

X3T9.2/88-005

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To: X3T9.2 Membership

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Subject: Change Definition/Inquiry modifications

This document is in response to an action item generated at the January working group. The actions performed are as follows:

1. deleted the 'sense' function relative to a DATA IN phase and move it to INQUIRY VPD.
2. add a DATA OUT phase for vendor unique password data.
3. add a fourth option to the list of possible 'modifications' listed on page 7-2.
4. add additional error handling information.
5. changes to the defined VPD codes were made, and these also appear here.

Command Descriptions for All Device Types

04/01/88

Command Descriptions for All Device Types

CHANGE DEFINITION Command

Peripheral Device Type: All  
Operation Code Type: Optional

CHANGE DEFINITION Command

Bit Byte	7	6	5	4	3	2	1	0	
0	Operation Code (40h)								
1	Logical Unit Number			Reserved					
2	Reserved						†	SN6	Save
3	Reserved		Definition Parameter						
4	Reserved								
5	Reserved								
6	Reserved								
7	Reserved								
8	Parameter List Length								
9	Control Byte								

The CHANGE DEFINITION command modifies the operating definition of the selected logical unit or target with respect to commands from the selecting initiator or for all initiators. Data defining the operating definition may also be returned to the initiator.

[some paragraphs here are re-arranged for editorial consistency...ed.]

A save control bit (Save) of zero indicates that the target shall not save the operating definition. A Save bit of one indicates that the target shall save the operating definition to non-volatile memory.

The definition parameter values are defined in Table 7-.

## Definition Parameter Values

Value	Meaning of Definition Parameter Value
00h	Default Operating Definition
01h	SCSI X3.131-1986 Operating Definition
02h	CCS Operating Definition
03h	SCSI-2 X3.131-198x Operating Definition
04-3Fh	Reserved
40-7Fh	Vendor Unique

IMPLEMENTOR'S NOTE: The Definition Parameter values establish operating definitions compatible with the appropriate SCSI level specification. The Vendor Unique values are available for those applications where more complex operation definition changes are required.

The parameter list length field specifies the length in bytes of the CHANGE DEFINITION parameter list that shall be transferred from the initiator to the target. A parameter list length of zero indicates that no data shall be transferred. This condition shall not be considered as an error. Parameter list lengths greater than zero are vendor unique.

The data contained in the parameter list is vendor unique.

IMPLEMENTOR'S NOTE: The parameter list has been included with the intent that it be used to specify a password to validate an operating definition change. If the password data is invalid, the target may reject the command with CHECK CONDITION status, and a sense key of ILLEGAL REQUEST, or it may enter some other unique error state.

The CHANGE DEFINITION command may cause any of the modifications listed below:

The CHANGE DEFINITION command causes one of the operating definition modifications listed below.

- (1) The operating definition of a logical unit relative to the initiator that issued the command: In this case, the target is capable of maintaining a unique operating definition for each logical unit relative to each initiator in the system.
- (2) The operating definition of the target relative to the initiator that issued the command: In this case, the target is capable of maintaining a unique operating definition for each initiator in the system that applies to all logical units of the target.

(3) The operating definition of logical unit relative to all initiators in the system: In this case, the target is capable of maintaining a unique operating definition for each logical unit relative to all initiators in the system.

(4) The operating definition of the target relative to all initiators in the system: In this case, the target is capable of maintaining only one operating definition.

[the stuff above sounds a lot like saving mode select parameters on a per initiator basis. also, do we need to say more about this; e.g., how does the initiator determine which way the target works? and does it need to know?]

If the target changes the operating definition that effects another initiator, it shall generate a Unit Attention condition for all initiators except the one that issued the CHANGE DEFINITION command. The additional sense code shall be set to Changed Operating Definition.

If the target changes the operating definition when no CHANGE DEFINITION command is executing, it shall generate a Unit Attention condition for all affected initiators. The additional sense code shall be set to Changed Operating Definition.

The operating definition is modified after successful completion of the command. The newly established definition becomes active as if it had just received a "hard" reset. All events described under the "Hard" Reset Alternative (section 5.2.2.1) shall occur appropriate to the new operating definition. A target shall consider the command successfully completed when it detects the assertion of ACK for the COMMAND COMPLETE message. The initiator should verify the new operating definition by issuing an INQUIRY command.

If the CHANGE DEFINITION command is not executed successfully for any reason, the operating definition remains the same as it was before the CHANGE DEFINITION command was attempted. If it is impossible to return to the previous operating definition, a Unit Attention condition shall be created, and the initiator may issue an INQUIRY command to determine the actual operating definition.

IMPLEMENTOR'S NOTE: The present operating definition of the target may always be interrogated through the INQUIRY command. A change in the operating definition may change the vendor identifier, the device type, the device model, the SCSI implementation level, the command set, and any other operating characteristics. The logical unit responds to any command according to the requirements of its present operating definition.

After a power on condition or a hard reset condition, the target shall set its initial operating definition to the last saved value, if saving is implemented, or its default value, if saving is not implemented.

The sense control bit (SNS) indicates whether the command is changing the operating definition or sensing operating definition information. A SNS bit of zero indicates that the CHANGE DEFINITION command shall change the operating definition to the one specified by the Definition Parameter. A SNS bit of one indicates that the target shall transfer definition data, and shall not change the operating definition. The definition data is defined by the

## definition parameter:

If the SNS bit is one, the Save bit should be set to zero by the initiator. If both the SNS and Save bits are one, the target shall terminate the command with CHECK CONDITION status with a sense key of ILLEGAL REQUEST and an additional sense code of Invalid Field in Command Descriptor Block.

The Allocation Length field specifies the number of bytes that the initiator has allocated for returned definition data. An allocation length of zero indicates that no definition data shall be transferred. This condition shall not be considered as an error. Any other value indicates the maximum number of bytes that shall be transferred. The target shall terminate the DATA IN phase when allocation length bytes have been transferred or when all available definition data have been transferred to the initiator, whichever is less.

{There was something about a 'password' to be added in here somewhere. Does Bob Grively or Jim McGrath know anything about that?}

If the SNS bit is zero, and the allocation length is non-zero, the target shall terminate the command with CHECK CONDITION status, a sense key of ILLEGAL REQUEST, and an additional sense code of Invalid Field in Command Descriptor Block.

The definition parameter defines the data returned when the SNS bit is one. If the definition parameter is 00h, the target shall return data that defines which operating definitions are implemented, as shown in Table 7-1.

## Implemented Operating Definition Data

Bit	7	6	5	4	3	2	1	0
Byte								
0								Definition Data Length
1								Definition Parameter (00h)
2								Default Definition Parameter
3								First Implemented Definition Parameter
4								Second Implemented Definition Parameter
n								Last Implemented Definition Parameter

The definition data length field specifies the length in bytes of the following definition data that is available to be transferred during the DATA IN phase. The definition data length does not include itself.

The definition parameter is the value as the definition parameter in the command descriptor block.

The implemented definition parameters define which operating definitions are implemented by the target.

If the definition parameter is other than 00h, the target shall return data that defines a specific operating definition, as defined in Table 7-2.

## Specific Operating Definition Data

Bit	7	6	5	4	3	2	1	0
Byte								
0								
1								
2								
3 - n								

The definition data length and definition parameter are as defined in Table 7-2, (above).

A save implemented (Savimpl) bit of zero indicates that the operating definition defined by the definition parameter cannot be saved. A Savimpl bit of one indicates that the operating definition defined by the definition parameter may be saved.

The ASCII definition descriptor data field contains ASCII description text for the selected operating definition. This data is not defined by this standard. The data shall be formatted in lines (or character strings) to allow it to be directly displayed on the system. Each line shall contain only graphic codes (i.e., code values 20h through 7Eh) and shall be terminated with a NUL (00h) character.

[this is the modified table 7-20, page 7-26, VPD Identifiers]  
Vital Product Data Identifiers

Identifier	Description
00h	Return a List of VPD Identifiers Supported by the target or LUN
01h - 7Fh	VPD information for the FRU code returned in the sense data
80h	ROM Software code Revision level {Not defined, yet-}
81h	RAM Software code Revision level {Not defined, yet-}
82h	Hardware Revision level {Not defined, yet-}
80h	Unit Serial Number
84h	Manufacturing Data (Manufacturer, Plant, Date, etc.) {Not defined, yet-}
81h	Implemented Operating Definitions
82h	Operating Definition Description Data
83h - 8Fh	Reserved
C0h - FFh	Vendor Unique

[new table for VPD ID 81h]

Implemented Operating Definitions Page (VPD Identifier 81h)

Bit Byte	7	6	5	4	3	2	1	0
0	Peripheral Qualifier			Peripheral Device Type				
1	VPD Identifier							
2	Reserved							
3	VPD Total Page Length (n-3)							
4	Reserved	Current Operating Definition						
5	SavImp	Default Operating Definition						
6	SavImp	First Supported Operating Definition						
7	SavImp	Second Supported Operating Definition						
.			.		.			
.			.		.			
.			.		.			
n	SavImp	Last Supported Operating Definition						

The implemented definition parameters define which operating definitions are implemented by the target. These definitions are defined in the CHANGE DEFINITION command (section 7.1.1).

A save implemented (SavImp) bit of zero indicates that the corresponding operating definition parameter cannot be saved. A SavImp bit of one indicates that the corresponding operating definition parameter is saveable.

[new table for VPD ID 82h]

Operating Definition Description Page (VPD Identifier 82h)

Bit Byte	7	6	5	4	3	2	1	0	
0	Peripheral Qualifier			Peripheral Device Type					
1	VPD Identifier								
2	Reserved								
3	VPD Total Page Length (n-3)								
4	ASCII VPD Length (____)								
5	ASCII Operating Definition Description Data								
m									
p									Vendor Unique VPD Length (____)
q	Vendor Unique Operating Definition Description Data								
n									

The ASCII operating definition description data field contains ASCII description text for all possible operating definitions. This data is not defined by this standard. The data shall be formatted in lines (or character strings) to allow it to be directly displayed on the system. Each line shall contain only graphic codes (i.e., code values 20h through 7Eh) and shall be terminated with a NULL (00h) character.

The contents of the vendor unique operating definition description data is not defined in this standard. Consult the appropriate manufacturer's documentation for the data contained in this field.