NAME

re - RealTek 8139C+/8169/816xS/811xS/8168/810xE/8111 PCI/PCIe Ethernet adapter driver

SYNOPSIS

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

> **device miibus**
> **device re**

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

> if_re_load="YES"

DESCRIPTION

The **re** driver provides support for various NICs based on the RealTek RTL8139C+, RTL8169, RTL816xS, RTL811xS, RTL8168, RTL810xE and RTL8111 PCI and PCIe Ethernet controllers.

NICs based on the 8139C+ and 810xE are capable of 10 and 100Mbps speeds over CAT5 cable. NICs based on the 8169, 816xS, 811xS, 8168 and 8111 are capable of 10, 100 and 1000Mbps operation.

All NICs supported by the **re** driver have TCP/IP checksum offload and hardware VLAN tagging/insertion features, and use a descriptor-based DMA mechanism. They are also capable of TCP large send (TCP segmentation offload).

The 8139C+ is a single-chip solution combining both a 10/100 MAC and PHY. The 8169 is a 10/100/1000 MAC only, requiring a GMII or TBI external PHY. The 816xS, 811xS, 8168 and 8111 are single-chip devices containing both a 10/100/1000 MAC and 10/100/1000 copper PHY. Standalone 10/100/1000 cards are available in both 32-bit PCI and 64-bit PCI models. The 8110S is designed for embedded LAN-on-motherboard applications.

The 8169, 8169S and 8110S also support jumbo frames, which can be configured via the interface MTU setting. The MTU is limited to 7422, since the chip cannot transmit larger frames. Selecting an MTU larger than 1500 bytes with the ifconfig(8) utility configures the adapter to receive and transmit jumbo frames.

The **re** 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. The RealTek gigE chips support 1000Mbps in **full-duplex** mode only.

The **re** 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 **re** driver supports RealTek RTL8139C+, RTL8169, RTL816xS, RTL811xS, RTL8168, RTL810xE and RTL8111 based Fast Ethernet and Gigabit Ethernet adapters including:

- Alloy Computer Products EtherGOLD 1439E 10/100 (8139C+)
- Compaq Evo N1015v Integrated Ethernet (8139C+)
- Corega CG-LAPCIGT Gigabit Ethernet (8169S)
- D-Link DGE-528(T) Gigabit Ethernet (8169S)
- Gigabyte 7N400 Pro2 Integrated Gigabit Ethernet (8110S)
- LevelOne GNC-0105T (8169S)
- LinkSys EG1032 (32-bit PCI)
- PLANEX COMMUNICATIONS Inc. GN-1200TC (8169S)
- TP-Link TG-3468 v2 Gigabit Ethernet (8168)
- USRobotics USR997902 Gigabit Ethernet (8169S)
- Xterasys XN-152 10/100/1000 NIC (8169)

LOADER TUNABLES
Tunables can be set at the loader(8) prompt before booting the kernel or stored in loader.conf(5).

hw.re.intr_filter
         This tunable makes driver use interrupt filter handler on controllers that support MSI/MSI-X capability. If MSI/MSI-X is disabled by administrator this tunable has no effect and driver will

use interrupt filter handler. The default value is 0 to use interrupt thread handler.

hw.re.msi_disable
> This tunable disables MSI support on the Ethernet hardware. The default value is 0.

hw.re.msix_disable
> This tunable disables MSI-X support on the Ethernet hardware. The default value is 0.

hw.re.prefer_iomap
> This tunable controls which register mapping should be used on the specified device. A non-zero value enables I/O space register mapping. The default value is 0 to use memory space register mapping.

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

dev.re.%d.int_rx_mod
> Maximum amount of time to delay receive interrupt processing in units of 1us. The accepted range is 0 to 65, the default is 65(65us). Value 0 completely disables the interrupt moderation. The interface need to be brought down and up again before a change takes effect.

DIAGNOSTICS
re%d: couldn't map memory A fatal initialization error has occurred.

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

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

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

re%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.

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

re%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), rgephy(4), vlan(4), ifconfig(8)

RealTek Semiconductor RTL8139C+, RTL8169, RTL8169S and RTL8110S datasheets, https://www.realtek.com.

HISTORY

The **re** device driver first appeared in FreeBSD 5.2.

AUTHORS

The **re** driver was written by Bill Paul *<wpaul@windriver.com>*.

BUGS

The Xterasys XN-152 32-bit PCI NIC, which uses the RTL8169 MAC and Marvell 88E1000 PHY, has a defect that causes DMA corruption if the board is plugged into a 64-bit PCI slot. The defect lies in the board design, not the chip itself: the PCI REQ64# and ACK64# lines should be pulled high, but they are not. The result is that the 8169 chip is tricked into performing 64-bit DMA transfers even though a 64-bit data path between the NIC and the bus does not actually exist.

Unfortunately, it is not possible to correct this problem in software, however it is possible to detect it. When the **re** driver is loaded, it will run a diagnostic routine designed to validate DMA operation by placing the chip in digital loopback mode and initiating a packet transmission. If the card functions properly, the transmitted data will be echoed back unmodified. If the echoed data is corrupt, the driver will print an error message on the console and abort the device attach. The user should ensure the NIC is installed in a 32-bit PCI slot to avoid this problem.

The RealTek 8169, 8169S and 8110S chips appear to only be capable of transmitting jumbo frames up to 7.5K in size.

If this driver is causing problems then an updated driver from the vendor can be found in ports under net/realtek-re-kmod.