



LEGAL NOTICE:

© Copyright 2007 to 2021 NVM Express™, Inc. ALL RIGHTS RESERVED.

This NVM Express revision 1.4 technical proposal is proprietary to the NVM Express, Inc. (also referred to as "Company") and/or its successors and assigns.

NOTICE TO USERS WHO ARE NVM EXPRESS, INC. MEMBERS: Members of NVM Express, Inc. have the right to use and implement this NVM Express revision 1.4 technical proposal subject, however, to the Member's continued compliance with the Company's Intellectual Property Policy and Bylaws and the Member's Participation Agreement.

NOTICE TO NON-MEMBERS OF NVM EXPRESS, INC.: If you are not a Member of NVM Express, Inc. and you have obtained a copy of this document, you only have a right to review this document or make reference to or cite this document. Any such references or citations to this document must acknowledge NVM Express, Inc. copyright ownership of this document. The proper copyright citation or reference is as follows: "© 2007 to 2021 NVM Express, Inc. ALL RIGHTS RESERVED." When making any such citations or references to this document you are not permitted to revise, alter, modify, make any derivatives of, or otherwise amend the referenced portion of this document in any way without the prior express written permission of NVM Express, Inc. Nothing contained in this document shall be deemed as granting you any kind of license to implement or use this document or the specification described therein, or any of its contents, either expressly or impliedly, or to any intellectual property owned or controlled by NVM Express, Inc., including, without limitation, any trademarks of NVM Express, Inc.

LEGAL DISCLAIMER:

THIS DOCUMENT AND THE INFORMATION CONTAINED HEREIN IS PROVIDED ON AN "AS IS" BASIS. TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, NVM EXPRESS, INC. (ALONG WITH THE CONTRIBUTORS TO THIS DOCUMENT) HEREBY DISCLAIM ALL REPRESENTATIONS, WARRANTIES AND/OR COVENANTS, EITHER EXPRESS OR IMPLIED, STATUTORY OR AT COMMON LAW, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, TITLE, VALIDITY, AND/OR NONINFRINGEMENT.

All product names, trademarks, registered trademarks, and/or servicemarks may be claimed as the property of their respective owners.

The NVM Express® design mark is a registered trademark of NVM Express, Inc.

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

NVM Express Technical Proposal for New Feature

Technical Proposal ID	4071b Command and Effect Log Enhancements
Change Date	2021-01-14
Builds on Specification	NVM Express 1.4
References Specification	TP 4009 Domains and Partitions TP 4056b Namespace Types

Technical Proposal Author(s)

Name	Company
Mark Gianopulos	Intel
Mike Allison	Intel

This proposal intends to do the following:

- add a new log page to report the list of supported log pages;
- add a new log page to describe the behaviors of all possible feature identifiers (FID) 0-255;
- add a new log page to report the list of supported NVMe-MI commands;
- add a field to the Commands Supported and Effects data structure and to the new log pages proposed to identify the scope (e.g., NVM subsystem, Domain, controller, Endurance Group, NVM Set, namespace, etc.).

Revision History

Revision Date	Change Description
2019-08-26	Initial version
2019-08-27	Updated for NVMe-MI and TP 4046 Lockdown command
2019-08-29	Cleaned up some typos
2019-09-12	Updated Log Identifier 0 Log Page to have a data structure per LID. Added the new log pages to the list of log pages supported on an I/O Controller and Administration Controller.
2019-10-03	Phase 3 final wording: <ul style="list-style-type: none">• Removed the shall requirement on LID 0h in Figure TBD_FX1 as the requirement is specified by Section 7.1.• Updated LSUPP field in Figure TBD_FX2 to refer to section 7.1 for the LID support requirements per controller type.• The FSUPP field removed the txt stating support for changing the value to just supporting the FID.• Updated FSUPP field in Figure TBD_FY2 to refer to section 7.1 for the LID support requirements per controller type.• Corrected reference to UUID section 8.24• Changed the CSE field to use "should" instead of "may"
2020-01-02	Moved back to Phase 2 to address the CSE field definition for FIDs that do not have namespace scope. Fixed black text that should have been blue.
2020-01-16	Changed "this FID" to "changing the f= value of this FID". Used bit names instead of bit numbering.

2020-01-28	Reverted CSE field changes in Commands Supported and Effects Data Structure. Removed the CSE field in the FID Supported and Effects Data Structure.
2020-01-30	Made supporting all of the log pages in this specification mandatory after version 1.4 of this specification. Reduced the support of changed to this TP to one bit. Added the Administrative Controller support for the new log pages based on the associated NVMe command being supported.
2020-02-06	Made the log pages mandatory and use notes to specify conditions when optional.
2020-02-12	Removed repeated list item. Changed “effected” to “affected”.
2020-02-27	Accepted all changes. Updated the date. Ready for member review.
2020-04-15	Integrated into NVMe 1.4 Base Specification
2020-04-16	Changes “is describes” to “describes”. Ratification Ready
2020-04-30	Aligning to TP 4056 Namespace types that uses the CSI value to get the supported log pages and features per I/O Command Set type.
2020-05-01	Missed specifying use of CSI when CC.CSS is set to 110b.
2020-05-14	Changed a “a” to “the” in two places. Ready for 30 day member review.
2020-07-20	Integrated into the NVM Express Base Specification.
2020-09-03	Added Get Log Page command to the I/O Command Set Not Supported status code.
2020-10-22	Accepted all changes and removed comments for member review.
2020-12-14	Integrated into the NVMe Base Specification
2020-12-15	Changed title to state 4071b.
2021-01-14	Accepted all changes and removed comments for ratification

Description for NVMe 1.4 Changes Document

This technical proposal adds support for several new log pages. A new log page to allow the host to retrieve a list of supported log pages and attributes per log page. A new log page to allow the host to retrieve the supported NVMe-MI commands and their effects. A new log page to allow the host to retrieve the supported feature identifiers and their effects when used with a Set Features command. Each log page will also state the scope for each command, FID or log page.

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 Figure 128 in section 4.6.1.2.2. from TP 4056b as shown below:

4.6.1.2.2 Command Specific Status Definition

Technical input submitted to the NVM Express™ Workgroup is subject to the terms of the NVM Express™ Participant's agreement. Copyright © 2014 to 2021 NVMe™ Corporation.

...

Figure 128: Status Code – Command Specific Status Values

Value	Description	Commands Affected
00h	Completion Queue Invalid	Create I/O Submission Queue
01h	Invalid Queue Identifier	Create I/O Submission Queue, Create I/O Completion Queue, Delete I/O Completion Queue, Delete I/O Submission Queue
02h	Invalid Queue Size	Create I/O Submission Queue, Create I/O Completion Queue
...
21h	Invalid Number of Controller Resources	Virtualization Management
22h	Invalid Resource Identifier	Virtualization Management
23h	Sanitize Prohibited While Persistent Memory Region is Enabled	Sanitize
24h	ANA Group Identifier Invalid	Namespace Management
25h	ANA Attach Failed	Namespace Attachment
...
29h	I/O Command Set Not Supported	Namespace Attachment, Namespace Management, Get Log Page
2Ah	I/O Command Set Not Enabled	Namespace Attachment
2Bh	I/O Command Set Combination Rejected	Set Features
2Ch	Invalid I/O Command Set	Identify
2Dh to 6Fh	Reserved	
70h to 7Fh	Directive Specific	NOTE 1
80h to BFh	I/O Command Set Specific	NOTE 2
C0h to FFh	Vendor Specific	
NOTES: 1. The Directives Specific range defines Directives specific status values. Refer to section 9. 2. The I/O Command Set Specific range in the NVMe over Fabrics specification defines Fabrics command specific status values.		

Modify portions of section 5.14.1 as shown below:

5.14.1 Log Specific Information

Figure 191 and Figure 192 define the Log pages that may be retrieved with the Get Log Page command and the scope of the information that is returned in those Log pages. Refer to section 7.1 for mandatory, optional, and prohibited Log pages for the various controller types.

Log pages that indicate a scope of NVM subsystem return information that is global to the NVM subsystem. Log pages that indicate a scope of controller return information that is specific to the controller that is processing the command. Log pages that indicate a scope of Namespace return information that is specific to the specified namespace. For log pages that indicate multiple scopes, the namespace identifier that is specified determines which information is returned. The definition of any individual field within a Log page may indicate a different scope that is specific to that individual field.

For Log Pages with a scope of NVM subsystem or controller (as shown in Figure 191 and Figure 192), the controller should abort commands that specify namespace identifiers other than 0h or FFFFFFFFh with status Invalid Field in Command. Otherwise the rules for namespace identifier usage in Figure 105 apply.

Figure 191: Get Log Page – Log Page Identifiers

Log Identifier	Scope	Log Page Name	Reference Section
00h	Reserved Controller	Supported Log Pages	5.14.TBD2
01h	Controller	Error Information	5.14.1.1

Figure 191: Get Log Page – Log Page Identifiers

Log Identifier	Scope	Log Page Name	Reference Section
...			
0Fh	NVM subsystem	Endurance Group Event Aggregate	5.14.1.15
12h	Controller	Feature Identifiers Supported and Effects	5.14.TBD3
13h	Controller	NVMe-MI Commands Supported and Effects	5.14.TBD4
14h to 6Fh	Reserved		
...			

Add a new section to section 5.14 as shown below:

5.14.TBD2 Supported Log Pages (Log Identifier 00h)

This log page is used to describe the log pages that the controller supports and attributes specific to each log page. The log page is defined in Figure <TBD_FX1>. The attributes of each log page are described in a LID Supported and Effects data structure defined in Figure <TBD_FX2>.

The log pages that the controller supports are dependent on the I/O Command Set that is based on:

- the I/O Command Set selected in CC.CSS, if CC.CSS is not set to 110b; and
- the Command Set Identifier (CSI) field in CDW 14, if CC.CSS is set to 110b.

Figure <TBD_FX1>: Supported Log Pages – Log

Bytes	Description
3:0	Log Page Identifier Supported 0: Contains the LID Supported and Effects data structure (refer to Figure <TBD_FX2>.) for the LID 0h.
7:4	Log Page Identifier Supported 1: Contains the LID Supported and Effects data structure (refer to Figure <TBD_FX2>.) for the LID 1h.
...	...
1019:1016	Log Page Identifier Supported 254: Contains the LID Supported and Effects data structure (refer to Figure <TBD_FX2>.) for the LID FEh.
1023:1020	Log Page Identifier Supported 255: Contains the LID Supported and Effects data structure (refer to Figure <TBD_FX2>.) for the LID FFh.

Figure <TBD_FX2>: Get Log Page – LID Supported and Effects Data Structure

Bits	Description
31:1	Reserved
0	LID Supported (LSUPP): If this bit is set to '1', then the LID is supported for a Get Log Page command by the controller. If this bit is cleared to '0', then this LID is not supported for a Get Log Page command by the controller. Refer to section 7.1 for the LID support requirements for each controller type.

Add another new section to section 5.14 as shown below:

5.14.TBD3 Feature Identifiers Supported and Effects (Log Identifier 12h)

This log page describes the feature identifiers (FIDs) that the controller supports and the effects of those features on the state of the NVM subsystem. The log page is defined in Figure <TBD_FY1>. Each Feature

Identifier's effects are described in a FID Supported and Effects data structure defined in Figure <TBD_FY2>.

The features that the controller supports are dependent on the I/O Command Set that is based on:

- the I/O Command Set selected in CC.CSS, if CC.CSS is not set to 110b; and
- the Command Set Identifier (CSI) field in CDW 14, if CC.CSS is set to 110b.

Figure <TBD_FY1>: Get Log Page – Feature Identifiers Effects Log

Bytes	Description
03:00	Feature Identifier Supported 0: Contains the FID Supported and Effects data structure (refer to Figure <TBD_FY2>) for FID 0h.
07:04	Feature Identifier Supported 1: Contains the FID Supported and Effects data structure (refer to Figure <TBD_FY2>) for FID 1h.
...	...
1019:1016	Feature Identifier Supported 254: Contains the FID Supported and Effects data structure (refer to Figure <TBD_FY2>) for FID FEh.
1023:1020	Feature Identifier Supported 255: Contains the FID Supported and Effects data structure (refer to Figure <TBD_FY2>) for FID FFh.

The FID Supported and Effects data structure describes the effect of a Set Features command for the FID, including any optional features of the FID.

If multiple hosts are connected to the NVM subsystem, then those hosts should coordinate their commands to meet the Command Submission and Execution requirements (refer to Figure <TBD_FY2>). The details of this coordination are outside the scope of this specification.

Figure <TBD_FY2>: Get Log Page – FID Supported and Effects Data Structure

Bits	Description															
31:20	FID Scope (FSP): This field defines the scope for the associated feature identifier. If the value of this field is 0h, then no scope is reported. If this field is non-zero, then only one bit shall be set to '1'.															
	<table> <tr> <th>Bits</th><th>Description</th></tr> <tr> <td>11:6</td><td>Reserved</td></tr> <tr> <td>5</td><td>NVM Subsystem Scope: If set to '1', then modifying the value of the FID may impact the whole NVM subsystem. If cleared to '0' and the FSP field is non-zero, then modifying the value of the FID does not impact the whole NVM subsystem.</td></tr> <tr> <td>4</td><td>Domain Scope: If set to '1', then modifying the value of the FID may impact a single Domain. If cleared to '0' and the FSP field is non-zero, then modifying the value of the FID does not impact a single Domain.</td></tr> <tr> <td>3</td><td>Endurance Group Scope: If set to '1', then then modifying the value of the FID may impact Endurance Groups. If cleared to '0' and the FSP field is non-zero, then modifying the value of the FID does not impact Endurance Groups.</td></tr> <tr> <td>2</td><td>NVM Set Scope: If set to '1', then modifying the value of the FID may impact NVM Sets. If cleared to '0' and the FSP field is non-zero, then modifying the value of the FID does not impact NVM Sets.</td></tr> <tr> <td>1</td><td>Controller Scope: If set to '1', then modifying the value of the FID may impact the controller. If cleared to '0' and the FSP field is non-zero, then the FID does not have controller scope.</td></tr> <tr> <td>0</td><td>Namespace Scope: If set to '1', then modifying the value of the FID may impact namespaces. If cleared to '0' and the FSP field is non-zero, then modifying the value of the FID does not impact namespaces.</td></tr> </table>	Bits	Description	11:6	Reserved	5	NVM Subsystem Scope: If set to '1', then modifying the value of the FID may impact the whole NVM subsystem. If cleared to '0' and the FSP field is non-zero, then modifying the value of the FID does not impact the whole NVM subsystem.	4	Domain Scope: If set to '1', then modifying the value of the FID may impact a single Domain. If cleared to '0' and the FSP field is non-zero, then modifying the value of the FID does not impact a single Domain.	3	Endurance Group Scope: If set to '1', then then modifying the value of the FID may impact Endurance Groups. If cleared to '0' and the FSP field is non-zero, then modifying the value of the FID does not impact Endurance Groups.	2	NVM Set Scope: If set to '1', then modifying the value of the FID may impact NVM Sets. If cleared to '0' and the FSP field is non-zero, then modifying the value of the FID does not impact NVM Sets.	1	Controller Scope: If set to '1', then modifying the value of the FID may impact the controller. If cleared to '0' and the FSP field is non-zero, then the FID does not have controller scope.	0
Bits	Description															
11:6	Reserved															
5	NVM Subsystem Scope: If set to '1', then modifying the value of the FID may impact the whole NVM subsystem. If cleared to '0' and the FSP field is non-zero, then modifying the value of the FID does not impact the whole NVM subsystem.															
4	Domain Scope: If set to '1', then modifying the value of the FID may impact a single Domain. If cleared to '0' and the FSP field is non-zero, then modifying the value of the FID does not impact a single Domain.															
3	Endurance Group Scope: If set to '1', then then modifying the value of the FID may impact Endurance Groups. If cleared to '0' and the FSP field is non-zero, then modifying the value of the FID does not impact Endurance Groups.															
2	NVM Set Scope: If set to '1', then modifying the value of the FID may impact NVM Sets. If cleared to '0' and the FSP field is non-zero, then modifying the value of the FID does not impact NVM Sets.															
1	Controller Scope: If set to '1', then modifying the value of the FID may impact the controller. If cleared to '0' and the FSP field is non-zero, then the FID does not have controller scope.															
0	Namespace Scope: If set to '1', then modifying the value of the FID may impact namespaces. If cleared to '0' and the FSP field is non-zero, then modifying the value of the FID does not impact namespaces.															
19	UUID Selection Supported: If set to '1', then the controller supports the selection of a UUID (refer to section 8.24) by a Get Features command or a Set Features command using this FID. If cleared to '0', then the controller does not support the selection of a UUID by a Get Features command or a Set Features command using this FID.															
18:05	Reserved															

Figure <TBD_FY2>: Get Log Page – FID Supported and Effects Data Structure

Bits	Description
04	Controller Capability Change (CCC): If this bit is set to '1', then changing the value of this FID may change controller capabilities. If this bit is cleared to '0', then changing the value of this FID does not modify controller capabilities. Controller capability changes include a firmware update that changes the capabilities reported in the CAP register.
03	Namespace Inventory Change (NIC): If this bit is set to '1', then changing the value of this FID may change the number of namespaces or capabilities for multiple namespaces. If this bit is cleared to '0', then changing the value of this FID does not modify the number of namespaces or capabilities for multiple namespaces. Namespace inventory changes include adding or removing namespaces.
02	Namespace Capability Change (NCC): If this bit is set to '1', then changing the value of this FID may change the capabilities of a single namespace. If this bit is cleared to '0', then changing the value of this FID does not modify any namespace capabilities for the specified namespace. Namespace capability changes include a logical format change.
01	User Data Content Change (UDCC): If this bit is set to '1', then changing the value of this FID may modify user data content in one or more namespaces. If this bit is cleared to '0', then changing the value of this FID does not modify user data content in any namespace.
00	FID Supported (FSUPP): If this bit is set to '1', then this FID is supported by the controller. If this bit is cleared to '0', then this FID is not supported by the controller and all other fields in this structure shall be cleared to 0h. Refer to section 7.1 for the FID support requirements for each controller type.

Add another new section to section 5.14 as shown below:

5.14.TBD4 NVMe-MI Commands Supported and Effects (Log Identifier 13h)

This log page describes the Management Interface Command Set commands (refer to the NVMe Management Interface Specification) that the controller supports using the NVMe-MI Send and NVMe-MI Receive commands and the effects of those Management Interface Command Set commands on the state of the NVM subsystem. The log page is defined in Figure <TBD_FZ1>.

Figure TBD_FZ1: Get Log Page – NVMe-MI Commands Supported and Effects Log

Bytes	Description
03:00	Management Interface Command Supported 0: Contains the NVMe-MI Commands Supported and Effects data structure (refer to Figure <TBD_FZ2>) for the Management Interface command with an opcode value of 0h.
07:04	Management Interface Command Supported 1: Contains the NVMe-MI Commands Supported and Effects data structure (refer to Figure <TBD_FZ2>) for the Management Interface command with an opcode value of 1h.
...	...
1019:1016	Management Interface Command Supported 254: Contains the NVMe-MI Commands Supported and Effects data structure (refer to Figure <TBD_FZ2>) for the Management Interface command with an opcode value of 254.
1023:1020	Management Interface Command Supported 255: Contains the NVMe-MI Commands Supported and Effects data structure (refer to Figure <TBD_FZ2>) for the Management Interface command with an opcode value of 255.
4095:1024	Reserved

The NVMe-MI Commands Supported and Effects data structure describes the overall possible effect of a Management Interface command using the NVMe-MI Send command, including any optional features of the command.

Figure <TBD_FZ2>: Get Log Page – NVMe-MI Commands Supported and Effects Data Structure

Bits	Description																
31:20	Command Scope (CSP): This field defines the scope for the associated NVMe-MI Send command that specifies the Management Interface command opcode for this data structure. If the value of this field is 0h then no scope is reported. . If this field is non-zero, then only one bit shall be set to '1'.																
	<table><tr><th>Bits</th><th>Description</th></tr><tr><td>11:6</td><td>Reserved</td></tr><tr><td>5</td><td>NVM Subsystem Scope: If set to '1', then the command performs actions that may impact the whole NVM subsystem. If cleared to '0' and the CSP field is non-zero, then the command performs actions that do not impact the whole NVM subsystem.</td></tr><tr><td>4</td><td>Domain Scope: If set to '1', then the command has Domain scope. If cleared to '0' and the CSP field is non-zero, then the command does not have Domain scope.</td></tr><tr><td>3</td><td>Endurance Group Scope: If set to '1', then the command has Endurance Group scope. If cleared to '0' and the CSP field is non-zero, then the command does not have Endurance Group scope.</td></tr><tr><td>2</td><td>NVM Set Scope: If set to '1', then the command has NVM Set scope. If cleared to '0' and the CSP field is non-zero, then the command does not have NVM Set scope.</td></tr><tr><td>1</td><td>Controller Scope: If set to '1', then the command has controller scope. If cleared to '0' and the CSP field is non-zero, then the command does not have controller scope.</td></tr><tr><td>0</td><td>Namespace Scope: If set to '1', then the command has namespace scope. If cleared to '0' and the CSP field is non-zero, then the command does not have namespace scope.</td></tr></table>	Bits	Description	11:6	Reserved	5	NVM Subsystem Scope: If set to '1', then the command performs actions that may impact the whole NVM subsystem. If cleared to '0' and the CSP field is non-zero, then the command performs actions that do not impact the whole NVM subsystem.	4	Domain Scope: If set to '1', then the command has Domain scope. If cleared to '0' and the CSP field is non-zero, then the command does not have Domain scope.	3	Endurance Group Scope: If set to '1', then the command has Endurance Group scope. If cleared to '0' and the CSP field is non-zero, then the command does not have Endurance Group scope.	2	NVM Set Scope: If set to '1', then the command has NVM Set scope. If cleared to '0' and the CSP field is non-zero, then the command does not have NVM Set scope.	1	Controller Scope: If set to '1', then the command has controller scope. If cleared to '0' and the CSP field is non-zero, then the command does not have controller scope.	0	Namespace Scope: If set to '1', then the command has namespace scope. If cleared to '0' and the CSP field is non-zero, then the command does not have namespace scope.
	Bits	Description															
	11:6	Reserved															
	5	NVM Subsystem Scope: If set to '1', then the command performs actions that may impact the whole NVM subsystem. If cleared to '0' and the CSP field is non-zero, then the command performs actions that do not impact the whole NVM subsystem.															
	4	Domain Scope: If set to '1', then the command has Domain scope. If cleared to '0' and the CSP field is non-zero, then the command does not have Domain scope.															
	3	Endurance Group Scope: If set to '1', then the command has Endurance Group scope. If cleared to '0' and the CSP field is non-zero, then the command does not have Endurance Group scope.															
	2	NVM Set Scope: If set to '1', then the command has NVM Set scope. If cleared to '0' and the CSP field is non-zero, then the command does not have NVM Set scope.															
	1	Controller Scope: If set to '1', then the command has controller scope. If cleared to '0' and the CSP field is non-zero, then the command does not have controller scope.															
0	Namespace Scope: If set to '1', then the command has namespace scope. If cleared to '0' and the CSP field is non-zero, then the command does not have namespace scope.																
19:05	Reserved																
04	Controller Capability Change (CCC): If this bit is set to '1', then this command may change controller capabilities. If this bit is cleared to '0', then this command does not modify controller capabilities. Controller capability changes include a firmware update that changes the capabilities reported in the CAP register.																
03	Namespace Inventory Change (NIC): If this bit is set to '1', then this command may change the number of namespaces or capabilities for multiple namespaces. If this bit is cleared to '0', then this command does not modify the number of namespaces or capabilities for multiple namespaces. Namespace inventory changes include adding or removing namespaces.																
02	Namespace Capability Change (NCC): If this bit is set to '1', then this command may change the capabilities of a single namespace. If this bit is cleared to '0', then this command does not modify any namespace capabilities for the specified namespace. Namespace capability changes include a logical format change.																
01	User Data Content Change (UDCC): If this bit is set to '1', then this command may modify user data content in one or more namespaces. If this bit is cleared to '0', then this command does not modify user data content in any namespace. User data content changes include a write operation.																
00	Command Supported (CSUPP): If this bit is set to '1', then this command is supported by the controller. If this bit is cleared to '0', then this command is not supported by the controller and all other fields in this structure shall be cleared to 0h.																

Modify Figure 198 in section 5.14.1.5 as shown below:

5.14.1.5 Commands Supported and Effects (Log Identifier 05h)

...

Figure 198: Get Log Page – Commands Supported and Effects Data Structure

Bits	Description															
31:20	Reserved Command Scope (CSP): This field defines the scope for the associated command. If the value of this field is 0h then no scope is reported.															
	<table> <tr> <th>Bits</th><th>Description</th></tr> <tr> <td>11:6</td><td>Reserved</td></tr> <tr> <td>5</td><td>NVM Subsystem Scope: If set to '1', then the command performs actions that may impact the whole NVM subsystem. If cleared to '0' and the CSP field is non-zero, then the command performs actions that does not impact the whole NVM subsystem.</td></tr> <tr> <td>4</td><td>Domain Scope: If set to '1', then the command performs actions that may impact a single Domain. If cleared to '0' and the CSP field is non-zero, then the command performs actions that does not impact a single Domain.</td></tr> <tr> <td>3</td><td>Endurance Group Scope: If set to '1', then the command then the command performs actions that may impact a Endurance Groups. If cleared to '0' and the CSP field is non-zero, then then the command performs actions that does not impact a single Endurance Group.</td></tr> <tr> <td>2</td><td>NVM Set Scope: If set to '1', then the command then the command performs actions that may impact a NVM Sets. If cleared to '0' and the CSP field is non-zero, then the command the command then the command performs actions that do not impact NVM Sets.</td></tr> <tr> <td>1</td><td>Controller Scope: If set to '1', then then the command performs actions that may impact a controller. If cleared to '0' and the CSP field is non-zero, then then the command performs actions that do not impact a single controller.</td></tr> <tr> <td>0</td><td>Namespace Scope: If set to '1', then the command performs actions that may impact a namespaces. If cleared to '0' and the CSP field is non-zero, then the command performs actions that do not impact a namespaces.</td></tr> </table>	Bits	Description	11:6	Reserved	5	NVM Subsystem Scope: If set to '1', then the command performs actions that may impact the whole NVM subsystem. If cleared to '0' and the CSP field is non-zero, then the command performs actions that does not impact the whole NVM subsystem.	4	Domain Scope: If set to '1', then the command performs actions that may impact a single Domain. If cleared to '0' and the CSP field is non-zero, then the command performs actions that does not impact a single Domain.	3	Endurance Group Scope: If set to '1', then the command then the command performs actions that may impact a Endurance Groups. If cleared to '0' and the CSP field is non-zero, then then the command performs actions that does not impact a single Endurance Group.	2	NVM Set Scope: If set to '1', then the command then the command performs actions that may impact a NVM Sets. If cleared to '0' and the CSP field is non-zero, then the command the command then the command performs actions that do not impact NVM Sets.	1	Controller Scope: If set to '1', then then the command performs actions that may impact a controller. If cleared to '0' and the CSP field is non-zero, then then the command performs actions that do not impact a single controller.	0
Bits	Description															
11:6	Reserved															
5	NVM Subsystem Scope: If set to '1', then the command performs actions that may impact the whole NVM subsystem. If cleared to '0' and the CSP field is non-zero, then the command performs actions that does not impact the whole NVM subsystem.															
4	Domain Scope: If set to '1', then the command performs actions that may impact a single Domain. If cleared to '0' and the CSP field is non-zero, then the command performs actions that does not impact a single Domain.															
3	Endurance Group Scope: If set to '1', then the command then the command performs actions that may impact a Endurance Groups. If cleared to '0' and the CSP field is non-zero, then then the command performs actions that does not impact a single Endurance Group.															
2	NVM Set Scope: If set to '1', then the command then the command performs actions that may impact a NVM Sets. If cleared to '0' and the CSP field is non-zero, then the command the command then the command performs actions that do not impact NVM Sets.															
1	Controller Scope: If set to '1', then then the command performs actions that may impact a controller. If cleared to '0' and the CSP field is non-zero, then then the command performs actions that do not impact a single controller.															
0	Namespace Scope: If set to '1', then the command performs actions that may impact a namespaces. If cleared to '0' and the CSP field is non-zero, then the command performs actions that do not impact a namespaces.															
19	UUID Selection Supported: If set to '1', then the controller supports selection of a UUID by this command (refer to section 8.24). If cleared to '0', then the controller does not support selection of a UUID by this command.															
18:16	Command Submission and Execution (CSE): This field defines the command submission and execution recommendations for the associated command.															
	<table> <tr> <th>Value</th><th>Definition</th></tr> <tr> <td>000b</td><td>No command submission or execution restriction</td></tr> <tr> <td>001b</td><td>The command associated with this structure should only may-be submitted when there is no other outstanding command affecting to the same namespace and another command should not be submitted that affects to the same namespace until this command is complete.</td></tr> <tr> <td>010b</td><td>The command associated with this structure should only may-be submitted when there is no other outstanding command that affects to any namespace and another command should not be submitted that affects to any namespace until this command is complete.</td></tr> <tr> <td>011b to 111b</td><td>Reserved</td></tr> </table>	Value	Definition	000b	No command submission or execution restriction	001b	The command associated with this structure should only may -be submitted when there is no other outstanding command affecting to the same namespace and another command should not be submitted that affects to the same namespace until this command is complete.	010b	The command associated with this structure should only may -be submitted when there is no other outstanding command that affects to any namespace and another command should not be submitted that affects to any namespace until this command is complete.	011b to 111b	Reserved					
Value	Definition															
000b	No command submission or execution restriction															
001b	The command associated with this structure should only may -be submitted when there is no other outstanding command affecting to the same namespace and another command should not be submitted that affects to the same namespace until this command is complete.															
010b	The command associated with this structure should only may -be submitted when there is no other outstanding command that affects to any namespace and another command should not be submitted that affects to any namespace until this command is complete.															
011b to 111b	Reserved															
15:05	Reserved															
04	Controller Capability Change (CCC): If this bit is set to '1', then this command may change controller capabilities. If this bit is cleared to '0', then this command does not modify controller capabilities. Controller capability changes include a firmware update that changes the capabilities reported in the CAP register.															
...																

Modify section 5.14.2 as shown below:

5.14.2 Command Completion

Upon completion of the Get Log Page command, the controller posts a completion queue entry to the Admin Completion Queue. Get Log Page command specific status values are defined in Figure 239.

1.14.1.1 Figure 239: Get Log Page – Command Specific Status Values

Value	Description
9h	Invalid Log Page: The log page indicated is invalid or not supported. This error condition is also returned if a reserved log page is requested. Controllers compliant with versions 1.3 and earlier of the specification may return Invalid Field in Command for this condition.
29h	I/O Command Set Not Supported: The specified I/O Command Set is not supported by the controller.

Modify Figure 247 in section 5.15.2.2 as shown below:

5.15.2.2 Identify Controller data structure (CNS 01h)

...

Figure 247: Identify – Identify Controller Data Structure

Bytes	O/M ¹	Description																
261	M	Log Page Attributes (LPA): This field indicates optional attributes for log pages that are accessed via the Get Log Page command.																
		Bits	Description	7:6	are R reserved-	5	If set to '1', then the controller supports: <ul style="list-style-type: none">the Supported Log Pages log page (Log Identifier 0h);returning the scope of each command in the Commands Supported and Effects log page (Log Identifier 05h);the Feature Identifiers Supported and Effects log page (Log Identifier TBD); andthe NVMe-MI Commands Supported and Effects log page (Log Identifier TBD1).	If cleared to '0', then the controller: <ul style="list-style-type: none">does not support returning the scope of each command in the Commands Supported and Effects log page;may support the Supported Log Pages log page;may support the Feature Identifiers Supported and Effects log page; andmay support the NVMe-MI Commands Supported and Effects log page.	Bit 4	if set to '1', then the controller supports the Persistent Event log. If cleared to '0', then the controller does not support the Persistent Event log.	Bit 3	if set to '1', then the controller supports the Telemetry Host-Initiated and Telemetry Controller-Initiated log pages and sending Telemetry Log Notices. If cleared to '0', then the controller does not support the Telemetry Host-Initiated and Telemetry Controller-Initiated log pages and Telemetry Log Notice events.	Bit 2	if set to '1', then the controller supports extended data for the Get Log Page command (including extended Number of Dwords and Log Page Offset fields). Bit 2 if cleared to '0', then the controller does not support extended data for the Get Log Page command.	Bit 1	if set to '1', then the controller supports the Commands Supported and Effects log page. Bit 1 if cleared to '0', then the controller does not support the Commands Supported and Effects log page.	Bit 0	if set to '1', then the controller supports the SMART / Health Information log page on a per namespace basis. If cleared to '0', then the controller does not support the SMART / Health Information log page on a per namespace basis.
		Bits	Description															
		7:6	are R reserved-															
		5	If set to '1', then the controller supports: <ul style="list-style-type: none">the Supported Log Pages log page (Log Identifier 0h);returning the scope of each command in the Commands Supported and Effects log page (Log Identifier 05h);the Feature Identifiers Supported and Effects log page (Log Identifier TBD); andthe NVMe-MI Commands Supported and Effects log page (Log Identifier TBD1).															
			If cleared to '0', then the controller: <ul style="list-style-type: none">does not support returning the scope of each command in the Commands Supported and Effects log page;may support the Supported Log Pages log page;may support the Feature Identifiers Supported and Effects log page; andmay support the NVMe-MI Commands Supported and Effects log page.															
		Bit 4	if set to '1', then the controller supports the Persistent Event log. If cleared to '0', then the controller does not support the Persistent Event log.															
		Bit 3	if set to '1', then the controller supports the Telemetry Host-Initiated and Telemetry Controller-Initiated log pages and sending Telemetry Log Notices. If cleared to '0', then the controller does not support the Telemetry Host-Initiated and Telemetry Controller-Initiated log pages and Telemetry Log Notice events.															
		Bit 2	if set to '1', then the controller supports extended data for the Get Log Page command (including extended Number of Dwords and Log Page Offset fields). Bit 2 if cleared to '0', then the controller does not support extended data for the Get Log Page command.															
		Bit 1	if set to '1', then the controller supports the Commands Supported and Effects log page. Bit 1 if cleared to '0', then the controller does not support the Commands Supported and Effects log page.															
Bit 0	if set to '1', then the controller supports the SMART / Health Information log page on a per namespace basis. If cleared to '0', then the controller does not support the SMART / Health Information log page on a per namespace basis.																	

5.21.1 Feature Specific Information

Figure 271 defines the Features that may be configured with a Set Features command and retrieved with a Get Features command. Figure 272 defines Features that are specific to the NVM Command Set. Refer to section 7.1 for mandatory, optional, and prohibited features for the various controller types. Some Features utilize a memory buffer to configure or return attributes for a Feature, whereas others only utilize a dword in the command or completion queue entry. Feature values that are not persistent across power cycles and resets are restored to their default values as part of a controller reset operation. For more information on Features, including default value definitions, saveable value definitions, and current value definitions, refer to section 7.8.

Upon completion of a Set Features command for a feature, the host should rediscover, re-enumerate and/or re-initialize all capabilities associated with that feature. For example, if a namespace capability change may occur for a feature, then host software should pause the use of any associated namespace, submit the Set Features command for that feature and wait for that command to complete, and then re-issue commands to all namespaces affected by that Set Features command.

There may be commands in execution when a Feature is changed. The new settings may or may not apply to commands already submitted for execution when the Feature is changed. Any commands submitted to a Submission Queue after a Set Features command is successfully completed shall utilize the new settings for the associated Feature. To ensure that a Features values apply to all subsequent commands, the host should allow commands being processed to complete prior to issuing the Set Features command.

Modify Figure 420 in section 7.1.1 as shown below:

7.1.1 I/O Controller

...

Figure 420: I/O Controller – Log Page Support

Log Page Name	Command Support Requirements ¹
Supported Log Pages	M ²
Error Information	M
SMART / Health Information (Controller scope)	M
SMART / Health Information (NVM subsystem scope)	O
Firmware Slot Information	M
Changed Namespace List	O
Commands Supported and Effects	M ²
Device Self-test	O
Telemetry Host-Initiated	O
Telemetry Controller-Initiated	O
Endurance Group Information	O
Predictable Latency Per NVM Set	O
Predictable Latency Event Aggregate	O
Asymmetric Namespace Access	O
Persistent Event	O
LBA Status Information	O
Endurance Group Event Aggregate	O
Feature Identifiers Supported and Effects	M ²
NVMe-MI Commands Supported and Effects	M ²
Notes:	
1. O = Optional, M = Mandatory, P = Prohibited.	
2. Optional for versions 1.4 and earlier of this specification.	

Modify Figure 428 in section 7.1.2 as shown below:

7.1.2 Administrative Controller

...

Figure 428 and Figure 429 defines log pages that are mandatory, optional, and prohibited for an administrative controller.

Figure 428: Administrative – Controller Log Page Support

Log Page Name	Command Support Requirements ¹
Supported Log Pages	M ⁴
Error Information	M
SMART / Health Information (Controller scope)	O
SMART / Health Information (NVM subsystem scope)	O
Firmware Slot Information	O
Changed Namespace List	O
Commands Supported and Effects	M
Device Self-test	O
Telemetry Host-Initiated	O
Endurance Group Information	O
Predictable Latency Per NVM Set	O
Predictable Latency Event Aggregate	O
Asymmetric Namespace Access	P
Persistent Event	O
LBA Status Information	P
Endurance Group Event Aggregate	O
Feature Identifiers Supported and Effects	M ^{2,4}
NVMe-MI Commands Supported and Effects	M ^{3,4}
Notes: 1. O = Optional, M = Mandatory, P = Prohibited 2. Optional if Set Features command is not supported (refer to Figure 426). 3. Optional if NVMe-MI Send command and NVMe-MI Receive command is not supported (refer to Figure 426). 4. Optional for versions 1.4 and earlier of this specification.	