

Explanatory Notes on SCSI

Overview SCSI Standards

SCSI-1		SE	5MB/s	8	passive	25 pol SUB-D 50 Centronics Mini SUB-D
SCSI-2	Ultra	SE	10MB/s	8	passive	
	Wide	SE	20MB/s	8	passive	
SCSI-3	UW	SE	40MB/s	16	active	68 pol Mini SUB-D / VHD-con- nector
	U2W	LVD	80MB/s	16	active	
	U160	LVD	160MB/s	16	active	
	U320	LVD	320MB/s	16	active	
Firewire	serial		800MB/s		active	4 pol-con- nector
Fibre-Channel	serial		800MB/s		active	

8 = 8Bit-Bus, 16 = 16Bit-Bus, SE: single ended (TTL-Level),
LVD: low voltage differential (-3,3V...3,3V),
passive = passive termination, active = active termination

General:

- No Y-connections!
- Never place flat cables beside the CPU as damage and interference from heat and emissions may occur
- Never bend a flat cable sharply, you might expose the wiring

Termination:

- Only internal/external devices:
 terminate last device and host-adapter
- Internal and external devices:
 terminate last internal and external device,
 don't terminate host-adapter

8-bit Device on 16-bit bus:

- All devices are SE:
 16-bit terminator on the end of the bus
 and 16-bit-to-8-bit adapter for the 8-bit devices

- LVD and SE devices:
 only works with a SCSI bridge (e.g. Sym53C141) or switching
 the 16-bit devices to SE

That means:
Either 1 double-channel-HBA or 2 single-channel-HBAs

RAID Systems (most common configurations):

RAID 0	striping without parity	no redundancy, very fast
RAID 1	mirroring	redundancy, high overhead writing
RAID 5	mirroring with parity	error correction, good performance r/w
RAID 10	mirroring with striping	high data safety, good performance

Performance:

- The HBA negotiates the speed for each individual device
- 8-bit devices do not slow down 16-bit devices
- Performance-loss only during data transfer from and to 8-bit devices

Additional Information

Compiling a New Kernel:

```
# cd /usr/src/sys/i386/conf
# cp GENERIC SCSIKERNEL
```

In addition to the device driver for your SCSI device your kernel configuration must contain following entries:

```
# SCSI peripherals
device scbus # SCSI bus (required)
device da # Direct Access (disks)
device sa # Sequential Access (tape etc)
device cd # CD
device pass # Pass-through device
              (direct SCSI access)
```

Save your configuration:

```
# cd /usr/src
# make buildkernel KERNCONF=SCSIKERNEL
# make installkernel KERNCONF= SCSIKERNEL
```

You may choose any name for your SCSI-capable kernel, SCSIKERNEL is just an example. Pay attention to any error messages while compiling and installing. Also make sure you have backed up your old kernel and it's modules, before creating a new kernel.

Helpful Commands

camcontrol: Control your SCSI devices
camcontrol rescan all: Rescan to look for new devices
camcontrol devlist: Show all SCSI devices on the bus

FreeBSD-Homepage: www.FreeBSD.org
 BSD-Forum (English): www.BSDforums.org

Notice

Experimental support for iSCSI is already available for FreeBSD and will be finished soon.

If you see something not listed here or have any suggestions, please contact Daniel.Seuffert@allBSD.de, we will update this flyer. Thanks for helping us!

FreeBSD

SCSI



Hostadapter (HBA):

Adaptec: AIC7770 , AIC7850, AIC7860, AIC7870, AIC7880, AIC7890, AIC7891, AIC7892, AIC7895, AIC7896, AIC7897, AIC7899, AIC7901, AIC7901A , AIC7902, AIC-7110, AHA-1505, AHA-1510A, AHA-1510B, AHA-1520A, AHA-1520B, AHA-1522A, AHA-1522B, AHA-1535, AHA-1460, AHA-1460B, AHA-1460C, AHA-1460D (PC Card), AHA-1030B, AHA-1030P (PC98), NEC PC-9801-100 (PC98), AHA-154xB, AHA-154xC, AHA-154xCF, AHA-154xCP, AHA-1640, AHA-174x(in 154x emulation mode), DTC 3290 (in 1542 emulation mode), AHA-1740, AHA-1742, AHA-1740A, AHA-1742A, 274X(W), 274X(T), 284X, 2910, 2915, 2920, 2930C, 2930U2, 2940, 2940J, 2940N, 2940U, 2940AU, 2940UW, 2940UW Dual, 2940UW Pro, 2940U2W, 2940U2B, 2950U2W, 2950U2B, 19160B, 29160B, 29160N, 3940, 3940U, 3940AU, 3940UW, 3940AUW, 3940U2W, 3950U2, 3960, 39160, 3985, 4944UW, NEC PC-9821Xt13 (PC-98), NEC RvII26 (PC-98), NEC PC-9821X-B02L/B09 (PC-98), NEC SV-98/2-B03 (PC-98), 29320, 39320, AAC-364, SCSI RAID 2120S, SCSI RAID 2130S, SCSI RAID 2200S, SCSI RAID 2410SA, SCSI RAID 2810SA, SCSI RAID 5400S

Adaptec Zero-Channel SCSI RAID 2000S, 2005S, 2010S, 2015S, 2100S, 2110S, 3200S, 3210S, 3400S, 3410S, PM1554, PM1564, PM2554, PM2564, PM2664, PM2754, PM2865, PM3754, PM3755U2B, V Millennium, PM3757

AdvanSys: ABP510/5150, ABP5140, ABP5142, ABP902/3902, ABP3905, ABP915, ABP920, ABP3922, ABP3925, ABP930, ABP930U, ABP930UA, ABP960, ABP960U, ABP542, ABP742, ABP842, ABP940, ABP940UA/3940UA, ABP940U, ABP3960UA, ABP970, ABP970U, ABP752, ABP852, ABP950, ABP980, ABP980U, ABP980UA/3980UA, MELCO IFC-USP (PC-98), RATOX REX-PCI30 (PC-98), @Nifty FNECHARD IFC-USUP-TX (PC-98), ABP940UW/ABP3940UW, ABP950UW, ABP970UW, ABP3940U2W, ABP3950U2W

BusLogic: BT-445C, BT-445S, BT-540CF, BT-542B, BT-542D, BT-542D, BT-545C, BT-545S, BT-640, BT-742A, BT-742A, BT-747C, BT-747D, BT-747S, BT-757C, BT-757CD, BT-757D, BT-757S, BT-946C, BT-948, BT-956C, BT-956CD, BT-958, BT-958D, SDC3211B / SDC3211F

DPT: Smart Cache Plus, Smart Cache II (PM2?2?, PM2022 [EISA], PM2024/PM2124 [PCI]) (Gen2), Smart RAID II (PM3?2?, PM3021, PM3222), Smart Cache III (PM2?3?), Smart RAID III (PM3?3?, PM3332 [EISA], PM3334UW [PCI]) (Gen3), Smart Cache IV (PM2?4?, PM2042 [EISA], PM2044/PM2144 [PCI]) (Gen4), Smart RAID IV

AMI (American Megatrend): AMI MegaRAID 320-1, 320-2, 320-4X, Series 418, Enterprise 1200 (Series 428), 1300 (Series 434), 1400 (Series 438), 1500 (Series 467), 1600 (Series 471), 1500 (Series 467), 1600 (Series 493), 1650 (Series 4xx), 100 (Series 466WS), 200 (Series 466), 300 (Series 490), 500 (Series 475), Dell PERC, 2/SC, 2/DC, 3/DCL, 3/QC, 4/Di, HP NetRAID-1/Si, 3/Si (D4943A), Embedded NetRAID

Mylex (jetzt LSI Logic): DAC960P, DAC960PD / DEC KZPSC (Fast Wide), DAC960PDU, DAC960PL, DAC960PJ, DAC960PG, DAC960PU / DEC PZPAC (Ultra Wide), AcceleRAID 150 (DAC960PRL), 160, 170, 250 (DAC960PTL1), 352, eXtremeRAID 1100 (DAC1164P), 2000, 3000, Ultra-SCSI DEC KZPAC-AA (1-ch, 4MB cache), KZPAC-CA (3-ch, 4MB), KZPAC-CB (3-ch, 8MB cache)

SymBIOS / LSI Logic: 53C810, 53C810A, 53C815, 53C820, 53C825, 53C825A, 53C860, 53C875, 53C875J, 53C876, 53C885, 53C895, 53C895A, 53C896, 53C897, 53C1000, 53C1000R, 53C1010-33, 53C1010-66, 53C1510D, ASUS SC-200, SC-896, DTC3130, DC2976UW, Diamond FirePort (all), I-O DATA SC-UPCI (PC-98), Logitech LHA-521UA (PC-98), NCR cards (all), Symbios cards (all), LSI Logic 53c1030 (Dual Ultra320 SCSI), FC909 (1Gb/s Fibre Channel), FC909A (Dual 1Gb/s Fibre Channel), FC919 (2Gb/s Fibre Channel), FC929 (Dual 2Gb/s Fibre Channel)

Qlogic: ISP1000, SBS440, ISP1020, ISP1040, SBS450, SBS470, Qlogic 1240, 1020, 1040, 1080, 1280, 12160, 2100, 2102, 2200, 2202, 2204, 2300, 2312

Antares P-0033

Tekram: Tekram DC390, DC390T, DC390W, 390U, 390F, 390U2B, 390U2W, 390U3D, 390U3W, DC-315, DC-315U, DC-395F, DC-395U, DC-395UW, DC-395U2W, Tyan S1365

Compaq/Hewlett-Packard: Compaq SMART Array 221, Integrated SMART Array Controller, SMART Array 4200, 4250ES, 3200, 3100ES, SMART-2/DH, SMART-2/SL, SMART-2/P, SMART-2/E, SMART Controller, Smart Array 5300, 532, Smart Array 5i, 5312, Smart Array 6i, 641, 642, 6400, 6400 EM, 6422 HP Smart Array V100, Smart Array 20 (MSA20), 500 (MSA500)

Intel: Intel RAID Controller SRCMR, Server RAID Controller U3-1, U3-1L (SRCU31La), U3-2 (SRCU32), SRCU21 (discontinued), SRCU31 & SRCU31L (older revision, not compatible)

IBM: IBM ServeRAID 3H, 4L/4M/4H, Series 5, 6i/6M

Sonstige Hostadapter: I-O DATA PCSC-DV, KME KXLC002 (TAXAN ICD-400PN, etc.), KXLC004, UJD-CD450, Macnica Miracle SCSI-II mPS110, Media Intelligent MSC-110, MSC-200, NEC PC-9801N-J03R, New Media Corporation BASICS SCSI, Qlogic Fast SCSI, RATOX REX-9530, REX-5572 (SCSI only), Future Domain SCSI2GO, Future Domain TMC-18XX/3260, IBM SCSI PCMCIA Card, ICM PSC-2401 SCSI, MELCO IFC-SC, RATOX REX-5536, REX-5536AM, REX-5536M, REX-9836A, Alpha-Data AD-PCS201, I-O DATA CBSC16, WD7000,

ProAudio Spectrum and SoundBlaster SCSI), Matsushita CR-562, CR-563, Sony proprietary interface