	<b>APPLICATION NOTE</b>	Doc.No.: AN001
		Date: 2006-07-14
Product: Hurricane – LX800		
Title:	Installing the Micrel KS884X Ethernet Driver using Linux	

## Concerned Versions

All

## General Information


This paper discusses the implementation of the Micrel KS8842 ethernet driver using the Linux kernel environments 2.4 and 2.6.

## Revision History

07 / 14 / 06 Initial Version

## Validation Environment

- Hurricane LX800 (SCH: 1V0 / PCB: 1V0 / PL: 1V0)
- Hurricane BIOS Revision 1.01.09
- IBM Travelstar 30GB Hard Drive (Model No. IC25N030ATCS04-0)
- Standard Linux Kernel Version 2.6.17
- Standard Linux Kernel Version 2.4.32

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## Building the Driver for Linux Kernel 2.4

The kernel sources are expected to reside within `/usr/src/linux-2.x.x`, whereas this will be `/usr/src/linux-2.4.32` for this chapter.

First of all, a directory structure `KS884X/PCI` must be created inside the `/usr/src/linux-2.4.32/drivers/net` directory.

**-> `mkdir -p /usr/src/linux-2.4.32/drivers/net/KS884X/PCI`**

(the `mkdir` option `-p` will create all given subdirectories as well)

In a second step, the tar archive can be unzipped in a random directory. For example, the directory `/temp` is used.

**-> `tar -xvzf KS884X_Linux_2.4_1V0A.tgz /temp/`**

Unzipping the file will create a directory `PCI` inside `/temp`, including all driver files and a configuration file, named `Config.in`.

In a next step, `Config.in` needs to be copied to `/usr/src/linux-2.4.32/drivers/net/KS884X` and the contents of the `PCI` directory to `/usr/src/linux-2.4.32/drivers/net/KS884X/PCI`.

Now, the `drivers/net/Makefile` needs to be modified to include the ethernet driver. Therefore, two lines are added (these can be placed anywhere inside the file):

**`subdir-$(CONFIG_KS8842_PCI) += KS884X/PCI` and  
`obj-y += KS884X/PCI/ks8842_pci.o`**

The last step, before the kernel configuration can be started is to modify the general `drivers/net/Config.in` to include the driver specific configuration file. The context of the driver's `Config.in` can afterwards be seen and several options chosen when configuring the kernel. The following line can be added somewhere but to create a plain overview it is recommended to place it below the Ethernet (10 or 100Mbit) entry.

**source `drivers/net/KS884X/Config.in`**

As the Micrel ethernet device, implemented on the Hurricane is a `KS8842` device and connected to the PCI bus, the kernel configuration should include these settings. But before, set the call to open the configuration menu.

**-> `make menuconfig` (at path `/usr/src/linux-2.4.32/`)**

Inside the configuration the user shall browse to the driver. This depends on the placement of the Config.in statement in the drivers/net/Config.in file. For example, if the appropriate line was placed at the bottom of Config.in, browsing to the entry may look like this:

-> **Network device support**

-> **KS8841/2 Ethernet controller support** (include in the kernel [\*])

-> **KS8842 with 2 devices** (set option [\*])

-> **PCI support** (set option [\*])

**The steps done so far explained the inclusion of the driver inside the kernel environment. For compiling and finishing the installation, please refer to “*Finishing the Installation*” as this step is the same as for kernel versions of 2.6.x.**

## Building the Driver for Linux Kernel 2.6

The kernel sources are expected to reside within `/usr/src/linux-2.x.x`, whereas this will be `/usr/src/linux-2.6.17` for this chapter.

First of all, a directory structure `KS884X/PCI` must be created inside the `/usr/src/linux-2.6.17/drivers/net` directory.

```
-> mkdir -p /usr/src/linux-2.6.17/drivers/net/KS884X/PCI
```

(the `mkdir` option `-p` will create all given subdirectories as well)

In a second step, the tar archive can be unzipped in a random directory. For example, the directory `/temp` is used.

```
-> tar -xvzf KS884X_Linux_2.6_1V0A.tgz /temp/
```

Unzipping the file will create a directory `PCI` inside `/temp`, including all driver files and a configuration file, named `Kconfig`.

In a next step, `Kconfig` needs to be copied to `/usr/src/linux-2.6.17/drivers/net/KS884X` and the contents of the `PCI` directory to `/usr/src/linux-2.6.17/drivers/net/KS884X/PCI`.

Now, the `drivers/net/Makefile` needs to be modified to include the ethernet driver. Therefore, the following statement should be added below the title "Ethernet (10 or 100Mbit)" and below the subtitle "Config NET\_ETHERNET".

```
source "drivers/net/KS884X/Kconfig"
```

After including the driver's specific kernel configuration file the `drivers/net/Makefile` needs to be modified as well. One line must be added to tell the kernel where to find the driver sources.

```
obj-$(CONFIG_KS8842_PCI) += KS884X/PCI/
```

The last step for configuring the driver is to open the kernel configuration and add the driver to the actual setting. Therefore, for not running into an error during compilation, the MII (Media Independent Interface) must be activated within the kernel as well, because the driver needs this interface for interaction.

It is already verified within the `Kconfig` file of the driver that the MII is included before activating the driver. If MII isn't active the driver will not be present.

```
-> make menuconfig (at path of /usr/src/linux-2.6.17/)
```

As the Micrel ethernet device, implemented on the Hurricane is a `KS8842` device and connected to the PCI bus, the kernel configuration should include these settings.

-> Device Drivers

-> Network device support

-> Ethernet (10 or 100Mbit)

-> **KS8841/2 Ethernet controller support** (include in the kernel [\*])

-> **KS8842 with 2 devices** (set option [\*])

-> **PCI support** (set option [\*])

The steps done so far explained the inclusion of the driver inside the kernel environment. For compiling and finishing the installation, please refer to *“Finishing the Installation”* as this step is the same as for kernel versions of 2.4.x.

## Finishing the Installation

Note: The steps described in this chapter are the same for kernel versions 2.4 and 2.6.

At the point when configuration is finished, the kernel must be built. This process may take a while.

-> **make bzImage** (at path /usr/src/linux-2.x.x)

Then, the kernel (bzImage) is placed into the **/boot** directory of the target system.

-> **cp /usr/src/linux-2.x.x/arch/i386/boot/bzImage /boot**

For systems that need an initrd, creating it is discussed in “*Additional Configuration*”. To tell the boot loader where to look for the kernel, it’s configuration file is modified.

For Fedora Core / RedHat this would be grub.

-> **vi /etc/grub.conf** (nano or any other editor can be used instead of vi)

Figure 1 depicts a sample configuration of the appropriate grub entry.

```
title Hurricane - Micrel KS8842 Integration -> Kernel 2.x.x
  root (hd0,0)
  kernel /bzImage ro root=/dev/hda2
```

Figure 1: Sample configuration of the grub boot loader 1

Now, the system can be rebooted and the kernel will include the ethernet driver!

## Additional Configuration

If a Linux distribution is used that needs an initrd besides the kernel image, some more steps must be done to bring up the system.

-> **make modules** (at path /usr/src/linux-2.x.x)  
(Depending on the configuration, this step may take a long time!)

-> **make modules\_install**

After the installation of the modules is finished, the initrd is built:

-> **mkinitrd initrd-Hurricane-2.x.x 2.x.x** (call mkinitrd inside the /boot directory where the new kernel image resides)


Syntax: **mkinitrd** *name kernel\_version*

The configuration for a grub boot loader may look like this.

```
title Hurricane - Micrel KS8842 Integration -> Kernel 2.x.x
root (hd0,0)
kernel /bzImage ro root=/dev/hda2
initrd /initrd-Hurricane-2.x.x
```

Figure 2: Sample configuration of the grub boot loader 12

**- End -**

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## Contacting the Support ([helpdesk@lippert-at.com](mailto:helpdesk@lippert-at.com))

The LiPPERT support team is always willing to provide you with any support you need. If you still have problems with the installation of the driver after following the instructions above, please don't hesitate to contact our support center via e-mail. To assist you as best as possible, please provide us with at least the following 5 informations:

1. Do you have followed the instructions in this guide carefully?
2. Please provide the serial number of your board
3. Please provide the Operating System you are using, respectively the kernel version
4. Please explain which type of hard drive or removable medium you are using
5. Please leave a phone number for any further inquiry