**NVMe Test Cases**

**Test 1: ID-CTRL**

Purpose: Create a static test to validate nvme id-ctrl command is working as expected.

Execution Steps:

- Take a snapshot with the command nvme id-ctrl.

*nvme id-ctrl /dev/nvme0 --output-format=json > id-ctrl-current.json*

- Compare the output against the content of the file id-ctrl-main.json.

- Iterate through all values in the drive config and compare them.

- Ignore mismatches in fields: sn, fguid, unvmcap, subnqn.

Expected Result: Test is PASSED if all required fields match; otherwise, FAILED.

**Test 2: SMART-LOG**

Purpose: Create a dynamic test to validate nvme smart-log command is working as expected.

Execution Steps:

- Take initial snapshot with SMART-LOG command via admin-passthru.

*nvme admin-passthru /dev/nvme0 --opcode=0x02 --data-len=512 --read --cdw10=0x7f0002*

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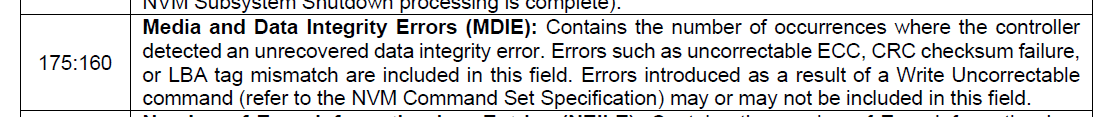
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- Verify no media errors exist.

Check bits 175:160 🡪 0xAF : 0xA0

List = [00 00 00 00 00 00]



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**MDIE** = 0

- Validate POH (Power On Hours) is less than 1000.

Check bits 143:128 🡪 0x8F : 0x80



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**POH** = 0x09 0x13 = 2,323

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- Check temperature is within threshold using Get Features FID 0x4.

*nvme admin-passthru /dev/nvme0 --opcode=0x0A --cdw10=0x04 --data-len=16 --read*

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- Verify percentage usage is less than 100%.

- Execute nvme read and write commands N times (1 ≤ N ≤ 200).

- Change temperature threshold and critical warning using set-feature.

- Take final snapshot with SMART-LOG via admin-passthru.

- Verify host\_read\_commands and host\_write\_commands increased by N.

- Validate critical warning was updated and temperature reset.

Expected Result: Test is PASSED if all fields match expected values; otherwise, FAILED.

*Command Line:*

**Test 3: ID-NS**

Purpose: Create a dynamic test to validate nvme id-ns command is working as expected.

Execution Steps:

- Take initial snapshot with ID-NS command via admin-passthru.

*nvme admin-passthru /dev/nvme0 --opcode=0x6 --namespace-id=1 --data-len=4096 –read*

*nvme admin-passthru /dev/nvme0 --opcode=0x06 --data-len=4096 --read --cdw10=0x00 -n 1 --raw-binary > id\_ns\_snapshot.bin*

- Delete all namespaces.

- Create and attach a new namespace.

- Format the drive and execute nvme write.

- Take final snapshot with ID-NS via admin-passthru.

- Verify block size, nuse, nsize, ncap, flbas, lbaf, dps match expected values.

Expected Result: Test is PASSED if all fields match expected values; otherwise, FAILED.

Command Line: nvme id-ns /dev/nvme0n1

**Test 4: GET FEATURES - Volatile Write Cache**

Purpose: Validate the behavior of the nvme get-feature command for Feature ID 0x06.

Execution Steps:

- Take initial snapshot using nvme get-feature -f 0x06.

- Disable cache using nvme set-feature -f 0x06 -v 0.

- Re-check feature value to confirm it is disabled.

- Re-enable cache and confirm value is restored.

Expected Result: Test is PASSED if cache state toggles correctly and matches expected values.

Command Line: nvme get-feature -f 0x06 /dev/nvme0n1

**Test 5: FORMAT NVM**

Purpose: Validate the nvme format command and its impact on drive configuration.

Execution Steps:

- Take snapshot of drive parameters (block size, metadata settings).

- Execute nvme format with new settings.

- Verify changes in flbas, lbaf, and dps fields.

- Confirm previous data is erased and namespace is reset.

Expected Result: Test is PASSED if format parameters are applied correctly and data is reset.

Command Line: nvme format /dev/nvme0n1

**Test 6: GET LOG PAGE - Error Information**

Purpose: Validate the nvme get-log command for log page 0x01.

Execution Steps:

- Trigger known error conditions (e.g., invalid command).

- Retrieve error log using nvme get-log -i 0x01.

- Verify error entries: opcode, status, LBA.

Expected Result: Test is PASSED if error log reflects triggered conditions accurately.

Command Line: nvme get-log -i 0x01 /dev/nvme0n1

**Test 7: POWER STATE TRANSITIONS**

Purpose: Validate transitions between NVMe power states.

Execution Steps:

- Take initial snapshot of power state using nvme get-feature -f 0x02.

- Set new power state using nvme set-feature -f 0x02 -v <state>.

- Measure latency and confirm transition via SMART log.

Expected Result: Test is PASSED if power state changes successfully and latency is within spec.

Command Line: nvme get-feature -f 0x02 /dev/nvme0n1

**Test 8: RESERVATION REGISTER & RELEASE**

Purpose: Validate NVMe reservation mechanism for multi-host environments.

Execution Steps:

- Register reservation key using nvme resv-register.

- Acquire reservation using nvme resv-acquire.

- Release reservation using nvme resv-release.

- Confirm reservation status using nvme resv-report.

Expected Result: Test is PASSED if reservation lifecycle completes without errors.

Command Line: nvme resv-register /dev/nvme0n1

**Test 9: Identify Controller via Admin-Passthru**

Purpose: Validate the nvme admin-passthru command for retrieving controller identity.

Execution Steps:

- Send Identify Controller command (Opcode 0x06) via admin-passthru.

- Parse returned structure and verify VID, SSVID, SN, MN, FR.

- Compare values against expected configuration.

Expected Result: Test is PASSED if all fields match expected values.

Command Line: nvme admin-passthru /dev/nvme0n1 --opcode=0x06

**Test 10: Get Log Page - SMART via Admin-Passthru**

Purpose: Validate retrieval of SMART log page using admin-passthru.

Execution Steps:

- Send Get Log Page command (Opcode 0x02) with Log Page ID 0x02 via admin-passthru.

- Validate temperature, available spare, percentage used, data units read/written.

- Compare against thresholds and expected values.

Expected Result: Test is PASSED if SMART data is retrieved and validated correctly.

Command Line: nvme admin-passthru /dev/nvme0n1 --opcode=0x02 --log-id=0x02

**Test 11: Firmware Slot Information**

Purpose: Validate firmware slot information retrieval using admin-passthru.

Execution Steps:

- Send Get Log Page command with Log Page ID 0x03 via admin-passthru.

- Verify number of firmware slots, active slot, and revision strings.

- Confirm slot switching behavior if applicable.

Expected Result: Test is PASSED if firmware slot data is accurate.

Command Line: nvme admin-passthru /dev/nvme0n1 --opcode=0x02 --log-id=0x03

**Test 12: Namespace Management via Admin-Passthru**

Purpose: Validate namespace creation and deletion using raw admin commands.

Execution Steps:

- Send Create Namespace (Opcode 0x0D) via admin-passthru.

- Send Attach Namespace (Opcode 0x15) to controller.

- Send Delete Namespace (Opcode 0x0E) and verify removal.

- Confirm namespace attributes before and after operations.

Expected Result: Test is PASSED if namespace lifecycle operations succeed.

Command Line: nvme admin-passthru /dev/nvme0n1 --opcode=0x0D

**Test 13: Set/Get Features via Admin-Passthru**

Purpose: Validate feature manipulation using raw admin commands.

Execution Steps:

- Send Set Features (Opcode 0x09) for Feature ID 0x04 (Temperature Threshold).

- Send Get Features (Opcode 0x0A) to confirm value was set.

- Trigger temperature change and verify critical warning bit.

Expected Result: Test is PASSED if feature values are correctly set and reflected.

Command Line: nvme admin-passthru /dev/nvme0n1 --opcode=0x09 --feature-id=0x04

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