanning Tree Protocol</b>	Added support for detecting Spanning Tree Protocol non-forwarding ports (RSTP/MSTP)
<b>Upstream sync</b>	Synced the source with iPXE (upstream sync)
<b>Rev. 3.4.521</b>	
	<ul style="list-style-type: none"> <li>• Added iSCSI CHAP and mutual CHAP configuration</li> <li>• Added the GRH size when allocating receive buffer for IPoIB</li> <li>• Updated VLAN netdevice's settings with all the trunk's iSCSI required settings</li> <li>• Updated the port event handling process</li> <li>• Enabled console output in Debug mode</li> <li>• Disabled the serial output</li> <li>• Disabled the banner in BEV execution</li> <li>• Disabled function 0x04 (in int21) when serial console is disabled</li> <li>• Preserved COM port settings</li> </ul>
<b>Rev. 3.4.460</b>	

**Table 9 - Changes and New Feature History**

Release	Changes
	<ul style="list-style-type: none"> <li>• Boot Menu support: Added new FlexBoot GUI. The device can now be configured in the POST stage</li> <li>• Non-volatile memory read/write support</li> <li>• Configurable URI boot retry and delay between retries</li> <li>• Configurable iSCSI settings using DHCP/NVM</li> <li>• Added new interface in order to update the registered devices on the PXE stage</li> <li>• Enabled ConnectX Ethernet adapter cards family to work with interrupts</li> <li>• Enabled PXE to work in promiscuous VLAN mode (configurable through the INI)</li> <li>• Synced version with ipxe.org: Now the latest code in iPXE is used</li> <li>• Added boot priority capability: iSCSI vs PXE and fallback in case one fails</li> <li>• Updated the Proxy DHCP request method for non-existing option 54. ProxyDHCP request is sent to port 67 with broadcast IP address if the server identifier in option 54 is zero. Packets with source port different than BOOTPS_PORT and PXE_PORT are filtered by the PROXY</li> <li>• SHELL CLI is currently supported on ConnectX-3 and ConnectX-3 Pro adapter cards only</li> <li>• Both the GUID and the MAC are printed on the screen when the port link layer is set as InfiniBand</li> <li>• PROXYDHCP and PXEBS settings are saved under netdevice settings</li> <li>• rootpath/filename/nextserver are now fetched from the netdevice settings</li> <li>• The cached DHCP packet are received only if working with the same net device. When pxelinux.0 receives the cached DHCP packet from the UNDI API, it constructs a new (fake) packet for the current net device.             <ul style="list-style-type: none"> <li>• If the process is stopped and then restarted and booted from the next boot device which serves as the second port in the HCA, a new (fake) DHCP packet is not constructed. The previous packet which includes all the information of the first port (IP, MAC, Netmask, etc...) is used.</li> <li>• If an old (fake) DHCP packet is discovered, its chaddr is compared to the chaddr in the pxe_netdev, if not similar, a new (fake) DHCP packet is created.</li> </ul> </li> <li>• PXE shutdown is called if int22 with function 0x000C is called.</li> <li>• The server's IP address in DHCP server replies is now checked before checking the reply type. This will ignore NACK replies from servers which already were ignored by the client. In case of 2 DHCP servers in the same subnet, the client will eventually choose one of them, by sending the DHCP REQUEST with 'DHCP Server Identifier' (option 54) filled with the requested server's IP address.</li> <li>• Changed DHCP discover timeouts to comply with PXE spec</li> </ul>
	<p>Rev. 3.4.306</p>

**Table 9 - Changes and New Feature History**

Release	Changes
	<ul style="list-style-type: none"> <li>• Added validation script for the released ROMs</li> <li>• Added the option to always keep SAN hook to enable WIN install on iSCSI target</li> <li>• Added compilation flag around the flash readout</li> <li>• Added URI Boot retry. Default retries = 0</li> <li>• Added Unmap MPT command in teardown</li> <li>• Added support for HII iSCSI configuration</li> <li>• Added 64-bit PCI BAR support (Large bar)</li> <li>• Added the option added for running PXE with promiscuous VLAN</li> <li>• Re-added COMBOOT image support by default</li> <li>• Enabled pages-function handling in Connect-IB initialization stage to work according to the PRM</li> <li>• Applied additional patches from ipxe.org</li> <li>• Updated the window even if ACK does not acknowledge new data</li> <li>• Modified the error print to debug print</li> <li>• Modified the printed string when initializing devices</li> <li>• Modified the error print. Added additional information to make the output more user-friendly</li> <li>• Changed the size of the domain name array to 0xfd</li> <li>• Disabled the waiting period for link up on trunk-net-device when VLAN is enabled on port</li> <li>• Removed unsupported EQ event in Connect-IB</li> </ul>
<b>Rev. 3.4.225</b>	
	<ul style="list-style-type: none"> <li>• Added additional information to the error print output</li> <li>• Added compilation flag around the flash readout</li> <li>• Added URI Boot retry. Default retries = 0</li> <li>• Added Unmap MPT command in teardown</li> <li>• Added 64-bit PCI BAR support</li> <li>• Added an option for running PXE with promiscuous VLAN</li> <li>• Added support for HII iSCSI configuration</li> <li>• Enlarged the mailbox size to 4kb</li> <li>• Enlarged the number of WQE to 64 (from 4)</li> <li>• Enabled multiple DHCP offers to be received before proceeding to request state</li> <li>• Changed the size of the domain name array to 0xfd</li> <li>• Changed error print to debug print</li> <li>• Changed printed string when initializing devices</li> <li>• Kept the SAN connection permanently open to enable Windows install on iSCSI target even when the iSCSI target is empty</li> <li>• Readded COMBOOT image support by default</li> <li>• Prevented a netdevice (VLAN) from opening/closing twice</li> <li>• Removed unsupported EQ event in Connect-IB</li> <li>• Disabled the waiting time for link up on trunk net device when VLAN is enabled on a port</li> </ul>
<b>Rev. 3.4.142</b>	
	<ul style="list-style-type: none"> <li>• Enabled firmware to handle the link state with the Subnet Manager</li> <li>• Updated the DHCP class code to NONE</li> <li>• Added flash access capability for reading software-to-software configurations</li> <li>• Enabled DHCP validation of MAC address and XID for a unique tuple</li> <li>• Improved randomness algorithm for DHCP XID</li> </ul>
<b>Rev. 3.4.000</b>	

**Table 9 - Changes and New Feature History**

Release	Changes
	<ul style="list-style-type: none"> <li>Increased the number of the supported systems</li> <li>Added the ability to merge the PXE image with the UFI image</li> </ul>
	<b>Rev. 3.3.420</b>
	<ul style="list-style-type: none"> <li>Increased DHCP timeout</li> </ul>
	<b>Rev. 3.3.400</b>
	<ul style="list-style-type: none"> <li>Added ConnectX-3 support</li> <li>Increased the number of the supported systems</li> <li>All iPXE features are now part of the ROM image</li> <li>Support multiple functions (Flex10)</li> <li>Added support for Link Aggregation Control Protocol (LACP)</li> <li>Added ifenable/ifdisable network interface command</li> <li>Improved reliability</li> </ul>
	<b>Rev. 3.3.000</b>
	<ul style="list-style-type: none"> <li>Initial Release</li> </ul>