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NVM Express® Technical Proposal (TP)

Technical Proposal ID	TP8021 – Connect Command reconciliation
Revision Date	9/27/2022
Builds on Specification(s)	NVMe Base Specification 2.0b
References	

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Technical Proposal Overview

This TP adds features from the Create I/O Submission Queue command (for PCIe) to the Connect command (for Fabrics).

Revision History

Revision Date	Change Description
2022.03.22	Initial draft
2022.04.14	Incorporate suggested rewordings from TWG meeting.
2022.05.19	30 Day review feedback – Figure 73 update added.
2022.09.09	Added section 8.22 update which should have been updated.
2022.09.27	Removed comments and reference links.

Description for Changes Document for the NVM Express Base Specification

New Features/Feature Enhancements/Required Changes:

- The capability to specify an NVM Set ID during the creation of a fabric connection (i.e., the mechanism that creates an I/O submission and completion queue for an NVMe-oF controller) was added.
 - A field to specify an NVM Set ID is added to the Connect command replacing 2 reserved bytes.
 - References
 - NVMe revision 2.0b section 3.2.2, 5.17, and 6.3

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

Description of Specification Changes for the NVM Express Base Specification

Modify a portion of section 3.2 as shown below:

3.2.2 NVM Sets

...

Figure 73: NVM Set Aware Admin Commands

Admin Command	Details
...	
Get Features and Set Features	<ul style="list-style-type: none">• The Read Recovery Level Feature specifies the associated NVM Set Identifier.• The Predictable Latency Mode Config Feature specifies the associated NVM Set Identifier.• The Predictable Latency Mode Window Feature specifies the associated NVM Set Identifier.
Connect	<ul style="list-style-type: none">• The Connect command includes the associated NVM Set Identifier.

...

Modify a portion of section 5.17 as shown below:

5.17 Identify command

...

Figure 275: Identify – Identify Controller Data Structure, I/O Command Set Independent

...				
1802	M ²	M ²	R	<p>Fabrics Controller Attributes (FCATT): This field indicates attributes of the controller that are specific to NVMe over Fabrics.</p> <p>Bits 7:42 are reserved.</p> <p>Bit 1 if cleared to '0', then the NVM controller does not support a non-zero value in the NVMSETID field in the Connect command (refer to section 6.3). Bit 1 if set to '1', then the NVM controller does support a non-zero value in the NVMSETID field in the Connect command.</p> <p>Bit 0 if cleared to '0', then the NVM subsystem uses a dynamic controller model. Bit 0 if set to '1', then the NVM subsystem uses a static controller model.</p>
...				

...

Modify a portion of section 6.3 as shown below:

6.3 Connect Command and Response

...

Figure 380: Connect Command – Submission Queue Entry

Bytes	Description
00	Opcode (OPC): Set to 7Fh to indicate a Fabrics command.
...	
47	Reserved
51:48	Keep Alive Timeout (KATO): In the Connect command for the Admin Queue, this field has the same definition as the Keep Alive Timeout (Keep Alive Timer) defined in section 5.27.1.12. Upon successful completion of the Connect command the controller shall enable and activate the Keep Alive timer as described in section 3.9. In the Connect command for an I/O Queue, this field is reserved.
53:52	NVM Set Identifier (NVMSETID): This field indicates the identifier of the NVM Set to be associated with this Submission Queue. This field is only valid for I/O Queues. In the Connect command for an Admin Queue, the: <ul style="list-style-type: none">• host should clear this field to 0h;• controller shall ignore this field; and.• Submission Queue is not associated with any NVM Set. In the Connect command for an I/O queue, if the SQ Associations capability is not supported (refer to section 8.22) or this field is cleared to 0h, then this Submission Queue is not associated with any specific NVM Set. If the SQ Associations feature is supported (refer to section 8.22) and this field contains a non-zero value that is not indicated in the NVM Set List (refer to Figure 278), then the controller shall abort the command with a status code of Invalid Field in Command. The host should not submit commands for namespaces associated with other NVM Sets in this Submission Queue (refer to section 8.22).
63:5254	Reserved

...

Modify a portion of section 8.22 as shown below:

8.22 Submission Queue (SQ) Associations

...

The host enables the SQ Associations capability by creating an association between an NVM Set and a Submission Queue at the time the Submission Queue is created (e.g., with a Connect command (refer to section 6.3)).

...