Fibre Channel Firmware

Release Notes

Applicability

These release notes apply to the following Fibre Channel controller chipsets:

- 2600 and 2700 Series, 16 and 32 Gbit/s FC
- 2800 Series, 32 and 64 Gbit/s FC
    - Revision 2 chips (i.e., A1) only

Abbreviations

The following abbreviations may appear in this document but are not defined in the standard API:

- RWO (Remote Write Optimization)
- EDiF (Encrypted Data in Flight)
- SLER (Sequence Level Error Recovery)

64G Fibre Channel Considerations

Note that Marvell tests with QLogic-branded optics for the vendors listed below and does not guarantee operation with comparable OEM-branded parts.

There are two of training associated with 64G SFPs: SFP training and 64G Link training. All 64G SFPs require 64G Link training but only certain 64G SFPs require SFP training.

Avago 64G SFPs require a successful SFP training operation by the FC firmware after every soft reset or SFP insertion. This SFP training can take up to 5 seconds to complete.

For every 64G link up, there is link training that can take from 10-20 seconds to complete.

Since training processes vary for each vendor, firmware modifications are required to support each new vendor. Hence, any 64G SFP not listed herein is unsupported.

Supported 64G SFP vendors:

- Avago
- WTD
- Coherent

Mailbox Commands affected whenever 64G SFPs are used:

- The firmware delays execution of the following mailbox commands for up to 20 seconds during either SFP training or link training:
    - Read SFP (0031h)
    - Write SFP (0030h)
    - Get Firmware State (0069h)
    - Data Rate (005Dh)
    - Diagnostic Loopback (0045h)
- The firmware delays execution the following mailbox commands for up to 6 seconds during SFP training only:
    - Initialize Firmware (0048h or 0060h)

- The Driver-controlled SFP feature is unsupported for any 64G SFP. Board designers must provide an I2C path to the SFP and allow firmware control.

Changes and Fixes from v9.14.01 to v9.15.00

Overview:

- This release is for 27XX and 28XX.
- The issues below are resolved in this release.
- For this 27XX release, the HFL version is 47 (unchanged).
- For this 28XX release, the HFL version is 146 (unchanged).

Error ID	Issue	Root Cause
FCD-3194	28XX AE8002h with sub error code = 2F6h	When processing CTIO for status and finding host XCB relating to this CTIO just moved from system memory in not as expected, FW generated AE8002h.
FCD-3502	FW was not posting the PUREX on calculated ATIO queue when assign FCID for FCP and Connection ID policy for NVME.	Firmware used content in byte 7Fh of IFWCB, instead of its low nibble for ATIO queue index width.
FCD-3484	28XX: FW was stuck in allocating host XCB, not servicing any tasks	Driver assigned whole XCB pool for target mode.
FCD-3344	28XX: NVMe CTIO is returned with completion status of Invalid REA (08h) when memory offload and NVMe connection ID routing are enabled.	FW posted NVMe ATIO with offload exchange address, but saved command information in other exchange, causing it to reject NVMe CTIO later with completion status of Invalid REA (08h)
FCD-3433	RISC does not indicate it has paused when an ECC error occurs in a Sequencer.	Bit 10 was off in the Sequencer Control register EEh
FCD-3426	CRC corruption occurs in transmitted frame after Mach reset	Changed to 8000h which is the Vendor recommended value based on STA.
FCD-3595	Seeing an invalid bit set in NVMe Response payload when using CRC NVMe CTIOs and FCP_CONF is enabled.	Missing check for NVMe CRC CTIO Types in the routine that builds the Response payload.
FCD-3619	28XX: During plug-unplug and speed auto the serdes sometime hang.	Tx/Rx serdes need to be ready before next serdes interrupt

FCD-3573	28XX: Issue in Finisar 64G SFP for 16G FEC/NON-FEC	Finisar SFP: bit error occurs when FEC enabled on FEC and FEC disable depending on the sequelch mode on the SFP right after link up.
FCD-3716	28XX: Need to support Inphy base DSP format 4 64G SFP.	N/A
FCD-3200	28XX: 8002h with error id 00ECh.	SBus hang
FCD-3639	27XX, 28XX: Seeing NVMe_RSP frames going out on occasion, with the wrong length and bad response data.	A regression caused by FCD-3595.
FCD-3685	27XX, 28XX: The FC4Value in the FLUSH_RSP frame is being set to zero when a FCP_RSP is recovered during a write operation.	Behavior was intentional based upon our interpretation of the NVMe2 spec.
FCD-3683	27XX, 28XX: Target was reporting in the FLUSH_RSP that it sent a standard FC_RSP instead on an NVME_ERSP.	The f/w did not have a handler on the target or initiator side to handle the scenario.
FCD-2491	28XX: After HFL all I/O rounds to queue 0 only	Do not change FW initialize control block configuration during restore the HFL.
FCD-3733	27XX, 28XX: The f/w is not correctly reporting the FLUSH count value in all scenarios	The f/w was using a single FLUSH count for both the transmitted and received FLUSH count.
FCD-3411	27XX, 28XX: During Initiator Write with single block T10 CRC with DIF Bundling, unexpected DMA error is reported.	The XDMA status reported by ASIC is premature as the transfer done bit shows up later.
FCD-3923	27XX, 28XX: CTIO CRC_1 return with timeout status when running write IO.	This problem introduced by FCD-2690.
FCD-3941	28XX: NMI occurred on a write during heavy IOs run.	This got introduce by FCD-3212
FCD-3787	27XX: The Task Retry ID field was being populated in the REC frame even when Task Retry ID feature was not being enabled	The register that should be initializing the ID to zero in the ASeq is getting corrupted
FCD-3795	27XX, 28XX: 8002/2E4 error when testing NVMe SLER and forcing a scenario where we	Improper PcbDummy structure when handling the scenario

	received a NVMe_SR frame but did not have a related Port Control Block (PCB) for the port.	
FCD-3738	28XX: During restore XCB the checksum occurs with error code 0035	The ATIO DMA shut down while the RXB still unload the frames.
FCD-3960	28XX: Add code to support customer specific 64G SFP.	N/A
FCD-3794	27XX, 28XX: Slow request queue service was observed when running first burst.	RSEQ2 detected error in first burst frames and flushed RISC with messages causing it had no time to take care other tasks.

Changes and Fixes from v9.14.00 to v9.14.01

Overview:

- This release is for 28XX.
- The issues below are resolved in this release.
- For this 28XX release, the HFL version is 146 (unchanged).

Error ID	Issue	Root Cause
FCD-3385	28XX (Dell 64G): Link up failed with Dell-branded Coherent SFPs.	The firmware incorrectly identified the SFP, resulting in improper SFP training.
FCD-3397	28XX (Virtual Lane): The firmware reported data underrun while VL was enabled.	The firmware did not configure enough credits to match the advertised amount.
FCD-3396	28XX: Improve signal integrity at various FC link speeds.	N/A
FCD-3317	28XX: Add internal functional support.	N/A

Changes and Fixes from v9.13.00 to v9.14.00

Overview:

- This release is for 27XX and 28XX.
- The issues below are resolved in this release.
- For this 27XX release, the HFL version is 47 (unchanged).
- For this 28XX release, the HFL version is 146 (unchanged).

Known Issues:

1. This Mach firmware release may crash with System Error (error code 43Ch) when Coherent 64G SFPs are used with either a loopback connector or a direct attached connection with another Coherent 64G SFP. The SFP vendor is currently participating in debug.
2. The link may not come up using Coherent 64G SFP, observed on one lab setup with a Brocade 32G switch.

Error ID	Issue	Root Cause
FCD-3056	28XX: An IOCB resource leak may occur during IO (IOCB type 76h) exception handling.	The firmware did not release the command IOCB.
FCD-2777	28XX: When the driver issued Abort IO IOCB for a command IOCB for a target port in login state 07h, the firmware posted an IOSB that did not contain Aborted (5h) status.	The firmware incorrectly searched for a command IOCB referenced by the aborted handle.
FCD-2893	The driver incorrectly issued a command that resulted in a timeout.	The firmware did not enforce host queue alignment rules.
FCD-3082	The firmware did not return MB1=4005h and MB2=0009h for Send RNFT (005Eh) MBC when the responding port's login state did not equal 0404h.	The firmware incorrectly set the command status.
FCD-3107	28XX: The firmware did not activate TTS and FEC at 16G link speed when enabled via Load Operational Firmware Parameters (001Bh) MBC with Fibre Channel FEC Parameters (8h) type.	The firmware did not acquire the FEC parameters from MBC 001Bh.
FCD-1915	28XX: While the link was idle at 64G, the link went down, upon processing successive internal loopback operations.	The firmware did not complete the SFP calibration.

FCD-3115	28XX: A Firmware System Error with error code ECh could occur during device initialization.	The firmware did not wait long enough for a FIFO to respond.
FCD-3160	28XX: Update control of Avago 64G SFP per data sheet.	N/A
FCD-3161	28XX: Speed negotiation failed with WTD 64G SFP while the data rate was fixed at 16G.	The firmware incorrectly controlled the SFP.
FCD-3130	SLER recovery failed during NVME traffic with Block CRC protection.	The firmware mishandled SLER.
FCD-3051	During SLER recovery, the initiator firmware did not respond to FLUSH while waiting for FCP_RSP.	The firmware mishandled SLER.
FCD-3169	28XX: Code management.	N/A
FCD-3165	28XX: The 64G FC link performance was suboptimal on a OEM 28XX board design.	The firmware did not honor the 64G FC serdes transmit parameters loaded from flash.
FCD-3154	The target port firmware ceased processing Mailbox Command IOCB, while Exchange Memory Offload was enabled.	An IOCB buffer leak occurred.
FCD-3099	An IO error occurred for a read command while SLER was enabled.	The initiator firmware transmitted a FLUSH_RSP frame without the transferred byte count.
FCD-3159	The target port firmware posted System Error (error code 2ACh) during SLER recovery.	The firmware incorrectly handled SLER.
FCD-3091	The firmware posted System Error (error code 1BEh) while the link was in FC-AL.	The firmware mishandled LISM transmit recovery.
FCD-3187	The target port firmware posted System Error (error code EFh) while processing ABTS Response IOCB and while Exchange Memory Offload was enabled.	The firmware mishandled the abort operation.
FCD-3212	The target port firmware posted System Error (error code 2C3h) while aborting an IO.	The firmware mishandled the abort operation.
FCD-3207	The firmware extended SLER behavior to all remote ports, regardless of whether each enabled SLER.	The firmware mishandled SLER enablement at the port level.

FCD-517	28XX: The responder port firmware responded slowly to ELS requests for certain originator port login sessions.	The firmware did not optimize session lookup.
ER148384	Following link bounce, the firmware did not transmit FLOGI request.	The firmware ran out of exchange buffers.
FCD-3199	28XX: Read performance was reduced from a target port while VL was enabled.	The target port firmware did not handle multiple data transmission rates.
FCD-2848	28XX: Add support for QLogic-branded Coherent 64G optics.	N/A
FCD-3059	28XX: A FLOGI request transmitted firmware timed out while VL was enabled.	The firmware transmitted the FLOGI request in VL mode.
FCD-3239	28XX: IO performance was below expected rates while VL was enabled.	The firmware did not advertise enough BB credits while VL was enabled.
FCD-2925	The BBCR N/A flag indicated in a Report ID Acquisition (32h) IOCB was clear after the HBA port advertised non-zero BB_SC_N but the peer port advertised zero BB_SC_N.	The firmware did not properly clear the BBCR N/A flag.
FCD-2706	The firmware did not post a D_Port completion event during link diagnostics with Cisco 64G switch.	The firmware used an incorrect timeout value.
ER148036	The target port firmware did not contiguously post PUREX IOCB with associated Status Continuation Type 0 IOCB to the ATIO queue while Additional FW Option 2 bit 11 (Enable Asynchronous IOCB to ATIO Queue) was set to 1.	The firmware mishandled ATIO queue posting.
FCD-3261, FCD-3304	28XX: Expand 64G SFP format handling.	N/A
FCD-3276	The firmware did not post Firmware Restart Complete AEN when the ATIO queue was full and while Enable Asynchronous Event to Immediate Notify IOCB (AFWO1 bit 11) was set to 1.	The API did not cover this condition.

FCD-3124	28XX: In auto-negotiation mode, the link did not come up to 64G in some cases.	Auto-negotiation was not handled correctly.
FCD-3320	The target firmware posted System Error (092h) while handling receive errors.	The firmware incorrectly handled receive errors.
FCD-3336	The firmware posted System Error (error code 0FFh) while processing Diagnostic Loopback MBC.	The firmware began processing Diagnostic Loopback MBC before SFP training was complete.
FCD-3334	The firmware posted System Error (error code 092h) when the SFP was removed before firmware initialization and while Enable 8130 and 8131 Asynchronous Events (AFWO3 bit 10) is set to 1.	This failure was introduced by CD-710.
FCD-3340	28XX: Execute Firmware completed with command error 4005h/0035h during HFL.	The firmware corrupted a pointer.

Changes and Fixes from v9.12.00 to v9.13.00

Overview:

- This release is for 27XX and 28XX.
- The issues below are resolved in this release.
- For this 27XX release, the HFL version is 47 (unchanged).
- For this 28XX release, the HFL version is 146 (unchanged).

Error ID	Issue	Root Cause
FCD-2690	A Firmware System Error with error code EFh could occur while running block CRC traffic via CRC_3 IOCB types.	The firmware incorrectly handled data transmit via CRC_3 IOCB types.
FCD-2740	28XX: A Firmware System Error with error code 1C7h could occur while cleaning up exchanges and while attempting to transmit BA_RSP.	The firmware did not invalidate a co-processor message.
FCD-2689, FCD-2804	28XX: A Firmware System Error with error code ECh could occur during device initialization.	The firmware did not release a semaphore during SBUS load.
FCD-2710	The firmware failed to keep down the link via Perform Link Initialization (0072h) MBC to disable the HBA port.	The firmware transitioned to the wrong link initialization state.
FCD-2546	The firmware did not process a received LRR primitive.	This error was introduced by ER147074.
FCD-2699	28XX: During WTD 64G SFP interoperability testing, there was no link up when the data rate was fixed at 16G.	SFP faulty behavior.
FCD-2708	A Firmware System Error with error code 251h occurred while handling IO recovery.	The firmware did not properly clean up a co-processor message.
FCD-2619	28XX: Allow the driver to specify SFP Shutdown Temperature. Contact Marvell for API documentation.	N/A
FCD-2853	28XX: Load SFP Firmware (002Fh) mailbox command did not return correct data in outgoing MB4.	This part of the API was not implemented in the initial release.
FCD-2852, FCD-2924	28XX: Expand the API for the Load SFP Firmware feature. Contact Marvell for API documentation.	N/A

FCD-2851	28XX: The firmware unexpectedly transmitted LR while Virtual Lane was enabled and after transmitting a Common Transport IU to the Cisco switch.	The firmware used a mismatched CS_CTL and VL pair to transmit the IU.
FCD-2789	When the driver issued Perform Link Re-initialization (0072h) MBC with an incorrect parameter, the firmware returned the wrong completion code.	The mailbox command error handling was incorrectly implemented.
FCD-2748	BB Credit Recovery was not successfully activated in direct-attached topology when the driver controlled the PLOGI request.	The firmware erroneously expected a pending link reset condition.
FCD-657	An unexpected BA_ACC was received after jamming write data, while Sequence Level Error Recovery (SLER) was enabled.	The firmware (initiator mode) transmitted the wrong reply after receiving Responder Error Detected (RED).
FCD-2915	An unexpected ABTS was received after jamming write data, while Sequence Level Error Recovery (SLER) was enabled.	The firmware (target mode) transmitted a redundant FCP_XFER_RDY.
FCD-2601	28XX: After an ATIO queue full condition, the firmware incremented the ATIO Queue in-pointer but did not post a new ATIO entry, while interrupt handshaking was enabled.	Interrupt handshaking for ATIO queues is unsupported for Mach (target mode).
FCD-3000	28XX: A Firmware System Error with error code EFh occurred after an FCP_CMND containing no payload was received, while Exchange Buffer Offload was enabled.	The firmware (target mode) erroneously addressed the XCB.
FCD-2917	The firmware (target mode) erroneously posted an ATIO entry containing REA equals FFFFFFFFh for an NVMe IO exchange, while an option for target firmware to automatically send FCP_RSP was enabled.	The firmware incorrectly validated the NVMe port login state.
FCD-2947	The firmware built an incorrect LS_ACC reply as an RNFT responder supporting FCP.	The RNFT FC-4 Entry was incorrectly formatted.
FCD-2948	The firmware built an incorrect LS_ACC reply as an RNFT responder supporting NVMe.	The firmware did not provide NVMe support in the LS_ACC reply.

FCD-2595	28XX: The firmware did not post Receive Error (8048h) AEN after receiving an ELS request frame containing an invalid SOF delimiter.	The firmware used an incorrect argument value.

Changes and Fixes from v9.11.00 to v9.12.00

Overview:

- This release is for 27XX and 28XX.
- The issues below are resolved in this release.
- For this 27XX release, the HFL version is 47 (unchanged).
- For this 28XX release, the HFL version is 146 (unchanged).

Error ID	Issue	Root Cause
FCD-1641	28XX: While disabling and enabling a virtual port, the firmware dropped an incoming SCR ELS reply.	The firmware failed to store a port identifier into its lookup table.
FCD-2471	28XX: (Target mode) After servicing a command, the firmware erroneously fed an initiator XCB into the Receive Exchange Address FIFO.	The firmware did not range check the XCB.
FCD-2580	Remove the restriction of the Diagnostic Trace Control (0027h) MBC issued via the Mailbox Command (39h) IOCB.	N/A
FCD-2525, FCD-2517, FCD-2553, FCD-2555, FCD-2556, FCD-2635, FCD-2027	28XX: Minor changes related to 64G.	N/A
FCD-2483, FCD-2406, FCD-2665, FCD-2429, FCD-2634	28XX: Minor general changes.	N/A

Changes and Fixes from v9.10.00 to v9.11.00

Overview:

- This release is for 27XX and 28XX.
- The issues below are resolved in this release.
- For this 27XX release, the HFL version is 47 (unchanged).
- For this 28XX release, the HFL version is 146 (new).

Error ID	Issue	Root Cause
FCD-1976	28XX: The firmware erroneously posted AEN 8048h/FFFDh after an FDISC request was transmitted while Virtual Lane was enabled and while ER_RDY was active.	The firmware incorrectly handled FDISC transmit.
FCD-1991	28XX: The firmware failed to activate the Virtual Lane feature while Virtual Lane was enabled but while D_Port was enabled and FA_WWPN was disabled.	The firmware did not transmit an additional FLOGI request containing VL information.
FCD-2024	28XX: There is no known failure caused by this issue and was found only by code inspection.	The firmware incorrectly processed the SFP data.
FCD-1921, FCD-2025, FCD-2160, FCD-2366, FCD-2372	28XX: Allow operation with WTD 64G optics. Increase the HFL version for Mach.	No root cause exists.
FCD-2026	27XX, 28XX: There is no known failure by this bug and was found only by code inspection.	After LS_RJT reply was received for FLOGI, the firmware incorrectly determined that FLOGI completed.
FCD-1493	28XX: Frames were dropped at 64G link rate after a substantial increase in ASIC temperature occurred.	The firmware did not recalibrate the FC Ser-Des under this condition.
FCD-1835	27XX, 28XX: The firmware trapped with error code 423h while aborting a FLUSH request while both SLER and Expedite ABTS features were enabled.	The firmware erroneously cleared information required to abort the FLUSH request.
FCD-1678	27XX, 28XX: Add support to flush the internal FCE trace buffer without requiring FCE tracing to be disabled.	No root cause exists.

FCD-1210	28XX: The ATIO Queue Full statistics were incremented incorrectly.	The firmware did not increment ATIO Queue Full statistics while the queues were full due to received FCP_CMND frames.
FCD-2244	28XX: The HBA port transmitted LR while running traffic and while SAN Congestion Mitigation (SCM) with Virtual Lanes (VL) was actively enabled.	The firmware caused a credit overflow.
FCD-2339	27XX, 28XX: A hang occurred while processing Get Firmware State (0069h) mailbox command on a certain Qlipper mezzanine adapter model.	This failure was introduced by FCD-1519.
FCD-1680	27XX, 28XX: The firmware failed to send commands to MPI firmware.	The firmware did not free buffers and exhausted buffer resources.
FCD-1073	27XX, 28XX: Add conditional FLOGI control to VP Control (30h) IOCB and Modify VP Configuration (31h) IOCB.	Root cause is not applicable. Refer to ER148332 for history of this feature.
FCD-2349	27XX, 28XX (Target Mode): The firmware failed termination of target exchanges after an explicit request for port logout and freeing the N_Port handle.	The firmware did not populate the necessary information while searching for target exchanges.
FCD-1710	27XX, 28XX: The firmware trapped with System Error (8002h, 043Fh) during either SFP insertion or removal.	An associated retry count was exhausted.
FCD-2124	27XX, 28XX: Write SFP (0030h) MBC erroneously returned good status in error cases.	The firmware did not check for certain error conditions.

Changes and Fixes from v9.09.00 to v9.10.00

Overview:

- This release is for 27XX and 28XX.
- The issues below are resolved in this release.
- For this 27XX release, the HFL version is 47 (unchanged).
- For this 28XX release, the HFL version is 145 (unchanged).

Error ID	Issue	Root Cause
FCD-1676	28XX: Add changes to support congestion mitigation over FC virtual lanes.	n/a
FCD-1644	27XX, 28XX: The LS_ACC reply generated by the firmware for an RDP request received from the fabric port did not contain the Optical Product Data descriptor.	The firmware incorrectly built the LS_ACC payload.
FCD-1446, FCD-1485, FCD-1519, FCD-736, FCD-1617	28XX: Add support for 64G SFPs from multiple vendors.	n/a
FCD-1700, FCD-690, FCD-1797	27XX, 28XX: Multiple issues were detected during simulation of SLER with NVMe-2 traffic.	The firmware mishandled various SLER scenarios.
FCD-1824	27XX, 28XX: The firmware reported an incorrect error status (Invalid Vendor), while executing various mailbox commands (example: Initialize Firmware, Initialize MID Firmware, Get Firmware State), while an SFP was installed that did not comply with the speed characteristics of the HBA.	The firmware did not check for invalid SFP speed.
FCD-927	27XX, 28XX: The firmware hung while terminating the exchange associated with a logout.	A deadlock occurred between the main processor and co-processor.
FCD-1874	27XX, 28XX: The firmware trapped with AEN 8002h while Exchange Buffer Offload was enabled and while multiple request queues were enabled in target mode.	The firmware did not correctly assign a pointer field and caused an invalid memory access.

Changes and Fixes from v9.08.00 to v9.09.00

Overview:

- This release is for 27XX and 28XX.
- The issues below are resolved in this release.
- For this 27XX release, the HFL version is 47 (new).
- For this 28XX release, the HFL version is 145 (new).

Notes:

- 64G FC is supported in 2800 series.
- For this release, the only 64G SFP supported is Avago AFBR-57H5MZ (EEPROM A2h/FDh equals 16h).
- Due to Avago 64G SFP behavior,
    - Read SFP (0031h) mailbox command and Write SFP (0030h) mailbox commands may take up to 7 seconds.
    - Link up at 64G can take up to 20 seconds.
    - The Driver-Controlled SFP feature is not supported with Avago 64G SFP.

Error ID	Issue	Root Cause
FCD-674, FCD-710, FCD-888, FCD-908, FCD-913, FCD-1355, FCD-1394, FCD-1395	28XX: The link may not come up after hot-plugging the Avago 64G SFP.	While initializing the SFP, the firmware state machine did not correctly handle removal of the SFP.
FCD-616	IOPs dropped with light load IOs and with a large number of response queues, with Operation Mode ZIO 6 and non-zero Interrupt Delay Time.	The firmware delayed in generating an interrupt for some response queues.
FCD-770	28XX: Add support for one specific OEM-branded Avago 64G SFP.	New feature
FCD-420	A firmware hang occurred (2800 series ASIC) while attempting to pause transmit channels.	The firmware did not successfully pause the hardware.
FCD-748	The firmware erroneously included the “Link Fault Descriptor” in EDC ELS payload, while the link speed was below 64G.	The firmware did not ensure that the link speed was 64G before building the EDC request payload.

FCD-665	27XX: After a link bounce, the firmware reported “LIP Reset” AEN 8013h and failed to bring up the link, while attached to a certain 16G switch model, and while both the HBA port speed and the switch port speed were configured to 8G.	The firmware did not identify the bogus LIP reset received after link bounce.
FCD-481	28XX: The D_Port test did not complete with the Avago 64G SFP while the link speed was 16G.	The firmware did not clear the LSN bit after link up at 16G.
FCD-257	D_Port failed with an OEM-branded SFP.	The firmware did not enable E_WRAP and O_WRAP per the module specifications.
FCD-572	Customer-specific	
ER148584	The firmware did not transmit ABTS immediately after receiving an NVMe XFER_RDY with Burst Length equals 0.	This exception was not previously handled.
ER148585	The firmware did not transmit ABTS immediately after receiving an NVMe XFER_RDY with Burst Length exceeding the data length.	This exception was not previously handled.
ER148582	The firmware did not transmit ABTS immediately for the following cases: Data frame received for a write command, or XFER_RDY received for a read command.	This exception was not previously handled.
FCD-660	After receiving NVMe_ERSP and transferring the NVMe_ERSP payload to system memory, the firmware did not set both bit 0 (NVMe_RSP DMA’ed) to 1 and bit 6 (NVMe_ERSP received) to 1 of State Flags field of the Status IOCB.	This is a bug introduced by ER148309.
FCD-426	A firmware system error (AEN 8002h, error code 036Bh) occurred while handling a frame receive error.	The firmware mishandled certain receive errors and produced subsequent misbehavior.
FCD-1034	Upon detecting a DIF error in the receive path, the firmware may incorrectly report the actual DIF.	The firmware did not correctly stop the read path upon detecting the initial error.

FCD-1055	28XX: A loss of synch occurred, upon executing a hot firmware load while the link was up at 64G.	The firmware incorrectly configured the hardware after completing the HFL.
FCD-449	Add an option to Abort IO (33h) IOCB that allows firmware to abort only active IO matching the specified IO handle, but not others with a matching IO handle that are not active (e.g., abort pending). This option should be enabled only while Additional Firmware Options 1, bit 5 (Disable ABTS Initiation by Firmware) is set to 1.	Customer requirement
FCD-876	The firmware posted ABTS Response (55h) IOCB with error completion 31h (Valid Subcode Error) and Error Subcode 18h, the offset to S_ID, while the VP was disabled.	The firmware validated the specified SID before validating that the VP was enabled. The firmware will now validate the VP first and return Port Logged Out status (29h) if the VP is disabled.
FCD-806	28XX: Add various performance improvements to target mode write operations.	Various performance paths were suboptimal.
FCD-1050	27XX, 28XX: (Exchange Buffer Offload) A firmware system error occurred (AEN 8002h, error code 2F6h).	When the firmware moved a host XCB from RISC to host memory, it didn't update the host index state. Later, when host XCB was moved from host memory to RISC memory, host XCB validation failed due to host index mismatch with host XCB content.
FCD-840	28XX: A firmware system error (AEN 8002h, error code F0h) occurred while processing a loopback operation and while Virtual Lane was enabled.	The firmware erroneously wrote to a hardware register in the transmit path.
FCD-1093	28XX: ATIO queue pointer shadowing was performed incorrectly while the API Enhanced Queue Pointer Shadowing feature was enabled.	The firmware incorrectly handled enhanced queue pointer shadowing while the RISC processor posted IOCBs to ATIO queues.
FCD-1176	28XX: Add an options parameter (MB10) to Write SFP (0030h) and Read SFP (0031h) mailbox commands. When bit 10 is set to 1, the firmware will return 30h (SFP not ready) if the SFP is present but not yet fully initialized.	This is a new feature.

FCD-1183	27XX, 28XX: While performing FC-TAPE error recovery for a Class 2 IO exchange, the firmware retransmitted data.	This bug was caused by FCD-371 and ER147301.
FCD-1196	27XX, 28XX: The firmware ceased data transmit after an IO was aborted while Multi-channel Transmit was enabled.	This bug was caused by FCD-134 and ER146084.
FCD-1189	27XX, 28XX: (Exchange Buffer Offload) A trap occurred (AEN 8002h, error code 00EFh).	While processing an ABTS Response IOCB associated with a host XCB, the firmware mishandled the host XCB.
FCD-1207	27XX, 28XX: (Exchange Buffer Offload) A trap occurred (AEN 8002h, error code 01E6h).	This failure was caused by ER146964.
FCD-1231	27XX, 28XX: Contrary to API documentation, the firmware did not discard a FC-NVMe FC-4 Link Service Request with SOFi2 (Class 2).	The SOF type was not checked upon receiving the Link Service Request frame.
FCD-1104	28XX: Following hot plug of the Avago 64G SFP, the link speed may intermittently land at 16G while the HBA port speed is Auto-negotiate.	The firmware didn't check for 64G properly when switching to the next TX cycle during auto speed negotiation.
ER148474	27XX, 28XX: (Exchange Buffer Offload) The firmware could hang or trap (AEN 8002h, subcode 00EFh) when the configured initiator exchange count was less than 11.	The firmware misconfigured the actual number of initiator exchanges.
FCD-889, FCD-1245, FCD-1265, FCD-1316	28XX: Customer-specific	
FCD-1167	27XX, 28XX: The firmware overwrote certain locations of shared RAM, resulting in zero RA_TOV, ED_TOV and VP Count values.	The firmware used an incorrect memory pointer.
FCD-1230	27XX, 28XX: Add support for handling an RDF ELS request (received from fabric).	New feature
FCD-1114	28XX: The firmware reported error status 400Ch when consecutive Diagnostic Loopback (0045h) mailbox commands with Internal loopback point option were processed while the HBA port was connected to the fabric and while the current link speed was 64G.	The firmware did not correctly setup the FC SerDes for internal loopback when the current link speed was 64G.

FCD-1121	27XX, 28XX: A firmware system error (AEN 8002h, error code EFh) occurred after failing to pause a transmit DMA operation during exception handling.	The firmware did not handle a spurious internal interrupt from the transmit path.
FCD-1384	27XX, 28XX: A firmware system error (AEN 8002h, error code EFh) occurred when handling a received RDP ELS request.	The firmware used an incorrect memory pointer.
FCD-1358	27XX, 28XX: A firmware system error (AEN 8002h, error code 351h) occurred while the Exchange Memory Offload feature and Sequence Error Detection feature were enabled.	The firmware incorrectly handled a sequence timeout.
ER148535	27XX, 28XX: A firmware system error (AEN 8002h, error code 19Fh) occurred during IO abort handling and exchange cleanup.	The firmware incorrectly managed the exchange ownership.
FCD-1051	27XX, 28XX: The firmware ceased processing the request queue when the link went down while the firmware was processing IO with T10 DIF protection.	The firmware incorrectly managed IOCB buffers during error handling.
FCD-1397	27XX, 28XX: Incorrect error codes were reported with certain firmware system errors (AEN 8002h).	The error code was overwritten.
FCD-1076	28XX: The firmware erroneously posted ATIO IOCBs containing Receive Exchange Address equals FFFFFFFFh (indicating insufficient exchange resources) to the ATIO queue.	The firmware did not supply receive exchanges to the receive path.
FCD-1281	28XX: A firmware system error (AEN 8002h, error code EFh) occurred while the firmware handled receive frame errors with EDiF IO.	The firmware erroneously wrote to a hardware register in the transmit path.
FCD-600	27XX, 28XX: Add support for Get Parameters (005Dh) mailbox command with Type field (MB1 bits 15-8) equals Eh. Contact Marvell for supplemental API documentation.	New feature
FCD-718, FCD-989, FCD-1174,	27XX, 28XX: Sudden accesses to the SFP after soft reset or insertion could fail.	A delay was not imposed while the SFP was not ready.

FCD-1238, FCD-1481		

Changes and Fixes from v9.07.00 to v9.08.00

Overview:

- This release is for 27XX and 28XX.
- The issues below are resolved in this release.
- For this 27XX release, the HFL version is 46 (new).
- For this 28XX release, the HFL version is 144 (new).

Error ID	Issue	Root Cause
ER148469	28XX: An incorrect Maximum Supported Speed value (MB2 bits 3-0) was reported by Execute Firmware (0002h) mailbox command.	None
ER148475	(Initiator) A transmit operation hung while attempting to transmit a data frame for a received invalid FCP_XFER_RDY with zero relative offset and zero burst length.	The firmware attempted a zero-length operation that is unsupported by hardware.
ER148516	28XX: The firmware generated a System Error (AEN 8002h, error code 00E0h) while trying to bring up the FC link.	The FC SerDes did not respond to FC firmware.
ER148533	The firmware generated a System Error (AEN 8002h, error code 0251h) after handling either a Receive Error or a Link Reset.	The firmware erroneously deleted the wrong message while re-initializing the receive path.
ER148332, FCD-223, FCD-329	27XX, 28XX: Allow a virtual port to transmit either FLOGI or FDISC via Virtual Port Control (030h) IOCB or Modify Virtual Port Configuration (31h) IOCB.	New feature
ER148391, FCD-604	27XX, 28XX: (Exchange Buffer Offload) The firmware responded slowly while processing an RRQ while Exchange Buffer Offload was enabled.	The firmware did not locally store host XCB to OX_ID lookup information.
ER148611	28XX: (SAN Congestion Management) The firmware erroneously indicated a frame drop due to no credit (AEN 8048h, code FFFDh) upon link-up while ER_RDY flow control was active.	The error was caused while transmitting Command Transport IUs to the fabric.
ER148065	27XX, 28XX: (Exchange Buffer Offload) The firmware reported a System Error (AEN 8002h, error code 0371h).	A timeout was exceeded while no pageable and Host index were available.

ER148371	27XX, 28XX: (Exchange Buffer Offload) The firmware reported a System Error (AEN 8002h, error code 0374h).	A timeout was exceeded while writing the ATIO queue shadow in-pointer.
ER148488	28XX: The firmware specified Receive Exchange Address FFFF_FFFFh in an ATIO Type 7 IOCB even though exchange buffer resources were available.	The firmware posted the ATIO before feeding the REA FIFO.
ER148319	28XX: After cable pull and insert in a direct-attached (N_Port-to-N_Port) topology, 16G FEC was not active intermittently upon link up. Details: 1. Each N_Port was associated with a 32G capable device. A 16Gbps SFP was installed on one port and a 32Gbps SFP was installed on the other. 2. On each port, Data Rate (bits 15-13 of Firmware Options 3) was set to 2 (Auto-negotiated) and both “Enable Training” (bit 16 of Serial Link Control) and “FEC Enable” (bit 1 of Serial Link Control 2) were set to 1.	The training negotiation status was not remembered in the transition to the final stage of the link negotiation cycle.
ER148426	27XX, 28XX: (NVMe) The firmware did not correctly handle a target port that erroneously transmitted SLER frames while SLER was not actively enabled.	The firmware did not ensure whether SLER was actively enabled and did not drop SLER-related frames received from the target port.
FCD-182	27XX, 28XX: (Expedite ABTS Processing) Move the feature enable to bit 1 of Additional Firmware Option 4.	API change
FCD-108	28XX: (Target) A CTIO Type 7 IOCB failed with status 08h (Invalid Receive Exchange Address).	When an LR occurred during ATIO DMA, the firmware did not save FCP_CMND information into the exchange control block that is used later to validate CTIO.
FCD-157	A CTIO Type 7 was returned with status 08h (Invalid Receive Exchange Address).	The FCP_CMND context was not saved across a reset of the receive processor.

FCD-130, FCD-144, ER148338, FCD-131, FCD-365, FCD-387, FCD-450, FCD-585, FCD-442	28XX: (64G) Support 64 Gbps on adapters that feature the 64 Gbps capability. (Note that only "Avago model AFBR-57H5MZ" optics are currently supported.) At the time of release, 64G link speed was tested only with Brocade 64G switches.	New feature
ER148370	Get Port Database (0064h) mailbox command failed with status 4005h (Command Error) and sub-error 0009h (The remote port is not logged in") for a virtual port, even if PCB was allocated but the virtual port was currently disabled.	The firmware erroneously required that the specified VP be enabled.
ER148451	(Block CRC) The firmware posted a System Error (AEN 8002h, code 00EFh or 0369h) while aborting an IO.	The error occurred in the transmit path, due to incomplete cleanup of a write IO issued via Command Type CRC_3 (38h) IOCB consisting of multiple DSDs. This failure could also occur on the target during reads while processing CTIO Type CRC_3 (42h) IOCB.
ER148569	The LR protocol failed in direct-attached topology with a particular HBA vendor.	The vendor was taking 94 (of the 100ms) to respond to LRR, and the firmware was timing out a little too early.
FCD-94	The firmware posted a System Error (AEN 8002h, code 00EFh) during a slow-down in the transmit path.	Following aborts, the firmware was rescheduling new transmit requests before resources were available.
FCD-134	27XX: (NVMe) There were high latencies with 8KB IO sizes.	This change ported ER146084 (28XX) to 27XX.
ER146739, ER146988	28XX: Add statistics to monitor depletion of transmit and receive credit.	New feature
ER147128	28XX: Add an optional customer specific statistics page accessible via Get Link Statistics and Private Data Counts (006Dh) mailbox command.	New API

ER148316	28XX: The firmware posted System Error (AEN 8002h, error code 00F2h) due to receive FIFOs out of sync.	The firmware mishandled error frames. This ER resyncs the receive FIFOs.
ER148435	Get Port Database (0064h) mailbox command erroneously returned status 4005h (Command Error) and sub-error 0002h (The IOCB buffer cannot be allocated) when the VP index parameter was incorrect. The correct status is 4006h (Command Parameter Error).	A routine to search for the PCB did not initialize an exit parameter properly.
ER146413, ER146758, ER146877, ER146956, ER147015, ER147385, ER148380	28XX: Add support for command Dh (Disable VP, Logout all Ports, and wait for FLOGO completion) via VP Control IOCB. Contact Marvell for details.	New feature
ER148618	28XX: The firmware reports System Error (AEN 8002h, error code 00EAh or 00EBh) while processing the Execute Firmware (0002h) mailbox command.	A timeout occurred while attempting to access an FC SerDes register.
FCD-261	(Block CRC) The initiator port erroneously did not report DIF Error for read data frame containing bad DIF.	This is a regression caused by ER145507.
ER146454	28XX: Add a Timeout field (16-bit value in 1-second units at byte offset 8h) of ELS Pass-through (53h) IOCB. This field is applicable to originator requests only.	New feature
ER146533	28XX: Enhance the FCE tracing feature for capturing 24 bytes of frame headers of CT and NVMe-LS request or replies frames.	Enhancement
ER147463	28XX: Add a customer-specific feature.	New feature
FCD-259	(FC-TAPE) The firmware did not send a REC request frame during IO recovery.	This was a regression introduced by adding support of NVMe.
ER148561, FCD-545	28XX: Add improvements for initiator mode IOPS performance.	N/A

ER148436	The firmware placed an incorrect address in “RECEIVE EXCHANGE ADDR. SPECIFIED BY ABTS TO ABORT” field of ABTS Received (54h) IOCB.	The firmware did not use sufficient criteria for searching for the receive exchange address.
ER147232	27XX, 28XX: Certain statistics related to dropped frames were inaccurate.	Certain counts were missing or repeated.
ER146655	28XX: The link is unstable while one Mach port is directly attached to another Mach port and the link speed is 16G.	A new value was recommended for a 16G TX SerDes parameter (TX phase slip).
ER148309	27XX, 28XX: (NVMe) The initiator port did not correctly handle certain NVMe_ERSP IUs.	The firmware did not get the Transfer Data Length from the response payload.
FCD-328	28XX: (EDiF) While running a mix of EDiF and non-EDiF traffic, the firmware erroneously reported status 67h (SPI Error) for non-EDiF reads of over 16KB.	A shared register was not preserved between separate transmit processors.
ER147754, ER148530, FCD-358	27XX, 28XX: (Exchange Buffer Offload) IOPS with FCP traffic dropped on a target with many open exchanges while Exchange Buffer Offload was enabled.	The firmware used a slow algorithm to find open exchanges.
FCD-123	28XX: (EDiF) Add a feature to inhibit the firmware from automatically transmitting PRLI ELS after receiving PLOGI LS_ACC while directly attached to FC storage.	New feature.
FCD-258	27XX, 28XX: (Block CRC) While processing a write command, the firmware returned command status DIF Error (0Ch).	The firmware erroneously configured the hardware for DIF Pass instead of DIF Remove requested by the driver.
FCD-363	28XX: (RWO) The target firmware reported System Error (AEN 8002h, error code EFh) when processing a first-burst write transfer while multiple ATIO queues were active.	The receive processor improperly processed multiple first-burst write transfers.
FCD-371	27XX, 28XX: (NVMe-2) Prevent possible failures with SLER.	Validate an SR frame before linking it to the corresponding command.
FCD-389	The firmware caused a pause condition while receiving two FCP_RSP frames for a single command.	The firmware mishandled the second FCP_RSP while the first one was being transferred to host memory.

ER148107	28XX: The Data Rate (005Dh) mailbox command failed to change the data rate.	The firmware did not create Loss of Sync to restart speed negotiation.
FCD-485	28XX: Failures could occur as described in ER146564.	See ER146564.
FCD-529	In the RDP ELS reply transmitted by the firmware, the date code field does not match the value contained in the SFP.	The firmware incorrectly read the data from the SFP.
FCD-602	27XX, 28XX: (Exchange Memory Offload) The firmware generated System Error (AEN 8002h, error code 306h) when Exchange Memory was offloaded to onboard DDR3/DDR4 memory.	This failure was introduced by ER146964.
FCD-456	27XX, 28XX: (NVMe-2) The firmware generated System Error (AEN 8002h, error code 35Fh) when the optical cable was pulled and while IO was running.	The firmware did not cleanup outstanding IO and re-initialize the port state.
ER147074	An unexpected LRR received during link re-initialization caused the firmware to mismanage BB credit.	The firmware mishandled the received LRR.

Changes and Fixes from v9.06.00 to v9.07.00

Overview:

- This release is for 27XX and 28XX.
- The issues below are resolved in this release.
- For this 27XX release, the HFL version is 45 (new).
- For this 28XX release, the HFL version is 143 (unchanged).

Error ID	Issue	Root Cause
ER147485	27XX, 28XX (Exchange Buffer Offload): The firmware erroneously returned an ELS Pass-Through (53h) IOCB with error status 08h (Invalid Receive Exchange Address).	The firmware did not correctly initialize the offload index in the associated PUREX IOCB for the ELS exchange.
ER146997, ER147641	27XX, 28XX (SCM): Add support for Priority Update Notification descriptor type in FPIN ELS request payload.	Feature enhancement
ER147608	28XX (NVMe): A firmware System Error (AEN 8002h, error code 360h) occurred immediately on the initiator port upon starting NVMe traffic while the Sequence-Level Error Recovery mode was not active.	This bug was related to NVMe-2 implementation in v9.06.00.
ER143826	83XX, 27XX (Target, Multiple ATIO Queue): The firmware would continuously post Asynchronous Event 8075h (FC_ID ATIO Queue Transfer Error Asynchronous Event) after receiving an FCP command while the destination queue was unavailable.	The received frame was not completely purged.
ER147871	28XX (Target): An IO may timeout during sequence level error recovery.	The task retry identifier or SLER qualifier field of a received command was not saved.
ER147894	28XX (Exchange Buffer Offload): Various issues occurred while the Exchange Buffer Offload feature was enabled: Firmware System Error (AEN 8002h, error code EFh), hang, CTIO returned with completion status of 08h (Invalid Receive Exchange Address), or incorrect counts returned via Get Resource Counts (0042h) MBC.	The firmware read certain resource counts from the wrong source.

ER147432	28XX (SCM): Add support for virtual lanes.	Feature enhancement
ER147900	28XX: The receive path of the initiator stalled while receiving an unterminated data sequence (i.e., missing EOFt) followed by a good FCP_RSP for the IO. The peer port may send a Link Reset (LR) primitive, resulting in Receive Error (8048h) AEN being reported.	A timeout mechanism did not exist to handle this case.
ER147269	28XX: The firmware failed to transmit BLS and ELS frames while the firmware was busy with exception handling.	The exchange control block was not requeued when the firmware was too busy to transmit the frame.
ER147671	27XX, 28XX (Target): During link down, a CTIO fails unexpectedly with error status 28h (Port Unavailable) while NVMe is enabled.	The firmware was not correctly checking the port login state for FCP and NVMe remote ports.
ER147522	After link bounce, the firmware transmitted FLOGI before speed negotiation completed and did not receive a corresponding reply.	A speed negotiation timer was not managed correctly.
ER147872	27XX, 28XX (NVMe2): During process login, the initiator activated SLER whenever the target advertised SLER, regardless of whether the initiator advertised it.	The initiator did not check its own SLER enable flag when processing PRLI LS_ACC.
ER147927	27XX, 28XX (Target): An ATIO marker was not posted to the correct ATIO queue while Multiple ATIO queue was enabled.	The routing bitmap processed correctly.
ER147647	27XX, 28XX: Sideband reported incorrect link status, speed and topology information (MPI FW version 3.01.00).	The link status was incorrectly passed to the MPI firmware.
ER147660	27XX, 28XX: When processing an MPI pass-through command, the firmware waited for a response from MPI firmware even when MPI firmware was not running.	The firmware did not handle this negative case.
ER146687	28XX: The firmware ceased transmitting link service frames after processing an ELS Pass-Through (53h) IOCB containing an invalid host memory address.	The firmware did not clear transmit contexts while handling this exception.

ER147234	27XX, 28XX (NVMe): Add support for FC-NVMe Exchange Cleanup Task (1Ch) IOCB in pure initiator mode.	New feature.
ER147235	27XX, 28XX (NVMe): Add support for pure initiator mode in dual traffic protocol (FCP and FC-NVMe).	Feature enhancement.
ER147913, ER148251, ER148204, ER148331	27XX, 28XX (NVMe): Various failures, including firmware System Error (AEN 8002h), occurred during error injection while SLER was enabled.	This bug was related to NVMe-2 implementation in v9.06.00.
ER146672	28XX (Target): If VP0 decoupling was enabled (during firmware initialization), then ATIO IOCBs for VP0 would not be posted to the ATIO Queue when VP 0 was later enabled.	ATIO Queue 0 was not enabled in the Auto ATIO VP registers.
ER146382, ER147318	27XX, 28XX (Target): Support NVMe ATIO Queue routing by Connection ID. The About Firmware (0008h) mailbox command returns Extended Firmware Attributes bit 15 set to 1. ER147318 includes an HFL version change for 27XX.	New feature.
ER147065	27XX: After an error occurred during data transmit, the firmware stopped transmitting data frames, while the Multiple Channels Transmit DMA feature (MCXDMA) was enabled.	There was a bug in data transmit error handling.
ER147420	27XX, 28XX: A firmware System Error (AEN 8002h) occurred while processing an FC-NVMe Link Service Pass-Through IOCB (89h) containing an invalid data segment address.	The firmware mishandled the DMA error.
ER147539	27XX, 28XX: The firmware transmitted an NVMe Link Service frame with payload size greater than the maximum receive payload size advertised by the remote port.	The firmware erroneously added an optional header.
ER147920	(Target): The firmware did not transmit ABTS for a CTIO request with Receive Exchange Address equals FFFFFFFFh and Send ABTS Exchange option (CTIO Flags bit 14 and CTIO	This corner case was not handled properly.

	Additional Flags bit 4 both set to 1) while the Sequence Error Detect feature was enabled.	
ER146666	(Target): The firmware corrupted the response queue after it processed an invalid CTIO request to terminate a Pass-Up Received ELS Exchange (PUREx) IOCB.	The firmware did not properly handle the invalid CTIO request.
ER148033	27XX, 28XX: Add missing code for ER146978 and ER146379.	The manual code merge was incomplete.
ER147009	27XX, 28XX: A link bounce test between 32G capable FC ports and Cisco switch ports failed occasionally.	The TTS transmit duration was not long enough to be detected by the link partner.
ER147405	27XX, 28XX: Add an optional feature that allows the firmware to skip providing the Receive Exchange Address of an aborted exchange (the ABTS is received from the exchange originator) before posting ABTS Received IOCB.	New feature.
ER147830	27XX, 28XX (Target): A firmware System Error (AEN 8002h, error code 0082h) occurred while the ATIO Queue In-Pointer Shadowing, Enable Asynchronous IOCBs to ATIO Queue option and Remote Write Optimization option were enabled.	A timeout occurred while updating the ATIO shadow pointer.
ER148136	27XX, 28XX (Target): A firmware System Error (AEN 8002h, error code 00EFh) occurred while handling a received ABTS for an NVMe exchange.	A bug occurred while terminating REC or SRR associated with the NVMe exchange.
ER148155	27XX, 28XX: A firmware System Error (AEN 8002h) occurred during frame error injection with NVMe traffic while SLER was enabled.	The firmware issued FLUSH (initiator) or Responder Error Detect (target) requests while the same were already in progress.
ER147648	27XX, 28XX (SCM): 1) Register Diagnostic Features (RDF) requests were transmitted to F_Port Controller (FFFFFEh) of the Brocade switch, instead of Fabric Controller (FFFFFDh). 2) An RDF request was not transmitted after receiving an LS_RJT for a preceding Exchange Diagnostic Capabilities (EDC) request.	The current implementation did not comply with new protocols.

ER148295	27XX, 28XX (NVMe): Certain mailbox commands failed with Command Error (4005h) and subcode Not Logged In (0009h), even while there was an active login to an NVMe port. The following mailbox commands are affected: Send RNID (0057h), Send RNFT (005Eh), Get Link Status/Read Port Status (006Bh), Get Port/Node Name List (0075h), and Get ID List (007Ch).	The firmware did not read the NVMe login state.
ER148317	28XX (NVMe, RWO): A firmware System Error (AEN 8002h, error code 00EFh) occurred while running first-burst IO and while Exchange Buffer Offload was enabled.	An invalid address was accessed while handling the no pageable exchange buffer available condition.
ER148323	28XX (Target): The firmware may mishandle cleanup of IO while Exchange Buffer Offload was enabled.	
ER148227	28XX (Target): A firmware System Error (AEN 8002h with error code 00EFh) occurred when routing either an FC-NVMe or FCP command to an ATIO queue and while Exchange Buffer Offload was enabled.	
ER148354	28XX: On a certain platform, PCIe completion timeouts occurred when jumping from legacy BIOS mode to operational firmware.	
ER148096	27XX, 28XX (SCM): Add an option to allow the driver to transmit and receive EDC and RDF ELS frames.	New feature.
ER147541	27XX, 28XX (NVMe): A firmware System Error (AEN 8002h, error code 318h) occurred while processing an NVMe Link Services Pass-through IOCB request to abort an NVMe Link Service request.	When aborting the exchange during NVMe Link Service transmission, the firmware set the wrong exchange state for the exchange.
ER148234	28XX: The firmware may fail to bring up the link at 8G or 16G. The issue may occur whenever FC SerDes parameters are specified via Load Operational Firmware Parameters (001Bh) mailbox command with Format equals	This error case existed since the initial version of 28XX.

	8, or via the FC Board Configuration contained in flash.	

Changes and Fixes from v9.05.00 to v9.06.00

Overview:

- This release is for 27XX and 28XX.
- The issues below are resolved in this release.
- For this 27XX release, the HFL version is 44 (unchanged).
- For this 28XX release, the HFL version is 143 (unchanged).

Error ID	Issue	Root Cause
ER147287	An ABTS Response (55h) IOCB was returned with Error code/subcode 31h/1Eh (aborted exchange not terminated).	The exchange was not terminated because the firmware did not search the target exchange pool.
ER147412	27XX, 28XX (Exchange Buffer Offload): A RISC pause occurred during Abort IO (33h) IOCB processing.	This was a bug introduced in v9.05.00 by ER146379.
ER147130	27XX, 28XX (Exchange Buffer Offload): An ABTS Response (55h) IOCB was not returned to the driver.	A pageable exchange control block was not available for use to process the ABTS Response IOCB. The fix uses a static buffer instead.
ER147357	27XX, 28XX (Exchange Buffer Offload): The HBA port stopped sending buffer credits, causing the fabric to drop frames.	Firmware exhausted all available pageable exchange control block buffers until none were available to swap-in the exchange control block for the active exchange. The fix establishes a threshold to avoid this condition.
ER147243	27XX, 28XX (Exchange Buffer Offload): The number of active IO exchanges was reduced, resulting in a performance drop.	This was a bug introduced in v8.06.00 by ER137645.
ER147312	27XX, 28XX: Enhance the default behavior of the Get Firmware State (0069h) mailbox command to return MPI Enabled flag (bit 8) and MPI Active flag (bit 9) in outgoing register 12, each of which are valid when bit 15 of this register equals 1.	This is an enhancement with no other effect on existing behavior.
ER147410	27XX, 28XX (NVMe-2): The target did not stop transmission when a FLUSH frame was received with the HT (Halt Transmission) bit set to 1.	The firmware did not stop all transmit queues.
ER147451	Add support of value 0Eh in Type field (mailbox register 1, bits 15-8) of	The customer-specific feature included in this change is

	Get Parameters (005Ah) mailbox command, as described in the Firmware Features Information API. Also, add a customer-specific feature (27XX, 28XX).	applicable only when certain MPI capabilities are active.
ER147521	28XX: An SCM Notification (801Eh) Asynchronous Event was posted even while the SCM feature was not enabled.	The firmware incorrectly enabled the interrupt.
ER147534	28XX: Back-out ER147341.	ER147341 was introduced in v9.05.00.

Changes and Fixes from v9.04.00 to v9.05.00

Overview:

- This release is for 27XX and 28XX.
- The issues below are resolved in this release.
- For this 27XX release, the HFL version is changed from 43 to 44.
- For this 28XX release, the HFL version is changed from 142 to 143.

Error ID	Issue	Root Cause
ER146867	28XX: An MPI dump did not include the entire ASIC RAM.	The memory size in the dump template was not updated to reflect changes in the newer hardware.
ER146888	83XX, 27XX, 28XX: The firmware provided an incorrect N_Port Handle in a Pass-Up Unsolicited Received ELS (PUREX) IOCB, while virtual ports were enabled and while the PCB Offload feature was enabled.	When searching offloaded PCBs, the firmware did not qualify the destination port ID (D_ID) with the virtual port ID.
ER146882	28XX: The target firmware may hang while processing an FCP or NVMe Command IU with D_ID error.	An interlock could occur while firmware attempts to post an IOCB to an ATIO queue via hardware and while the hardware is simultaneously waiting for firmware to unload the erroneous command frame.
ER146880	28XX: The target firmware did not update the shadowed ATIO queue in-pointer when posting an ATIO Type 7 IOCB or ATIO Type 9 (First-burst NVMe) with FCP_CMND payload size greater or equal to 128 bytes while the Enable ATIO Queue 0 In-Pointer Shadowing (Initialize Firmware Options 2) was enabled.	The firmware did not enable ATIO queue in-pointer shadowing in hardware when the command payload size was greater or equal to 128 bytes.
ER146972	The firmware could hang when transmitting data frames if the destination port's Receive Data Field Size is less than 256 bytes.	While initializing the PCB for the remote port, the firmware did not validate the Receive Data Field Size in the PCB, causing the frame transmit hardware to be misconfigured.
ER146998	A timeout occurred with a 28XX initiator after errors were induced during FC-TAPE IO.	This bug was caused by a regression that reduced the IO timeout value.

ER146987	83XX, 27XX, 28XX: The firmware generated a System Error (AEN 8002h) while processing an Abort IO IOCB and while the Exchange Offload feature was enabled, and while exchange resources were configured only for target mode.	The firmware searched the aborted initiator IO command from the target offload exchange pool.
ER146995	27XX: A firmware fatal error occurred when firmware attempted to swap-in an XCB from host memory, while the Exchange Buffer Offload feature was enabled.	This bug was introduced in v9.03.00, where ER146647 removed code that prevented sequencing processors from clobbering the XCB.
ER147020	28XX: After login with the remote port in N2N P2P or private loop topology, the firmware state (Get Firmware State MBC) remained at 2 (Waiting For Login), while the SAN Congestion Management (SCM) feature was enabled. Also, the firmware did not indicate SCM support via About Firmware (0008h) MBC.	The firmware waited for completion of SCM protocol with the fabric when there was no fabric. Missing implementation of attribute bit for SCM support.
ER146733	27XX, 28XX: The initiator generated a System Error (AEN 8002h) and/or repeated Receive Error (AEN 8048h) while receiving data frames for standard or T10-DIF IO.	The firmware failed to clear stale information after a receive FIFO reset, leading to the use of bad pointers or stalled receive path.
ER146903	28XX: Wrong data was written to the ATIO queue when target firmware posted an IOCB including continuation IOCB(s).	The ATIO queue was not locked before configuring the DMA operation, allowing another IOCB to be written.
ER147048	83XX, 27XX, 28XX: The firmware hung while the offload pending queue contained multiple CTIO IOCBs associated with the same host XCB and while Exchange Offload feature was enabled.	The CTIO handler continued to search for CTIO IOCBs associated with the host XCB and unnecessarily added the CTIO IOCB back to the pending queue.
ER146971	25XX, 83XX, 27XX, 28XX: A firmware System Error (AEN 8002h) occurred when the target firmware attempted to post an AEN Immediate Notify (status 49h) to an ATIO queue that is not full.	Insufficient time was given to the receive sequencer to acquire the ATIO queue lock in order to post the Immediate Notify.
ER147017	25XX, 83XX, 27XX, 28XX: A firmware System Error (AEN 8002h) occurred when the target firmware failed to	An error handler did not clear a receive sequencer context and

	acquire an ATIO queue lock while Extra Receive Credits were enabled.	receive sequencer owned lock while resetting a receive FIFO.
ER147023	28XX (Target mode): A mailbox command timed out, firmware System Error (AEN 8002h) occurred, or firmware could not post an Immediate Notify IOCB during an ATIO queue full condition.	The firmware did not service mailbox commands while waiting for the ATIO queue full condition to clear.
ER146967	83XX, 27XX, 28XX: The firmware erroneously generated Receive Error (8048h) AEN after detecting DIF errors for received data frame(s).	A frame associated with the DIF error was not removed from a receive FIFO.
ER147195	27XX, 28XX: Customer-specific.	N/A
ER147079	27XX, 28XX (Target): A firmware fatal error occurred when an exchange to be aborted was not found (i.e., Receive Exchange Address equals FFFFFFFFh), while the Multiple ATIO Queues feature was enabled with round-robin routing mode.	The firmware did not perform the check on the Receive Exchange Address while posting an ABTS Received IOCB.
ER146964	27XX, 28XX (Target): A firmware fatal error (invalid memory access) occurred when firmware attempted to access an offloaded XCB while the Exchange Buffer Offload feature was enabled and while the Multiple ATIO Queues feature was enabled with round-robin routing mode.	The firmware used an invalid value to access the XCB.
ER146379, ER146978, ER147316	27XX, 28XX: Add a feature to Disable ABTS initiation by Firmware (Additional Firmware Options 1, bit 5). The API documentation is available on request.	New feature
ER147173	27XX, 28XX: The FC firmware could hang while processing the Initialize Firmware MBC and while MPI firmware was running.	A semaphore was not being unlocked due to a previous communication failure.
ER146380	Report the maximum number of supported logins via Get Resource Counts (0042h) MBC, outgoing mailbox register 25.	New Feature
ER147166	24XX/25XX (MID), 83XX, 27XX, 28XX: The firmware could run out of exchange resources after multiple LS_RJT replies for FDISC are received. Some symptoms include	The exchange resource used to transmit each FDISC request is not freed immediately after LS_RJT is received.

	failed Virtual Port Control, Modify Virtual Port Configuration, and occurrence of 8049h AEN.	
ER147169	28XX: The Current Free Target XCB buffer count (outgoing mailbox register 2) returned by Get Resource Counts (0042h) MBC is incorrect while the Exchange Offload is enabled.	The buffer count did not include the offloaded exchange buffers.
ER147172	28XX (Customer specific): A firmware System Error (AEN 8002h, error code EFh) occurred while attempting to post an ATIO Type 9 (67h) IOCB for an FCP_CMND frame received with payload size greater than 128 bytes while the RWO feature was enabled.	The receive sequencer did not populate the receive exchange address correctly while posting the command frame.
ER146980	27XX: Add support for SAN Congestion Management (FPIN).	Extend support to 27XX.
ER147198, ER147199	27XX: OEM platform-specific.	Not applicable for general interest.
ER145460	27XX, 28XX: While processing a request to transmit an FC-NVMe FC-4 Link Service request, a sequence timeout (35h) was reported instead of Command Timeout (06h) when no response was received.	The firmware used an incorrect timer.
ER147308	28XX (T10): A firmware System Error (AEN 8002h) occurred after an HFL operation was performed while running T10 traffic and while the Multiple Channel Transmit DMA (MCXDMA) option was enabled.	The HFL operation did not properly restore the context for an active IO.
ER147301	27XX, 28XX: Add support for FC-NVMe2.	New feature.
ER147160	28XX (EDiF): Add EDiF support for NVME. Report SA_IDX used for receiving good encrypted data.	EDiF enhancements.
ER147366	27XX, 28XX: Link initialization failed in public loop topology.	Introduced by ER146274 in v9.03.00.

ER147341	27XX, 28XX: The link did not come up after processing Data Rate (005Dh) mailbox command with Set Data Rate with automatic Link Re-initialization opcode (Mailbox 1 equals 2) and Data Rate 16G (Mailbox 2 equals 5), while the HBA port was currently configured in auto-negotiation mode.	The Brocade switch port did not recognize the speed change initiated by the HBA port.
ER147311	27XX, 28XX: Increment the HFL version number.	

Changes and Fixes from v9.03.00 to v9.04.00

Overview:

- This release is for 28XX.
- The issues below are resolved in this release.
- For this 28XX release, the HFL version is 142 (unchanged).

Error ID	Issue	Root Cause
ER146780	28xx: IO timeouts were caused by the target firmware while receiving FCP_CMND with payload of at least 128 bytes or NVMe first-burst write commands.	The receive sequencer code issued and invalid instruction to an ATIO register.
ER146790	83xx, 27xx, 28xx: (NPIV) After the driver disabled a virtual port then enabled a new virtual port for the same WWPN, the firmware dropped frames associated with the new virtual port.	The old DID was not properly cleared from caching because firmware neglected to clear a validity flag.
ER146762	83xx, 27xx, 28xx: (NPIV) The firmware generated a System Error (AEN 8002h) after a cable pull while a virtual port was created.	A pointer associated with the virtual port was destroyed while posting the asynchronous event notification or Immediate Notify IOCB.
ER146793	28xx: The target firmware generated System Error (AEN 8002h) when the receive sequencer hanged.	The receive sequencer ignored incoming messages while waiting for completion from ATIO hardware.
ER146823	28xx: The FC link would occasionally land at 8G after link bounce while both the adapter port and switch port were configured in Auto-Negotiate mode.	This bug was introduced by ER145984.
ER146665	28xx: The target firmware posted ATIO Type 7 IOCB with Receive Exchange Address field equals FFFF_FFFFh, even though XCB resources were available.	The firmware failed to efficiently replenish the Receive Exchange Address FIFO.
ER146357	28xx: The target firmware stopped receiving frames after an FCP_CMND IU containing an unexpected D_ID was received.	Upon DID error, the FCP_CMND was not removed from a receive FIFO.
ER146836	28xx: (T10 DIF) The firmware falsely reported SPI Error (67h) for an IO	A context variable for EDiF IO was not initialized before use.

	requested via Command CRC_3 IOCB, even while EDiF was not active.	

Changes and Fixes from v9.02.00 to v9.03.00

Overview:

- This release is for 83XX, 27XX, and 28XX.
- The issues below are resolved in this release.
- For this 28XX release, the HFL version is 142 (new).
- For this 27XX release, the HFL version is 43 (new).
- For this 83XX release, the HFL version is 41 (new).

Error ID	Issue	Root Cause
ER144790	27XX, 28XX: A firmware system error (AEN 8002h) occurred while processing a message from MPI firmware.	FC firmware caused an invalid memory access.
ER144744	27XX, 28XX: The firmware provided incorrect version information to server management software.	The firmware could not handle version number components greater than two digits.
ER144525	27XX, 28XX: On adapters where ports were remapped (i.e., swapped), server management software would display the wrong WWPN for the port.	The routine that returned WWPNs to the server management software was not using the swapped port ID.
ER145818, ER145983	27XX, 28XX: Add static codes to MB5-MB6 of System Error (AEN 8002h).	Note: debugging only.
ER145884	28XX: After the flash was upgraded using QConvergeConsole HBA management applications, the firmware read stale data from the FC board configuration region in flash.	The region validation flags contained in flash were updated by Marvell HBA management software but were not interpreted correctly by firmware.
ER145955	28XX: Aborting a data transmit can result in a completion timeout, unexpected completion, and/or Request Transfer Error (8003h) AEN.	Firmware was using conflicting PCIe tags for Transmit DMA and Request Queue DMA, resulting in the cleanup of the Transmit DMA channel to affect a pending MEM_RD for a Request Queue DMA.
ER145876	28XX: DIF errors were reported during a write FCP command using DIF bundling with multiple XFER_RDYs.	The DIF context is initialized for the entire IO. If the first XFER_RDY IU's burst length was less than the entire transfer length, the DIF context did not get updated properly for the ensuing data sequences.
ER145705	The firmware posted an ELS Pass-through IOCB containing S_ID[23:16] equal to zero. This occurred in N2N	The firmware did not preserve S_ID[23:16] from the ELS Pass-through IOCB issued by the driver.

	topology while the Disable N2N Login After FLOGI feature (bit 8 of Firmware Options 3) was enabled.	
ER145757	28XX: Prevent corrupted frames from being transmitted after an internal ECC error is detected in the frame buffer. The potential for this condition can occur only when EDiF is enabled.	
ER145984	28XX: Improve calibration of the FC serdes receiver for optical connection at 16G and 32G speeds.	This change was for improvement only and not for any issue.
ER145989	28XX: An unknown serdes bus master (SBUS) version was captured in a FW dump after an SBUS version mismatch occurred.	Note: debugging only.
ER145990	28XX: The firmware did not apply optional FC serdes transmit parameters. The transmit parameters may be present either in flash or provided from system memory via Load Operational Firmware Parameters (001Bh) MBC.	Firmware did not correctly parse the optional FC serdes transmit parameters.
ER146029	28XX: After an exchange abort occurred, the target firmware posted errant Receive Error (8048h) AEN and CTIO IOCB with timeout status.	The failure was caused by resets to the receive FIFO.
ER135518	A System Error (AEN 8002h) occurred while aborting an exchange associated with Command Type 6 IOCB consisting of at least two data segments.	The firmware accessed an invalid memory address.
ER146057	28XX: The firmware posted an ELS Pass-through IOCB for an ELS reply containing incorrect payload.	The firmware allowed a frame buffer to be overwritten before the buffer could be transferred to system memory.
ER145878	28XX: The firmware began transmitting invalid frames after receiving a Class 2 FLOGI request, while Class 2 support was not enabled.	The firmware neglected to dequeue a P_RJT frame from the transmit queue.
ER146084	28XX: (FC_NVMe) Implement an initiator performance optimization for 4KB write IOs.	Send NVMe commands with equal priority as NVMe data to ensure there are enough pending XFER_RDYs to keep data flowing.

ER146106	28XX: After processing five write IOs requested via Command Type 6 IOCB with invalid DSD length, the transmit path was unable to send good data.	During DMA error handling, transmit DMA resources were not freed.
ER146044	27XX, 28XX: The link would not come up after advertising a non-zero BB_SC_N to the fabric port on older switches.	The firmware did not change the BB_SC_N value to zero after receiving LS RJT for FLOGI with reason code explanation equals zero (No Additional Information).
ER146131	25XX, 83XX, 27XX, 28XX: A System Error (AEN 8002h) occurred while processing Abort IO IOCB.	An XCB buffer was allocated without zeroing pointer fields.
ER144449	The Loss Of Sync field of Report Link Statistics did not reflect actual loss of sync events on the link.	The firmware did not increment the counter during certain link states.
ER146146	28XX: The firmware accessed the wrong location in the host XCB buffer pool while the Memory Offload feature was enabled.	The firmware used a dword offset instead of a byte offset to calculate the system memory address within the host XCB buffer pool.
ER146164	28XX: A host XCB was not offloaded to the host XCB buffer pool after the XCB's offload timer expired.	Related code was missing to perform this operation.
ER146169	28XX: The Current free target XCB count (MB2) of Get Resource Counts (0042h) MBC was incorrect.	The firmware used a logical operation instead of an arithmetic operation.
ER146135	28XX: The LEDs on link down did not blink as specified in the LED table.	The firmware incorrectly turned off the LED.
ER146124	28XX: 28XX: The FC link did not come up in direct-attached topology (i.e., N_Port to N_Port). Both ports in the connection were capable of 32G data rate and were initialized in auto-negotiate mode. A 16G SFP was installed on one port and the 16G FEC setting was enabled. On the other port, a 32G SFP was installed but the 16G FEC setting was not enabled.	In this configuration, the data rate should be 16G and FEC should be inactive, but firmware prevented this by not clearing internal flags correctly during the speed negotiation process.
ER146165	28XX: The firmware turned off the laser off on a certain 32G SFP during firmware initialization.	The SFP advertised low power mode incorrectly. To ensure better interoperability, firmware has been modified to not change the power level 32G or lower speed SFPs.

ER146197	28XX: The firmware wrote an incorrect power level to a certain 32G SFP.	To ensure better interoperability, firmware has been modified to not change the power level 32G or lower speed SFPs.
ER146219	28XX: A firmware System Error (AEN 8002h) occurred while configuring an SFP.	The issue was caused by an incompatibility with ER145984.
ER146218	28XX: During abort of an IO exchange, the target firmware posted an ATIO Type 7 IOCB containing an invalid frame header.	The firmware issued an extra read to a receive FIFO.
ER146006	The link did not come up with a certain 16G SFP.	The SFP required a longer time to complete a write access than the firmware expected.
ER146205	28XX: Signal integrity testing found incorrect FC link behavior.	The firmware did not load the optional FC receive serdes parameters.
ER146123	28XX: A System Error (AEN 8002h) occurred after cable pull.	An invalid PCB pointer was dereferenced during exchange cleanup.
ER146280	27XX, 28XX: Mailbox commands timed out during the dump procedure while the MPI firmware was running.	The interprocessor semaphore was not released.
ER146283	28XX: The link did not come up in 16G FEC configuration while attached directly to a certain storage device.	A timing window allowed noise to be misinterpreted as loss of sync.
ER146245	83XX, 27XX, 28XX: Timeouts occurred on the target for IO using CTIO Type CRC_3 with multiple DSDs.	Data was not transmitted because contexts were not setup for additional DSDs.
ER146293	27XX: A degradation in write IO throughput was observed.	27XX data transmits were misconfigured due to 28XX firmware changes.
ER146055	28XX: For FC data rate greater than 32G, Serdes Bus Master firmware v1026 requires the FC firmware to periodically pass temperature data to the FC serdes.	N/A
ER146294	28XX: After a cable pull, the target firmware falsely returned status Invalid EDiF Request (66h) or SPI Error (67h) for a CTIO Type 9 IOCB with Additional Flags 2 field bit 2, Enable In-Flight Encryption, set to 1, and IOCB Flags Data Direction bits set to 1, Data in (Transmit).	The main processor relied on bogus status from the transmit or auxiliary processors.

ER146299	28XX: A System Error (AEN 8002h) occurred during an I/O with EDiF active.	An invalid message was generated by the transmit co-processor.
ER146306	28XX: A System Error (AEN 8002h) occurred during an I/O with EDiF active.	The transmit co-processor was unable to pass a message to the RISC while the message FIFO was full.
ER145997	28XX: The firmware did not set the Allow Mixed Text Receive flag (Port Flags bit 1 of Get Port Database MBC) while there were active transmit requests for the SA Index being invalidated and while the Allow Mixed Text Receive Write Enable (bit 6), Invalidate Index (bit 0), and Transmit Direction (bit 1) of the Flags field of the Security Association Update IOCB request were set to 1.	There was a missing implementation for deferred SAU IOCB completion case (due to active transmit requests).
ER145998	28XX: Fixed potential System Error (AEN 8002h) or Security Association Update IOCB not completing when processing a Security Association Update IOCB invalidating a transmit SA Index with active transmit requests for the SA Index.	There was an incorrect implementation to handle a deferred SAU IOCB completion case (due to active transmit requests).
ER145783	28XX: The “Allow Plaintext Receive” implementation did not allow for mixing encrypted and unencrypted data IUs on an initiator read command.	This change was an enhancement.
ER146345	28XX: Target firmware gave the wrong status for a CTIO completion while EDiF was enabled.	The expected status (Invalid EDiF Request) was overwritten before posting the CTIO completion.
ER146326	83XX, 27XX, 28XX: The firmware falsely returned IO completion 0Ch (DIF Error) while aborting T10 IO using DIF bundling.	The firmware did not remove pending DMA requests associated with abort exchanges.
ER146375	28XX: The initiator FC port stopped transmitting BB credits, causing the switch to issue Link reset.	When receive data frames are followed by a large-sized FCP_RSP IU (greater than 64byte payload) and a subsequent series of 4 or more short-size FCP_RSP IUs, receive processing gets stuck and is unable to unload and process the incoming frames.

ER146063	28XX: An IO timeout occurred while 'Enable Asynchronous IOCBs to ATIO Queue' (Bit 11 of Additional Firmware Options 2) was set to 1 on the target.	The operation to post an ATIO Type 7 IOCB was prevented while the firmware was posting an Asynchronous IOCB to the ATIO queue.
ER146356	28XX: While aborting specific IO exchanges, a target firmware issue led to timeouts of unrelated IO exchanges.	The operation to post an ATIO Type 7 IOCB was prevented while processing received ABTS requests.
ER146403	28XX: The firmware prematurely changed the port login state to 'PLOGI pending' without successfully transmitting PLOGI to the remote port. The login was requested by the driver via Login/Logout Port IOCB containing SP bit set to 1 that resulted in Command Parameter Error.	The firmware changed the port login state before completing validation of the PLOGI request with SP bit set to 1.
ER146404	28XX: A firmware System Error (AEN 8002h) occurred when Memory Offload Control/Status (0034h) MBC was issued to configure PCB Offload.	The auxiliary sequencer panicked upon receiving an unsupported message from the main processor.
ER146396	28XX: A firmware System Error (AEN 8002h) occurred on the target after a T10 CRC write with EDiF fails with DIF Error.	In handling the IO exchange, the receive sequencer did not identify the owner of the exchange before invoking the main processor.
ER146354	83XX, 27XX, 28XX: Stop Firmware (0014h) MBC completed with Command Error (4005h) and subcode 'Incompatible HFL Version' (36h).	An XCB pointer associated with Memory Offload was not cleared after use.
ER146037	28XX: The condition specified in 'an interrupt is generated when the firmware has no active exchanges' for ZIO6 operation mode was not implemented correctly.	A certain number of active exchanges were not considered before generating the interrupt.
ER146393	28XX: A firmware System Error (AEN 8002h) occurred after the link was bounced while IO was running.	When aborting an IO, the firmware failed to clear all the IO context. The inconsistent context was later detected and trapped as a system error.
ER146287	83XX, 27XX, 28XX: The firmware did not complete a loop while searching for XCB swap candidates while the PCB Offload feature was enabled on the target.	The firmware did not update the loop counter.

ER146442	83FC, 27XX, 28XX: The link initialization timing was beyond design limits.	The additional time was caused by reading the SFP to check RxLOS while in a loop.
ER146417	28XX: The target firmware hanged upon receiving a first burst command.	The RISC processor did not release a lock to access the ATIO queue.
ER146415	27XX, 28XX: The target firmware hanged while offloading a PCB to DDR memory while the PCB Offload feature was enabled and was configured with DDR memory.	After offload, the firmware didn't update the host PCB's DDR access state to IDLE, thus preventing subsequent offload operations.
ER146414	28XX: A firmware system error (AEN 8002h) occurred while running IO with the PCB Offload feature enabled.	The firmware accessed an invalid address by forming a bad PCB pointer.
ER146267	83XX, 27XX: 28XX: Potential issues could occur while the PCB Offload feature was enabled.	Prior to swapping out a host PCB, the firmware neglected to determine whether the host PCB swap-out candidate was associated with either host XCB buffer or pending BA_RSP buffer. These buffers could be updated with stale PCB pointer.
ER146470	28XX: An HFL operation may disable the frame transmit timeout mechanism.	Firmware did not restart a frame transmit timer after HFL.
ER146484	28XX: Increment the HFL version	
ER146482, ER146628	28XX: Implement the Read PCIe Serdes Register (0074h) MBC.	This feature is applicable to testing only.
ER146453	28XX: The target firmware stopped posting ATIO Type 7 IOCB after only 64 FCP_CMND IUs were received while Queue Pointer Mirroring (Fh) operation mode was enabled.	The firmware did not empty the ATIO completion FIFO.
ER146501	83XX, 27XX: Access Control (003Eh) MBC, related to flash, completed with 'Command Error' (4005h) and subcode 'Unrecognized Flash' (4h).	Validation of the Flash Description Table (FDT) was broken by ER145733.
ER146416	28XX: A CTIO timeout occurred while running NVMe traffic.	The auxiliary processor did not unlink the previous CTIO from the XCB, leading to timeout for the next CTIO.
ER146488	27XX, 28XX: The offsets of several statistics fields (starting from byte offset 18Ch) did not match the	An earlier firmware change incorrectly shifted certain offsets.

	Private Data Counters API documentation.	
ER146530	28XX: A firmware system error (AEN 8002h) occurred upon processing Command Type NVMe CRC IOCB.	The auxiliary processor did not support this IOCB type.
ER146531	28XX: A NVMe first burst command was transmitted to a target port that did not enable NVMe first burst.	The firmware did not validate NVMe first burst support by the target port.
ER146534	28XX: (T10 DIF) A CTIO issued by the driver to send SCSI Status with SCSI Status Mode 2 was returned by the firmware with 'DMA Error' (10h) status.	When processing the new CTIO to send FCP_RSP with status mode 2, firmware failed to clear T10 flags from the previous T10 CTIO.
ER146540	24XX, 25XX, 83XX, 27XX: A firmware System Error (AEN 8002h) occurred on the target while simultaneously processing T10 CRC write IO and attempting to post a PUREX IOCB while Enable Asynchronous IOCBs to ATIO Queue (Additional Firmware Option 2, bit 11) was enabled.	A deadlock occurred with the main processor unable to acquire the ATIO queue lock as the receive sequencer attempted to send a message to the main processor.
ER146557	28XX: Integrate the FC serdes bus master (SBUS) version 0x1026 for operability at FC speeds greater than 32G.	N/A
ER146518	27XX, 28XX: After link up with the fabric, the firmware reported N2N topology to the driver while the adapter was configured to advertise BB_SC_N.	An incoming LS_ACC frame for FLOGI was be overwritten by subsequent LS_ACC for PLOGI.
ER145736	IOPS was below requirements for certain environments.	The initiator firmware did not optimize certain cases of received FCP_RSP.
ER146564	28XX: A firmware System Error (AEN 8002h) occurred on the initiator while running NVMe traffic.	Firmware caused an internal NMI by accessing a particular hardware register while a DMA operation was in progress.
ER146578	28XX: Get Parameters (005Dh) MBC returned zero ASIC temperature while an old FC SBUS version was running.	The previous method of getting the ASIC temperature was disabled by the new method without bridging the gap.
ER146577	27XX, 28XX: In a multi-ATIO queue configuration in round-robin mode, the target firmware posted all ABTS Received IOCBs to ATIO queue 0,	The firmware implementation neglected to correctly route ABTS Received IOCB.

	instead of to the specific ATIO queue used to service the exchange.	
ER146622	28XX: Failures were observed during FC signal integrity testing.	Firmware failed to correctly load optional FC serdes transmit parameters from flash.
ER146625	28XX: Implement the Enhanced Queue Pointer Shadowing feature.	
ER146643	28XX: Firmware ignored MB4 (Options) of Execute Firmware (0002h) MBC, preventing the Additional Receive Credits from being enabled.	ER145599 overwrote the Options parameter of Execute Firmware (0002h) MBC.
ER146647	28XX: Add support for the Memory Exchange Offload feature.	
ER146601	83FC, 27XX, 28XX: Firmware depleted its buffer resources while accessing its port database while the PCB Offload feature was enabled.	The firmware continuously allocated buffers while attempting to swap-in a PCB from host memory.
ER146703	28XX: Firmware posted a System Error (AEN 8002h) indicating inconsistency in the firmware buffer pool on the target.	While failing a CTIO with an entry status error, the CTIO buffer was deallocated twice.
ER146679	28XX: Firmware posted a System Error (AEN 8002h) while the Exchange Offload feature was enabled.	Firmware formed an invalid pointer to a pageable XCB.
ER146711	28XX: The target caused IO timeouts with reads over 16K.	The target changed SEQ_ID after transmitting the first 8K.
ER146660	28XX: The firmware reported buffer credit overflow after running internal loopback while the HBA port was attached to a Cisco switch.	The firmware was incorrectly handling buffer credit management during internal loopback operations.
ER146274	28XX: Add initial support for the SAN Congestion Management feature.	
ER146684	27XX, 28XX: The LEDs across the ports of certain adapter models blinked out of sync on Link Down.	Firmware did not check for a change in a port LED.
ER146755	28XX: An IO timeout or System Error (AEN 8002h) could occur while processing an Abort IO (33h) IOCB.	While handling the Abort IO, the transmit sequencer remained stopped and was not resumed.
ER146752	28XX: The link did come up after processing Data Rate (005Dh) MBC with MB1 equals 2 and MB2 equals 4 (8G), 5 (16G) or 6 (32G), while the Data Rate (Firmware Options 3, bits	The Loss Of Sync transmit duration was too short to be detected by the peer port.

	15-13) were set to 2 (Auto-negotiate).	

Changes from 9.01.00 to 9.02.00

Overview:

- This release is for 28XX.
- The issues below are resolved in this release.
- For this 28XX release, the HFL version is 141 (new version).

Error ID	Issue	Root Cause
ER145495	28XX: Add support to transmit LR whenever a frame is dropped by hardware due to no BB credit.	Prior to 28xx, chipsets did not notify firmware of this condition.
ER145688	28XX: While the Exchange Offload feature was enabled, a firmware System Error (AEN 8002h) occurred due to a failed range check of OX_ID or RX_ID.	When bit 15 of X_ID was inadvertently mask off, two different X_IDs could end up mapping into the same address. Later, when the saved X_ID is fetched for range checking, the check failed as out of range which led to a system error.
ER145730	28XX (A1): A continuation IOCB associated with an asynchronous IOCB type (PUREX, Report ID Acquired, etc) was not posted on the ATIO queue.	Firmware did not handle the asynchronous IOCB with continuation IOCB to the ATIO queue correctly.
ER145507	Unexpected 8048h asynchronous event occurred due to firmware initiated receive FIFO Reset after receive path T10 CRC IO encountering DIF error(s).	When a T10 CRC IO encounters a DIF error in the receive path, firmware cleans up that IO. If more frames for that IO were received interleaved with frames for a different IO, the firmware processed them without checking whether the IO was cleaned up. This could interfere with the cleanup and require a receive FIFO reset to recover.
ER145508	An unexpected 8048h AE was generated from the receive path during abort testing of T10 CRC with DIF Bundling.	Before firmware decides to abort a receive operation, it tries to wait until no more progress is being made. In DIF bundling path firmware looked at the wrong status register to determine progress, leading to a premature aborting of IO and frames left behind in the receive FIFO that lead to firmware resetting the Rx FIFO to clean up.

ER145509	Unexpected 8048h AE occurred when the driver mis-programmed the DSD byte counts and a T10 DIF error occurred in the receive path.	Firmware did not account for driver programming the wrong value in this case and did not have code to properly discard the frame(s) in this situation. This resulted in resetting the receive FIFO.
ER145748	27XX, 28XX (Target): While the Autonomously Send FCP_RSP feature (Additional FW Options 1, bit 8) was enabled, a firmware System Error (AEN 8002h) occurred when target exchange resources were exhausted	Firmware de-allocated an IOCB twice.
ER145389	83XX, 27XX, 28XX (Target): While Exchange Offload feature was enabled, a firmware System Error (AEN 8002h) occurred when the target port received a BA_ACC reply. The abort was requested by the target driver via a CTIO.	The exchange associated with the IO was offloaded and the XCB used for the ABTS exchange was not preserved while waiting for the ABTS reply.
ER145525	27XX, 28XX (Target): While the RWO feature was enabled, a First Burst 2 received IOCB (3Dh) failed with overrun error (0007h) completion status when FC frame crosses first burst buffer boundary.	Firmware previously did not support such buffer boundary crossing as indicated in the RWO API. The API has been changed to relax this restriction.
ER145264	27XX, 28XX (Target): While the RWO feature was enabled, a firmware System Error (AEN 8002h) occurred when aborting a first burst receive frame that crossed a buffer boundary, followed by receiving an unsolicited frame.	Missing firmware implementation for this special case as there was no firmware to handle such abort.
ER145261	27XX, 28XX (Target): While the RWO feature was enabled, a firmware System Error (AEN 8002h) occurred when running write IOs and clean up was applied to the IO or to the associated N_Port handle for the IO.	Firmware performed an illegal memory access due to an uninitialized field in the port control block.
ER145269	27XX, 28XX (Target): While the RWO feature was enabled, a firmware System Error (AEN 8002h) occurred when firmware attempted to post an asynchronous IOCB to the ATIO queue.	A deadlock occurred in inter-processor messaging under heavy IO.

ER145268	27XX, 28XX (Target): Issue #1: A firmware System Error (AEN 8002h) occurs when firmware is out of receive buffer to handle more first burst data frame coming in during RWO handling. Issue #2: Firmware doesn't generate Asynchronous Event 8019h/801Ah. To avoid these issues, the API was enhanced to return the free receive buffer container count in outgoing mailbox register 4 of MBC 42h.	Root Cause #1) The RWO discard timer handling was not implemented. Root Cause #2) Firmware doesn't generate Asynchronous Event 8019h/801Ah when the available receive buffer count is running out or below low watermark threshold, when the receive buffer size is greater than FCP_DL.
ER145733	28XX: Following a flash update and subsequent ASIC reset, FC firmware could access stale information from flash. This issue occurs only after flashing with QConvergeConsole HBA management applications.	Flash validation flags were decoded incorrectly.
ER145749	28XX: Following a link re-initialization in public loop, a subsequent FCP command completed with reset status.	Updated system flags were not communicated to the auxiliary processor for IOCB validation.
ER145344	27XX, 28XX: The offsets of several fields in the Link Statistics and Private Data area did not match the documentation.	This issue affected certain builds and was introduced by an earlier change to the Link Statistics and Private Data area.
ER145782	27XX, 28XX (Target): ATIO Queue Full occurred after an HFL was performed, resulting in FCP command time outs.	ATIO Queue shadow pointer was not updated when posting INOT.
ER145320	27XX, 28XX (Target): While RWO was enabled and while receiving first burst data, the target stopped sending buffer credits, resulting in link recovery (LR).	Received first burst IU is not handled by firmware when F_CTL bit 16 (sequence initiative transferred) is set, the frame is not the last frame of the sequence, and there is at least one more receive IO interleaved with the first burst IU.
ER145343	27XX, 28XX: Add support for HFL while RWO is enabled. This change requires an HFL version bump.	
ER145361	27XX, 28XX (Target): When RWO was enabled and the Release Buffer Pools (004Eh) mailbox command was executed, multiple received first	Firmware did not release the receive buffer container buffers allocated to the active RWO

	burst IUs could reference the same receive buffer container.	exchanges when processing Release Buffer Pools (004Eh) MBC.
ER145488	27XX, 28XX (Target): While the RWO feature was enabled, a CTIO IOCB request to send FCP_RSP was sometimes not processed for an RWO command. This led to IO timeouts, as well as a memory leak of the FCP_RSP CTIO.	If the CTIO to send FCP_RSP was received before the RWO data phase completed, the FCP_RSP CTIO was linked to the pre-allocated CTIO. However, when the data phase completed, the firmware did not check to see whether another CTIO was waiting to be processed. This resulted in firmware not processing the FCP_RSP CTIO.
ER145489	27XX, 28XX (Target): While the RWO feature and Receive Sequence Error Detection feature were enabled, the target did not detect and report sequence timeout errors for RWO exchanges.	The sequence timer was not started for RWO data.
ER145732	83XX, 27XX, 28XX: A Firmware System Error (AEN 8002h) was reported due to unexpected contents in the offloaded XCB structure while searching the offloaded exchange list for an aborted exchange.	The command DMA (CDMA) channel is used to perform the offload, as well as other types of data transfer between the ASIC and host memory. Firmware single threads these CDMA requests. If the driver is slow to provide CTIOs for an active pageable exchange, the firmware will attempt to offload that exchange. If that exchange is aborted in the middle of its DMA, while there are other types of requests in the CDMA queue (including other offloaded exchanges waiting to be swapped in/out), the firmware can accidentally request more than one CDMA transfer. This causes the FW and HW states to get out of sync. Accordingly, firmware uses stale data and posts the AE8002.
ER145734	83XX, 27XX, 28XX: While the Exchange Offload feature is enabled, a firmware System Error (AEN 8002h) could occur under heavy IO load.	RISC timed out waiting for a semaphore that is needed to access the XCB array, when almost all the exchanges are allocated. The semaphore timeout did not account for the worst-case time

		required for the receive processor to search the entire array with offload enabled.
ER145735	83XX, 27XX, 28XX (Target): A firmware System Error (AEN 8002h) occurred while processing a CTIO to terminate an offloaded exchange with mismatched OX_ID field and the exchange is being swapped into RISC memory.	Firmware corrupted a host exchange, resulting in an invalid internal memory access.
ER145481, ER145523, ER145747	83XX, 27XX, 28XX: False DIF errors were reported while processing CRC_3 IOCBs with frame mode enabled for the transmit path. The symptom of the false errors is that the reported Expected and Actual tags are identical. The fix for this issue requires an HFL version change.	When the DSD did not end on a frame boundary, the HW used the wrong expected tags when switching DSDs.
ER145787	83XX, 27XX, 28XX: In initiator mode, when using command type CRC_3 with multiple FCP_XFER_RDY, the secondary FCP_XFER_RDYs could either get dropped or result in a DIF error.	When an FCP_XFER_RDY was received which did not begin on a DSD boundary, firmware used the wrong block size (depending on the DIF mode), which can result in identifying the wrong DSD to resume the transfer.
ER145800	28XX: Added ATIO shadows (see 28XX Series Fibre Channel Firmware Interface Specification) to dump template.	Missing from dump template.
ER145812	28XX (A1): The target firmware failed to post an ATIO IOCB, resulting in IO timeouts.	FCP_CMD IUs with payload greater than 128 bytes were not posted to ATIO.
ER145772	28XX (A1): Updated FC serdes firmware 109B_2085.	N/A
ER145821	28XX (Target): While multiple ATIO Queues were enabled, the firmware transferred the ATIO IOCB to the wrong address, resulting in IO timeouts.	An incorrect address of the ATIO queue was programmed for ATIO queue numbers greater than zero.
ER145834	28XX (A1, Target): A firmware System Error (AEN 8002h) could occur when multiple CTIOs were posted to the request queue for the same IO.	Target mode performance improvements for 28XX A1 resulted in two different processors accessing the same field in the exchange resource. If the

		accesses occurred simultaneously, the structure was corrupted.

Changes from 9.00.00 to 9.01.00

Overview:

- This release is for 28XX.
- This is the initial release for 28XX 'A1' (rev 2).
- The issues below are resolved in this release.
- For this 28XX release, the HFL version is 140 (new version).

Error ID	Issue	Root Cause
ER144741	27XX, 28XX: Add support for Port Congestion descriptor in RDP reply payload. For 27XX, the descriptor fields will be present but will not be valid.	N/A
ER145480	28XX: A firmware System Error (AEN 8002h) occurred while firmware was processing an internal PCIe interrupt.	Firmware formed an invalid address to the statistics data structure.
ER145506	28XX A1: Validate the ASIC version during Execute Firmware (0002h) MBC. If version is less than 2, this MBC completes with mailbox command failure (4005h).	N/A
ER145533	28XX (A1): Add support for the BB credit recovery feature.	
ER145535	Initiator performance issue when certain target sends otherwise good FCP_RSP IUs containing a non-zero parameter field.	Firmware sets up ASIC to treat a non-zero parameter field of FCP_RSP as slow path.
ER145556	28XX: The internal I2C bus could end up in an invalid state after an access error occurred.	Following an access error, the I2C bus was not cleared.
ER145595	(Target): The CRC errors field of the Report Link Status (RLS) data structure was not incremented when the target received FCP_CMND IUs containing CRC frame errors.	The firmware recognized the CRC error, but did not increment the RLS CRC error counter.
ER145522	After the initiator stopped IO, the target firmware reported the current free target exchange count to be less than the original free target exchange count.	During heavy IO load, exchange resources can become very low. Both the receive processor (RSEQ) and the main processor (RISC) attempted to allocate a newly released exchange resource. There was a case where one processor allocated the resource and did not update the status right away. This allowed the other processor to

		allocate the same resource. The exchange context then was a mix of two exchanges, which prevented the exchange from completing, and also prevented the driver from being able to terminate the exchange.
ER145424	28XX (A1, EDiF): Add capability of detecting and reporting OPD errors.	On 28XX_A0, OPD errors were reported as CRC frame errors. 28XX A1 added a HW fix to allow firmware to distinguish OPD errors, but it required a firmware change to process the new HW status. Firmware for 28XX A1 will report OPD errors as authentication errors (completion status 63h).
ER145604	28XX (A1): Improve detection of pad length error.	
ER145599	28XX: Unused hardware was consuming power.	Firmware was not efficiently managing power consumption.
ER145487	Flooding of tracing in firmware dumps reduced ability to debug.	Tracing of received XFER_RDY frames was duplicated.
ER145274	Continuation Type CRC_3 IOCB followed by Command CRC Type 3 IOCB may be inadvertently rejected with Invalid Entry Type Entry Status if running with multiple request queues.	Firmware switched to a new request queue between Command CRC Type 3 and Continuation Type CRC_3 IOCB.
ER145423	28XX (A1, Target): Add improvements to target mode performance.	
ER145649	A Firmware System Error (AEN 8002h) occurred during abort an FCP IO associated with Command Type 6.	When processing a Command Type 6 IOCB, a firmware transmit queue was corrupted due to a bad pointer.
ER145672	28XX (Target): Firmware posted a CTIO response containing Port Unavailable (28h) status.	Port information had not been set up prior to processing a CTIO.
ER145363	28XX: While two 28XX N_Ports were directly attached, the link did not come up while one N_Port's speed was fixed at 32G.	This issue was due to a timing issue during training.
ER145695	28XX: The FEC error counters were not incrementing when the link rate was 64G and errors were encountered. The FC link was established electrically.	There was no code to increment the counters when the FC link rate was 64G.

ER145706	28XX (A1, Target): An FCP IO timeout occurred following an HFL was performed on the target.	Firmware did not preserve the ATIO in-pointer.

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