Mellanox PXE Remote Installation User Guide

Rev 1.3

www.mellanox.com

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Mellanox Technologies, Inc.
350 Oakmead Parkway Suite 100
Sunnyvale, CA 94085
U.S.A.
www.mellanox.com
Tel: (408) 970-3400
Fax: (408) 970-3403

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About this Manual

The user guide describes the Mellanox support for OS installation via PXE server while using Mellanox VPI (Ethernet and InfiniBand) adapter cards. The user guide covers the recommended operations needed when using Ethernet and IPoIB under various OSes.

Mellanox supports the use of PXE server for both Ethernet and IPoIB based networks. The user guide details the requirements and limitations for using PXE in both networks.

Audience

Customers using Mellanox ConnectX® family adapters who need to install RedHat or SUSE distributions via PXE server.

Document Conventions

The following lists conventions used in this document.

NOTE: Identifies important information that contains helpful suggestions.

CAUTION: Alerts you to the risk of personal injury, system damage, or loss of data.

WARNING: Warns you that failure to take or avoid a specific action might result in personal injury or a malfunction of the hardware or software. Be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents before you work on any equipment.

Related Documentation

For additional information, see the following documents:

Document	Reference
MLNX_OFED_LINUX User Manual	http://mellanox.com/related-docs/prod_software/Mellanox%20OFED%20Linux%20User%20Manual%201_5_3-3_0_0.pdf
RedHat Installation Guide	http://docs.redhat.com/docs/en-US/Red_Hat_Enterprise_Linux/6/html/Installation_Guide/index.html http://docs.redhat.com/docs/en-US/Red_Hat_Enterprise_Linux/5/html/Installation_Guide/index.

	html
SUSE Installation Guide	http://drivers.suse.com/doc/kit_usage.html http://www.suse.com/documentation/sles11/book_sle_deployment/?page=/documentation/sles11/book_sle_deployment/data/book_sle_deployment.html http://www.suse.com/documentation/sles11/book_sle_deployment/?page=/documentation/sles11/book_sle_deployment/data/sec_deployment_remoteinst_boot.html#sec_deployment_remoteinst_boot_pxe

1 Overview of the PXE Boot Process

This section contains an overview of the PXE Boot process. The procedure below is used to boot over PXE:

1. The host BIOS reads the configuration from nonvolatile memory to determine the boot device order. In order to boot over IB/EN using PXE, the first entry for the boot order should be PXE by default.
2. The host BIOS sends a DHCP request to a PXE-enabled DHCP server to obtain initial configuration and boot parameters, IP address, and boot loader filename.
3. The host BIOS loads the boot loader from TFTP server and starts it.
4. Boot loader reads its configuration file from TFTP server and parses it to get boot options, Linux kernel, and **initrd** filenames.
5. The boot loader loads the Linux kernel and executes it, passing some options from the configuration file.
6. The Linux kernel performs the initialization procedures and loads the initrd image from the TFTP server as a temporary root file system before mounting the root file system.
7. The initrd image startup script starts and loads the EN driver and IB stack and IPoIB driver. This process changes the root file system to an NFS volume.
8. The Linux initialization continues with the NFS root file system, using the IPoIB or Ethernet interface until it is up and running.

2 Configuring Boot over PXE

This section describes how to perform PXE boot with the BoIB feature.

To perform a PXE boot with the BoIB feature (BoIB-PXE), you must perform the steps described in the following sections:

- Prerequisites
- Mellanox FlexBoot
- Configuring the DHCP Server
- Configuring the TFTP Server
- Configuring the Boot Loader

2.1 Prerequisites

2.1.1 Hardware

Prior of performing boot over PXE, please verify your system supports the following Mellanox Adapter Devices:

- ConnectX-2 / ConnectX-3 devices

2.1.2 Software

The boot server provides DHCP, TFTP, and NFS services. These services could be provided by a single node or separate network nodes connected either to the InfiniBand for IPoIB or Ethernet network. This document describes both cases.

- The latest version of MLNX_OFED_LINUX should be installed on the DHCP, TFTP and NFS servers in order to use IPoIB PXE installation
- MLNX_OFED_LINUX can be used for the Ethernet PXE installation as well.
- The latest version of mellanox-mlnx-en RPM should be installed on the DHCP, TFTP and NFS servers in order to use Ethernet PXE installation

2.1.3 Firmware

- ConnectX®-3 Firmware fw-ConnectX3 version 2.10.0000 and above
- ConnectX®-2 Firmware fw-ConnectX2 version 2.8.0600 and above

➢ ***To verify the HCA firmware version:***

```
# lspci -n | grep 15b3
01:00.0 0280: 15b3:1003

# mstflint -d 01:00.0 q
Image type: ConnectX
FW Version: 2.9.1000
Rom Info: type=PXE version=3.3.400 devid=26428 proto=VPI
Device ID: 26428
Description: Node Port1 Port2 Sys image
GUIDs: 0002c9030005cffa 0002c9030005cffb 0002c9030005cffc
0002c9030005cffd MACs: 0002c905cffa 0002c905cffb
Board ID: (MT_0DD0110009)
VSD:
PSID: MT_0DD0110009
```

2.2 Mellanox FlexBoot

2.2.1 Overview

Mellanox FlexBoot is a multiprotocol remote boot technology. FlexBoot supports remote Boot over InfiniBand (BoIB) and over Ethernet.

Using Mellanox Virtual Protocol Interconnect (VPI) technologies available in ConnectX® adapters, FlexBoot gives IT Managers' the choice to boot from a remote storage target (iSCSI target) or a LAN target (Ethernet Remote Boot Server) using a single ROM image on Mellanox ConnectX products.

FlexBoot is based on the open source project iPXE available at http://www.ipxe.org.

FlexBoot first initializes the adapter device, senses the port protocol – Ethernet or InfiniBand, and brings up the port. Then it connects to a DHCP server to obtain its assigned IP address and network parameters, and also to obtain the source location of the kernel/OS to boot from. The DHCP server instructs FlexBoot to access the kernel/OS through a TFTP server, an iSCSI target, or some other service.

For an InfiniBand port, Mellanox FlexBoot implements a network driver with IP over IB acting as the transport layer. IP over IB is part of the *Mellanox OFED for Linux* software package (see www.mellanox.com > Products > InfiniBand/VPI SW/Drivers).

The binary code is exported by the device as an expansion ROM image.

For detailed information on Mellanox FlexBoot see Mellanox FlexBoot User Manual

2.2.2 FlexBoot Operation

2.2.2.1 Steps to be Followed

1. Make sure that your client is connected to the server(s)
2. The FlexBoot image is already programmed on the adapter card – see Section Checking the HCA Firmware Version

If you purchased your adapter cards from a vendor other than Mellanox Technologies, DO NOT update the FlexBoot image. Please contact your vendor for FlexBoot image updates.

3. For InfiniBand ports only: Start the Subnet Manager.
4. The DHCP server should be configured and started - see Section Configuring the DHCP Server
5. Configure and start TFTP service as described in Section Configuring the TFTP Server
6. Boot the client machine and enter BIOS setup to configure “MLNX FlexBoot” to be the first on the boot device priority list.

On dual-port network adapters, the client first attempts to boot from Port 1. If this fails, it switches to boot from Port 2. Note also that the driver waits up to 90 seconds for each port to come up.

If MLNX FlexBoot/iPXE was selected through the BIOS setup, the server is booted from FlexBoot displaying FlexBoot attributes and sensing the used port protocol (Ethernet or InfiniBand). In case of an InfiniBand port, FlexBoot will also wait until the port configuration by the Subnet Manager is completed.

If the port protocol sensing fails, the port will be configured as an InfiniBand port.

After configuring the InfiniBand/Ethernet port, the server attempts to connect to the DHCP server to obtain an IP address and the source location of the kernel/OS to boot from.

2.2.2.2 BIOS Configuration

The expansion ROM image presents itself to the BIOS as a boot device. As a result, the BIOS will add to the list of boot devices "MLNX FlexBoot <ver>" for a ConnectX® device. The priority of this list can be modified through BIOS setup.

2.2.2.3 Starting Boot

On dual-port network adapters, the client first attempts to boot from Port 1. If this fails, it switches to boot from Port 2. Note also that the driver waits up to 90 seconds for each port to come up. If the port protocol sensing fails, the port will be configured as an InfiniBand port.

2.3 Configuring the DHCP Server

- ***To configure the DHCP server, perform the following steps:***

Step 1: Verify that the DHCP server supports PXE extensions.

The following example shows how to configure a Linux DHCP server.

i. Include a section describing the IP subnet of the booting host in the DHCP server configuration `/etc/dhcpd.conf` file. The minimum required information is as follows:

```
ddns-update-style none;

subnet 192.168.0.0 netmask 255.255.0.0 {
        next-server 192.168.1.1;
        filename "/pxelinux.0";

        range dynamic-bootp 192.168.1.100 192.168.1.200;
        always-broadcast on;
}
```

The important options are `next-server`, filename, and `always-broadcast`.

ii. Specify the TFTP server and filename of the initial boot loader in the `next-server` and filename options.

iii. Turn On the `always-broadcast` option. As part of the DHCP over IB specification, and as a requirement for the IB DHCP client to acquire the IP address, turning on the always-broadcast option causes the DHCP server to broadcast the DHCP OFFER reply, instead of unicast. IP addresses and ranges can be changed to match the target setup.

The following is an example of setting fixed IP address

IPoIB interface:

```
# Placing Client Identifiers in /etc/dhcpd.conf for IPoIB interface
# The following is an excerpt of a /etc/dhcpd.conf example file
showing the # format of representing a client machine for the DHCP
server.

host host1 {
fixed-address 192.168.1.50;
option dhcp-client-identifier =
ff:00:00:00:00:00:02:00:00:02:c9:00:00:02:c9:03:00:00:10:39;
}
```

Ethernet interface:

```
# The following is an excerpt of a /etc/dhcpd.conf example file
showing the # format of representing a client machine for the DHCP
server.

host host1 {
fixed-address 192.168.1.50;
hardware ethernet 00:00:00:12:34:56;
}
```

The broadcast option must be specified even if the DHCP server is on the Ethernet network.

Step 2: (Optional) Limit the DHCP server to specific IP interfaces by including the following statement in the `/etc/sysconfig/dhcpd` file:

```
DHCPDARGS=interface
```

In this example, the DHCP server is active only on the ib0 interface.

```
host1# /etc/sysconfig/dhcpd DHCPDARGS="ib0 lo0"
```

Step 3: Activate the DHCP server after the configuration files are prepared. To start the server, run the `service dhcpd start` command as root.

```
host1# # service dhcpd start
Starting dhcpd:
[  OK  ]
```

Step 4: Make the DHCP configuration consistent across reboots. Run the `chkconfig` command.

```
host1# chkconfig --list dhcpd
dhcpd           0:off   1:off   2:on    3:on    4:on    5:on
6:off
```

Step 5: Verify the DHCP server is running.

```
host1# ps -ef | grep dhcp
root      4069     1  0 12:06 ?        00:00:00 /usr/sbin/dhcpd ib0
lo0
```

2.4 Configuring the TFTP Server

This section describes how to configure the TFTP server.

The steps in this section assume you are using the Linux tftp-server package as a TFTP server.

In this procedure, the setup tftp service is handled by the xinetd daemon. The corresponding xinetd configuration file must be edited in order to enable the service. The steps below show a sample of the `/etc/xinetd.d/tftp` file:

Step 1: Enable TFTP service.

Step 2: Edit the xinetd.d file to enable TFTP service with root directory `/tftpboot`. All file paths must be relative to this directory.

```
service tftp
{
        socket_type             = dgram
        protocol                = udp
        wait                    = yes
        user                    = root
        server                  = /usr/sbin/in.tftpd
        server_args             = -s /tftpboot
        disable                 = no
        per_source              = 11
        cps                     = 100 2
        flags                   = IPv4
}
```

Step 3: Activate the configuration by restarting the inetd daemon.

```
# service xinetd restart
Stopping xinetd:                                           [  OK  ]
Starting xinetd:                                           [  OK  ]
```

The TFTP service is now active and the initial boot loader, Linux kernel, and initrd image can be placed under the TFTP root directory.

2.5 Configuring the Boot Loader

This section describes how to configure the boot loader. Only the PXE boot loader is used. The filename is `pxelinux.0`.

The boot loader used in this example is from syslinux distribution http://syslinux.zytor.com.

➢ ***To configure the boot loader, perform the following steps:***

Step 1: Copy the boot loader file to the `tftpboot` directory stated in the DHCP configuration file.

The boot loader expects to find its configuration file on the TFTP server under the `pxelinux.cfg` directory.

Step 2: Create the `/tftpboot/pxelinux.cfg` directory and create a configuration file.

The boot loader configuration could be for a specific host, for a group of hosts, or for all hosts.

To create individual configuration files, the filename must match the corresponding host IP address as a 32-bit hex number. For example, for a host with IP address 192.168.1.1, the filename would have to be C0A80101.

To create a single configuration file for use by all hosts (as in the example below), the filename must be default.

The following example shows how to configure the boot loader to load the Linux kernel with the filename linux and initrd image filename `initrd.img` from the `/tftpboot` directory on the TFTP server.

```
default rhel6.2
prompt 1
timeout 100
```

```
label rhel6.2
  kernel linux
  append initrd=initrd.img
  append initrd=initrd.img
ks=nfs:192.168.1.1:/tftpboot/rhel6.2/ks.cfg ksdevice=<ksdevice>
```

To install RedHat Distributions using Mellanox ethernet driver driver update disk (DUD) is required (See Appendix RedHat 5.x Installation using DUD (on page 13) and RedHat 6.x Installation using DUD (on page 15)).

To install RedHat or SUSE Distributions using IPoIB network interface updated initrd image is required. It is available on mellanox.com. (http://mellanox.com/content/pages.php?pg=products_dyn&product_family=34&menu_section=34#tab-three)

Appendix A: RedHat 5.x Installation using DUD

A.1 Preparing an Initial RAM Disk Update for RHEL5.7 and RHEL5.8

➢ ***To make the driver update available on your PXE server:***

Step 1: Place the driver update image file on your PXE server.

Usually, it is done by downloading the driver to the PXE server from a location on the Internet specified by Red Hat or your hardware vendor. Names of driver update image files end in .iso.

Step 2: Copy the driver update image file into the `/tmp/initrd_update` directory.

Step 3: Rename the driver update image file to `dd.img`.

Step 4: From the command line, go to the `/tmp/initrd_update` directory, type the following command, and press Enter:

```
$ find . | cpio --quiet -c -o | gzip -9 >/tmp/initrd_update.img
```

Step 5: Download the image from the Mellanox site and copy the file `/tmp/initrd_update.img` into the target directory that will be used for installation.

This directory is placed under the `/tftpboot/pxelinux/` directory. For example, `/tftpboot/pxelinux/rh5u7/` might hold the PXE target for Red Hat Enterprise Linux 5.7 Server.

Step 6: Edit the `/tftpboot/pxelinux/pxelinux.cfg/`default file to include an entry that includes the initial RAM disk update that you just created, in the following format:

```
LABEL RH5.8
        kernel rhel5u8/vmlinuz
        append initrd=rhel5u8/initrd.img,rhel5u8/dd.img
        append initrd=initrd.img
ks=nfs:192.168.1.1:/tftpboot/rhel6.2/ks.cfg ksdevice=<ksdevice>
```

*Where ksdevice is ethX for Ethernet or ibX for IPoIB

A.2 Preparing an initial RAM Disk Update from a Driver Update Image File

The following is ***an example*** of preparing an initial RAM disk update from a driver update image file for RHEL5.7.

In this example, `dd-mellanox-mlnx_en-1.5.7.2.rhel5.7x64.iso.gz` is a driver update image file that was downloaded from the Internet to a directory on your PXE server. The target that you want to PXE boot from is located in `/tftpboot/pxelinux/rh5u7`

Step 1: Perform **Steps 1-5** as described in section Preparing an Initial RAM Disk Update for RHEL5.7 and RHEL5.8. Run:

```
$ gzip -d dd-mellanox-mlnx_en-1.5.7.2.rhel5.7x64.iso.gz
```

```
$ cp dd-mellanox-mlnx_en-1.5.7.2.rhel5.7x64.iso
/tmp/initrd_update/dd.img
$ cd /tmp/initrd_update
$ find . | cpio --quiet -c -o | gzip -9 >/tmp/initrd_update.img
$ cp /tmp/initrd_update.img /tftpboot/pxelinux/rh5u7/dd.img
```

Step 2: Edit the `/tftpboot/pxelinux/pxelinux.cfg/`default file and include the following entry:

```
default rhel5.7
prompt 1
timeout 100

label rhel5.7
      kernel linux
      append initrd=initrd.img
      append initrd=rhel5.7/initrd.img,rhel5.7/dd.img
ks=nfs:192.168.1.1:/tftpboot/rhel5.7/ks.cfg ksdevice=<ksdevice>
```

**Where ksdevice is ethX for Ethernet or ibX for IPoIB

Please refer to http://docs.redhat.com/docs/en-US/Red_Hat_Enterprise_Linux/5-Beta/html/Installation_Guide/sect-Preparing_an_initial_RAM_disk_update-x86.html for more information.

- ***To get an updated Ethernet driver installed after RedHat installation, add the following lines to the kickstart file:***

```
%post

yum localinstall -y /root/DD-0/*mellanox*.rpm
sed -i -e 's/^blacklist mlx4_core/#blacklist mlx4_core/' -e 's/^blacklist
mlx4_en/#blacklist mlx4_en/' /etc/modprobe.d/mlx4.conf
```

Appendix B: RedHat 6.x Installation using DUD

B.1 Preparing an Initial RAM Disk Update for RHEL6.1 and RHEL6.2

➢ ***To make the driver update available on your PXE server:***

Step 1: Place the driver update image file on your PXE server.

Usually, it is done by downloading the driver to the PXE server from a location on the Internet specified by Red Hat or your hardware vendor. Names of driver update image files end in .iso.

NOTE: For RHEL6.x, initrd.img should be updated as well

Step 2: Copy the driver update image file into the `/tmp/initrd_update` directory.

Step 3: Rename the driver update image file to `dd.img`.

Step 4: From the command line, go to the `/tmp/initrd_update` directory, type the following command, and press Enter:

```
$ find . | cpio --quiet -o -H newc | gzip -9 >/tmp/initrd_update.img
```

Step 5: Copy the file `/tmp/initrd_update.img` into the target directory that will be used for installation.

This directory is placed under the `/tftpboot/pxelinux/` directory. For example, `/tftpboot/pxelinux/r6.2/` might hold the PXE target for Red Hat Enterprise Linux 6.2 Server.

Step 6: Download the image from the Mellanox site and copy the file `initrd-rhel6.x.img` into the target directory that will be used for installation.

This directory is placed under the `/tftpboot/pxelinux/` directory. For example, `/tftpboot/pxelinux/r6.2/` might hold the PXE target for Red Hat Enterprise Linux 6.2 Server.

Step 7: Edit the `/tftpboot/pxelinux/pxelinux.cfg/`default file to include an entry that includes the initial RAM disk update that you just created, in the following format:

```
LABEL RH6.1
      kernel vmlinuz
      append initrd=initrd.img, dd.img
ks=nfs:192.168.1.1:/export/ksadd.cfg ksdevice=<ksdevice>**
```

**Where ksdevice is ethX for Ethernet or ibX for IPoIB

The target parameter is the target used for installation.

B.2 Preparing an Initial RAM Disk Update From a Driver Update Image File

The following is ***an example*** of preparing an initial RAM disk update from a driver update image file for RHEL6.2.

In this example, `dd-mellanox-mlnx_en-1.5.7.2.rhel6.2x64.iso.gz` is a driver update image file was downloaded from the Internet to a directory on your PXE server. The target that you want to PXE boot from is located in `/tftpboot/pxelinux/rh6.2`

Step 1: Perform **Steps 1-7** as described in section Preparing an Initial RAM Disk Update for RHEL6.1 and RHEL6.2.

Run:

```
$ gzip -d dd-mellanox-mlnx_en-1.5.7.2.rhel6.2x64.iso.gz
$ cp dd-mellanox-mlnx_en-1.5.7.2.rhel6.2x64.iso
/tmp/initrd_update/dd.img
$ cd /tmp/initrd_update
$ find . | cpio --quiet -o -H newc | gzip -9 >/tmp/initrd_update.img
$ cp initrd-rhel6.2.img /tftpboot/pxelinux/rh6.2/initrd.img
$ cp /tmp/initrd_update.img /tftpboot/pxelinux/rh6.2/dd.img
```

Step 2: Edit the `/tftpboot/pxelinux/pxelinux.cfg/`default file and include the following entry:

```
LABEL RH6.2
      kernel vmlinuz
      append initrd=initrd.img, dd.img
ks=nfs:192.168.1.1:/export/ks.cfg ksdevice=<ksdevice>
```

**Where ksdevice is ethX for Ethernet or ibX for IPoIB

Please refer to http://docs.redhat.com/docs/en-US/Red_Hat_Enterprise_Linux/6/html/Installation_Guide/sect-Preparing_an_initial_RAM_disk_update-x86.html for more information.

- ***To get an updated Ethernet driver installed after RedHat installation, add the following lines to the kickstart file:***

```
%post

yum localinstall -y /root/DD-0/*mellanox*.rpm
sed -i -e 's/^blacklist mlx4_core/#blacklist mlx4_core/' -e 's/^blacklist
mlx4_en/#blacklist mlx4_en/' /etc/modprobe.d/mlx4.conf
```

Appendix C: SLES Installation using kISO

A kISO is an ISO image containing an updated kernel for SUSE® Linux Enterprise installation to be used when installation fails on specific hardware configurations because the kernel from the standard installation media panics or hangs.

➢ ***To install SUSE® Linux Enterprise products using a kISO:***

Step 1: Boot using the kISO image and the normal boot/installation screen will appear.

Step 2: Configure installation options as usual and continue with the install.

After the kernel and initial RAM disk from the KISO are loaded, the install process will prompt for disk 1 of the SUSE® Linux Enterprise media to be inserted.

Step 3: Insert the proper media and select "OK" to continue.

At this point the install will continue as normal.

After package installation and before the first boot of the newly installed OS, the standard installed kernel will be updated to the version provided by the kISO.

For the PXE installation, initrd image should be extracted from the kISO and placed under `/tftpboot`.

C.1 SLES11 SP1 Installation using kISO

The following is an example of preparing an initial RAM disk update from a kISO image file for SLES11 SP1.

In this example, `sles11-sp1-x86_64-mlnx_en-1.5.7.iso` is a kISO image file was

downloaded from the Internet to a directory on your PXE server. The target that you want to PXE boot from is located in `/tftpboot/SLES11SP1`

Step 1: Extract the initrd and kernel images from the kISO.

```
mount -o loop /tmp/sles11-sp1-x86_64-mlnx_en-1.5.7.iso /mnt
cp /mnt/boot/x86_64/loader/initrd
/tftpboot/SLES11SP1/x86_64/boot/x86_64/loader/initrd
cp /mnt/boot/x86_64/loader/linux
/tftpboot/SLES11SP1/x86_64/boot/x86_64/loader/linux
```

Step 2: Edit the /tftpboot/pxelinux/pxelinux.cfg/default file to include an entry that includes the initial RAM disk , in the following format:

```
DEFAULT SLES11SP1
prompt 1
timeout 1400 # 140 sec
LABEL SLES11SP1
      kernel SLES11SP1/x86_64/boot/x86_64/loader/linux
      append initrd=SLES11SP1/x86_64/boot/x86_64/loader/initrd
install=nfs://192.168.1.1/distros/SLES11SP1/x86_64/?device=<ksdevice
> autoyast=nfs://192.168.1.1/distros/SLES11SP1/x86_64/ks.xml
```

**Where ksdevice is ethX for Ethernet or ibX for IPoIB

Appendix D: ks RedHat 5.8.cfg Example File

```
#platform=x86, AMD64, or Intel EM64T

#System  language
lang en_US.UTF-8
#Language modules to install
langsupport en_US.UTF-8
#System keyboard
keyboard us
#System mouse
mouse
#Sytem timezone
timezone Alaska
#Root password
rootpw --iscrypted $1$CYWny2Ic$D4.iysW/N5Wsj7S9gzJSN0
#Reboot after installation
reboot
#Use text mode install
text
#Install OS instead of upgrade
install
#Use NFS installation Media
nfs --server=192.168.1.50  --dir=/mnt/someiso/
#System bootloader configuration
bootloader --location=none
###
key --skip
###
#Clear the Master Boot Record
#zerombr yes
#Disk partitioning information
part / --fstype ext3 --size 14000
#System authorization infomation
auth  --useshadow  --enablemd5  --enablenis --nisdomain nisdomain.com --
nisserver 192.168.20.20
#auth  --enableshadow --enablemd5
#Network information
network --bootproto=dhcp
#Firewall configuration
firewall --disabled
#SElinux configuration
selinux --disabled
#Do not configure XWindows
skipx
#Package install information
%packages --resolvedeps
@ Base
@ editors
@ network-server
@ development-tools
@ x-software-development
@ admin-tools
@ system-tools
%post
yum localinstall -y /root/DD-0/*mellanox*.rpm
sed -i -e 's/^blacklist mlx4 core/#blacklist mlx4 core/' -e 's/^blacklist
mlx4_en/#blacklist mlx4_en' /etc/modprobe.d/mlx4.conf
```

Appendix E: ks RedHat 6.1.cfg Example File

```
#platform=x86, AMD64, or Intel EM64T

#System  language
lang en_US.UTF-8
#Language modules to install
#langsupport en_US.UTF-8
#System keyboard
keyboard us
#System mouse
#mouse
#Sytem timezone
timezone Alaska
#Root password
rootpw --iscrypted $1$CYWny2Ic$D4.iysW/N5Wsj7S9gzJSN0
#Reboot after installation
reboot
#Use text mode install
text
#Install OS instead of upgrade
install
#Use NFS installation Media
nfs --server=192.168.1.50  --dir=/mnt/someiso
#System bootloader configuration
bootloader --location=none
###
key --skip
###
#Clear the Master Boot Record
#zerombr yes
#Disk partitioning information
part / --fstype ext3 --size 14000
#System authorization infomation
auth  --useshadow  --enablemd5  --enablenis --nisdomain nisdomain.com --
nisserver 192.168.20.20
#Network information
network --bootproto=dhcp
#Firewall configuration
firewall --disabled
#SElinux configuration
selinux --disabled
#Do not configure XWindows
skipx
#Package install information
%packages everything
@Additional Development
#@Backup Client
#@Backup Server
@Base
#@CIFS file server
@Compatibility libraries
@Console internet tools
@Debugging Tools
@Desktop
@Desktop Debugging and Performance Tools
@Desktop Platform
#@Desktop Platform Development
@Development tools
#@Directory Client
#@Directory Server
#@E-mail server
@Eclipse
@Emacs
@FCoE Storage Client
@FTP server
```

```
@Fonts
@General Purpose Desktop
@Graphical Administration Tools
@Graphics Creation Tools
@Hardware monitoring utilities
@Input Methods
@Internet Browser
@Java Platform
@KDE Desktop
@Large Systems Performance
@Legacy UNIX compatibility
@Legacy X Window System compatibility
#@Mainframe Access
@MySQL Database client
@MySQL Database server
@NFS file server
@Network Infrastructure Server
@Network Storage Server
@Network file system client
@Networking Tools
@Performance Tools
#@PostgreSQL Database client
#@PostgreSQL Database server
#@Print Server
#@Printing client
@Remote Desktop Clients
@Scientific support
@Security Tools
@Server Platform
@Server Platform Development
@Smart card support
@Storage Availability Tools
@System administration tools
@TeX support
@Technical Writing
@TurboGears application framework
@Web Server
@Web Servlet Engine
@Web-Based Enterprise Management
@X Window System
@iSCSI Storage Client
@System Management
sendmail
nfs-utils-lib
nfs4-acl-tools
nfs-utils
autofs
ypbind
rsh
rsh-server
%post
yum localinstall -y /root/DD-0/*mellanox*.rpm
sed -i -e 's/^blacklist mlx4 core/#blacklist mlx4 core/' -e 's/^blacklist
mlx4_en/#blacklist mlx4_en' /etc/modprobe.d/mlx4.conf
```