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NVM Express® Technical Proposal (TP)

Technical Proposal ID	TP4135 NVMe Specification Version Reporting
Revision Date	2022.07.26
Builds on Specification(s)	NVM Express® Base Specification Revision 2.0b NVM Express® NVM Command Set Specification Revision 1.0b NVM Express® Key Value Command Set Specification Revision 1.0b NVM Express® Zoned Namespace Command Set Specification Revision 1.1b NVM Express® Management Interface Specification 1.2b
References	

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Technical Proposal Overview`

This technical proposal provides a means for the host to retrieve the versions of NVMe specifications which are implemented by the controller, in particular, the I/O command set specifications and the NVMe Management Interface Specification.

Revision History

Revision Date	Change Description
2022.03.18	<ul style="list-style-type: none">• Initial revision• Changes for all specifications in the NVMe 2.0 family.
2022.03.18a	<ul style="list-style-type: none">• Corrected SPECID values in changes to PCIe and RDMA transport specs.• Removed non-NVMe styles from style gallery.
2022.03.18b	<ul style="list-style-type: none">• Change the structure of the log to have 1 byte to each specification and add the MI spec version reporting
2022.03.24	<ul style="list-style-type: none">• Corrected erroneous versions of ratified specs.• Removed the Supported Specification Log Page.• Added the Command Set Support Vector as a new Extended Attribute of the Discovery log page.• Adopted a convention of major and minor version fields each being one byte containing an integer, and the Tertiary Version being one byte containing an ASCII letter. This does not change the existing Tertiary Version field in the Version property.• Added Base Letter Version field to the to the Identify Controller Data Structure, I/O Command Set Independent CNS 01h)

Revision Date	Change Description
	<ul style="list-style-type: none"> Added a list of Supported Transport Specification Descriptors to the Identify Controller Data Structure, I/O Command Set Independent CNS 01h). Added supported specification version fields to the I/O Command Set Specific Identify Controller data structures (CNS 06h). This is a new structure in the KV Command Set spec. Added a section specifying the Supported Transport Specification Descriptor to each I/O command set spec. Added a figure to the NVMe MI spec defining the field in the Identify Controller data structure (CNS 01h) which is reserved for the Management Interface. This figure contains the major, minor, and tertiary versions of the MI spec.
2022.04.20	<ul style="list-style-type: none"> Deleted change to Discovery log page, per 2022-03-24 Technical WG meeting. Added questions for directions to be given by the 2022-04-14 Technical WG meeting. Replaced list of transport spec version descriptors with one transport specification descriptor per transport type (i.e., PCIe, RDMA, TCP, FC-NVMe). Moved descriptions of descriptors for PCIe, RDMA, and TCP to the separate transport specs. Modified changes for the NVMe-MI specification, to report the MI letter version in the NVM Subsystem Information data structure. Corrected headings in the changes for the KV Command Set Spec.
2022.04.21	<p>Changes from 2022-04-21 meeting of Technical WG:</p> <ul style="list-style-type: none"> Do not define letter version fields. Do not define transport spec version reporting. The above two items removed all changes to the Base Spec and to all transport specs. Added an I/O command set version field for I/O command specs. This field has three bytes (major, minor, tertiary). Added a tertiary version field for the NVMe-MI spec. Added comments for Phase 3 questions. Accepted all changes.
2022.04.26	<p>Changes from 2022-04-25 meeting of the NVMe-MI TG:</p> <ul style="list-style-type: none"> Revise existing MI fields to align with other specifications.
Phase 3	
2022.05.09	<ul style="list-style-type: none"> Change “valid versions” to “published versions” and list all of those in the version tables. Clarified notes to indicate in which data structure the version letter is not reported, per NVMe-MI TG meeting of 2022-05-09.
Member Review	
2022.05.12	<p>Revision for Member Review.</p> <p>Changes from 2022-05-09 Meeting of the NVMe-MI TG and the 2022-05-12 meeting of the Technical WG:</p> <ul style="list-style-type: none"> Removed redundant sentences stating that version letters are not reported. Modified figures showing version field values for each spec version (FigNVM, FigKV, FigZNS, FigMI). <ul style="list-style-type: none"> Removed lettered versions from Specification Versions column. Added lettered versions to Note 1 as examples.
2022.05.16	<p>Second revision for Member Review.</p> <p>Changes from 2022-05-16 meeting of the NVMe-MI TG:</p> <ul style="list-style-type: none"> Removed addition of the Tertiary field to NVMe-MI specification Figure 94. Reworded descriptions of NVMe-MI Major and Minor fields in Figure 94. Reworded e.g. list of specs in Note 1 to Figure FigMI.

Revision Date	Change Description
2022.05.20	<p>Third revision for Member Review.</p> <ul style="list-style-type: none"> Base Spec 3.1.3.1: <ul style="list-style-type: none"> Defined Version Descriptor for use in multiple specs. Defined Version property to use Version Descriptor. Added table showing reset values of Version Descriptor fields. Deleted sections 3.1.3.1.x. In I/O command set specs, changed the IOCSVER field to use the Version Descriptor. Removed Tertiary field from Figure FigMI. Updated description for changes document for NVMe-MI.
2022-05-26	<p>Fourth revision for Member Review.</p> <ul style="list-style-type: none"> Renamed Version Descriptor to Specification Version Descriptor. Modified description of the Specification Version Descriptor.
2022-07-20	Integrated
2022-07-26	Updated per editorial comments from Mike Allison and Paul Suhler

Description for Changes Document for NVM Express® Base Specification 2.0b

New Features/Feature Enhancements/Required Changes:

- Added the Specification Version Descriptor for use in multiple specifications.
- Re-defined the Version property to use the Specification Version Descriptor.
- References:
 - TP4135

Description for Changes Document for NVM Express® NVM Command Set Specification 1.0b

New Features/Feature Enhancements/Required Changes:

- Added the Version (VER) field to the I/O Command Set Specific Identify Controller data structure for the NVM Command Set.
- References:
 - TP4135

Description for Changes Document for NVM Express® Key Value Command Set Specification 1.0b

New Features/Feature Enhancements/Required Changes:

- Added the I/O Command Set Specific Identify Controller data structure for the Key Value Command Set. The contents are the Version (VER) field.
- References:
 - TP4135

Description for Changes Document for NVM Express® Zoned Namespace Specification 1.1b

New Features/Feature Enhancements/Required Changes:

- Added the Version (VER) field to the I/O Command Set Specific Identify Controller data structure for the Zoned Namespace Command Set.
- References:
 - TP4135

Description for Changes Document for NVM Express® Management Interface Specification 1.2b

New Features/Feature Enhancements/Required Changes:

- Aligned the descriptions of the version number fields with those in other specifications in the NVM Express Library of Specifications.
- References:
 - TP4135

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 NVM Express® Base Specification 2.0b

3 NVM Express Architecture

3.1 NVM Controller Architecture

...

3.1.3 Controller Properties

...

3.1.3.2 Offset 8h: VS – Version

This property is Read Only (RO) and indicates the ~~major, minor, and tertiary~~ version of ~~the NVM Express base~~ this specification that the controller ~~implementation~~ supports, as defined in **Figure FigVer1**. ~~Valid versions of the specification are: 1.0, 1.1, 1.2, 1.2.1, 1.3, 1.4, and 2.0.~~

Figure FigVer1: Specification Version Descriptor

Bits	Description
31:16	Major Version (MJR): An integer value indicating the major version number of this specification which is supported by the controller.
15:08	Minor Version (MNR): An integer value indicating the minor version number of this specification which is supported by the controller.
07:00	Tertiary Version (TER): An integer value indicating the tertiary version number of this specification which is supported by the controller. If this field is cleared to 0h, then this specification does not have a tertiary version number.

The reset value for each field is described in **Figure FigVer2**:

Figure FigVer2: NVM Express Base Specification Version Property Reset Values

Specification Versions ¹	MJR Field	MNR Field	TER Field
1.0	1h	0h	0h
1.1	1h	1h	0h
1.2	1h	2h	0h
1.2.1	1h	2h	1h
1.3	1h	3h	0h
1.4	1h	4h	0h
2.0	2h	0h	0h
Notes: 1. The specification version listed includes lettered versions (e.g., 1.4 includes 1.4, 1.4a through 1.4c, etc.).			

< **Note to Editor:** Sections 3.1.3.2.1 through 3.1.3.2.7 are deleted. >

3.1.3.2.1 VS Value for 1.0 Compliant Controllers

Figure 1: VS Value for 1.0 Compliant Controllers

Bits	Type	Reset	Description
31:16	RO	1h	Major Version Number (MJR): Indicates the major version is "1".
15:08	RO	0h	Minor Version Number (MNR): Indicates the minor version is "0".
07:00	RO	0h	Reserved

3.1.3.2.2 VS Value for 1.1 Compliant Controllers

Figure 2: VS Value for 1.1 Compliant Controllers

Bits	Type	Reset	Description
31:16	RO	1h	Major Version Number (MJR): Indicates the major version is "1".
15:08	RO	1h	Minor Version Number (MNR): Indicates the minor version is "1".
07:00	RO	0h	Reserved

3.1.3.2.3 VS Value for 1.2 Compliant Controllers

Figure 3: VS Value for 1.2 Compliant Controllers

Bits	Type	Reset	Description
31:16	RO	1h	Major Version Number (MJR): Indicates the major version is "1".
15:08	RO	2h	Minor Version Number (MNR): Indicates the minor version is "2".
07:00	RO	0h	Reserved

3.1.3.2.4 VS Value for 1.2.1 Compliant Controllers

Figure 4: VS Value for 1.2.1 Compliant Controllers

Bits	Type	Reset	Description
31:16	RO	1h	Major Version Number (MJR): Indicates the major version is "1".
15:08	RO	2h	Minor Version Number (MNR): Indicates the minor version is "2".
07:00	RO	1h	Tertiary Version Number (TER): Indicates the tertiary version is "1".

3.1.3.2.5 VS Value for 1.3 Compliant Controllers

Figure 5: VS Value for 1.3 Compliant Controllers

Bits	Type	Reset	Description
31:16	RO	1h	Major Version Number (MJR): Indicates the major version is "1".
15:08	RO	3h	Minor Version Number (MNR): Indicates the minor version is "3".
07:00	RO	0h	Tertiary Version Number (TER): Indicates the tertiary version is "0".

3.1.3.2.6 VS Value for 1.4 Compliant Controllers

Figure 6: VS Value for 1.4 Compliant Controllers

Bits	Type	Reset	Description
31:16	RO	1h	Major Version Number (MJR): Indicates the major version is "1".
15:08	RO	4h	Minor Version Number (MNR): Indicates the minor version is "4".
07:00	RO	0h	Tertiary Version Number (TER): Indicates the tertiary version is "0".

3.1.3.2.7 VS Value for 2.0 Compliant Controllers

Figure 7: VS Value for 2.0 Compliant Controllers

Bits	Type	Reset	Description
31:16	RO	2h	Major Version Number (MJR): Indicates the major version is “2”.
15:08	RO	0h	Minor Version Number (MNR): Indicates the minor version is “0”.
07:00	RO	0h	Tertiary Version Number (TER): Indicates the tertiary version is “0”.

3.1.3.3 Offset Ch: INTMS – Interrupt Mask Set

...

Description of NVM Express® NVM Command Set Specification 1.0b changes

4 Admin Commands for the NVM Command Set

...

4.1 Admin Command behavior for the NVM Command Set

...

4.1.5 Identify command

...

4.1.5.4 I/O Command Set Specific Identify Controller Data Structure (CNS 06h, CSI 00h)

Figure defines the I/O Command Set Specific Identify Controller data structure for the NVM Command Set.

Figure 102: I/O Command Set Specific Identity Controller Data Structure for the NVM Command Set

Bytes	O/M ¹	Description
...		
23:20	M	Version (VER): This field contains a Specification Version Descriptor (refer to the NVM Express Base Specification) indicating the version of this specification supported by the controller, as defined in Figure FigNVM .
4095: 16 24	M	Reserved
NOTES:		
1. O/M definition: O = Optional, M = Mandatory.		

...

Published versions of this specification and the values that shall be reported by compliant controllers are defined in [Figure FigNVM](#).

[Figure FigNVM](#): NVM Command Set Specification Version Descriptor Field Values

Specification Versions ¹	MJR Field	MNR Field	TER Field
1.0	1h	0h	0h
Notes:			
1. The specification version listed includes lettered versions (e.g., 1.0 includes 1.0, 1.0a, 1.0b, etc.).			

...

Description of NVM Express® Key Value Command Set specification 1.0b changes

4 Admin Commands for the Key Value Command Set

...

4.1 Admin Command behavior for the Key Value Command Set

...

4.1.5 Identify command

...

4.1.5.2 I/O Command Set Specific Identify Controller Data Structure (CNS 06h, CSI 01h)

~~The Key Value Command Set does not have an Identify I/O Command Set specific Controller data structure (i.e., CNS 06h). The controller shall return a zero filled data structure for this CNS value.~~

Figure FigKV1 defines the I/O Command Set Specific Identify Controller data structure for the Key Value Command Set.

Figure FigKV1: I/O Command Set Specific Identify Controller Data Structure for the Key Value Command Set

Bytes	O/M ¹	Description
03:00	M	Version (VER): This field contains a Specification Version Descriptor (refer to the NVM Express Base Specification) indicating the version of this specification supported by the controller, as defined in Figure FigKV2.
4095:04		Reserved
Notes: 1. O/M definition: O = Optional, M = Mandatory.		

Published versions of this specification and the values that shall be reported by compliant controllers are defined in Figure FigKV2.

Figure FigKV2: Key Value Command Set Specification Version Descriptor Field Values

Specification Versions ¹	MJR Field	MNR Field	TER Field
1.0	1h	0h	0h
Notes: 1. The specification version listed includes lettered versions (e.g., 1.0 includes 1.0, 1.0a, 1.0b, etc.).			

...

Description of NVM Express® Zoned Namespace Command Set specification 1.1b changes

4 Admin Commands for the Zoned Namespace Command Set

...

4.1 Admin Command behavior for the Zoned Namespace Command Set

...

4.1.5 Identify command

...

4.1.5.2 I/O Command Set Specific Identify Controller Data Structure (CNS 06h, CSI 02h)

Figure 50 defines the I/O Command Set specific Identify Controller data structure for the Zoned Namespace Command Set.

Figure 50: I/O Command Set Specific Identify Controller Data Structure for the Zoned Namespace Command Set

Bytes	O/M ¹	Description
...		
35:32	M	Version (VER): This field contains a Specification Version Descriptor (refer to the NVM Express Base Specification) indicating the version of this specification supported by the controller, as defined in Figure FigZNS .
4095:04 36		Reserved
NOTES: 1. O/M definition: O = Optional, M = Mandatory. 2. Mandatory for controllers that support the Zone Append command.		

Published versions of this specification and the values that shall be reported by compliant controllers are defined in [Figure FigZNS](#).

Figure FigZNS: Zoned Namespace Command Set Specification Version Descriptor Field Values

Specification Versions ¹	MJR Field	MNR Field	TER Field
1.0	1h	0h	0h
1.1	1h	1h	0h
Notes: 1. The specification version listed includes lettered versions (e.g., 1.1 includes 1.1, 1.1a, 1.1b, etc.).			

...

Description of NVM Express® Management Interface Specification
1.2b changes

5 Management Interface Command Set

...

5.7 Read NVMe-MI Data Structure

...

Figure 94: NVM Subsystem Information Data Structure

Bytes	Description
00	Number of Ports (NUMP): This field indicates the maximum number of ports of any type supported by the NVM Subsystem. This is a 0's based value. The value of FFh is not supported because a port identifier of 256 is not able to be reported (refer to section Error! Reference source not found.).
01	NVMe-MI Major Version Number (MJR): This field shall be set to 1h to indicate the major version number of this specification. An integer value indicating the major version number of this specification supported by the NVM Subsystem, as defined in Figure FigMI.
02	NVMe-MI Minor Version Number (MNR): This field shall be set to 2h to indicate the minor version number of this specification. An integer value indicating the minor version number of this specification supported by the NVM Subsystem, as defined in Figure FigMI.
31:03	Reserved

...

Published versions of this specification and the values that shall be reported by compliant implementations are defined in Figure FigMI.

Figure FigMI: Version Number Field Values

Specification Versions ¹	MJR Field	MNR Field
1.0	1h	0h
1.1	1h	1h
1.2	1h	2h
Notes: 1. The specification version listed includes lettered versions (e.g., 1.0 includes 1.0 and 1.0a, 1.1 includes 1.1 and 1.1a through 1.1d, etc.).		

...