



Ubuntu 16.10 Linux Inbox Driver User Manual

Ubuntu 16.10

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Document Revision History

Table 1: Document Revision History

Revision	Date	Description
Ubuntu 16.10	December 1, 2016	Initial version of this document.

1 Firmware Burning

1. Check the device's PCI address.

```
lspci | grep Mellanox
```

Example:

```
00:06.0 Infiniband controller: Mellanox Technologies MT27520 Family  
[ConnectX-3 Pro]
```

2. Identify the adapter card's PSID.

```
# mstflint -d 81:00.0 q  
Image type:          FS2  
FW Version:          2.36.5000  
FW Release Date:     26.1.2016  
Rom Info:            type=PXE version=3.4.718 devid=4103  
Device ID:           4103  
Description:         Node          Port1          Port2  
Sys image  
GUIDs:              e41d2d0300b3f590 e41d2d0300b3f591 e41d2d0300b3f592  
e41d2d0300b3f593  
MACs:                e41d2db3f591      e41d2db3f592  
VSD:  
PSID:                MT_1090111019
```

3. Download the firmware BIN file from the Mellanox website that matches your card's PSID:

www.mellanox.com → [Support/Education](#) → [Support Downloader](#)

4. Burn the firmware.

```
# mstflint -d <lspci-device-id> -i <image-file> b
```

5. Reboot your machine after the firmware burning is completed.

6. Validate new firmware burned successfully:

```
# ethtool -i ens3  
driver: mlx4_en  
version: 2.2-1 (Feb 2014)  
firmware-version: 2.40.5000  
expansion-rom-version:  
bus-info: 0000:0a:00.0  
supports-statistics: yes  
supports-test: yes  
supports-EEPROM-access: no  
supports-register-dump: no  
supports-priv-flags: yes
```

2 Port Type Management

ConnectX®-3/ConnectX®-3 Pro/ConnectX®-4 ports can be individually configured to work as InfiniBand or Ethernet ports. By default both ConnectX®-4 VPI ports are initialized as InfiniBand ports. If you wish to change the port type use the `mstconfig` after the driver is loaded.

1. Install `mstflint` tools.

```
yum install mstflint
```

2. Check the device's PCI address.

```
lspci | grep Mellanox
```

Example:

```
00:06.0 Infiniband controller: Mellanox Technologies MT27520 Family
[ConnectX-3 Pro]
```

3. Use `mstconfig` to change the link type as desired IB – for InfiniBand, ETH – for Ethernet.

```
mstconfig -d <device pci> s LINK_TYPE_P1/2=<ETH|IB|VPI>
```

Example:

```
# mstconfig -d 00:06.0 s LINK_TYPE_P1=ETH

Device #1:
-----

Device type:      ConnectX3Pro
PCI device:      00:06.0

Configurations:
LINK_TYPE_P1      Current      New
                  IB (1)       ETH (2)

Apply new Configuration? ? (y/n) [n] : y
Applying... Done!
-I- Please reboot machine to load new configurations.
```

4. Reboot your machine.
5. Query the device's parameters to validate the new configuration.

```
# mstconfig -d 00:06.0 q

Device #1:
-----

Device type:      ConnectX3Pro
PCI device:      0a:00.0

Configurations:
SRIOV_EN          Current
                  True (1)
NUM_OF_VFS        8
LINK_TYPE_P1      ETH (2)
LINK_TYPE_P2      IB (1)
LOG_BAR_SIZE      3
BOOT_PKEY_P1      0
BOOT_PKEY_P2      0
BOOT_OPTION_ROM_EN_P1 True (1)
BOOT_VLAN_EN_P1   False (0)
BOOT_RETRY_CNT_P1 0
LEGACY_BOOT_PROTOCOL_P1 PXE (1)
BOOT_VLAN_P1      1
BOOT_OPTION_ROM_EN_P2 True (1)
```

```
BOOT_VLAN_EN_P2           False (0)
BOOT_RETRY_CNT_P2         0
LEGACY_BOOT_PROTOCOL_P2   PXE (1)
BOOT_VLAN_P2              1
IP_VER_P1                  IPv4 (0)
IP_VER_P2                  IPv4 (0)
```


3 Modules Loading and Unloading

Mellanox modules for ConnectX®-2/ConnectX®-3/ConnectX®-3 Pro are:

- mlx4_en, mlx4_core, mlx4_ib

Mellanox modules for ConnectX®-4/ConnectX®-4 Lx are:

- mlx5_core, mlx5_ib

In order to unload the driver, you need to first unload `mlx*_en/` `mlx*_ib` and then the `mlx*_core` module.

➤ *To load and unload the modules, use the commands below:*

- Loading the driver: `modprobe <module name>`

```
# modprobe mlx5_ib
```

- Unloading the driver: `modprobe -r <module name>`

```
# modprobe -r mlx5_ib
```

4 Important Packages and Their Installation

libibverbs: InfiniBand verbs library

<code>libibverbs-devel</code>	Development files for the libibverbs library
<code>libibverbs-utils</code>	Examples for the libibverbs library
<code>libibverbs</code>	A library for direct userspace use of RDMA (InfiniBand/iWARP)

librdmacm: RDMA cm library

<code>librdmacm-devel</code>	Development files for the librdmacm library
<code>librdmacm</code>	Userspace RDMA Connection Manager

libibcm: Userspace InfiniBand Connection Management API

<code>libibcm</code>	Userspace InfiniBand Connection Manager
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libibmad: Low layer InfiniBand diagnostic and management programs

<code>libibmad</code>	OpenFabrics Alliance InfiniBand MAD library
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libibumad: Low layer InfiniBand diagnostic and management programs

<code>libibumad-devel</code>	Development files for the libibumad library
<code>libibumad</code>	OpenFabrics Alliance InfiniBand umad (user MAD) library

libmlx4: Mellanox ConnectX InfiniBand HCA User space Driver

<code>libmlx4</code>	Mellanox ConnectX InfiniBand HCA Userspace Driver
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libmlx5: Mellanox Connect-IB InfiniBand HCA User space Driver

<code>libmlx5</code>	Mellanox Connect-IB InfiniBand HCA Userspace Driver
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opensm: InfiniBand Subnet Manager

<code>opensm-libs</code>	Libraries used by OpenSM and included utilities
<code>opensm</code>	OpenIB InfiniBand Subnet Manager and management utilities

ibutils: OpenIB Mellanox InfiniBand Diagnostic Tools

<code>ibutils-libs</code>	Shared libraries used by ibutils binaries
<code>ibutils</code>	OpenIB Mellanox InfiniBand Diagnostic Tools

infiniband-diags: OpenFabrics Alliance InfiniBand Diagnostic Tools

<code>infiniband-diags</code>	OpenFabrics Alliance InfiniBand Diagnostic Tools
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srptools: Tools for SRP/IB

<code>srptools</code>	Tools for using the InfiniBand SRP protocol devices
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perftest: IB Performance tests

<code>perftest</code>	IB Performance Tests
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mstflint: Mellanox Firmware Burning and Diagnostics Tools

<code>mstflint</code>	Mellanox firmware burning tool
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rdmacm-utils

<code>librdmacm-utils</code>	Examples for the librdmacm library
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ibverbs-utils

<code>libibverbs-utils</code>	Examples for the libibverbs library
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➤ *To install the packages above run:*

```
# apt-get install libibverbs1 librdrmacm1 libibcm1 libibmad5 libibumad3  
libmlx4-1 libmlx5-1 opensm ibutils infiniband-diags srptools perftest  
mstflint rdrmacm-utils ibverbs-utils -y
```

5 SR-IOV Configuration

5.1 Setting up SR-IOV

1. Install the mstflint tools.

```
# yum install mstflint
```

2. Check the device's PCI.

```
# lspci | grep Mellanox
```

Example:

```
00:06.0 Infiniband controller: Mellanox Technologies MT27520 Family
[ConnectX-3 Pro]
```

3. Check if SR-IOV is enabled in the firmware.

```
mstconfig -d <device pci> q
```

Example:

```
# mstconfig -d 00:06.0 q

Device #1:
-----

Device type:      ConnectX3Pro
PCI device:      00:06.0

Configurations:                                     Current
SRIOV_EN                                               True(1)
NUM_OF_VFS                                             8
LINK_TYPE_P1                                          ETH(2)
LINK_TYPE_P2                                          IB(1)
LOG_BAR_SIZE                                           3
BOOT_PKEY_P1                                           0
BOOT_PKEY_P2                                           0
BOOT_OPTION_ROM_EN_P1                                True(1)
BOOT_VLAN_EN_P1                                       False(0)
BOOT_RETRY_CNT_P1                                     0
LEGACY_BOOT_PROTOCOL_P1                              PXE(1)
BOOT_VLAN_P1                                           1
BOOT_OPTION_ROM_EN_P2                                True(1)
BOOT_VLAN_EN_P2                                       False(0)
BOOT_RETRY_CNT_P2                                     0
LEGACY_BOOT_PROTOCOL_P2                              PXE(1)
BOOT_VLAN_P2                                           1
IP_VER_P1                                             IPv4(0)
IP_VER_P2                                             IPv4(0)
```

4. Enable SR-IOV:

```
mstconfig -d <device pci> s SRIOV_EN=<False|True>
```

5. Configure the needed number of VFs

```
mstconfig -d <device pci> s NUM_OF_VFS=<NUM>
```



NOTE: This file will be generated only if IOMMU is set in the grub.conf file (by adding "intel_iommu=on" to /boot/grub/grub.conf file).

6. **[mlx4 devices only]** Create/Edit the file /etc/modprobe.d/mlx4.conf:

```
options mlx4_core num_vfs=[needed num of VFs] port_type_array=[1/2 for IB/ETH],[ 1/2 for IB/ETH]
```

Example:

```
options mlx4_core num_vfs=8 port_type_array=1,1
```

7. **[mlx5 devices only]** Write to the sysfs file the number of needed VFs.

```
echo [num_vfs]re > /sys/class/infiniband/mlx5_0/device/sriov_numvfs
```

Example:

```
# echo 8 > /sys/class/infiniband/mlx5_0/device/sriov_numvfs
```

8. Reboot the driver.
9. Load the driver and verify that the VFs were created.

```
# lspci | grep mellanox
```

Example:

```
00:06.0 Network controller: Mellanox Technologies MT27520 Family [ConnectX-3 Pro]
00:06.1 Network controller: Mellanox Technologies MT27500/MT27520 Family [ConnectX-3/ConnectX-3 Pro Virtual Function]
00:06.2 Network controller: Mellanox Technologies MT27500/MT27520 Family [ConnectX-3/ConnectX-3 Pro Virtual Function]
00:06.3 Network controller: Mellanox Technologies MT27500/MT27520 Family [ConnectX-3/ConnectX-3 Pro Virtual Function]
00:06.4 Network controller: Mellanox Technologies MT27500/MT27520 Family [ConnectX-3/ConnectX-3 Pro Virtual Function]
00:06.5 Network controller: Mellanox Technologies MT27500/MT27520 Family [ConnectX-3/ConnectX-3 Pro Virtual Function]
00:06.6 Network controller: Mellanox Technologies MT27500/MT27520 Family [ConnectX-3/ConnectX-3 Pro Virtual Function]
00:06.7 Network controller: Mellanox Technologies MT27500/MT27520 Family [ConnectX-3/ConnectX-3 Pro Virtual Function]
00:06.0 Network controller: Mellanox Technologies MT27500/MT27520 Family [ConnectX-3/ConnectX-3 Pro Virtual Function]
```

For further information, refer to section Setting Up SR-IOV MLNX_OFED User Manual.

6 Default RoCE Mode Setting

1. Mount the configs file.

```
# mount -t configfs none /sys/kernel/config
```

2. Create a directory for the mlx4/mlx5 device.

```
# mkdir -p /sys/kernel/config/rdma_cm/mlx4_0/
```

3. Validate what is the used RoCE mode in the default_roce_mode configs file.

```
# cat /sys/kernel/config/rdma_cm/mlx4_0/ports/1/default_roce_mode  
IB/RoCE v1
```

4. Change the default RoCE mode,

- For RoCE v1: IB/RoCE v1
- For RoCE v2: RoCE v2

```
# echo "RoCE v2" >  
/sys/kernel/config/rdma_cm/mlx4_0/ports/1/default_roce_mode  
# cat /sys/kernel/config/rdma_cm/mlx4_0/ports/1/default_roce_mode  
RoCE v2
```

```
# echo "IB/RoCE v1" >  
/sys/kernel/config/rdma_cm/mlx4_0/ports/1/default_roce_mode  
# cat /sys/kernel/config/rdma_cm/mlx4_0/ports/1/default_roce_mode  
IB/RoCE v1
```