

**NAME**

**bge** - Broadcom BCM57xx/BCM590x Gigabit/Fast Ethernet driver

**SYNOPSIS**

To compile this driver into the kernel, place the following lines in your kernel configuration file:

```
device miibus
device bge
```

Alternatively, to load the driver as a module at boot time, place the following line in loader.conf(5):

```
if_bge_load="YES"
```

**DESCRIPTION**

The **bge** driver provides support for various NICs based on the Broadcom BCM570x, 571x, 572x, 575x, 576x, 578x, 5776x and 5778x Gigabit Ethernet controller chips and the 590x and 5779x Fast Ethernet controller chips.

All of these NICs are capable of 10, 100 and 1000Mbps speeds over CAT5 copper cable, except for the SysKonnct SK-9D41 which supports only 1000Mbps over multimode fiber. The BCM570x builds upon the technology of the Alteon Tigon II. It has two R4000 CPU cores and is PCI v2.2 and PCI-X v1.0 compliant. It supports IP, TCP and UDP checksum offload for both receive and transmit, multiple RX and TX DMA rings for QoS applications, rules-based receive filtering, and VLAN tag stripping/insertion as well as a 256-bit multicast hash filter. Additional features may be provided via value-add firmware updates. The BCM570x supports TBI (ten bit interface) and GMII transceivers, which means it can be used with either copper or 1000baseX fiber applications. Note however the device only supports a single speed in TBI mode.

Most BCM5700-based cards also use the Broadcom BCM5401 or BCM5411 10/100/1000 copper gigabit transceivers, which support autonegotiation of 10, 100 and 1000Mbps modes in full or half duplex.

The BCM5700, BCM5701, BCM5702, BCM5703, BCM5704, BCM5714, BCM5717, BCM5719, BCM5720, BCM5780 and BCM57765 also support jumbo frames, which can be configured via the interface MTU setting. Selecting an MTU larger than 1500 bytes with the ifconfig(8) utility configures the adapter to receive and transmit jumbo frames. Using jumbo frames can greatly improve performance for certain tasks, such as file transfers and data streaming.

The **bge** driver supports the following media types:

- autoselect** Enable autoselection of the media type and options. The user can manually override the autoselected mode by adding media options to rc.conf(5).
- 10baseT/UTP** Set 10Mbps operation. The ifconfig(8) **mediaopt** option can also be used to select either **full-duplex** or **half-duplex** modes.
- 100baseTX** Set 100Mbps (Fast Ethernet) operation. The ifconfig(8) **mediaopt** option can also be used to select either **full-duplex** or **half-duplex** modes.
- 1000baseTX** Set 1000baseTX operation over twisted pair. Only **full-duplex** mode is supported.
- 1000baseSX** Set 1000Mbps (Gigabit Ethernet) operation. Both **full-duplex** and **half-duplex** modes are supported.

The **bge** driver supports the following media options:

**full-duplex** Force full duplex operation.

**half-duplex**  
Force half duplex operation.

For more information on configuring this device, see ifconfig(8).

## HARDWARE

The **bge** driver provides support for various NICs based on the Broadcom BCM570x family of Gigabit Ethernet controller chips, including the following:

- ⊕ 3Com 3c996-SX (1000baseSX)
- ⊕ 3Com 3c996-T (10/100/1000baseTX)
- ⊕ Apple Thunderbolt Display (10/100/1000baseTX)
- ⊕ Apple Thunderbolt to Gigabit Ethernet Adapter (10/100/1000baseTX)
- ⊕ Dell PowerEdge 1750 integrated BCM5704C NIC (10/100/1000baseTX)
- ⊕ Dell PowerEdge 2550 integrated BCM5700 NIC (10/100/1000baseTX)
- ⊕ Dell PowerEdge 2650 integrated BCM5703 NIC (10/100/1000baseTX)
- ⊕ Dell PowerEdge R200 integrated BCM5750 NIC (10/100/1000baseTX)
- ⊕ Dell PowerEdge R300 integrated BCM5722 NIC (10/100/1000baseTX)
- ⊕ IBM x235 server integrated BCM5703x NIC (10/100/1000baseTX)
- ⊕ HP Compaq dc7600 integrated BCM5752 NIC (10/100/1000baseTX)
- ⊕ HP ProLiant NC7760 embedded Gigabit NIC (10/100/1000baseTX)
- ⊕ HP ProLiant NC7770 PCI-X Gigabit NIC (10/100/1000baseTX)

- ⊕ HP ProLiant NC7771 PCI-X Gigabit NIC (10/100/1000baseTX)
- ⊕ HP ProLiant NC7781 embedded PCI-X Gigabit NIC (10/100/1000baseTX)
- ⊕ Netgear GA302T (10/100/1000baseTX)
- ⊕ SysKonnect SK-9D21 (10/100/1000baseTX)
- ⊕ SysKonnect SK-9D41 (1000baseSX)

## LOADER TUNABLES

The following tunables can be set at the loader(8) prompt before booting the kernel, or stored in loader.conf(5).

*hw.bge.allow\_asf*

Allow the ASF feature for cooperating with IPMI. Can cause system lockup problems on a small number of systems. Enabled by default.

*dev.bge.%d.msi*

Non-zero value enables MSI support on the Ethernet hardware. The default value is 1.

## SYSCTL VARIABLES

The following variables are available as both sysctl(8) variables and loader(8) tunables:

*dev.bge.%d.forced\_collapse*

Allow collapsing multiple transmit buffers into a single buffer to increase transmit performance with the cost of CPU cycles. The default value is 0 to disable transmit buffer collapsing.

*dev.bge.%d.forced\_udpcsum*

Enable UDP transmit checksum offloading even if controller can generate UDP datagrams with checksum value 0. UDP datagrams with checksum value 0 can confuse receiver host as it means sender did not compute UDP checksum. The default value is 0 which disables UDP transmit checksum offloading. The interface need to be brought down and up again before a change takes effect.

## DIAGNOSTICS

**bge%d: couldn't map memory** A fatal initialization error has occurred.

**bge%d: couldn't map ports** A fatal initialization error has occurred.

**bge%d: couldn't map interrupt** A fatal initialization error has occurred.

**bge%d: no memory for softc struct!** The driver failed to allocate memory for per-device instance information during initialization.

**bge%d: failed to enable memory mapping!** The driver failed to initialize PCI shared memory mapping. This might happen if the card is not in a bus-master slot.

**bge%d: firmware handshake timed out, found 0xffffffff** The device was physically disconnected from the system, or there is a problem with the device causing it to stop responding to the host it is attached to.

**bge%d: no memory for jumbo buffers!** The driver failed to allocate memory for jumbo frames during initialization.

**bge%d: watchdog timeout** The device has stopped responding to the network, or there is a problem with the network connection (cable).

## SEE ALSO

altq(4), arp(4), miibus(4), netintro(4), ng\_ether(4), polling(4), vlan(4), ifconfig(8)

## HISTORY

The **bge** device driver first appeared in FreeBSD 4.5.

## AUTHORS

The **bge** driver was written by Bill Paul <[wpaul@windriver.com](mailto:wpaul@windriver.com)>.

## BUGS

Hotplug is not currently supported in FreeBSD, hence, Thunderbolt interfaces need to be connected prior to system power up on Apple systems in order for the interface to be detected. Also, due to the lack of hotplug support, Thunderbolt-based interfaces must not be removed while the system is up as the kernel is currently unable to cope with a **bge** interface disappearing.