LNX PFE Driver Release Notes

Rev. 1.1.0 — 30 September 2022

1 Introduction

Release Notes for NXP PFE S32G A53 LNX swv: 1.1.0 RTM.

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2 What is new in this release

This release has the following status in terms of testing and quality documentation:

- ORTM for S32G3
- ORTM for S32G2

The main goals of this release are:

1. S32G3: report all errors - IRQ handling for all available S32G3 PFE interrupts indicating errors.
2. Health monitor - core functionality for PFE events collection and reporting.
3. FCI Ownership negotiation for Multi-instance (Master/Slave scenario) enabling permissions and FCI configuration transactions for FCI clients.
4. PFE Platform removal - done due to internal organizational changes. PFE_PLATFORM tickets may have been cloned. All affected tickets have this information added, listed in format [AAVB-nnnn/cccc] where nnnn is number of new issue cloned from PFE_PLATFORM ticket number cccc.

The release includes also other features and many improvements, as well as an important number of bug fixes (see detailed list below).

Note:

The optimal PFE performance is obtained when buffers are placed in SRAM.

More recommendations can be found in PFE_S32G_A53_LNX_UserManual.pdf - Performance Considerations chapter.

3 Installation

Install the package into the desired directory and follow the enclosed user manual.

4 Release Location

This RTM 1.1.0 release sources are internally stored at location:

https://bitbucket.sw.nxp.com/projects/AUTO_ETH/repos/pfe_linux/browse

GIT release tag: BLN_PFE-DRV_S32G_A53_LNX_RTM_1.1.0

5   Release Specifics

This release was developed and tested with:

- Geany IDE version 1.38
- editor VIM - Vi IMproved 8.2
- NXP Auto Linux BSP 34
- GCC 10.2/10.3/8.3

This release was developed and tested using:

- Evaluation board: S32G-VNP-EVB
  - S32GRV-PLATEVB SCH-30081
  - X-S32G-PROCEVB-S SCH-32170
- Evaluation board: S32G-VNP-EVB3
  - S32GRV-PLATEVB SCH-30081
  - S32G-PROCEVB3-S SCH-50784
- S32G2 Vehicle Networking Reference Design: S32G-VNP-RDB2 SCH-47440
- S32G3 Vehicle Networking Reference Design: S32G-VNP-RDB3 SCH-53060

6   Supported Features

- Integrates the S32G PFE Ethernet driver
- Supports slow-path functionality
- Supports fast-path features and configuration API

7   Supported Derivatives

The release integrates following derivatives:

- PS32G274ABVUC 0P77B Rev. 2.0
- P32G399AACVUC 0P72B Rev. 1.0

8   Directory Structure

Release package directory structure:

- `sw/bpool`
  BPool library sources (dependency for the linux-pfeng)
- `sw/common`
  Common library sources (dependency for the linux-pfeng)
- `sw/linux-pfeng`
  Linux kernel driver sources (the driver project)
- `sw/elf`
  ELF library sources (dependency for linux-pfeng)
- `sw/fifo`
  FIFO library sources (dependency for linux-pfeng)
- `sw/hal`

HAL library sources (dependency for linux-pfeng)
- `sw/oal`
  OAL library sources (dependency for linux-pfeng)
- `sw/pfe_hif_drv`
  Host interface library sources (dependency for linux-pfeng)
- `sw/pfe_platform`
  PFE Platform library sources (dependency for linux-pfeng)
- `sw/fci`
  FCI endpoint library sources (dependency for linux-pfeng)
- `sw/xfci/libfci`
  The FCI library sources (FCI library and dependency for linux-pfeng)
- `sw/libfci_cli`
  FCI CLI DEMO example utility libfci_cli sources
- `doc/`
  User's manual, FCI API Reference manual and device-tree
- `PFE_S32G_A53_LNX_RTM_1.1.0_ReleaseNotes.pdf`
  Release notes file
- `LICENSE-GPL2.txt`
  License text file
- `LICENSE-BSD3.txt`
  License text file
- `PFE_S32G_A53_LNX_RTM_1.1.0_SCR.txt`
  Software Content Register

9 Compiler Options

Compiler options are described within Makefile located in every SW module directory.

10 Assumptions

- Compatible firmware: BLN_PFE-FW_S32G_RTM_1.4.0
- Compatible Linux BSP: Linux BSP 34

11 Known Issues

List of known issues:

- [AAVB-3527] - [PFE_DRV_LINUX] Platform doesn't clear all states on destroy (issue for suspend)
- [AAVB-3751] - [PFE_DRV_LINUX] Rare FW errors on unload
- [AAVB-3970] - [PFE_DRV_LINUX] IDEX: remove use of in_atomic()
- [AAVB-4031] - [PFE_DRV_LINUX] Driver crash: rcu_preempt self-detected stall on CPU (~ 1 in a 1000 times)
- [AAVB-4103] - [PFE_DRV_LINUX] Autoneg from 2.5 to 1G on PFE0 - Error from Aquantia PHY
- [AAVB-4505] - [PFE_DRV_LINUX] Slave AUX only scenario: Not able to access PHY registers over MDIO
- [AAVB-4867] - [PFE_DRV_LINUX] Coverity: CID 21531074: 'Constant' variable guards dead code
- [AAVB-4870] - [PFE_DRV_LINUX] Coverity: CID 21531071: Structurally dead code

- [AAVB-5117] - [PFE_DRV_LINUX] RPC transport failed after repeated load & unload of pfeng-slave driver
- [AAVB-5345] - [PFE_DRV_LINUX] libfci_cli hangs after traffic load test (Bridging fast path)
- [AAVB-5489] - Tx timestamp message of pfe timeout when it is under high load
- [AAVB-5566] - [PFE_DRV_LINUX] Thread deadlock in pfe_log_if
- [AAVB-5568/4102] - [PFE_DRV_LINUX] Include file recursion pfe_log_if.h/pfe_phy_if.h
- [AAVB-5570/3776] - [PFE_DRV_LINUX] HIF channel DMA is active even when there is no traffic
- [AAVB-5572/3768] - [PFE_DRV_LINUX] Multi-Instance: RPC will not work after many logical interfaces were created
- [AAVB-5574/3701] - [PFE_DRV_LINUX] HIF and HIF_NOCPY channels still receive data even if Rx path is disabled
- [AAVB-5776] - [PFE_DRV_LINUX] G3: EMAC FSM errors is looping all the time
- [AAVB-5836] - [PFE_DRV_LINUX] Ingress QoS classification based on L4 port ID range is not functional
- [AAVB-5904] - [PFE_DRV_LINUX] The PFE driver prints a large number of firmware messages#Mixed in with (Invalid error address from FW)
- [AAVB-5945] - [PFE_DRV_LINUX] S32G3 Wrong number of WDT IRQ number

12 3rd Party Issues

List of 3rd party issues:

13 Changelog

13.1 What's Modified in RTM_1.1.0

- **New Feature**
  - [AAVB-2058] - [PFE_PLATFORM] PE stall/crash detection
  - [AAVB-3962] - [PFE_PLATFORM] VLAN Statistics FCI API
  - [AAVB-3991] - [PFE_PLATFORM] S32G3: report all errors
  - [AAVB-5231] - [PFE_PLATFORM] EMAC events handling - EMACs ECC, Timeout and Parity checking and implement events processing
  - [AAVB-5277] - [PFE_PLATFORM] Health monitor module in Master mode
  - [AAVB-5497] - [PFE_DRV_LINUX] Implement FCI ownership negotiation
  - [AAVB-5713] - [PFE_DRV_LINUX] PTP frames distribution FCI API
- **Improvement**
  - [AAVB-2409] - [PFE_PLATFORM] Routing table hash algorithm update to be more benefical for symetric trafic routes
  - [AAVB-5040] - [PFE_DRV_LINUX] FCI: Change mutex locking scheme of FCI module to better support FCI events
  - [AAVB-5780] - [PFE_DRV_LINUX] The for loop for clearing LMEM is optimized as memset while pfe is built into kernel
- **Bug**
  - [AAVB-4508] - [PFE_DRV_LINUX] Aquantia PHY driver allows to connect on unsupported speeds (speed higher than 2.5G)
  - [AAVB-4755] - [PFE_DRV_LINUX] Coverity: CID 10134: Logically dead code

- – [AAVB-5086] - [PFE_DRV_LINUX] The counter of conntrack does not work properly
- – [AAVB-5555] - [PFE_DRV_LINUX] BMU2 buffer size should not be configurable
- – [AAVB-5564/4863] - [PFE_DRV_LINUX] Coverity: CID 21531078: Logically dead code removal
- – [AAVB-5658] - [PFE_LINUX][develop]Receiving on PFE ethernet interface can get stalled with a lot of DDR traffic
- – [AAVB-5768] - Frame reception is unreliable after Linux exits Out Of Memory (OOM) condition

13.2 What's Modified in BETA_1.0.0

- **New Feature**
  - – [AAVB-4524] - [PFE_DRV_LINUX] libFCI: Add fci_fd()
  - – [AAVB-4726] - [PFE_DRV_LINUX] Enable placement of BMU2 buffers and routing table in SRAM
- **Improvement**
  - – [AAVB-2412] - [PFE_DRV_LINUX] Make routing table configurable
  - – [AAVB-3202] - [PFE_DRV_LINUX] finalize pinctrl for EVB, RDB & RDB devboards
  - – [AAVB-3295] - [PFE_DRV_LINUX] pfe driver should report phy timestamping support
  - – [AAVB-3829] - [PFE_DRV_LINUX] Retry to request(clk_prepare_enable) RX clock
  - – [AAVB-3874] - [PFE_DRV_LINUX] S32G3: allows 2500 Mbps over SGMII
  - – [AAVB-4028] - [PFE_DRV_LINUX] Simplify DT: hide HIF config
  - – [AAVB-4112] - [PFE_DRV_LINUX] Remove HIF NOCPY from driver
  - – [AAVB-4880] - [PFE_DRV_LINUX] Clean-up: remove PFENG_CFG_LINUX_NO_SERDES_SUPPORT
  - – [AAVB-5016] - [PFE_DRV_LINUX] Defeature reserved-memory support from the Slave driver
  - – [AAVB-5207] - [PFE_DRV_LINUX] pfeng: remove silicon check
- **Bug**
  - – [AAVB-3197] - [PFE_DRV_LINUX] pinctrl-0/pinctrl-names properties are ignored
  - – [AAVB-4466] - [PFE_DRV_LINUX] eth0 logical interface can not work after perform suspend on ram
  - – [AAVB-4607] - [PFE_DRV_LINUX] Failed to disable logical interface during driver unload
  - – [AAVB-4674] - [PFE_DRV_LINUX] Napi schedule customer bug report
  - – [AAVB-4675] - [PFE_DRV_LINUX] Preemption counter shouldn't be modified by drv
  - – [AAVB-4677] - [PFE_DRV_LINUX] Can not ping from/to PFE0 after suspend on RAM
  - – [AAVB-4721] - [PFE_DRV_LINUX] BUG: use-after-free Read in pfeng_netif_logif_xmit
  - – [AAVB-4742] - [PFE_DRV_LINUX] Coverity: CID 21530842: Operands don't affect result
  - – [AAVB-4743] - [PFE_DRV_LINUX] Coverity: CID 21530841: Uninitialized scalar variable
  - – [AAVB-4744] - [PFE_DRV_LINUX] Coverity: CID 21530840: Resource leak
  - – [AAVB-4745] - [PFE_DRV_LINUX] Coverity: CID 21530839: Uninitialized scalar variable
  - – [AAVB-4746] - [PFE_DRV_LINUX] Coverity: CID 21530838: Resource leak
  - – [AAVB-4747] - [PFE_DRV_LINUX] Coverity: CID 21530837: Dereference before null check

- [AAVB-4748] - [PFE_DRV_LINUX] Coverity: CID 21530836: Unused value
- [AAVB-4749] - [PFE_DRV_LINUX] Coverity: CID 21530835: Unused value
- [AAVB-4750] - [PFE_DRV_LINUX] Coverity: CID 21530834: Unchecked return value
- [AAVB-4751] - [PFE_DRV_LINUX] Coverity: CID 21530833: Explicit null dereferenced
- [AAVB-4752] - [PFE_DRV_LINUX] Coverity: CID 21530832: Dereference null return value
- [AAVB-4753] - [PFE_DRV_LINUX] Coverity: CID 21272112: Out-of-bounds access
- [AAVB-4754] - [PFE_DRV_LINUX] Coverity: CID 21099164: Logically dead code
- [AAVB-4762] - [PFE_DRV_LINUX] OAL mem management init error causes seg fault
- [AAVB-4763] - [PFE_DRV_LINUX] Slave driver: PFE_CFG_LINUX_RES_MEM_ENABLE cannot be enabled
- [AAVB-4779] - [PFE_DRV_LINUX] driver doesn't receive traffic in AUX only mode
- [AAVB-4864] - [PFE_DRV_LINUX] Coverity: CID 21531077: Uninitialized scalar variable
- [AAVB-4865] - [PFE_DRV_LINUX] Coverity: CID 21531076: Dereference before null check
- [AAVB-4866] - [PFE_DRV_LINUX] Coverity: CID 21531075: 'Constant' variable guards dead code
- [AAVB-4868] - [PFE_DRV_LINUX] Coverity: CID 21531073: Uninitialized scalar variable
- [AAVB-4869] - [PFE_DRV_LINUX] Coverity: CID 21531072: Uninitialized scalar variable
- [AAVB-4993] - [PFE_DRV_LINUX] Fix kmalloc alignment checks for oal_mm_malloc_contig_*_aligned_cache
- [AAVB-5035] - [PFE_DRV_LINUX] PFE2 SGMII mode doesn't up to speed 2.5 Gb
- [AAVB-5039] - [PFE_DRV_LINUX] Master detect feature should not access registers during soft reset
- [AAVB-5072] - [PFE_DRV_LINUX] Segmentation fault triggered by mii-tool aux0
- [AAVB-5073] - [PFE_DRV_LINUX] Kernel panic when running ptp4l with aux0
- [AAVB-5205] - [PFE_DRV_LINUX] Coverity: CID 21764888,21764889: Out-of-bounds write
- [AAVB-5206] - [PFE_DRV_LINUX] Coverity: CID 21764890: Dereference null return value
- [AAVB-5212] - [PFE_DRV_LINUX] oal_mm reserved-memory nodes parsing fixes
- [AAVB-5236] - [PFE_DRV_LINUX] PFE stops working along with HIF channel timeout
- **PFE Platform - New Feature**
  - [AAVB-4117] - [PFE_PLATFORM] Implement soft_reset_done bit on G3
  - [AAVB-4673] - [PFE_PLATFORM] Routing table statistics FCI API
- **PFE Platform - Improvement**
  - [AAVB-3027] - [PFE_PLATFORM] Flush MAC table when interface is removed from bridge domain
  - [AAVB-3523] - [PFE_PLATFORM] Avoid modifying elf binary buffer when it is being loaded
  - [AAVB-3969] - [PFE_PLATFORM] Remove global flexible filter: FCI part
  - [AAVB-4680] - [PFE_PLATFORM] ERR051211: Driver shall update queue data in firmware before setting new queue sizes in TMU

- – [AAVB-4890] - [PFE_PLATFORM] Disable dynamic TMU configuration for UTIL interface
- **PFE Platform - Bug**
  - – [AAVB-3968] - [PFE_PLATFORM] FCI: isl value of QoS shaper is decremented with each shaper update
  - – [AAVB-4218] - [PFE_PLATFORM] MMC interrupt may be triggered without being handled
  - – [AAVB-4273] - [PFE_PLATFORM] pfe_phy_if_create() will cause a segmentation fault if mac db not created successfully
  - – [AAVB-4308] - [PFE_PLATFORM] 'Unmanaged' packets are not dropped if DMEM queue level above WRED MAX threshold
  - – [AAVB-4492] - [PFE_PLATFORM] Dynamic activation of the Ingress QoS policer block not reliable
  - – [AAVB-4713] - [PFE_PLATFORM] FCI: cannot set conntrack timeout for TCP and UDP traffic via FPP_CMD_IPV4_SET_TIMEOUT
  - – [AAVB-4740] - [PFE_PLATFORM] Driver crash during unload if conntrack FCI events are issued
  - – [AAVB-4808] - [PFE_PLATFORM] pfe_l2br_domain_create() does not return failure code when malloc 'domain' fails
  - – [AAVB-4828] - [PFE_PLATFORM] Logical interface name requested by slave driver is null string
  - – [AAVB-5082] - [PFE_PLATFORM] ERR051211 - Wrong default optimal queue size for TMU Q1-7

13.3 What's Modified in BETA_0.9.7

- **New Feature**
  - – [AAVB-4226] - [PFE_DRV_LINUX][PFE_PLATFORM] Support for PFE Configuration using FCI API from Linux Slave Driver through MCAL Master Driver as a Proxy
  - – [AAVB-4628] - [IMPLEMENTATION] Support RDB3 board in 2022 Q1 Releases
- **Improvement**
  - – [AAVB-2128] - [PFE_QNX/LINUX] Create a common database module and use it in FCI
  - – [AAVB-2397] - [PFE_DRV_LINUX] pfeng: dt: move to reg-names
  - – [AAVB-3343] - [PFE_DRV_LINUX] mtu 64: Network is unreachable
  - – [AAVB-4144] - [PFE_DRV_LINUX] Driver message logging refactor
  - – [AAVB-4180] - [PFE_DRV_LINUX] Master warn about IHC msg on wrong HIF channel
  - – [AAVB-4316] - [PFE_DRV_LINUX] Improve IHC: optimize tx spinlock usage and reduce wait queue overhead
  - – [AAVB-4331] - [PFE_DRV_LINUX] Update documentation with details about FCI Proxy
  - – [AAVB-4360] - [PFE_DRV_LINUX] When HIF is used for AUX and Log interfaces it is not possible to bridge traffic
  - – [AAVB-4431] - [PFE_DRV_LINUX] ERR051211 - Update all comments in Source Code to make refference to ERR051211

- – [AAVB-4472] - [PFE_DRV_LINUX] Rx datapath corner case fixes, optimizations and cleanup
- **Bug**
  - – [AAVB-3908] - [PFE_DRV_LINUX] Slave driver corrupts L2 bridge behavior when using EMAC
  - – [AAVB-4140] - [PFE_DRV_LINUX] Slave: ifconfig doesn't update MAC address forwarding rule on EMAC logif
  - – [AAVB-4244] - [PFE_DRV_LINUX] Ingress QoS IP address classification fails
  - – [AAVB-4276] - [PFE_DRV_LINUX] tcpdump exit or 'ifconfig up' breaks bridging
  - – [AAVB-4277] - [PFE_DRV_LINUX] typo in EMAC autoconfig
  - – [AAVB-4296] - [PFE_DRV_LINUX] Reload pfeng driver fails and hang DUT
  - – [AAVB-4318] - [PFE_DRV_LINUX] FCI proxy - occasional crash when executing LOGIF-related FCI commands
  - – [AAVB-4323] - [PFE_DRV_LINUX] phydev is not dettached when placed on external mdio bus
  - – [AAVB-4330] - [PFE_DRV_LINUX] Inter host communication (IHC) sleep in atomic context bugs for Linux SLAVE and MASTER drivers
  - – [AAVB-4344] - [PFE_DRV_LINUX] Driver can crash when receiving IHC on not-ihc channel
  - – [AAVB-4349] - [PFE_DRV_LINUX] Buffer allocation error after repeated driver load unload
  - – [AAVB-4362] - [PFE_DRV_LINUX] PFE unresponsive after Tx of IP fragmented UDP packet of certain size
  - – [AAVB-4493] - [PFE_DRV_LINUX] Failed to unload the PFE Slave driver in Linux
  - – [AAVB-4561] - [PFE_DRV_LINUX] slave pfe and slave aux logical interfaces can not be exposed to the OS
- **PFE Platform - New Feature**
  - – [AAVB-3911] - [PFE_PLATFORM] Statistics for conntrack
  - – [AAVB-4315] - [PFE_PLATFORM] Improve granularity of statistics of idex communication
- **PFE Platform - Improvement**
  - – [AAVB-4008] - [PFE_PLATFORM] Print error names in libfci_cli error messages
  - – [AAVB-4079] - [PFE_PLATFORM] Master/Slave: It should be possible to check if master was started using PFE Platform support
  - – [AAVB-4088] - [PFE_PLATFORM] pfe_hif_drv_client_receive_pkt() return NULL even HIFs have frames in receive buffer when send and loopback PTP packets in single client mode
  - – [AAVB-4099] - [PFE_PLATFORM] Master-detect: allow disable
  - – [AAVB-4142] - [PFE_PLATFORM] Error messages - Platform shell discriminate between firmware and driver error messages
  - – [AAVB-4145] - [PFE_PLATFORM] Remove non-VLAN bridge algorithm
  - – [AAVB-4231] - [PFE_PLATFORM] Disable FW feature ERR051211 when not needed
  - – [AAVB-4421] - [PFE_PLATFORM] ERR051211 - TMU queues sizes should be limited to the number of available slots
  - – [AAVB-4443] - [PFE_PLATFORM] FCI: Remove unnecessary interface modifications from non-interface FCI commands
- **PFE Platform - Bug**
  - – [AAVB-3945] - [PFE_PLATFORM] FCI command always return EOK when using unuse rules from FP table

- [AAVB-4097] - [PFE_PLATFORM] Memory overrun in pfe_l2br_table_read_cmd
- [AAVB-4116] - [PFE_PLATFORM] TMU queue statistic is incorrect after driver probe
- [AAVB-4135] - [PFE_PLATFORM] TMU queues can have max 256 packets across all queues on single PHY
- [AAVB-4164] - [PFE_PLATFORM] RPC transport failed due to race condition between Rx and Tx confirmation
- [AAVB-4178] - [PFE_PLATFORM] GPI QOS reset timed-out in pfe_gpi_destroy()
- [AAVB-4322] - [PFE_PLATFORM] FCI: cannot set position 16 for Egress QoS shapers
- [AAVB-4345] - [PFE_PLATFORM] Accessing UTIL text statistics while UTIL Firmware is not loaded crashes the driver
- [AAVB-4420] - [PFE_PLATFORM] fw feature ERR051211 is disabled by default on platform start-up
- [AAVB-4437] - [PFE_PLATFORM] FCI: wrong conntrack timeout when configured via FPP_CMD_IPV4_SET_TIMEOUT
- [AAVB-4491] - [PFE_PLATFORM] Ingress QoS WRED DMEM threshold cannot exceed the limit of 512

13.4 What's Modified in BETA_0.9.6

- **New Feature**
  - [AAVB-4047] - [PFE_DRV_LINUX] M/S: IP-ready signalization
  - [AAVB-2830] - [PFE_DRV_LINUX] Ingress QoS
- **Bug**
  - [AAVB-3705] - [PFE_DRV_LINUX] Slave logical interface prints IDEX error messages when getting up
  - [AAVB-3754] - [PFE_DRV_LINUX] Slave driver does not accept HIF NOCPY as a master channel
  - [AAVB-3828] - [PFE_DRV_LINUX] "Kernel BUG at pfeng_hif_chnl_txconf_free_map_full" for high Tx rate on 2.5G link
  - [AAVB-3878] - [PFE_DRV_LINUX] Slave: Don't setup EMAC logif to promisc mode
  - [AAVB-3898] - [PFE_DRV_LINUX] BUG: KASAN: use-after-free in pfeng_hif_chnl_poll+0x570/0x644 [pfeng]
  - [AAVB-3946] - [PFE_DRV_LINUX] "Sleeping while atomic" bug in pfeng driver
  - [AAVB-4000] - [PFE_DRV_LINUX] Slave driver unload triggers Kernel BUG at gen_pool_destroy()
- **Improvement**
  - [AAVB-3660] - [PFE_DRV_LINUX] Make default VLAN ID configurable
  - [AAVB-3706] - [PFE_DRV_LINUX] SLAVE should not use reserved-memory
  - [AAVB-4050] - [PFE_DRV_LINUX] Divide Master/Slave driver code
  - [AAVB-4074] - [PFE_DRV_LINUX] M/S: Master-detection
- **PFE Platform - New Feature**
  - [AAVB-2191] - [PFE_PLATFORM] FCI should allow change of physical interface MAC address
  - [AAVB-2203] - [PFE_PLATFORM] Feature set recognition
  - [AAVB-2216] - [PFE_PLATFORM] Ingress QoS table API
  - [AAVB-2217] - [PFE_PLATFORM] Ingress QoS WRED config
  - [AAVB-2218] - [PFE_PLATFORM] Ingress QoS shaper control
  - [AAVB-2222] - [PFE_PLATFORM] FCI API for Ingress QoS

- – [AAVB-3913] - [PFE_PLATFORM] libfci_cli - add support for Ingress QoS
- – [AAVB-3928] - [PFE_PLATFORM] Vlan statistics bytes counters
- **PFE Platform - Bug**
  - – [AAVB-3616] - [PFE_PLATFORM] FCCU 101 - PFE TLITE reclaim memory causes ECC errors
  - – [AAVB-3657] - [PFE_PLATFORM] Can not return HIF NOCPY buffers into BMU
  - – [AAVB-3665] - [PFE_PLATFORM] blalloc clears the next area if called to free an empty area
  - – [AAVB-3735] - [PFE_PLATFORM] Master driver not support PFE_PLATFORM_RPC_PFE_LOG_IF_DEL_EGRESS_IF request
  - – [AAVB-3765] - [PFE PLATFORM] Driver crashes when FCI query for QoS queue is requested.
  - – [AAVB-3785] - [PFE_PLATFORM] HIF ring gets corrupted under heavy traffic load
  - – [AAVB-3880] - [PFE_PLATFORM] Can not get logical interface statistics on slave mode
  - – [AAVB-3905] - [PFE_PLATFORM] Missing mutex destroy in pfe_l2br_table_destroy() function
  - – [AAVB-3918] - [PFE_PLATFORM] Fci can't query rules from FP table when PFE_CFG_NULL_ARG_CHECK is defined
  - – [AAVB-3945] - [PFE_PLATFORM] FCI command always return EOK when using unuse rules from FP table
  - – [AAVB-3952] - [PFE_PLATFORM] If there are more than 20 vlans configured driver could access an invalid vector index
- **PFE Platform - Improvement**
  - – [AAVB-2414] - [PFE_PLATFORM] Routing table hash collisions reporting
  - – [AAVB-3121] - [PFE_PLATFORM] Optimize driver initialization time
  - – [AAVB-3260] - [PFE_PLATFORM] Disable routing lookup in case it is not used
  - – [AAVB-3297] - [PFE_FW] Extend the configurable features implementation to UTIL, have a common approach in driver
  - – [AAVB-3327] - [PFE_PLATFORM] Update libfci_cli mirroring support
  - – [AAVB-3416] - [PFE_PLATFORM] FCI: Remove FPP_IF_LOADBALANCE flag from manual and libfci_cli
  - – [AAVB-3420] - [PFE_PLATFORM] Update libFCI documentation with demo codes from libFCI_cli
  - – [AAVB-3435] - [PFE_PLATFORM] Fix HIFNOCPY pcls headers skip
  - – [AAVB-3449] - [PFE_PLATFORM] Master/Slave: It should be possible to check if master was started
  - – [AAVB-3731] - [PFE_PLATFORM] libfci_cli: Modify makefile to allow cleaner YOCTO recipe
  - – [AAVB-3749] - [PFE_PLATFORM] Improvement of FCI QoS driver
  - – [AAVB-3761] - [PFE_PLATFORM] Don't enable IRQ when enabling HIF and HIF_NOCPY channel RX/TX
  - – [AAVB-3773] - [PFE_PLATFORM] Create API to get value table entry of l2 bridge
  - – [AAVB-3912] - [PFE_PLATFORM] Create function to get Entry from L2 static entry
  - – [AAVB-3921] - [PFE_PLATFORM] G3 bring-up: minimal feature support
  - – [AAVB-3941] - [PFE_PLATFORM] Detect S32G silicon version on init

13.5 What's Modified in BETA_0.9.5

- **New Feature**
  - [AAVB-2328] - [PFE_LINUX] HIF traffic steering
  - [AAVB-2827] - [PFE_LINUX] Aux interface support
  - [AAVB-3398] - [PFE_LINUX] Add support for multiple MAC unicast addresses (MAC unicast filtering)
  - [AAVB-3633] - [PFE_LINUX] Improved suspend to RAM (STR) support - restore net device configs
- **Bug**
  - [AAVB-2149] - [PFE_LINUX] Promiscuous mode not working
  - [AAVB-2973] - [PFE_LINUX] Configured Bridge outputs periodic backtrace dumps
  - [AAVB-3187] - [PFE_LINUX] Observed zero throughput results for slow path bi-directional tests
  - [AAVB-3196] - [PFE_LINUX] each pfeX interface should be found by of_find_net_device_by_node
  - [AAVB-3375] - [PFE_LINUX] "ERR: No timer was running" on rmmod
  - [AAVB-3496] - [PFE_LINUX] sw bridged traffic gets damaged on output
  - [AAVB-3580] - [PFE_LINUX] Transition to IDEX_REQ_STATE_TRANSMITTED failed
  - [AAVB-3611] - [PFE_LINUX] Replace pfe_log_if_*() MAC filtering API with pfe_phy_if_*() equivalent
  - [AAVB-3639] - [PFE_LINUX] linux interface in PFENG_LOGIF_MODE_TX_CLASS mode don't work
  - [AAVB-3671] - [PFE_LINUX][PFE_PLATFORM] use-after-free in _raw_spin_lock_irqsave
- **Improvement**
  - [AAVB-2700] - [PFE_LINUX] pfeng: follow SGMII configuration for PHY config
  - [AAVB-3066] - [PFE_LINUX] Move TX confirmation processing to NAPI
  - [AAVB-3340] - [PFE_LINUX] libfci_cli: Fix build warnings
  - [AAVB-3374] - [PFE_LINUX] STR: guard all necessary functions by pm_runtime_get_sync
  - [AAVB-3451] - [PFE_LINUX] use-case: run driver w/o u-boot dependency
  - [AAVB-3636] - [PFE_LINUX] Configure hif channel interrupt affinity hint to distribute interrupt load
- **PFE Platform - New Feature**
  - [AAVB-1602] - [PFE_PLATFORM] HIF NOCPY LMEM copy mode
  - [AAVB-1872] - [PFE_PLATFORM] All buffers shall be returned at driver shutdown phase
  - [AAVB-3404] - [PFE_PLATFORM] Fast path router uses phyif MAC as default source address make this configurable
- **PFE Platform - Bug**
  - [AAVB-2326] - [PFE_PLATFORM] Logical interface 'discard' API missing in slave variant
  - [AAVB-3377] - [PFE_PLATFORM] Driver reports a couple of build errors when PFE_CFG_NULL_ARG_CHECK is enabled
  - [AAVB-3378] - [PFE_PLATFORM] SIP/DIP replacement flags rewrite other flags.
  - [AAVB-3380] - [PFE_PLATFORM] Rx interrupt coalescing configuration failed
  - [AAVB-3385] - [PFE_PLATFORM] libFCI: FW feature struct has too small buffer for some FW feature names

- [AAVB-3406] - [PFE_PLATFORM] Incorrect return value when reading QoS shaper idle slope
- [AAVB-3414] - [PFE_PLATFORM] Memory leak when mac address is already in db
- [AAVB-3415] - [PFE_PLATFORM] MAC database memory leak when MAC addr addition fails
- [AAVB-3417] - [PFE_PLATFORM] libFCI: Missing ntoh() conversions in conntrack handling
- [AAVB-3418] - [PFE_PLATFORM] libFCI: Wrong return value of ".vlan" and ".vlan_reply" fields in IPv4 conntracks
- [AAVB-3456] - [PFE_PLATFORM] Build error when router support is disabled
- [AAVB-3457] - [PFE_PLATFORM] Invalid cast while printing BMU buffer address
- [AAVB-3458] - [PFE_PLATFORM] Forwarding list of MAC static entry is not propagated to HW
- [AAVB-3478] - [PFE_PLATFORM] IDEX buffers not allocated from a controlled pool
- [AAVB-3482] - [PFE_PLATFORM] FCI: HIF_NOCPY is skipped when updating a logical interface
- [AAVB-3570] - [PFE_PLATFORM] pfe_idex_rpc not callable from atomic context
- [AAVB-3574] - [PFE_PLATFORM] Type pfe_ip_addr_t in pfe_rtable.h is too large
- [AAVB-3578] - [PFE_PLATFORM] pfe_idex_rpc RPC transport time-out when enabling MAC filtering on slave
- [AAVB-3579] - [PFE_PLATFORM] Physical interface flags are set incorrectly
- [AAVB-3658] - [PFE_PLATFORM] HIF NOCPY - Buffer descriptors wrap mechanism does not work
- [AAVB-3667] - [PFE_PLATFORM] pfe_tmu_sch_get_bound_sch_output returns wrong value
- **PFE Platform - Improvement**
  - [AAVB-1645] - [PFE_PLATFORM] Interrupt dispatchers
  - [AAVB-2086] - [PFE_PLATFORM] Move fci_msg_t definition to the fci_msg.h
  - [AAVB-2304] - [PFE_PLATFORM] Allow to set the physical interface to promiscuous mode via FCI
  - [AAVB-2350] - [PFE_PLATFORM] Add FCI usage examples, stage 3
  - [AAVB-2511] - [PFE_PLATFORM][PFE_FW] Remove PE ID passing
  - [AAVB-2807] - [PFE_FW] HIF no copy/LMEM copy mode
  - [AAVB-2938] - [PFE_PLATFORM] Static entry documentation update
  - [AAVB-3431] - [PFE_PLATFORM] Remove compilation warnings
  - [AAVB-3467] - [PFE_PLATFORM] Disable PFE_CFG_HIF_NOCPY_SUPPORT in PFE SLAVE mode
  - [AAVB-3471] - [PFE_PLATFORM] Optimize PE memory access locks
  - [AAVB-3649] - [PFE_PLATFORM] libfci_cli: Add rebuilding of libfci library to libfci_cli makefile
  - [AAVB-3669] - [PFE_PLATFORM] Fix master/slave to work again

13.6 What's Modified in BETA_0.9.4

- **Bug**
  - [AAVB-2224] - [PFE_LINUX] named memory API cannot be divided
  - [AAVB-2313] - [PFE_PLATFORM] In case of error pfe_class_create causes destruction of a mutex which does not exist
  - [AAVB-2430] - [PFE_PLATFORM] FCI conntrack query returns wrong IP address

- – [AAVB-2441] - [ALB 26.0] VLAN forwarding is not working for pfe0 interface (pfe2 is working)
- – [AAVB-2443] - [ALB 25.0]Observed "ping: getnameinfo: Temporary failure in name resolution" while doing ping6 from the DUT
- – [AAVB-2446] - [ALB 25.0]ping6 traffic is started working when I run tcpdump on DUT,while doing ping6 from the Linux Host
- – [AAVB-2447] - [ALB 25.0]IPerf3 session is not getting connected from the DUT while running UDP bi-directional traffic,if I start IPerf client in Linux Host first, then Iperf client in S32G
- – [AAVB-2468] - [S32G Linux] SW forwarding doesn't work well with IPv6
- – [AAVB-2469] - [PFE_LINUX] pfeng: udp reassembling failure
- – [AAVB-2526] - [PFE_LINUX] pfeng: interface autonegotiation doesn't follow SGMII possibilities
- – [AAVB-2538] - [PFE_DRV_LINUX] IPv6 fast-forward is not working
- – [AAVB-2624] - [PFE_PLATFORM] Errata ERR050221 workaround: driver shall ensure that safety features are enabled
- – [AAVB-2701] - [ALB 27.0-RDB2]Sometimes S32G DUT is getting hanged while adding 100 flexible parser rules
- – [AAVB-2720] - [PFE_LINUX] pfeng: kernel 4.19: driver backtrace when util fw version requested
- – [AAVB-2914] - [PFE_LINUX] pfeng: insmod reports success ($? = 0) even driver probe failed
- – [AAVB-2944] - [PFE_FW] VLAN QinQ doesn't work with 802.1AD ethertype
- – [AAVB-2983] - [PFE_PLATFORM] Adding new multicast will break existing multicast streams
- – [AAVB-3100] - [PFE_PLATFORM] libFCI: LOGIF QUERY returns bad/wrong data for some match rule arguments
- – [AAVB-3195] - [PFE_DRV_LINUX] devm_get_clk_from_child fails if the interface is rgmii-id/rgmii-txid/rgmii-rxid
- – [AAVB-3200] - Observed "ADDR: No space left on device" while trying to change the MAC address S32G interface
- – [AAVB-3244] - [PFE_PLATFORM] Pause frame is incorrectly generated and blocks transmittion
- – [AAVB-3326] - [PFE_LINUX] Slave: hardcoded Master's HIF destination
- – [AAVB-3329] - [PFE_PLATFORM] FPP_IF_LOOPBACK flag of logical interfaces is seemingly never set.
- – [AAVB-3330] - [PFE_LINUX] Crash in qdisc on tx ring overrun (high rate ip fwding 2 opposite flows)
- **New Feature**
  - – [AAVB-1924] - [PFE_PLATFORM] Enable by default the TTL decrement when the packet is routed
  - – [AAVB-2201] - [PFE_PLATFORM] Flexible Parser statistics API
  - – [AAVB-2210] - [PFE_PLATFORM] Add L2 bridge MAC table flush API
  - – [AAVB-2295] - [PFE_LINUX] pfeng: add SGMII autonegotiation
  - – [AAVB-2465] - [PFE_PLATFORM] Pause Support
  - – [AAVB-2826] - [PFE_DRV_LINUX] Mulitple HIF channel support
  - – [AAVB-2828] - [PFE_DRV_LINUX] Multiclient HIF support
  - – [AAVB-2860] - [PFE_DRV_QNX] eMAC multicast group membership
  - – [AAVB-3276] - [PFE_DRV_LINUX] Suspend to RAM support

- [AAVB-3277] - [PFE_DRV_LINUX] Integrate new SERDES driver
- [AAVB-3278] - [PFE_DRV_LINUX] Kernel 5.10 support
- **Improvement**
  - [AAVB-2129] - [PFE_Linux] MTU runtime configuration
  - [AAVB-2391] - [PFE_LINUX] pfeng: add per-HIF statistics
  - [AAVB-2410] - [PFE_PLATFORM] Make routing table configurable
  - [AAVB-2470] - [PFE_LINUX] pfeng: move of HIF ring allocated structs from uncachable memory to cachable
  - [AAVB-2471] - [PFE_LINUX] pfeng: allocate new RX buffers in chunks
  - [AAVB-2475] - [PFE_LINUX] Pause Support
  - [AAVB-2595] - [PFE_LINUX] pfeng: manage mdio_bus independently
  - [AAVB-2601] - [PFE_LINUX] pfeng: pfe_hif_drv: refactor linux hif driver to use skbuffs
  - [AAVB-2644] - [PFE_LINUX] HIF rings should be allocated from cached coherent memory
  - [AAVB-2863] - [PFE_DRV_LINUX] BMU memory allocator change
  - [AAVB-2991] - [PFE_FW] Discard packets that do not match the IEEE 802.1Q (VLAN) specifications
  - [AAVB-2992] - [PFE_FW] Discard packets that do not match the IEEE 802.1AS specifications
  - [AAVB-2994] - [PFE_FW] The network stack shall drop Ethernet frames with two or more VLAN tags
  - [AAVB-2995] - [PFE_FW] Drop Ethernet frames without a VLAN tag except selected cases
  - [AAVB-3049] - [LINUX_PFE] Linux driver includes some user space header files
  - [AAVB-3056] - [PFE_LINUX][PFE_QNX][PFE_PLATFORM] clean introduced warnings
  - [AAVB-3059] - [PFE_LINUX] Use triggered DMA instead of polling
  - [AAVB-3060] - [PFE_LINUX] Interrupt coalescing
  - [AAVB-3073] - [PFE_LINUX] Implement page allocation/reuse scheme for Rx buffers
  - [AAVB-3074] - [PFE_LINUX] PFE descriptor usage optimization
  - [AAVB-3077] - [PFE_PLATFORM] Should support APIs to enable the EMAC loop-back in slave mode
  - [AAVB-3098] - [PFE_LINUX] Optimize rx buffer handling, drop embedded skb, clean up pfeng-hif
  - [AAVB-3139] - [PFE_LINUX] pfeng: clean clocks on exit
  - [AAVB-3173] - [PFE_LINUX] pfeng: get rid of use emac_regs
  - [AAVB-3194] - [PFE_LINUX] build warnings being treated as errors
  - [AAVB-3205] - [PFE_LINUX] Enable DMA coherency from driver
  - [AAVB-3221] - [PFE_PLATFORM] Fix build warnings for SLAVE mode
  - [AAVB-3233] - [PFE_DRV_QNX, PFE_DRV_LINUX] Enable print of diagnostic messages
  - [AAVB-3300] - [PFE_LINUX] pfeng: support S32G2 cut 1.1/cut 2.0 dynamically
  - [AAVB-3322] - [PFE_PLATFORM] API to get rx/tx packet count

13.7 What's Modified in BETA_0.9.3

- **Bug**
  - [AAVB-2910] - [PFE_LINUX] pfeng: Slave: Backtraces on MII ioctl

    – [AAVB-2965] - Linux pfeng module crash at remove
- **New Feature**
  - [AAVB-1376] - [PFE_QNX][PFE_PLATFORM] Fast-path IPv4/IPv6 Forwarder/Router
  - [AAVB-1423] - [PFE_QNX][PFE_PLATFORM] Implement the conntrack manipulation FCI API
  - [AAVB-1429] - [PFE_PLATFORM][PFE_QNX] Extend rtable API by query functions
  - [AAVB-1495] - [PFE_PLATFORM] Create L2 bridge SW module
  - [AAVB-1509] - [PFE_PLATFORM][PFE_QNX] Implement L2 Bridge FCI API
  - [AAVB-2340] - [PFE_FW]Firmware variants support shall be added.
  - [AAVB-2500] - [PFE_QNX] Add IEEE1588 timestamping support
  - [AAVB-2746] - [PFE_PLATFORM] Allow use of NAT with IPv6
  - [AAVB-2836] - [PFE_DRV_LINUX] L2 bridge static entry configuration using FCI
  - [AAVB-2937] - [PFE_FW] FlexibleFilter per physical interface
- **Improvement**
  - [AAVB-2362] - [PFE_DRV_LINUX] Multicast address management
  - [AAVB-2630] - [PFE_LINUX] pfeng: use EMAC port mode specific clocks
  - [AAVB-2670] - [PFE_FW] Send egress timestamp report to respective HIF channel
  - [AAVB-2818] - [PFE_FW] L3 router with NAT
  - [AAVB-2837] - [PFE_DRV_LINUX] PFE 802.1as API
  - [AAVB-2845] - [PFE_DRV_LINUX] eMAC multicast group memebership support
  - [AAVB-2869] - [PFE_FW] VLAN tagging of L3 routed traffic
  - [AAVB-2986] - [PFE_PLATFORM] fix linux build warnings
  - [AAVB-2998] - [PFE_LINUX] pfeng: select correct TX clock name

13.8 What's Modified in BETA_0.9.2

- **Improvement**
  - [AAVB-1886] - [PFE_PLATFORM] Optimize BD ring access
  - [AAVB-1972] - [PFE_LINUX] add S/G support to TX path
  - [AAVB-2560] - [PFE_PLATFORM] Add support for adding logical interfaces to UTIL PHY
  - [AAVB-2570] - [PFE_PLATFORM] Dispatch HIF traffic using physical interfaces
  - [AAVB-2623] - [PFE_LINUX] DMA32 memory should be preferred for rx buffers
  - [AAVB-2669] - [PFE_LINUX] pfeng: notice about errata fix usage
- **Bug**
  - [AAVB-2499] - [S32G EVB:ALB 25]Low throughput observed for Bridge scenario
  - [AAVB-2523] - [PFE_LINUX] pfeng: phylink backtraces on interface changes
  - [AAVB-2586] - [PFE_PLATFORM] PTP-over-Ethernet + VLAN stall
  - [AAVB-2610] - [PFE_LINUX] Oal memory cached interface provides non-cached memory
  - [AAVB-2614] - [PFE_PLATFORM] Incorrect shaper weight calculation
  - [AAVB-2642] - [PFE_LINUX] pfeng: fix 100Base-T1 support
  - [AAVB-2643] - [PFE_LINUX] pfeng: fix rgmii-id, rgmii-txid, rgmii-rxid support
- **New Feature**
  - [AAVB-1945] - [PFE_FW,PFE_PLATFORM] Allow adding HIF interfaces to bridge (domain)
  - [AAVB-2211] - [PFE_PLATFORM] Add API to get PE firmware version
  - [AAVB-2276] - [PFE_FW]L2 bridge learning shall be switchable per port

13.9 What's Modified in BETA_0.9.1

- **Improvement**
  – [AAVB-2067] - [PFE_LINUX][PFE_QNX] Notify FCI clients about FCI shutdown
  – [AAVB-2568] - [PFE_LINUX] pfeng: enable util fw loading
  – [AAVB-2571] - [PFE_PLATFORM] Firmware-based HIF traffic priority mgmt
  – [AAVB-2575] - [PFE_PLATFORM] Disable HIF stall workaround
- **Bug**
  – [AAVB-2442] - [ALB 25.0]Unable to create bridge configuration
- **New Feature**
  – [AAVB-2206] - [PFE_PLATFORM] Egress QoS topology change API
  – [AAVB-2472] - [PFE_FW] Implement SPD for IPsec
  – [AAVB-2510] - [PFE_LINUX] pfeng: support for master/slave mode
  – [AAVB-2534] - [PFE_QNX] PFE isolation support
  – [AAVB-2561] - [PFE_PLATFORM] Egress QoS FCI API

13.10 What's Modified in BETA_0.9.0

- **Improvement**
  – [AAVB-2436] - [PFE_PLATFORM] Code cleanup
  – [AAVB-2494] - [PFE_LINUX] Fix mistake in the sysfs + add new syfs files
- **Bug**
  – [AAVB-2008] - [PC-FPGA-PFE-Linux]: Bridging of the PFE-interfaces eth0/pfe-0 and rename4/pfe-1 is NOT WORKING as expected.
  – [AAVB-2297] - [PFE Linux] periodic load/unload of driver sometimes fails
  – [AAVB-2345] - [PFE_PLATFORM] Wrong IP address version detection
  – [AAVB-2380] - [PFE_LINUX] pfeng: incorrectly use highest speed of PHY
  – [AAVB-2444] - [ALB 25.0] Observed crash dump while running IPerf3 routing traffic
  – [AAVB-2501] - [S23G RDB - ALB25.0]: tcpdump crash on pfe0/pfe2 while running the IPv4 Fast path UDP traffic
- **New Feature**
  – [AAVB-1951] - [PFE_PLATFORM] Add FCI API to get physical/logical interface statistics
  – [AAVB-2190] - [PFE_PLATFORM] Let FCI API enable and disable log+phy interfaces
  – [AAVB-2212] - [PFE_PLATFORM] Port mirroring control
  – [AAVB-2213] - [PFE_PLATFORM] Port mirroring FCI API
  – [AAVB-2225] - [PFE_PLATFORM] Multi-instance HIF driver
  – [AAVB-2272] - [PFE_PLATFORM] Show required fw version
  – [AAVB-2348] - [PFE_DRV_LINUX] Add support for kernel 5.4 to PFE driver
  – [AAVB-2423] - [PFE_PLATFORM] Arbitrary data passing (FCI)

13.11 What's Modified in EAR_0.8.0 Patch1

- **List of Patched Files**
  – sw/xfci/libfci/Makefile
  – sw/pfe_platform/hw
  – sw/pfe_platform/hw/s32g
  – sw/pfe_platform/hw/s32g/pfe_platform_master.c
  – sw/pfe_platform/hw/s32g/pfe_emac_csr.c

- sw/pfe_platform/hw/s32g/pfe_emac_csr.h
- sw/pfe_platform/public/pfe_platform_cfg.h
- **doc/PFE_S32G_A53_LNX_UserManual.pdf**
- **Improvement**
  - [AAVB-2424] - [PFE_LINUX] libfci: allow building library in Yocto
  - [AAVB-2390] - [PFE_LINUX] UM: add FCI chapter

13.12 What's Modified in EAR_0.8.0

- **Improvement**
  - [AAVB-1584] - [PFE_LINUX] pfeng: sync HIF api
  - [AAVB-1540] - [PFE_LINUX] create preallocated dma buffer for TX path
  - [AAVB-1541] - [PFE_LINUX] user manual: fix formatting
  - [AAVB-1572] - [PFE_LINUX] don't copy frame data to skbuf on receive
  - [AAVB-1657] - [PFE_PLATFORM] CLASS PE Interrupt Dispatcher
  - [AAVB-1878] - [[PFE_PLATFORM][PFE_LINUX] oal_irq: allow callback mask management
  - [AAVB-1910] - [[PFE_QNX][PFE_LINUX] OAL API to manage named memory
  - [AAVB-1913] - [[PFE_LINUX] Implement named memory management API
  - [AAVB-1977] - [[PFE_LINUX] remove debug ifs component when VDK released
  - [AAVB-2322] - [PFE_PLATFORM] Statistics for phy/log interface are reset with all updates on given interface
  - [AAVB-2332] - [PFE_PLATFORM] Add FCI usage examples, stage 1
  - [AAVB-2333] - [PFE_PLATFORM] Add FCI usage examples, stage 2
  - [AAVB-2342] - [PFE_PLATFORM] HIF SC TX workaround
- **Bug**
  - [AAVB-2142] - [PFE_Linux] 32k ping not working on pfe1
  - [AAVB-2268] - [PFE_PLATFORM] FPP_CMD_IPVx_RESET does not remove all routes
  - [AAVB-2292] - [PFE_PLATFORM] FCI conntracks query doesn't provide route ID
  - [AAVB-2305] - [PFE_LINUX] Reserved memory is detected one byte short then declared in DT
  - [AAVB-2312] - [PFE_LINUX] pfeng: fix clause 45 support
  - [AAVB-2379] - [PFE_LINUX] pfeng: evb: pfe2 clock setting looped forever on console
- **New Feature**
  - [AAVB-2202] - [PFE_PLATFORM] Multi-channel HIF driver
  - [AAVB-2273] - [PFE_FW] Logical interface shall have configurable drop action
  - [AAVB-2283] - [PFE_PLATFORM][PFE_QNX] Performance improvements stage 2
  - [AAVB-2325] - [PFE_PLATFORM] HIF traffic steering

13.13 What's Modified in PRE-EAR_0.4.4

- **Bug**
  - [AAVB-2014] - [PFE_PLATFORM] pfe_log_if_create should not call pfe_phy_if_add_log_if
  - [AAVB-2028] - [PFE_FW][PFE_PLATFORM] PFE HW calculates incorrect IPv4 checksums for small frames
  - [AAVB-2063] - [PFE_PLATFORM] Physical interfaces are not created correctly
  - [AAVB-2107] - [PFE_PLATFORM] mutex double locked from platform during fci call

- – [AAVB-2112] - [PFE_LINUX] libfci_cli does compile under linux
- – [AAVB-2113] - [PFE_PLATFORM] TMU configuration
- – [AAVB-2131] - [PFE Linux] Fatal errors on driver unload
- – [AAVB-2149] - [PFE_LINUX] Promiscuous mode not working
- – [AAVB-2150] - [PFE_LINUX] driver crashes when detected non-compatible fw
- – [AAVB-2258] - [PFE_PLATFORM] pfe_l2br_table_init_cmd is writing wrong flags
- – [AAVB-2259] - [PFE_PLATFORM] Bridge accesses out of boundary memory
- – [AAVB-2261] - [PFE_PLATFORM] The initialization of L2 bridge is corrupted by soft reset
- – [AAVB-2289] - [PFE_LINUX] FCI is not functional

- **New Feature**
  - – [AAVB-1968] - [PFE_PLATFORM] HIF channel reset
  - – [AAVB-1985] - [PFE_PLATFORM] Split pfe_platform.c to master and slave variant
  - – [AAVB-1990] - [PFE_PLATFORM][PFE_QNX] FCI: Create core API to broadcast messages to all clients
  - – [AAVB-1992] - [PFE_PLATFORM] Multi-instance physical interfaces
  - – [AAVB-2016] - [PFE_PLATFORM] Multi-instance logical interfaces
  - – [AAVB-2019] - [PFE_PLATFORM] Add mdio Clause 45 support
  - – [AAVB-2053] - [PFE_FW] Implement exception handlers
  - – [AAVB-2054] - [PFE_FW] Implement a SW watchdog
  - – [AAVB-2075] - [PFE_FW] Add measurement of frame processing time by FW
  - – [AAVB-2111] - [PFE_PLATFORM] Extend interface-related RPC commands
  - – [AAVB-2189] - [PFE_LINUX] pfeng: add mdio support
  - – [AAVB-2199] - [PFE_FW]Add support for multicast replication
  - – [AAVB-2231] - [PFE_LINUX] Add total bytes into SG list in TX path
  - – [AAVB-2298] - [PFE_LINUX] pfeng: add more debug objects
  - – [AAVB-2300] - [PFE_LINUX] pfeng: support for GCC 9.2.0

- **Improvement**
  - – [AAVB-1334] - [PFE_PLATFORM] Unify the elf module
  - – [AAVB-1392] - [PFE_PLATFORM] Do not use -1 as unsigned integer
  - – [AAVB-1529] - [PFE_PLATFORM] HIF stops operating under heavy traffic conditions
  - – [AAVB-1656] - [PFE_QNX] Proper mbuf dequeue (IFQ_DEQUEUE)
  - – [AAVB-1659] - [PFE_PLATFORM] Watchdog timers
  - – [AAVB-1670] - [PFE_PLATFORM] Sync PE memory updates
  - – [AAVB-1974] - [PFE_LINUX] pfeng: optimize config storages
  - – [AAVB-1994] - [PFE_PLATFORM] DMEM heap allocator
  - – [AAVB-2015] - [PFE_PLATFORM] Physical and logical interface database
  - – [AAVB-2061] - [PFE_PLATFORM] Review registers against NPU v7.14
  - – [AAVB-2064] - [PFE_PLATFORM] Improve classifier startup
  - – [AAVB-2098] - [PFE_PLATFORM] Unify phy_if/log_if db between platfrom driver and fci
  - – [AAVB-2117] - [PFE_PLATFORM] Remove LS1012 code
  - – [AAVB-2118] - [PFE_PLATFORM] Allow static block allocator instances
  - – [AAVB-2147] - [PFE_FW] implement aggregated CLASS PE statistics
  - – [AAVB-2153] - [PFE_PLATFORM][PFE_FW] Move compiler checks out of pfe_ct.h
  - – [AAVB-2165] - [PFE_PLATFORM,PFE_LINUX,PFE_MCAL,PFE_QNX] Create global configuration header
  - – [AAVB-2169] - [PFE_PLATFORM] Extend EMAC text statistics

- – [AAVB-2170] - [PFE_FW]Add CPU ID to the firmware.
- – [AAVB-2241] - [PFE_PLATFORM] Update FCI reference
- – [AAVB-2248] - [PFE_PLATFORM] Extend the sysfs by debug registers
- – [AAVB-2250] - [PFE_PLATFORM] Update libfci doc to correct bridge add and bridge update order.
- – [AAVB-2252] - [PFE_FW]Allow to pass a 32-bit number together with error message through FP_ERROR
- – [AAVB-2302] - [PFE_LINUX] pfeng: add libfci build

13.14　What's modified in PRE-EAR_0.4.3

- **Bug**
  - – AAVB-1983 [PFE_LINUX] get driver compilable without extra options
  - – AAVB-1984 [PFE_LINUX] fix BMU2 buffers error
  - – AAVB-1989 [PFE_FW] Missing cthdr field in the pfe_ct_version_t
  - – AAVB-2042 [PFE_LINUX] pfeng: unloading driver never finish
- **Improvement**
  - – AAVB-1640 [PFE_LINUX] Create oal util for linux
  - – AAVB-1665 [PFE_LINUX] pfeng: add FCI subsystem
  - – AAVB-1914 [PFE_FW] Error reporting
  - – AAVB-1944 [PFE_LINUX] Create libfci for Linux
  - – AAVB-2004 Update help text for libfci_cli.
  - – AAVB-2051 [PFE_LINUX] pfeng: set explicit interface names
  - – AAVB-2052 [PFE_PLATFORM] oal:mbox: implement timers for Linux
  - – AAVB-2060 [PFE_LINUX] oal:thread: correctly signal thread join on linux
  - – AAVB-2094 [PFE_FW] Implement flexible parser
  - – AAVB-2119 [PFE_PLATFORM][PFE_LINUX][PFE_MCAL] remove VDK support
  - – AAVB-2146 [PFE_LINUX] pfeng: S32G bringup

13.15　What's modified in PRE-EAR_0.4.2

- **Bug**
  - – n/a
- **Improvement**
  - – [AAVB-1387] [PFE_PLATFORM] Ensure correct HIF driver worker thread scheduling
  - – [AAVB-1427] [PFE_PLATFORM] Make FCI endpoint OS-independent
  - – [AAVB-1484] [PFE_PLATFORM] Optimize frequently used structures
  - – [AAVB-1521] [PFE_PLATFORM] Set default interface operational mode when interface not being used
  - – [AAVB-1536] [PFE_PLATFORM] oal_msg: improve msg_signal
  - – [AAVB-1545] [PFE_PLATFORM] Make NULL argument checks switchable
  - – [AAVB-1548] [PFE_PLATFORM] Rework the get_text_stat() functions
  - – [AAVB-1553] [PFE_PLATFORM] HIF polling configurable
  - – [AAVB-1559] [PFE_PLATFORM] Move HIF header types to pfe_ct.h
  - – [AAVB-1621] [PFE_PLATFORM] Define firmware-driver control interface
  - – [AAVB-1633] [PFE_PLATFORM] Sync with latest design (1.0.4)
  - – [AAVB-1641] [PFE_PLATFORM] Get real system clock frequency for TMU shaper configuration

- [AAVB-1648] [PFE_QNX][PFE_PLATFORM] Thread driven OAL IRQ
- [AAVB-1650] [PFE_LINUX] Sync OAL IRQ module
- [AAVB-1651] [PFE_PLATFORM] HIF Interrupt Dispatcher
- [AAVB-1652] [PFE_PLATFORM] BMU Interrupt Dispatcher
- [AAVB-1654] [PFE_PLATFORM] Remove HIF DRV worker thread
- [AAVB-1655] [PFE_PLATFORM] Init PFE memories before soft reset
- [AAVB-1658] [PFE_PLATFORM] HIF NOCPY Interrupt Dispatcher
- [AAVB-1663] [PFE_PLATFORM][PFE_QNX] Create deferred job OAL abstraction module
- [AAVB-1871] [PFE_PLATFORM] Return all HIF NOCPY BMU buffers on shutdown
- [AAVB-1882] [PFE_PLATFORM] Fix HIF and HIF NOCPY interrupts
- [AAVB-1887] [PFE_LINUX][PFE_PLATFORM] pfeng: integrate enhanced irq manager
- [AAVB-1892] [PFE_PLATFORM] Uninstall IRQ when BMU instance is being destroyed
- [AAVB-1896] [PFE_PLATFORM] Global interrupt dispatcher
- [AAVB-1903] [PFE_PLATFORM] Improve RX buffer management
- [AAVB-1906] [PFE_PLATFORM] PFE AXI address range restriction
- [AAVB-1919] [PFE_PLATFORM] Out of HIF RX buffers event detection
- [AAVB-1925] [PFE_PLATFORM] RX termination
- [AAVB-1953] [PFE_QNX][PFE_LINUX][PFE_PLAFORM] Remove compiler warnings
- [AAVB-1962] [PFE_PLATFORM] More robust HIF ring handling
- **New Feature**
  - [AAVB-1435] [PFE_FW] Prepare statistics gathering
  - [AAVB-1499] [PFE_PLATFORM][PFE_QNX][PFE_LINUX] Bind PFE logical interfaces with HIF driver clients
  - [AAVB-1608] [PFE_LINUX][PFE_PLATFORM][PFE_QNX] support VDK platform
  - [AAVB-1629] [PFE_PLATFORM] Create the TLITE platform driver
  - [AAVB-1660] [PFE_PLATFORM] Fabric parity protection
  - [AAVB-1920] [PFE_PLATFORM] Ignore the ELF section MIPS.abiflags
  - [AAVB-1928] [PFE_PLATFORM][PFE_FW] Add HIF channel ID to HIF TX header (pfe_ct.h)
  - [AAVB-1935] [PFE_PLATFORM][PFE_FW] Define IHC flags within HIF TX and RX headers
  - [AAVB-1936] [PFE_PLATFORM] Implement the IHC API

13.16 What's modified in PRE-EAR_0.4.0

- **Bug**
  - AAVB-1422 [PFE_PLATFORM] Read beyond size of object
- **New Feature**
  - AAVB-1156 [PFE_PLATFORM][PFE_QNX] Port the PFE HW library to QNX environment
  - AAVB-1157 [PFE_PLATFORM][PFE_QNX] Import the HW initialization module
  - AAVB-1158 [PFE_PLATFORM][PFE_QNX] Import the HIF driver
  - AAVB-1159 [PFE_PLATFORM][PFE_QNX] Import the firmware driver
  - AAVB-1300 [PFE_PLATFORM][PFE_QNX] Add HIF channel abstraction class
  - AAVB-1301 [PFE_PLATFORM][PFE_QNX] OS abstraction

- AAVB-1337 [PFE_PLATFORM] Update the pfe_platform to support the latest x86 FPGA HW
- AAVB-1366 [PFE_PLATFORM] Make the HIF working on x86 FPGA HW
- AAVB-1378 [PFE_LINUX] Make sources Linux compilable
- AAVB-1486 [PFE_PLATFORM][PFE_QNX] Create SW module for L2 bridge tables
- AAVB-1488 [PPFE_LINUX] Implement PFE linux driver core
- AAVB-1498 [PFE_QNX][PFE_PLATFORM] Create PFE interface representation type
- **Improvement**
  - AAVB-1388 [PFE_PLATFORM][PFE_QNX] Command-line build
  - AAVB-1391 [PFE_PLATFORM] Replace native types by custom types
  - AAVB-1397 [PFE_PLATFORM][PFE_QNX] Make RELEASE as default build profile
  - AAVB-1398 [PFE_PLATFORM][PFE_QNX] Update headers in all deliverables
  - AAVB-1444 [PFE_PLATFORM] Simplify rtable entries representation
  - AAVB-1463 [PFE_PLATFORM] Improve PFE HIF ring handling
  - AAVB-1466 [PFE_PLATFORM] HIF driver improvement
  - AAVB-1534 [PFE_PLATFORM] Generalize the HW initialization

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