KSZ88XX Linux Driver Installation Guide

Revision 1.0
June 12, 2006

Confidential   Rev. 1.0 6/13/2006

Contents

Confidential   Rev. 1.0 6/13/2006

Introduction

This installation guide explains how to build the device drivers for the KSZ88XX family which includes KSZ8841M, KSZ8842M, KSZ8841P, KSZ8842P, KSZ8861M, and KSZ8862M, for use in a Linux system. They are provided in source code format so that they can be used in different systems. The drivers have been tested in a Renasas Solution Engine 7751R system running Linux 2.4.18. The PCI drivers have been tested in the Intel x386 PC running Linux 2.4.20 and in the ARM platform. The drivers can be compiled for Linux 2.6 also.

The drivers expect the system is properly configured to expose the I/O address space of the KSZ88XX devices and their hardware interrupts can be passed to the drivers. In the case of Renasas 7751R system this requires modification to the kernel code specific to the 7751R to use the KSZ88XX devices successfully.

Driver Features

The drivers are designed to operate the KSZ88XX devices and demonstrate their hardware features. They share some common code that is called the KSZ88XX library. This library provides an application programming interface to program the KSZ88XX hardware. Please consult the *KS88XX Programmer's Guide* to understand how to use the APIs. Because the library code is shared in several platforms, the drivers may not run efficiently. To increase performance, the conditional INLINE can be defined to put some functions inline.

There are two versions of drivers, one for ISA or generic bus and the other for PCI bus.

The ISA version of the KSZ88XX driver is used for ISA or generic bus such as the SH bus used in the Renasas 7751R board. It uses a list of banks to access registers. It supports early-transmit and early-receive features.

The PCI version of the KSZ88XX driver is used for PCI bus. It uses a flat address space to access registers. It uses lists of descriptors to send and receives packets.

The KSZ8841/KSZ8861 has one PHY port to send and receive packets, while the KSZ8842/KSZ8862 has two. It is possible to create two network devices in the KSZ8842/KSZ8862 driver so that the operating system can control which port to send packets. This is enabled by the TWO_NETWORK_INTERFACE conditional.

Building Drivers for Linux 2.4

The driver can be compiled in a simple PC development environment. This requires that the kernel header files be setup and available. The default kernel header location under RedHat 9.0 is `/usr/src/linux-2.4/include`. If other locations are used, please modify the `Makefile` appropriately. The `KERNELDIR` in the `Makefile` specifies this location.

The KSZ8842/62 device driver is built by default. If KSZ8841/61 device driver is wanted, define KSZ8841 before building the driver. Use this command to build KSZ8841 driver:

```
CONFIG_KS8841=1 make
```

The driver can be built inside the kernel source tree. Create subdirectories `KS884X/ISA` and `KS884X/PCI` under network driver directory `linux/drivers/net`. Copy the ISA and PCI driver source files to those directories. Copy the KS88XX configuration file `Config.in` to `KS88XX`.

Modify the network driver configuration file `Config.in` to include the KS88XX configuration by adding the line inside the Ethernet (10 or 100Mbit) menu:

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

Modify the network driver `Makefile` to build KSZ88XX drivers by adding the lines:

```
subdir-$(CONFIG_KS8842_ISA) += KS8842/ISA
subdir-$(CONFIG_KS8842_PCI) += KS8842/PCI

ifeq ($(CONFIG_KS8842_ISA),y)
ifeq ($(CONFIG_KS8841),y)
    obj-y += KS8842/ISA/ks8841_isa.o
else
    obj-y += KS8842/ISA/ks8842_isa.o
endif
endif
ifeq ($(CONFIG_KS8842_PCI),y)
ifeq ($(CONFIG_KS8841),y)
    obj-y += KS8842/PCI/ks8841_pci.o
else
    obj-y += KS8842/PCI/ks8842_pci.o
endif
endif
```

Run "`make menuconfig`" in the Linux base directory to bring up Linux kernel configuration. Select *Network device support*. Select *Ethernet (10 or 100Mbit)*. Select *KS8841/2 Ethernet controller support*. There will be 5 submenus. The default is to build KSZ8842 driver. Select *KS8841 only* to build KSZ8841/61 driver, or select *KS8842 with 2 devices* to add 2-device support. Select *SH support* to build driver for SH bus, or select *ISA support*. Select *PCI support* to build driver for PCI bus. The *SH support*, *ISA support*, and *PCI support* can indicate module if dynamic module loading is supported.

The driver can be built outside the kernel source tree while using the kernel configurations. Use this command to build the driver module:

```
make -C /kernel_source SUBDIRS=$PWD modules
```

This way the driver source does not need to copy to the kernel source tree. However, if the driver configurations are not integrated into the kernel configurations, they need to be specified while running the above command., e.g., use this command to build KSZ8841/61 driver:

```
CONFIG_KS8841=m make -C /kernel_source SUBDIRS=$PWD
modules
```

For better configuration, it is better to integrate the driver source into the kernel source.

Building Drivers for Linux 2.6

The driver can be built outside the kernel source tree. However, it requires additional steps to convert the driver into .ko format as required by Linux 2.6. As a result, it is recommended to build the driver inside the kernel source tree.

Create subdirectories `KS884X/ISA` and `KS884X/PCI` under network driver directory `linux/drivers/net`. Copy the ISA and PCI driver source files to those directories. Copy the KS88XX configuration file `Kconfig` to KS88XX.

Modify the network driver configuration file `Kconfig` to include the KS88XX configuration by adding the line inside the Ethernet (10 or 100Mbit) menu:

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

Modify the network driver `Makefile` to build KSZ88XX drivers by adding the lines:

```
obj-$(CONFIG_KS8842_ISA) += KS884X/ISA/
obj-$(CONFIG_KS8842_PCI) += KS884X/PCI/
```

Run "`make menuconfig`" in the Linux base directory to bring up Linux kernel configuration. Select *Networking support*. Select *Network device support*. Select *Ethernet (10 or 100Mbit)*. Select *KS8841/2 Ethernet controller support*. There will be 5 submenus. The default is to build KSZ8842/62 driver. Select *KS8841 only* to build KSZ8841/61 driver, or select *KS8842 with 2 devices* to add 2-device support. Select *SH support* to build driver for SH bus, or select *ISA support*. Select *PCI support* to build driver for PCI bus. The *SH support*, *ISA support*, and *PCI support* can indicate module if dynamic module loading is supported.

The driver source can be located outside the kernel source tree while using the kernel configurations. Use this command to build the driver module:

```
make –C /kernel_source SUBDIRS=$PWD modules
```

Use this command to cleanup the directory:

```
make –C /kernel_source SUBDIRS=$PWD clean
```

This way the driver source does not need to copy to the kernel source tree. However, if the driver configurations are not integrated into the kernel configurations, they need to be specified while running the above command., e.g., use this command to build KSZ8841/61 driver:

```
CONFIG_KS8841=m make –C /kernel_source SUBDIRS=$PWD
modules
```

For better configuration, it is better to integrate the driver source into the kernel source.

Known Bugs

The PCI drivers do not work well in the Renesas 7751R board due to unknown system issues.