

[MS-RSVD-Diff]:

Remote Shared Virtual Disk Protocol

Intellectual Property Rights Notice for Open Specifications Documentation

- **Technical Documentation.**
* * *
 - **Copyrights,**
*
* B ' *
* F *
* A *
 - **No Trade Secrets,**
 - **Patents,**
* A
* > *
 - **Trademarks,**
* D *
 - **Fictitious Names,**
* * * * *
* * * * *
* * * * *
- Reservation of Rights, ?**
* * *
- Tools,**
* A

Preliminary Documentation.

- + , * 9

+ , ?

* ,

* ,

Revision Summary

Date	Comments
. 2-06- /3	B ,

PREVIEW

Table of Contents

1	Introduction	6
/,/	E	4
/,0	.....	4
/,0,/	.....	4
/,0,0	.....	5
/,1	.....	5
/,2	.....	5
/,3	-	6
/,4	?	6
/,5	A	6
/,6	+C D	7
/,7	?	7
2	Messages	10
0,/	.....	/.
0,0	.....	/.
0,0,/	A	/.
0,0,0	A	//
0,0,1	C A	/0
0,0,2	.....	/1
0,0,2,/	FB C AFCA A CA C C	/1
0,0,2,0	FB C AFCA A CA C C	/1
0,0,2,1	FB C @ ? C C	/1
0,0,2,2	FB C @ ? C C	/1
0,0,2,3	FB C B D C C	/2
0,0,2,4	FB C B D C C	/3
0,0,2,5	FB C A C C	/5
0,0,2,6	FB C A C C	/6
0,0,2,7	FB C ? B? C B C C	0.
0,0,2,/.	FB C ? B? C B C C	0.
0,0,2,./	FB C C ? F? BC	0/
0,0,2,/0	FB C BC AC A C	0/
0,0,2,/1	FB C ? D C C	00
0,0,2,/2	FB C ? D C C	01
0,0,2,/3	FB F? CB ? B C C	01
0,0,2,/4	FB F? CB ? B C C	01
0,0,2,/5	FB C ? C ? ? C C	02
0,0,2,/5,/	FB C ? C ? A C? C ? F	04
0,0,2,/5,./	FB C ? C ? C ? A C? C AB ? ? C C	06
0,0,2,/5,0	FB C ? C ? C ? A C	06
0,0,2,/5,1	FB C ? C ? A C FB C	1.
0,0,2,/5,2	FB C ? C ? C C ? B	1.
0,0,2,/6	FB C ? C ? C	1/
0,0,2,/7	FB C FB C C D ? C C	10
0,0,2,0.	FB C FB C C D ? ? F C C	11
0,0,2,0/	FB C FB C C D ? ? F C C C	12
0,0,2,00	FB C FB C C D ? C C C	13
0,0,2,01	FB C ? C ? C E C C C	14

0,0,2,02	FB	C ?	C ?	C	E C	C	C	14
0,0,2,03	FB	AF?	EC	? A	E EC	? ?	C C	15
0,0,2,04	FB		C	BC C C	? F	C C		15
0,0,2,05	FB	AF?	EC	? A	E ?	C C		16
0,0,2,06	FB	AF?	EC	? A	E ?	C	C	17
0,0,2,07	FB	AF?	EC	? A	E	C C		17
0,0,2,1.	FB	AF?	EC	? A	E	C	C	2.
0,0,2,1/	FB		C	BC AC A	C	C	C	2.
0,0,3	@	A						2/
0,0,4								2/

3 Protocol Details43

1,/ A B								21
1,/,/ ?	B							21
1,/,/,/ E								21
1,/,0								21
1,/,1								21
1,/,2 F +			C					21
1,/,2,/								21
1,/,2,0 ?						B		21
1,/,2,1 ?		A				B		22
1,/,2,2 ?			D			B		23
1,/,2,3 ?						B		23
1,/,2,4 ?			B D					23
1,/,2,5 ?		A						24
1,/,2,6 ?				B				24
1,/,2,7 ?		C		A A				25
1,/,2,/. ?						B		26
1,/,2,/,/ ?						B		26
1,/,2,0 ?		A						27
1,/,2,1 ?		A	AB					3.
1,/,2,2 ?					FB			3/
1,/,2,3 ?		C	B			FB		30
1,/,2,4 ?		A			B	FB		31
1,/,2,5 ?					B			32
1,/,2,6 ?								33
1,/,2,7 ?				FB				33
1,/,2,0. ?		B						34
1,/,2,0/ ?			A					35
1,/,2,00 ?			A					35
1,/,2,01 ?			A					36
1,/,3		C						37
1,/,3,/								37
1,/,3,0	A							37
1,/,3,1								37
1,/,3,2								4.
1,/,3,3		B D						4.
1,/,3,4	A							4.
1,/,3,5			B					4.
1,/,3,6	A A							4/
1,/,3,7		B						4/
1,/,3,/. ?			B					4/
1,/,3,/,/		+						4/
1,/,3,0		+						4/
1,/,3,1		FB						4/

1,/,3,/2	B	4/
1,/,3,/3	A	40
1,/,3,/4	A	40
1,/,3,/5	A	40
1,/,4	C	40
1,/,5	C	40
1,0	B	40
1,0,/ ?	B	40
1,0,/,/	E	40
1,0,/,0		41
1,0,/,1	C C B	41
1,0,0		41
1,0,1		41
1,0,2	F + C	42
1,0,2,/	F	42
1,0,2,0	F	42
1,0,3	C	42
1,0,3,/		42
1,0,3,0	A	44
1,0,3,1		44
1,0,3,2		45
1,0,3,3		46
1,0,3,3,/	B D	47
1,0,3,3,0	A	5.
1,0,3,3,1		5.
1,0,3,3,2	B	5/
1,0,3,3,3	A A	50
1,0,3,3,4	B +	51
1,0,3,3,5		51
1,0,3,3,5,/	A	52
1,0,3,3,5,0	C	53
1,0,3,3,5,1	FB	53
1,0,3,3,5,2	A FB	54
1,0,3,3,5,3		54
1,0,3,3,6	FB +	54
1,0,3,3,7	FB	55
1,0,3,3,/.	B	57
1,0,3,3,/,/	A	6.
1,0,3,3,/,0	A	6/
1,0,3,3,/,1	A	6/
1,0,3,4	C	6/
1,0,4	C	60
1,0,5	C	60
4 Protocol Examples		83
2,/	B D	61
2,0 C	A A	62
5 Security		88
3,/	A	66
3,0		66
6 Appendix A: Product Behavior		89

1 Introduction

B & B' +
1 & @
/6*0* 1 F B DA0//7 , /3 /7 ? * F B*

1.1 Glossary

E B
A
8
persistent reservation 8? A & A+
1 3,4',
SCSI command descriptor block 8? A
sense data 8B +
A
virtual hard disk set (VHD set) 8?
MAY, SHOULD, MUST, SHOULD NOT, MUST NOT:
F B , DA0//7 , ?

1.2 References

1.2.1 Normative References

+ @ A * @ & @ 0 1 ,
+ A *
DA0//7 @ * , * DA * @A /2* DA
0//7* /775* 8- , + , - - 0//7,
A BC A * A F *0.4*

1.2.2 Informative References

E @1. 03. 7/ A * ? F +
E , 0. /0 0 *? 0. /3* 8- , , - + - -1. 03. 7/
A+1 A * A +
1 & A+1' * /.- /2/4+B* 0. . 3* 8- , /., - + - , =; ; - 1 01, +

1.3 Overview

8
, D
* @
B ,
B 8
▪ ? ,
▪ * * ,
▪ D A ,
B 0

1.4 Relationship to Other Protocols

+ @0 , @ & @ 1 & @' *

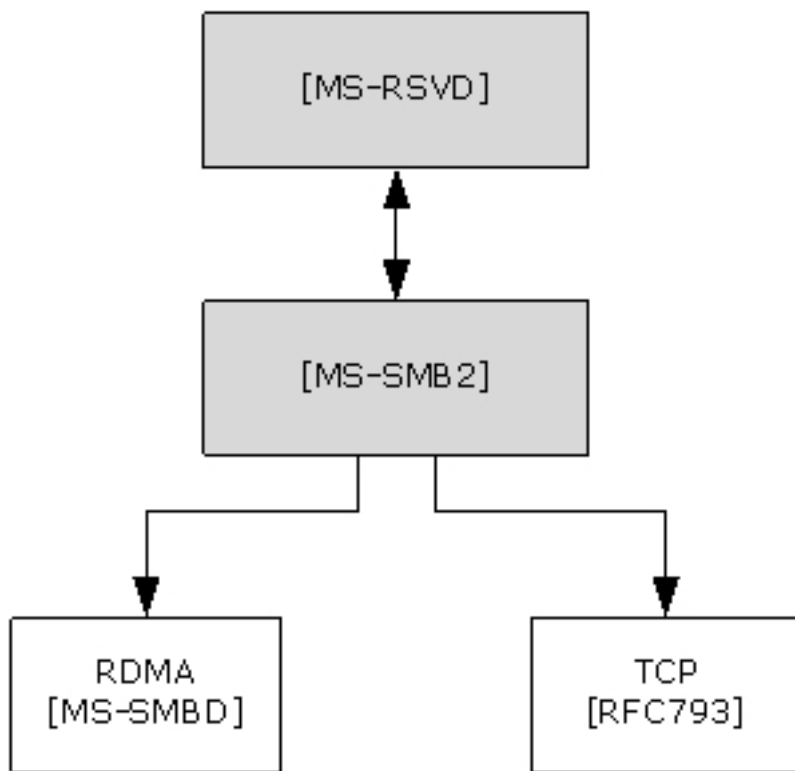


Figure 1: Relationship to other protocols

1.5 Prerequisites/Preconditions

- B 8 @ ,
- B @ FB C BC AC A C *
- 0,0,2,/0,

1.6 Applicability Statement

B ,

1.7 Versioning and Capability Negotiation

8 , D @ ,

* B ,

:/<

Version	Value
B / /
<u>B</u> <u>0</u>	<u>. 0</u>

1.8 Vendor-Extensible Fields

1.9 Standards Assignments

+ @0 /,7, @ 0 1*

2 Messages

2.1 Transport

8

+5& '4&32,16 '4&3 (&'+3&4&+5&3&' +5& ' ' +3&' 3 3 &'+3&' -

PREVIEW

Constant name	Meaning
<u>. . . . 7. 142</u>	

2.2.2 Operation Codes

<u>8</u>	
<u>, D</u>	
<u>*</u>	<u>@</u>

Name	Meaning
<u>B C EC D C ?</u> <u>. . 0. . / . . / . . . /</u>	
<u>B C A C ?</u> <u>. . . 0. . . 0. . / . . 0</u>	A
<u>B C AFCA A CA ? C ?</u> <u>. . . 1. . . 0. . / . . 1</u>	
<u>B C @ ? C ?</u> <u>. . . 2. . . 0. . / . . 2</u>	
<u>B C EC B D C ?</u> <u>. . . 3. . . 0. . / . . 3</u>	
<u>B C ? B ? C B C ?</u> <u>. . . 4. . . 0. . / . . 4</u>	
<u>B C C ? C ? ?</u> <u>. . 0. . 0. . / . . /</u>	<u>+</u>
<u>B C C ? C ? C E C</u> <u>. . 0. . 0. . 0</u>	<u>+</u>
<u>B C FB C C D ?</u> <u>. . 0. . 0. . 3</u>	virtual hard disk set (VHD set)
<u>B C BC C C ? F</u> <u>. . 0. . 0. . 4</u>	B
<u>B C AF ? EC ? A E EC ? ? C C</u> <u>. . 0. . 0. . 6</u>	E +
<u>B C AF ? EC ? A E ?</u> <u>. . 0. . 0. . 7</u>	
<u>B C AF ? EC ? A E</u> <u>. . 0. . 0. . ?</u>	

2.2.3 Error Code

Name	Meaning
? FB C CB . A. 3A. ...	
? FB C ? ? ?@ C . A. 3ADD. .	
? FB ? C ? ? ?@ C . A. 3ADD. /	?
? FB ? C A? ? A B? ? AF? E CB . A. 3ADD. 0	* ?
? FB ? C C C ? CC CB . A. 3ADD. 1	? * ?
? FB ? C C C ? C C? CB . A. 3ADD. 2	? * ?
? FB ? C CE ? CC CB . A. 3ADD. 3	? * ?
? FB ? C C ? E BCD AF? E CB . A. 3ADD. 4	* ?
? FB C C ? A D A . A. 3ADD. 5	A
? FB E D C C . A. 3ADD. 6	D
? FB C ? AF . A. 3ADD. 7	/

2.2.4 Structures

2.2.4.1 SVHDX_TUNNEL_CHECK_CONNECTION_REQUEST Structure

FB C AFCA A CA C C
FB C C ? FC?BC *

2.2.4.2 SVHDX_TUNNEL_CHECK_CONNECTION_RESPONSE Structure

FB C AFCA A CA C C
B C AFCA A CA ? C ?
FB C C ? FC?BC *

2.2.4.3 SVHDX_TUNNEL_SRB_STATUS_REQUEST Structure

FB C @ ? C C

.	/	0	1	2	3	4	5	6	7	/	/	0	1	2	3	4	5	6	7	0	/	0	1	2	3	4	5	6	7	1	/
										'''																					
										'''																					
										'''																					
										'''																					
										'''																					
										'''																					

StatusKey (1 byte):

Reserved (27 bytes):

2.2.4.4 SVHDX_TUNNEL_SRB_STATUS_RESPONSE Structure

FB C @ ? C C
B C @ ? C ?

P

@		
B		
'''		
'''		
'''		
	2 ?	
D		
'''		
B		
'''		
'''		
'''		

DiskType (4 bytes):

Value	Meaning
FB C D CB 0	,
FB C B ? A 1	,

DiskFormat (4 bytes):

Value	Meaning
? ?EC C BC AC FB 1	,

BlockSize (4 bytes):

LinkageID (16 bytes): ? GUID

IsMounted (1 byte): ? @ D? C & . . '*'
C & . / '*'

Is4kAligned (1 byte): ? @ , C* D? C* 2 ,

Reserved (2 bytes): * , F B

FileSize (8 bytes): * * ,

VirtualDiskId (16 bytes): ? E B ,

2.2.4.7 SVHDX_TUNNEL_SCSI_REQUEST Structure

FB		C		A		C		C																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
----	--	---	--	---	--	---	--	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Length (2 bytes): * * FB C A C C
DataBuffer , 14,

Reserved1 (2 byte): ,

SrbFlags (4 bytes): A , 8

Name	Meaning
@ D ? E B ? ? 2.	
@ D ? E B ? ? 6.	

DataTransferLength (4 bytes): * *
DataBuffer ,

SenseDataEx (variable): ? 0.
 ,

DataBuffer (variable): ? + *
DataTransferLength ,

2.2.4.9 SVHDX_TUNNEL_VALIDATE_DISK_REQUEST Structure

SVHDX_TUNNEL_VALIDATE_DISK_REQUEST

, 34 , 34

.	/	0	1	2	3	4	5	6	7	/	.	/	0	1	2	3	4	5	6	7	0	.	/	0	1	2	3	4	5	6	7	1	/
<div>834</div>																																	
<div>'''</div>																																	
<div>'''</div>																																	

Reserved (56 bytes): 34

2.2.4.10 SVHDX_TUNNEL_VALIDATE_DISK_RESPONSE Structure

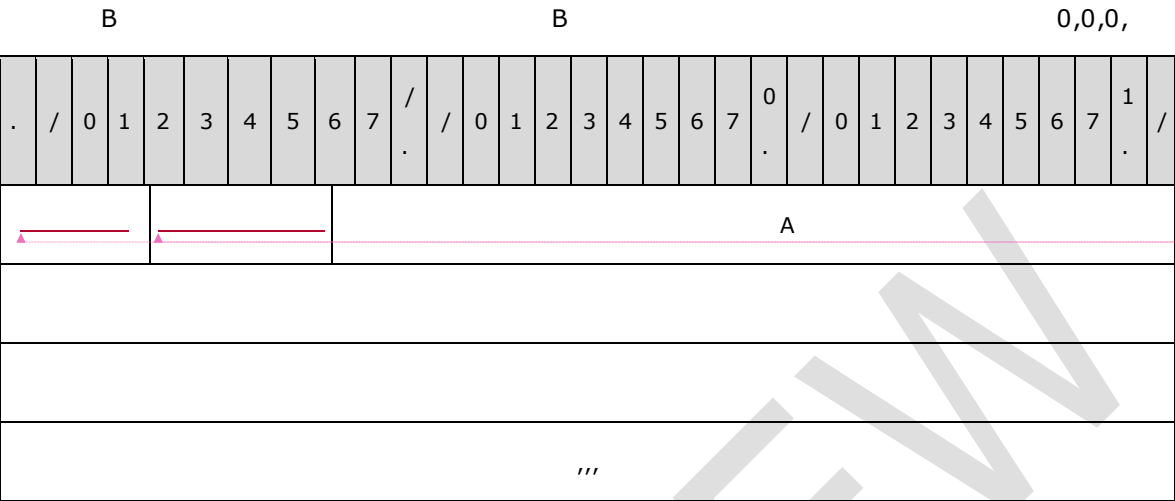
SVHDX_TUNNEL_VALIDATE_DISK_RESPONSE

B C ? B ? C B C ? ,

.	/	0	1	2	3	4	5	6	7	/	.	/	0	1	2	3	4	5	6	7	0	.	/	0	1	2	3	4	5	6	7	1	.	/
B																																		

IsValidDisk (1 byte): ? @ * *

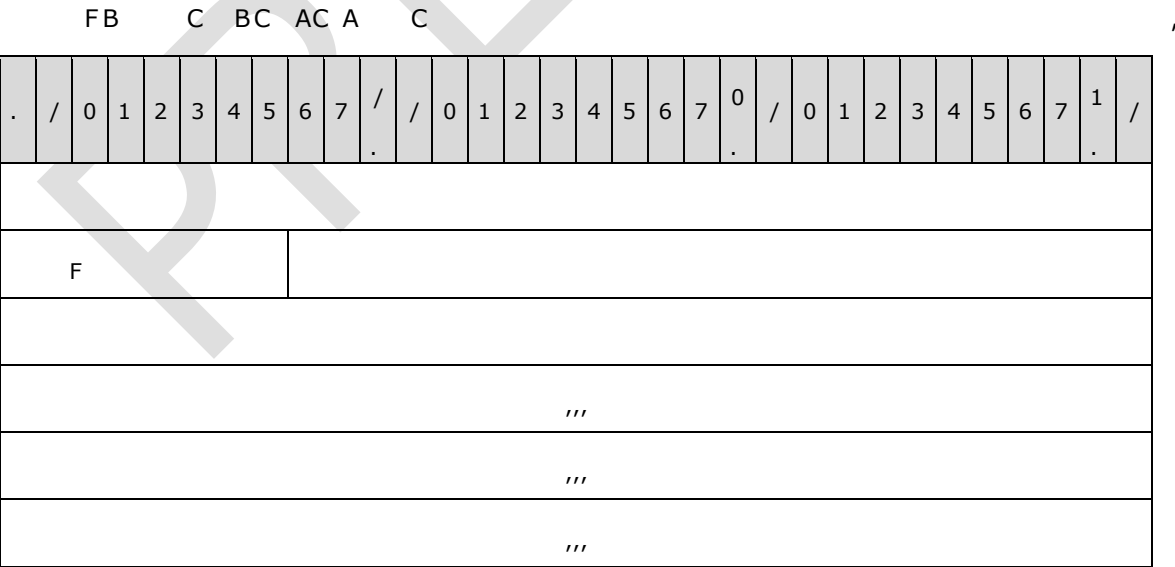
2.2.4.11 SVHDX_TUNNEL_OPERATION_HEADER Structure



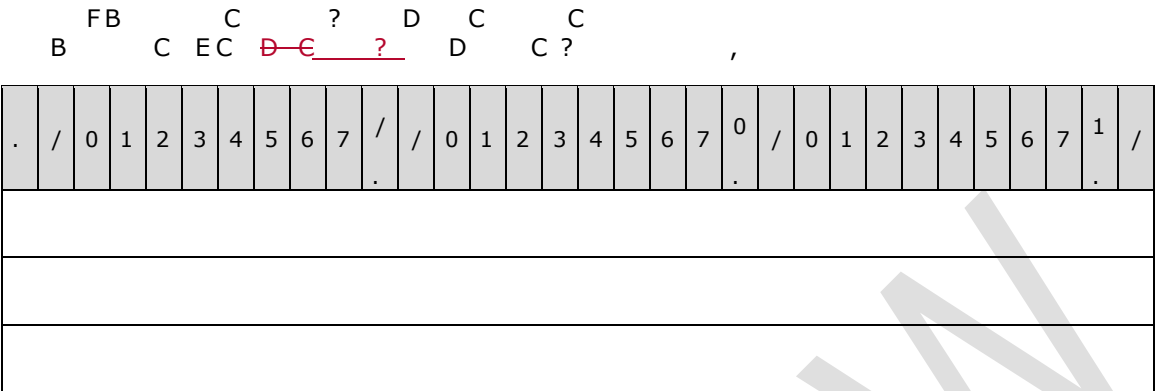
Deleted C
Deleted C

ProtocolId (1 byte): , 0,
ProtocolVersion(12 bits): , /,
OperationCode (12 bits 4 bytes) 8 ,
0,0,0,
Status (4 bytes) 8 F B *
RequestId (8 bytes) 8?

2.2.4.12 SVHDX_OPEN_DEVICE_CONTEXT Structure



2.2.4.14 SVHDX_TUNNEL_ ~~FILE~~INITIAL_INFO_RESPONSE Structure



.	/	0	1	2	3	4	5	6	7	/	.	/	0	1	2	3	4	5	6	7	0	.	/	0	1	2	3	4	5	6	7	1	.	/
B																																		
B F																																		

SharedVirtualDiskSupport (4 bytes) 8

Value	Meaning
_____ B _____ /	_____
_____ B 0 _____ 1	_____ 0 _____

SharedVirtualDiskHandleState (4 bytes) 8

Value	Meaning
F	,
F D /	,
F 1	,

2.2.4.17 SVHDX META OPERATION START REQUEST Structure

8?

SVHDX META OPERATION START REQUEST

.	/	0	1	2	3	4	5	6	7	.	/	0	1	2	3	4	5	6	7	0	.	/	0	1	2	3	4	5	6	7	1	.	/

...
...
...

B & _____
...

TransactionId (16 bytes) 8 _____ B _____ + _____

OperationType (4 bytes) 8 _____

Value	Meaning
_____ A _____/	_____ + _____
_____ _____0	_____ + _____ _____
_____ C FB _____1	_____ + _____ _____ FB _____
_____ A FB _____2	_____ + _____ _____ FB _____
_____ _____3	_____ + _____

Padding (4 bytes): _____

Data (variable): ? _____ + _____
OperationType _____

OperationType SvhdxCMetaOperationTypeCreateSnapshot*
FB C ? C ? A C ? C 0,0,2,/5,/,

OperationType SvhdxCMetaOperationTypeExtractVHD*
FB C ? C ? C ? A 0,0,2,/5,0,

OperationType SvhdxCMetaOperationTypeOptimize* _____

--

SnapshotType (4 bytes) 8
0,0,4,

Flags (4 bytes): 8

Name	Meaning
FB ? F B D?E C ?@C AF? EC ?A E/	?

Stage1 (4 bytes) 8

Name	Meaning
...../
.....@0
.....1
.....2	?
.....D.....3

Stage2 (4 bytes) 8 **Stage1**
SvhdxSnapshotStageInvalid*

Name	Meaning
.....

Stage3 (4 bytes) 8 **Stage1**
SvhdxSnapshotStageInvalid.

Stage4 (4 bytes) 8 **Stage1**
SvhdxSnapshotStageInvalid.

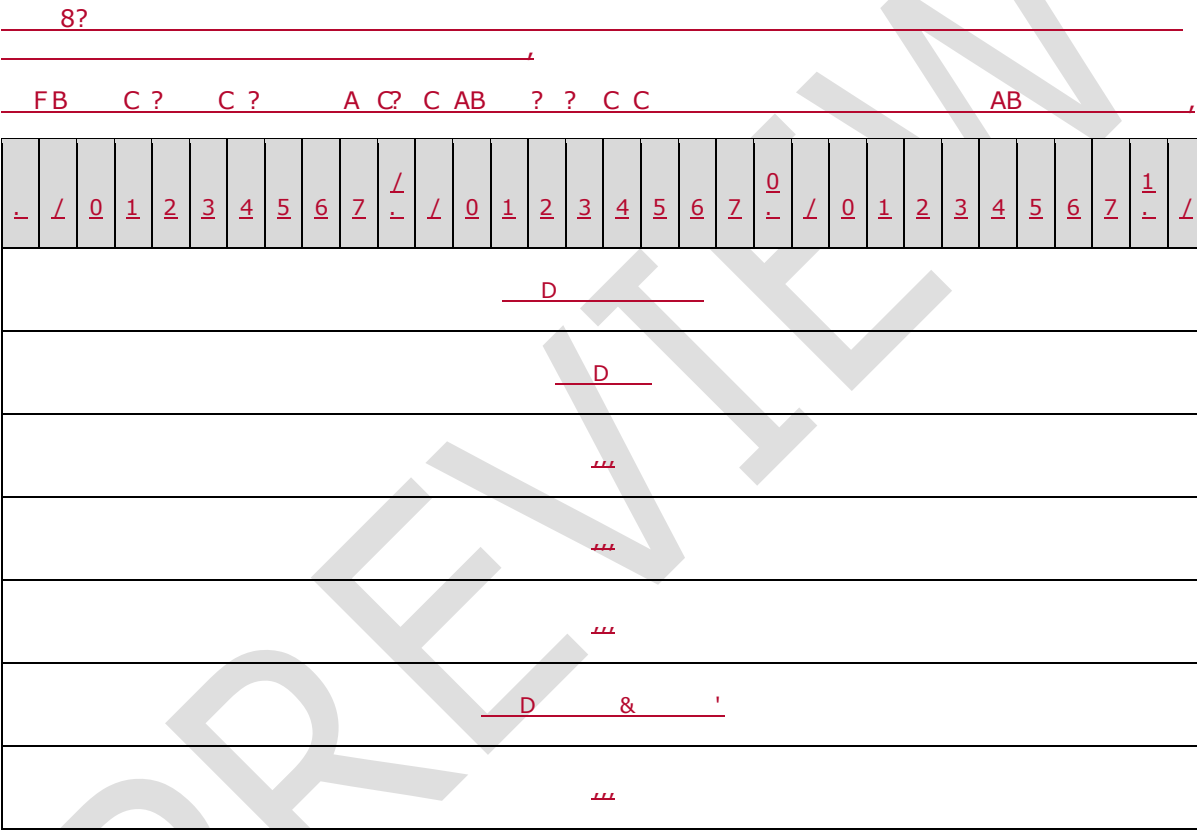
Stage5 (4 bytes) 8 **Stage1**
SvhdxSnapshotStageInvalid.

Stage6 (4 bytes) 8 **Stage1**
SvhdxSnapshotStageInvalid.

SnapshotId (16 bytes) 8 B
ParametersPayloadSize (4 bytes) 8
SnapshotType *
SnapshotType SvhdxCdpSnapshotTypeCDP*

CdpParameters (variable) 8 continuous data protection
snapshot (CDP snapshot)
FB C ? C ? A C ? C AB ? ? C C 0,0,2,/,/,/,/

2.2.4.17.1.1 SVHDX META OPERATION CREATE CDP PARAMETER Structure



SnapshotType (4 bytes): _____, _____
 _____0,0,4,_____

Flags (4 bytes): 8

Name	Meaning
$\frac{\text{FB} \quad \text{C} \quad ? \text{A} \quad ? \quad \text{F} \quad \text{D} ? \text{E} \quad \text{B} \quad \text{C} \quad \text{C} \quad \text{A} \quad \text{C}}{\text{...../}}$	$\frac{\text{FB}}{\text{...../}}$

SourceSnapshotId (16 Bytes): ? E B B

SourceLimitSnapshotId (16 Bytes): ? E B B

DestinationVhdSetNameLength (4 Bytes): * *

DestinationVhdSetName (Variable): ? + D+/4

2.2.4.17.3 SVHDX META OPERATION CONVERT TO VHDSET Structure

8?

$$\frac{\text{FB} \quad \text{A} \quad \text{C} \quad \text{FB} \quad \text{C}}{\text{FB} \quad \text{C} ? \quad \text{C} ? \quad ? \quad \text{C} \quad \text{C} \quad * \quad +}$$

SvhdxCmetaOperationTypeConvertToVhdSet, FB

+ FB

-	/	0	1	2	3	4	5	6	7	/	/	0	1	2	3	4	5	6	7	0	-	/	0	1	2	3	4	5	6	7	1	/
2	6	8	2	8	C	3	C	C	?	2	3	?	C	2	3																	

DestinationVhdSetNameLength (4 Bytes) 8 * *

DestinationVhdSetName,

DestinationVhdSetName (Variable) 8? + D+/4

FB

2.2.4.17.4 SVHDX META OPERATION RESIZE VIRTUAL DISK Structure

8?

FB A C FB C 4&24, '+/. &'3&' +1

SvhdxCmdOperationTypeResize,

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
C																?															

NewSize (8 bytes) 8

ExpandOnly (1 byte) 8?

AllowUnsafeVirtualSize (1 byte) 8?

ShrinkToMinimumSafeSize (1 byte) 8?

Reserved (1 byte) 8

2.2.4.18 SVHDX META OPERATION REPLY Structure

8?

SVHDX META OPERATION REPLY
SVHDX META OPERATION START REQUEST +
SvhdxCmdOperationTypeCreateSnapshot
SvhdxCmdSnapshotTypeCDP* *

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
A																C															

ChangeTrackingErrorStatus (4 bytes) 8

+

Name	Meaning
FB C AF? EC ?A E ? AAC	A +
FB C AF? EC ?A E ? CB	A +
A. 1?...0.	

Name	Meaning
FB.....0	_____
FB C.....3	_____
FB.....6	FB _____
FB A.....7	AB FB _____
FB A ??	AB B FB _____
FB A.....A	AB B FB _____

SnapshotType (4 bytes)8
SvhdxCSnapshotType _____

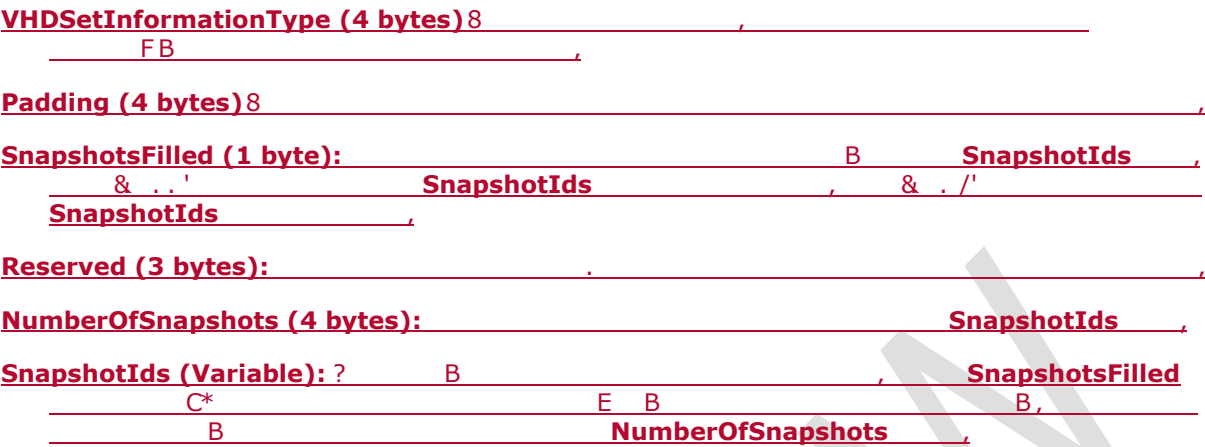
SnapshotId (16 bytes): B _____

**2.2.4.20 SVHDX TUNNEL VHDSET QUERY INFORMATION SNAPSHOT LIST R
ESPONSE Structure**

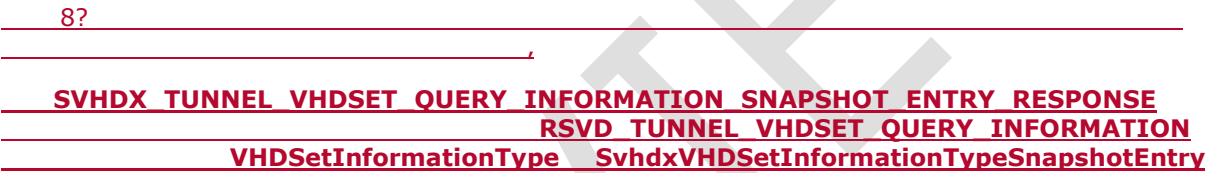
8?

SVHDX TUNNEL VHDSET QUERY INFORMATION SNAPSHOT LIST RESPONSE
RSVD TUNNEL VHDSET QUERY INFORMATION
FB SvhdxCVHDSetInformationTypeSnapshotList,

⌊	⌋	0	1	2	3	4	5	6	7	⌊	⌋	0	1	2	3	4	5	6	7	0	⌊	⌋	0	1	2	3	4	5	6	7	1	⌊	⌋
FB																																	
D																																	
&																																	



2.2.4.21SVHDX TUNNEL VHDSET QUERY INFORMATION SNAPSHOT ENTRY RESPONSE Structure



.	/	0	1	2	3	4	5	6	7	/	.	/	0	1	2	3	4	5	6	7	0	.	/	0	1	2	3	4	5	6	7	1	.	/
FB																																		
A																																		
...																																		
...																																		
...																																		

...

...
...
...
...
...
...
...
...

VHDSetInformationType (4 bytes): _____, _____
_____ C _____

SnapshotCreationTime (8 bytes): _____ * _____ /* /75. *

SnapshotType (4 bytes): _____, _____ **SvdxSnapshotType**
_____ 0,0,4, _____

IsValidSnapshot (4 bytes): _____ / _____ 9 _____

SnapshotId (16 bytes): _____ B _____

ParentSnapshotId (16 bytes): _____ B, _____ AB _____

LogFileId (16 bytes): _____ B _____, _____
AB _____

2.2.4.22 SVHDX TUNNEL VHDSET QUERY INFORMATION OPTIMIZE RESPONSE Structure

8? _____

SVHDX TUNNEL VHDSET QUERY INFORMATION OPTIMIZE RESPONSE
RSVD TUNNEL VHDSET QUERY INFORMATION
VHDSetInformationType VHDsvdxSetInformationTypeOptimizeNeeded,

PRR

...
A
...

CurrentProgressValue (8 bytes) 8? +
+ ,

CompleteValue (8 bytes) 8 *
CurrentProgressValue CompleteValue* ,

2.2.4.25 SVHDX CHANGE TRACKING GET PARAMETERS RESPONSE Structure

8?
 ,

SVHDX CHANGE TRACKING GET PARAMETERS RESPONSE
B C AF? EC ?A E EC ? ? C C ,

.	/	0	1	2	3	4	5	6	7	.	/	0	1	2	3	4	5	6	7	0	.	/	0	1	2	3	4	5	6	7	1	.	/
A																																	
...																																	
D																																	
...																																	

ChangeTrackingStatus (8 bytes) 8
0,0,1 ,

LogFileSize (8 bytes) 8
 ,

2.2.4.26 SVHDX TUNNEL DELETE SNAPSHOT REQUEST Structure

8?
 ,

SVHDX TUNNEL DELETE SNAPSHOT REQUEST
 ,

SVHDX CHANGE TRACKING STOP REQUEST

2.2.4.30 SVHDX CHANGE TRACKING STOP RESPONSE Structure

8?

SVHDX CHANGE TRACKING STOP RESPONSE

B C AF? EC ?A E

2.2.4.31 SVHDX OPEN DEVICE CONTEXT RESPONSE Structure

FB C BC AC A C C C

.	/	0	1	2	3	4	5	6	7	/	/	0	1	2	3	4	5	6	7	0	/	0	1	2	3	4	5	6	7	1	/
F																															
D																															
F																F 8/04															

Version (4 bytes):

*

/,5,

HasInitiatorId (1 bytes): ? @ * D? C
C,

Reserved (3 bytes): ,

InitiatorId (16 bytes): ? E B ,

Flags (4 bytes): , F B *

OriginatorFlags (4 bytes): ,

Name	Meaning
FB E ? FB ? C /	A
FB E ? FB 2	

OpenRequestId (8 bytes): ? 42+ ,

InitiatorHostNameLength (2 bytes): * * InitiatorHostName,
B ? ? C C E F,

InitiatorHostName (126 bytes): ? /04+ + D+/4 ,

2.2.5 SRB Status Code

@ ,

Value	Meaning
. . /	,
. . 0	,
. . 4	B ,
. . 6	B ,
. . ?	A ,
. /0	? ,
. . 2	,

2.2.6 Snapshot Types

8? ,

D _____.

Name	Meaning
_____	? _____.
_____. /	
_____ AB	? _____ &AB ' _____.
_____. 1	

3 Protocol Details

3.1 Client Details

3.1.1 Abstract Data Model

3.1.1.1 Global

8
ClientServiceVersion8
RequestIdentifier8? 42+

3.1.2 Timers

3.1.3 Initialization

ClientServiceVersion
,: 0<
RequestIdentifier8 F B: 1< + ,

3.1.4 Higher-Layer Triggered Events

3.1.4.1 Sending Any Outgoing Message

A RequestIdentifier /*
0,0,0,

3.1.4.2 Application Requests Opening a Shared Virtual Disk

- 8
- '
- '
- & ',
- * + ,
- '
- & ',
- '
- ? @ * * A ,

*
 FB C BC AC A C 0,0,2,/0
 8
 ▪ **Version** **ClientServiceVersion**,
 ▪ **InitiatorId** + * , ***InitiatorId**
 ,
 ▪ **HasInitiatorId** C 9
 D? C,
 ▪ **Flags** + ,
 ▪
OriginatorFlags FB E ? FB ? C , *
 FB E ? FB ,
 ▪ **OpenRequestId** **RequestIdentifier**,
 ▪ **InitiatorHostNameLength** **InitiatorHostName** * ,
 ▪ **InitiatorHostName** + * ,
InitiatorHostNameLength /04 * ,
 ,
 8 B ,
 + @
 1,0,2,0 8
 ▪ + ,
 ▪ + ,
 ▪ + ,
 + @ 1,0,2,1
 8
 ▪ D
 ▪ FB C BC AC A C A ,
 ▪ **CreateOptions** + @ 0,0,/1
 D C C CB ? C @ DDC E ,
 * ,

3.1.4.3 Application Requests Closing a Shared Virtual Disk

8
 ▪ ? **Open** ,

* + @ 1,0,2,3
+ ,

3.1.4.4 Application Requests Reading From a Shared Virtual Disk

8
▪ ? **Open** ,
▪ * * ,
▪ ,
▪ & ' ,
▪ ,
+ @ 1,0,2,4* +

3.1.4.5 Application Requests Writing To a Shared Virtual Disk

8
▪ ? **Open** ,
▪ * * ,
▪ ,
▪ ? ,
+ @ 1,0,2,5* +

3.1.4.6 Application Requests Virtual Disk File information

8
▪ ? **Open** ,
▪ ,
0,0,2,/1 8 FB C ? D-C D C C *
FB C C ? FC BC 8
▪ **OperationCode** B C EC ? D C ? ,
▪ **Status** ,
▪ **RequestId** **RequestIdentifier**,
+ @ 1,0,2,0. ,//*
8

- ? + Open,
- A 8D A FB A C C C ,
- FB C C ? FC? BC ,
- ,

3.1.4.7 Application Requests Connection Status

- ? 8 Open ,
- 0,0,2,/ FB 8 C AFCA A CA C C *
- FB C C ? FC? BC 8
- **OperationCode** B C AFCA A CA ? C ? ,
- **Status** ,
- **RequestId** RequestIdentifier, + @ 1,0,2,0. ,//*
- 8
- ? + Open,
- A 8D A FB A C C C ,
- FB C C ? FC? BC ,

3.1.4.8 Application Requests Shared Virtual Disk Information

- ? 8 Open ,
- 0,0,2,3* 8 FB C B D C C *
- FB C C ? FC? BC 8
- **OperationCode** B C EC B D C ? ,
- **Status** ,
- **RequestId** RequestIdentifier, + @ 1,0,2,0. ,//*
- 8

FB C B D C C 8

▪ Reserved ,

- **BlockSize** ,
- **LinkageId** ,
- **IsMounted** ,
- **Is4kAligned** ,
- **FileSize** ,
- **VirtualDiskId** ,

- ? + **Open** ,
- A 8D A FB A C C C ,
- FB C B D C C *

3.1.4.9 Application Requests Execution of SCSI Command

- ? **Open** ,
- B ,
- A A B @ &AB@ * ,
- *
- ? @ A AB@ * 0,0,2,1,
- A D A -*
0,0,2,5: 2< ,
- A AB@ ,
- & ,
- ? & ,
- 0,0,2,5 8 FB C A C C *
- FB C C ? FC BC 8
- **OperationCode** B C A C ? ,
- **Status** ,
- **RequestId** ,
- FB C A C C 8
- **Length** 14,
- **Reserved1*Reserved2*Reserved3** ,
- **CDBLength** + AB@ ,

- **SenseInfoExLength** + ,
- **DataIn** + @ ,
- **SrbFlags** + , **SrbFlags**.
- **SrbFlags** @ D?E B? ? * **DataIn** . . . , **SrbFlags**
@ D?E B? ? * **DataIn** F B: 3< . . / , **SrbFlags**
@ D?E B? ? @ D?E B? ? * **DataIn** . . 0 ,
- **DataTransferLength** + * **Length**
- **CDBBuffer** + AB@ ,
- **DataBuffer** + * ,
- 8 + @@ 1,0,2,0. ,//*
- 8
- ? + **Open** ,
- A 8D A FB A C C C ,
- FB C A C C ,

3.1.4.10 Application Requests to Validate a Shared Virtual Disk

- 8
- ? **Open** ,
- FB C ? B? C B C C *
- 0,0,2,7* 8
- FB C C ? FC? BC 8
- **OperationCode** B C ? B? C B C ? ,
- **Status** ,
- **RequestId** **RequestIdentifier** ,
- + @@ 1,0,2,0. ,//*
- 8
- ? + **Open** ,
- A 8D A FB A C C C ,
- FB C C ? FC? BC ,

3.1.4.11 Application Requests Querying Shared Virtual Disk Support

8

- ? **Open** ,
+ @@ 1,0,2,0. ,//*
- ? + **Open** ,
- A 8D A C F? CB ? B

3.1.4.12 Application Requests Creating a Virtual Machine Snapshot

- 8?
- 8
- ? **Open** FB ,
- **TransactionId** 8? E B
- /
- 0
- 1
- 2
- 3
- 4
- **SnapshotId** 8? E B
- FB C ? C ? ? C C *
- 0,0,2,/5 8
- FB C C ? F C BC 8
- **OperationCode** B C C ? C ? ? ,
- **Status** ,
- **RequestId** **RequestIdentifier** ,
- FB C ? C ? ? C C 8
- **TransactionId** + **TransactionId** ,
- **OperationType** **SvhdxMetaOperationTypeCreateSnapshot** ,
- **Data** FB C ? C ? A C C ? F
8
- **SnapshotType**
- **Stage1** /
- **Stage2** 0

- **Stage3** 1
- **Stage4** 2
- **Stage5** 3
- **Stage6** 4
- **SnapshotId**
- **ParametersPayloadSize**

+ @ 1,0,2,0.,//*

8

- ? + **Open**,

▪ A 8D A FB ? A C C C ,

▪ FB C ? C ? ? C C

3.1.4.13 Application Requests Creating a CDP Snapshot

8?

8

- ? **Open** FB ,

- **TransactionId**8? E B

▪ /

▪ 0

▪ 1

▪ 2

▪ 3

▪ 4

- **SnapshotId**8? E B

- **LogFileID**8? E B

- **FileName**8?

FB C ? C ? ? C C *

0,0,2,/5* 8

FB C C ? FC?BC 8

- **OperationCode** B C C ? C ? ? ,

- **Status**

FB C C ? FC BC		8
▪ OperationCode	B C C ? C ? ?	,
▪ Status		,
▪ RequestId	RequestIdentifier	
FB C ? C ? ? C C		8
▪ TransactionId	+	TransactionId ,
▪ OperationType	SvhdXMetaOperationTypeOptimize	
		+ @ 1,0,2,0. ,/*
		8
▪ ?	+	Open ,
▪ A	8D A FB ? A C C C	,
▪ FB	C ? C ? ? C C	,
3.1.4.15 Application Requests Extracting a Differencing VHD		
8?		
		,
		8
▪ ?	Open	FB ,
▪ TransactionId	8? E B	,
▪ SnapshotType	8	,
▪ Flags	8	,
▪ SnapshotId	8? E B	,
▪ SnapshotLimitId	8? E B	,
▪ DestinationVhdSetName	8? FB	,
		FB C ? C ? ? C C *
0,0,2,/5*		8
FB C C ? FC BC		8
▪ OperationCode	B C C ? C ? ?	,
▪ Status		,
▪ RequestId	RequestIdentifier	
FB C ? C ? ? C C		8
▪ TransactionId	+	TransactionId ,

▪ **Data** FB C ? C ? A C FB C
8

▪ **DestinationVhdSetNameLength** * *
DestinationVhdSetName,

▪ **DestinationVhdSetName** **DestinationVhdSetName**
,

+ @ 1,0,2,0. ,//*

8

▪ ? + **Open**,

▪ A 8D A FB ? A C C C ,

▪ FB C ? C ? ? C C ,

3.1.4.17 Application Requests Resizing a Shared Virtual Disk

8?

8

▪ ? **Open** ,

▪ **TransactionId** 8? E B ,

▪ **NewVirtualSize** 8 ,

▪ **ExpandOnly** 8 ,

▪ **AllowUnsafeVirtualSize** 8 ,

▪ **ShrinkToMinimumSafeSize** 8 ,

FB C ? C ? ? C C *

0,0,2,/5* 8

FB C C ? FC? BC 8

▪ **OperationCode** B C C ? C ? ? ,

▪ **Status** ,

▪ **RequestId** **RequestIdentifier** ,

FB C ? C ? ? C C 8

▪ **TransactionId** + **TransactionId** ,

▪ **OperationType** **SvhdxMetaOperationTypeExtractVHD** ,

▪ **Data** FB C ? C ? C C ? B
8

- **NewSize** **NewVirtualSize** _____,
- **ExpandOnly** **ExpandOnly** _____,
- **AllowUnsafeVirtualSize** **AllowUnsafeVirtualSize** _____,
- **ShrinkToMinimumSafeSize** **ShrinkToMinimumSafeSize** _____,

_____ + @ 1,0,2,0. ,//*
 _____ 8

- ? + **Open** _____,
- A 8D A FB ? A C C C _____,
- FB C ? C ? ? C C _____,

3.1.4.18 Application Requests Querying Meta Operation Progress

8?
 _____,

_____ 8

- ? **Open** FB _____,
- **TransactionId** 8? E B _____,

_____ FB C ? C ? C E C C C *
 _____ 0,0,2,01* 8

_____ FB C C ? FC BC 8

- **OperationCode** B C C ? C ? C E C _____,
- **Status** _____,
- **RequestId** **RequestIdentifier** _____,

_____ FB C ? C ? C E C C C 8

- **TransactionId** **TransactionId** _____,

_____ + @ 1,0,2,0. ,//*
 _____ 8

- ? + **Open** _____,
- A 8D A FB A C C C _____,
- FB C ? C ? C E C C C _____,

3.1.4.19 Application Requests Querying VHD Set Information

8?
 _____,

_____8

- ? **Open** _____FB _____,
- **InformationType**8 _____,
- **SnapshotType**8 _____,
- **SnapshotId**8? _____,

_____FB _____C _____FB C _____C _____D ? _____C C _____*

_____0,0,2,00* _____8

FB _____C _____C ? _____FC?BC _____8

- **OperationCode** _____B _____C _____FB C _____C _____D ? _____,
- **Status** _____,
- **RequestId** _____**RequestIdIdentifier** _____,

_____FB _____C _____FB C _____C _____D ? _____C C _____8

- **VHDSetInformationType** _____**InformationType** _____,
- **SnapshotType** _____**SnapshotType** _____,
- **SnapshotId** _____**SnapshotId** _____,

_____+ @ 1,0,2,0. ,//*

_____8

- ? _____+ _____**Open** _____,
- A _____8D A _____FB _____A _____C _____C C _____,
- FB _____C _____FB C _____C _____D ? _____C C _____,

3.1.4.20 Application Requests Deleting a Snapshot

_____8? _____,

_____8 _____,

- ? **Open** _____FB _____,
- **SnapshotID**8? _____,
- **PersistReference**8? _____9 _____C* _____,
- **SnapshotType**8 _____,

_____FB _____C _____B C C C ? _____F _____C C _____*

_____0,0,2,04* _____8

_____FB _____C _____C ? _____FC?BC _____8

- **OperationCode** _____B _____C _____B C C C ? _____F _____

▪ **Status** _____ ,

▪ **RequestId** _____ **RequestIdIdentifier** _____

_____ FB _____ C B C C C ? F _____ C C _____ 8

▪ **SnapshotId** _____ **SnapshotID** _____ ,

▪ **PersistReference** _____ **PersistReference** _____ ,

▪ **SnapshotType** _____ **SnapshotType** _____ ,

_____ 8 _____ + @ 1,0,2,0. ,//*

▪ ? _____ + _____ **Open** _____ ,

▪ A _____ 8D A _____ FB _____ A _____ C C C _____ ,

▪ FB _____ C B C C C ? F _____ C C _____ ,

3.1.4.21 Application Requests Querying Change Tracking Parameters

_____ 8? _____ ,

_____ 8 _____ ,

▪ ? _____ **Open** _____ FB _____ ,

_____ FB _____ C C ? _____ FC? BC _____ 8

▪ **OperationCode** _____ B _____ C AF? EC ?A E EC ? ? C C _____ ,

▪ **Status** _____ ,

▪ **RequestId** _____ **RequestIdIdentifier** _____

_____ 8 _____ + @ 1,0,2,0. ,//*

▪ ? _____ + _____ **Open** _____ ,

▪ A _____ 8D A _____ FB _____ A _____ C C C _____ ,

▪ FB _____ C C ? _____ FC? BC _____ ,

3.1.4.22 Application Requests Starting a Change Tracking Operation

_____ 8? _____ ,

_____ 8 _____ ,

▪ ? _____ **Open** _____ FB _____ ,

▪ **TransactionId** 8? _____ ,

▪ **LogFileId** 8? E B _____ ,

▪ **MaxLogFileSize** _____ ,

▪ **AppendData** 8? 9 C* _____ ,

▪ **LogFileName** 8? _____ ,

_____ **SVHDX CHANGE TRACKING START REQUEST** _____ *

_____ 0,0,2,05* _____ 8

_____ FB C C ? FC? BC _____ 8

▪ **OperationCode** _____ B C AF? EC ?A E ? _____ ,

▪ **Status** _____ ,

▪ **RequestId** _____ **RequestIdentifier** _____ ,

_____ **SVHDX CHANGE TRACKING START REQUEST** _____ 8

▪ **TransactionId** _____ **TransactionId** _____ ,

▪ **LogFileNameLength** _____ * * _____ + _____ D _____ ,

▪ **MaxLogFileSize** _____ **MaxLogFileSize** _____ ,

▪ **AppendData** _____ **AppendData** _____ ,

▪ **LogFileName** _____ **LogFileName** _____ ,

_____ + @ 1,0,2,0. ,//*

_____ 8

▪ ? + _____ **Open** _____ ,

▪ A 8D A FB A C C C _____ ,

▪ FB AF? EC ?A E ? C C _____ ,

3.1.4.23 Application Requests Stopping a Change Tracking Operation

8? _____ ,

_____ 8

▪ ? **Open** _____ FB _____ ,

_____ FB C C ? FC? BC _____ 8

▪ **OperationCode** _____ B C AF? EC ?A E _____ ,

▪ **Status** _____ ,

▪ **RequestId** _____ **RequestIdentifier** _____ ,

+ @@ 1,0,2,0. ,//*

8

- ? + **Open.**
- A 8D A FB A C C C ,
- FB C C ? FC?BC

3.1.5 Message Processing Events and Sequencing Rules

3.1.5.1 Receiving an Open Response

@ *

,

*

Open.ContextHandle

,

3.1.5.2 Receiving a Close Response

3.1.5.3 Receiving a Read Response

@ *

,

*

0,0,1*

0,0,1* 8

FB C @ ? C C

FB C C ? FC?BC 8

- **OperationCode** B C @ ? C ? ,
- **Status** ,
- **RequestId** **RequestIdentifier**,
- FB C @ ? C C 8
- **StatusKey** ,
- **Reserved** ,

8 + @@ 1,0,2,0. ,//*

8

- ? + ,
- A 8D A FB A C C C ,
- FB C @ ? C C ,

3.1.5.4 Receiving a Write Response

FB C @ ? C C 0,0,1* 8

FB C C ? FC BC 8

- **OperationCode** B C @ ? C ? ,
- **Status** ,
- **RequestId** RequestIdentifier, 8
- **StatusKey** ,
- **Reserved** ,

8 + @ 1,0,2,0. ,//*

- ? + ,
- A 8D A FB A C C C ,
- FB C @ ? C C ,

3.1.5.5 Receiving a Virtual Disk File Information Response

3.1.5.6 Receiving a Connection Status Response

3.1.5.7 Receiving a Shared Virtual Disk Information RequestResponse

*

3.1.5.8 Receiving a SCSI Command Response

@

*

*

3.1.5.9 Receiving a Validate Disk Response

3.1.5.10 Receiving a Shared Virtual Disk Support Response

3.1.5.11 Receiving a Meta-Operation Start Response

8?

3.1.5.12 Receiving a Meta-Operation Progress Response

8?

@

*

*

3.1.5.13 Receiving a Query VHD Set Information Response

8?

@

*

*

3.1.5.14 Receiving a Delete Snapshot Response

8?

_____.

3.1.5.15 Receiving a Change Tracking Parameter Response

8?

_____@_____*

_____*
_____.

3.1.5.16 Receiving a Start Change Tracking Response

8?

_____.

3.1.5.17 Receiving a Stop Change Tracking Response

8?

_____.

3.1.6 Timer Events

,

3.1.7 Other Local Events

,

3.2 Server Details

3.2.1 Abstract Data Model

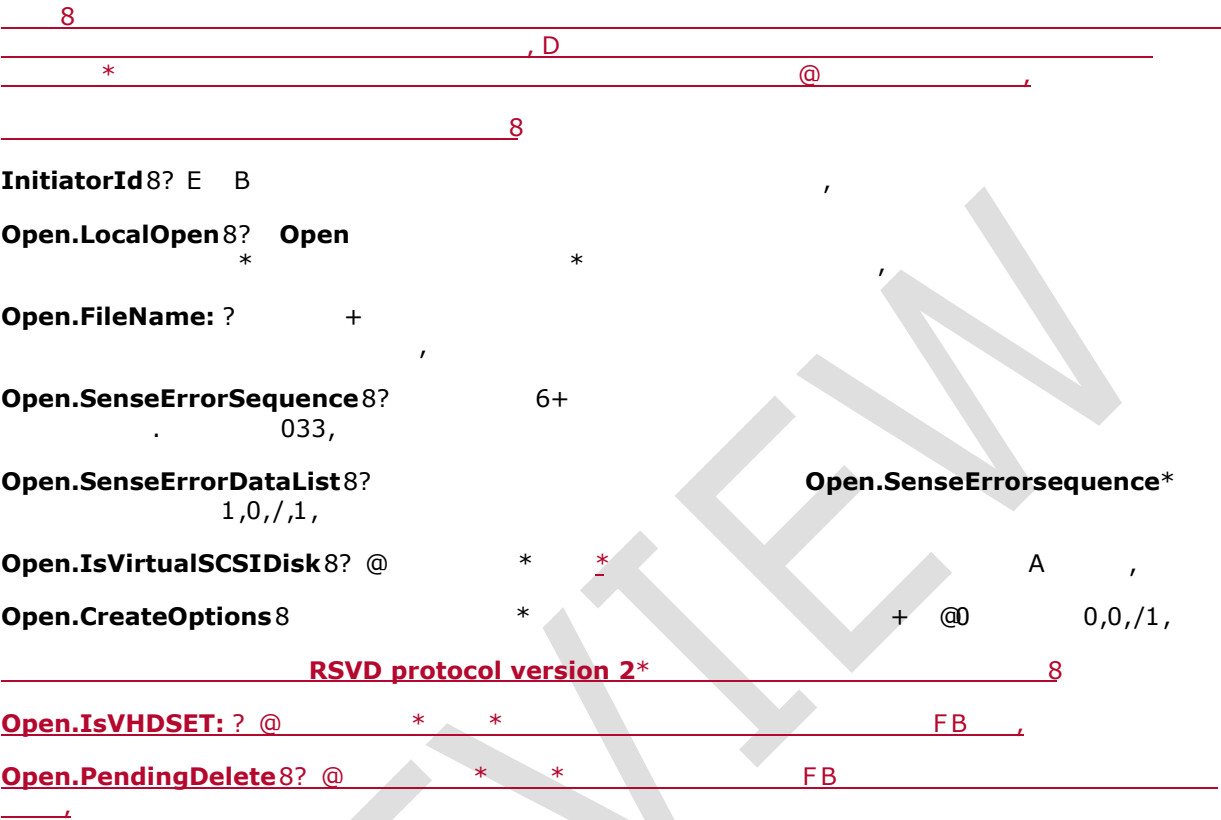
3.2.1.1 Global

8
IsSVHDXSupported8? @_____*_____*

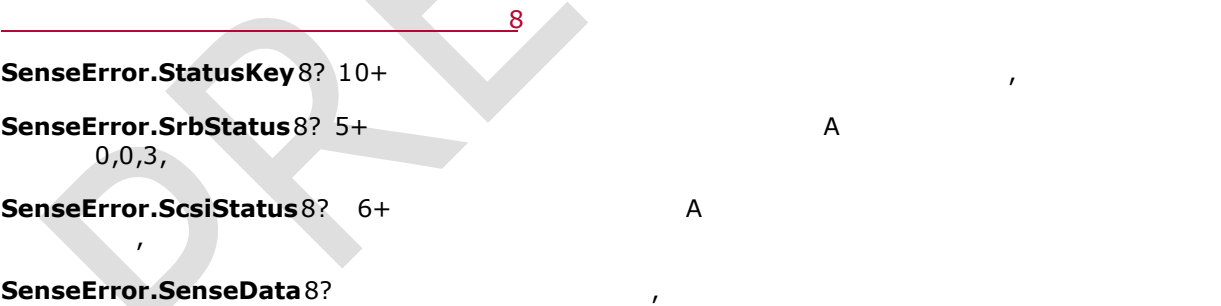
OpenTable8?_____*1,0,/,0*

ServerServiceVersion8_____,

3.2.1.2 Per Open



3.2.1.3 Per SenseError in SenseErrorDataList



3.2.2 Timers

3.2.3 Initialization



$$\frac{C \ A \ C \ D \ *}{IsSVHDXSupported \ C,} + 0,0,0,2^*$$

8

- $$\frac{- \ IsSVHDXSupported \ C^*}{*} + @ 1,1,2,03,$$
- $$\frac{ServerServiceVersion}{,; \ 4<}$$

3.2.4 Higher-Layer Triggered Events

3.2.4.1 Handling a Tunnel Operation Request

- 8
- ?
$$\frac{Open,}{*}$$
 - ,
 - $$\frac{MaxOutputResponse,}{1,0,3,3,}$$

3.2.4.2 Handling a Shared Virtual Disk Support Request

- 8
- ?
$$\frac{Open,}{*}$$
 - D ,
 - $$\frac{MaxOutputResponse,}{1,0,3,4,}$$

3.2.5 Message Processing Events and Sequencing Rules

$$\frac{D \ * \ IsSVHDXSupported \ D^? \ C^*}{? \ ? \ B \ BC \ AC \ C \ C,}$$

3.2.5.1 Receiving an Open Request

8

$$\frac{*}{Open.LocalOpen \ * \ Open \ OpenTable} + @$$

$$\frac{1,1,3,7,/0, \ Open \ *}{* \ ? \ ? \ B \ F? \ B \ C,}$$

Open.LocalOpen

FB C BC AC A C

FB C BC AC A C *

8

8 B *

HasInitiatorId D? C & ..' C & . / '*
? ? B ? ? C C ,

OriginatorFlags

FB E ? FB *

? F? E ? *

OriginatorFlags

F B: 35<

A

FB E ? FB *

A

*

A

Open * ? AAC ,8

Open.LocalOpen

Open

HasInitiatorId ... * Open.InitiatorId

InitiatorId,

Open.FileName

+

Open.SenseErrorDataList

Open.SenseErrorSequence

Open.IsVirtualSCSIDisk F B: 6< C OriginatorFlags

FB E ? FB , * D? C,

Open.CreateOptions

CreateOptions

Open.IsVHDSET C + , D? C ,

Open.PendingDelete D? C,

FB C BC AC A C C C
FB C BC AC A C ,

F B: 7< FB C BC AC A C C C
? AAC ,

3.2.5.2 Receiving a Close Request

8
 , D
 * @
 *

8

Open
 @ *

OpenTable
 + @0

Open.LocalOpen
 1,1,2,/5,

Open

Open.PendingDelete C*

OpenTable* Open *

Open ? AAC

Open

3.2.5.3 Receiving a Read Request

1,0,3,/0,

Open *

Open ? B F? B C

Open.InitiatorId *

Open.SenseErrorSequence . DD* Open.SenseErrorSequence

Open.SenseErrorSequence 8

SenseError Open.SenseErrorDataList

SenseError.StatusKey Open.SenseErrorSequence,

SenseError + : / . <

& ? FB C CB SenseError.StatusKey'

Open

Open.CreateOptions* D C C CB ? C @ DDC E ? CB

Open Open.IsVirtualSCSIDisk D? C*

9 A

+

A *

0,0,1* A 0,0,1* *

0,0,1* A 8

- **Open.SenseErrorSequence** . DD* **Open.SenseErrorSequence** **Open.SenseErrorSequence** . . /,
- **SenseError** **Open.SenseErrorDataList** 8
Open.SenseErrorSequence
 - **SenseError.StatusKey** **Open.SenseErrorSequence**,
 - **SenseError.SrbStatus** A ,
 - **SenseError.ScsiStatus** A ,
 - **SenseError.SenseData** A ;: // <
- & ? FB C CB **SenseError.StatusKey'**

3.2.5.4 Receiving a Write Request

Open.LocalOpen * **Open** **Open** **OpenTable** +
 @ 1,1,3,/1, @ ? ? B ? ? C C

Open * ? ? B F ? B C 8

- **Open.SenseErrorSequence** . DD* **Open.SenseErrorSequence** **Open.SenseErrorSequence** . . /,
- **SenseError** **Open.SenseErrorDataList** 8
Open.SenseErrorSequence
 - **SenseError.StatusKey** **Open.SenseErrorSequence**,
 - **SenseError** + : /0 <
- & ? FB C CB **SenseError.StatusKey'**

Open D C C CB ? C @ DDC E ? CB ,

Open.CreateOptions* **Open** **Open.IsVirtualSCSIDisk** D? C* A

9 + , A *

persistent reservation * A 3,4* *
 ? FB C C ? A D A ,
 * 0,0,1*
 ,
 A 8
 0,0,1*
 ▪ Open.SenseErrorSequence . DD* Open.SenseErrorSequence
 * Open.SenseErrorSequence . . . /,
 ▪ SenseError Open.SenseErrorDataList
 Open.SenseErrorSequence 8
 ▪ SenseError.StatusKey Open.SenseErrorSequence,
 ▪ SenseError.SrbStatus A ,
 ▪ SenseError.ScsiStatus A ,
 ▪ SenseError.SenseData A 7,1 /1<
 ▪ & ? FB C CB SenseError.StatusKey'
 ,

3.2.5.5 Receiving a Tunnel Operation Request

OpenTable Open.LocalOpen * Open Open
 + @ 1,1,3,/1, @ *
 Open * ? ? B ? ? C C ,
 /4*
 ? @ DDC ? ,
 Open ? B OperationCode
 DD 0 *
 ? ? B BC AC C C ,
 FB C C ? FC ? BC C* * * A *
 *
 ▪ ServerServiceVersion B /& /'
 ProtocolId ? B OperationCode ... DDD /
 . . 0* Status ? C C CB ,
 ▪ ProtocolId . . /* Status
 ? ? B BC AC C C ,
 ▪ ProtocolVersion / / . . . * Status
 ? FB C ? AF ,

▪ **ServerServiceVersion** B 0& 0'
 ? B **OperationCode** . . . DDD. / 0. . . *
Status ? FB C ? AF,

▪ **OperationCode**
 0,0,0* **Status** ? ? B ? ? C C ,

▪ **OperationCode** B C A C ? **Open.InitiatorId**
 * **Status** ? ? B F ? B C,
 FB C C ? FC BC ,
 /4*
 ? @ DDC ? ,
OperationCode ,

3.2.5.5.1 Receiving a Virtual Disk File Information Request

B C EC ? D C ? * 8
MaxOutputResponse 2. & FB C C ? FC BC)
 FB C ~~D-E~~ ? D C C*
 ? @ DDC ? ,
 * A +
 A *
Status FB C C ? FC BC *
 *
 0,0,2,/2 FB C ~~D-E~~ ? D C C 8
 FB C C ? FC BC 8
 ▪ **OperationCode** A ,
 ▪ **Status** ? AAC
 ▪ **RequestId** ,
 FB C ~~D-E~~ ? D C C 8
 ▪ **ServerVersion** **ServerServiceVersion**,
 ▪ **SectorSize** A
 ▪ **PhysicalSectorSize** A ,
 ▪ **VirtualSize** A

3.2.5.5.2 Receiving a Connection Status Request

OperationCode
B C AFCA A CA ? C ? *

MaxOutputResponse
? /4 & FB C C ? FC? BC '*
@ DDC C D ,
FB C AFCA A CA C C
0,0,2,0 8
FB C C ? FC? BC 8

- **OperationCode** A ,
- **Status** ? AAC ,
- **RequestId** ,

3.2.5.5.3 Receiving a ~~Sense-Code~~**Status** Request for a Prior Operation

OperationCode
B C @ ? C ? * 8

MaxOutputResponse
FB C @ ? C 2. & FB C C ? FC? BC)
? ? B ? ? C C , C *

SenseInfoExLength ? ? B ? ? C C , **SenseDataEx***

SenseError.StatusKey **SenseError** **Open.SenseErrorDataList**
StatusKey ,

SenseError * ? FB C ? ? ? @ C ,

SenseError * FB C @ ? C C
0,0,2,2 8

FB C C ? FC? BC 8

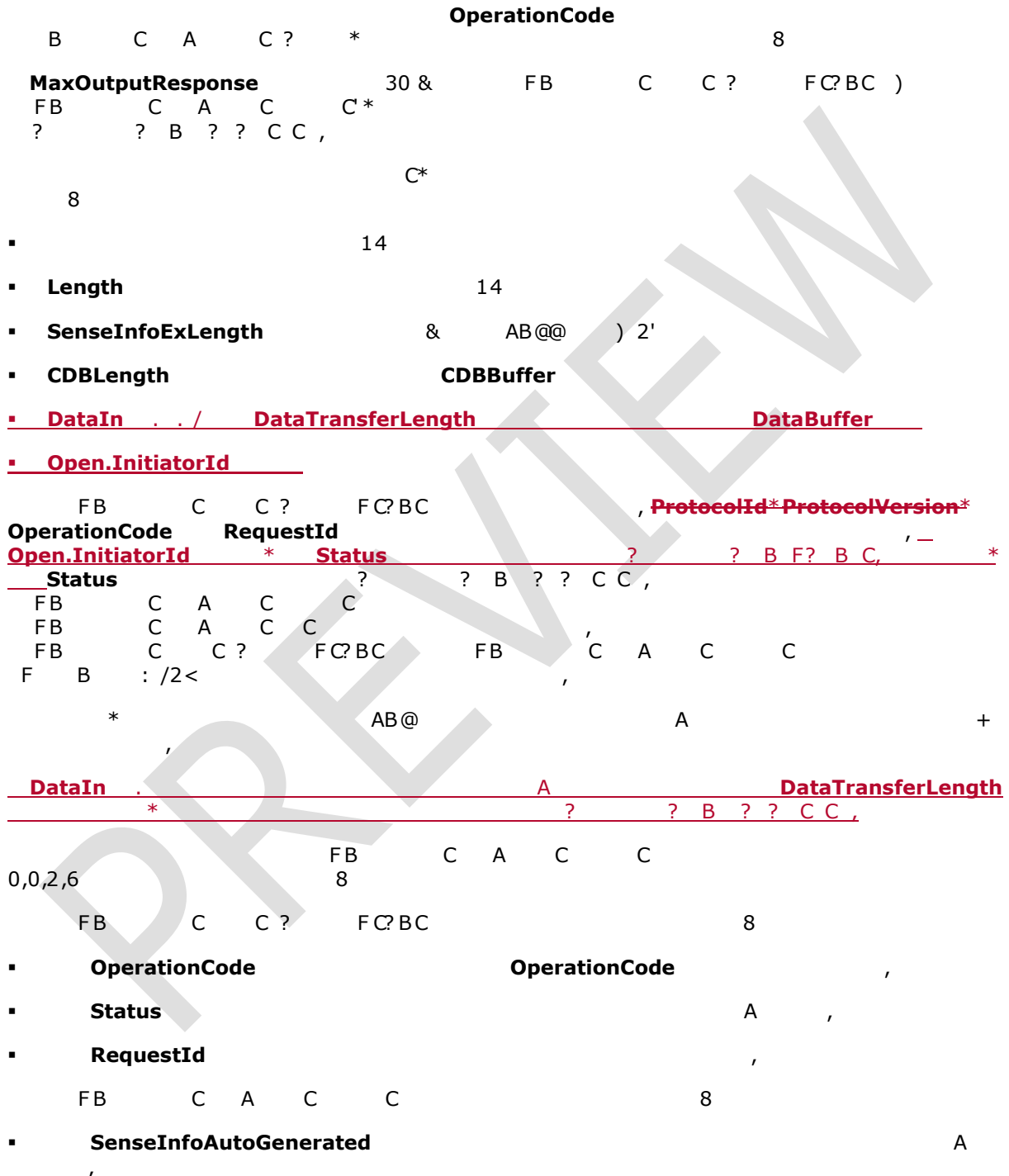
- **OperationCode** A ,
- **Status** ? AAC ,
- **RequestId** ,
- **StatusKey** ,
- **SenseInfoAutoGenerated** A
- **SrbStatus** **SenseError.SrbStatus** ,

- **ScsiStatus** **SenseError.ScsiStatus,**
- **SenseInfoExLength** **SenseError.SenseData***
- **SenseDataEx** **SenseError.SenseData,**

3.2.5.5.4 Receiving a Shared Virtual Disk Information Request

- OperationCode** 8
- MaxOutputResponse** 50 & FB C C ? FC? BC)
- FB C B D C C* ? @ DDC ? ,
- Status** FB C C ? FC? BC *
- 0,0,2,2
- FB C C ? FC? BC 8
- **OperationCode** A ,
 - **Status** ? AAC ,
 - **RequestId** ,
 - **DiskType** A ,
 - **DiskFormat** ? ?EC C BC AC FB ,
 - **BlockSize** A ,
 - **LinkageId** E B A ,
 - **IsMounted** C A D? C,
 - **Is4kAligned** C A D? C,
 - **Reserved** ,
 - **FileSize** A
 - **VirtualDiskId** E B A ,

3.2.5.5.5 Receiving a SCSI Command Request



- **SrbStatus** 0,0,3
- **SCSIStatus** A ,
- **DataIn** ,
- **SrbFlags**
- **CDBLength**
- **Length** * * FB C A C C 0,0,2,6,
- **SenseInfoExLength** A * ,
- **SenseDataEx** A *
- **DataTransferLength** A *
- **DataBuffer** A *

3.2.5.5.6 Receiving a Validate Disk Request

OperationCode B C ? B? C B C ? * 8

MaxOutputResponse FB C ? B? C B C /5 & FB C C ? FC? BC)

0,0,2,/. * FB C ? B? C B C C * 8

OperationCode A ,

Status A ? AAC 9

RequestId ,

IsValidDisk C D? C, A ,

3.2.5.5.7 Receiving a Start Meta-Operation Request

8?	
OperationCode	
B C ? C ? C ? *	8
OperationType SvhdxCmetaOperationTypeCreateSnapshot*	
SvhdxCmetaOperationTypeOptimize* SvhdxCmetaOperationTypeExtractVHD*	
? ? B ? ? C C ,	
OperationType	1,0,3,4—3,5,/*1,0,3,3,5,0*
1,0,3,3,5,1,	
3.2.5.5.7.1 Receiving a Create Snapshot Request	
8?	
OperationType	
SvhdxCmetaOperationTypeCreateSnapshot*	8
54) ParametersPayloadSize *	
? @ DDC ? ,	
SnapshotType SvhdxCsnapshotTypeVM SvhdxCsnapshotTypeCDP*	
? ? B ? ? C C / & ' ,	
Stage1 SvhdxCsnapshotStageInvalid*	
? ? B ? ? C C 0 & ' ,	
C*	
? ? B ? ? C C 3 & 1'8	
▪ Flags SnapshotType SvhdxCsnapshotTypeVM	
▪ Flags FB ? F B D ? E C ? @ C AF ? EC ? A E	
Stage1 SvhdxCsnapshotStageInitialize,	
▪ SnapshotType SvhdxCsnapshotTypeVM Flags	
FB ? F B D ? E C ? @ C AF ? EC ? A E ,	
C Stage2 Stage6	8
▪ *	
? ? B ? ? C C 1 & / ' ,	
▪ SvhdxCsnapshotStageInvalid	
SvhdxCsnapshotStageInvalid *	
? ? B ? ? C C 2 & 0' ,	
Open.IsVHDSET D ? C*	
? ? B BC AC C C ,	
A A	+
SVHDX META OPERATION REPLY	
0,0,2,2*	8

SVHDX TUNNEL OPERATION HEADER		8
▪ OperationCode	OperationCode	,
▪ Status	? AAC	,
▪ RequestId		,
	FB C ? C ? C	8
▪ ChangeTrackingErrorStatus		A
		,
SVHDX META OPERATION REPLY		,
3.2.5.5.7.2 Receiving an Optimize Request		
	8?	,
		,
	OperationType	
SvhdxMetaOperationTypeOptimize*		8
	FB A	+
		,
	Status FB C C ? FC BC	
C AAC *		,
3.2.5.5.7.3 Receiving an ExtractVHD Request		
	8?	,
		,
	OperationType	
SvhdxMetaOperationTypeExtractVHD*		8
	46) ParametersPayloadSize *	
	? @ DDC ?	,
	C*	
	? ? B ? ? C C 8	
▪ ParametersPayloadSize	4.	,
▪ DestinationFileLengthBytes	/0.	,
▪ A BC DestinationVhdSetName		,
▪ DestinationVhdSetName		,
▪ SourceSnapshotId SourceLimitSnapshotId	B.	,
	C*	
	? ? B ? ? C C / & 1'8	
▪ Flags SnapshotType SvhdxSnapshotTypeVM		,

A		*		*	
Status		FB	C	C ?	FC? BC *
*		FB	C ?	C ?	C E C C C
		0,0,2,2*		8	
FB		C	C ?	FC? BC	8
OperationCode		OperationCode			
Status		?		AAC	
RequestId					
FB		C ?	C ?	C	E C C C
8					
CurrentProgressValue		A			
CompleteValue		A			

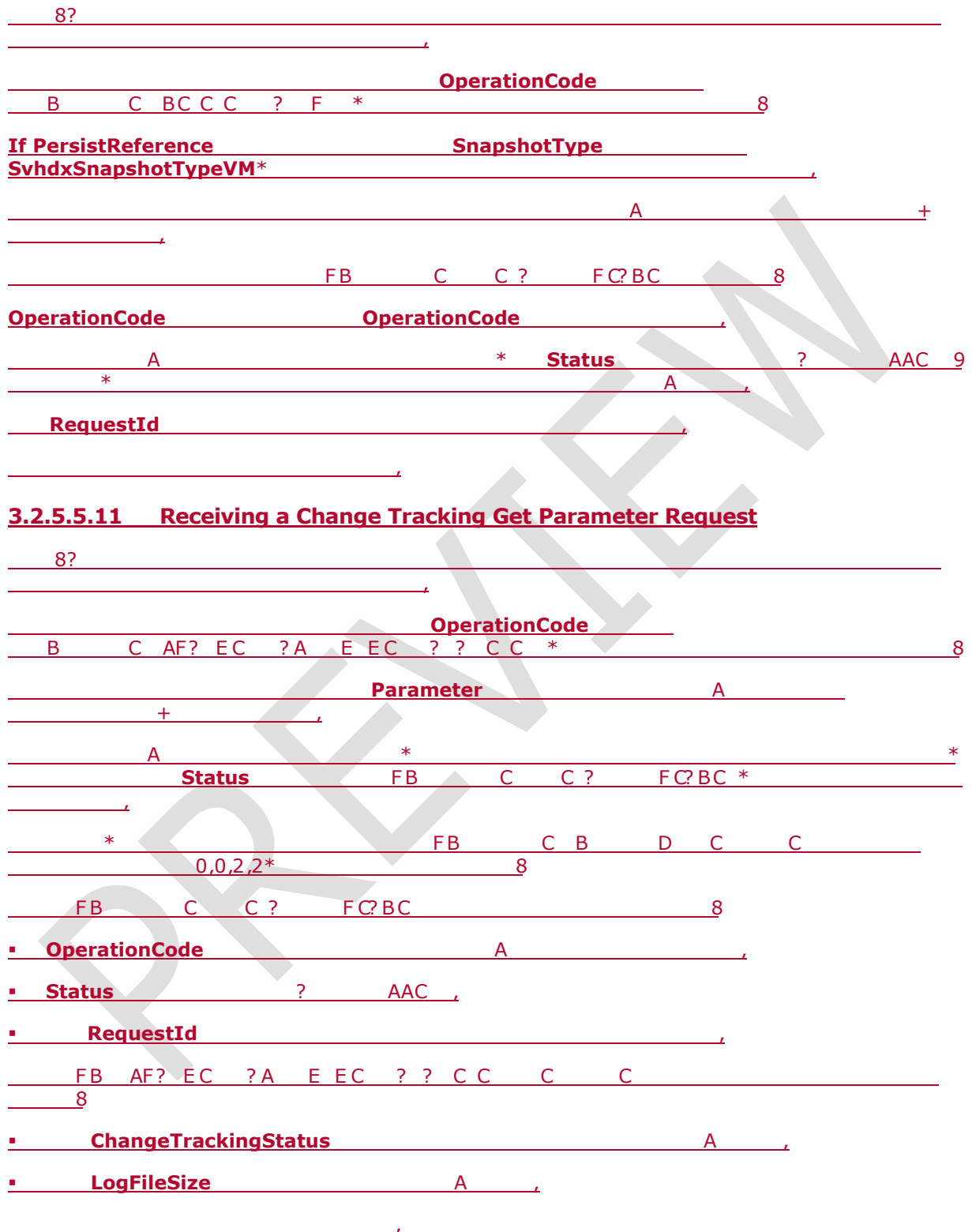
3.2.5.5.9 Receiving a Query VHD Set Information Request

8?					
		OperationCode		B	C FB C
C	D ? *	8			
		FB		C	FB C
C	D ? C C *				
? @ DDC ? ,					
Open.IsVHDSET		D?	C*		
?		? B BC AC C C ,			
VHDSetInformationType					0,0,2,/7*
		?	? B ? ? C C /& ' ,		
VHDSetInformationType		SvhdXVHDSetInformationTypeSnapshotEntry			
SnapshotType		SvhdXSnapshotTypeVM		SvhdXSnapshotTypeCDP*	
?		? B ? ? C C / ,			
VHDSetInformationType		SvhdXVHDSetInformationTypeSnapshotList			
SnapshotType		SvhdXSnapshotTypeVM*			
?		? B ? ? C C / ,			
VHDSetInformationType		SvhdXVHDSetInformationTypeSnapshotEntry			
SvhdXVHDSetInformationTypeSnapshotList		SnapshotType			
SvhdXSnapshotTypeInvalid*					
?		? B ? ? C C ,			
		FB		A	
+					

A		*		*	
Status		FB	C	C ?	FC? BC *
*		8			
▪ VHDSetInformationType <u>SvhdxFVHDSetInformationTypeSnapshotEntry*</u>					
SVHDX TUNNEL VHDSET					
QUERY INFORMATION SNAPSHOT ENTRY RESPONSE					
0,0,2,0/*		8			
		FB	C	C ?	FC? BC
		8			
▪ OperationCode		OperationCode			
▪ Status		?		AAC	
▪ RequestId					
▪ SVHDX TUNNEL VHDSET					
QUERY INFORMATION SNAPSHOT ENTRY RESPONSE					
		8			
▪ VHDSetInformationType		<u>SvhdxFVHDSetInformationTypeSnapshotEntry.</u>			
▪ SnapshotType		A			
▪ IsValidSnapshot		A			
▪ SnapshotId		SnapshotId			
▪ ParentSnapshotId					
▪ LogFileId					
▪					
▪ VHDSetInformationType <u>SvhdxFVHDSetInformationTypeSnapshotList*</u>					
<u>SvhdxFVHDSetInformationTypeCdpSnapshotActiveList*</u>					
<u>SvhdxFVHDSetInformationTypeCdpSnapshotInactiveList*</u>					
SVHDX TUNNEL VHDSET QUERY INFORMATION SNAPSHOT LIST					
0,0,2,0.*		8			
		FB	C	C ?	FC? BC
		8			
▪ OperationCode		OperationCode			
▪ Status		?		AAC	
▪ RequestId					
▪ SVHDX TUNNEL VHDSET QUERY INFORMATION SNAPSHOT LIST					
		8			
▪ VHDSetInformationType		<u>SvhdxFVHDSetInformationTypeSnapshotList.</u>			

▪	SnapshotsFilled	C	B
▪	SnapshotsFilled	A	
▪	NumberOfSnapshots	A	
▪	SnapshotsFilled	C*SnapshotIds	
▪		A	
▪			
▪	VHDSetsInformationType	SvhdXVHDSetsInformationTypeCdpSnapshotRoot*	
	SVHDX TUNNEL VHDSSET		
	QUERY INFORMATION SNAPSHOT ENTRY RESPONSE		
	0,0,2,0/*	8	
▪	FB	C	C ? F ? BC
▪	OperationCode	OperationCode	8
▪	Status	?	AAC
▪	RequestId		
▪	SVHDX TUNNEL VHDSSET		
	QUERY INFORMATION SNAPSHOT ENTRY RESPONSE		
	8		
▪	VHDSetsInformationType	SvhdXVHDSetsInformationTypeCdpSnapshotRoot	
▪	SnapshotType	A	
▪	IsValidSnapshot	A	
▪	SnapshotId	SnapshotId	
▪	ParentSnapshotId	A	
▪	LogFileId	A	
▪			
▪	VHDSetsInformationType	SvhdXVHDSetsInformationTypeOptimizeNeeded*	
	SVHDX TUNNEL VHDSSET		
	QUERY INFORMATION OPTIMIZE RESPONSE		0,0,2,00*
	8		
▪	FB	C	C ? F ? BC
▪	OperationCode	OperationCode	8
▪	Status	?	AAC
▪			

3.2.5.5.10 Receiving a Delete Snapshot Request



3.2.5.5.12 Receiving a Change Tracking Start Request

8?

OperationCode

B C AF? EC ?A E ? *

AppendData D? C LogFileNameLengthInBytes . *

? ? B ? ? C C

A +

FB C C ? FC? BC 8

- OperationCode
- Status A
- RequestId

3.2.5.5.13 Receiving a Change Tracking Stop Request

8?

OperationCode

B C AF? EC ?A E *

A +

FB C C ? FC? BC 8

- OperationCode A
- Status A
- RequestId

3.2.5.6 Receiving a Query Shared Virtual Disk Support Request

8

, D

* @

MaxOutputResponse 6 &

FB F? CB ? B C C *

? @ DDC ? ,

IsSVHDXSupported C* SharedVirtualDiskSupport / , *

F B: /3< SharedVirtualDiskSupport . ,

ServerServiceVersion

B

/& /'*

SharedVirtualDiskSupport

SharedVirtualDiskSupported,

SharedVirtualDiskSupport

SharedVirtualDiskVer2OperationsSupported,

OpenTable

Open.FileName

,

Open

*

SharedVirtualDiskHandleState

HandleStateNone,

Open

Open.LocalOpen

+

*

SharedVirtualDiskHandleState

HandleStateShared,

*

SharedVirtualDiskHandleState

HandleStateFileShared,

,

3.2.6 Timer Events

,

3.2.7 Other Local Events

,

4 Protocol Examples

B & B' ,

4.1 Retrieving Virtual Disk File Information

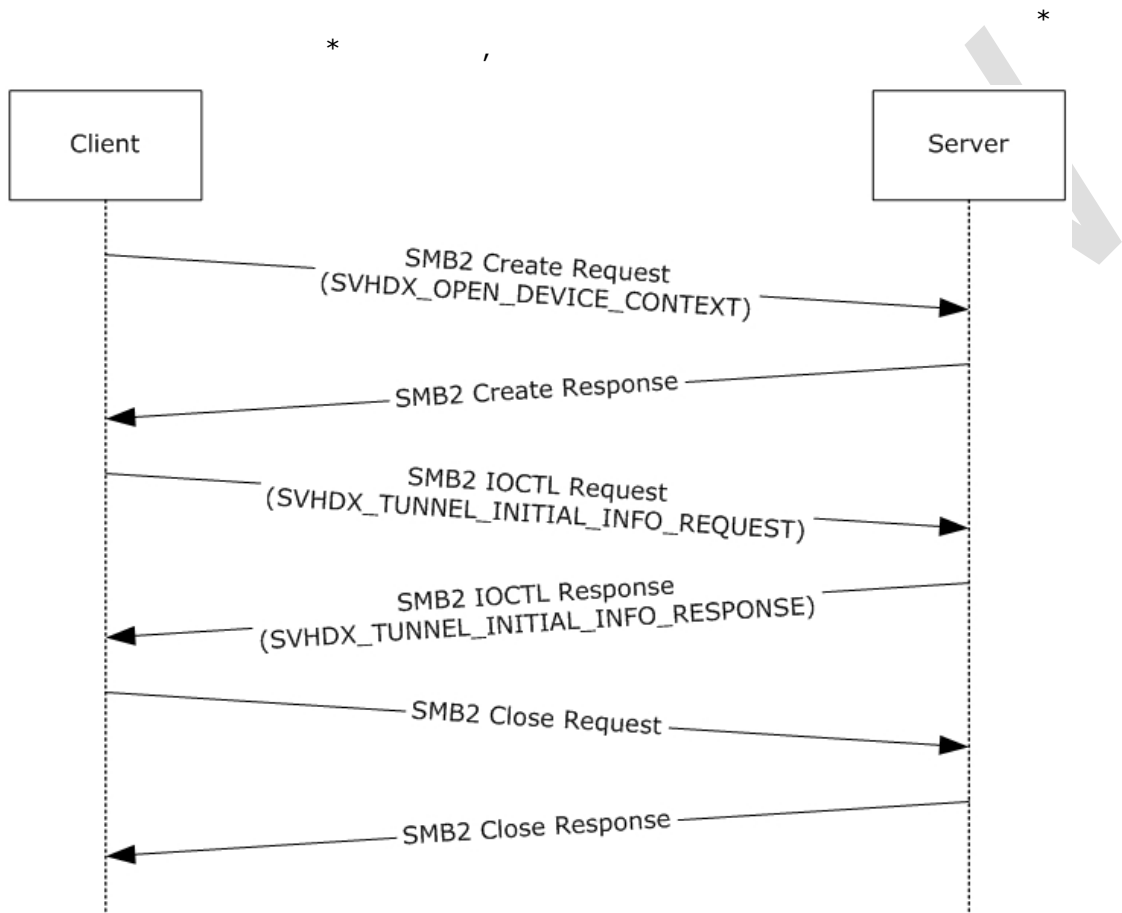


Figure 2: Retrieving virtual disk file information

/, @ A C? C FB C BC AC A C

Version: 1 (0x00000001)
HasInitiatorId: 1
Reserved: 0 (0x0000000)
InitiatorId: (0x07770D201F2740834579D46F5AC43B73)
Flags: 0 (0x00000000)
OriginatorFlags: 1 (0x00000001)
OpenRequestId: (0x000000001EC7871E)
InitiatorHostNameLength: 16 (0x0010)
InitiatorHostName: client01 (0x003100300074006E00650069006C0063)

0, @ A C C

1, @ A FB C ~~D-E~~ ? D C C

OperationCode: RSVD_TUNNEL_GET_INITIAL_INFO_OPERATION (0x02001001)
Status: 0 (0x00000000)
RequestId: (0x000000001Ec7871E)
ServerVersion: 0 (0x00000000)
SectorSize: 0 (0x00000000)
PhysicalSectorSize: 0 (0x00000000)
VirtualSize: 0 (0x0000000000000000)

2, D C C @ A FB C ~~D-E~~ ?

OperationCode: RSVD_TUNNEL_GET_INITIAL_INFO_OPERATION (0x02001001)
Status: 0 (0x00000000)
RequestId: (0x000000001Ec7871E)
ServerVersion: 1 (0x00000001)
SectorSize: 512 (0x00000200)
PhysicalSectorSize: 256 (0x00000100)
VirtualSize: (0x4000000000000000)
Reserved: 0 (0x00000000)

3, @ A C

4, @ A C

4.2 Executing a SCSI Command

A

*

*

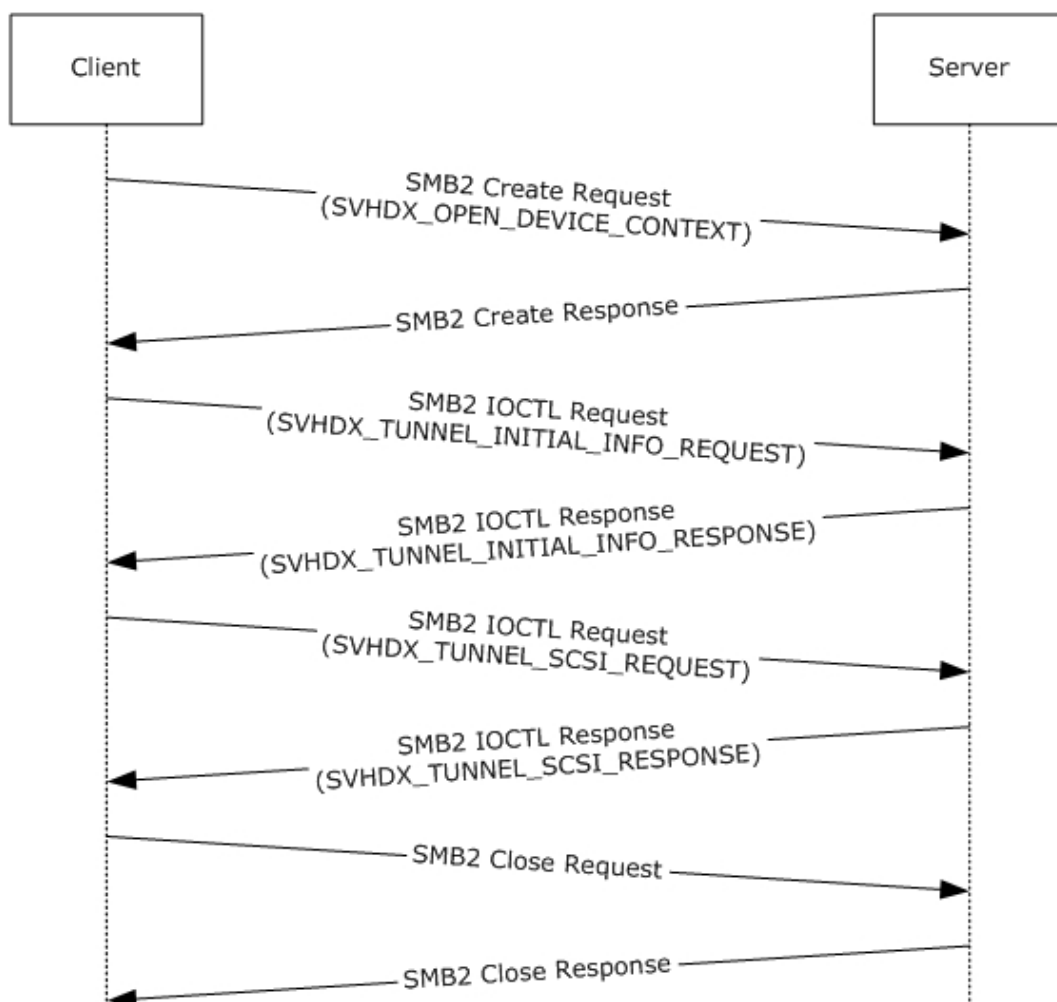


Figure 3: Executing an SCSI command

/, @0 A C? C , FB C BC AC A C

```

Version: 1(0x00000001)
HasInitiatorId: 1
Reserved: 0 (0x0000000)
InitiatorId: (0x07770D201F2740834579D46F5AC43B73)
Flags: 0 (0x00000000)
OriginatorFlags: 1 (0x00000001)
OpenRequestId: (0x000000001EC7871E)
InitiatorHostNameLength: 16 (0x0010)
InitiatorHostName: client01 (0x003100300074006E00650069006C0063)
  
```

0, @0 A C? C ,

```

OperationCode: RSVD_TUNNEL_GET_INITIAL_INFO_OPERATION (0x02001001)
Status: 0 (0x00000000)
RequestId: (0x0000000001Ec7871E)
ServerVersion: 0 (0x00000000)
SectorSize: 0 (0x00000000)
PhysicalSectorSize: 0 (0x00000000)
VirtualSize: 0 (0x0000000000000000)

```

2, FB C ~~D~~ E @0 ? A D C C

```
OperationCode: RSVD TUNNEL GET FILEINITIAL INFO OPERATION (0x02001001)
Status: 0 (0x00000000)
RequestId: (0x000000001Ec7871E)
ServerVersion: 1 (0x00000001)
SectorSize: 512 (0x00000200)
PhysicalSectorSize: 256 (0x00000100)
VirtualSize: (0x4000000000000000)
Reserved: 0 (0x00000000)
```

3, A, @ A, FB, C A C C

[illegible]

4, @0 A FB C A C C

[illegible]

DataBuffer: 0 (0x0000000000000000)

5,	@0 A	C	,
6,	@0 A	C	,

PREVIEW

5 Security

5.1 Security Considerations for Implementers

,

5.2 Index of Security Parameters

,

PREVIEW

6 Appendix A: Product Behavior

8

8

, D

* @

0. /0 0

6, /

C * *

D C & DC

DC,

*

F B F B F B

F B

: /< /,58

B B

RSVD client	RSVD server
6, /	0. /0 0
0. /0 0	

: 0< 1, /,18 6, / 0. /0 0 ClientServiceVersion B

/ & /',

ClientServiceVersion B 0& 0',

: 1< 1, /,18 + B

: 2< 1, /,2,78

0,0,2,5, ? **SrbFlags**

1,0,3,3,3,

: 3< 1, /,2,78 + B **DataIn** . . / **SrbFlags**

@ D ? E B ? ? @ D ? E B ? ? ,

: 4< 1,0,18 0. /0 0 **ServerServiceVersion** B

/ & /', **ServerServiceVersion** B

0& 0',

: 35< 1,0,3, /8— **OriginatorFlags** 6

* 0. /0 0

_____ A
 _____ B
 _____ ? D C A C ,
 : 6< 1,0,3,/8 **OriginatorFlags**6* 0./0
 -0+ B **Open.IsVirtualSCSIDisk** D? C,
 : 7< 1,0,3,/8 0./0 0 @1.03.7/
 FB C BC AC A C C C,
 : /.< 1,0,3,18 + B **SenseError.SrbStatus** . . 0*
SenseError.ScsiStatus . . 0* **SenseError.SenseData**
 . D ?
 : //< 1,0,3,318 0./0 0 _____
 : /0< 1,0,3,28 + B **SenseError.SrbStatus** . . 0*
SenseError.ScsiStatus . . 0* **SenseError.SenseData**
 . D ?
 : /1< 1,0,3,28 0./0 0 _____
 : /2< 1,0,3,3,38 0./0 0
MaxOutputResponse & FB C C ? FC?BC)
 FB C A C C * *
 : /3< 1,0,3,48 0./0 0 **SharedVirtualDiskSupport** /.