

D-Link DL2000-based Gigabit Ethernet Adapter Installation  
for Linux  
May 23, 2002

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Compatibility List

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Adapter Support:

D-Link DGE-550T Gigabit Ethernet Adapter.  
D-Link DGE-550SX Gigabit Ethernet Adapter.  
D-Link DL2000-based Gigabit Ethernet Adapter.

The driver support Linux kernel 2.4.7 later. We had tested it  
on the environments below.

- . Red Hat v6.2 (update kernel to 2.4.7)
- . Red Hat v7.0 (update kernel to 2.4.7)
- . Red Hat v7.1 (kernel 2.4.7)
- . Red Hat v7.2 (kernel 2.4.7-10)

Quick Install

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Install linux driver as following command:

1. make all
2. insmod dl2k.ko
3. ifconfig eth0 up 10.xxx.xxx.xxx netmask 255.0.0.0

IP

NETMASK

Now eth0 should active, you can test it by "ping" or get more information by  
"ifconfig". If tested ok, continue the next step.

4. cp dl2k.ko /lib/modules/`uname -r`/kernel/drivers/net
5. Add the following line to /etc/modprobe.conf:  
    alias eth0 dl2k
6. Run "netconfig" or "netconf" to create configuration script ifcfg-eth0  
    located at /etc/sysconfig/network-scripts or create it manually.  
    [see - Configuration Script Sample]
7. Driver will automatically load and configure at next boot time.

Compiling the Driver

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## dl2k.txt

In Linux, NIC drivers are most commonly configured as loadable modules. The approach of building a monolithic kernel has become obsolete. The driver can be compiled as part of a monolithic kernel, but is strongly discouraged. The remainder of this section assumes the driver is built as a loadable module. In the Linux environment, it is a good idea to rebuild the driver from the source instead of relying on a precompiled version. This approach provides better reliability since a precompiled driver might depend on libraries or kernel features that are not present in a given Linux installation.

The 3 files necessary to build Linux device driver are dl2k.c, dl2k.h and Makefile. To compile, the Linux installation must include the gcc compiler, the kernel source, and the kernel headers. The Linux driver supports Linux Kernels 2.4.7. Copy the files to a directory and enter the following command to compile and link the driver:

### CD-ROM drive

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```
[root@XXX /] mkdir cdrom
[root@XXX /] mount -r -t iso9660 -o conv=auto /dev/cdrom /cdrom
[root@XXX /] cd root
[root@XXX /root] mkdir dl2k
[root@XXX /root] cd dl2k
[root@XXX dl2k] cp /cdrom/linux/dl2k.tgz /root/dl2k
[root@XXX dl2k] tar xfvz dl2k.tgz
[root@XXX dl2k] make all
```

### Floppy disc drive

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```
[root@XXX /] cd root
[root@XXX /root] mkdir dl2k
[root@XXX /root] cd dl2k
[root@XXX dl2k] mcopy a:/linux/dl2k.tgz /root/dl2k
[root@XXX dl2k] tar xfvz dl2k.tgz
[root@XXX dl2k] make all
```

### Installing the Driver

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#### Manual Installation

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Once the driver has been compiled, it must be loaded, enabled, and bound to a protocol stack in order to establish network connectivity. To load a module enter the command:

```
insmod dl2k.o
```

or

```
insmod dl2k.o <optional parameter> ; add parameter
```

---

```
example: insmod dl2k.o media=100mbps_hd
or      insmod dl2k.o media=3
or      insmod dl2k.o media=3,2 ; for 2 cards
```

Please reference the list of the command line parameters supported by the Linux device driver below.

The insmod command only loads the driver and gives it a name of the form eth0, eth1, etc. To bring the NIC into an operational state, it is necessary to issue the following command:

```
ifconfig eth0 up
```

Finally, to bind the driver to the active protocol (e.g., TCP/IP with Linux), enter the following command:

```
ifup eth0
```

Note that this is meaningful only if the system can find a configuration script that contains the necessary network information. A sample will be given in the next paragraph.

The commands to unload a driver are as follows:

```
ifdown eth0
ifconfig eth0 down
rmmod dl2k.o
```

The following are the commands to list the currently loaded modules and to see the current network configuration.

```
lsmod
ifconfig
```

### Automated Installation

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This section describes how to install the driver such that it is automatically loaded and configured at boot time. The following description is based on a Red Hat 6.0/7.0 distribution, but it can easily be ported to other distributions as well.

Red Hat v6.x/v7.x

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1. Copy dl2k.o to the network modules directory, typically /lib/modules/2.x.x-xx/net or /lib/modules/2.x.x/kernel/drivers/net.
2. Locate the boot module configuration file, most commonly modprobe.conf or modules.conf (for 2.4) in the /etc directory. Add the following lines:

```
alias ethx dl2k
options dl2k <optional parameters>
```

where ethx will be eth0 if the NIC is the only ethernet adapter, eth1 if one other ethernet adapter is installed, etc. Refer to the table in the previous section for the list of optional parameters.

3. Locate the network configuration scripts, normally the /etc/sysconfig/network-scripts directory, and create a configuration script named ifcfg-ethx that contains network information.

4. Note that for most Linux distributions, Red Hat included, a configuration utility with a graphical user interface is provided to perform steps 2 and 3 above.

### Parameter Description

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You can install this driver without any additional parameter. However, if you are going to have extensive functions then it is necessary to set extra parameter. Below is a list of the command line parameters supported by the Linux device driver.

- |                               |  |           |                           |           |                     |           |                     |            |                      |            |                      |             |                       |             |                       |   |                           |   |                     |   |                     |   |                      |   |                      |   |                       |   |                       |
|-------------------------------|--|-----------|---------------------------|-----------|---------------------|-----------|---------------------|------------|----------------------|------------|----------------------|-------------|-----------------------|-------------|-----------------------|---|---------------------------|---|---------------------|---|---------------------|---|----------------------|---|----------------------|---|-----------------------|---|-----------------------|
| mtu=packet_size               | - Specifies the maximum packet size. default is 1500.  |           |                           |           |                     |           |                     |            |                      |            |                      |             |                       |             |                       |   |                           |   |                     |   |                     |   |                      |   |                      |   |                       |   |                       |
| media=media_type              | <p>- Specifies the media type the NIC operates at.</p> <table border="0"> <tr><td>autosense</td><td>Autosensing active media.</td></tr> <tr><td>10mbps_hd</td><td>10Mbps half duplex.</td></tr> <tr><td>10mbps_fd</td><td>10Mbps full duplex.</td></tr> <tr><td>100mbps_hd</td><td>100Mbps half duplex.</td></tr> <tr><td>100mbps_fd</td><td>100Mbps full duplex.</td></tr> <tr><td>1000mbps_fd</td><td>1000Mbps full duplex.</td></tr> <tr><td>1000mbps_hd</td><td>1000Mbps half duplex.</td></tr> <tr><td>0</td><td>Autosensing active media.</td></tr> <tr><td>1</td><td>10Mbps half duplex.</td></tr> <tr><td>2</td><td>10Mbps full duplex.</td></tr> <tr><td>3</td><td>100Mbps half duplex.</td></tr> <tr><td>4</td><td>100Mbps full duplex.</td></tr> <tr><td>5</td><td>1000Mbps half duplex.</td></tr> <tr><td>6</td><td>1000Mbps full duplex.</td></tr> </table> <p>By default, the NIC operates at autosense. 1000mbps_fd and 1000mbps_hd types are only available for fiber adapter.</p> | autosense | Autosensing active media. | 10mbps_hd | 10Mbps half duplex. | 10mbps_fd | 10Mbps full duplex. | 100mbps_hd | 100Mbps half duplex. | 100mbps_fd | 100Mbps full duplex. | 1000mbps_fd | 1000Mbps full duplex. | 1000mbps_hd | 1000Mbps half duplex. | 0 | Autosensing active media. | 1 | 10Mbps half duplex. | 2 | 10Mbps full duplex. | 3 | 100Mbps half duplex. | 4 | 100Mbps full duplex. | 5 | 1000Mbps half duplex. | 6 | 1000Mbps full duplex. |
| autosense                     | Autosensing active media.  |           |                           |           |                     |           |                     |            |                      |            |                      |             |                       |             |                       |   |                           |   |                     |   |                     |   |                      |   |                      |   |                       |   |                       |
| 10mbps_hd                     | 10Mbps half duplex.  |           |                           |           |                     |           |                     |            |                      |            |                      |             |                       |             |                       |   |                           |   |                     |   |                     |   |                      |   |                      |   |                       |   |                       |
| 10mbps_fd                     | 10Mbps full duplex.  |           |                           |           |                     |           |                     |            |                      |            |                      |             |                       |             |                       |   |                           |   |                     |   |                     |   |                      |   |                      |   |                       |   |                       |
| 100mbps_hd                    | 100Mbps half duplex.   |           |                           |           |                     |           |                     |            |                      |            |                      |             |                       |             |                       |   |                           |   |                     |   |                     |   |                      |   |                      |   |                       |   |                       |
| 100mbps_fd                    | 100Mbps full duplex.   |           |                           |           |                     |           |                     |            |                      |            |                      |             |                       |             |                       |   |                           |   |                     |   |                     |   |                      |   |                      |   |                       |   |                       |
| 1000mbps_fd                   | 1000Mbps full duplex.  |           |                           |           |                     |           |                     |            |                      |            |                      |             |                       |             |                       |   |                           |   |                     |   |                     |   |                      |   |                      |   |                       |   |                       |
| 1000mbps_hd                   | 1000Mbps half duplex.  |           |                           |           |                     |           |                     |            |                      |            |                      |             |                       |             |                       |   |                           |   |                     |   |                     |   |                      |   |                      |   |                       |   |                       |
| 0                             | Autosensing active media.  |           |                           |           |                     |           |                     |            |                      |            |                      |             |                       |             |                       |   |                           |   |                     |   |                     |   |                      |   |                      |   |                       |   |                       |
| 1                             | 10Mbps half duplex.  |           |                           |           |                     |           |                     |            |                      |            |                      |             |                       |             |                       |   |                           |   |                     |   |                     |   |                      |   |                      |   |                       |   |                       |
| 2                             | 10Mbps full duplex.  |           |                           |           |                     |           |                     |            |                      |            |                      |             |                       |             |                       |   |                           |   |                     |   |                     |   |                      |   |                      |   |                       |   |                       |
| 3                             | 100Mbps half duplex.   |           |                           |           |                     |           |                     |            |                      |            |                      |             |                       |             |                       |   |                           |   |                     |   |                     |   |                      |   |                      |   |                       |   |                       |
| 4                             | 100Mbps full duplex.   |           |                           |           |                     |           |                     |            |                      |            |                      |             |                       |             |                       |   |                           |   |                     |   |                     |   |                      |   |                      |   |                       |   |                       |
| 5                             | 1000Mbps half duplex.  |           |                           |           |                     |           |                     |            |                      |            |                      |             |                       |             |                       |   |                           |   |                     |   |                     |   |                      |   |                      |   |                       |   |                       |
| 6                             | 1000Mbps full duplex.  |           |                           |           |                     |           |                     |            |                      |            |                      |             |                       |             |                       |   |                           |   |                     |   |                     |   |                      |   |                      |   |                       |   |                       |
| vlan=n                        | - Specifies the VLAN ID. If vlan=0, the Virtual Local Area Network (VLAN) function is disable.   |           |                           |           |                     |           |                     |            |                      |            |                      |             |                       |             |                       |   |                           |   |                     |   |                     |   |                      |   |                      |   |                       |   |                       |
| jumbo=[0 1]                   | <p>- Specifies the jumbo frame support. If jumbo=1, the NIC accept jumbo frames. By default, this function is disabled.</p> <p>Jumbo frame usually improve the performance int gigabit.</p> <p>This feature need jumbo frame compatible remote.</p>  |           |                           |           |                     |           |                     |            |                      |            |                      |             |                       |             |                       |   |                           |   |                     |   |                     |   |                      |   |                      |   |                       |   |                       |
| rx_coalesce=m<br>rx_timeout=n | <p>- Number of rx frame handled each interrupt.</p> <p>- Rx DMA wait time for an interrupt.</p> <p>If set rx_coalesce &gt; 0, hardware only assert an interrupt for m frames. Hardware won't assert rx interrupt until m frames received or reach timeout of n * 640 nano seconds.</p> <p>Set proper rx_coalesce and rx_timeout can reduce congestion collapse and overload which</p>  |           |                           |           |                     |           |                     |            |                      |            |                      |             |                       |             |                       |   |                           |   |                     |   |                     |   |                      |   |                      |   |                       |   |                       |

dl2k.txt

has been a bottleneck for high speed network.

For example, rx\_coalesce=10 rx\_timeout=800.  
that is, hardware assert only 1 interrupt  
for 10 frames received or timeout of 512 us.

tx\_coalesce=n

- Number of tx frame handled each interrupt.  
Set n > 1 can reduce the interrupts  
congestion usually lower performance of  
high speed network card. Default is 16.

tx\_flow=[1|0]

- Specifies the Tx flow control. If tx\_flow=0,  
the Tx flow control disable else driver  
autodetect.

rx\_flow=[1|0]

- Specifies the Rx flow control. If rx\_flow=0,  
the Rx flow control enable else driver  
autodetect.

### Configuration Script Sample

Here is a sample of a simple configuration script:

```
DEVICE=eth0
USERCTL=no
ONBOOT=yes
BOOTPROTO=none
BROADCAST=207.200.5.255
NETWORK=207.200.5.0
NETMASK=255.255.255.0
IPADDR=207.200.5.2
```

### Troubleshooting

Q1. Source files contain ^ M behind every line.

Make sure all files are Unix file format (no LF). Try the following  
shell command to convert files.

```
cat dl2k.c | col -b > dl2k.tmp
mv dl2k.tmp dl2k.c
```

OR

```
cat dl2k.c | tr -d "\r" > dl2k.tmp
mv dl2k.tmp dl2k.c
```

Q2: Could not find header files (\*.h) ?

To compile the driver, you need kernel header files. After  
installing the kernel source, the header files are usually located in  
/usr/src/linux/include, which is the default include directory configured  
in Makefile. For some distributions, there is a copy of header files in  
/usr/src/include/linux and /usr/src/include/asm, that you can change the  
INCLUDEDIR in Makefile to /usr/include without installing kernel source.

Note that RH 7.0 didn't provide correct header files in /usr/include,  
including those files will make a wrong version driver.

d12k.txt