

Date: February 21, 2008

To: T10 Committee (SCSI)

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Subject: SBC-3 SPC-4: Protection Type 3 Reference Tag Clarification

## 1 Overview

When type 3 data protection is used the logical block reference tag should follow the same rules as the logical block application tag when it comes to the rules on whether or not it may be modified by the device server. To make this clear the following changes should be made to SBC-3 and SPC-4.

## 2 SBC-3 changes

### 2.0.1 Protection information format

Table 1 defines the placement of protection information in a logical block.

**Table 1 — User data and protection information format**

Byte/Bit	7	6	5	4	3	2	1	0	
0	USER DATA								
n - 1	USER DATA								
n	(MSB)	LOGICAL BLOCK GUARD							
n + 1		LOGICAL BLOCK GUARD							(LSB)
n + 2	(MSB)	LOGICAL BLOCK APPLICATION TAG							
n + 3		LOGICAL BLOCK APPLICATION TAG							(LSB)
n + 4	(MSB)	LOGICAL BLOCK REFERENCE TAG							
n + 7		LOGICAL BLOCK REFERENCE TAG							(LSB)

The USER DATA field shall contain user data. The contents of the USER DATA field shall be used to generate and check the CRC contained in the LOGICAL BLOCK GUARD field.

The LOGICAL BLOCK GUARD field contains the CRC (see 4.17.4) of the contents of the USER DATA field.

The LOGICAL BLOCK APPLICATION TAG field is set by the application client. If the device server detects a:

- a) LOGICAL BLOCK APPLICATION TAG field set to FFFFh and type 1 protection (see 4.17.2.3) or type 2 protection (see 4.17.2.4) is enabled; or
- b) LOGICAL BLOCK APPLICATION TAG field set to FFFFh, LOGICAL BLOCK REFERENCE TAG field set to FFFF FFFFh, and type 3 protection (see 4.17.2.5) is enabled,

then the device server disables checking of all protection information for the logical block when reading from the medium. Otherwise, the contents of the logical block application tag are not defined by this standard.

The LOGICAL BLOCK APPLICATION TAG field may be modified by a device server if the ATO bit is set to zero in the Control mode page (see SPC-4).

The contents of the LOGICAL BLOCK APPLICATION TAG field shall not be used to generate or check the CRC contained in the LOGICAL BLOCK GUARD field.

The LOGICAL BLOCK REFERENCE TAG field of the first logical block in the data-in buffer and/or data-out buffer shall contain the value specified in table 2.

**Table 2 — Contents of the LOGICAL BLOCK REFERENCE TAG field of the first logical block in the data-in buffer and/or data-out buffer**

Protection Type	Content of the LOGICAL BLOCK REFERENCE TAG field of the first logical block in the data-in buffer and/or data-out buffer
Type 1 protection (see 4.17.2.3)	The least significant four bytes of the LBA contained in the LOGICAL BLOCK ADDRESS field of the command.
Type 2 protection (see 4.17.2.4)	The value in the EXPECTED INITIAL LOGICAL BLOCK REFERENCE TAG field of the command.
Type 3 protection (see 4.17.2.5)	Not defined in this standard. <a href="#">May be modified by a device server if the ATO bit is set to zero in the Control mode page (see SPC-4).</a>

The LOGICAL BLOCK REFERENCE TAG field subsequent logical blocks in the data-in buffer and/or data-out buffer shall be set as specified in table 3.

**Table 3 — Setting the LOGICAL BLOCK REFERENCE TAG field of the subsequent logical blocks in the data-in buffer and/or data-out buffer**

Protection Type	The content of the LOGICAL BLOCK REFERENCE TAG field of each subsequent logical block in the data-in buffer and/or data-out buffer
Type 1 protection (see 4.17.2.3) and Type 2 protection (see 4.17.2.4)	The logical block reference tag of the previous logical block plus one.
Type 3 protection (see 4.17.2.5)	Not defined in this standard. <a href="#">May be modified by a device server if the ATO bit is set to zero in the Control mode page (see SPC-4).</a>

The contents of the LOGICAL BLOCK REFERENCE TAG field shall not be used to generate or check the CRC contained in the LOGICAL BLOCK GUARD field.

### 3 SPC-4 changes

#### 7.4.6 Control mode page

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~~An application tag owner (ATO) bit set to one specifies that the contents of the LOGICAL BLOCK APPLICATION TAG field in the protection information (see SBC-2), if any, shall not be modified by the device server. An ATO bit set to zero specifies that the contents of the LOGICAL BLOCK APPLICATION TAG field in the protection information, if any, may be modified by the device server. If the ATO bit is set to zero, the device server shall ignore the contents of the LOGICAL BLOCK APPLICATION TAG field in the protection information when received from the application client.~~  
[The application tag owner \(ATO\) bit is as specified in table 4](#)

Table 4 — Application tag owner (ATO) bit

<u>Code</u>	<u>Protection Type</u>	<u>Definition</u>
<u>0b</u>	<u>Type 1 protection (see 4.17.2.3) and Type 2 protection (see 4.17.2.4)</u>	<u>The contents of the LOGICAL BLOCK APPLICATION TAG field in the protection information, if any, may be modified by the device server. The device server shall ignore the contents of the LOGICAL BLOCK APPLICATION TAG field in the protection information when received from the application client.</u>
	<u>Type 3 protection (see 4.17.2.5)</u>	<u>The contents of the LOGICAL BLOCK REFERENCE TAG field and the LOGICAL BLOCK APPLICATION TAG field in the protection information, if any, may be modified by the device server. The device server shall ignore the contents of the LOGICAL BLOCK REFERENCE TAG field and the LOGICAL BLOCK APPLICATION TAG field in the protection information when received from the application client.</u>
<u>1b</u>	<u>Type 1 protection (see 4.17.2.3) and Type 2 protection (see 4.17.2.4)</u>	<u>The contents of the LOGICAL BLOCK APPLICATION TAG field in the protection information (see SBC-2), if any, shall not be modified by the device server.</u>
	<u>Type 3 protection (see 4.17.2.5)</u>	<u>The contents of the LOGICAL BLOCK REFERENCE TAG field and LOGICAL BLOCK APPLICATION TAG field the in the protection information (see SBC-2), if any, shall not be modified by the device server.</u>