memorandum

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T10/06-046r0

| To | From | Subject | Date |
|---|---|---|---|
| INCITS T10 Committee | Curtis Ballard, HP<br>Michael Banther, HP | Report Supported Medium Types | 5 January 2006 |

**Revision History**

Revision 0 – Initial document.

**Related Documents**

smc3r01 – SCSI Media Changer Commands - 3 revision 01

spc3r23 – SCSI Primary Commands -3 revision 23

**Background**

The Read Element Status command is used by applications to describe the contents of all elements within a media changer device. Information about the element compatibility and type of medium in the elements is not currently captured and media changer vendors have implemented several vendor unique methods for reporting those attributes. Most media changer vendors report media type information using two vendor unique values for medium domain which is the physical shape and medium type which is the particular media generation or variant within that domain.

A new command is proposed that provides a way for media changers to report what values will be used to describe the medium supported by the media changer and report which data transfer devices support that medium type.

In the proposed changes that follow, new text appears in blue or purple, deleted text appears in ~~red strikeout~~, and editorial comments appear in green.

## 6.x REPORT MEDIUM TYPES SUPPORTED command

The REPORT MEDIUM TYPES SUPPORTED command (see table y) requests that information regarding the supported medium types for the logical unit be sent to the application client.

**Table y – REPORT MEDIUM TYPES SUPPORTED command**

| Bit / Byte | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|
| 0 | OPERATION CODE (44h) | | | | | | | |
| 1 | Reserved | | | | | | SINGLE | SUPPORTED |
| 2 | Reserved | | | | | | | |
| 3 | Reserved | | | | | | | |
| 4 | Reserved | | | | | | | |
| 5 | (MSB) | ELEMENT ADDRESS | | | | | | |
| 6 | | | | | | | | (LSB) |
| 7 | (MSB) | ALLOCATION LENGTH | | | | | | |
| 8 | | | | | | | | (LSB) |
| 9 | CONTROL | | | | | | | |

See SPC-3 for the definition of the OPERATION CODE, ALLOCATION LENGTH, and CONTROL fields.

A SINGLE bit set to one specifies that the device server shall return medium type supported descriptors for the data transfer device specified in the ELEMENT ADDRESS field. If the SINGLE bit is set to one the ELEMENT ADDRESS field shall be set to 0.

A SUPPORTED bit set to one specifies that the device server shall return medium type supported descriptors for all medium types supported by the logical unit even if the currently installed data transfer devices do not support all of these medium types. A SUPPORTED bit set to zero specifies the device server shall return medium type supported descriptors for medium types supported by the currently installed data transfer devices. If the SUPPORTED bit is set to one and the logical unit either does not contain a data transfer device or contains a data transfer device but cannot determine the supported medium types (e.g. during power on when the media changer has not yet determined the data transfer device type), the device server shall return CHECK CONDITION status and shall set the sense key to NOT READY.

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The ELEMENT ADDRESS field shall contain an element number for a data transfer device if the SINGLE bit is set to one and shall be set to zero if the SINGLE bit is set to zero. If the ELEMENT ADDRESS field does not contain a valid data transfer element and the SINGLE bit is set to one the device server shall terminate the command with CHECK CONDITION status, with the sense key set to ILLEGAL REQUEST, and the additional sense code set to INVALID ELEMENT ADDRESS.

Comment: The single bit and the element address field allow an application to request information for a data transfer device that has been selected for a job without having to parse through the support information for all data transfer devices in the media changer.

The REPORT MEDIUM TYPES SUPPORTED command returns a medium types supported header (see table y+1) followed by one of more medium type supported descriptors (see table y+2).

**Table y+1: Medium types supported header**

| Bit / Byte | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|
| 0 | (MSB) | MEDIUM TYPES SUPPORTED LENGTH (n-1) | | | | | | |
| 1 | | | | | | | | (LSB) |
| 2 | Reserved | | | | | | | |
| 3 | Reserved | | | | | | | |

The MEDIUM TYPES SUPPORTED LENGTH field specifies the length in bytes of the medium type support descriptor data that is available to be transferred. The medium types supported length does not include the header. If the device server truncates parameter data due to an insufficient allocation length, it shall not alter the MEDIUM TYPES SUPPORTED LENGTH field to reflect the truncation.

The device server may return multiple medium type supported descriptors with the same PRIMARY MEDIUM TYPE CODE or with the same PRIMARY MEDIUM TYPE CODE and the same SECONDARY MEDIUM TYPE CODE. The device server shall order the medium type supported descriptors by:

1. Ascending PRIMARY MEDIUM TYPE CODE;
2. Ascending SECONDARY MEDIUM TYPE CODE;
3. Most to least preferred DATA TRANSFER DEVICE VENDOR ID; and
4. Most to least preferred DATA TRANSFER DEVICE PRODUCT ID.

If multiple supported data transfer device types use the same medium type, then the device server shall return one medium type supported descriptor for each data transfer device type that uses this media type. The device server shall return these media type supported descriptors in order from most to least preferred data transfer device type.

NOTE: This ordering allows a media changer device to support of multiple generations of data transfer devices. It also allows a media changer device to support multiple vendors' versions of the same generation data transfer device.

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**Table y+2: Medium type supported descriptor**

| Byte \ Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|
| 0 | PRIMARY MEDIUM TYPE CODE | | | | | | | |
| 1 | SECONDARY MEDIUM TYPE CODE | | | | | | | |
| 2 | WRTOK | DUP | DEFLT | MAM | MSMTOK | MSDCOK | Reserved | |
| 3 | Reserved | | | | | MEDIUM TYPE | | |
| 4 | MODE SELECT MEDIUM TYPE | | | | | | | |
| 5 | MODE SELECT DENSITY CODE | | | | | | | |
| 6 | Reserved | | | | | | | |
| 7 | Reserved | | | | | | | |
| 8 | (MSB) | DATA TRANSFER DEVICE VENDOR ID | | | | | | |
| 15 | | | | | | | | (LSB) |
| 16 | (MSB) | DATA TRANSFER DEVICE PRODUCT ID | | | | | | |
| 31 | | | | | | | | (LSB) |
| 32 | (MSB) | DESCRIPTION | | | | | | |
| 63 | | | | | | | | (LSB) |

The PRIMARY MEDIUM TYPE CODE field and the SECONDARY MEDIUM TYPE CODE field contain the values (see table y+3) returned in the medium type identifier of a READ ELEMENT STATUS command for the medium type described by the remainder of this medium type supported descriptor.

The PRIMARY MEDIUM TYPE CODE shall be the same for all physically compatible medium supported by the device server. Any medium with physical difference that causes incompatibility with one or more elements in the device server shall have a different PRIMARY MEDIUM TYPE CODE.

Comment: There has been some disagreement among vendors whether "almost compatible" medium needs to have a different PRIMARY MEDIUM TYPE CODE. Some medium families have added minor physical features to prevent loading a new medium type into an older drive. Under this definition the new medium must have a different PRIMARY MEDIUM TYPE CODE.

The SECONDARY MEDIUM TYPE CODE field shall be the same for all medium with identical specifications within a PRIMARY MEDIUM TYPE. If the device server is able to detect different medium capacities or formats the SECONDARY MEDIUM TYPE CODE should be different .

**Table y+3 – PRIMARY MEDIUM TYPE CODE AND SECONDARY MEDIUM TYPE CODE values**

| PRIMARY MEDIUM TYPE CODE | SECONDARY MEDIUM TYPE CODE | Description |
|---|---|---|
| 00h | 00h | Universal medium type |
| 01h – FEh | 00h | Primary medium type vendor-specific<br>Secondary medium type universal |
| 01h – FEh | 01h - FEh | Vendor-specific |
| 01h – FEh | FFh | Primary medium type vendor-specific;<br>Secondary medium type unknown |
| FFh | FFh | Unknown medium type |

A WRTOK bit set to zero specifies that the described data transfer device does not support writing to this medium type. A WRTOK bit set to one specifies that the described data transfer device supports writing to this medium type. The described data transfer device shall support reading from the media at this density.

A DUP bit set to zero specifies that exactly one medium types supported descriptor in the parameter list contains this combination of PRIMARY MEDIUM TYPE CODE and SECONDARY MEDIUM TYPE CODE values. A DUP bit set to one specifies that more than one medium types supported descriptors in the parameter list contains this combination of PRIMARY MEDIUM TYPE CODE and SECONDARY MEDIUM TYPE CODE values. If the DUP bit is set to one, more than one data transfer device type is capable of reading the described medium type.

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A DEFLT bit set to zero specifies that this medium type is not the default medium type of the described data transfer device. A DEFLT bit set to one specifies that this medium type is the default medium type of the described data transfer device.

A MAM bit set to zero specifies that the medium type does not support Medium Auxiliary Memory (MAM, see SPC-3). A MAM bit set to one specifies that the medium type, when used with the described data transfer device type, supports MAM.

The MSMTOK bit shall be set to one if the MODE SELECT MEDIUM TYPE field is set.

The MSDCOK bit shall be set to one if the MODE SELECT DENSITY CODE field is set.

Comment: Both the mode select medium type and mode select density code values are vendor unique and are they are used differently by different data transfer devices. Some data transfer devices use the density code field to designate a data transfer device type while other data transfer devices support multiple density codes in the same data transfer device type. Having valid bits on both of these fields lets the media changer use the values that are appropriate for the referenced data transfer device and not set values if they are not used by that data transfer device type.

The MEDIUM TYPE field specifies the type of medium for this combination of PRIMARY MEDIUM TYPE CODE and SECONDARY MEDIUM TYPE CODE values. Table 17 describes the values for the MEDIUM TYPE field.

If the MSMTOK bit is set to one, the MODE SELECT MEDIUM TYPE field shall be the MEDIUM TYPE value reported by the data transfer device in the mode select header (see SPC-3). If the MSMTOK bit is set to zero, the MODE SELECT MEDIUM TYPE field shall be set to zero.

If the MSDCOK bit is set to one, the MODE SELECT DENSITY CODE field shall be the DENSITY CODE value reported by the data transfer device in the mode select block descriptor (see SPC-3). If the MSDCOK bit is set to zero, the MODE SELECT DENSITY CODE field shall be set to zero.

The DATA TRANSFER DEVICE VENDOR ID field contains eight bytes of left-aligned ASCII data (see SPC-3) identifying the vendor of the data transfer device that supports medium with this PRIMARY MEDIUM TYPE CODE and SECONDARY MEDIUM TYPE CODE values. This parameter shall have the same value as the T10 VENDOR IDENTIFICATION field reported by the data transfer device in its standard INQUIRY data (see SPC-3).

The DATA TRANSFER DEVICE PRODUCT ID field contains sixteen bytes of left-aligned ASCII data (see SPC-3) identifying the product ID of the data transfer device that supports medium with this PRIMARY MEDIUM TYPE CODE and SECONDARY MEDIUM TYPE CODE values. This parameter shall have the same value as the PRODUCT IDENTIFICATION field reported by the data transfer device in its standard INQUIRY data (see SPC-3).

The DESCRIPTION field contains thirty two vendor-unique bytes of left-aligned ASCII data (see SPC-3) describing the medium type with this PRIMARY MEDIUM TYPE CODE and SECONDARY MEDIUM TYPE CODE values.

NOTE: The description field provides a value that an application may use for reporting the common name of the medium type to the end user.