Note: this presentation was made to the Joint T10/T11 Tape Working Group in Colorado Springs. Following comments from that group a new proposal is being prepared using dedicated commands. This will be presented in August.

Proposal for Storage and Access of Data on Media Auxiliary Memory T10/99-232r0

Steve Jerman
Hewlett Packard

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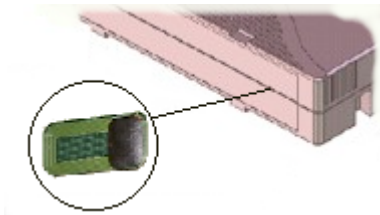
Overview of Presentation

- Background on the technology
- Opportunities and Benefits
- The Need for a Common Access Method
- Overview of the Proposal
- Implementing software support
- Standardisation Route
- Current Status
- Actions
- (more detail on specification)

Background on the Technology

- Tape cartridges are incorporating E^2PROM

Sony AIT-MIC



HP/IBM/Seagate LTO-CM

?

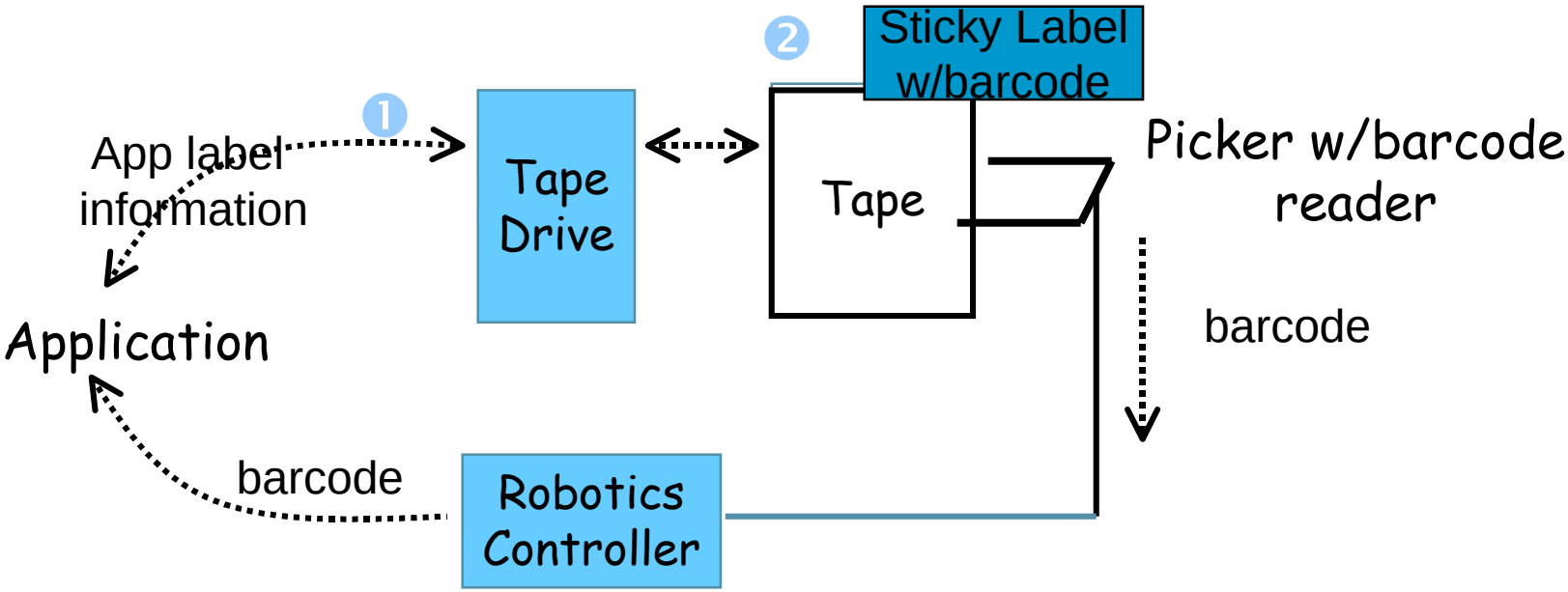
Others to come...

"Media Auxiliary Memory" is generic term
Primary purpose is to speed up drive internal operations
e.g. load/unload, spacing - transparent to host

Opportunities and Benefits

- Free space in MAM can be used by host software for solution value-add
  - Fast library inventory via picker arm-mounted MAM readers
  - Independent label printers
  - Correlation of media condition and drive load history
  - Improved media tracking in the enterprise
  - Enables/safeguards media sharing in Storage Area Networks
  - Anything else software vendors can think of...

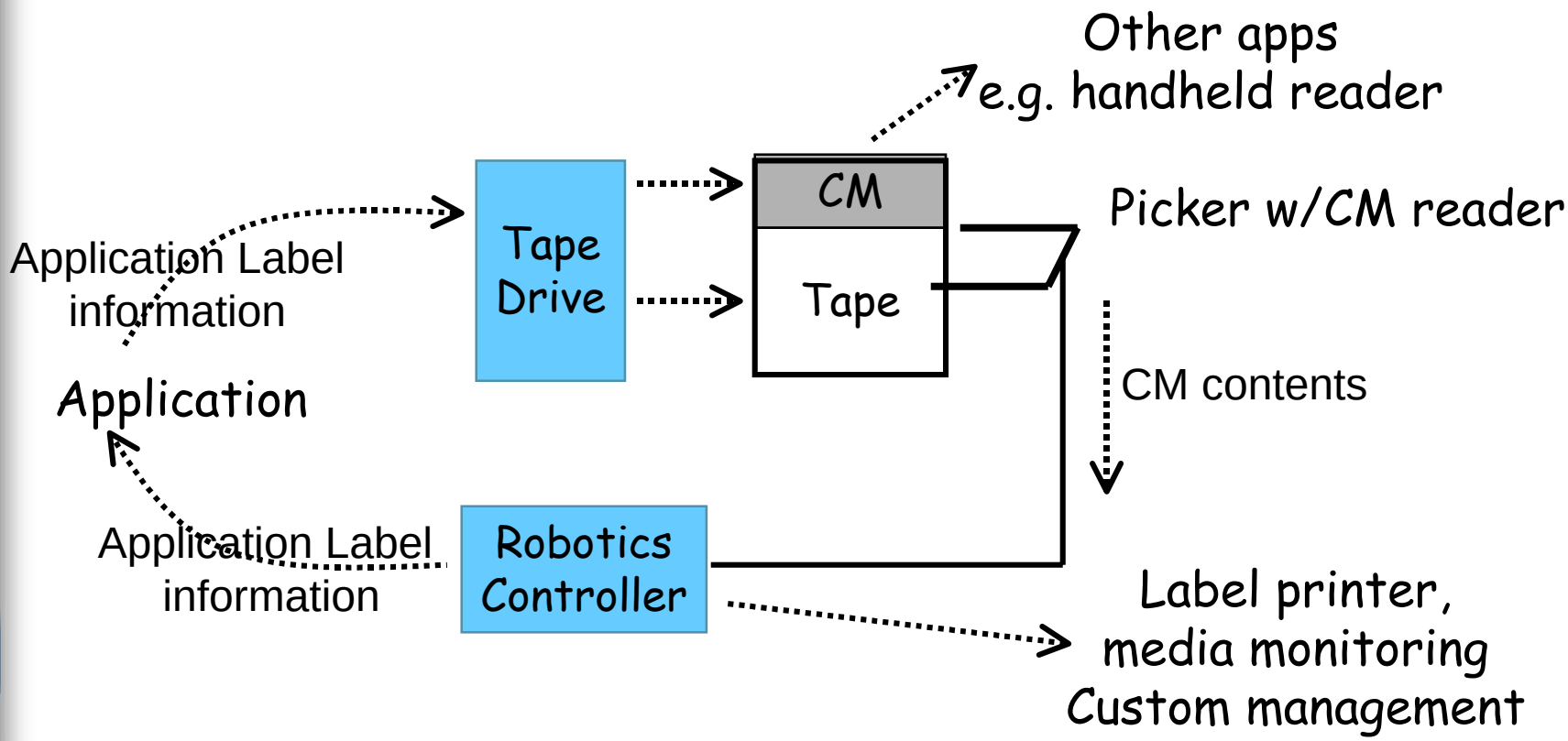
Current Libraries - Barcodes



Issues

1. Application needs to establish and confirm barcode to application label relationship ➔tape census
2. Physical label subject to human error

MAM in Libraries



- ☑ Library & drive aware of application level information
- ☑ No human interaction ➔less errors
- ☑ Enables extended applications ➔ e.g. label printer
- ☒ ISV Support needed ➔needs standards!

Common Access Method

- Application software vendors require a common access method to avoid re-implementing for each tape drive technology
- A common, technology-independent access method is being proposed by Hewlett Packard - “Proposal for Storage and Access of Data on Media Auxiliary Memory”
- Tape drive vendors need to move to using SCSI Log pages ratified through ANSI T10 - no more Vendor Unique pages

Overview of the Proposal

- **“Proposal for Storage and Access of Data on Media Auxiliary Memory”**
  - Version 5.2, 19 May 1999 (T10/99-148r1)
- **Proposes:**
  - **Log page 0Ah** (currently reserved by ANSI) to be the ‘Media Auxiliary Memory Information Page’ - allows reading and writing to MAM
  - **Inquiry Vital Product Data page 84h** to be the ‘Media Auxiliary Memory’ page - allows media detection in SANs where devices may be reserved by other hosts
  - **Read Element Status** command extensions to allow media changer devices to read MAM

Implementing Software Support

- All MAM parameters are accessible via a single vendor-independent SCSI Log page
- Mandatory MAM parameters are common to all tape drive and media technologies
- Read Element Status command returns *all* MAM parameters for *all* cartridges in a library with one command
- Few mandatory host parameters - easy to maintain with a single Log Select command

Standardisation Route

- Proposal versions on TapeAlert Working Group email reflector since February 1999
- ANSI X3/T10 SSC proposal T10/99-148r1
- Significant collaboration between HP and Sony to ensure AIT/LTO compatibility and future extensibility
- IHV/ISV comments/inputs integrated into proposal
- Nearly ready for inclusion in SSC ….

Current Status

- Still some minor outstanding issues
  - Not stable enough for inclusion in SSC
- But implementation will occur soon
  - Drive manufacturers are implementing
  - Some ISVs are very keen to use MAM are are ready to implement now
- So …

We request that placeholders be inserted into document reserving the necessary VPD and Log pages and referencing the latest version of T10/99-148

Specific Actions For SSC

- Identify Log Page 0Ah as reserved for this use. Reference **T10/99-148**
- Identify Inquiry Page 84h as reserved for this use. Reference **T10/99-148**

Other Actions

- SMC have been approached regarding Read Element Status
- Complete specification can be added to next version of SSC

Detail of Proposal (1)

- Data represented as logical *parameters* - physical MAM format irrelevant to host software
- Parameters grouped into *areas* to signify source of changes, and whether mandatory or optional

Parameter IDs	Area Name	Support in AIT media	Support in non-AIT media
0000h - 01FFh	AIT Compatibility area	Mandatory	Partial
0200h - 03FFh	Media Mandatory area	Mandatory	Mandatory
0400h - 04FFh	Device Mandatory area	Mandatory	Mandatory
0500h - 05FFh	Host Mandatory area	Mandatory	Mandatory
0600h - 06FFh	Media Vendor Unique area	Optional	Optional
0700h - 09FFh	Device Vendor Unique area	Optional	Optional
0A00h - FFFFh	Host Vendor Unique area	Optional	Optional

Detail of Proposal (2)

- AIT Compatibility / Multi-partition Area
  - Provided for compatibility with Sony's existing MIC format for AIT media,
  - Can be used by other multi-partition drives that wish to follow the AIT model.
  - Non-AIT drives need only support a subset of the parameters in this area
- Media Mandatory Area
  - Hardcoded at media manufacture time - read-only
  - Allows host to determine physical media characteristics, manufacture date, unique serial number, etc.

Detail of Proposal (3)

- Device Mandatory Area
  - Maintained by tape drive
  - Allows host to determine current media status, e.g. remaining tape capacity, remaining MAM capacity; and media history
    e.g. load count, TapeAlert flags, drive load history
- Host Mandatory Area
  - Maintained by software applications
  - Allows host to write basic ownership information e.g. application vendor, name and version; media text label; date and time last written

Detail of Proposal (4)

- Media Vendor Unique Area (optional)
  - Placeholder for future media vendor usage
- Device Vendor Unique Area (optional)
  - Drive technology-specific usage, e.g. extended multi-partition information, ECC/retry rates
- Host Vendor Unique Area (optional)
  - Software application value-add, e.g. backup session information, disaster recovery information
- Limitations
  - Typical 4kbyte MAM only leaves ~1.5kbytes for host usage. Not enough for a complete file catalog at the moment, but sizes will increase with time