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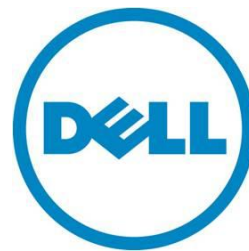
# Migrating from Conventional Device Names to Consistent Device Names for Ethernet Devices in Red Hat<sup>®</sup> Enterprise Linux<sup>®</sup> v6

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*A Dell White Paper*

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## Introduction

Network device names in Red Hat Enterprise Linux for Ethernet devices have traditionally followed the *ethN* naming scheme. In large deployments, the number of devices with *eth* names and their mapping to physical ports can be overwhelming and inconsistent with hardware peripheral's locations and changes.

Dell, in collaboration with the Linux community and major distribution vendors introduced a more consistent (predictable) and meaningful naming scheme for Ethernet devices. The new name indicates the physical location of the Ethernet port in the system. For details on how this works, see the white paper, [Consistent Network Device Naming in Linux](#).

This white paper assists you with migrating network device names of existing systems from the traditional *ethN* naming to the new consistent *emX* naming scheme. The document covers both the migration and the upgrade cases.

## Distributions

While most of the procedures described here can be applied to any Fedora™-like distribution, the focus is on the Red Hat Enterprise Linux v6 distribution. The document guides existing RHEL 6.X installations that use the *ethN* names to upgrade/migrate to the new naming scheme making sure network configurations and policies are not lost.

## Pre-requisites

|                   |   |
|-------------------|---|
| Hardware/Firmware | Consistent device naming is dependent on the system's firmware providing the physical NIC port's location details to the operating system. Dell™ PowerEdge™ 11 <sup>th</sup> Generation servers and later ship with a system BIOS that provides the information used by the operating system to rename the interfaces. Make sure that the Dell PowerEdge server on which you perform the migration/upgrade actions contains support for this feature. |
| Software          | Red Hat Enterprise Linux version 6.1 is the minimum version that contains support for the new naming scheme. More specifically, the primary package requirement is biosdevname-0.3.6-11.el6 or later.   |

In this document, we describe migrating/upgrading from a *Source* version of the distribution, which can be any Red Hat Enterprise Linux version 6.X using the traditional *eth* naming scheme to a destination using the *emX* naming scheme. The destination version of the distribution that is being migrated to must be Red Hat Enterprise Linux 6.1 or later.

**Note:** *When upgrading from any update of Red Hat Enterprise Linux 6 to a newer one, the Ethernet device names are not affected and are the same device names as the ones before the upgrade. When performing a fresh install of Red Hat Enterprise Linux 6.1 or later, the new naming scheme is used by default provided the hardware/firmware pre-requisites are met.*

## Preparation

On the source operating system: The source has network devices with the *ethN* names.

### Backing up data and operating system configuration from your system:

Refer to Red Hat documentation on how to back up your data and system configuration.

Backup existing network device configuration along with udev rules.

```
# export BACKUP_DIR=$HOME/eth-backup; mkdir $BACKUP_DIR
# cp /etc/udev/rules.d/70-persistent-net.rules $BACKUP_DIR/70-persistent-net.rules
```

If you have the *system-config-network-tui* package installed, the network configuration information is backed up like this:

```
# system-config-network-cmd -e > $BACKUP_DIR/old_eth_config
```

If you do not have *system-config-network-tui* installed, simply copy the network configuration information:

```
# cp -a /etc/sysconfig/network-scripts/ifcfg-e* $BACKUP_DIR
```

### Creating mapping between the ethN and the emX names:

List out the mapping of the current name (ethN) and the new name (emX). This mapping requires the *biosdevname* executable.

1. Make sure that all the network interface that you want to migrate are active (up) as shown by using this command: `# ip link show`
2. Install *biosdevname* from the Red Hat Network (RHN) if your system is subscribed to RHN or from the Red Hat Enterprise Linux version 6.1 DVD.

- a. If the system is subscribed to RHN:

```
# yum install biosdevname
```

- b. From the Red Hat Enterprise Linux version 6.1 DVD:

```
# yum localinstall <path_to_dvd_mount>/Packages/biosdevname-<version>.rpm
```

3. Get the mapping from the current ethN names to the new emX names. Preserve this information for use post upgrade/migration. There is a sample script that you can use, see the [Sample Scripts](#) section.

```
# biosdevname -d | awk '/BIOS device/ {new=$3} /Kernel name/ {old=$3} /Assigned MAC/ {mac=$4; print old" "new" "mac}'
```

Here is a sample output from above, where the first column is the current kernel assigned device name for the interface, column two is the firmware suggested name, and the third column is the assigned MAC address of the device. Save this output for use after you upgrade the system.

```
eth0 em1 84:2B:2B:4C:63:91
```

```
eth1 em2 84:2B:2B:4C:63:92
```

This mapping helps with the subsequent sections where you apply the new mapping to the network configuration.

### Migrating the configuration from an old naming to the new naming scheme

A system installed with Red Hat Enterprise Linux version 6.1 or later by default uses the new naming scheme on supported Dell systems. With the help of the map created above, make sure that configuration settings are as required.

1. Install the *destination* operating system making sure consistent device naming is enabled (it is enabled by default on all supported Dell systems).
2. Using the map created from above:
  - a. Make sure that all the `ifcfg-emX` and `ifcfg-pXpY` files in `/etc/sysconfig/network-scripts` contain the configuration as required by your deployment.
  - b. If your firewall rules contained device specific rules, edit the firewall configuration to reflect the same, but using the newer names instead of the `ethN` names.
  - c. Update other files that contain references to the older `ethN` names.
3. Reboot and make sure that network devices, services and firewall rules start up as expected.

### Upgrade

In this section, we demonstrate how the configuration on a system upgraded to Red Hat Enterprise Linux version 6.1 (or later) is configured to use the new naming scheme. The operating system's upgrade program preserves older `ethN` names and requires that we change all references to the older names with the newer names.

1. Upgrade to the destination operating system using the Red Hat documentation. If your previous install used the traditional naming scheme, post upgrade, the system continues to use the traditional naming (or same) scheme.
2. Find all configuration files that might use the (traditional `ethN`) naming scheme. For example:

```
# find /etc -type f -exec grep -l eth[0-9] '{}' \;
```
3. With the help of the map created above, rename each occurrence of the `ethN` name with the corresponding `emX` or `pXpY` name in all configuration files and/or file names. For network device configuration, do this:

Manually, or

with the `system-config-network-cmd` utility.

There is a sample script that you can use, see the [Sample Scripts](#) section.

## Manual network device reconfiguration

For this example, the current system has `/etc/sysconfig/network-scripts/ifcfg-eth3`. Consult the map generated earlier to find the corresponding new name for the device. Assume that this is `em4`. The configuration file should now be `ifcfg-em4`.

To rename the network configuration for `eth3`:

1. Rename the `ifcfg-eth3` to `ifcfg-em4`.

```
# cd /etc/sysconfig/network-scripts/  
  
# mv ifcfg-eth3 ifcfg-em4
```

Edit `ifcfg-em4` and change `DEVICE=` from `eth3` to `em4` as reported by the map.

Make sure that the `HWADDR` field has the correct hardware address by looking at the map created earlier.

After the changes, the `ifcfg-em4` looks like this:

```
DEVICE="em4"  
BOOTPROTO="dhcp"  
...
```

## Using the `system-config-network` utility to perform network device reconfiguration

In this method, we use the `system-config-network-cmd` utility to export the network configuration to a file. Change each occurrence of the older name with the corresponding newer name, and import the configuration.

1. You can export the current network configuration as a text file with the `system-config-network-cmd` tool like this. `/tmp/network.config` contains the system's network configuration information:

```
# system-config-network-cmd -e > /tmp/network.config
```

2. Replace each occurrence of the `ethN` name in `/tmp/network.config` with the corresponding `emX` or `pXpY` name as provided by the map.
3. Import the modified network configuration.

```
# system-config-network-cmd -i < /tmp/network.config
```

4. Verify in `/etc/sysconfig/network-scripts/ifcfg-e*` that the new names are used for the file names and also for the `DEVICE` variable in each of the configuration files.
5. Update firewall rules if you have device specific rules. Make sure that the firewall is running with the required rules.

- a. Make sure the firewall is running:

```
# iptables -L
```

- b. Save the current firewall rules:

```
# iptables-save > /tmp/iptables-old-names
```

- c. If the firewall is not active and you have the firewall rules defined, use the configuration from `/etc/sysconfig/iptables`:

```
# cp /etc/sysconfig/iptables /tmp/iptables-old-names
```

- d. Edit `/tmp/iptables-old-names` and replace each occurrence of `ethN` with the corresponding `emX/pXpY` name based on the map.
- e. Replace `/etc/sysconfig/iptables` with `/tmp/iptables` to load the rules during subsequent reboots.

```
# cp /tmp/iptables /etc/sysconfig/iptables
```

6. Update other miscellaneous files. For each of the other files that use the traditional `ethN` names, search and replace each occurrence of `ethN` names with `emX` or `pXpY` names. There is a sample script that you can use, see the [Sample Scripts](#) section.

7. Delete the file `/etc/udev/rules.d/70-persistent-net.rules`.

- f. `rm /etc/udev/rules.d/70-persistent-net.rules`

8. Reboot and make sure that the network devices, services, and firewall rules start up as expected—there should be no references to the older `ethN` names.

```
# ls /sys/class/net/  
em1 em2 em3 em4 lo  
# ip link show  
...  
# iptables-save | less  
...
```

## Sample Scripts

We have provided two sample scripts for migrating network information. Download the scripts at [linux.Dell.com](http://linux.Dell.com).

`eth2em-map.sh` This script creates a map of the old name, the corresponding new name, and the MAC address for each of the Ethernet interfaces on the system as reported by `biosevname`. Use the output to assist with changing the network configuration, firewall rules, and so on. Run this script on a system that is currently using the `ethN` names and save/print the output for use later.

`eth2em-rename.sh` This script uses the map created by `eth2em-map.sh` and replaces every occurrence of an `ethN` name with its corresponding `emX` or `pXpY` name, saving the output file as `em_<file>`.

## Reference

1. [Consistent Network Device Naming in Linux](#)