X3T9.2/87-144

StorageTek

August 14, 1987

TO: Accredited Standards Committee X3T9.2

FROM: Dennis Appleyard

SUBJECT: Additions to the Automatic Medium Changer Command Set

----

Current operating systems manage their tape resources by Volume ID. The Volume
ID is written on the medium and also physically attached to the exterior of the
tape reel or cartridge. The operating system requests a particular tape by
sending a message to the operator to mount the desired Volume ID. An automatic
tape library could be requested to mount a particular tape by Volume ID or by
physical location of the requested tape within the library. The current
Automatic Medium Changer command set allows addressing a particular piece of
medium by its physical location within the library. Under this addressing
scheme, the physical label on the exterior of the tape can also be useful to
the library as a check that the correct tape resides in the addressed physical
location in the library. In this case the library would have the capability
of optically reading the physical label attached to the tape reel or
cartridge. This capability is also useful when tapes are physically entered or
removed from the library so that the library can update its catalogue.

The following additions to the Automatic Medium Changer command set are
proposed to allow the use of the Volume ID label on tape reels and cartridges.

1. READ ELEMENT STATUS COMMAND

    The Read Element Status command needs the capability of reporting the ID of
    the unit of medium contained in each element within the changer. This
    could be accomplished by adding an eight byte field to the element status
    defined for storage, input/output and data transfer type elements. The
    eight byte Medium ID would only need to be reported when the full bit is
    set in byte one. The data length field indicates the length of each
    element status reported.

    If the medium transport element is capable of handling two units of medium,
    two Medium IDs would need to be returned by the Read Element Status
    command. This would require adding a bit to the data length field to allow
    up to 32 bytes of element status.

2. MOVE MEDIUM COMMAND

The Move Medium command needs the capability to provide the ID of the unit
of medium to be moved to the automatic changer device. This would allow
the changer to verify that the medium in the physically addressed element
is the correct unit of medium. An eight byte Medium ID could be provided
as parameter data transferred as part of the Move Medium command. Byte 10
of the command descriptor block could be used to specify the parameter list
length. The Invert bit currently in byte 10 bit 0 could be moved to the
reserved area of byte 1. If the Medium ID was not utilized by the changer,
the parameter list length would be set to zero.

3. EXCHANGE MEDIUM COMMAND

The Exchange Medium command also needs the capability of providing the
Medium ID for the units of medium to be exchanged. Two eight byte Medium
IDs would be needed; one for the unit of medium in the source address, the
other for the unit of medium in the first destination address that is to be
moved to the second destination address. Byte 10 of the command descriptor
block could be used to specify the parameter list length. The Inv1 and
Inv2 bits currently in bits 1 and 0 of byte 10 could be moved to the
reserved area of byte 1. As in the Move Medium command, the parameter list
length would be set to zero when the changer did not require the Medium ID.

4. Addressing An Automatic Medium Changer

The current Automatic Medium Changer command set is structured as a
separate peripheral device type. In a low cost application it would be
desirable for the changer to be accessed via the same SCSI ID and
controller as the data transfer device. This would require only one set of
interface hardware and a common microprocessor. This could be handled in
two possible ways. The changer command set could be allowed as valid
commands under other device types. Another approach would be to address the
changer and its data transfer device as separate LUNs under the same SCSI
ID. This approach does not define which data transfer devices are serviced
by which changer device. This may also be a problem when the data transfer
devices are addressed via separate SCSI IDs. This problem could be handled
in Inquiry data since it is a question of system configuration.

5. Asynchronous Event Notification

The asynchronous event notification scheme should allow a changer device to
notify the initiator(s) that is managing its operation whenever units of
medium have been added or removed via an input/output element. This allows
the manager to move new units of medium to storage element addresses and
update the current element status.

Please consider the above items for inclusion in the Automatic Media Changer
command set in SCSI-2.