LTO Drive / Tape Library Interface SCSI Encapsulated Protocol

Seagate Removable Storage Solutions
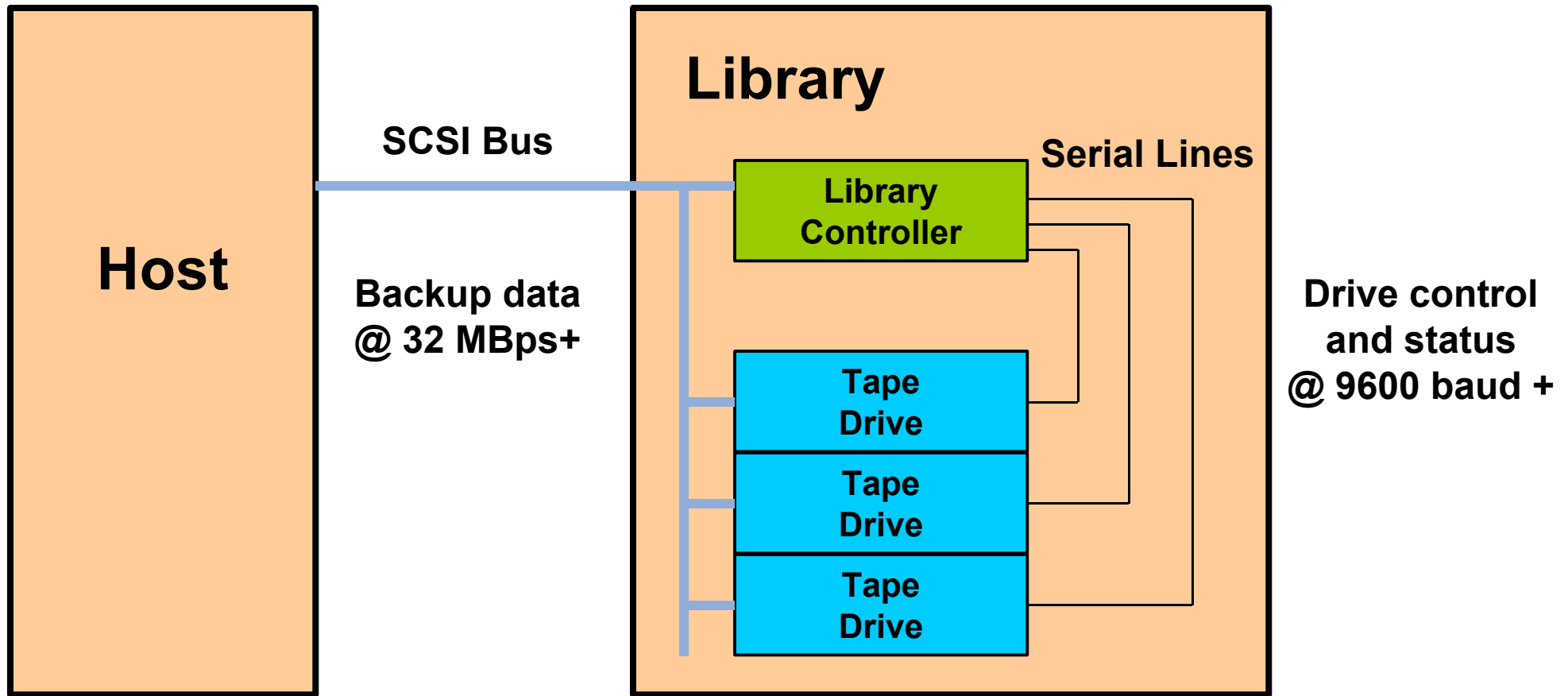
T10/01-346r0

Paul Suhler

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LTO Drive / Tape Library Interface

- Agenda
  - Design Goals
  - Features
  - Encapsulated SCSI Protocol
  - Summary

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Design Goals

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- Library queries drive

- Library controls drive

- Drive alerts library to errors

- Drive accepts LUN 1 commands and passes to library

Features

- SCSI commands transmitted in serial packets

- Information in standard and custom pages

- Commands from library not affected by reservations

- Asynchronous RS-422 at various rates

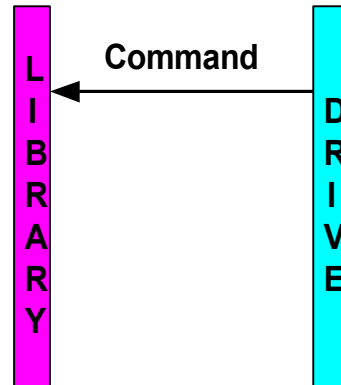# Encapsulated SCSI (ESP) Command Set

- All supported commands are available to library
    - Library mainly uses Inquiry/Mode/Log Sense/Select
    - Should not do Read or Write commands over serial link
- Vendor-specific pages
    - Status summary
    - Interface control (SCSI bus address, serial baud rate, reset)
- Alert functions:
    - Unit attention, deferred errors, Tape Alert
    - May never be implemented
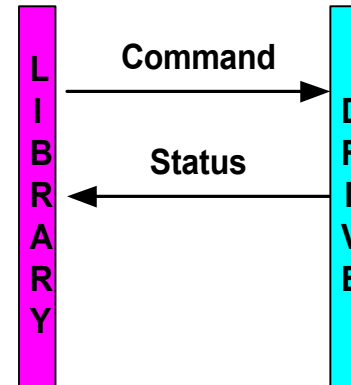
ESP Architecture

- Serial packet protocol encapsulates:
  - SCSI commands, including task management
  - SCSI data
  - SCSI status
  - Alerts

- Library interface task forwards commands and data to SCSI task for execution

- SCSI task sends data, status, and alerts to library task
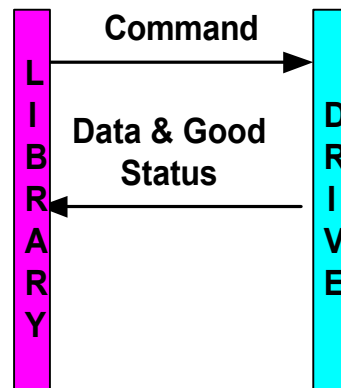
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ESP Information Over Serial Link

Alert Transaction

LIBRARY ← Command ← DRIVE

Non-Data Transaction

LIBRARY → Command → DRIVE
LIBRARY ← Status ← DRIVE

Read Transaction

LIBRARY → Command → DRIVE
LIBRARY ← Data & Good Status ← DRIVE

Write Transaction

LIBRARY → Command → DRIVE
LIBRARY ← Transfer Ready ← DRIVE
LIBRARY → Data → DRIVE
LIBRARY ← Status ← DRIVE

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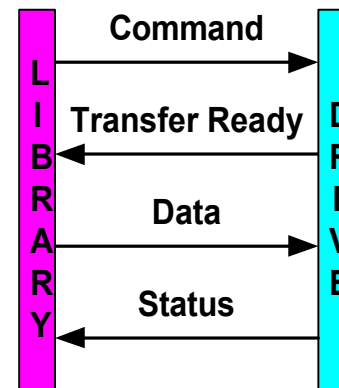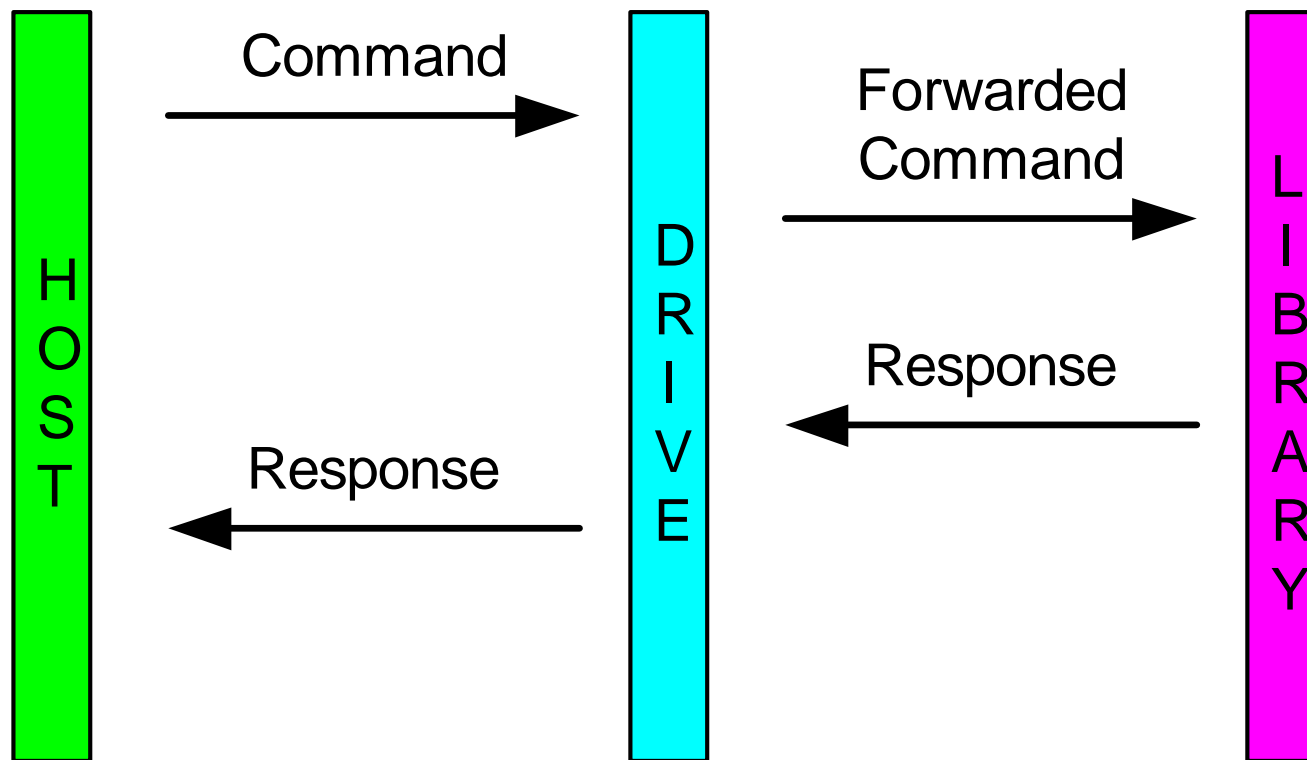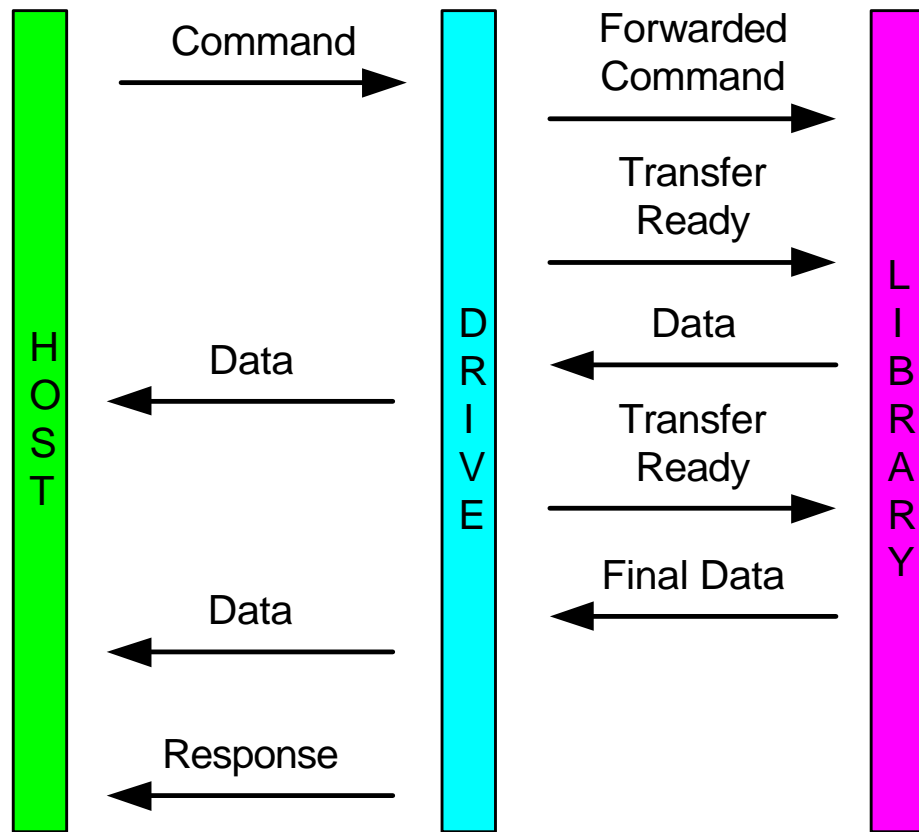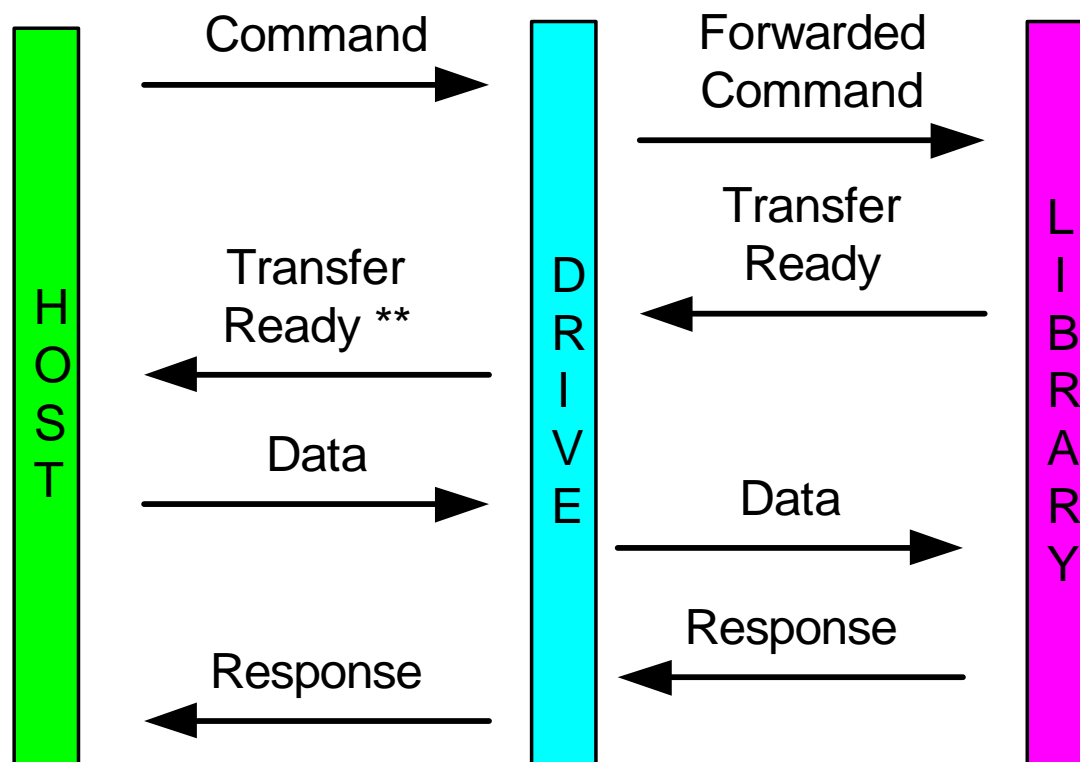
Command Forwarding (non-data)

Command Forwarding (data-in)

Command Forwarding (data-out)

** Fibre Channel drives only

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ESP Error Checking

- Link layer:
    - Packet header
    - Length
    - Checksum
    - Acknowledgement
- Transaction layer:
    - Packet loss
    - Data overrun/underrun
- Application layer:
    - Command validity

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Command Forwarding

- One drive in a library will accept commands at LUN 1

- Each command is sent to the library

- Library sends read data and command status to drive

- Drive returns data and status to host

- SCSI disconnect after command out

Summary

- Commands, alerts, and data over RS-422

- Reliable delivery

- Additional information via vendor-unique pages

- Accessible via serial port or SCSI bus

- Command forwarding

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Questions

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