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NVM Express Technical Proposal for New Feature

| | |
|----------------------------|--------------------------------|
| Technical Proposal ID | 4105a |
| Change Date | 2021-01-21 |
| Builds on Specification(s) | NVM Express specification 1.4b |

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This technical proposal adds a new Identify data structure that provides information that is consistent across all namespaces and information that is necessary before a namespace is attached to a controller. This extension is fully backward compatible with the existing NVMe specification.

Revision History

| Revision Date | Change Description |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2020-10-07 | <ul style="list-style-type: none">Initial version. |
| 2020-10-13 | <ul style="list-style-type: none">Comments from Refactoring TG incorporated |
| 2020-11-12 | <ul style="list-style-type: none">Added Figure 246Fixed title of Figure TBDa |
| 2020-12-02 | <ul style="list-style-type: none">Added Figure 149 modificationsAdded changes in 5.14.1.1 |
| 2020-12-02a | <ul style="list-style-type: none">Changed multiple instances of I/O Command Set Independent Identify Controller data structure to I/O Command Set Independent Identify Namespace data structure |
| 2020-12-03 | <ul style="list-style-type: none">Changed all references to NVMe 1.4b. This changed figure and section numbers and pulled in the appropriate source for figure 149 |
| 2021-01-20 | <ul style="list-style-type: none">Integrated into the NVMe Base Specification |
| 2021-01-21 | <ul style="list-style-type: none">Removed all comments and accepted all changes for ratification |

Description of Specification Changes

Markup Conventions:

- Black: Unchanged (however, hot links are removed)
- ~~Red Strikethrough~~: Deleted
- Red: New
- Red Highlighted: TBD values, anchors, and links to be inserted.
- <Green Bracketed>: Notes to editor

Description for NVMe 1.4 Changes Document

This technical proposal adds a new Identify data structure that provides information that is consistent across all namespaces and information that is necessary before a namespace is attached to a controller. This extension is fully backward compatible with the existing NVMe specification.

NVM Express specification 1.4 Changes

Modify the following row to Figure 149 Asynchronous Event Information – Notice in Section 5.2:

Figure 149: Asynchronous Event Information – Notice

| Value | Description |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 00h | <p>Namespace Attribute Changed: Indicates a change to one or both more of the following:</p> <ul style="list-style-type: none">the Identify Namespace data structure (refer to Figure 249) for one or more namespaces;the I/O Command Set Independent Identify Namespace data structure; orthe Namespace List returned when the Identify command is issued with the CNS field set to 02h. <p>To clear this event, host software issues a Get Log Page command for the Changed Namespace List log page (Log Identifier 04h - refer to section 5.14.1.4) with the Retain Asynchronous Event bit cleared to '0'.</p> <p>A controller shall not send this event if:</p> <ol style="list-style-type: none">Namespace Utilization (refer to Figure 249) has changed, as this is a frequent event that does not require action by the host;the ANAGRPID field (refer to Figure 249) has changed; orcapacity information (i.e., the NUSE field and the NVMCAP field) returned in the Identify Namespace data structure (refer to Figure 249) changed as a result of an ANA state change. <p>A controller shall only send this event for changes to the Format Progress Indicator field when bits 6:0 of that field transition from a non-zero value to 0h, or from 0h to a non-zero value.</p> |

Add the following row to Figure 248 Identify – CNS Values in Section 5.16:

Figure 248: Identify – CNS Values

| CNS Value | O/M ¹ | Definition | NSID ² | CNTID ³ | Reference Section |
|-----------|------------------|------------|-------------------|--------------------|-------------------|
|-----------|------------------|------------|-------------------|--------------------|-------------------|

| | | | | | |
|-----|-----|---------------------------------------------------------------|-----|-----|----------|
| ... | ... | ... | ... | ... | ... |
| 08h | M | I/O Command Set Independent Identify Namespace data structure | Y | N | 5.15.TBD |
| ... | ... | ... | ... | ... | ... |

Modify Section 5.14.1.4 Changed Namespace List (Log Identifier 04h):

5.14.1.4 Changed Namespace List (Log Identifier 04h)

This log page is used to describe namespaces attached to this controller that have:

- a) *changed information in their Identify Namespace data structure since the last time the log page was read;*
- b) *changed information in their I/O Command Set Independent Identify Namespace data structure since the last time the log page was read;*
- c) *been added; and*
- d) *been deleted.*

The log page contains a Namespace List with up to 1,024 entries. If more than 1,024 namespaces have changed attributes since the last time the log page was read, the first entry in the log page shall be set to FFFFFFFFh and the remainder of the list shall be zero filled.

Modify Section 5.15.2 Identify Data Structures:

5.15.2.1 NVM Command Set Identify Namespace data structure (CNS 00h)

If the Namespace Identifier (NSID) field specifies an active NSID, then the NVM Command Set Identify Namespace data structure (refer to Figure 271) is returned to the host for that specified namespace. If that specified namespace is an inactive NSID, then the controller returns a zero filled data structure. If the specified namespace is not associated with an I/O Command Set that supports this data structure, then the controller shall abort the command with status code Invalid I/O Command Set.

If the controller supports the Namespace Management capability (refer to section 8.12) and the NSID field is set to FFFFFFFFh, then the controller returns an Identify Namespace data structure that specifies NVM Command Set capabilities that are common across namespaces for the controller. If the controller does not support the Namespace Management capability and the NSID field is set to FFFFFFFFh, then the controller shall abort the command with a status code of Invalid Namespace or Format.

Figure 271: Identify – Identify Namespace Data Structure, NVM Command Set

| Bytes | O/M ¹ | Description |
|-------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 07:00 | M | Namespace Size (NSZE): This field indicates the total size of the namespace in logical blocks. A namespace of size n consists of LBA 0 through $(n - 1)$. The number of logical blocks is based on the formatted LBA size. This field is undefined prior to the namespace being formatted. |
| 15:08 | M | Namespace Capacity (NCAP): This field indicates the maximum number of logical blocks that may be allocated in the namespace at any point in time. The number of logical blocks is based on the formatted LBA size. Spare LBAs are not reported as part of this field. Refer to section 6.1.7 for details on the usage of this field. |

Figure 271: Identify – Identify Namespace Data Structure, NVM Command Set

| Bytes | O/M ¹ | Description |
|-------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 23:16 | M | <p>Namespace Utilization (NUSE): This field indicates the current number of logical blocks allocated in the namespace. This field is smaller than or equal to the Namespace Capacity. The number of logical blocks is based on the formatted LBA size.</p> <p>Refer to section 6.1.7 for details on the usage of this field.</p> |
| 24 | M | <p>Namespace Features (NSFEAT): This field defines features of the namespace.</p> <p>Bits 7:5 are reserved.</p> <p>Bit 4 (OPTPERF) if set to '1':</p> <ul style="list-style-type: none"> indicates that the fields NPWG, NPWA, NPDG, NPDA, and NOWS are defined for this namespace and should be used by the host for I/O optimization; and NOWS defined for this namespace shall adhere to Optimal Write Size field setting defined in NVM Sets Attributes Entry (refer to Figure 277) for the NVM Set with which this namespace is associated. <p>If cleared to '0', then:</p> <ul style="list-style-type: none"> the controller does not support the fields NPWG, NPWA, NPDG, NPDA, and NOWS for this namespace; and Optimal Write Size field in NVM Sets Attributes Entry (refer to Figure 277) for the NVM Set with which this namespace is associated should be used by the host for I/O optimization. <p>Bit 3 (UIDREUSE) if set to '1' indicates that the value in the NGUID field for this namespace, if non-zero, is never reused by the controller and that the value in the EUI64 field for this namespace, if non-zero, is never reused by the controller. If cleared to '0', then the NGUID value may be reused and the EUI64 value may be reused by the controller for a new namespace created after this namespace is deleted. This bit shall be cleared to '0' if both NGUID and EUI64 fields are cleared to 0h. Refer to section 7.14. This bit is as defined in the UIDREUSE bit in the I/O Command Set Independent Identify Namespace data structure (refer to section 5.15.2. TBD).</p> <p>Bit 2 (DAE) if set to '1' indicates that the controller supports the Deallocated or Unwritten Logical Block error for this namespace. If cleared to '0', then the controller does not support the Deallocated or Unwritten Logical Block error for this namespace. Refer to section 6.8.2.1.</p> <p>Bit 1 (NSABP) if set to '1' indicates that the fields NAWUN, NAWUPF, and NACWU are defined for this namespace and should be used by the host for this namespace instead of the AWUN, AWUPF, and ACWU fields in the Identify Controller data structure. If cleared to '0', then the controller does not support the fields NAWUN, NAWUPF, and NACWU for this namespace. In this case, the host should use the AWUN, AWUPF, and ACWU fields defined in the Identify Controller data structure in Figure 273. Refer to section 6.4.</p> <p>Bit 0 (THINP) if set to '1' indicates that the namespace supports thin provisioning. If cleared to '0' indicates that thin provisioning is not supported. Refer to section 6.1.7 for details on the usage of this field.</p> |

Figure 271: Identify – Identify Namespace Data Structure, NVM Command Set

| Bytes | O/M ¹ | Description |
|-------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 25 | M | <p>Number of LBA Formats (NLBAF): This field defines the number of supported LBA data size and metadata size combinations supported by the namespace. LBA formats shall be allocated in order (starting with 0) and packed sequentially. This is a 0's based value. The maximum number of LBA formats that may be indicated as supported is 16. The supported LBA formats are indicated in bytes 128 to 191 in this data structure. The LBA Format fields with an index beyond the value set in this field are invalid and not supported. LBA Formats that are valid, but not currently available may be indicated by setting the LBA Data Size for that LBA Format to 0h.</p> <p>The metadata may be either transferred as part of the LBA (creating an extended LBA which is a larger LBA size that is exposed to the application) or may be transferred as a separate contiguous buffer of data. The metadata shall not be split between the LBA and a separate metadata buffer.</p> <p>It is recommended that software and controllers transition to an LBA size that is 4 KiB or larger for ECC efficiency at the controller. If providing metadata, it is recommended that at least 8 bytes are provided per logical block to enable use with end-to-end data protection, refer to section 8.2.</p> |
| 26 | M | <p>Formatted LBA Size (FLBAS): This field indicates the LBA data size & metadata size combination that the namespace has been formatted with (refer to section 5.25).</p> <p>Bits 7:5 are reserved.</p> <p>Bit 4 if set to '1' indicates that the metadata is transferred at the end of the data LBA, creating an extended data LBA. Bit 4 if cleared to '0' indicates that all of the metadata for a command is transferred as a separate contiguous buffer of data. Bit 4 is not applicable when there is no metadata.</p> <p>Bits 3:0 indicates one of the 16 supported LBA Formats indicated in this data structure.</p> |
| 27 | M | <p>Metadata Capabilities (MC): This field indicates the capabilities for metadata.</p> <p>Bits 7:2 are reserved.</p> <p>Bit 1 if set to '1' indicates the namespace supports the metadata being transferred as part of a separate buffer that is specified in the Metadata Pointer. Bit 1 if cleared to '0' indicates that the namespace does not support the metadata being transferred as part of a separate buffer.</p> <p>Bit 0 if set to '1' indicates that the namespace supports the metadata being transferred as part of an extended data LBA. Bit 0 if cleared to '0' indicates that the namespace does not support the metadata being transferred as part of an extended data LBA.</p> |

Figure 271: Identify – Identify Namespace Data Structure, NVM Command Set

| Bytes | O/M ¹ | Description | | | | | | | | | | | | |
|--------------|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------------|------|---------------------------------------|------|-------------------------------------------|------|-------------------------------------------|------|-------------------------------------------|--------------|----------|
| 28 | M | <p>End-to-end Data Protection Capabilities (DPC): This field indicates the capabilities for the end-to-end data protection feature. Multiple bits may be set in this field. Refer to section 8.3.</p> <p>Bits 7:5 are reserved.</p> <p>Bit 4 if set to '1' indicates that the namespace supports protection information transferred as the last eight bytes of metadata. Bit 4 if cleared to '0' indicates that the namespace does not support protection information transferred as the last eight bytes of metadata.</p> <p>Bit 3 if set to '1' indicates that the namespace supports protection information transferred as the first eight bytes of metadata. Bit 3 if cleared to '0' indicates that the namespace does not support protection information transferred as the first eight bytes of metadata.</p> <p>Bit 2 if set to '1' indicates that the namespace supports Protection Information Type 3. Bit 2 if cleared to '0' indicates that the namespace does not support Protection Information Type 3.</p> <p>Bit 1 if set to '1' indicates that the namespace supports Protection Information Type 2. Bit 1 if cleared to '0' indicates that the namespace does not support Protection Information Type 2.</p> <p>Bit 0 if set to '1' indicates that the namespace supports Protection Information Type 1. Bit 0 if cleared to '0' indicates that the namespace does not support Protection Information Type 1.</p> | | | | | | | | | | | | |
| 29 | M | <p>End-to-end Data Protection Type Settings (DPS): This field indicates the Type settings for the end-to-end data protection feature. Refer to section 8.3.</p> <p>Bits 7:4 are reserved.</p> <p>Bit 3 if set to '1' indicates that the protection information, if enabled, is transferred as the first eight bytes of metadata. Bit 3 if cleared to '0' indicates that the protection information, if enabled, is transferred as the last eight bytes of metadata.</p> <p>Bits 2:0 indicate whether Protection Information is enabled and the type of Protection Information enabled. The values for this field have the following meanings:</p> <table><tr><th>Value</th><th>Definition</th></tr><tr><td>000b</td><td>Protection information is not enabled</td></tr><tr><td>001b</td><td>Protection information is enabled, Type 1</td></tr><tr><td>010b</td><td>Protection information is enabled, Type 2</td></tr><tr><td>011b</td><td>Protection information is enabled, Type 3</td></tr><tr><td>100b to 111b</td><td>Reserved</td></tr></table> | Value | Definition | 000b | Protection information is not enabled | 001b | Protection information is enabled, Type 1 | 010b | Protection information is enabled, Type 2 | 011b | Protection information is enabled, Type 3 | 100b to 111b | Reserved |
| Value | Definition | | | | | | | | | | | | | |
| 000b | Protection information is not enabled | | | | | | | | | | | | | |
| 001b | Protection information is enabled, Type 1 | | | | | | | | | | | | | |
| 010b | Protection information is enabled, Type 2 | | | | | | | | | | | | | |
| 011b | Protection information is enabled, Type 3 | | | | | | | | | | | | | |
| 100b to 111b | Reserved | | | | | | | | | | | | | |
| 30 | O | <p>Namespace Multi-path I/O and Namespace Sharing Capabilities (NMIC): This field specifies multi-path I/O and namespace sharing capabilities of the namespace.</p> <p>Bits 7:1 are reserved.</p> <p>Bit 0: If set to '1', then the namespace may be attached to two or more controllers in the NVM subsystem concurrently (i.e., may be a shared namespace). If cleared to '0', then the namespace is a private namespace and is able to be attached to only one controller at a time. This field is as defined in the I/O Command Set Independent Identify Namespace data structure (refer to section 5.15.2. TBD).</p> | | | | | | | | | | | | |

Figure 271: Identify – Identify Namespace Data Structure, NVM Command Set

| Bytes | O/M ¹ | Description |
|-------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 31 | O | <p>Reservation Capabilities (RESCAP): This field indicates the reservation capabilities of the namespace. A value of 0h in this field indicates that reservations are not supported by this namespace. Refer to section 8.8 for more details.</p> <p>Bit 7 if set to '1' indicates that Ignore Existing Key is used as defined in revision 1.3 or later of this specification. Bit 7 if cleared to '0' indicates that Ignore Existing Key is used as defined in revision 1.2.1 or earlier of this specification. This bit shall be set to '1' if the controller supports revision 1.3 or later as indicated in the Version register.</p> <p>Bit 6 if set to '1' indicates that the namespace supports the Exclusive Access — All Registrants reservation type. If this bit is cleared to '0', then the namespace does not support the Exclusive Access — All Registrants reservation type.</p> <p>Bit 5 if set to '1' indicates that the namespace supports the Write Exclusive — All Registrants reservation type. If this bit is cleared to '0', then the namespace does not support the Write Exclusive — All Registrants reservation type.</p> <p>Bit 4 if set to '1' indicates that the namespace supports the Exclusive Access — Registrants Only reservation type. If this bit is cleared to '0', then the namespace does not support the Exclusive Access — Registrants Only reservation type.</p> <p>Bit 3 if set to '1' indicates that the namespace supports the Write Exclusive — Registrants Only reservation type. If this bit is cleared to '0', then the namespace does not support the Write Exclusive — Registrants Only reservation type.</p> <p>Bit 2 if set to '1' indicates that the namespace supports the Exclusive Access reservation type. If this bit is cleared to '0', then the namespace does not support the Exclusive Access reservation type.</p> <p>Bit 1 if set to '1' indicates that the namespace supports the Write Exclusive reservation type. If this bit is cleared to '0', then the namespace does not support the Write Exclusive reservation type.</p> <p>Bit 0 if set to '1' indicates that the namespace supports the Persist Through Power Loss capability. If this bit is cleared to '0', then the namespace does not support the Persist Through Power Loss Capability. This field is as defined in the I/O Command Set Independent Identify Namespace data structure (refer to section 5.15.2. TBD).</p> |
| 32 | O | <p>Format Progress Indicator (FPI): If a format operation is in progress, this field indicates the percentage of the namespace that remains to be formatted.</p> <p>Bit 7 if set to '1' indicates that the namespace supports the Format Progress Indicator defined by bits 6:0 in this field. If this bit is cleared to '0', then the namespace does not support the Format Progress Indicator and bits 6:0 in this field shall be cleared to 0h.</p> <p>Bits 6:0 indicate the percentage of the Format NVM command that remains to be completed (e.g., a value of 25 indicates that 75% of the Format NVM command has been completed and 25% remains to be completed). If bit 7 is set to '1', then a value of 0h indicates that the namespace is formatted with the format specified by the FLBAS and DPS fields in this data structure and there is no Format NVM command in progress. This field is as defined in the I/O Command Set Independent Identify Namespace data structure (refer to section 5.15.2. TBD).</p> |

Figure 271: Identify – Identify Namespace Data Structure, NVM Command Set

| Bytes | O/M ¹ | Description | | | | | | | | | | |
|--------------|-------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------------|------|-----------------------------------|------|-------------------------------------------------------------|------|----------------------------------------------------------|--------------|----------|
| 33 | O | <p>Deallocate Logical Block Features (DLFEAT): This field indicates information about features that affect deallocating logical blocks for this namespace.</p> <p>Bits 7:5 are reserved.</p> <p>Bit 4 if set to '1' indicates that the Guard field for deallocated logical blocks that contain protection information is set to the CRC for the value read from the deallocated logical block and its metadata (excluding protection information). If cleared to '0' indicates that the Guard field for the deallocated logical blocks that contain protection information is set to FFFFh.</p> <p>Bit 3 if set to '1' indicates that the controller supports the Deallocate bit in the Write Zeroes command for this namespace. If cleared to '0' indicates that the controller does not support the Deallocate bit in the Write Zeroes command for this namespace. This bit shall be set to the same value for all namespaces in the NVM subsystem.</p> <p>Bits 2:0 indicate deallocated logical block read behavior. For a logical block that is deallocated, this field indicates the values read from that deallocated logical block and its metadata (excluding protection information). The values for this field have the following meanings:</p> <table><tr><th>Value</th><th>Definition</th></tr><tr><td>000b</td><td>The read behavior is not reported</td></tr><tr><td>001b</td><td>A deallocated logical block returns all bytes cleared to 0h</td></tr><tr><td>010b</td><td>A deallocated logical block returns all bytes set to FFh</td></tr><tr><td>011b to 111b</td><td>Reserved</td></tr></table> | Value | Definition | 000b | The read behavior is not reported | 001b | A deallocated logical block returns all bytes cleared to 0h | 010b | A deallocated logical block returns all bytes set to FFh | 011b to 111b | Reserved |
| Value | Definition | | | | | | | | | | | |
| 000b | The read behavior is not reported | | | | | | | | | | | |
| 001b | A deallocated logical block returns all bytes cleared to 0h | | | | | | | | | | | |
| 010b | A deallocated logical block returns all bytes set to FFh | | | | | | | | | | | |
| 011b to 111b | Reserved | | | | | | | | | | | |
| 35:34 | O | <p>Namespace Atomic Write Unit Normal (NAWUN): This field indicates the namespace specific size of the write operation guaranteed to be written atomically to the NVM during normal operation. If the NSABP bit is cleared to '0', then this field is reserved.</p> <p>A value of 0h indicates that the size for this namespace is the same size as that reported in the AWUN field of the Identify Controller data structure. All other values specify a size in terms of logical blocks using the same encoding as the AWUN field. Refer to section 6.4.</p> | | | | | | | | | | |
| 37:36 | O | <p>Namespace Atomic Write Unit Power Fail (NAWUPF): This field indicates the namespace specific size of the write operation guaranteed to be written atomically to the NVM during a power fail or error condition. If the NSABP bit is cleared to '0', then this field is reserved.</p> <p>A value of 0h indicates that the size for this namespace is the same size as that reported in the AWUPF field of the Identify Controller data structure. All other values specify a size in terms of logical blocks using the same encoding as the AWUPF field. Refer to section 6.4.</p> | | | | | | | | | | |
| 39:38 | O | <p>Namespace Atomic Compare & Write Unit (NACWU): This field indicates the namespace specific size of the write operation guaranteed to be written atomically to the NVM for a Compare and Write fused command. If the NSABP bit is cleared to '0', then this field is reserved.</p> <p>A value of 0h indicates that the size for this namespace is the same size as that reported in the ACWU field of the Identify Controller data structure. All other values specify a size in terms of logical blocks using the same encoding as the ACWU field. Refer to section 6.4.</p> | | | | | | | | | | |

Figure 271: Identify – Identify Namespace Data Structure, NVM Command Set

| Bytes | O/M ¹ | Description |
|-------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 41:40 | O | <p>Namespace Atomic Boundary Size Normal (NABSN): This field indicates the atomic boundary size for this namespace for the NAWUN value. This field is specified in logical blocks. Writes to this namespace that cross atomic boundaries are not guaranteed to be atomic to the NVM with respect to other read or write commands.</p> <p>A value of 0h indicates that there are no atomic boundaries for normal write operations. All other values specify a size in terms of logical blocks using the same encoding as the AWUN field. Refer to section 6.4.</p> <p>Refer to section 8.25 for how this field is utilized.</p> |
| 43:42 | O | <p>Namespace Atomic Boundary Offset (NABO): This field indicates the LBA on this namespace where the first atomic boundary starts.</p> <p>If the NABSN and NABSPF fields are cleared to 0h, then the NABO field shall be cleared to 0h. NABO shall be less than or equal to NABSN and NABSPF. Refer to section 6.4.</p> <p>Refer to section 8.25 for how this field is utilized.</p> |
| 45:44 | O | <p>Namespace Atomic Boundary Size Power Fail (NABSPF): This field indicates the atomic boundary size for this namespace specific to the Namespace Atomic Write Unit Power Fail value. This field is specified in logical blocks. Writes to this namespace that cross atomic boundaries are not guaranteed to be atomic with respect to other read or write commands and there is no guarantee of data returned on subsequent reads of the associated logical blocks.</p> <p>A value of 0h indicates that there are no atomic boundaries for power fail or error conditions. All other values specify a size in terms of logical blocks using the same encoding as the AWUPF field. Refer to section 6.4.</p> |
| 47:46 | O | <p>Namespace Optimal I/O Boundary (NOIOB): This field indicates the optimal I/O boundary for this namespace. This field is specified in logical blocks. The host should construct Read and Write commands that do not cross the I/O boundary to achieve optimal performance. A value of 0h indicates that no optimal I/O boundary is reported.</p> <p>Refer to section 8.25 for how this field is utilized to improve performance and endurance.</p> |
| 63:48 | O | <p>NVM Capacity (NVMCAP): This field indicates the total size of the NVM allocated to this namespace. The value is in bytes. This field shall be supported if the Namespace Management capability (refer to section 8.12) is supported.</p> <p>Note: This field may not correspond to the logical block size multiplied by the Namespace Size field. Due to thin provisioning or other settings (e.g., endurance), this field may be larger or smaller than the product of the logical block size and the Namespace Size reported.</p> <p>If the controller supports Asymmetric Namespace Access Reporting (refer to the CMIC field), and the relationship between the controller and the namespace is in the ANA Inaccessible state (refer to section 8.20.3.3) or the ANA Persistent Loss state (refer to section 8.20.3.4), then this field shall be cleared to 0h.</p> |
| 65:64 | O | <p>Namespace Preferred Write Granularity (NPWG): This field indicates the smallest recommended write granularity in logical blocks for this namespace. This is a 0's based value. If the OPTPEFT bit is cleared to '0', then this field is reserved.</p> <p>The size indicated should be less than or equal to Maximum Data Transfer Size (MDTS) that is specified in units of minimum memory page size. The value of this field may change if the namespace is reformatted. The size should be a multiple of Namespace Preferred Write Alignment (NPWA).</p> <p>Refer to section 8.25 for how this field is utilized to improve performance and endurance.</p> |

Figure 271: Identify – Identify Namespace Data Structure, NVM Command Set

| Bytes | O/M ¹ | Description |
|-------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 67:66 | O | <p>Namespace Preferred Write Alignment (NPWA): This field indicates the recommended write alignment in logical blocks for this namespace. This is a 0's based value.</p> <p>The value of this field may change if the namespace is reformatted. Refer to section 8.25 for how this field is utilized to improve performance and endurance.</p> |
| 69:68 | O | <p>Namespace Preferred Deallocate Granularity (NPDG): This field indicates the recommended granularity in logical blocks for the Dataset Management command with the Attribute – Deallocate bit set to '1' in Dword 11. This is a 0's based value. If the OPTPEFT bit is cleared to '0', then this field is reserved.</p> <p>The value of this field may change if the namespace is reformatted. The size should be a multiple of Namespace Preferred Deallocate Alignment (NPDA).</p> <p>Refer to section 8.25 for how this field is utilized to improve performance and endurance.</p> |
| 71:70 | O | <p>Namespace Preferred Deallocate Alignment (NPDA): This field indicates the recommended alignment in logical blocks for the Dataset Management command with the Attribute – Deallocate bit set to '1' in Dword 11. This is a 0's based value. If the OPTPEFT bit is cleared to '0', then this field is reserved.</p> <p>The value of this field may change if the namespace is reformatted.</p> <p>Refer to section 8.25 for how this field is utilized to improve performance and endurance.</p> |
| 73:72 | O | <p>Namespace Optimal Write Size (NOWS): This field indicates the size in logical blocks for optimal write performance for this namespace. This is a 0's based value. If the OPTPEFT bit is cleared to '0', then this field is reserved.</p> <p>The size indicated should be less than or equal to Maximum Data Transfer Size (MDTS) that is specified in units of minimum memory page size. The value of this field may change if the namespace is reformatted. The value of this field should be a multiple of Namespace Preferred Write Granularity (NPWG).</p> <p>Refer to section 8.25 for how this field is utilized to improve performance and endurance.</p> |
| 75:74 | O | <p>Maximum Single Source Range Length (MSSRL): This field indicates the maximum number of logical blocks that may be specified in each valid Source Range field (refer to Figure 408) of a Copy command.</p> <p>If the controller supports the Copy command, then this field shall be set to a non-zero value.</p> |
| 79:76 | O | <p>Maximum Copy Length (MCL): This field indicates the maximum number of logical blocks that may be specified in a Copy command (i.e., the sum of the number of logical blocks specified in all Source Range entries).</p> <p>If the controller supports the Copy command, then this field shall be set to a non-zero value.</p> |
| 80 | O | <p>Maximum Source Range Count (MSRC): This field indicates the maximum number of Source Range entries that may be used to specify source data in a Copy command. This is a 0's based value.</p> |
| 86:81 | | Reserved |

Figure 271: Identify – Identify Namespace Data Structure, NVM Command Set

| Bytes | O/M ¹ | Description | | | | | | | | |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-----|----------|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 87 | O | Key Per I/O Status (KPIOS): This field indicates namespace Key Per I/O capability status. | | | | | | | | |
| | | <table><tr><th>Bits</th><th>Description</th></tr><tr><td>7:2</td><td>Reserved</td></tr><tr><td>1</td><td>KPIOSNS: If set to '1', then the Key Per I/O capability is supported by the namespace. If cleared to '0', then the Key Per I/O capability is not supported by the namespace.</td></tr><tr><td>0</td><td>KPIOENS: If set to '1', then the Key Per I/O capability is enabled on the namespace. The mechanism to enable the Key Per I/O capability on the namespace is specified in the TCG Storage Security Subsystem Class: Key Per IO Specification. If cleared to '0', then the Key Per I/O capability is disabled on the namespace. If bit 1 is cleared to '0', then this bit shall be cleared to '0'.</td></tr></table> | Bits | Description | 7:2 | Reserved | 1 | KPIOSNS: If set to '1', then the Key Per I/O capability is supported by the namespace. If cleared to '0', then the Key Per I/O capability is not supported by the namespace. | 0 | KPIOENS: If set to '1', then the Key Per I/O capability is enabled on the namespace. The mechanism to enable the Key Per I/O capability on the namespace is specified in the TCG Storage Security Subsystem Class: Key Per IO Specification. If cleared to '0', then the Key Per I/O capability is disabled on the namespace. If bit 1 is cleared to '0', then this bit shall be cleared to '0'. |
| | | Bits | Description | | | | | | | |
| | | 7:2 | Reserved | | | | | | | |
| 1 | KPIOSNS: If set to '1', then the Key Per I/O capability is supported by the namespace. If cleared to '0', then the Key Per I/O capability is not supported by the namespace. | | | | | | | | | |
| 0 | KPIOENS: If set to '1', then the Key Per I/O capability is enabled on the namespace. The mechanism to enable the Key Per I/O capability on the namespace is specified in the TCG Storage Security Subsystem Class: Key Per IO Specification. If cleared to '0', then the Key Per I/O capability is disabled on the namespace. If bit 1 is cleared to '0', then this bit shall be cleared to '0'. | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| 91:88 | O | Key Per I/O Data Access Alignment and Granularity (KPIODAAG): This field indicates the alignment and granularity in logical blocks that is required for commands that support a KPIOTAG value in the CETYPE field (refer to section 8.26). This is a 0's based value. The size indicated should be less than or equal to Maximum Data Transfer Size (MDTS) that is specified in units of minimum memory page size. The value of this field may change if the namespace is reformatted. If a read or write command is received that: <ul style="list-style-type: none">• is not less than or equal to the MDTS;• is not an integral multiple of this field; and• specifies a KPIOTAG value in the CETYPE field, then that command shall be aborted with a status code of Invalid Field in Command. If the Optional Admin Command Support field bit 11 (refer to Figure 273) is cleared to '0', then this field is reserved. | | | | | | | | |
| 95:92 | O | ANA Group Identifier (ANAGRPID): This field indicates the ANA Group Identifier of the ANA group (refer to section 8.20.2) of which the namespace is a member. Each namespace that is attached to a controller that supports Asymmetric Namespace Access Reporting (refer to the CMIC field) shall report a valid ANAGRPID. If the controller does not support Asymmetric Namespace Access Reporting, then this field shall be cleared to 0h. If the value in this field changes and Asymmetric Namespace Access Change Notices are supported and enabled, then the controller shall issue an Asymmetric Namespace Access Change Notice. This field is as defined in the I/O Command Set Independent Identify Namespace data structure (refer to section 5.15.2, TBD). | | | | | | | | |
| 98:96 | | Reserved | | | | | | | | |
| 99 | O | Namespace Attributes (NSATTR): This field specifies attributes of the namespace. Bits 7:1 are reserved. Bit 0: If set to '1', then the namespace is currently write protected due to any condition (e.g., namespace write protection set for the namespace, media errors) and all write access to the namespace shall fail. If cleared to '0', then the namespace is not currently write protected. This field is as defined in the I/O Command Set Independent Identify Namespace data structure (refer to section 5.15.2, TBD). | | | | | | | | |

Figure 271: Identify – Identify Namespace Data Structure, NVM Command Set

| Bytes | O/M ¹ | Description |
|---------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 101:100 | O | NVM Set Identifier (NVMSETID): This field indicates the NVM Set with which this namespace is associated. If NVM Sets are not supported by the controller, then this field shall be cleared to 0h. This field is as defined in the I/O Command Set Independent Identify Namespace data structure (refer to section 5.15.2. TBD). |
| 103:102 | O | Endurance Group Identifier (ENDGID): This field indicates the Endurance Group with which this namespace is associated. If Endurance Groups are not supported by the controller, then this field shall be cleared to 0h. This field is as defined in the I/O Command Set Independent Identify Namespace data structure (refer to section 5.15.2. TBD). |
| 119:104 | O | <p>Namespace Globally Unique Identifier (NGUID): This field contains a 128-bit value that is globally unique and assigned to the namespace when the namespace is created. This field remains fixed throughout the life of the namespace and is preserved across namespace and controller operations (e.g., Controller Level Reset, namespace format, etc.).</p> <p>This field uses the EUI-64 based 16-byte designator format. Bytes 114:112 contain the 24-bit Organizationally Unique Identifier (OUI) value assigned by the IEEE Registration Authority. Bytes 119:115 contain an extension identifier assigned by the corresponding organization. Bytes 111:104 contain the vendor specific extension identifier assigned by the corresponding organization. Refer to the IEEE EUI-64 guidelines for more information. This field is big endian (refer to section 7.10.5).</p> <p>The controller shall specify a globally unique namespace identifier in this field, the EUI64 field, or a Namespace UUID in the Namespace Identification Descriptor (refer to Figure 275) when the namespace is created. If the controller is not able to provide a globally unique identifier in this field, then this field shall be cleared to 0h. Refer to section 7.11.</p> |
| 127:120 | O | <p>IEEE Extended Unique Identifier (EUI64): This field contains a 64-bit IEEE Extended Unique Identifier (EUI-64) that is globally unique and assigned to the namespace when the namespace is created. This field remains fixed throughout the life of the namespace and is preserved across namespace and controller operations (e.g., Controller Level Reset, namespace format, etc.).</p> <p>The EUI-64 is a concatenation of a 24-bit or 36-bit Organizationally Unique Identifier (OUI or OUI-36) value assigned by the IEEE Registration Authority and an extension identifier assigned by the corresponding organization. Refer to the IEEE EUI-64 guidelines for more information. This field is big endian (refer to section 7.10.4).</p> <p>The controller shall specify a globally unique namespace identifier in this field, the NGUID field, or a Namespace UUID in the Namespace Identification Descriptor (refer to Figure 275) when the namespace is created. If the controller is not able to provide a globally unique 64-bit identifier in this field, then this field shall be cleared to 0h. Refer to section 7.11.</p> |
| 131:128 | M | LBA Format 0 Support (LBAF0): This field indicates the LBA format 0 that is supported by the controller. The LBA format field is defined in Figure 272. |
| 135:132 | O | LBA Format 1 Support (LBAF1): This field indicates the LBA format 1 that is supported by the controller. The LBA format field is defined in Figure 272. |
| 139:136 | O | LBA Format 2 Support (LBAF2): This field indicates the LBA format 2 that is supported by the controller. The LBA format field is defined in Figure 272. |
| 143:140 | O | LBA Format 3 Support (LBAF3): This field indicates the LBA format 3 that is supported by the controller. The LBA format field is defined in Figure 272. |
| 147:144 | O | LBA Format 4 Support (LBAF4): This field indicates the LBA format 4 that is supported by the controller. The LBA format field is defined in Figure 272. |
| 151:148 | O | LBA Format 5 Support (LBAF5): This field indicates the LBA format 5 that is supported by the controller. The LBA format field is defined in Figure 272. |

Figure 271: Identify – Identify Namespace Data Structure, NVM Command Set

| Bytes | O/M ¹ | Description |
|-------------------------------------------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 155:152 | O | LBA Format 6 Support (LBAF6): This field indicates the LBA format 6 that is supported by the controller. The LBA format field is defined in Figure 272. |
| 159:156 | O | LBA Format 7 Support (LBAF7): This field indicates the LBA format 7 that is supported by the controller. The LBA format field is defined in Figure 272. |
| 163:160 | O | LBA Format 8 Support (LBAF8): This field indicates the LBA format 8 that is supported by the controller. The LBA format field is defined in Figure 272. |
| 167:164 | O | LBA Format 9 Support (LBAF9): This field indicates the LBA format 9 that is supported by the controller. The LBA format field is defined in Figure 272. |
| 171:168 | O | LBA Format 10 Support (LBAF10): This field indicates the LBA format 10 that is supported by the controller. The LBA format field is defined in Figure 272. |
| 175:172 | O | LBA Format 11 Support (LBAF11): This field indicates the LBA format 11 that is supported by the controller. The LBA format field is defined in Figure 272. |
| 179:176 | O | LBA Format 12 Support (LBAF12): This field indicates the LBA format 12 that is supported by the controller. The LBA format field is defined in Figure 272. |
| 183:180 | O | LBA Format 13 Support (LBAF13): This field indicates the LBA format 13 that is supported by the controller. The LBA format field is defined in Figure 272. |
| 187:184 | O | LBA Format 14 Support (LBAF14): This field indicates the LBA format 14 that is supported by the controller. The LBA format field is defined in Figure 272. |
| 191:188 | O | LBA Format 15 Support (LBAF15): This field indicates the LBA format 15 that is supported by the controller. The LBA format field is defined in Figure 272. |
| 383:192 | | Reserved |
| 4095:384 | O | Vendor Specific |
| NOTES: | | |
| 1. O/M definition: O = Optional, M = Mandatory. | | |

<Add the following new section>

5.15.2.TBD I/O Command Set Independent Identify Namespace data structure (CNS 08h)

If the Namespace Identifier (NSID) field specifies an active NSID, then the I/O Command Set Independent Identify Namespace data structure (refer to Figure TBDA) is returned to the host for that specified namespace. If that specified namespace is an inactive NSID, then the controller returns a zero filled data structure.

If the controller supports the Namespace Management capability (refer to section 8.12) and the NSID field is set to FFFFFFFFh, then the controller returns an I/O Command Set Independent Identify Namespace data structure that specifies capabilities that are common for the controller. If the controller does not support the Namespace Management capability and the NSID field is set to FFFFFFFFh, then the controller shall abort the command with a status code of Invalid Namespace or Format.

Figure TBDA: Identify – I/O Command Set Independent Identify Namespace Data Structure

| Bytes | O/M ¹ | Description |
|-------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 00 | M | <p>Common Namespace Features (NSFEAT): This field defines features of the namespace.</p> <p>Bits 7:4 are reserved.</p> <p>Bit 3 (UIDREUSE) if set to '1' indicates that the value in the NGUID field for this namespace, if non-zero, is never reused by the controller and that the value in the EUI64 field for this namespace, if non-zero, is never reused by the controller. If cleared to '0', then the NGUID value may be reused and the EUI64 value may be reused by the controller for a new namespace created after this namespace is deleted. This bit shall be cleared to '0' if both NGUID and EUI64 fields are cleared to 0h. Refer to section 7.11.</p> <p>Bit 2:0 are reserved</p> |
| 01 | O | <p>Namespace Multi-path I/O and Namespace Sharing Capabilities (NMIC): This field specifies multi-path I/O and namespace sharing capabilities of the namespace.</p> <p>Bits 7:1 are reserved.</p> <p>Bit 0: If set to '1', then the namespace may be attached to two or more controllers in the NVM subsystem concurrently (i.e., may be a shared namespace). If cleared to '0', then the namespace is a private namespace and is able to be attached to only one controller at a time.</p> |
| 02 | O | <p>Reservation Capabilities (RESCAP): This field indicates the reservation capabilities of the namespace. A value of 0h in this field indicates that reservations are not supported by this namespace. Refer to section 8.8 for more details.</p> <p>Bit 7 if set to '1' indicates that Ignore Existing Key is used as defined in revision 1.3 or later of this specification. Bit 7 if cleared to '0' indicates that Ignore Existing Key is used as defined in revision 1.2.1 or earlier of this specification. This bit shall be set to '1' if the controller supports revision 1.3 or later as indicated in the Version register.</p> <p>Bit 6 if set to '1' indicates that the namespace supports the Exclusive Access – All Registrants reservation type. If this bit is cleared to '0', then the namespace does not support the Exclusive Access – All Registrants reservation type.</p> <p>Bit 5 if set to '1' indicates that the namespace supports the Write Exclusive – All Registrants reservation type. If this bit is cleared to '0', then the namespace does not support the Write Exclusive – All Registrants reservation type.</p> <p>Bit 4 if set to '1' indicates that the namespace supports the Exclusive Access – Registrants Only reservation type. If this bit is cleared to '0', then the namespace does not support the Exclusive Access – Registrants Only reservation type.</p> <p>Bit 3 if set to '1' indicates that the namespace supports the Write Exclusive – Registrants Only reservation type. If this bit is cleared to '0', then the namespace does not support the Write Exclusive – Registrants Only reservation type.</p> <p>Bit 2 if set to '1' indicates that the namespace supports the Exclusive Access reservation type. If this bit is cleared to '0', then the namespace does not support the Exclusive Access reservation type.</p> <p>Bit 1 if set to '1' indicates that the namespace supports the Write Exclusive reservation type. If this bit is cleared to '0', then the namespace does not support the Write Exclusive reservation type.</p> <p>Bit 0 if set to '1' indicates that the namespace supports the Persist Through Power Loss capability. If this bit is cleared to '0', then the namespace does not support the Persist Through Power Loss Capability.</p> |

Figure TBDA: Identify – I/O Command Set Independent Identify Namespace Data Structure

| Bytes | O/M ¹ | Description |
|----------------------------------------------------------------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 03 | O | <p>Format Progress Indicator (FPI): If a format operation is in progress, this field indicates the percentage of the namespace that remains to be formatted.</p> <p>Bit 7 if set to '1' indicates that the namespace supports the Format Progress Indicator defined by bits 6:0 in this field. If this bit is cleared to '0', then the namespace does not support the Format Progress Indicator and bits 6:0 in this field shall be cleared to 0h.</p> <p>Bits 6:0 indicate the percentage of the Format NVM command that remains to be completed (e.g., a value of 25 indicates that 75% of the Format NVM command has been completed and 25% remains to be completed). If bit 7 is set to '1', then a value of 0h indicates that the namespace is formatted with the format specified by the FLBAS and DPS fields in this data structure and there is no Format NVM command in progress.</p> |
| 07:04 | O | <p>ANA Group Identifier (ANAGRPID): For NSID other than FFFFFFFFh, this field indicates the ANA Group Identifier of the ANA group (refer to section 8.20.2) of which the namespace is a member. Each namespace that is attached to a controller that supports Asymmetric Namespace Access Reporting (refer to the CMIC field) shall report a valid ANAGRPID. If the controller does not support Asymmetric Namespace Access Reporting, then this field shall be cleared to 0h.</p> <p>If the value in this field changes and Asymmetric Namespace Access Change Notices are supported and enabled, then the controller shall issue an Asymmetric Namespace Access Change Notice.</p> |
| 08 | O | <p>Namespace Attributes (NSATTR): This field specifies attributes of the namespace.</p> <p>Bits 7:1 are reserved.</p> <p>Bit 0: If set to '1', then the namespace is currently write protected due to any condition (e.g., namespace write protection set for the namespace, media errors) and all write access to the namespace shall fail. If cleared to '0', then the namespace is not currently write protected.</p> |
| 09 | | Reserved |
| 11:10 | O | <p>NVM Set Identifier (NVMSETID): For NSID other than FFFFFFFFh, this field indicates the NVM Set with which this namespace is associated. If NVM Sets are not supported by the controller, then this field shall be cleared to 0h.</p> |
| 13:12 | O | <p>Endurance Group Identifier (ENDGID): For NSID other than FFFFFFFFh, this field indicates the Endurance Group with which this namespace is associated. If Endurance Groups are not supported by the controller, then this field shall be cleared to 0h.</p> |
| 4095:14 | | Reserved |
| <p>NOTES:</p> <p>2. O/M definition: O = Optional, M = Mandatory.</p> | | |