LEGAL NOTICE:

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NVM Express Technical Proposal for New Feature

Technical Proposal ID	**4078 Namespace Attachment Limits**
Change Date	**2020-03-09**
Builds on Specification	**NVM Express 1.4**
References Specification	**TP 4009 Domains and Partitions**

Technical Proposal Author(s)

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This proposal intends to do the following:

- Limit the number of namespaces that can be attached to each and all controllers within a domain.
- Update the NN field in the Identify Controller data structure to change the definition associated with the supported number of namespace by referring to the MNAN field.

Revision History

Revision Date	**Change Description**
2019-11-22	Initial version.
2019-11-26	Updated section 5.19 to use the definition text from the MAXDNA field as requested by Paul Suhler.
2019-12-05	Technical WG requested that the limit at the domain and I/O controller both coexist.
2020-01-06	Moved to Phase 3 and moved dates to 2020
2020-03-03	Ready for ratification
2020-03-09	Ratified

Description for NVMe 1.4 Changes Document

This technical proposal allows a Domain to limit the number of namespaces that can be attached to all controllers within a domain. This is to reduce the complexity of controller hardware to support attaching the maximum number of supported namespaces on all controllers within the NVM subsystem.

Description of Specification Changes

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.

<Green Bracketed>: Notes to editor

Modify portions of section 5.15.2.2 as shown below:

…

4.6.1.2.2 Generic Command Status Definition

…

Figure 1: Status Code – Command Specific Status Values

Value	Description	Commands Affected
…		
27h	Namespace Attachment Limit Exceeded	Namespace Attachment

Modify portions of section 5.15.2.2 as shown below:

5.15.2.2 Identify Controller data structure (CNS 01h)

…

Figure 2: Identify – Identify Controller Data Structure

Bytes	O/M [1]	Description
…		
519:516	M	**Number of Namespaces (NN):** This field indicates the maximum value of a valid NSID for the NVM subsystem. ~~If the MNAN field is cleared to 0h, then this field also indicates the maximum number of namespaces supported by the NVM subsystem.~~ Refer to the MNAN field for the number of supported namespaces in the NVM subsystem.
…		
559:544	O	**Maximum Domain Namespace Attachments (MAXDNA):** Indicates the maximum of the sum of the number of namespaces attached to each I/O controller in the Domain. If this field is cleared to 0h, then no maximum is specified. The value of this field shall be the same value for all I/O controllers in the Domain.
563:560	O	**Maximum I/O Controller Namespace Attachments (MAXCNA): Indicates** the maximum number of namespaces that are allowed to be attached to this I/O controller. If this field is cleared to 0h, then no maximum is specified. The value of this field shall be less than or equal to the number of namespaces supported by the NVM Subsystem (refer to the MNAN field).
…		

Modify portions of section 5.19 as shown below:

5.19 Namespace Attachment command

…

The Select field determines the data structure used as part of the command. The data structure is 4,096 bytes in size. The data structure used for Controller Attach and Controller Detach is a Controller List (refer to section 4.11). The controllers that are to be attached or detached, respectively, are described in the data structure.

If the SEL field specifies the Controller Attach value, then

- If the Maximum Domain Namespace Attachments (MAXDNA) field in the Identify Controller data structure (refer to Figure 247) is non-zero, then:
    - For each controller specified in the controller list, if attaching the namespace to that I/O controller causes the sum of the number of namespaces attached to each I/O controller in the Domain to be greater than the value specified in the MAXDNA field, then the controller shall abort the command with a status code of Namespace Attachment Limit Exceeded;

and

- For each I/O controller specified in the controller list, if the Maximum I/O Controller Namespace Attachments (MAXCNA) field in the Identify Controller data structure for that controller is non-zero, then:
    - If attaching the namespace to that I/O controller causes that I/O controller to have the number of attached namespaces to be greater than the value specified in the MAXCNA field, then the controller shall abort the command with a status code of Namespace Attachment Limit Exceeded.

Modify portions of section 5.19.1 as shown below:

5.19.1 Command Completion

...

Figure 3: Namespace Attachment – Command Specific Status Values

Value	Description
...	
27h	**Namespace Attachment Limit Exceeded:** Attaching the namespace to a controller causes maximum number of namespace attachments allowed to be exceeded.