To: X3T10 Committee (SCSI)

From: George Penokie (IBM)

Subject: Simplification of SACL Configuration

1 SCSI Implementation

This implementation of the simplified configuration of a storage subsystem will use simplified volume set and redundancy group service actions to deliver the configuration parameters to the storage subsystem.

1.1 CREATE/MODIFY BASIC VOLUME SET service action

The CREATE/MODIFY BASIC VOLUME SET service action (see table 1) requests the creation of a new volume set or the modification of an existing volume set. This service action differs from the CREATE/ MODIFY VOLUME SET service action (see xxxx) in that it does not provide detailed control over the mapping of the user data. If the create operation fails to complete successfully the command shall be terminated with a CHECK CONDITION status. The sense key shall be set to HARDWARE ERROR, and the additional sense code set to CREATION OF LOGICAL UNIT FAILED. If the modification operation fails to complete successfully the command shall be terminated with a CHECK CONDITION status. The sense key shall be set to HARDWARE ERROR, and the additional sense code set to MODIFICATION OF LOGICAL UNIT FAILED.

Table 1 - CREATE/MODIFY BASIC VOLUME SET service action

Bit Byte	7	6	5	4	3	2	1	0
0	OPERATION CODE (BFh)							
1	RESERVED			SERVICE ACTION (xxh)				
2	RESERVED							
3	RESERVED			EQSPRD	RESERVED			
4	(MSB)			LUN_V				
5								(LSB)
6	(MSB)							
7				LIST LENGTH				
8								
9								(LSB)
10	CREATE/MODIFY		CONFIGURE		RESERVED			IMMED
11	CONTROL							

An equal user data spreading (EQSPRD) bit of zero indicates the target may spread user data in a nonuniform manner over the peripheral devices associated with the volume set being created or modified. A EQSPRD bit of one indicates the target shall spread user data in a uniform manner over all the peripheral devices associated with the volume set being created or modified.

The LUN_V field specifies the address of the volume set that shall be created or modified.

An immediate (IMMED) bit of zero indicates that status shall be returned after the create/modify basic volume set operation has completed. An IMMED bit of one indicates that the storage array shall return status as soon as the command descriptor block has been validated, and the entire CREATE/MODIFIY BASIC VOLUME SET parameters list has been transferred.

The CONFIGURE field is defined in table 2.

TABLE 2 - CONFIGURE

Codes	Description
00b	Any unassigned ps_extent(s) within the target that received the CRE-ATE/MODIFY BASIC VOLUME SET service action may be used to configure the selected volume set to the requested capacity. Any CRE-ATE/MODIFY PERIPHERAL DEVICE DESCRIPTORS (table 15) shall be ig-nored.
01b	The target shall use the CREATE/MODIFY BASIC VOLUME SET pa-rameter list (table 14) to determine the configuration of the volume set. The EQSPRD bit shall be ignored.
10b	All unassigned p_extents within the target that received the CREATE/MODIFIY BASIC VOLUME SET service action shall be configured into a volume set. The VOLUME SET CAPACITY field (table 14) and any CRE-ATE/MODIFY PERIPHERAL DEVICE DESCRIPTORS (table 15) shall be ig-nored.
11b	Reserved

The CREATE/MODIFY field is defined in table 3.

TABLE 3 - CREATE/MODIFY

Codes	Description
00b	The target shall create a volume set and shall assign to the created volume set the logical unit number contained in the LUN_V field. If the addressed volume set already exists within the target the target shall modify the existing volume set as requested in the CREATE/MODIFY BASIC VOLUME SET service action. The target may preserve the contents of and access to user data on completion of a modify.
01b	The target shall create a volume set and shall assign to the created volume set logical unit numbers per the addressing rules (xxx). The LUN_V field shall be ignored.
10b	The target shall modify the volume set addressed in the LUN_V field. If the addressed volume set does not exist the target shall terminate the command with a CHECK CONDITION status. The sense key shall be set to ILLEGAL REQUEST, and the additional sense code set to LOG-ICAL UNIT NOT CONFIGURED.The target may preserve the contents of and access to user data on completion of the modify.
11b	The target shall modify the volume set addressed in the LUN_V field. If the addressed volume set does not exist the target shall terminate the command with a CHECK CONDITION status. The sense key shall be set to ILLEGAL REQUEST, and the additional sense code set to LOG-ICAL UNIT NOT CONFIGURED. The target shall preserve the con-tents of and access to user data on completion of the modify.

The CREATE/MODIFY BASIC VOLUME SET parameter list (see table 4) contains user data mapping

information and a list of CREATE/MODIFY PS_EXTENT DESCRIPTORS that are used to create or modify the addressed volume set.

Table 4 - CREATE/MODIFY BASIC VOLUME SET parameter list

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)							
1				CAPACITY				
2								
3								(LSB)
4	(MSB)			BYTES PER BLOCK				
5								(LSB)
6	RESERVED							
7	RESERVED							
	CREATE/MODIFY PERIPHERAL DEVICE DESCRIPTORS(S) (if any)							
8				CREATE/MODIFY PERIPHERAL DEVICE DESCRIPTOR 0				
11								
	. . .							
n-3				CREATE/MODIFY PERIPHERAL DEVICE DESCRIPTOR X				
n								

The CAPACITY field contains the size to configure the volume set in logical blocks. If the CREATE/MODIFY field is 10b the new size of the volume set being modified shall be set to the value in the CAPACITY field.

> NOTE 1 - Attempts by an application client to modify a volume set to a smaller capacity may result in a loss of user data.

The BYTES PER BLOCK field contains the size, in bytes, of the logical blocks in the CAPACITY field. A value of zero in the BYTES PER BLOCK field shall indicate the number of bytes per logical block is 512.

The CREATE/MODIFY PERIPHERAL DEVICE DESCRIPTOR contains information the target shall use to control the user data mapping within peripheral devices. See table 5 for the format of the CREATE/MODIFY PERIPHERAL DEVICE DESCRIPTOR.

Table 5 - Data format of CREATE/MODIFY PERIPHERAL DEVICE DESCRIPTOR

Bit Byte	7	6	5	4	3	2	1	0
0				LUN_P				
1								
2	RESERVED							
3	WEIGHTING OF USER DATA							

The LUN_P field defines the address of the peripheral device to place user data.

The WEIGHTING OF USER DATA field contains a value used to calculate the portion of the volume set's capacity to place on the selected peripheral device. The target shall determine this capacity by using the equation $c = (dw) \times [(vc)/(\Sigma dw)]$ where:

    c = capacity of the peripheral device selected in the LUN_P field,
    dw = value of WEIGHTING OF USER DATA field, and
    vc = value of the CAPACITY field.

If the requested capacity (c) will not fit within the unassigned ps_extent area(s) on the addressed peripheral device the target shall terminate the command with a CHECK CONDITION status. The sense key shall be set to ILLEGAL REQUEST, and the additional sense code set to PARAMETER VALUE INVALID.

1.2 REPORT BASIC VOLUME SET service action

The REPORT BASIC VOLUME SET service action (see table 6) requests that information regarding the selected volume set within the target be sent to the application client. This service action differs from the REPORT VOLUME SET service action (see xxxx) in that it does not report detailed information on the mapping of the user data.

Table 6 - REPORT BASIC VOLUME SET service action

Bit Byte	7	6	5	4	3	2	1	0
0	OPERATION CODE (BEh)							
1	RESERVED			SERVICE ACTION (xxh)				
2	RESERVED							
3	RESERVED							
4	(MSB)							
5				LUN_V				(LSB)
6	(MSB)							
7								
8				ALLOCATION LENGTH				
9								(LSB)
10	RESERVED							
11	CONTROL							

The LUN_V field specifies the address of the volume set for which information shall be reported per table 17. If the requested logical unit has not been configured the command shall be terminated with a CHECK CONDITION status. The sense key shall be set to ILLEGAL REQUEST, and the additional sense code set to LOGICAL UNIT NOT CONFIGURED.

The REPORT CONFIGURATION parameter list is defined in table 7.

Table 7 - REPORT CONFIGURATION parameter list

Bit Byte	7	6	5	4	3	2	1	0
0	RESERVED							
1	RESERVED							
2	RESERVED			EQSPRD	RESERVED			
3	RESERVED	STATE OF THE VOLUME SET						
4	(MSB)							
5		CAPACITY						
6								
7								(LSB)
8	(MSB)	BYTES PER BLOCK						
9								(LSB)
10	(MSB)	BASIC VOLUME SET PERIPHERAL DEVICE DESCRIPTOR LIST LENGTH						
11								(LSB)
	BASIC VOLUME SET PERIPHERAL DEVICE DESCRIPTOR(S)							
12	BASIC VOLUME SET PERIPHERAL DEVICE DESCRIPTOR (First)							
15								
	. . .							
n-3	BASIC VOLUME SET PERIPHERAL DEVICE DESCRIPTOR (Last)							
n								

An equal user data spreading (EQSPRD) bit of zero indicates the target is configured such that the user data is spread in a nonuniform manner over the peripheral devices associated with the addressed volume set. An EQSPRD bit of one indicates the target is configured such that the user data is spread in a uniform manner over all the peripheral devices associated with the addressed volume set.

The VOLUME SET STATE field is defined in xxx.

The CAPACITY field indicates the size of the addressed volume set in logical blocks.

The BYTES PER BLOCK field indicates the size, in bytes, of the logical blocks in the CAPACITY field.

The BASIC VOLUME SET PERIPHERAL DEVICE DESCRIPTOR contains a list of peripheral devices associated with the addressed volume set. See table 8 for the format of the BASIC VOLUME SET PERIPHERAL DEVICE DESCRIPTOR field.

TABLE 8 - BASIC VOLUME SET PERIPHERAL DEVICE DESCRIPTOR

Bit Byte	7	6	5	4	3	2	1	0
0				LUN_P				
1								
2				RESERVED				
3				WEIGHTING OF USER DATA				
4				RESERVED				
5				RESERVED				
6	(MSB)			ASSOCIATED REDUNDANCY GROUPS LIST LENGTH				
7								(LSB)
				LUN_R(S)				
8				LUN_R (First)				
9								
10				RESERVED				
11				RESERVED				
				. . .				
n-3				LUN_R (Last)				
n-2								
n-1				RESERVED				
n				RESERVED				

The LUN_P field indicates the address of a peripheral device associated with the addressed volume set.

The WEIGHTING OF USER DATA field indicates the portion of the volume set's capacity placed on the selected peripheral device.

> NOTE 2 - The WEIGHTING OF USER DATA fields may contain the same values as the target received from the application client or it may be calculated using an equation. One example of an equation that may be used by the target to calculate the value in the WEIGHTING OF USER DATA field is $dw = (vc)/c$ where:
>
> c = capacity of the peripheral device selected in the LUN_P field assigned to the selected volume set,
> dw = value to be placed into the WEIGHTING OF USER DATA field, and
> vc = value of the CAPACITY field.

The ASSOCIATED REDUNDANCY GROUP LIST LENGTH field specifies the length in bytes of the following list of

LUN_R(s).

The LUN_R field specifies the address of the redundancy group associated with the addressed volume set.

1.3 CREATE/MODIFY BASIC REDUNDANCY GROUP service action

The CREATE/MODIFY BASIC REDUNDANCY GROUP service action (see table 9) requests the creation of a new redundancy group, or the modification of an existing redundancy group. If the create operation fails to complete successfully the command shall be terminated with a CHECK CONDITION status. The sense key shall be set to HARDWARE ERROR, and the additional sense code set to CREATION OF LOGICAL UNIT FAILED. If the modification operation fails to complete successfully the command shall be terminated with a CHECK CONDITION status. The sense key shall be set to HARDWARE ERROR, and the additional sense code set to MODIFICATION OF LOGICAL UNIT FAILED.

Table 9 - CREATE/MODIFY BASIC REDUNDANCY GROUP service action

Bit Byte	7	6	5	4	3	2	1	0
0	OPERATION CODE (BFh)							
1	RESERVED			SERVICE ACTION (xxh)				
2	REDUNDANCY TYPE IDENTIFIER							
3	BUSPROC	RESERVED		EQSPRD	RESERVED			
4	(MSB)			LUN_R				
5								(LSB)
6	(MSB)							
7				LIST LENGTH				
8								
9								(LSB)
10	CREATE/MODIFY		CONFIGURE		RESERVED			IMMED
11	CONTROL							

The REDUNDANCY TYPE IDENTIFIER field indicates the type of protection that shall be used within the redundancy group being created or modified. See table 10 for the format of the REDUNDANCY TYPE

IDENTIFIER field.

Table 10 - REDUNDANCY TYPE IDENTIFIERS

Codes	Description
00h	No redundancy
01h	Copy redundancy
02h	XOR redundancy
03h	P+Q redundancy
04h	P+S redundancy
05h	S redundancy
06h-7Fh	Reserved
80h-FFh	Vendor specific

The redundancy type identifier field shall only indicate the minimum amount of protection required by the redundancy group being configured or modified. See table 11 for the minimum requirements for each type of redundancy.

Table 11 - Minimum redundancy group protection

Type	Minimum protection within the configured redundancy group
No redundancy	The SACL is not required to protect user data.
Copy redundancy	The SACL shall duplicate all user data at least one time, preferably on different peripheral devices.
XOR redundancy	The SACL shall protect user data such that a single peripheral device failure does not cause loss of user data.
P+Q redundancy	The SACL shall protect user data such that the failure of two peripheral devices does not cause loss of user data.
P+S redundancy	The SACL shall protect user data such that the failure of a single peripheral device does not cause loss of user data and after some vendor specific amount of time a second peripheral device failure shall not cause loss of user data. If a second peripheral device fails within the vendor specific amount of time user data may be lost.
S redundancy	The SACL shall have access to at least enough spare space to allow a rebuild of one peripheral device within that space. User data may be lost if the SACL cannot predict or predicts incorrectly a peripheral device failure. User data may also be lost if the SACL does not complete a rebuild before the peripheral device fails.

An equal spreading (EQSPRD) bit of zero indicates the target may spread protected space and check data in a nonuniform manner over the peripheral devices associated with the redundancy group being created or modified. A EQSPRD bit of one indicates the target shall spread protected space and check data in a uniform manner over all the peripheral devices associated with the redundancy group being created or modified.

A bus protection (BUSPROC) bit of zero indicates that the target shall be configured such that a single bus failure may cause the application client to lose access to any user data associated with the redundancy group being created or modified. A BUSPROC bit of one indicates that the target shall be configured so a single bus failure shall not cause the application client to lose access to any user data associated with the redundancy group being created or modified.

The LUN_R field specifies the address of the redundancy group that shall be created or modified.

An immediate (IMMED) bit of zero indicates that status shall be returned after the create/modify basic redundancy group has completed. An IMMED bit of one indicates that the storage array shall return status as soon as the command descriptor block has been validated, and the entire CREATE/MODIFIY BASIC REDUNDANCY GROUP parameters list has been transferred.

The CONFIGURE field is defined in table 12.

TABLE 12 - CONFIGURE

Codes	Description
00b	Any unassigned p_extent(s) within the target that received the CREATE/MODIFY BASIC REDUNDANCY GROUP service action may be used to configure the selected redundancy group to the requested capacity. Any CREATE/MODIFY PERIPHERAL DEVICE DESCRIPTORS (table 15) shall be ignored.
01b	The target shall use the CREATE/MODIFY BASIC REDUNDANCY GROUP parameter list (table 14) to determine the configuration of the redundancy group. The EQSPRD bit shall be ignored.
10b	All unassigned p_extents within the target that received the CREATE/MODIFIY BASIC REDUNDANCY GROUP service action shall be configured into a redundancy group. The VOLUME SET CAPACITY field (table 14) and any CREATE/MODIFY PERIPHERAL DEVICE DESCRIPTORS (table 15) shall be ignored.
11b	Reserved

The CREATE/MODIFY field is defined in table 13.

TABLE 13 - CREATE/MODIFY

Codes	Description
00b	The target shall create a redundancy group and shall assign to the created redundancy group the logical unit number contained in the LUN_R field. If the addressed redundancy group already exists within the target the target shall modify the existing redundancy group as requested in the CREATE/MODIFY BASIC REDUNDANCY GROUP service action. The target may preserve the contents of protected space on completion of a modify.
01b	The target shall create a redundancy group, and shall assign to the created redundancy group logical unit numbers per the addressing rules (xxx). The LUN_V field shall be ignored.
10b	The target shall modify the redundancy group addressed in the LUN_R field. If the addressed redundancy group does not exist the target shall terminate the command with a CHECK CONDITION status. The sense key shall be set to ILLEGAL REQUEST, and the additional sense code set to LOGICAL UNIT NOT CONFIGURED.The target may preserve the contents of protected space on completion of the modify.
11b	The target shall modify the redundancy group addressed in the LUN_R field. If the addressed redundancy group does not exist the target shall terminate the command with a CHECK CONDITION status. The sense key shall be set to ILLEGAL REQUEST, and the additional sense code set to LOGICAL UNIT NOT CONFIGURED. The target shall preserve the contents of protected space on completion of the modify.

The CREATE/MODIFY BASIC REDUNDANCY GROUP parameter list (see table 14) contains check data mapping information and a list of CREATE/MODIFY P_EXTENT DESCRIPTORS that are used to create or modify

the addressed redundancy group.

Table 14 - CREATE/MODIFY BASIC REDUNDANCY GROUP parameter list

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)							
1								
2				CAPACITY				
3								(LSB)
4	(MSB)							
5				BYTES PER BLOCK				(LSB)
6				RESERVED				
7				RESERVED				
			CREATE/MODIFY PERIPHERAL DEVICE DESCRIPTORS(S) (if any)					
8								
11				CREATE/MODIFY PERIPHERAL DEVICE DESCRIPTOR 0				
				.				
				.				
				.				
n-3								
n				CREATE/MODIFY PERIPHERAL DEVICE DESCRIPTOR X				

The CAPACITY field contains the size to configure the redundance group in logical blocks. If the CREATE/ MODIFY field is 10b the new size of the redundancy group shall be set to the value in the CAPACITY field.

Attempts by an application client to modify a redundancy group to a smaller capacity shall result in the target terminating the command with a CHECK CONDITION status. The sense key shall be set to ILLEGAL REQUEST, and the additional sense code set to PARAMETER VALUE INVALID.

The BYTES PER BLOCK field contains the size, in bytes, of the logical blocks in the CAPACITY field. A value of zero in the BYTES PER BLOCK field shall indicate the number of bytes per logical block is 512.

The CREATE/MODIFY PERIPHERAL DEVICE DESCRIPTOR contains information the target shall use to control the check data mapping within peripheral devices. See table 15 for the format of the CREATE/MODIFY PERIPHERAL DEVICE DESCRIPTOR.

Table 15 - Data format of CREATE/MODIFY PERIPHERAL DEVICE DESCRIPTOR

Bit Byte	7	6	5	4	3	2	1	0
0				LUN_P				
1								
2	WEIGHTING OF PROTECTED SPACE + CHECK DATA							
3	PERCENT OF CHECK DATA							

The LUN_P field defines the address of the peripheral device to place user data.

The WEIGHTING OF PROTECTED SPACE + CHECK DATA field contains a value used to calculate the portion of the redundancy group's capacity to place on the selected peripheral device. The target shall determine this capacity by using the equation $c = (dw) \times [(vc)/(\Sigma dw)]$ where:

   c = capacity of the peripheral device selected in the LUN_P field,
   dw = value of WEIGHTING OF PROTECTED SPACE + CHECK DATA field, and
   vc = value of the CAPACITY field.

If the requested capacity (c) will not fit within the unassigned p_extent area(s) on the addressed peripheral device the target shall terminate the command with a CHECK CONDITION status. The sense key shall be set to ILLEGAL REQUEST, and the additional sense code set to PARAMETER VALUE INVALID.

The PERCENT OF CHECK DATA field contains the percentage of the requested capacity (c) that shall contain check data on the selected peripheral device. If the PERCENT OF CHECK DATA field contains a value greater then 100 the target shall terminate the command with a CHECK CONDITION status. The sense key shall be set to ILLEGAL REQUEST, and the additional sense code set to PARAMETER VALUE INVALID.

1.4 REPORT BASIC REDUNDANCY GROUP service action

The REPORT BASIC REDUNDANCY GROUP service action (see table 16) requests that information regarding the selected redundancy group be sent to the application client. This service action differs from the REPORT REDUNDANCY GROUP service action (see xxxx) in that it does not report detailed information on the mapping of protected space and check data.

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Table 16 - REPORT BASIC REDUNDANCY GROUP service action

Bit Byte	7	6	5	4	3	2	1	0
0	OPERATION CODE (BEh)							
1	RESERVED			SERVICE ACTION (xxh)				
2	RESERVED							
3	RESERVED							
4	(MSB)							
5				LUN_R				(LSB)
6	(MSB)							
7								
8				ALLOCATION LENGTH				
9								(LSB)
10	RESERVED							
11	CONTROL							

The LUN_R field specifies the address of the redundancy group for which information shall be reported per table 17. If the requested logical unit has not been configured the command shall be terminated with a CHECK CONDITION status. The sense key shall be set to ILLEGAL REQUEST, and the additional sense code set to LOGICAL UNIT NOT CONFIGURED.

The REPORT CONFIGURATION parameter list is defined in table 17.

Table 17 - REPORT CONFIGURATION parameter list

Bit Byte	7	6	5	4	3	2	1	0
0	RESERVED							
1	REDUNDANCY TYPE IDENTIFIER							
2	BUSPROC	RESERVED		EQSPRD	RESERVED			
3	RESERVED	STATE OF THE REDUNDANCY GROUP						
4	(MSB)							
5				CAPACITY				
6								
7								(LSB)
8	(MSB)			BYTES PER BLOCK				
9								(LSB)
10	(MSB)							
11	REDUNDANCY GROUP PERIPHERAL DEVICE DESCRIPTOR LIST LENGTH							(LSB)
	REDUNDANCY GROUP PERIPHERAL DEVICE DESCRIPTOR(S)							
12	REDUNDANCY GROUP PERIPHERAL DEVICE DESCRIPTOR (First)							
15								
	. . .							
n-3	REDUNDANCY GROUP PERIPHERAL DEVICE DESCRIPTOR (Last)							
n								

The REDUNDANCY TYPE IDENTIFIER field (table 10) indicates the type of protection being used within the addressed redundancy group. For a description of the redundancy group methods see xxx.

An equal user data spreading (EQSPRD) bit of zero indicates the target is configured such that the protected space and check data is spread in a nonuniform manner over the peripheral devices associated with the addressed redundancy group. An EQSPRD bit of one indicates the target is configured such that the protected space and check data is spread in a uniform manner over all the peripheral devices associated with the addressed redundancy group.

A bus protection (BUSPROC) bit of zero indicates that the target is configured such that a single bus failure causes the application client to lose access to user data associated with the addressed redundancy group. A BUSPROC bit of one indicates that the target is configured such that single bus failure does not cause the application client to lose access to any user data associated with the addressed redundancy group.

The REDUNDANCY GROUP STATE field is defined in xxx.

The CAPACITY field indicates the size of the addressed redundancy group in logical blocks.

The BYTES PER BLOCK field indicates the size, in bytes, of the logical blocks in the CAPACITY field and the NORMAL USER DATA TRANSFER SIZE field.

The REDUNDANCY GROUP PERIPHERAL DEVICE DESCRIPTOR contains a list of peripheral devices associated with the addressed redundancy group. See table 18 for the format of the REDUNDANCY GROUP PERIPHERAL DEVICE DESCRIPTOR field.

TABLE 18 - REDUNDANCY GROUP PERIPHERAL DEVICE DESCRIPTOR

Bit Byte	7	6	5	4	3	2	1	0
0					LUN_P			
1								
2	WEIGHTING OF PROTECTED SPACE + CHECK DATA							
3	PERCENT OF CHECK DATA							

The LUN_P field indicates the address of a peripheral device associated with the addressed redundancy group.

The WEIGHTING OF USER DATA + CHECK DATA field indicates the portion of the redundancy group's capacity placed on the selected peripheral device.

The PERCENT OF CHECK DATA field indicates the percentage of the weighted capacity that contains check data on the selected peripheral device.

> NOTE 3 - The WEIGHTING OF PROTECTED SPACE + CHECK DATA and the PERCENT OF CHECK DATA fields may contain the same values as the target received from the application client or it may be calculated using equations. One example that may be used by the target to calculate the value of the WEIGHTING OF PROTECTED SPACE + CHECK DATA field is $dw = (vc)/c$ and to calculate to the value of the percent of CHECK DATA field is $pr = (100 \times cd)/c$ where:
>
> c = capacity of the peripheral device selected in the LUN_P field assigned to the selected redundancy group,
> dw = value to be placed into the WEIGHTING OF PROTECTED SPACE + CHECK DATA field,
> vc = value of the CAPACITY field,
> pr = value to be placed into the PERCENT OF CHECK DATA field, and
> cd = the number of blocks of check data configured onto the selected peripheral device assigned to the selected redundancy group.