Enabling Predictable Naming Scheme for Network Interfaces

Predictable network interface naming in SUSE Linux Enterprise Server for SAP applications assigns persistent, stable names to network hardware based on firmware index, PCI slot topology or physical location. By replacing unpredictable kernel-based default names like eth0, this systemd-managed naming scheme ensures network interface identifiers survive hardware changes and reboots, preventing security policy misconfigurations and maintaining consistent firewall rules across the system.

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1 Introduction

1.1 Traditional naming schemes

When SLE boots, network interface names are assigned. The traditional naming scheme used to assign names beginning with `eth`*X*, where *X* is the order number of the discovered matching driver of the related network device. Because the driver probing is not predictable, the assigned names may become unstable and on the next boot, `eth0` may become `eth1`, for example. Such behavior has security implications because firewall rules are sensitive to unpredictable changes in network interface names.

Another and more recent approach based on the `biosdevname` package tries to find fixed slot topology information in certain firmware interfaces and uses them to assign fixed names to interfaces that incorporate their physical location on the mainboard.

1.2 What is a predictable naming scheme?

To make network interface naming persistent and customizable, you can activate more predictable naming of network interfaces based on `systemd`.

`systemd` offers a stable naming scheme closer to kernel-internal device identification. Together with `udev` rules, they create flexible algorithms for assigning network device names.

1.3 How does the predictable naming scheme work?

The following is the process of deriving the network interface naming. The priority of steps is top to bottom—if the device information outlined in a specific step is not available, the next step is a fallback.

1. If custom `udev` rules for assigning network interface names exist, they are used.
2. If the `biosdevname` package is installed, its `udev` rules are used.
3. If the device's firmware / BIOS index number for onboard devices is available, it is used. For example, `eno1`.
4. If the device's firmware / BIOS PCI Express hotplug slot index number is available, it is used. For example, `ens1`.

5. If the device's names incorporating physical / geographical location of the connector of the hardware are available, they are used. For example, `enp2s0`.
6. If none of the above information is available, the traditional unpredictable kernel-based naming is applied. For example, `eth0`.

1.4 Benefits of the predictable naming scheme

If you activate the `systemd`-based network interface naming scheme, you get the following benefits:

- Persistent interface names between reboots.
- Persistent interface names even if hardware is added or removed.
- Interface names are automatically determined without user configuration.
- The interface names are fully predictable. For example, by looking at the output of the **`lspci`** command, you can determine the name of the interface.
- Fully stateless operation—changing the hardware configuration does not modify the content of `/etc`.
- Compatibility with the read-only root `/` file system.

2 Enabling the predictable naming scheme

You can enable the predictable naming scheme either during a new system installation, or on an already installed system. Select one of the following procedures that matches your case.

PROCEDURE 1: ENABLING THE NAMING SCHEME DURING SYSTEM INSTALLATION

1. Install the SLES for SAP installation media.
2. Highlight the *SUSE Linux Enterprise Server for SAP applications Installation* option and press *e* to enter edit mode.

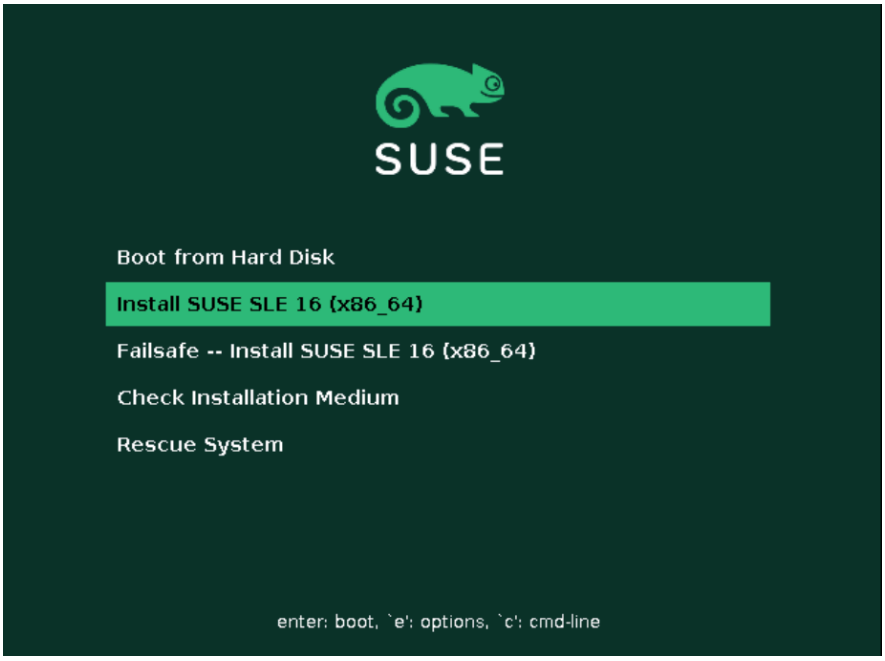


FIGURE 1: INITIAL BOOT MENU

3. At the end of the line that starts with `linux`, add a space and enter `net.ifnames=1`.

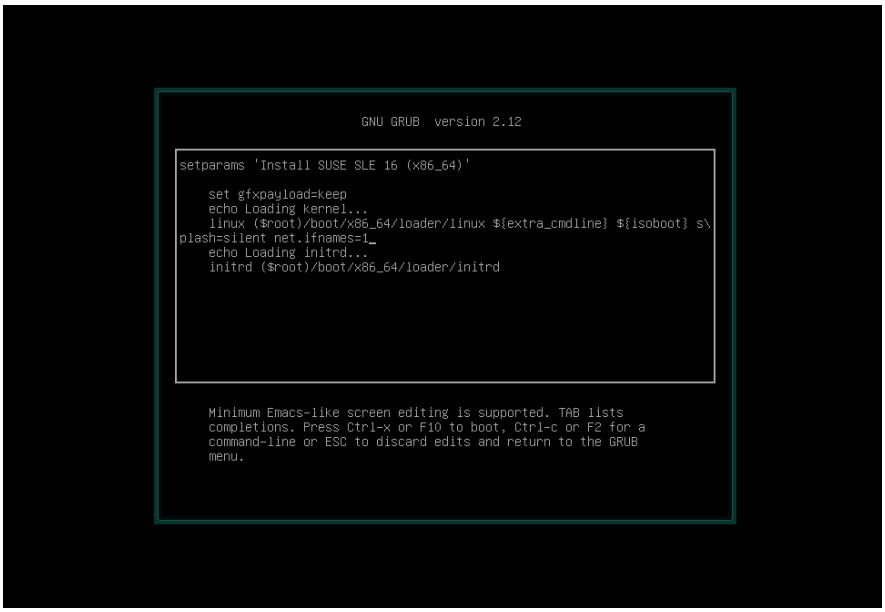


FIGURE 2: INITIAL BOOT MENU

4. Press `Ctrl` – `X` or `F10` to boot and continue with the regular system installation.

PROCEDURE 2: ENABLING THE NAMING SCHEME ON AN ALREADY INSTALLED SYSTEM

1. If the `biosdevname` package is installed, uninstall it.

```
> sudo zypper rm biosdevname
```

2. Back up existing naming rules from `/etc/udev/rules.d` if they exist, for example:

```
> sudo cp /etc/udev/rules.d/70-persistent-net.rules /backup
```



Note

Remove the file `/etc/udev/rules.d/70-persistent-net.rules` if it exists, to enable predictable network interface names.

3. Regenerate the initrd.

```
> sudo dracut -f
```

4. Open the Boot Loader GRUB 2 and append `net.ifnames=1` to the kernel command line.



Note

To access the terminal through Cockpit and enable predictable naming, log in to Cockpit and click *Terminal*.

```
> sudo  vi /etc/default/grub
```

5. Modify the `GRUB_CMDLINE_LINUX` line to append `net.ifnames=1`.

```
GRUB_CMDLINE_LINUX="net.ifnames=1"
```

6. Rebuild the GRUB 2 configuration.

```
> sudo  grub2-mkconfig -o /boot/grub2/grub.cfg
```

7. Reboot the system.

```
> sudo reboot
```

8. Verify the kernel boot line.

```
> cat /proc/cmdline
```

3 Disabling the predictable naming scheme

The following procedure describes steps to disable the predictable naming scheme if you had previously enabled it and now have decided to revert to the traditional naming scheme.

1. Recover or create your own network interface naming scheme under `/etc/udev/rules.d/`, or reinstall the `biosdevname` package.
2. Open the Boot Loader GRUB 2, delete `net.ifnames=1` if present, and append `net.ifnames=0` to the kernel command line.
3. Reboot the host.

4 Troubleshooting

udev-based network interface names mixed with traditional names

When mixed up naming schemes appear on your system, `udev` may not be able to create proper names for certain devices. There are two most common reasons for such behavior:

- There is no usable information provided by the kernel to `udev`. Therefore, `udev` cannot figure out a device name.
- The information provided to `udev` is not suitable, such as non-unique device IDs.

The solution is to create custom naming `udev` rules for the devices that are not properly named by the `udev` rules that are currently in use. Inspect files in the `/etc/udev/rules.d` directory, for example, `70-persistent-net.rules`.

5 For more information

- For more detailed information about naming customization, read the `systemd.net-naming-scheme` man page (**`man 7 systemd.net-naming-scheme`**).
- A more detailed description and reasoning behind the predictable naming scheme are given in https://systemd.io/PREDICTABLE_INTERFACE_NAMES/.

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