

StorageWorks[™]

Summary of FC Hot Swap Issues

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digital



- Summary of two FC white papers written by Doug Hagerman of Digital
- Work in progress.
- Deals with Hot Swap and Sequential Device Support
- Some issues are common to all serial protocols.
- Ref:
 - X3T11/96-097
 - X3T10/96-156



- Hot Swap Summary
- Top Level Requirements, assumptions
 - Prevent recoverable transport errors induced by hot swap from disrupting the subsystem (aborting commands, etc)
 - Prevent out-of-order command scenarios
 - Assume bit error rates are not a factor
- Hot swap scenarios
 - Warm Swap - Bus Idle
 - Hot swap -- Bus active, device idle
 - Yank swap -- Bus active, device active.
- Swap designs
 - Disruptive swap
 - occurs without warning, O/S recovers as best it can
 - Controlled swap
 - O/S receives a signal of an impending swap.
 - Recovery managed by O/S



- Sequential Device Error Recovery on FC
- Classes of service
 - Class 1 -- confirmed receipt, point-to-point.
 - Class 2 -- Confirmed receipt, multiplexed
 - Class 3 -- Unconfirmed receipt, multiplexed.
- Scenario
 - All direct attach devices use class-3
 - Error rates speced in FC-PH at 1×10^{-12} (one every 17 minutes)
 - actual errors rates expected to be far lower
 - No frame-level error recovery
 - FC Specs error recovery at the sequence level only.
 - Sequence recovery assumes class 2 delivery



- Tapes must stream for throughput
 - Tapes are block-structured
 - Requires large data buffer
 - Drive maintains a pipeline of blocks which it strives to keep full by means of write-behind or read-ahead strategies.
- Recovery strategies
 - Write errors only
 - Assumes tape reads are not a problem
 - Large Write-behind cache
 - All data for the failed command is in cache
 - Host simply reissues command since no data has been committed to media
 - Small Write behind buffer recovery options
 - Special reposition command to write the data from point of failure
 - Rewind and reposition (undesirable)
 - To be discussed at ssc wg.