NAME

sym - NCR/Symbios/LSI Logic 53C8XX PCI SCSI host adapter driver

SYNOPSIS

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

> **device pci**
> **device scbus**
> **device sym**

To disable PCI parity checking (needed for broken bridges):
options SYM_SETUP_PCI_PARITY=<boolean>

To control driver probing against HVD buses:
options SYM_SETUP_SCSI_DIFF=<bit combination>

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

> sym_load="YES"

DESCRIPTION

This driver provides support for the Symbios/LSI Logic 53C8XX PCI SCSI controllers.

Driver features include support for wide SCSI busses and fast10, fast20, fast40 and fast80-dt synchronous data transfers depending on controller capabilities. It also provides generic SCSI features such as tagged command queueing and auto-request sense. This driver is configured by default for a maximum of 446 outstanding commands per bus, 8 LUNs per target and 64 tagged tasks per LUN. These numbers are not so much limited by design as they are considered reasonable values for current SCSI technology. These values can be increased by changing appropriate constants in driver header files (not recommended).

This driver supports the entire Symbios 53C8XX family of PCI SCSI controllers. It also offers the advantage of architectural improvements available only with newer chips.

sym notably handles phase mismatch from SCRIPTS for the 53C896, 53C895A, and 53C1010 cores. As a result, it guarantees that no more than 1 interrupt per IO completion is delivered to the CPU, and that the SCRIPTS processor is never stalled waiting for CPU attention in normal situations.

sym also uses LOAD/STORE SCRIPTS instructions for chips that support it. Only the early 810, 815 and 825 NCR chips do not support LOAD/STORE. Use of LOAD/STORE instead of MEMORY

MOVE allows SCRIPTS to access IO registers internal to the chip (no external PCI cycles). As a result, the driver guarantees that no PCI self-mastering will occur for chips that support LOAD/STORE.

LOAD/STORE instructions are also faster than MEMORY MOVE because they do not involve the chip DMA FIFO and are coded on 2 DWORDs instead of 3.

For the early NCR 810, 815 and 825 chips, the driver uses a separate SCRIPTS set that uses MEMORY MOVE instructions for data movements. This is because LOAD/STORE are not supported by these chips.

HVD/LVD capable controllers (895, 895A, 896, and 897) report the actual bus mode in the STEST4 chip IO registers. This feature allows the driver to safely probe against bus mode and to set up the chip accordingly. By default the driver only supports HVD for these chips. For other chips that can support HVD but not LVD, the driver has to probe implementation dependent registers (GPIO) in order to detect HVD bus mode. Only HVD implementations that conform with Symbios Logic recommendations can be detected by the driver. When the *SYM_SETUP_SCSI_DIFF* kernel option is assigned a value of 1, the driver will also probe against HVD for 825a, 875, 876 and 885 chips, assuming Symbios Logic compatible implementation of HVD.

When the *SYM_SETUP_PCI_PARITY* is assigned a value of 0, the driver will not enable PCI parity checking for 53C8XX devices. PCI parity checking should not be an option for PCI SCSI controllers, but some systems have been reported to fail using 53C8XX chips, due to spurious or permanent PCI parity errors detected. This option is supplied for convenience but it is neither recommended nor supported.

This driver offers other options that are not currently exported to the user. They are defined and documented in the *sym_conf.h* driver file. Changing these options is not recommended unless absolutely necessary. Some of these options are planned to be exported through sysctl(3) or an equivalent mechanism in a future driver releases and therefore, no compatibility is guaranteed.

At initialization, the driver tries to detect and read user settings from controller NVRAM. The Symbios/Logic NVRAM layout and the Tekram NVRAM layout are currently supported. If the reading of the NVRAM succeeds, the following settings are taken into account and reported to CAM:

Host settings	Symbios	Tekram
SCSI parity checking	Y	N
Host SCSI ident	Y	Y
Verbose messages	Y	N
Scan targets hi-lo	Y	N
Avoid SCSI bus reset	Y	N

Device settings	Symbios	Tekram
Synchronous period	Y	Y
SCSI bus width	Y	Y
Queue tag enable	Y	Y
Number of tags	NA	Y
Disconnect enable	Y	Y
Scan at boot time	Y	N
Scan LUN	Y	N

Devices that are configured as disabled for 'scan' in the NVRAM are not reported to CAM at system start-up. They can be discovered later using the 'camcontrol rescan' command.

The table below summarizes the main features and capabilities of the NCR/Symbios/LSI Logic 53C8XX family of PCI SCSI controllers.

Chip	Sync	Width	SRAM	PCI64	Supported
sym53c810	10MHz	8Bit	N	N	Y
sym53c810a	10MHz	8Bit	N	N	Y
sym53c815	10MHz	8Bit	N	N	Y
sym53c825	10MHz	16Bit	N	N	Y
sym53c825a	10MHz	16Bit	4KB	N	Y
sym53c860	20MHz	8Bit	N	N	Y
sym53c875	20MHz	16Bit	4KB	N	Y
sym53c876	20MHz	16Bit	4KB	N	Y
sym53c885	20MHz	16Bit	4KB	N	Y
sym53c895	40MHz	16Bit	4KB	N	Y
sym53c895A	40MHz	16Bit	8KB	N	Y
sym53c896	40MHz	16Bit	8KB	Y	Y
sym53c897	40MHz	16Bit	8KB	Y	Y
sym53c1510D	40MHz	16Bit	4KB	Y	Y
sym53c1010	80MHz	16Bit	8KB	Y	Y

HARDWARE

The **sym** driver provides support for the following Symbios/LSI Logic PCI SCSI controllers:

- 53C810
- 53C810A
- 53C815
- 53C825
- 53C825A

- 53C860
- 53C875
- 53C876
- 53C895
- 53C895A
- 53C896
- 53C897
- 53C1000
- 53C1000R
- 53C1010-33
- 53C1010-66
- 53C1510D

The SCSI controllers supported by **sym** can be either embedded on a motherboard, or on one of the following add-on boards:

- ASUS SC-200, SC-896
- Data Technology DTC3130 (all variants)
- DawiControl DC2976UW
- Diamond FirePort (all)
- NCR cards (all)
- Symbios cards (all)
- Tekram DC390W, 390U, 390F, 390U2B, 390U2W, 390U3D, and 390U3W
- Tyan S1365

MISC
The DEC KZPCA-AA is a rebadged SYM8952U.

SEE ALSO
cd(4), da(4), sa(4), scsi(4), camcontrol(8)

HISTORY
The **sym** driver appeared in FreeBSD 4.0.

AUTHORS
The **sym** driver was written by Gerard Roudier and is derived from the Linux sym53c8xx driver from the same author. The sym53c8xx driver is derived from the ncr53c8xx driver, which was ported from the FreeBSD ncr(4) driver to Linux-1.2.13. The original ncr(4) driver was written for 386BSD and FreeBSD by Wolfgang Stanglmeier and Stefan Esser.

BUGS
  No known bugs.