



OpenVMS CD & DVD, IDE ATA & ATAPI

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- ***This is a technical session***
- Target Audience:
 - OpenVMS Programmers, System Managers
 - Folks interested in Backup or Distribution
- Some OpenVMS Familiarity is Assumed:
 - User Commands
 - System Management Commands
 - Programming APIs

- ***Topics Covered***
- Hardware:
 - ATA & ATAPI
 - Disks, CD & DVD devices
- Software:
 - APIs
- Media-Recording Applications
 - Open Source
 - Commercial



support statement

this presentation is not and is not intended as a support statement. both supported and unsupported devices, software, and configurations are cited.



Support Statement



Device references here do not imply nor deny support, nor do references imply nor deny any testing, compatability nor even basic correct operation of the devices.

Some devices and some software referenced here may be or are formally supported on OpenVMS, and some are not.

Please consult formal corporate support statements and the applicable Software Product Descriptions for the supported devices and supported software, and for other support-related information.

Please don't call the Customer Support Center based solely on information found in this



the hardware

cables, controllers, peripherals.



Common ATA Devices



Common ATA Devices...

- Disks
- Disks
- Disks
- Did I mention Disks?

Common ATAPI Devices

Common ATAPI Devices...

- Disks
- Iomega Zip
- CD: Compact Disk
 - CD-ROM
 - CD-R, CD-RW
- DVD: Digital Versatile Disk
 - DVD-ROM
 - DVD+R/RW
 - DVD-R/RW
 - DVD-RAM

ATA: AT/Attachment

Very simple and very low-cost interface...

- Used for disk devices
- Various interface speeds available
- Typically fixed sector size
 - 512 bytes per sector

ATAPI: ATA/Packet Interface

Simple and low-cost interface...

- Provides for CD, DVD and other devices' needs
 - door lock & unlock
 - drive door or tray
 - media status
 - button I/O
- Provides SCSI-like Packet Interface
- ATAPI devices can have differing sector sizes
 - 512 bytes per sector
 - 2048 bytes per sector
 - other values possible

ATA & ATAPI Sector Sizes

Common ATAPI Device Sector Sizes...

- Disks, Iomega Zip
 - 512 byte sectors
- CD, DVD
 - 2048 byte sectors

Devices and Available Form Factors...

- CD and DVD, full-size disks
 - Most CD and DVD devices
- Floppy disk replacement
 - Iomega Zip
- Notebook-sized peripherals
 - MultiBay disks, CD, DVD
 - Integrity Servers

Controllers and Interconnects...

- Host ATA and ATAPI controller
 - PIO
 - DMA

Controllers and Interconnects...

- Controller cabling
 - Traditional Parallel Cable
 - 80pin berg connector ribbon cable
 - round cables
 - Serial Cable
 - much easier to route, and to maintain
 - much smaller connectors
 - negligible thermal benefit

Drive Selection...

- Parallel ATA/ATAPI has one or two devices per cable
 - D0; primary device, DQc0:
 - D1; secondary device, DQc1:

Available Drive Selection

Drive (D0 or D1) Selection...

- Cable select
 - Host and D0 are on far ends of cable
 - D1 is the middle connector
- Drive select
 - More commonly chosen
 - D0, D1 and (no) cable select via jumpers/switches

Available Drive Selection

Drive (D0 or D1) Selection...

- SRM can require D0 bootstrap
 - May not boot D1 device

Available Drive Selection

Drive (D0 or D1) Selection...

- Serial ATA/ATAPI (SATA) has no D1; only D0
 - Cables also compatible with SAS (Serial SCSI)
 - Some SAS controllers may work with SATA devices



the software

specifications & programming interfaces



\$qio



The core OpenVMS I/O interface is \$qio[w]...

- See the OpenVMS I/O Abuser's Reference Manual

Committees: SFF, T13, T10...

- Small Form Factor (SFF) Cmte
 - SFF 8020 (withdrawn, but well worth reading)
 - SFF 8070
- T13 ATA/ATAPI Cmte
 - ATA/ATAPI Specs
- T10 SCSI Cmte
 - SPC: SCSI Primary Commands
 - SBC: SCSI Block Commands
 - MMC: MultiMedia Commands

Command Interface

OpenVMS SCSI T10 Command Structure...

- Two or three Component Buffers
 - Buffer Descriptor
 - DKDRIVER
 - DQDRIVER
 - CDB: The Command Packet
 - Optional Parameter or I/O Buffer
 - optional data for specific T10 commands
 - read or write buffers for others

DQDRIVER and DKDRIVER Structures...

- IO\$_DIAGNOSE
 - S2DGBDEF (DKDRIVER) SCSI
 - T10DEF? (DQDRIVER) ATA/ATAPI
- See DECW\$EXAMPLES:DECW\$CDPLAYER.*

Sense Key, ASC, ASCQ

Error processing returns coded status...

- Sense Key (SKEY)
- Associated Sense Code (ASC)
- ASC Qualifier (ASCQ)

Access to listings of these values are available, and are most definitely necessary when working with ATAPI...

Required Commands

Command Sequence documentation sparse

- Reference materials widely available
- Tutorial documentation "sparse"
- Trial and error common
- Device "individuality" is (still) widespread
 - MMC provides the core command set
 - Errors and behaviours and timings can vary (widely)
 - Inter-vendor and even intra-vendor differences



the utilities and tools

for writing CD and DVD data media



Data Media Mastering

Steps for Writing CD and DVD data media...

- Choose a Volume Structure
- Generate and Populate the Media Master
- WRITEBOOT or SETBOOT (if needed)
- Copy the Master to the Recordable Media

The Data Master Disk (or Partition)

LD and VD64 Logical Disk Drivers...

- Used to master the media
 - LD is latent in V7.3-1 and later
 - LD and VD64 available via Freeware

Volume Structures

INITIALIZE and ODS-2, ODS-5...

- Generate an OpenVMS structure
 - Specify /GPT, if needed
 - BTB (VAX and Alpha)
 - MBR (I64)
 - GPT (I64)

Volume Structures

INITIALIZE/GPT...

- [000000]GPT.SYS contains
 - Boot Block
 - Front and Back GPT Arrays
 - Two Extents; one of few core files that is non-contiguous

Volume Structures

ISO-9660 and El Torito...

- Can coexist with ODS-2 and ODS-5
- mkisofs
- One of the supported volume structures for EFI boot

Bootblocks and Sector Sizes

WRITEBOOT and SETBOOT...

- Used during mastering of the media
 - WRITEBOOT in OpenVMS VAX, Alpha
 - SETBOOT present in OpenVMS Alpha, I64

*Beware sector size for OpenVMS I64 EFI bootstraps;
OpenVMS VAX and OpenVMS Alpha are 512, OpenVMS
I64 requires 2048 byte sectors for bootstrap.*

*Once bootstrapped, DQDRIVER presents 2048 byte blocks as
512 byte blocks, while DKDRIVER requires SCSI devices
that can present 512 byte blocks*

Software Packages

CDRTOOLS, DVDRTOLS, etc...

- Various packages available
 - Open source packages
 - Commercial packages
- CDRECORD.COM
 - OpenVMS Alpha V7.3-1 and later
- Tools on Other Platforms
 - Block-by-Block copy



summary

resources and URLs



For pointers to...

- Recording Tools
- Examples

<http://www.hp.com/go/openvms/faq/>

Where to go for help?

<http://www.t10.org/>

<http://www.t13.org/>

<http://www.hp.com/go/openvms/>

<http://www.hp.com/go/openvms/faq/>

<http://www.hp.com/go/openvms/wizard/>

<http://www.hp.com/go/openvms/freeware/>

Thank You!

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Q & A

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