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NVM Express Workgroup
c/o VTM, Inc.
3855 SW 153rd Drive
Beaverton, OR 97003
USA
info@nvmexpress.org

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NVM Express® Technical Proposal

Technical Proposal ID	**TP4186 Logical Block Storage Tag Mask Caveats**
Revision Date	**2024.11.24**
Builds on Specification(s)	**NVM Express NVM Command Set Specification 1.0d**
References	**TP4140 Format Index Mismatch Protection** **TP4146a Flexible Data Placement**

Technical Proposal Author(s)

Name	**Company**
Judy Brock	Samsung

Technical Proposal Overview

This proposal defines the expected behavior of the controller when a Format NVM command is processed that specifies an LBA Format that includes a Storage Tag. A controller shall only permit a Format NVM command to be processed that specifies an LBA Format that includes a Storage Tag if all the namespaces affected by that command were created with that same LBA Format.

A controller shall not permit a Format NVM command to be processed that specifies an LBA Format that includes a Storage Tag in any other case. A host may choose to delete one or more namespaces that were created with a different LBA Format and then create one or more new namespaces with an LBA Format includes a Storage Tag

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Revision History

Revision Date	Change Description
2024.01.04	Initial draft
2024.01.26	Incorporated Tech WG feedback
2024.02.09	Changed filename to Phase 3, changed references in the TP from 1.0c to 1.0d
2024.02.24	Integrated Member Review feedback from Mike Allison
2024.04.11	Minor editorial change (changed one occurrence of “Format” to “format”) This version approved for integration
2024.04.24	Integrated

Description for Changes Document for NVM Express NVM Command Set Specification 1.0d

New Features/Feature Enhancements/Required Changes:

-
    - **New requirement and incompatible change**
        - Only permit a Format NVM command that specifies an LBA Format that includes a Storage Tag to be processed if all the namespaces affected by that command were created with that same LBA Format
    - References
        -

Markup Conventions:

Black:	Unchanged (however, hot links are removed)
~~Red Strikethrough~~:	Deleted
Blue:	New
Blue Highlighted:	TBD values, anchors, and links to be inserted in new text.
~~Purple Strikethrough~~:	Existing text moved to a different location.
Purple:	Inserted existing text moved from a different location.
Orange:	From another Technical Proposal
<Green Bracketed>:	Notes to editor

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Description of Specification Changes for the NVM Express NVM Command Set Specification 1.0d

Modify a portion of section 4.1.2 as shown below:

4 Admin Commands for the NVM Command Set

…

4.1 Admin Command behavior for the NVM Command Set

…

4.1.2 Format NVM command

…

If the LBA Format Extension Enable (LBAFEE) field is not set to 1h in the Host Behavior Support feature (refer to the Host Behavior Support section in the NVM Express Base Specification), then the controller aborts a Format NVM command with a status code of Invalid Namespace or Format that specifies an LBA format (refer to section 5.3.1) of, or specifies an individual namespace formatted with~~,~~:

a) 16b Guard Protection Information with the STS field set to a non-zero value;
b) 32b Guard Protection Information; or
c) 64b Guard Protection Information.

If:

- the LBA Format Extension Enable (LBAFEE) field is set to 1h in the Host Behavior Support feature;
- the Format NVM command specifies an LBA format with the STS field set to a non-zero value; and
- at least one namespace affected by that command is not formatted with that same LBA format,

then the controller shall abort the command with a status code of Invalid Namespace or Format.

If Flexible Data Placement (refer to the NVM Express Base Specification) is enabled in the Endurance Group associated with the specified namespace, then:

…

Add section 5.2.1.4.TBD immediately following section 5.2.1.4.1 Storage Tag field and Logical Block Reference Tag field

5 Extended Capabilities

…

5.2 End-to-end Data Protection

…

5.2.1 Protection Information Formats

…

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5.2.1.4 Storage Tag and Logical Block Reference Tag from Storage and Reference Space

…

5.2.1.4.TBD Host Considerations when Formatting with Storage Tag (Informative)

The Format NVM command does not provide a method to change the Storage Tag Size (STS) field of the LBA format that a namespace is formatted with:

- from the value 0h to a non-zero value; or
- from a non-zero value to a different non-zero value.

The Namespace Management command, if supported, is able to be used to delete the existing namespace and to create a namespace with a different combination of values in the Storage Tag Size (STS) field and the Logical Block Storage Tag Mask (LBSTM) field.

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