memorandum

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T10/05-153r0

To	From	Subject	Date
INCITS T10 Committee	Curtis Ballard, HP Michael Banther, HP	Read Element Multi-identifiers	28 April 2005

Revision History

Revision 0 – Initial document.

Related Documents

smc3r00 – SCSI Media Changer Commands - 3 revision 00

spc3r22a – SCSI Primary Commands -3 revision 22a

Background

The Read Element Status command is used by applications to describe the contents of all elements within a media changer device. Several attributes about the elements are not currently captured, and media changer vendors have implemented several vendor unique methods for reporting those attributes. Application developers must know which vendor unique method to use with the Read Element Status information from a specific media changer.

Currently Read Element Status provides the MEDIA TYPE field to report the type of media in an element. The defined media types do not contain all media types commonly found in media changers so this field has not relieved the need for vendor unique methods of reporting media type.

Read Element Status provides a method for reporting an SPC-2 vital product data device identifier for elements within the device server. Many element types require multiple device identifiers to describe the device. When a data transfer device returns multiple device identifiers, the media changer must return only one device identifier, and which identifier it returns varies by library vendor. Some vendors use this field to return the inquiry data and the serial number. Other vendors use the field to return the fibre channel port world wide name.

Media changer devices often contain multiple types of media within a single changer. The media types may be different generations of the same type or completely different types of media that are incompatible with some of the data transfer devices. A method is needed to report which media types can be used and which data transfer devices the media is compatible with.

Many media changers are configurable and the physical location of a logical element can change depending on the configuration. Different tape sizes with different magazine sizes can change the capacity of the media changer and replacing storage slots with import/export slots or data transfer devices can change the number of elements. Since the configuration of a device can be changed dynamically it is not possible to label all of the elements in the media changer and mapping from a logical element to the physical element is difficult. A method is needed to report the physical location of an element so that an application can provide the user with that information to assist in error recovery or for bulk loading. Currently several library vendors have implemented vendor unique methods of reporting the physical locations. Those methods can only be reported by a few custom applications.

A method is proposed for extending the capabilities for reporting device descriptors so that multiple descriptors can be reported for a single element. New descriptors are defined for reporting the media type and the physical location. A new command leveraged from the SSC Report Density Codes command is proposed for reporting the compatible media types that can be reported in the Read Element Status data.

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.

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Changes to SMC-2

5.3.5 Data transfer element

A data transfer element represents the ~~interface between the media changer and a~~ data transfer device (e.g., a removable media optical disk drive or tape drive) that is controlled by the media changer device. A data transfer ~~element~~ device is considered to be part of the media changer and associated with the currently addressed logical unit. The data transfer element is not considered to be part of a data transfer device.

6.10 READ ELEMENT STATUS commands

6.10.1 READ ELEMENT STATUS introduction

The READ ELEMENT STATUS and READ ELEMENT STATUS ATTACHED commands (see table 12) request that the device server report the status of its internal elements to the application client. Support for the READ ELEMENT STATUS command is mandatory for independent media changers. Support for the READ ELEMENT STATUS ATTACHED command is mandatory for attached media changers.

Table 12 – READ ELEMENT STATUS & READ ELEMENT STATUS ATTACHED command

Bit/Byte	7	6	5	4	3	2	1	0
0	OPERATION CODE							
1	Reserved			VOLTAG	ELEMENT TYPE CODE			
2	(MSB)							
3	STARTING ELEMENT ADDRESS							(LSB)
4	(MSB)							
5	NUMBER OF ELEMENTS							(LSB)
6	Reserved					MID	CURDATA	DVCID
7	(MSB)							
8	ALLOCATION LENGTH							
9								(LSB)
10	Reserved							
11	CONTROL							

The NUMBER OF ELEMENTS field specifies the maximum number of element descriptors to be created by the device server for this command. The value specified by this field is not the range of element addresses to be considered for reporting but rather the number of defined elements to report. If the ALLOCATION LENGTH field is not sufficient to transfer all the element descriptors, the device server shall transfer all those descriptors whose complete contents fit within the allocation field and this shall not be considered an error.

If the media descriptor (MID) bit is set to one, the device server may return multiple device identifiers for each element. If the MID bit is set to zero, the device server shall return a single device identifier for each element. If the MID bit is set to one and the DVCID bit is set to zero, the device server shall return CHECK CONDITION status and shall set the sense key to ILLEGAL REQUEST and the additional sense code to INVALID FIELD IN CDB.

A device ID (DVCID) bit of one specifies that the device server shall return device identifiers (see 6.10.8), if available, for the specified range. A DVCID bit of zero specifies that the target shall not return device identifiers. If the DVCID is set to one and the device ID feature is not supported by the media changer, CHECK CONDITION status shall be returned. The sense key shall be set to ILLEGAL REQUEST and the additional sense code set to INVALID FIELD IN CDB.

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6.10.4 Medium transport element descriptor

Table 16 defines the medium transport element descriptor.

Table 16 – Medium transport element descriptor

Bit/Byte	7	6	5	4	3	2	1	0
0	(MSB)	ELEMENT ADDRESS						
1								(LSB)
2	Reserved					EXCEPT	RSVD	FULL
3	Reserved							
4	ADDITIONAL SENSE CODE							
5	ADDITIONAL SENSE CODE QUALIFIER							
6		Reserved						
8								
9	SVALID	INVERT	Reserved		ED	MEDIUM TYPE		
10	(MSB)	SOURCE STORAGE ELEMENT ADDRESS						
11								(LSB)
. . .								
(36 Bytes)	PRIMARY VOLUME TAG INFORMATION (field omitted if PVOLTAG=0)							
(36 Bytes)	ALTERNATE VOLUME TAG INFORMATION (field omitted if AVOLTAG=0)							
. . .								
(4 Bytes)	MID HEADER (field omitted if MID=0)							
(x Bytes)	IDENTIFICATION DESCRIPTOR(S)							
. . .								
To z-1	Vendor-specific							

The MEDIUM TYPE field provides the type of medium currently present in the element as determined by the medium changer. Table 17 describes the values for the ~~Medium Type~~ MEDIUM TYPE field.

Table 17 – Medium Type codes

Code	Description
0h	Unspecified. The medium changer does not support this field, cannot determine the medium type, or the element is empty
1h	Data medium
2h	Cleaning medium
3h	Diagnostic medium
4h	WORM medium
5h	Firmware update medium
~~3h~~6h – 7h	Reserved

The SOURCE STORAGE ELEMENT ADDRESS field provides the address of the last storage element this unit of media occupied. This field is valid only if the SVALID bit is one.

The PRIMARY VOLUME TAG INFORMATION and ALTERNATE VOLUME TAG INFORMATION fields provide for identifying the unit of media residing in this element (see 5.4). Either or both of these fields may be omitted for all the element descriptor blocks that comprise an element status page as indicated by the PVOLTAG and AVOLTAG bits in the element status page header.

If the MID bit in the READ ELEMENT STATUS or READ ELEMENT STATUS ATTACHED CDB is set to one, the device server shall return the MID HEADER. If MID bit is set to zero or no identifier is available, the device server shall not return the MID HEADER.

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The MID HEADER field describes the identifier data to follow and is defined in table y.

Table y: MID HEADER field

(1 Byte)	IDENTIFIER COUNT		
(1 Byte)	Reserved		
(1 Byte)	(MSB)	IDENTIFIERS LENGTH	
(1 Byte)			(LSB)

The IDENTIFIER COUNT field contains a count of the total number of identifiers to follow. If the identifiers field is truncated because of the allocation length, the IDENTIFIER COUNT field shall not be affected.

~~The CODE SET field and IDENTIFIER TYPE field are defined in 6.10.8.~~

The IDENTIFIERS LENGTH field contains the total length in bytes of the ~~IDENTIFIER field (see 6.10.8)~~ identifiers to follow. ~~If no device identifier is available, or the DVCID bit in the CDB is zero, the IDENTIFIERS LENGTH field shall be zero and the CODE SET and IDENTIFIER TYPE fields shall also be zero.~~ If the identifiers are truncated because of the allocation length, the IDENTIFIERS LENGTH field shall not be affected. The value of the IDENTIFIERS LENGTH field shall be the same for all elements of the same element type. If the sum of the length of the identifiers is not equal to the value of the IDENTIFIERS LENGTH field, the device server shall add padding bytes with the value 00h after the last identifier to make up the difference.

Comment: SMC-2 had padding in the identifier field to produce equal length fields. If a total field length is given the padding can be outside of the identifier field to allow for identifiers that are exactly the same as those returned in the VPD page.

~~The IDENTIFIER field provides a device identifier for this medium transport element as defined in .~~ The IDENTIFICATION DESCRIPTOR(S) field returns identification data, see section 6.10.8. If no ~~device~~ identifier is available for this element, or the DVCID bit in the READ ELEMENT STATUS OR READ ELEMENT STATUS ATTACHED CDB is zero, ~~this field~~ the device server shall ~~be omitted~~ return one identification descriptor. If the DVCID bit is set to one and the MID bit is set to zero, the device server shall return one identification descriptor. If the DVCID bit is set to one and the MID bit is set to one the device server may return multiple identification descriptors.

NOTE: Returning a single identification descriptor when either DVCID is set to zero or DVCID is set to one and MID is set to zero is backwards compatible with SMC-2.

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6.10.5 Storage element descriptor

Table 18 defines the storage element descriptor.

Table 18: Storage element descriptor

Bit/Byte	7	6	5	4	3	2	1	0
0	(MSB)	ELEMENT ADDRESS						
1								(LSB)
2	Reserved				ACCESS	EXCEPT	RSVD	FULL
3	Reserved							
4	ADDITIONAL SENSE CODE							
5	ADDITIONAL SENSE CODE QUALIFIER							
6	Reserved							
7								
8								
9	SVALID	INVERT	Reserved		ED	MEDIUM TYPE		
10	(MSB)	SOURCE STORAGE ELEMENT ADDRESS						
11								(LSB)
. . .								
(36 Bytes)	PRIMARY VOLUME TAG INFORMATION (field omitted if PVOLTAG=0)							
(36 Bytes)	ALTERNATE VOLUME TAG INFORMATION (field omitted if AVOLTAG=0)							
. . .								
(4 Bytes)	MID HEADER (field omitted if MID=0)							
(x Bytes)	IDENTIFICATION DESCRIPTOR(S)							
. . .								
To z-1	Vendor-specific							

The SOURCE STORAGE ELEMENT ADDRESS field provides the address of the last storage element this unit of media occupied. This element address value may or may not be the same as this element. This field is valid only if the SVALID bit is one.

~~The CODE SET field and IDENTIFIER TYPE field are defined in 6.10.8.~~

~~The IDENTIFIER LENGTH field contains the length in bytes of the IDENTIFIER field (see 6.10.8). If no device identifier is available, or the DVCID bit in the CDB is zero, the IDENTIFIER LENGTH field shall be zero and the CODE SET and IDENTIFIER TYPE fields shall also be zero.~~

~~The IDENTIFIER field provides a device identifier for this storage element as defined in 6.10.8. If no device identifier is available for this element, or the DVCID bit in the CDB is zero, this field shall be omitted.~~

For fields not defined in this subclause, see 6.10.4.

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6.10.6 Import/export element descriptor

Table 19 defines the import/export element descriptor.

Table 19: Import/export element descriptor

Bit/Byte	7	6	5	4	3	2	1	0
0	(MSB)	ELEMENT ADDRESS						
1								(LSB)
2	OIR	CMC	INENAB	EXENAB	ACCESS	EXCEPT	IMPEXP	FULL
3	Reserved							
4	ADDITIONAL SENSE CODE							
5	ADDITIONAL SENSE CODE QUALIFIER							
6	Reserved							
7								
8								
9	SVALID	INVERT	Reserved		ED	MEDIUM TYPE		
10	(MSB)	SOURCE STORAGE ELEMENT ADDRESS						
11								(LSB)
. . .								
(36 Bytes)	PRIMARY VOLUME TAG INFORMATION (field omitted if PVOLTAG=0)							
(36 Bytes)	ALTERNATE VOLUME TAG INFORMATION (field omitted if AVOLTAG=0)							
. . .								
(4 Bytes)	MID HEADER (field omitted if MID=0)							
(x Bytes)	IDENTIFICATION DESCRIPTOR(S)							
. . .								
To z-1	Vendor-specific							

An import export (IMPEXP) bit of one indicates the unit of media in the import/export element was placed there by an operator. An IMPEXP bit of zero indicates the unit of media in the import/export element was placed there by the medium transport element.

~~The CODE SET field and IDENTIFIER TYPE field are defined in 6.10.8.~~

~~The IDENTIFIER LENGTH field contains the length in bytes of the IDENTIFIER field (see 6.10.8). If no device identifier is available, or the DVCID bit in the CDB is zero, the IDENTIFIER LENGTH field shall be zero and the CODE SET and IDENTIFIER TYPE fields shall also be zero.~~

~~The IDENTIFIER field provides a device identifier for this storage element as defined in 6.10.8. If no device identifier is available for this element, or the DVCID bit in the CDB is zero, this field shall be omitted.~~

For fields not defined in this subclause, see 6.10.4.

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6.10.7 Data transfer element descriptor

Table 20 defines the data transfer element descriptor.

Table 20: Data transfer element descriptor

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			ELEMENT ADDRESS				
1								(LSB)
2	Reserved				ACCESS	EXCEPT	RSVD	FULL
3	Reserved							
4	ADDITIONAL SENSE CODE							
5	ADDITIONAL SENSE CODE QUALIFIER							
6	Obsolete	RSVD	Obsolete	Obsolete	RSVD	Obsolete		
7	Obsolete							
8	Reserved							
9	SVALID	INVERT	Reserved		ED	MEDIUM TYPE		
10	(MSB)			SOURCE STORAGE ELEMENT ADDRESS				
11								(LSB)
	. . .							
(36 Bytes)	PRIMARY VOLUME TAG INFORMATION (field omitted if PVOLTAG=0)							
(36 Bytes)	ALTERNATE VOLUME TAG INFORMATION (field omitted if AVOLTAG=0)							
	. . .							
(4 Bytes)	MID HEADER (field omitted if MID=0)							
(x Bytes)	IDENTIFICATION DESCRIPTOR(S)							
	. . .							
To z-1	Vendor-specific							

An ACCESS bit value of one indicates access to the data transfer element by the medium transport element is allowed. A value of zero indicates access to the data transfer element by a medium transport element is denied.

NOTE 8— Access to the data transfer element by medium transport elements might be denied if a data transfer operation was under way. Note that a one value in this bit may not be sufficient to ensure a successful operation. This bit only reflects the best information available to the media changer device, which may not accurately reflect the state of the data transfer device.

~~The CODE SET field and IDENTIFIER TYPE field are defined in 6.10.8.~~

~~The IDENTIFIER LENGTH field contains the length in bytes of the IDENTIFIER field (see 6.10.8). If no device identifier is available, or the DVCID bit in the CDB is zero, the IDENTIFIER LENGTH field shall be zero and the CODE SET and IDENTIFIER TYPE fields shall also be zero.~~

~~The IDENTIFIER field provides a device identifier for this storage element as defined in 6.10.8. If no device identifier is available for this element, or the DVCID bit in the CDB is zero, this field shall be omitted.~~

For fields not defined in this subclause, see 6.10.4.

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6.10.8 Identification descriptor

Table 21 defines the identification descriptor ~~fields returned in element descriptors~~.

Table 21: Identification descriptor ~~fields~~

Bit / Byte	7	6	5	4	3	2	1	0
(1 Byte)	PROTOCOL IDENTIFIER				CODE SET			
(1 Byte)	PIV	Reserved		ASSOCIATION	IDENTIFIER TYPE			
(1 Byte)	Reserved				COMMAND SET SPECIFIC TYPE			
(1 Byte)	IDENTIFIER LENGTH (x)							
(x Bytes)	IDENTIFIER							

The CODE SET, PROTOCOL IDENTIFIER, ~~IDENTIFIER TYPE,~~ PIV, IDENTIFIER LENGTH and IDENTIFIER fields ~~in element descriptors~~ are defined by the device identification page in SPC-~~2~~3. Identification descriptors may be available for some or all elements in a media changer. If no identification descriptor is available or the DVCID bit in the CDB is zero, the IDENTIFIER LENGTH shall be zero, the IDENTIFIER field ~~is~~ shall be omitted, and the CODE SET ~~and~~, PROTOCOL IDENTIFIER, IDENTIFIER TYPE, ASSOCIATION, PIV and COMMAND SET SPECIFIC TYPE fields shall be zero.

~~Within the element descriptors for a single element status page, the device server may pad IDENTIFIER fields to the right with 00h to achieve a consistent length between such fields.~~

For a data transfer element, the IDENTIFIER field returns a device identifier from the data transfer device (e.g. disk or tape drive) associated with this element. If the COMMAND SET SPECIFIC TYPE field is set to zero, ~~with the exception of 00h padding in the IDENTIFIER field,~~ the same CODE SET, PROTOCOL IDENTIFIER, IDENTIFIER TYPE, ASSOCIATION, PIV, IDENTIFIER LENGTH and IDENTIFIER fields should be available via an INQUIRY command (see SPC-~~2~~3) ~~issued~~ addressed to a logical unit in the data transfer device.

For an import/export element, the IDENTIFIER field returns a unique identifier for the import/export device. An element used to exchange media between two media changers should return the same CODE SET, PROTOCOL IDENTIFIER, IDENTIFIER TYPE, ASSOCIATION, PIV, IDENTIFIER LENGTH and IDENTIFIER fields via either media changer.

For a storage or medium transport element the CODE SET, PROTOCOL IDENTIFIER, IDENTIFIER TYPE, ASSOCIATION, PIV, IDENTIFIER LENGTH and IDENTIFIER fields refer to the element, and are not an identifier for a volume stored in this location.

If the MID bit is set to one, a medium changer element may have more than one identification descriptor (e.g., if the element supports several types or associations of identifier). The device server may report any of the device identifier types defined in SPC-3. In addition the device server may report command set specific identification descriptors:

a) Media type; and
b) Element location

If the MID bit is set to one, the first identification descriptor in a data transfer element descriptor shall be an MD5 logical unit identifier (see SPC-3).

NOTE: The MD5 logical unit identifier provides the information required for an application client to map the data transfer device reported by the medium changer to the data transfer device interface path.

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The ASSOCIATION field (see table y+1) indicates the entity with which the IDENTIFIER field is associated. If the COMMAND SET SPECIFIC IDENTIFIER TYPE field is set to a value other than zero, the ASSOCIATION field shall be set to 10b.

Table y+1 – ASSOCIATION field

Code	Element descriptor type	Description
00b	Data transfer	The IDENTIFIER field is associated with a logical unit in a data transfer device.
	Import/Export, Medium transport, or Storage	The IDENTIFIER field is associated with the addressed logical unit.
01b	Data transfer	The IDENTIFIER field is associated with a target port in a data transfer device.
	Import/Export, Medium transport, or Storage	The IDENTIFIER field is associated with the target port that received the request.
10b	Data transfer	The IDENTIFIER field is associated with a data transfer device.
	Import/Export, Medium transport, or Storage	The IDENTIFIER field is associated with SCSI target device that contains the addressed logical unit.
11b	Any	Reserved

The IDENTIFIER TYPE field is defined by the device identification VPD page in SPC-3. If the COMMAND SET SPECIFIC IDENTIFIER TYPE field is set to a value other than zero, the IDENTIFIER TYPE field contents are reserved.

The COMMAND SET SPECIFIC TYPE field (see table y+2) indicates the format for the identifier for those identifier formats specific to this standard.

Table y+2: COMMAND SET SPECIFIC TYPE field

Code	Identifier
0h	Device identifier (see SPC-3)
1h	Media type
2h	Element location
3h – Fh	Reserved

If the COMMAND SET SPECIFIC TYPE field is set to 1h, the identifier has the format shown in table y+3.

Table y+3: Media Type identifier field format

Bit / Byte	7	6	5	4	3	2	1	0
0	PRIMARY MEDIA TYPE CODE							
1	SECONDARY MEDIA TYPE CODE							
2	Reserved							
3	Reserved							

The PRIMARY MEDIA TYPE CODE field and the SECONDARY MEDIA TYPE CODE field contain values returned in a media type supported descriptor by the REPORT MEDIA TYPES SUPPORTED command.

If the COMMAND SET SPECIFIC TYPE field is set to 2h, the identifier has the format shown in table y+4.

Table y+4: Element Location identifier field format

Bit / Byte	7	6	5	4	3	2	1	0
0	ELEMENT LOCATION DESCRIPTOR COUNT				CODE SET			
1	Reserved							
2	(MSB)	ELEMENT LOCATION IDENTIFIER LENGTH (x-4)						
3								(LSB)
x bytes	Element location descriptors							

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COMMENT: Management and ISV software need a method to indicate the physical location of a logical element reported over SCSI. This proposal allows multiple fields to support coordinate-style location information or a single field if the device does not use coordinate-style location information. Applications may report the location information in a human readable format without any interpretation or may provide device specific interpretation for supported devices.

The ELEMENT LOCATION DESCRIPTOR COUNT field specifies the number of element location descriptors that describe the element location.

The CODE SET field indicates the code set used for the IDENTIFIER field, as described in table y+5. This field is intended to be an aid to software that displays the IDENTIFIER field.

Table y+5 – CODE SET field

Code	Description
0h	Reserved
1h	The IDENTIFIER field shall contain binary values.
2h	The IDENTIFIER field shall contain ASCII printable characters (i.e., code values 20h through 7Eh).
3h	The IDENTIFIER field shall contain ISO/IEC 10646-1 (UTF-8) codes.
4h – Fh	Reserved

COMMENT: The definition of the CODE SET field follows that of the CODE SET field in SPC-3 (see spc3r22a, 7.6.3.1 *Device identification VPD page overview*).

The ELEMENT LOCATION IDENTIFIER LENGTH field indicates the length in bytes of the element location descriptors, as described in table y+6.

Table y+6: Element location descriptor format

Bit / Byte	7	6	5	4	3	2	1	0
1 byte	(MSB)							
1 byte	ELEMENT LOCATION LENGTH (w+2)							(LSB)
1 byte	Reserved							
1 byte	Reserved							
w bytes	ELEMENT COORDINATE							

The ELEMENT LOCATION LENGTH field indicates the length in bytes of the element location descriptor.

Comment: The ELEMENT LOCATION IDENTIFIER LENGTH field is not absolutely required since the same value could be generated by multiplying the number of element location descriptors by the length of each descriptor. Having fixed length descriptors is not absolutely necessary but having a total identifier length that is fixed is required so that all elements of a given type can return the same data length. If fixed length descriptors are not used then some method of reporting the length of each descriptor is required.

The ELEMENT COORDINATE field specifies a physical location coordinate for this element within the media changer device using vendor-specific coordinate system.

NOTE: The element location identifier provides a way for the device server to describe the location of an element. An application client may report the location description. The device server may use multiple fields for multi-dimensional (e.g. X-Y) coordinate system.

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6.x REPORT MEDIA TYPES SUPPORTED command

The REPORT MEDIA TYPES SUPPORTED command (see table y+7) requests that information regarding the supported media types for the logical unit be sent to the application client.

Table y+7 – REPORT MEDIA TYPES SUPPORTED command

Bit / Byte	7	6	5	4	3	2	1	0
0	OPERATION CODE (44h)							
1	Reserved							INSTLD
2	Reserved							
3	Reserved							
4	Reserved							
5	Reserved							
6	Reserved							
7	(MSB)	ALLOCATION LENGTH						
8								(LSB)
9	CONTROL							

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

A INSTLD bit set to zero specifies that the device server shall return media type supported descriptors for all media types supported by the logical unit even if the currently installed data transfer devices do not support all of these media types. An INSTLD bit set to one specifies the device server shall return media type supported descriptors for media types supported by the currently installed data transfer devices. If the INSTLD 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 media 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.

The REPORT MEDIA TYPES SUPPORTED command returns a media types supported header (see table y+8) followed by one of more media type supported descriptors (see table y+9).

Table y+8: Media types supported header

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)	MEDIA TYPES SUPPORTED LENGTH (n-1)						
1								(LSB)
2	Reserved							
3	Reserved							
4	Media type supported descriptors							
n								

The MEDIA TYPES SUPPORTED LENGTH field specifies the length in bytes of the following data that is available to be transferred. The media types supported length does not include the number of bytes in the MEDIA TYPES SUPPORTED LENGTH field. If the device server truncates parameter data due to an insufficient allocation length, it shall not alter the MEDIA TYPES SUPPORTED LENGTH field to reflect the truncation.

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

1. Ascending PRIMARY MEDIA TYPE CODE;
2. Ascending SECONDARY MEDIA 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 media type, then the device server shall return one media 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.

Table y+9: Media type supported descriptor

Bit / Byte	7	6	5	4	3	2	1	0
0	PRIMARY MEDIA TYPE CODE							
1	SECONDARY MEDIA TYPE CODE							
2	WRTOK	DUP	DEFLT	MAM	Reserved			
3	Reserved							
4	Reserved							
5	Reserved					MEDIUM TYPE		
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 MEDIA TYPE CODE field and the SECONDARY MEDIA TYPE CODE field contain the values (see table y+10) returned in the media type identifier of a READ ELEMENT STATUS command for the media type described by the remainder of this media type supported descriptor.

Table y+10 – PRIMARY MEDIA TYPE CODE AND SECONDARY MEDIA TYPE CODE values

PRIMARY MEDIA TYPE CODE	SECONDARY MEDIA TYPE CODE	Description
00h	00h	Universal media type
01h - FEh	00h - FEh	Vendor-specific
01h - FEh	FFh	Primary media type vendor-specific; Secondary media type unknown
FFh	FFh	Unknown media type

Comment: It might be useful for the media type codes to be sequential starting with 00h in which case "Unknown" should be something other than FFh. Currently library vendors and ISV's use values called "Media Domain" and "Media Type". The simplest implementation for both would probably be to map those values directly to the primary and secondary media type codes.

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If that is done the values will not be sequential and many values such as 01h are already used. I have not found a pre-existing definition for 00h and FFh that would conflict with this method.

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

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

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

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

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

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 media with this PRIMARY MEDIA TYPE CODE and SECONDARY MEDIA 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 data transfer device that supports media with this PRIMARY MEDIA TYPE CODE and SECONDARY MEDIA 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 bytes of left-aligned ASCII data (see SPC-3) describing the media type with this PRIMARY MEDIA TYPE CODE and SECONDARY MEDIA TYPE CODE values.