acontis technologies GmbH

EC-Master
EtherCAT® Master Stack

Version 3.1

Release Notes

1 EC-Master – Features

The EtherCAT specification contains a broad range of different protocols. The EC-Master EtherCAT Master Stack supports the following EtherCAT features:

- Configuration: EtherCAT Network Information Format (ENI XML)
- Cyclic process data update
  - o Synchronous and asynchronous modes
  - o Master triggered and user triggered data update
  - o Memory provider interface for user application synchronization
- Error detection and diagnosis, e.g.
  - o Bus scan with bus topology/configuration check
  - o Lost cable connection or missing EtherCAT slave response
  - o Wrong EtherCAT slave reaction (not all slaves responded)
  - o Slave operation monitoring
  - o Ethernet link layer debug messages for run-time error diagnostics
- ADS over EtherCAT (AoE)
- CANopen over EtherCAT (CoE)
- Ethernet over EtherCAT (EoE)
- File access over EtherCAT (FoE)
- Vendor specific profile over EtherCAT (VoE)
- Servo Profile over EtherCAT (SoE)
- Distributed Clocks (DC)
  - o SYNC unit support
  - o Latch unit support
- EtherCAT Bus Scan
  - o Slave detection without existing bus configuration
  - o Slave EEPROM information service
  - o Topology detection
  - o Slave Alias Addressing support
- Modular software structure, easy portable
  - o Ethernet Link Layer (zero-copy and polling option to optimize performance and CPU load)
  - o OS-Layer
- Slave EEPROM Read/Write Support
- Slave to slave communication via master ("CopyInfos" in ENI file)
- Feature Pack VLAN Frame Support
  - o An optional additional license for VLAN Frame support is now available.
- Feature Pack EoE Endpoint Support
- Feature Pack Redundancy Support
  - o An optional additional license for Redundancy support is now available.
- Feature Pack Master Object Dictionary
  - o An optional additional license for Master Object Dictionary support is now available.
- Feature Pack ET9000 Remote Access

2 Migration from V3.0

- Application should call ProcessAllRxFrames in interrupt mode on cyclic event timeout
- Add SDK\INC\OsCommon.h
- OsDeleteThreadHandle, OsSetThreadPriority, OsSetThreadAffinity, OsGetThreadAffinity have been refactored (additional parameters / return code)
- Add cpuAffinityMask to ATEMRAS_T_SRVPARMS, ATEMRAS_T_CLNTCONDESC, ATEMRAS_T_CLNTPARMS
- Add cpuIstCpuAffinityMask to EC_T_LINK_PARMS
- Add EC_CPUSET_IS_ZERO
- Add EC_LOG_LEVEL_INFO_API
- EC_IOCTL_DC_REF_CLOCK_CONTROLLED_BY_PDI replaced by EC_IOCTL_DC_SLAVE_CONTROLLED_BY_PDI
- Changed to .NET 4.0 Client Profile instead of .NET 2.0 for EcMasterDotNet
- Removed obsolete parameter dwSlaveId from emTferSingleRawCmd, emQueueRawCmd, emClntQueueRawCmd
- Removed obsolete members ATEMRAS_T_SRVPARMS::dwReConTOLimit, ATEMRAS_T_CLNTPARMS::dwKeepAliveTrigger, EC_T_MBX_DATA::dwFoETransferredBytes
- Removed obsolete EcMasterDemo2

3 New Features of V3.1

- New delivery model:
  - Setup.exe only for Windows Delivery
  - ARM_32Bit, ARM_64Bit, x86_32Bit x86_64Bit, PPC_32BIT in the ZIP file name
  - AddOns deliveries are OS/Architecture specific
- Simplified Examples:
  - Each OS has a own EcDemoMain.cpp, operating system related #ifdef
  - Common files moved to [...]\Examples\Common
- Reinforcement of Master Redundancy
- Add NDIS link layer
- Support EC-Simulator
- Support LxWin
- Support CMSIS-RTOS (STM32)
- Support Linux PHY driver (ePHY_OSDRIVER)
- Support QNX7-ARM_64Bit
- Support for RTX64 4.0
- Support for VxWorks70 SR6xx
- Support for QNX7.1
- Support Python programming interface
- Support Zephyr OS

3.1 List of enhancements/bug fixes in V3.1.1.02

Enhancements
- Enhance slave identification in case of missing slaves at the beginning and permanent frame loss at main
- Change memory logging message level from EC_LOG_LEVEL_VERBOSE to EC_LOG_LEVEL_VERBOSE_CYC
- Fix emInitMaster invalid parameters logging
- Remove warning about unknown "SdoAccess" (ignore)

Fixes
- Fix MbxTferObject pointer in EC_NOTIFY_MBOXRCV
- Fix SDO abort code command size for raw mailbox command responses
- Remove interface locking from ecatGetSlaveState (usage in JobTask)

Platform
- Fix ICSS receive hang-up on broken frames
- Add PACKET_MMAP for ReceiveFrame in SockRaw
- Fix emllFslFec maximum receive buffer size
- Add timing task based on clock_nanosleep to the Linux examples
- Add support for PHY Lib to GEM
- Updated to atemsys V1.4.10
  Fix Device Tree Ethernet driver: Mdio/Phy sup-node, test 4.6.x kernel
  Add Device Tree Ethernet driver support for GEM
  Fix PCI driver: force DMA to 32 bit
- Fix emllFslFec cache data synchronization issues under high memory usage
- Fix LinkOsMemoryBarrier for Linux and Xenomai x86-64
- Fix LinkOsMemoryBarrier for QNX 7.1 x86-64

3.2 List of enhancements/bug fixes in V3.1.1.01

Enhancements
- Add OsReplaceQueryMsecCount

Fixes
- Fix access violation in API called from the job task during ecatDeinitMaster
- Fix race condition between CFrameSpy destructor and Job Task
- Fix link stay masked by cable redundancy in disconnection/reconnection cases in interrupt mode

3.3 List of enhancements/bug fixes in V3.1.0.20

Enhancements
- SDO Abort codes refractored and refreshed

Fixes
- Don't re-trigger INACTIVE master on circulating last master red cyclic frame

- Protect against unexpected frames during re-configure master

Platform
- Add PHY Microchip KSZ9131 to PHY Lib
- Fix emllFslFec for NXP i.MX8
- Fix memory leak in SYSBIOS thread handling

3.4 List of enhancements/bug fixes in V3.1.0.19

Enhancements
- Use verbosity passed via command line for the RAS Server in the EcMasterDemoRasServer example
- Add debug message for memory allocations inside EC_TRACE_ADDMEM_LOG
- Add Memory Footprint Measurements to RAS Server and Examples
- Add Memory Footprint Message to Demos
- Enhance DCX to remove constant offset between the two system times for topologies with the EL6695 as the first DC-capable slave in both networks
- Notify EC_LINECROSSED_INVALID_PORT_CONNECTION at first slave in case of invalid connection detected (unsupported topology)
- Add frame timestamp to pcap file reader
- Add device info of INACTIVE Master to forwarded cyclic master red frame
- Enhance performance impact of EC_T_INIT_MASTER_PARMS::bApiLockByApp

Fixes
- Fix external memory provider requested twice without release during call to ecatGetProcessData
- Always wait for DC InSync just after DCM InSync in PS transition
- Fix erroneous line crossed detection for cycle time below 1ms
- Fix cascaded spinlock usage leading to deadlock under some OS
- Refresh device info at INACTIVE Master needed to send on one line only
- Fix AoE command header length calculation (broken since V3.0.1.21)
- Fix endless loop in bus scan until timeout sometimes at startup

Platform
- Fix thread affinity setting for Xenomai
- Fix AuxClkTask for Xenomai
- Updated to atemsys V1.4.09
  Add atemsys as PCI Driver for Intel, Realtek and Beckhoff
  Add memory allocation and mapping on platform / PCI driver device
  Fix PHY driver for FslFec 64Bit
- Add 64Bit support for emllCCAT
- RTOS-32: Bad DMA memory address handling if base is > 2GB leading to permanent frameloss
- SHEth, support for fixed link
- Add device IDs for I219 and I225LM
- Update VxWorks7 from SR540 to SR620
- Add NXP i.MX 8M support for emllFslFec

- Fix Interrupt Mode for Xenomai3_x64Cobalt
- Fix parallel usage of emllNDIS and Wireshark
- Add Secure Boot support to EcatDrv for Windows

3.5 List of enhancements/bug fixes in V3.1.0.18

Enhancements
- Add EC_T_INIT_MASTER_PARMS::bApiLockByApp parameter to increase performance by disabling API locks
- Add EC_IOCTL_SET_MASTER_MAX_STATE
- Remove unnecessary locks in ecatGetCfgSlaveInfo, ecatGetCfgSlaveEoeInfo to increase performance

Fixes
- Stop Slave Statistics during ecatConfigureMaster()
- Immediately process Acyclic Master Redundancy Frames sent on one line only
- Fix occasional illegal unlock if compiled with EXCLUDE_INTERFACE_LOCK

Platform
- Add license check for Snarf

3.6 List of enhancements/bug fixes in V3.1.0.17

Enhancements
- Add EC_IOCTL_SET_IGNORE_SWAPDATA

Fixes
- Drop old queued frames in case of permanent frameloss detection in case of Master Redundancy
- Fix erroneous EC_T_CFG_SLAVE_INFO::wWkcStateDiagOffsOut returned if FMMU is spread over multiple cmds
- Fix ecatBadConnectionsDetect for cable redundancy topologies

Platform
- Add support for interrupt mode on ICSS and allow more send output per cycle by using all send queues.
- Fix CRC error handling for FslFec
- DW3504, new Synopsys DW IP 4.0 (STM32MP157)
- Add instance identification by PCI location for RTX
- Fix assert in OsQueryMsecCount for Xenomai on startup
- atemsys V1.4.08:
    - Fix Xilinx Ultrascale
    - Fix cleanup of Device Tree Ethernet driver

3.7 List of enhancements/bug fixes in V3.1.0.16

Enhancements
- Add emIsConfigured()

- Add HC mode echm_manual_noreset

Fixes
- Master Redundancy: Refresh link status of both potential forward devices
- Wait for eventually started topology change delay in ecbtsms_writeportctl
- Fix blocked mailbox transfers (VoE, AoE, SoE) in case the previous transfer was stopped unexpectedly
- EC_STA: Add EC-Simulator OD reading support
- Change InitCmd time out type from EC_T_WORD to EC_T_DWORD (ENI data type)
- Fix port stay closed until EC_IOCTL_SB_ACCEPT_TOPOLOGY_CHANGE is called in topology change manual mode
- Fix process data corruption in some cases if swapdata is used in ENI
- Fix memory leak in FrameSendAndFree for CableRed/MasterRed configurations
- Set nBitOffs in parenthesis in SETBIT and CLRBIT macros fixing their usage in case of complex expression

Platform
- Fix memory leak for allocated tx descriptors after reset in emlli8254x
- Add AARCH64/ARM64 support for emllFslFec (NXP i.MX8)
- Fix link to not come up at the lowest possible speed for Intel Pro/1000 (i8254x)
- Fix NDIS link layer verbose log message start up crash
- Add PHY access and PHY Lib to RTL8169
- Add NoPhyAccess Parameter to RTL8169
- Fix atemsys COPYING file format to match MD5 checksum for Yocto Linux
- Fix SYSBIOS Timer
- Updated to atemsys V1.4.07, Add support for NXP imx8 (FslFec 64bit)

3.8 List of enhancements/bug fixes in V3.1.0.15

Enhancements
- Show cyclically performance values if -perf and -v >= 2
- Add EC_T_LINK_CONNECTED_INFO
- Remove deprecated function LinkOsInterruptDone()

Fixes
- Fix complete access for history objects (0x10F3) and notification counters (0x2004) objects
- Repeat line crossed detection completely in case of DL status interrupt detected during the procedure (not only refresh DL status)
- Fix race condition in mailbox command queueing/processing

Platform
- Add support for CMSIS-RTOS (STM32)
- Add LinkLayer STM32Eth (STM32)
- Add support for RTX64 4.0
- Add support for Ti AM574x to ICSS

- Add NoPhyReset Parameter to ICSS
- Add support for Yaskawa/Profichip Antaios
- Add static libs for Windows unrestricted (VS2015)
- Linux / Xenomai: Updated to atemsys V1.4.06:
    o Fix Mdio-Bus timeout for kernel >= 5.0.00
    o Add support for IOMMU/Vt-D for Linux
- Fix AtemRasClient for PPC: EC_IOCTL_REGISTERCLIENT
- Add static libs for Windows unrestricted (VS6)
- Add link layer interrupt mode support for Windows

3.9 List of enhancements/bug fixes in V3.1.0.14

Enhancements
- Add EC_T_DCM_CONFIG_DCX::dwMaxErrCompensableOnExtClockReconnect
- Add EC_LOG_LEVEL_ANY to Logging interface
- Avoid processing frames not matching the expected ones to protect against data corruption and access violation

Fixes
- Fix EC_IOCTL_REGISTERCLIENT for mixed 32Bit / 64Bit connections in AtemRasClnt
- Repeat receive times latching if new bus slaves recorded to detect missing receive times
- Fix occasional frame re-processing in case of frame loss on one line only by Master Redundancy
- Fix previously reconnected link remains masked even if other link disconnection detected
- Fix EC_T_BUS_SLAVE_INFO:wMbxSupportedProtocols always returns 0
- Fix skipped port receive times refresh in some case of slaves reconnection leading to erroneous topology detection
- Don't execute hidden slave detection in case of unsupported topology
- Don't reset automatically the port receive times at beginning of bus scan to avoid inconsistent information in case of cancel
- Fix frame discard support for TX frame logging
- Fix EC_T_SET_MAILBOX_POLLING_CYCLES_DESC packing
- Fix InitCmd erroneously retried even if InitCmd timeout elapsed under some circumstance
- Stabilize slave state machine immediately during canceling if no InitCmd pending
- Fix missing Link up bit in object 0x2001
- Fix ecatConfigExtend() returns EC_E_LINK_DISCONNECTED if called just after ecatInitMaster()

Platform
- Fix Sybios OsMeasCalibrate()
- Fix PHY Lib Device Tree Ethernet driver wait for PHY link

- Updated to atemsys V1.4.04:
  Fix Device Tree Ethernet driver robustness
  Add Device Tree Ethernet driver support for ICSS
- Continue to probe all Bus/Dev/Func in RTX64 even if 0 is returned
- Add PHY Lib support to ICSS
- Add PhyAddress and PhyInterface Parameter to ICSS
- Add PHY Lib support to FslFec
- Add PHY Lib for handling known PHY's and OsDriver for all LinkLayers, starting with the current FslFec implementation

3.10 List of enhancements/bug fixes in V3.1.0.13

Enhancements
- Add frame buffers count parameter to RTL8169 (dwRxBuffers/dwTxBuffers)
- Linux / Xenomai: Updated to atemsys V1.4.03:
  - Add log level (e.g. "insmod atemsys loglevel=6")
- Add EC_T_ADS_ADAPTER_START_PARMS::cpuAffinityMask
- Add EC_T_MBX_GATEWAY_SRV_PARMS::cpuAffinityMask

Fixes
- Byte wise access to EC_T_UINT64 (EC_SETQWORD / EC_GETQWORD) for ARMv6 to protect against unaligned access
- Avoid processing frames not matching the expected ones to protect against data corruption and access violation
- Fix access violation under some init/deinit race condition in EoELinkFreeSendFrame()
- Fix CPU affinity for AtemRasSrv

3.11 List of enhancements/bug fixes in V3.1.0.12

Enhancements
- Tolerate ESC without 0x410 register implemented
- Adapt the DCX timestamp refresh method according the memory provider configuration
- Use InitCmd timeout to ack pending slave error at the beginning of the transition (even if EC_IOCTL_SET_AUTO_ACK_AL_STATUS_ERROR_ENABLED not used)
- Ignore PDI watchdog errors during a transition in which all InitCmds return successfully
- Add ecatBadConnectionsDetect and ecatBadConnectionsReset
- Add flags ECAT_LINK_FRAMEFLAG_CLOSE_JUNCTION_RED_PORT, ECAT_LINK_FRAMEFLAG_OPEN_JUNCTION_RED_PORT to EC_T_LINK_FRAMEDESC

Fixes
- Don't force mailbox read in case of WKC = 0 to protect against endless situation
- Fix unexpected automatic port opening in manual topology change mode (EC_IOCTL_SB_SET_TOPOLOGY_CHANGE_AUTO_MODE = EC_FALSE)

- Refresh DL Status at the end of ecatConfigExtend() to process new slave connection(s) masked during ecatConfigExtend()
- Fix endless mailbox polling during MbxInitCmd if slave has no mailbox data
- Fix unexpected delay in ecatConfigureMaster if job task not running
- Don't overwrite link layer log parms during ecatInitMaster()
- Generate EC_NOTIFY_DC_SLV_SYNC OutOfSync at falling transition to INIT (broken since V3.0.0.06)
- Fix erroneous line crossed detection during repeated junction redundancy line break in the middle
- Fix EcMasterDemoRasClient connect to legacy servers
- Fix MasterShiftByApp mode broken since (2.9.0.09)
- Fix deadlock situation using linklayer in interrupt mode (function registered with EC_IOCTL_REGISTER_CYCFRAME_RX_CB called with internal lock)

Platform
- Fix frame loss for several 100ms after ecatInitMaster() Intel Pro/1000 (i8254x)
- Fix LinkOsGetPciInfo() under WinCE returns 0 memory BARs in case of 0 IO BARs are declared (broken since V3.0.0.12)
- Add define NO_PCI_SUPPORT in LinkOSLayer.cpp for QNX to support platforms without PCI
- Add AARCH64/ARM64 support for Intel Pro/1000 (i8254x)
- Add to FslFec support atemsys as Device Tree Ethernet driver Allow to delegate whole PHY handling, PinMuxing and enable Clocks to Linux drivers via atemsys
- Updated to atemsys V1.4.02
  fix ARM/AARCH64 DMA configuration for PCIe and fix occasional insmod Kernel Oops
  register atemsys as Device Tree Ethernet driver "atemsys" and use Linux PHY and Mdio-Bus Handling

3.12 List of enhancements/bug fixes in V3.1.0.11

Enhancements
- Support ENI files generated with ESI using DynamicInputs / DynamicOutputs
- Add INCLUDE_INTERFACE_LOCK
- Fixed flash and add set license key
- Add flag ECAT_LINK_FRAMEFLAG_ADD_INTERFRAME_GAP to EC_T_LINK_FRAMEDESC
- Repeat frame to close/open junction red port 3 times to protect against permanent frameloss in case of frame doesn't reach both slaves successfully
- Junction red port are closed only during port receive time latching command. Don't repeat Propagation delay measurement during DcInit and.
- Apply EC_T_INIT_MASTER_PARMS::wMaxSlavesProcessedPerBusScanStep in DcSm and during hidden slave detection
- Integrate EcSdoServ in EC-Simulator
- Add INCLUDE_EXECJOB_REENTRANCY_SUPPORT

Fixes

- Fix EoE-Endpoint registration downward compatibility with V3.0 in RAS client
- Fix erroneous bus mismatch after excluding slaves from HC group
- Fix drop old frames in queues
- Fix occasionally circulating forwarded frames
- Fix occasionally circulating forwarded frames by MasterRed
- Fix hidden slave detection in junction redundancy topologies
- Fix compile errors for various EXCLUDE_ defines
- Fix access violation in case of mailbox size smaller than SDO info header
- Fix propagation delay measurement in junction redundancy topologies
- Fix occasional duplicated send requests in AtemRasClnt
- Fix segmented SoE transfers
- Return EC_E_SDO_ABORTCODE_OFFSET if requested subindex greater than max sub index
- Fix frame loss during propagation delay measurement and hidden slave detection in case of junction redundancy line break
- Fix DCX (broken since V3.0.1.17)
- Fix 0x2004 object definition to protect against invalid access by EC-Simulator
- Fix occasional crash on invalid EtherCAT receiving
- Fix occasional lock-up in JobTask in case of corrupt bus slave list
- Fix missing EC_NOTIFY_NOT_ALL_DEVICES_OPERATIONAL notification if slave disconnected and hot connect manual mode is used
- Fix dead pointer usage in SendFrame
- Fix potential memory leaks on reallocation
- Fix resource leak if ecatInitMaster() fails
- Unmask network adapter on disabling topology changed delay

Platform
- Removed AuxClk support from QNX7
- Fix CCAT for arm performance issue
- Removed deprecated functions OsMakeThreadPeriodic(), OsSleepTillTick() and XenomaiOSWarnUponSwitch() from Xenomai OS-Layer
- Removed OsMakeThreadPeriodic() and OsSleepTillTick() calls for Xenomai from all examples
- Intel Pro/1000: Strip CRC
- Fix assembly info properties for EC-STA, EC-EoEGateway, EcMasterDotNet.dll
- Don't process RX frames with CRC error flag ETSEC
- ICSS: MAC address reading and eval protection added
- Add DCM MasterShift to SYSBIOS on AM3359
- Fix PCI network adapter not found in VxWorks if adapter was behind more than 4 parent devices

3.13 List of enhancements/bug fixes in V3.1.0.10

Enhancements
- Add EC_IOCTL_SB_SET_TOPOLOGY_CHANGED_DELAYS
- Add wInitCmd to EC_IOCTL_SET_MASTER_DEFAULT_TIMEOUTS
- Add max. client count to RAS Server

Fixes

- Fix unmask send at reconnected device for INACTIVE Master for Master Redundancy
- Fix apply topology changed delay at INACTIVE Master for Master Redundancy
- Fix propagation delay calculation in case of junction redundancy line break
- Fix endless order cancelling situation if cable reconnection occurs during first buss can triggered by first ecatSetMasterstate
- Fix cable red bit for acyclic master red frames send on one line only for Master Redundancy
- Fix reading slave MbxOut size from Diagnosis Interface for MbxGateway
- Fix erroneous bus mismatch notification on startup
- Fix ecatNotifyApp return EC_E_NOERROR on success
- Fix crash in ESCTypeText in 64Bit
- Fix occasional crash in AtemRasSrv during client connection due to uninitialized member variables
- Report instead of crash in case of C++ to .NET marshalling error in EcMasterDotNet

Platform

- Fix OsAuxClkDeinit
- CPSW: EC_LINKIOCTL_UPDATE_LINKSTATUS not needed any more
- CPSW: Fix start with link disconnected and link reconnection
- FslFec: Add support for Toradex Colibri iMX7
- FslFec, GEM: Add EC_LINKIOCTL_PHY_READ and EC_LINKIOCTL_PHY_WRITE
- Linux / Xenomai: Updated to atemsys V1.3.16:
  - o Fix for API changes at kernel >= 4.18.00
  - o Fix for ARM DMA allocation for PCIe
- LxWin: Fix link layer integration
- QNX: Fix IO memory mapping under 32Bit (regression since V3.1.0.07)
- SockRaw: optionally replace Ethernet padding with NOP commands
- VxWorks70: Use vxbDmaEndBufLib instead of legacy API
- VxWorks70: Fix bad physical memory handling (32/64Bit)
- Windows: AuxClk fallback to kernel timer implementation if no interrupt assigned to ECAT driver for LocalApic implementation

3.14 List of enhancements/bug fixes in V3.1.0.09

Enhancements

- Add EC_LINKIOCTL_SET_LINKSTATUS to I8254x
- Add segmented CoE up- and download to EcMbxGatewayClient

Fixes

- Fix acyclic slave frames occasionally erroneously dropped on foreign frame receiving for Master Redundancy

Platform
- Add support for AARCH64 to FreeRTOS
- Add EC_T_OS_PLATFORM_PARMS::bUseKernelTimerForAuxClk for Windows

3.15 List of enhancements/bug fixes in V3.1.0.08

Enhancements
- Fix parsing variables of Specific Data Types
- Move EoEGateway config file location to executable's folder
- Add MAC protection to CCAT

Fixes
- Fix fairness in mailbox scheduling
- Fix unexpected slave transition during startup if fullmanual mode is used
- Fix erroneous behavior if slave disconnected during ecbtsms_chkwrttmpaddr
- Set EoE TAP threads priority below JobTask/ReceiveThread Priority

3.16 List of enhancements/bug fixes in V3.1.0.07

Fixes
- Fix INACTIVE to ACTIVE MasterRed INPUTs in case of line break
- Fix ACTIVE to INACTIVE MasterRed OUTPUTs flashing in EcMasterDemoMasterRed
- Fix missing EC_NOTIFY_SLAVE_PRESENCE if permanent frame loss during startup
- ProcessAllRxFrames (interrupt mode): Flush frames received on only one line: Prepone processing of frames (same cycle, not at permanent frame loss handling)
- Fix EC_T_PROCESS_VAR_INFO_EX::wWkcStateDiagOffs (ecatFindInpVarByNameEx, ecatGetSlaveInpVarByObjectEx, ecatGetSlaveInpVarInfoEx)
- Fix EoE retry access period if bus cycle less than 1ms
- Add support for ARM (am5728) and CPSW to SylixOs
- Add support for Renesas RZN1D Board to DW3504 Link-Layer

Platform
- Updated to atemsys V1.3.15
  - Fix crash while loading kernel module on ARM64
  - Add support for kernel >= 5.0.00…
- Fix discard of frames with CRC errors for FslFec Link-Layer
- Add support for Xlinix Zynq Ultrascale(ARM64) for GEM Link-Layer
- Add support for ARM / CX9020 to CCAT Link-Layer

3.17 List of enhancements/bug fixes in V3.1.0.06

Fixes
- Added myAppWorkpdMasterRed

- Fix overwriting data with data from previously ACTIVE Master on take-over
- For all examples execute myAppWorkPd() only for SafeOP and OP
- Fix EC_IOCTL_GET_SLVSTATISTICS for PPC
- Stop invalid mailbox InitCmds
- Fix EC_IOCTL_DC_SLAVE_CONTROLLED_BY_PDI for PPC
- Fix ecatSetMasterState lock-up if DC initialization canceled
- Fix race condition during emConfigExtend accessing to BusSlave objects
- Fix memory leak in EoE-Endpoint LinuxTAP
- Add ecatGetCfgSlaveEoeInfo
- Add vlan support to EcMasterDemo (EC-Master library must be compiled with VLAN_FRAME_SUPPORT)
- Add parameter "-play" to llAccept to send frames from pcap trace to network
- Fix compilation of llAccept
- Fix occasional circulating bit inserted to cyclic master red frameProcess instead of drop frames with slave data on red device flush
- Exclude MasterRed frames from slave frame loss monitoring

Platform
- Fix EC-Win packaging
- Add EC-WinLx support
- Enable ResetOnDisconnect by default for Intel Pro/1000 Generally needed for CableRed
- Log PCI info including device ID for Intel Pro/1000
- Re-enable interrupt in Intel Pro/1000 for "ResetOnDisconnect"
- Add Linux aarch64
- PRUICSS LinkLayer add support for dcm mode LinkLayerRefClock
- Fix time stamping on send frame for emllAlteraTSE, emllEG20T, emllEMAC, emllICSS, emllNdisUio, emllR6040, emllRIN32M3, emllRZT1, emllSnarf

3.18 List of enhancements/bug fixes in V3.1.0.05

Fixes
- Fix endless loop in BT state machine if returning frame setting station address is corrupted
- Fix AtemRasClient for PPC: EC_NOTIFY_RAWCMD_DONE
- Fix McSm order logging for multi-instance
- Fix logging ForeignCyclicMasterRed CmdFlags
- Fix WKC of empty acyclic master red frames
- Fix erroneous transition during slave identification if EC_IOCTL_SET_NEW_BUSSLAVES_TO_INIT is used and transition to INIT takes a long time
- Fix erroneous timeout during ecatSetMasterState() for LinkLayerRefClock and MasterRefClock modes if no DC slave is present
- Fix erroneous timeout during DC initialization if bus cycle less than 1ms because of endless loop during receive times latching
- Don't skip DC initialization if no configured DC slaves connected and EC_IOCLT_DC_FIRST_DC_SLV_AS_REF_CLOCK is used

- Fix handling of EK1200 (Beckhoff CX)
- Fix race condition between ecatSetMasterState() and topology change handling regarding DC initialization

Platform
- Probe Local APIC timer usage for Windows
- Fix FreeRTOS DMA allocation
- GEM force LED mode to blink for activity on PHY Microchip KSZ9031RNX

3.19 List of enhancements/bug fixes in V3.1.0.04

Enhancements
- Support parallel usage of AuxClk and optimzed linklayers for Windows
- Add LinkOsSetThreadAffinity, LinkOsGetThreadAffinity for VxWorks

Fixes
- Send acyclic master red frames on both devices and handle frame loss
- Enhance circulating frame protection for junction redundancy
- Use first DC slave as RefClock again if RefClock is optional
- Fix crash during ecatConfigExtend if link disconnect
- Avoid circulating frames when opening ports after junction red line fix
- Fix acyclic frame processing for repeated lost frames with mailbox commands NOP
- Check if DL status interrupt detected just after port receive times latching to protect against incoherent values generating invalid topology
- Fix unexpected EC_NOTIFY_SLAVE_INITCMD_RESPONSE_ERROR with error "PDI watchdog" in continuous transitions (INIT->OP)
- Remove automatic mailbox read after VoE write. Restart stuck mailbox read if mailbox write returns WKC = 0
- Check if DL status interrupt detected just after port receive times latching to protect against incoherent values generating invalid topology
- Read mailbox first before retrying MbxCmd WKC = 0 because some slaves reject MbxIn access as long as MbxOut is full
- Prevent data corruption if error detected just after extended config has been applied during ecatConfigExtend()
- Don't remove acyclic frame from pending queue in case of mismatching acyclic frame, but allow further processing and retrying
- Fix invalid read access during eCnfType_GenPreopENI
- Fix erroneous expected WKC if DL status read command corrupted during DL status irq
- Force mbx read to read eventually next MbxOut after repeating mailbox done
- Fix memory corruption during ecatConfigExtend if slave SII length exceeds internal buffer
- Read mailbox first before retrying MbxInitCmd because some slaves reject MbxIn access as long as MbxOut is full
- Prevent for repeated DC initialization during topology change handling if master is in PREOP

- Fix distance between receive times latching and reading too short if done by acyclic command generating bad topology detection / erroneous line crossed
- Fix erroneous slave detection in several cases of slave disabled / disconnected and mismatching slave is connection
- Fix erroneous slave disappear in some case of slave disconnection while writing the temp fixed address
- Fix crash in Intel Pro/1000 EcLinkSendFrame on non-allocated frame
- Fix building OS-Layer for RTOS-32 using Borland Compiler
- Fix RTX64 DLL exports

3.20 List of enhancements/bug fixes in V3.1.0.03

Enhancements
- PRUICSS LinkLayer TTS parameter moved to new descriptor EC_T_LINK_TTS
- Save error only acknowledged by ecatSetSlaveState() not ecatSetMasterState() if EC_IOCTL_SET_AUTO_ACK_AL_STATUS_ERROR_ENABLED used

Fixes
- Fix CoE transfer size calculation in case of Complete Access in EC-STA
- Fix occasional crash on retransmissions of SoE / VoE mailbox transfers
- Fix erroneous bus mismatch returned at line break occasionally (broken since V3.0.1.47)
- Fix mailbox management locking
- Only stop PS and SO transitions because of PDI watchdog expired. Other transitions continue until timeout and return EC_NOTIFY_SLAVE_INITCMD_RESPONSE_ERROR.
- Calling ecatSetSlaveState always generates EC_NOTIFY_SLAVE_STATECHANGED even EC_NOTIFY_SLAVE_INITCMD_RESPONSE_ERROR
- Fix endless loop in some case of mis connection (broken since V3.0.1.43)
- Fix slave state machine stuck for the extended slave (broken since V3.0.1.47)
- Fix bad propagation delay because of timestamp overflow
- Don't notify EC_NOTIFY_SLAVE_STATECHANGED beore InitCmds in II or PP transition
- Use timeout of OSP_I transition for slave error acknowledgment if EC_IOCTL_SET_AUTO_ACK_AL_STATUS_ERROR_ENABLED is used
- Fix WKC recalculation in case of SafeOpError and according 1Byte PDO setting
- Fix erroneous system offset if DC slave connected before previous first one and eDcmMode_LinkLayerRefClock is used
- Fix erroneous timeout elapsed during slave identification
- Probe register 0x0210 for ESC Type 2
- Fix CRC protected EEPROM area always at once for PowerPC
- Fix instance identification by PCI location for QNX
- Fix EC_NOTIFY_RAWCMD_DONE for ecatQueueQueueRawCmd via RAS
- Fix memory leaks in ecatDeinitMaster if splitted frame processing is enabled and compiler switch EXCLUDE_MULTIPLE_CYC_ENTRIES set

Other Changes
- Refactor EC_T_SLVSTATISTICS_DESC
- Changed .NET 4.0 Client Profile instead of .NET 2.0 for Windows x86
- Removed EcMasterDemo2
- Removed obsolete parameter from ecatTferSingleRawCmd, ecatQueueRawCmd, ecatClntQueueRawCmd, EC_T_MBX_DATA::dwFoETransferredBytes

3.21 List of enhancements/bug fixes in V3.1.0.02

Enhancements
- Write CRC protected EEPROM area always at once
- Always return identification value based on Omron GX-JC06-H main device for sub device if main device provide it by rotary switch

Fixes
- Fix link layer parameter handling for DW3504, ETSEC, GEM, I8254x, R6040, RTL8169, SHEth
- Fix crash in topology resynchronization if there are more slaves on the bus than expected. Only with complier switch EXCLUDE_HOTCONNECT
- Fix topology change delay applied on cable reconnection
- Apply identification fallback method if configured method failed by timeout
- Pending error acknowledgment move from API to slave state machine

3.22 List of enhancements/bug fixes in V3.1.0.01

Enhancements
- OS-Layer / LinkOsLayer refactoringOsDeleteThreadHandle, OsSetThreadPriority, OsSetThreadAffinity, OsGetThreadAffinity
- Add support for EC_LINKIOCTL_SET_LINKENABLED with EC_LINKENABLED_ONLY_SEND for interrupt mode
- Enhance line cross detection inside junction redundancy line
- Allow topology changed to cancel current topology changed handling as soon as scan bus finished
- Reorder InitCmds for Omron slaves to protect against WKC error during raising transitions to SAFEOP
- Separate OS-Layer / LinkOsLayer
- Suspend read slave statistic while topology is unknown
- If timeout elapsed during receive times latching with cyclic command in DC state machine, try with acyclic command
- Increase default order timeout to 20s to cover DC Initialization
- Rename EC_IOCTL_DC_REF_CLOCK_CONTROLLED_BY_PDI to EC_IOCTL_DC_SLAVE_CONTROLLED_BY_PDI
- Don't check 0x0210 during DL status interrupt handling, but directly read 0x0110
- Enhance detection of line crossed slave position

- Allow EEPROM filled with zeros for GenOpENI

Fixes
- Fix Object 0x2001, Bit 9 "Master in requested State"
- Slave absent at INACTIVE Master on link disconnection
- Fix topology change handling at INACTIVE master (regression since V3.0)
- Send acyclic master red frames only at adapter leading to other master (Support frame dropper connected to master port) (regression since V3.0)
- Support permanent frame loss by cable redundancy again
- Wait for DC at start of INIT transition in slave state machine if EC_T_DC_CONFIGURE::bDcInitBeforeSlaveStateChange is used
- Fix using uninitialized system time offset reference slave during topology change handling
- Don't re-read identification value if ADO is matching and value non zero
- Ignore network changes explicitly during ecatConfigExtend() and ecatRescueScan() instead of only disabling port operations
- Recalculate WKC just after the slave presence notification. Application get information in this order: WkcState = 1, Slave Disappear, WkcState = 0
- Fix DC system time offset calculation for LinkLayerRefClock mode
- Fix FoE busy handling during segmented transfer (emFoeSegmentedDownloadReq)
- Fix endless loop in BusScan if new port connection is detected but topology change delay has been started
- Only acknowledge topology change during in HcSm if port operation are enabled. Fix ConfigExtend() mask port connection detection
- Reset bus slave candidate in config slave in SetSlavePresence() to protect against invalid access to freed memory
- Consider error at transition start only if using EC_IOCTL_SET_AUTO_ACK_AL_STATUS_ERROR_ENABLED
- Fix invalid access to freed memory during reset of mailbox slaves in ecatConfigExtend()
- Fix missed cable connection if disconnection occurs immediately after
- Fix missing DC initialization of ref clock slave selected if EC_IOCLT_DC_FIRST_DC_SLV_AS_REF_CLOCK used
- Don't stop systematically topology change delay if topology change detected to assure the delay before opening port
- Fix wrong system time offset calculation if eDcmMode_LinkLayerRefClock used and DC system time offset ref slave disappear
- Continue master state transition over several states even if slave occurs during transition.(EC_IOCTL_ALL_SLAVES_MUST_REACH_MASTER_STATE = true)
- Set _DLSTATUS_IN_PROGRESS if topology change detected without DL status IRQ
- DL/AL status interrupt can interrupt topology change handling as soon as topology known
- Set _ALSTATUS_IN_PROGRESS if slave error detected without AL status IRQ
- Fix FoE busy handling during segmented transfer (emFoeSegmentedDownloadReq)

- Only acknowledge error in ecatSetSlaveState() if using EC_IOCTL_SET_AUTO_ACK_AL_STATUS_ERROR_ENABLED
- Increase receive times latching with cyclic command timeout to 3x cycle in DC state machine to protect against erroneous acyclic command method
- Fix erroneous transition if EC_IOCTL_SET_NEW_BUSSLAVES_TO_INIT and EC_IOCTL_SET_AUTO_ACK_AL_STATUS_ERROR_ENABLED used and transition to INIT take a long time
- Fix parameter check in several mailbox related APIs
- Fix erroneous topology detection in some junction redundancy cases if several junction slaves on the network and line break
- Fix missing master state change in some case if state change request interrupted by AL or DL status interrupt
- Fix erroneous expected WKC in case of slave with PDI watchdog expired cannot finish transition to INIT
- Don't refresh or notify junction redundancy and line crossed information if build topology has not be bought during the scan bus. Fix invalid flags
- Fix erroneous slave error notification if EC_IOCTL_SET_NEW_BUSSLAVES_TO_INIT used and transition to INIT take a long time
- Fix DC ARMW burst bulk in link layer mode
- Update MSU management at INACTIVE Master for WKC validation at takeover (Regression)
- Fix DC start time recalculation
- If timeout elapsed during receive times latching with cyclic command, try with acyclic command
- Wait for TopologyChange related order before inserting a new one
- Fix transition failure if EC_IOCTL_SET_NEW_BUSSLAVES_TO_INIT used and transition to INIT take a long time (broken since 3.0.1.33)
- Fix missing config slave synchronization in duplicate slaves synchronization
- Fix handling of duplicate slaves if EC_IOCTL_SET_NEW_BUSSLAVES_TO_INIT used
- Fix topology detection if consecutive slaves with matching fixed address (duplicate) are connected
- Fix redundancy line RX frame counter
- Call ForceSyncManagersEnabled(DEVICE_STATE_UNKNOWN) on slave disconnection. Fix erroneous WkcState errors (broken since 3.0.1.28)
- Remove WKC adjustment in case of PDI watchdog expired spontaneously to support the use case that the slave recover by itself
- Fix cyclic frame lost counter

Platform
- Add Ansys to Realtek PCI device list
- LxWin MAC eval license unlocking
- Add instance identification by PCI bus address to QNX 6
- Add DCM MasterShift to Renesas NoOs
- Add support for Toradex Colibri imx6 to FslFec
- Removed EC-Master linking from AtemRasClnt (Windows_x64)

- Updated to atemsys V1.3.14 Fix edge type interrupt (enabled if Kernel >= 3.4.1, because exported irq_to_desc needed) Fix Xenomai Cobalt interrupt mode
- Removed real_malloc, real_free wrappers from Xenomai

4 Migration from V2.9

- The acyclic communication bandwidth restriction was done by the combination of dwMaxSlaveCmdPerFrame and dwMaxSentQueuedFramesPerCycle.
Because mailbox transfers consume more bandwidth than register transfers, dwMaxAcycBytesPerCycle has been added to EC_T_INIT_MASTER_PARMS to restrict it in a better way.
The parameters related to acyclic communication have been renamed to identify them easily.
dwMaxQueuedEthFrames -> dwMaxAcycFramesQueued
dwMaxSentQueuedFramesPerCycle -> dwMaxAcycFramesPerCycle
dwMaxSlaveCmdPerFrame -> dwMaxAcycCmdsPerCycle
dwMaxAcycFramesPerCycle and dwMaxAcycCmdsPerCycle still exist to be able to limit the CPU load related to frame/command processing.
- Removed obsolete parameter EC_T_INIT_MASTER_PARMS::dwEoETimeout
- dwLogLevel and pfLogMsgCallBack have been moved into EC_T_INIT_MASTER_PARMS::LogParms. Additionally, a context has been added to the pfLogMsgCallBack function.
- Set INCLUDE_FAST_MODE in case of Fast Mode (implicit assuming dropped)
- Additional parameter dwTaskId to EC_PF_CYCFRAME_RECV
- API change for emExecJob: EC_T_USER_JOB_PARMS* pUserJobParms replaced parameter EC_T_VOID* pvParam
- IO control EC_IOCTL_SET_CYC_ERROR_NOTIFY_MASK replaced with EC_IOCTL_SET_FRAME_RESPONSE_ERROR_NOTIFY_MASK. Error masks were renamed accordingly.
- Additional parameter dwTaskId for memory provider callback functions pfPDOutReadRequest, pfPDOutReadRelease, pfPDInWriteRequest and pfPDInWriteRelease.
- Correlation between WkcState and Pd offset changed. Logical mailbox state commands are no longer considered.
- Value EC_LOG_LEVEL_UNDEFINED has been changed from 0 to -1 EC_LOG_LEVEL_SILENT is defined as 0.
- eInitCmdErr_UNDEFINED is not defined and returned anymore

5 New Features of V3.0

- Master Redundancy
- Splitted Frame Processing
- Junction redundancy supported together with DC
- Support revision checks with operator >=
- Slave to slave mailbox communication
- Hidden slave detection by junction redundancy

5.1 List of enhancements/bug fixes in V3.0.1.36

Core
- Fix transition failure if EC_IOCTL_SET_NEW_BUSSLAVES_TO_INIT used and transition to INIT takes a long time (broken since 3.0.1.33)
- Fix missing WKC adjustment in case of PDI watchdog expired spontaneously if EC_IOCTL_SET_AUTO_ADJUST_CYCCMD_WKC_ENABLED has been called
- Fix erroneous canceling of eMcSmOrderType_TOPOLOGY_CHANGE generating bus mismatch just after eCnfType_GenPreopENI

5.2 List of enhancements/bug fixes in V3.0.1.35

Core
- Fix erroneous EC_NOTIFY_CYCCMD_WKC_ERROR, if EC_IOCTL_SET_NEW_BUSSLAVES_TO_INIT and EC_IOCTL_SET_AUTO_ADJUST_CYCCMD_WKC_ENABLED have been called (broken since 3.0.1.33)
- Trigger eMcSmOrderType_TOPOLOGY_CHANGE at the end of ecatConfigExtend even if no bus slave has been added to the topology

5.3 List of enhancements/bug fixes in V3.0.1.34

Core
- Trigger eMcSmOrderType_TOPOLOGY_CHANGE at the end of ecatConfigExtend instead of eMcSmOrderType_REQ_SB, to trigger DC state machine if needed
- Fix junction redundancy line break detection at branching slave
- Add EC_IOCTL_SB_SET_NO_DC_SLAVES_AFTER_JUNCTION
- Reset PDI watchdog on transition start to stop failing transition faster
- Validate target state in ecatSetSlaveState() and in StartInitCmd() and generate at least a generic EC_NOTIFY_SLAVE_INITCMD_RESPONSE_ERROR
- Fix timeout in receive times latching during bus scan
- Fix illegal access to removed bus slave if junction red tail slave disconnected during hidden slave detection
- Fix temporary fixed address assignment for duplicated slaves

Platform
- Add EC-EngineerWeb support (shared objects) for Linux

5.4 List of enhancements/bug fixes in V3.0.1.33

Core
- Fix ecatRescueScan() stucks sometimes if cyclic frames permanent frame
- Fix erroneous topology detection in some junction redundancy cases if several junction slaves on the network and line break
- Don't stop transition if slave error or PDI watchdog have been detected at transition start

5.5 List of enhancements/bug fixes in V3.0.1.32

Core

- State change because of ecatSetSlaveDisabled() / ecatSetSlaveDisconnect() triggered in slave OnTimer and not in API call to avoid race condition
- Enhance ecatRescueScan to support line crossed topologies
- Fix invalid expected WKC if AL status refresh executed during slave transition and EC_IOCTL_SET_AUTO_ADJUST_CYCCMD_WKC_ENABLED has been called
- Fix missing EC_NOTIFY_SB_DUPLICATE_HC_NODE notifications
- Fix returned object name in ecCoeGetEntryDescReq if object data contains unit type record

5.6 List of enhancements/bug fixes in V3.0.1.31

Core

- Acknowledge AL-Status errors for new slaves on the network if EC_IOCTL_SET_NEW_BUSSLAVES_TO_INIT is enabled
- Fix endless resynchronization in case of slave with identification located at the end of the configuration have been connected at the begin of network
- Refactor MbxState management with LogMsg
- Wait for McSm becomes stable at the beginning of ecatConfigExtend()
- Re-enable port operation at the very end of ecatRescueScan() to assure the repeatability of the function behavior
- Fix WKC recalculation according PDI watchdog state and sync manager mode
- Protect McSm Order enqueuing against race condition
- Monitor port receive time and consider them missing if the value didn't change
- Fix erroneous port open in hidden slave detection after ecatRescueScan()

Platform

- Add OsReplaceGetLinkLayerRegFunc
- Remove RTAI and RCX from demo applications

5.7 List of enhancements/bug fixes in V3.0.1.30

Core

- Fix erroneous topology detection in some junction redundancy cases if several junction slaves on the network (OC#169)
- Fix erroneous topology detection in some junction redundancy line break cases if several junction slaves on the network (OC#167)
- Fix race condition in mailbox command queueing/processing
- Reduce port time limit from 200 to 170 for EL9010 detection
- Fix SetMasterstate() returns EC_E_TIMEOUT instead of EC_E_SLAVE_ERROR if PDI watchdog expired during transition

5.8 List of enhancements/bug fixes in V3.0.1.29

Core

- Add API emGetSlaveOutpVarByObjectEx and emGetSlaveInpVarByObjectEx
- Fix missing topology change detection during emConfigExtend()
- Fix PDO to SyncManager assignment for slaves with 4 SyncManagers in one direction
- Fix RescueScan frame loss after slave detection if there are multiple branching slaves in the topology
- Fix missing EC_NOTIFY_SLAVE_ERROR_STATUS_INFO if emSetSlaveState() has been call before
- Fix unexpected slave absence notifications if topology change happen during DL status handling
- Repeat DC state initialization if it has been interrupted by topology changes during transition above INIT
- Fix systematical frame loss during reconnection at red or main port

Platform
- Enhance LinkOSLayer for Windows 10 to run a 32Bit Link-Layer on a 64Bit platform

5.9 List of enhancements/bug fixes in V3.0.1.28

Core
- Avoid unexpected DL status interrupt handling caused by PDI watchdog monitor (since V3.0.1.25)
- Fix erroneous EC_NOTIFY_CYCCMD_WKC_ERROR if transition failed before writing AL control and EC_IOCTL_SET_AUTO_ADJUST_CYCCMD_WKC_ENABLED has been called (broken since 3.0.1.27)
- Fix port closed by RescueScan because of frameloss detection cannot be reopened enduring by ecatSetSlavePortState()
- Reset WkcState monitoring counters during cyclic frame adjustment to protect against permanent bad WkcState
- Fix race condition in DL status interrupt handling if slaves reappear in quick succession
- Fix erroneous topology detection in some junction redundancy line break cases if several junction slaves on the network
- Fix AtemRasClient: ecatScanBus returns busmismatch, line crossed,…
- Fix AtemRasClient for PPC: FindProcVarByName

Platform
- Updated to atemsys V1.3.13 Add ARM64 support
- Add ARM64 support for RTL8169
- Fix crash in EcMasterDemo for Xenomai3
- PRUICSS LinkLayer force LED mode to blink for activity

5.10 List of enhancements/bug fixes in V3.0.1.27

Core

- Enhance ecatRescueScan for topologies with more than one non EtherCAT device in a line. Reduce amount of slave presence notifications during ecatRescueScan
- Fix Wkc recalculation in case of failing transistion due to a PDI watchdog interrupt
- Resync on slave with matching identification after bus mismatch detected even if end of group is not fully present
- Fix erroneous line crossed flags and junction red line information in some line crossed case or unexpected junction redundancy with line break
- Fix AtemRasClient for PPC: ecatGetBusSlaveInfo
- Fix ecatSetMasterstate returns no error even if slave disappear during transition (broken since V3.0.1.26)

Platform
- Add AtemRasServer support to SylixOS x86 und x64
- Fix stack overflow with Microsoft .NET Core on Linux
- Updated to atemsys V1.3.12 Add atemsys API version selection. Share atemsys to V2.7 ... V3.0.

5.11 List of enhancements/bug fixes in V3.0.1.26

Core
- Reset PDI watchdog expired state only after successful transition. eInitCmdErr_PDI_WATCHDOG returned even if detected before transition
- Fix erroneous line crossed flags in case of junction red line break at head port B
- Enhance mailbox state change response time if slave slicing is activated
- Interrupt SetSlaveState request if DL status interrupt detected to detect PDI watchdog expired error

5.12 List of enhancements/bug fixes in V3.0.1.25

Core
- Support junction red topologies containing slaves without receive times at all
- Fix erroneous bus mismatch on reconnection of extended config slaves
- Disable hidden slave detection during RescueScan
- Fix DC handling of junction redundancy (broken since V3.0.1.24)
- Protect against endless DL Status interrupt handling in case of permanent PDI watchdog expired state
- Support line crossed detection for slave without receive time at processing unit
- Add EC_IOCTL_DC_REF_CLOCK_CONTROLLED_BY_PDI
- Restore exactly junction red port state during hidden slave detection and DC
- Add EC_IOCTL_DC_ENABLE_ALL_DC_SLV
- Fix RescueScan frame loss detection if frame loss occurs within a junction redundancy line
- Fix occasional crash for custom dwMaxAcycBytesPerCycle values

5.13 List of enhancements/bug fixes in V3.0.1.24

Core

- Skip hidden slave detection if unexpected connection has been detected to protect for permanent frame loss
- Add frame discard support to frame logging
- Fix erroneous PortSlaveIds in EC_T_BUS_SLAVE_INFO if ecatGetBusSlaveInfo is called during a DL status interrupt
- Enhance junction redundancy detection/checks for unexpected/unconfigured junction redundancy lines
- Fix commands to close and open ports sent in a single frame during hidden slave detection and DC initialization by junction redundancy
- Ignore topology errors during ecatConfigExtend and ecatRescueScan
- Fix ecatConfigExtend if unexpected bus slave becomes valid during extending bus scan because of delayed identification value
- Fix resetting of junction redundancy flags in case of a topology change
- Fix occasional crash for custom dwMaxAcycBytesPerCycle values
- Fix ecatConfigExtend if slave identification fails several times
- Fix erroneous line crossed detection under Windows by some random circumstances
- Fix BusSlave still considered as unexpected after ecatConfigExtend() has been called and some config slaves were missing
- Fix ecatGetSlaveProp() over RAS

Platform
- FslFec Fix sporadical endless loops during PHY initialization
- FslFec Support for PHY 8081
- Add I8254x auto negotiation timeout parameter
- Fix 64Bit OsMeasGetCounterTicks for QNX (ARM)
- Extend PRUICSS LinkLayer for Emerson TI AM5728 Board

5.14 List of enhancements/bug fixes in V3.0.1.23

Core
- Fix crash in ecatConfigExtend
- Fix strict junction redundancy check for line crossed slaves in broken junction redundancy line
- Fix segmented SDO download start with toggle bit set to 1
- Add handling of remaining 32Bit Os Counter Tick Measurents for Performance Measurement
- Enhance propagation delay calculation
- Fix emGetslaveProp always return EC_FALSE (broken since V3.0.1.22)
- Fix invalid read in ENI parsing if data type of variable is unknown

Platform
- Fix 64Bit Counter Tick measurent for VxWorks at ARM

5.15 List of enhancements/bug fixes in V3.0.1.22

Core
- Ignore pending PDI Watchdog by new connected slaves

- Adjust LineCrossedFlags behavior
- Enhance mailbox polling performance for running transfers
- Add ecatGetMasterDump API
- Add EcMbxGatewaySrv to AtemRasSrv
- Reorganize Notifications while errors during InitCmds
- Fix invalid read in EC_COPYBITS_INLINE (last byte at buffer with odd length)
- Fix detection of unconnected Port A if junction redundancy is enabled
- Don't consider return value of last ScanBus during ecatConfigExtend to not drop extended configuration in case of missing config slaves
- EC_IOCLT_DC_FIRST_DC_SLV_AS_REF_CLOCK sets first slave with DC support as reference clock
- Fix DC distribution in case of line break if reference clock is on red line
- Fix crash under Windows 10 64Bit if linklayer instance not found
- Fix mandatory slaves considered absent on MasterRed take-over
- Notify slave presence at INACTIVE Master
- Fix slave InitCmd response error after slave was in INIT with error

Platform
- Configurable TX/RX DMA Desc buffer count for GEM, DW3504, R6040 and SHEth
- Setup GMIItoRGMII converter independent of PHY access for GEM
- DW3504 Remove cable connected check in EcLinkAllocSendFrame
- Fix memory leak in emllPcap

5.16 List of enhancements/bug fixes in V3.0.1.21

Core
- Fix missing bus mismatch on adding incomplete hot connect group
- Add diagnosis info reset of 0xAnnn on writing 0xF200:16 (due to ETG.1510)
- Fix diagnosis info reset object 0xF200:16 reading (due to ETG.1510)
- Don't reset WKC error counter (0xAnnn:14) on slave disconnection (ETG.1510)
- Fix client notification for clients without notification callback
- Enhance fairness in mailbox scheduling
- Fix EC_T_BUS_SLAVE_INFO::wLineCrossedFlags always zero
- Fix SoE on PowerPC (broken since V3.0.1.19)
- Fix AoE InitCmds on PowerPC (broken since V3.0.1.19)

5.17 List of enhancements/bug fixes in V3.0.1.20

Core
- Add hidden slave connection detection in junction redundancy segment
- Update MSU management at INACTIVE Master for WKC validation at MasterRed take over
- Fix emVoeWriteReq (broken since V3.0.1.19)
- Detect topology correctly in case of junction redundancy line break in a segment containing a another junction slave (OC#418)

- ecatRescueScan returns EC_E_FRAMELOSS_AFTER_SLAVE again (broken since V3.0.1.19)
- Add legacy access support to objects 0x8nnn, 0x9nnn, 0xAnnn Enhanced due to ETG.1510 in V3.0.1.18, legacy EC-Engineer was incompatible (broken since V3.0.1.18)
- Fix last cyclic frame flag (EC_T_CMF_CMD_FLAG_LAST_CYC_FRAME) for MasterRed
- Fix parsing variables of Specific Data Types
- Fix GX-JC06-H enhanced identification method in case of EC_IOCTL_SB_SET_IDENTIFICATION_FALLBACK_ENABLED

5.18 List of enhancements/bug fixes in V3.0.1.19

Core
- Add GX-JC06-H enhanced identification method in case of EC_IOCTL_SB_SET_IDENTIFICATION_FALLBACK_ENABLED
- Fix corrupted network information after ecatConfigExtend() failed
- Fix enhance slave mailbox sending and processing
- Expedited transfers according to object size in MbxGateway
- Add EC_T_BUS_SLAVE_INFO::wLineCrossedFlags

5.19 List of enhancements/bug fixes in V3.0.1.18

Core
- Fix activation of Sync Window Monitoring Commands
- Fix get MAC-address in SockRaw
- Upload request to non-existing object in Master OD aborted as SDO REQ, not SDO RES
- Fix Hot Connect Slaves considered present on takeover
- Support RescueScan with not configured junction redundancy connection
- Fix timeout in emReadSlaveIdentificationReq
- Fix defect license check
- Fix erroneous merged BusTime if the reference clock is on the red line
- Fix slave disappear on getting ACTIVE
- Fix wrong notification of unexpected cyclic frame on getting ACTIVE
- Support ENI with DC enabled but NOP cmd to 0x900 is missing
- Fix ENI variable type parsing for STRING
- Fix handling of delayed CoE Frames
- Add EC_IOCTL_SB_SET_JUNCTION_REDUNDANCY_MODE
- Fix erroneous EC_E_MAX_BUS_SLAVES_EXCEEDED in case of topology change while scan at the end of the network
- Enhance Master Object Dictionary regarding ETG.1510

Platform
- Fix LinkOsMemoryBarrier and OsMemoryBarrier for Linux, Xenomai (ARM) (Fixes building Bin/Xenomai_armv6-vfp-eabihf/libemllGem.so)
- Add emllUdp

- Fix unexpected master version print under VxWorks
- Use clock_gettime in OsQueryMsecCount for QNX to support multiprocessor system

5.20 List of enhancements/bug fixes in V3.0.1.17

Core
- Add EcMbxGatewayClnt to AtemRasClnt
- Detect topology correctly in case of junction redundancy line break in a segment containing a another junction slave
- Add InSyncStartDelayCycle to EC_T_DCM_CONFIG_BUSSHIFT, _MASTERSHIFT, _MASTERREFCLOCK, _DCX
- Add EC_IOCTL_SET_MAILBOX_POLLING_CYCLES to change Mailbox polling cycle
- Reorder InitCmd for Omron slaves to protect against WKC error during falling transitions to INIT
- Force topology change at the end of ecatRescueScan
- Add support for disabled/disconnected slaves in junction redundancy
- Add EC_IOCTL_SB_SET_IDENTIFICATION_FALLBACK_ENABLED
- Reduce WKC error period during slave reconnection after it was in OP
- Always wait for DCM InSync just before PS transition if mode is not DCX
- Refresh branching information after disconnection at branching slave, fixing erroneous topology information leading to wrong propagation delay in case of junction redundancy line break
- Add EC_IOCTL_SET_ZERO_INPUTS_ON_WKC_ERROR and
- EC_IOCTL_SET_ZERO_INPUTS_ON_WKC_ZERO to RAS
- Add API emGetBusTime

Platform
- Add OsInit() to DllMain of AtEmRasClnt. To increase performance under Windows because of timeBegin(1)

5.21 List of enhancements/bug fixes in V3.0.1.16

Core
- Fix wrong DC start time after ecatSetMasterstate(INIT) in case of 64Bit distribution due to Master InitCmd BWR 0x910 in IP transition
- Add emReloadSlaveEEPRomReq
- Fix erroneous acyclic frame timeout / retry mechanism (broken since 3.0.1.07)
- Fix AcycCmdTimeout calculation if EC_T_INIT_MASTER_PARMS.dwEcatCmdTimeout == 0

Platform
- Fix byMaxSubIndex, byObjCode for ecatCoeGetObjectDesc on PPC
- Use CPU's unaligned access handling for WORD and DWORD (> ARMv6 only) in Linux
- Implement Marvell 88E1510 specific LED initialization in GEM

5.22 List of enhancements/bug fixes in V3.0.1.15

Core
- Fix erroneous bus mismatch when new bus slaves have been recorded during DL interrupt handling

5.23 List of enhancements/bug fixes in V3.0.1.14

Core
- Add DoS protection to HandleLinkPolling
- Fix update of PDO "Inputs.BusTime"
- Add exclusive API lock to ecatConfigExtend()
- Fix erroneously bus mismatch in case ecatConfigExcludeSlave() previously called

5.24 List of enhancements/bug fixes in V3.0.1.13

Core
- Fix topology information in case of junction red line break behind another junction slave
- Fix erroneous WkcState == 1 if Slaves of an Msu are missing and EC_IOCTL_SET_AUTO_ADJUST_CYCCMD_WKC_ENABLED has been called
- Fix missing mismatch notification if previous port was not matching by slaves with identification
- Add EC_IOCTL_SET_ZERO_INPUTS_ON_WKC_ERROR
- Fix crash in Object 0x2006 Mailbox Statistics Object on write access

Platform
- Add x86 for SylixOs

5.25 List of enhancements/bug fixes in V3.0.1.12

Core
- Filter start-up Eeprom check init-commands (Product-ID, Vendor-ID, Revision, Serialnumber). BusScan already checks Eeprom entries if necessary.

Platform
- Adaption of eT-Kernel for NXP-LS1021a
- Adaption of ETSEC for eT-Kernel for NXP-LS1021a

5.26 List of enhancements/bug fixes in V3.0.1.11

Core
- Recalculate WKC at end of rising transitions only in case of success
- Suppress JunctionRedChange notifications/errors during ecatRescueScan
- Fix detection of junction redundancy connections which contain junction slaves
- Fix detection of missing/unexpected junction redundancy connections (emConfigAddJunctionRedundancyConnection)
- Fix propagation delay calculation in case of junction redundancy line break

- Unexpected junction redundancy connections are marked as line crossed on the junction red tail slave. (emConfigAddJunctionRedundancyConnection)
- Fix bus slave leak in case of hot connect group members appear in quick succession

Platform
- GEM Xilinx GMIITORGMII Converter support
- Added new Link Layer Altera/Intel Triple Speed Ethernet

5.27 List of enhancements/bug fixes in V3.0.1.10

Core
- Fix McSm order leak in ecatSetSlaveState()
- Fix erroneous EC_NOTIFY_CYCCMD_WKC_ERROR if Slaves of an Msu are missing and   EC_IOCTL_SET_AUTO_ADJUST_CYCCMD_WKC_ENABLED has been called.
- Fix occasional crash in case of interrupt mode due to race condition between ProcessAcycRxFrames and OnMasterTimer
- Fix undefined behavior of ecatConfigExtend() if error occurs during bus scans
- Fix handshake between ecatDeinitMaster / ecatConfigureMaster and IST if linklayer in interrupt mode
- Fix crash for unsupported cascaded junction redundancy
- Fix ecatGetNumConnectedSlaves() can return 65535 instead of 0
- Fix parsing of port descriptor (ESC:0x0007) considering "not configured" port as configured. Erroneous line crossed notification by cable redundancy
- Protect against negative memory usage returned by ecatGetMemoryUsage()

Platform
- Call OsHwTimerGetInputFrequency() before OsHwTimerGetCurrentCount() to allow some run once initialization

5.28 List of enhancements/bug fixes in V3.0.1.09

Core
- Fix crash during ecatConfigExtend if slaves disappear
- Fix missing EC_NOTIFY_NOT_ALL_DEVICES_OPERATIONAL notification after slaves disappear
- Add EC-STA Eval building
- ecatRescueScan, ecatConfigExtend without JobTask
- Fix occasional crash in ecatConfigureMaster in Interrupt Mode (re-configure)
- Fix occasional crash in OnMasterTimer in Interrupt Mode
- Add missing documentation to EC-STA
- Fix recalculation of cyclic Wkc (EC_IOCTL_SET_AUTO_ADJUST_CYCCMD_WKC_ENABLED) for rising state transitions
- Fix missing EC_NOTIFY_SLAVES_STATECHANGED notification for reappeared slave which is set to origin state by ecatSetSlaveState
- Set first slave with DC capabilities as bus time reference in DCM modes LinkLayerRefClock and MasterRefClock
- Updated to atemsys V1.3.11 IO-Control to enable access to ARM cycle count register(CCNT)
- Refactor EcEniBuilderEmbedded

Platform
- INCLUDE_ASSERT_FUNC for Linux (DEBUG only)
- Add device ID for I219
- Fix linklayer instance selection in INTIME

5.29 List of enhancements/bug fixes in V3.0.1.08

Core
- Fix segmented SDO upload start with toggle bit set to 1 (broken since V3.0.0.19)
- Fix race condition between API calls and ecatDeinitMaster / ecatConfigureMaster
- Sysbios RAS support added for ECM on AM572x
- Fix unexpected EC_NOTIFY_NOT_ALL_DEVICES_OPERATIONAL notification while waiting for ecatHCAcceptTopoChange

5.30 List of enhancements/bug fixes in V3.0.1.07

Core
- Fix race condition between API calls and ecatDeinitMaster / ecatConfigureMaster
- Fix erroneous WkcState == 1 if Slaves of an Msu are missing and EC_IOCTL_SET_AUTO_ADJUST_CYCCMD_WKC_ENABLED has been called
- DCM logging prints only one line to buffer
- Fix master InitCmd for eCnfType_GenPreopENI, eCnfType_GenOpENI
- Fix crash in EoE Endpoint after ecatConfigureMaster
- Return code of initiating error instead of SDO abort code E.g. segmented CoE upload with too small buffer
- Fix FoE with RAS server V2.4.2.07

- Fix race condition in acyclic frame handling
- ecatSetLicenseKey() returns EC_E_LICENSE_MISSING if license is invalid
- Fix erroneous name of object 0x2006 sub index 3, 4, 7 and 8

Core
- Remove #include <windows.h> in RTOS-32 EcOsPlatform.h

5.31 List of enhancements/bug fixes in V3.0.1.06

Core
- Fix FoE regression to legacy RAS server (introduced with V2.9.1.12)
- Use standard DC loop control values for all Hilscher ESC again
- Fix erroneous max acyclic frames throttling

Platform
- Fix DW3504 Big frames descriptors corruption
- Fix LinkOsLayer DMA CacheSync with wrong index

5.32 List of enhancements/bug fixes in V3.0.1.05

Core
- Add DcStartTimeGrid support for LinkLayerRefCloc
- Fix topology detection if first slave isn´t matching
- Simple synchronize RescueScan to McSM
- Enable variable display of absent slave in EC-STA
- Add auto inc address information to slave in EC-STA
- Fix Slave OUTPUTs listed as Master INPUTs (GenOpENI)
- Always enable VoE support for Omron slaves during GenPreopENI
- Refactor EoE switch to not need a pending receive and send frame pointer anymore
- Use standard DC loop control values for all Hilscher ESC again

Platform
- Updated to atemsys V1.3.10 Fix compilation on Ubuntu 18.04, Kernel 4.9.90, Xenomai 3.0.6 x64 Cobalt

5.33 List of enhancements/bug fixes in V3.0.1.04

Core
- Fix set slaves to INIT on reconnection in HotConnect manual mode
- Fix erroneous WkcState == 1 if Slaves of an Msu are missing and EC_IOCTL_SET_AUTO_ADJUST_CYCCMD_WKC_ENABLED has been called
- Missing pass of LogParms in EcMotionControl
- Explicit device ID handling waits until request cleanup done
- Add EC_T_INIT_MASTER_PARMS::wMaxSlavesProcessedPerBusScanStep to reduce reaction time on topology change by low CPU load if stack is idle
- Don't refresh AL status of new bus slaves but reset them directly if EC_IOCTL_SET_NEW_BUSSLAVES_TO_INIT has been set

- Don't count slaves during bus scan explicitely if already known because of cyclic or acyclic BRD AL status
- Always enable VoE support for Omron slaves during GenPreopENI
- Recalculate DC start time if half of the DC start time safety time has been elapsed
- Default DC start time safety time calculated based on cycle time
- Always enable VoE support for Omron slaves during GenPreopENI
- Fix crash during emConfigExtend if ENI file doesn't contain any slaves
- Use default value if EC_T_INIT_MASTER_PARMS::dwEcatCmdMaxRetries is zero
- Don't use lock during notifications generated within the state machines

Platform
- Add new OS and LinkOsLayer, SylixOS and i8254x
- TI AM3359 ICEv2: board can now boot from sd card using app images.
- Fix alignment for ARM under WinCE

5.34 List of enhancements/bug fixes in V3.0.1.03

Core
- Fix repeated EC_NOTIFY_CYCCMD_WKC_ERROR notifications if hot-connect group disappears
- Eliminate zero bytes malloc during ecatInitMaster()
- Fix EC_COPYBITS_INLINE with BitOffs + BitSize >= 0x10000 and BitSize > 8
- Fix erroneous "DC start time" InitCmd during further IP transitions
- Reduce spinlock usage during topology change
- Fix ecatGetMasterRedProcessImageInputPtr() Regression since V3.0.0.17
- Fix ecatResetSlaveController with default EC_T_INITMASTERPARMS (EC-STA, EcMasterTests broken)

Platform
- Support optimized link layers I8254x I8255x in EC-STA
- Fixed bug in workspaces causing non-working app for TI RTOS on AM5728
- EC-Master license unlocking for EC-Win with VMF License Query

5.35 List of enhancements/bug fixes in V3.0.1.02

Core
- Adjust the DCX adjustment delay according the cycle time
- EC_NOTIFY_ALL_DEVICES_OPERATIONAL is enabled by default to match the ecatNotification.cpp expectation
- Add support for zero-lengthed cyclic cmds in ENI
- Fix erroneous bad MSU WkcState on slave disconnection (broken since 3.0.0.19)
- Fix dwMaxAcycBytesPerCycle change not applied after calling emSetMasterParms
- Fix unexpected EC_NOTIFY_CYCCMD_WKC_ERROR notification if hot-connect group disappears
- Fix ecatReleaseAllProcessDataBits returning EC_E_ERROR on success

- Fix missing port descriptor correction for slaves with invalid descriptors after second bus scan
- Reduce CPU load in OnMasterTimer during slave disconnection
- Enhance bus topology detection for hot connect slaves with invalid identification values
- Adjust EoE retry access period dynamically to increase bandwidth usage
- Add EC_IOCTL_SET_ZERO_INPUTS_ON_WKC_ZERO
- Add EC_E_SIGNATURE_MISMATCH
- Add support for zero-lengthed cyclic cmds in ENI

RAS
- Add support for ecatNotifyApp without parms
- Fix ecatSetSlavesDisconnected
- Fix ecatGetVersion (broken since V3.0.0.17)
- Enable ecatAoeWriteControl, re-enable ecatTferSingleRawCmd
- Fix protocol corruption in case of concurrent send requests at server
- Fix occassional crash related to unregister client / MbxTfers
- Abort pending transfer in ecatMbxTferDelete
- Add logging

Platform
- Removed dependency to VS2005 Redists from EcMasterDotNetNative.dll

5.36 List of enhancements/bug fixes in V3.0.1.01

Core
- Fix erroneous bad WkcState if transition failed (broken since 3.0.0.17)
- Use standard DC loop control values for old Hilscher ESC again (build < 20)
- Fix ecatGetSlaveInpVarInfo, ecatGetSlaveOutpVarInfo ecatGetSlaveInpVarInfoEx, ecatGetSlaveOutpVarInfoEx over RAS
- Fix CoE Emergency over RAS
- Fix ecatCoeSdoUploadReq, ecatAoeReadReq, ecatMarshalAoeWriteReq over RAS

Platform
- Allow unlimited DLL-instances per host / user with WIBU protection
- Fix EcMasterDemoMulti for Linux
- Set version information to DLLs for Windows
- Fix crash in EcMasterDotNet with RAS due to uninitialized logging structure
- atemsys for linux: added possibility to set log verbosity level dynamically when loading by insmod

5.37 List of enhancements/bug fixes in V3.0.0.19

Core
- Fix missing data at uploads (AoE, CoE, FoE) (regression since V3.0.0.17)
- Add bExtended to EC_T_CFG_SLAVE_INFO

- Fix crash in emConfigExtend() in case of max bus slaves exceeded
- Retry DC start time InitCmd if more than the half of safety time is elapsed during DC activation InitCmd
- Set WkcState bit if hot-connect group disappears
- Fix FoE data display (binary / ASCII) in the EC-SlaveTestApp
- Don't set PD Input to zero in case of HC group disconnection
- Fix FoE cancel in case of EoE in BOOTSTRAP (only FoE allowed by ETG.1000.6) "In Bootstrap state the mailbox is active but restricted to the FoE protocol"
- Fix segmented SDO upload start with toggle bit set to (broken since V3.0.0.17)
- Fix race condition during notification in case of parallel calls to Job_ProcessRxFramesByTaskId / Job_ProcessAcycRxFrames
- Protect against systematical acyc command queue overload because of dwMaxSlavesProcessedPerCycle equal to bus slaves count
- Fix missing ScanBus on reconnection if EC_IOCTL_ALL_SLAVES_MUST_REACH_MASTER_STATE set to FALSE
- Fix erroneous line crossed detected in case of line break

Platform
- Fix EC_IOCTL_ISLINK_CONNECTED in ETSEC
- PRUICSS Link Layer on TI RTOS has migrated to latest TI RTOS SDK 4.02
- PRUICSS Link Layer now supports Time-Triggered Send (TTS) feature on RT Linux (for am5721/am5728/am3359)
- PRUICSS Link Layer now supports Time-Triggered Send (TTS) Feature on AM3359 board

5.38 List of enhancements/bug fixes in V3.0.0.18

Core
- Add ecatSlaveSerializeMbxTfers and ecatSlaveParallelMbxTfers to RAS
- Fix crash during ecatDeinitMaster()
- Fix ecatFoeDownloadReq (don't upload download payload to RAS client)

5.39 List of enhancements/bug fixes in V3.0.0.17

Core
- Fix ecatNotifyApp() over RAS always returns zero dwNumOutdata (broken since 3.0.0.5)
- Fix unexpected EC_NOTIFY_SLAVE_UNEXPECTED_STATE notification if ScanBus during ecatSetSlaveDisabled() / ecatSetSlaveDisconnect()
- Fix erroneous bad WkcState during transition if set state / check state are not the last InitCmds of the transition
- Fix EC-Master stucks after emHCAcceptTopoChange() has been called
- Fix emGetslaveProp return EC_FALSE by mismatch at the beginning for first slave
- Fix missing SlaveId as MbxTferId in VoE notification
- Fix crash in emRasClntRemoveConnection while transfer is pending
- Set MSG_NOSIGNAL at socket send to prevent from unexpected SIGPIPE

- Extrapolate propagation delay of DC slaves without coherent port receive times (e.g. ESC20)
- Fix leak in client management if connection terminates while a notification is pending
- Fix erroneous BI transition during AL status refreshing
- Execute ecatSetSlaveState within McSm
- Fix overwriting of mailbox objects in asynchronous mailbox RAS-APIs (emCoeSdoUploadReq/emCoeSdoDownloadReq)
- Fix race condition in RAS client while accessing emMbxTferCreate and emMbxTferDelete
- RescueScan returns EC_E_TIMEOUT if timeoput elapsed within BusScan
- Fix GetBusSlaveBySlaveId returns a bus slave even though the slave id is invalid
- Move slave statistics from CfgSlave to BusSlave, adjust ProcessCmdResult chain
- Fix MaxSubIndex at object descriptions of 0x10F3, 0x2004
- Fix mailbox read response stuck if acyclic frame queue is full

5.40 List of enhancements/bug fixes in V3.0.0.16

Core
- Fix RAS API lock (connection lock instead of global lock)
- Fix missing mailbox read response command if acyclic frame queue is full
- Cancel running bus scan if emSetMasterState timeouts
- Return correct variable type instead of DEFTYPE_NULL for ARRAY types like DEFTYPE_ARRAY_OF_BYTE
- Always recalculate Wkc if SM/FMMU configuration changed in slave state transition

5.41 List of enhancements/bug fixes in V3.0.0.15

Core
- Fix bus slave leak during emConfigExtend leading to erroneous EC_E_MAX_BUS_SLAVES_EXCEEDED errors in some cases
- Fix missing EC_NOTIFY_ETH_LINK_CONNECTED notification if link was disconnected at start
- Fix NULL pointer access in some case of repeated bus scan by bus mismatch (ResyncSlave is NULL)
- Fix notify EC_NOTIFY_CYCCMD_WKC_ERROR immediately if cyclic command not related to hot-connect
- Send all Init-Commands in falling transition even if the slave is not responding
- Fix emReadSlaveIdentificationReq with EC_E_NOWAIT returns EC_E_INVALIDPARM
- Add emFoeUploadReq/emFoeDownloadReq to RAS
- Set LockType from SPIN to DEFAULT, removed external CmdQueue locking
- Fix master state machine hangs waiting for DCM InSync if DCM BusTime Ref slave disappear
- Fix erroneous HIDWORD during 64Bit bus time emulation start
- Fix wrong amount of sent frames sometimes returned by eUsrJob_SendAcycFrames

- Don't change DCM first (DC start time aligned) time on DcmReset
- ecatSetMasterState returns EC_E_TIMEOUT_WAITING_FOR_DC and EC_E_TIMEOUT_WAITING_FOR_DCM
- Set dwScanBusStatus to EC_E_BUSCONFIG_MISMATCH for all unexpected bus slaves
- Fix erroneous mismatch on slaves reconnection if line disconnected
- Fix line reconnection with line break in the middle (Broken since 2.9.2.03)
- Change return type of API LinkOsCreateContext to error codes
- Updated to atemsys V1.3.08 (Add support for Linux kernel >= 4.13.00)
- Fix endless scan bus in ecatConfigureMaster(GenPreopENI / eCnfType_GenOpENI) if cable disconnected during the call
- Fix race condition in ecatConfigureMaster(GenPreopENI / eCnfType_GenOpENI) if a scan bus is running
- Fix erroneous offset between external and internal SYNC signals in case of SyncToTimerIrq or different DCM SetVal are used in DCX mode
- Fix process variable to PDO assignment in case of several sync managers share same <Send>/<Recv> entry (Broken since 2.9.2.01)
- Support EC_NOWAIT at ecatCoeGetODList, ecatCoeGetObjectDesc, ecatCoeGetEntryDesc
- Flush the queue of the other line containing old frames by cable redundancy
- Fix Re-register client in EcMasterDemoRasServer

Platform
- PRUICSS Link Layer now supports Time-Triggered Send (TTS) Feature (TI RTOS, am5718/am5728)
- Fix Renesas NoOs Timer issue

5.42 List of enhancements/bug fixes in V3.0.0.14

Core
- Add dwTferId to ecatReadSlaveEEPRomReq, ecatWriteSlaveEEPRomReq, ecatAssignSlaveEEPRomReq, ecatActiveSlaveEEPRomReq, EC_T_EEPROM_OPERATION_NTFY_DESC and ecatSetSlavePortStateReq, EC_T_PORT_OPERATION_NTFY_DESC
- EcWin EVAL license unlocking
- Fix GenPreopENIWithCRC
- Fix GetBusSlaveBySlaveId returns a bus slave even though slave id is invalid due to bus mismatch

Platform
- Fix VxWorks70 "cannot map IO memory"

5.43 List of enhancements/bug fixes in V3.0.0.13

Core
- Fix buffer overflow caused by DCM LinkLayerRefClock logging
- Add VoE tab to EC-SlaveTestApplication

- Add TwinSafeLoader support (OBJ8XXX, SI 2 Slave Type String)
- Fix erroneous reset of SDO complete access bit in case segmented mailbox transfer
- Fix HC group state change to master state if HC group member is disconnected/disabled by API
- EC_IOCTL_SET_NEW_BUSSLAVES_TO_INIT also clears FMMU configuration
- Fix unexpected WkcState errors in eUsrJob_ProcessRxFramesByTaskId
- Add dwTferId to emReadSlaveRegisterReq, emWriteSlaveRegisterReq EC_T_SLAVEREGISTER_TRANSFER_NTFY_DESC, emReadSlaveIdentificationReq and EC_T_SLAVE_IDENTIFICATION_NTFY_DESC
- Fix EC_T_SLAVEREGISTER_TRANSFER_NTFY_DESC::bRead wasn´t set after slave register read request finished
- Fix max response length of MbxGateway server
- Fix Master State Summary Object 0x2001, SI 13 in case of eDcmMode_Off
- Fix DCM configuration parameter handling
- Fix DC start time offset calculation in DCX mode
- Fix race condition in McSM order management
- Add EC_T_DCM_CONFIG_BUSSHIFT::bUseDcLoopCtlStdValues

Platform
- Fix out data len at ecatVoeRead in DotNet
- Fix variables access starting at offset 0x10000 in DotNet

5.44 List of enhancements/bug fixes in V3.0.0.12

Core
- Fix inactive master doesn't forward frames to slaves in case of line break (since 3.0.0.11)
- Remove LinkOsPlatformInit()
- Fix missing initialization of EoE uplink ports
- Fix unexpected MSU WkcState errors
- Fix configuration errors for slaves with process data size > 8 kByte
- Fix line break error in case of junction redundancy line fixed
- Fix 32Bits internal and external counters by DCX
- Add junction redundancy flag to EC_T_BUS_SLAVE_INFO::adwPortSlaveIds
- Fix hot connect mode border close
- Fix missing notifications in manual topology change mode (EC_IOCTL_SB_SET_TOPOLOGY_CHANGE_AUTO_MODE = EC_FALSE)
- Fix erroneous line cross notification if number of maximum bus slaves exceeded Remove parameter pvDmaObject from API LinkOsAllocDmaBuffer and LinkOsFreeDmaBuffer
- Fix time-out handling in emConfigExtend
- Change parameter pbyPhysical/pbyPhysAddr to qwPhysAddr in APIs LinkOsMapMemory, LinkOsUnmapMemory, LinkOsAllocDmaBuffer, LinkOsFreeDmaBuffer

- Fix EXCLUDE_LOG_MESSAGES compiler errors
- Fix crash if identification failed during bus scan
- Add EcFeatures.h
- Fix core to not change given EC_T_INITMASTERPARMS
- Fix VLAN, support Canonical Format Indicator in VLAN ID

Platform
- Add protected version support to SockRaw
- CPSW: cyclic frames should have higher prio as acyclic
- Fix VLAN with emllPcap
- Fix not received frames for some RTL8169 cards
- Enable MasterRed for x86 / x64, Windows / Linux only

5.45 List of enhancements/bug fixes in V3.0.0.11

Core
- Add dwMaxAcycBytesPerCycle and rename the acyclic commands related EC_T_INITMASTERPARMS
- Add API emReadSlaveIdentificationReq
- Add API emSetSlaveStateReq
- Add API emActiveSlaveEEPRomReq, emAssignSlaveEEPRomReq, emReadSlaveEEPRomReq, emWriteSlaveEEPRomReq
- Fix missing EC_NOTIFY_JUNCTION_RED_CHANGE in some disconnect / reconnect situations
- Queue blocking APIs at RAS Server
- Fix delayed and skip behavior of added CoE InitCmd
- Fix too many WkcStateImage offsets in some cases if more than one MasterSyncUnit exists
- Add DcStartTimeCallback to struct EC_T_DCM_CONFIG_MASTERSHIFT and EC_T_DCM_CONFIG_LINKLAYERREFCLOCK
- Add emReadSlaveRegisterReq, emWriteSlaveRegisterReq
- Avoid systematical frame loss on cable redundancy line fixed in some situation
- Fix RAS Client locking (connection lock instead of global lock)
- Force Wkc recalculation at startup in case of enabled IO-Control EC_IOCTL_SET_AUTO_ADJUST_CYCCMD_WKC_ENABLED

Platform
- Added support for new board TI AM3359-ICEV2 to ICSS Link Layer
- Add API wWkcStateDiagOffsIn and wWkcStateDiagOffsOut to EC_T_MSU_INFO

5.46 List of enhancements/bug fixes in V3.0.0.10

Core
- Fix erroneous frame loss information at junction redundancy ports during rescue scan
- Fix Superset-ENI exclude individual slaves
- Master Object Dictionary 0x2006: Remove wrong size check for subindex 0
- Add possibility to delay added CoE InitCmd during transitions
- Fix hot connect slave set erroneously back to INIT after reconnection of another hot connect slave if manual mode is used
- Fix process variable to PDO assignment in case of unordered PDO entries in ENI
- Avoid disconnection during huge transfer segmented by the operating system if EC_E_BSD_EINPROGRESS is supported
- Fix Wkc state diagnosis signalizes error in master states INIT, PREOP and in case of frameloss
- Fix adjust DcStartTimeOffset if bus cycle time has been changed
-

Platforms
- EoF not reached workaround for EC-Master-RTOS-32 lib under VS2015
- Add PRUICSS Link Layer now works under TI RTOS
- PRUICSS Link Layer can now work in redundancy mode (master/slave PRUs)
- PRUICSS Link Layer now works under VxWorks

5.47 List of enhancements/bug fixes in V3.0.0.09

Core
- Add EC_IOCTL_SET_NEW_BUSSLAVES_TO_INIT
- Add EC_IOCTL_SB_SET_ERROR_ON_LINE_BREAK
- Generate EC_NOTIFY_SB_DUPLICATE_HC_NODE if bus mismatching due to slaves with duplicated identification values
- Add compiler flag INCLUDE_SLAVE_IDENTIFICATION
- LogFrameCallBack preserved at configure master
- Protect against sending empty EoE fragments (deny empty frames) Affects EoE-Endpoints (e.g. VxWorks)
- emMbxTferAbort() applied to all FoE transfers, not only the segmented ones
- Fix occasional timeout in ecatRegisterClient

Master Redundancy
- Protect against line crossed false positives (disabled detection)
- ACTIVE Master needs link connected. Master state Unknown on link disconnect.
- Don't forward AcycMasterRed frames or own frames
- Add EC_T_CMF_CMD_TYPE_BRD_ALSTATUS

Platforms
- CPSW Link Layer fix Port 2 on AM57x
- Fix EcatDrv for Windows x64 (WdfCoInstaller01007 instead of WdfCoInstaller01009)
- Updated to atemsys V1.3.07
- PRU-ICSS Link Layer supports now Port 1 & Port 2 on AM571x IDK on VxWorks and Linux.

5.48 List of enhancements/bug fixes in V3.0.0.08

Core
- Add API ecatGetMasterSyncUnitInfo / ecatGetMasterSyncUnitInfoNumOf
- Add bDisabled, bDisconnected to EC_T_CFG_SLAVE_INFO
- Add ecatSetSlavesDisabled / ecatSetSlavesDisconnected to RAS
- Fix Master OD 0x2020, SI 14, Linklayer driver Ident
- Fix correlation between WkcState and Pd offset (logical mailbox state command have been erroneously considered)
- Deny invalid SoE parameters at ecatSoeRead, ecatSoeWrite, (add EC_E_SOE_ERRORCODE_INVL_DRIVE_NO, EC_E_SOE_ERRCODE_NO_ELEM_ADR)
- Support startup with network on redundancy line (Master2)
- Fix Bus Load Measurement (Master OD 0x2200:04) for multi task ENIs
- Fix reconnecting Master
- Fix EC_IOCTL_SET_SLVSTAT_PERIOD with dwPeriod = 0
- Fix foreign communication filtering
- Longer topo change delay at INACTIVE master than at ACTIVE master
- Deny ecatBlockNode in case of Master Redundancy
- Auto-append new line to log messages
- Add API ecatSetSlavesDisabled / ecatSetSlavesDisconnected

5.49 List of enhancements/bug fixes in V3.0.0.07

Core
- Fix scanbus returns EC_E_BUSCONFIG_MISMATCH if identification failed
- Fix time-out for first frame in case of closed port
- Fix emGetMemoryUsage
- Fix occasional cyclic master red frame re-processing at inactive master
- Fix occasional master red frame forwarded bit set at active master
- Add EoE mailbox statistics, don´t count access to master object dictionary.
- Add pending EoE transfer cancel if slave is disconnected
- Add 32 bits support to internal and external DCX counters
- Add mailbox transfers cancel on Master INACTIVE / Slave disappears

Platforms
- Updated to atemsys V1.3.06 for Linux / Xenomai
- Reduce amount of interrupts by using bAckErrInIrq by RTL8169
- Fix second PCI device usage for Linux and Xenomai

- Use correct PCI domain in atemsys for Linux and Xenomai (atemsys V1.3.05)

5.50 List of enhancements/bug fixes in V3.0.0.06

Core
- Fix stalled connection detection in RAS Client
- Fix lock up on RAS Client disconnect if socket was disconnected before
- Fix unidentified slaves after bus mismatch behind a junction slave
- Fix RED Frame ID at MasterRed Frames from MAIN device
- Add dynamic frame support for MasterRed with Hot Connect
- Add port information to junction redundancy change notification EC_T_JUNCTION_RED_CHANGE_DESC
- Add emConfigAddJunctionRedundancyConnection
- Adjust DCM nMaxValidVal if DcStartTimeGrid is set
- Add Memory Provider with read/write, request/release for MasterRed
- Support revision checks with operator >=
- Don't call OsQueryMsecCount() in EcTimer::IsElapsed if timer not started to improve performance
- Fix crash in DCM mode LinkLayerRefClock after reconnection
- Support SyncToTimerIrq for DcmMastershift and DcmBusShift under RTOS-32
- Avoid null pointer exception while parsing hot connect configured eni
- Generate EC_NOTIFY_HC_DETECTADDGROUPS at start-up if hot-connect groups connected
- Fix erroneous EC_NOTIFY_CYCCMD_WKC_ERROR notification if hot-connect group disappears
- Fix unexpected RAS client disconnection after configuration download
- Fix EXCLUDE_VARREAD, EXCLUDE_PORT_OPERATION, EXCLUDE_OEM compiler errors
- Fix EXCLUDE_GEN_OP_ENI compiler errors. (INCLUDE_CONFIG_EXTEND depends on INCLUDE_GEN_OP_ENI)
- Enhance invalid ENI detection
- Fix Wkc recalculation only in case of hot-connect or modified configuration (ecatConfigExcludeSlave)
- Fix external memory provider support for splitted frame processing
- Fix invalid performance measurement time prints in the examples in case of reset
- Add MasterSyncUnit to ecatGetCfgSlaveInfo, ecatGetSlaveInpVarInfoEx
- Support DCM SetVal 0
- Fix access violation due to multiple assignment of same Client ID
- Change FoE MAX_FILE_NAME_SIZE from 32 to 64
- Fix duplicated master-master-link frames receiving by MasterRed
- Add NIC part of MAC address comparison on red frame merge

Platforms
- Support for Yocto Linux
- Change OsMemcpy for Xenomai/ARM (Link Layer handles unaligned memory access)
- Fix atemsys version check (atemsys V1.3.03)

- Fix support for Intel Pro/1000 I218LM
- Add EC-STA packaging
- Fix multiple connection at RAS-Server (xenomai) Thread names must be unique on Xenomai.

5.51 List of enhancements/bug fixes in V3.0.0.05

Core

- Change default DCM InSyncLimit to 25us
- Add OS parms size check in ecatInitMaster
- Add EC_NOWAIT support at ecatOpenBlockedPorts
- Generate EC_NOTIFY_SLAVE_UNEXPECTED_STATE if hot connect member reappear in unexpected state
- Generate EC_NOTIFY_CYCCMD_WKC_ERROR if HC group member is disconnected
- Fix erroneous SB_MISMATCH notification after junction redundancy line break
- Add EC_IOCTL_SET_EOE_DEFFERED_SWITCHING_ENABLED
- Fix notification EC_NOTIFY_SB_DUPLICATE_HC_NODE always disabled
- Fix change state of new slaves from bootstrap to init to make requesting ID mechanism (AL control) possible.
- Fix timeout handling of master and slave init commands
- Support emAoeWriteControl over RAS
- Add EC_IOCTL_GET_SLVSTAT_PERIOD
- Fix NewestAckMessage reset in Object 0x10F3 History Object
- Fix Object 0x2001 Master State Summary, Bit 9: Master in requested State
- Deny invalid paramater BOOTSTRAP at ecatSetMasterState
- Fix INPUTs temporary discarded on slave re-connect (AUTO_ADJUST_CYCCMD_WKC)
- Log DCM differences greater than 10% of the cycle if verbosity level 2 in EcMasterDemoDc / EcMasterDemoMotion
- Add junction red change notification to RAS
- Fix junction redundancy line break detection
- Enable DC window monitoring in case of DCM timeout elapsed during startup
- Fix exception in DcmGetLog()
- Fix BusShift part of DCX configuration was not applied
- Fix crash in ecatConfigureMaster() if dcmConfigure() was called before
- Fix sometimes bad first difference value for DCX
- Port stay closed on reconnection if closed by API
- Support combined use of cable and junction redundancy without enhanced line crossed detection
- Add defined cable red frame ID to dectect frames which were only sent on one line
- Add line cross notification to RAS
- Allow EC_NOWAIT in emTferSingleRawCmd(). Fix emSetSlaveState returns
- Fix client re-registration in EcMasterDemoRasServer

Platforms

- Support for Yocto Linux
- Add instance identification by PCI location for Windows
- Increase buffer count to 64 for DW3504
- Add uC/OS-III support for ARM
- Add ETSEC support to QNX for ARM
- Add atemsys version check for Xenomai3 x86Cobalt (atemsys V1.3.01)
- Add CPSW and EMAC support to VxWorks 7
- Fix Xenomai3 x86Cobalt Link Layer rtdm access (atemsys V1.2.16)
- Fix EC_NOWAIT support at OsWaitForEvent on Linux

5.52 List of enhancements/bug fixes in V3.0.0.04

Core

- Don't open the red master port automatically if topology change is in manual mode
- Protect against NULL pointer access to pdwNumOutData during emNotifyApp()
- Fix EoE-Endpoint (Uplink)
- Fix EoE-Endpoint (EcMasterDemoDotNetNative)
- Fix ecatSetMasterState returns DC error code in case of DC initialization error
- Fix FoE mailbox statistics (PPC)
- Support port receive time latching without enhanced line crossed detection
- Add EC_IOCTL_SET_ADJUST_CYCFRAMES_AFTER_SLAVES_STATE_CHANGE

Platforms

- Add CPSW and EMAC support for VxWorks 7

5.53 List of enhancements/bug fixes in V3.0.0.03

Core

- Add slave to slave mailbox communication
- Add propagation delay calculation for topologies with junction redundancy
- Add DCM mode eDcmMode_MasterShiftByApp for better management of EC_IOCTL_DCM_REGISTER_STARTSO_CALLBACK and EC_IOCTL_DCM_REGISTER_TIMESTAMP
- Protect for unnecessary mailbox repeating during redport handling in DC state machine
- Fix file name length reading to not exceed given buffer for FoE up- and download
- Add open fast hot-connect ports immediately without topology change delay
- Fix Mailbox Statistics FoE counting direction (read/write) fixed, cumulated counting fixed
- Fix EC_IOCTL_SET_BUS_CYCLE_TIME modifies init master parameter dwBusCycleTimeUsec
- EC_E_NOTSUPPORTED is returned instead of EC_E_INVALIDCMD if IOCTL is not supported
- Skip some DC related master InitCmds during state transition of single slave
- Fix AoE Mailbox APIs return vendor specific AoE device error

- Fix DC window sync monitoring after RefClock reconnect
- Fix crash if DC refclock removed by ecatConfigExcludeSlave()
- Fix External Synchronization Status PDO handling in DCM mode DCX
- Fix SockRaw default link layer parameter to fix starting with ENI
- Fix erroneous RAS disconnection at the end of large FoE transfer
- Add cyclic task id to EC_LINKIOCTL_SENDCYCLICFRAMES
- Add parameter bDcInitBeforeSlaveStateChange to struct EC_T_DC_CONFIGURE for DC initialization before slave state change to Pre-OP
- Fix DC start time calculation in DCM mode MasterRefClock
- Add Cyclic Master Red Frames
- Refactor splitted frame processing to avoid race conditions in polling mode
- Add non EtherCAT frame received notification(eRspErr_NON_ECAT_FRAME) to EC_NOTIFY_FRAME_RESPONSE_ERROR
- IO control EC_IOCTL_SET_CYC_ERROR_NOTIFY_MASK replaced with EC_IOCTL_SET_FRAME_RESPONSE_ERROR_NOTIFY_MASK
- Fix WKC calculation for splitted sync units
- Fix unexpected VoE notification to RAS clients
- EC_E_MAX_BUS_SLAVES_EXCEEDED correctly returned instead EC_E_LINE_CROSSED if more slaves are connected than MasterInitParms.dwMaxBusSlaves
- Fix connect to RAS Server V2.x
- Fix DCX with external memory provider write request callback

Platform

- Intel I219 support

5.54 List of enhancements/bug fixes in V3.0.0.02

Core

- API change for ecatExecJob. Replaced parameter EC_T_VOID* pvParam withEC_T_USER_JOB_PARMS* pUserJobParms
- Add dwTaskId to EC_PF_CYCFRAME_RECV
- Add ecatClearSlaveStatistics, emGetSlaveStatistics
- Add ecatPerfMeasSetIrqCtlEnabled
- Fix Mailbox Statistics Object (0x2006) (SubIndex 65 size wrong, complete access size check wrong)
- Deny instead of truncate too long FoE file name
- Performance Measurement including minimum time
- Add splitted frame processing
- Always trigger DC state machine if topology change detected
- Master Object Dict. History Object. Big Endian Support for notifications.
- Fix access violation in SetMasterState() during ecatconfigureMaster()
- Fix bus mismatch errors if a slave needs more than one cycle to return the idenfification value (Ado 0x134)
- Frame leak during Configure Master

- DC works again together with redundancy even if link layers don't support enhanced line crossed detection
- Fix connection drop if read data from socket take more time than watchdog
- Start DC window monitoring only after DCM/DCX is in sync
- Add ecatConfigExtend
- SupersetEni supports now HC group modification
- Fix crash during remote configuration on a master running with GenPreop
- Fix If DCX enabled, master state change from PREOP to SAFEOP only when DCM Mastershift and DCX in sync
- Add ecatRescueScan
- Fix multiple client registration support (EC-Engineer doesn't get all notifications)
- Fix topology detection if slave with matching fixed adress (duplicate) is connected
- Fix Mastershift.bCtlOff = EC_TRUE in EC_T_DCM_CONFIG_DCX disabled erroneously DCX controller too
- Configure DC slave controller registers 0x0934 in DCM mode BusShift to minimize synchronization jitter
- Fix CopyInfo copy 0 on WKC error
- Add FoeDownloadReq
- Add emSetSlaveDisabled
- Add EC_IOCTL_SET_AUTO_ADJUST_CYCCMD_WKC_ENABLED
- Add EC_IOCTL_SET_AUTO_ACK_AL_STATUS_ERROR_ENABLED
- Add emSetSlaveDisabled
- Add EC_IOCTL_SET_AUTO_ADJUST_CYCCMD_WKC_ENABLED
- Add EC_IOCTL_SET_AUTO_ACK_AL_STATUS_ERROR_ENABLED
- Add DCX time stamp difference alignment to DcStartTimeGrid to compensate DCX initial error
- Add dwDcStartTimeGrid to struct EC_T_DC_CONFIGURE for DC start time alignment on startup
- All APIs return EC_E_INVALIDSTATE if master instance was not initialized
- Rename struct EC_T_DCX_CONFIG to EC_T_DCM_CONFIG_DCX
- Add CoE Index, SubIndex info at EC_NOTIFY_MBOXRCV for CoE up-/download
- Add EC_IOCLT_DC_FIRST_DC_SLV_AS_REF_CLOCK
- Fix no external synchronization error handling in DCX with EL6695
- Send master InitCmds to new slaves with FPRD instead of BRD
- Configure all DC slave controller registers 0x0934 and 0x0930 in the same way
- Implement emGetMemoryUsage
- Avoid reading mailbox when slave is in INIT
- Execute DC initialization for bridge slaves even if there is no DC configuration for them in the ENI file
- Fix erroneous bus time calculation in 64 bit timestamp emulation
- Update pbyElementFlags at ecatSoeWriteReq, ecatSoeReadReq
- Fix erroneous log message unknown text ID 0x1022F
- Reduce time to get InSync in DCM mode MasterRefClock
- Initialize slave frame description after allocation
- Master Object Dictionary is using ecatGetText() to create strings for notifications.
- Fix slave error notifications during emReadSlaveIdentification (Ado 0x134)

- Don't queue command directly in EC_IOCTL_FORCE_SLVSTAT_COLLECTION only set a request flag to fix lock issue between jobtask and API
- No OsLock() in JobTask required anymore to queue notifications if RAS client is connected.
- Fix propagation delay calculation in DCM modes MasterRefClock and LinkLayerRefClock
- Add Dcx mode - External synchronization
- Add EC_IOCTL_SET_GENENI_ASSIGN_EEPROM_BACK_TO_ECAT
- Force process priority class to time critical only for highest priority (Fix RAS client to normal priority process class, e.g. EC-Engineer, EC-STA)
- Add ecatNotifyApp command line switch to EcMasterDemoRasClient
- Don't process PotentialRefClock tag as ReferenceClock tag
- Fix long delay (20s) in SetMasterState if slaves are absent
- Fix error parsing "read hot connect prev address" identify command (Ado 16)
- Fix RAS client taking several minutes to detect inactive RAS server <= V2.7 on RAS logon.
- Fix config slave still have old link to invalid bus slave during remote configuration EC-Engineer
- Fix erroneous line crossed notification due to acyclic AL status BRD during port receive time latching.
- Fix crash if ecatSetSlavePortState is called for absent slave Return immediately from ecatSetSlavePortState if called for absent slave
- Reset SettleTime timer on reference clock disconnection
- Change verbosity level for "Input Value updated" message
- Fix error in EC_COPYBITS
- Fix error 0x98110021 during EC-Engineer remote configuration
- Fix missing topology change delay in some case of line fixed
- Avoid OsMalloc in Job_MasterTimer because of ecatConfigureMaster(GenPreopEni)
- Fix EEPROM Write: Repeat also last word in case of EEPROM was busy
- Fix SoE Fragmented Write and Read
- Fix compiler errors with EXCLUDE_LINE_CROSSED_DETECTION
- Add sanity checks in EcMemPool
- Fix emGetSlaveInpVarInfoEx() missing index and sub index

Platform

- Fix erroneous filtering of own traffic in WinPcap linklayer for Windows 8 and above
- VxWorks7: support new VxBus
- DW3504 add PhyInterface and UseDmaBuffers parameters.
- EcWin: Add RtosCommStart to the demo
- Add RTLockHeap() to LinkOsMapMemory() for RTOS-32 to protect for race condition
- ETSEC Vxworks DIAB supported
- Master shift for RTOS32 implementation
- EcWin: remove unused code for EXCLUDE_ECWIN_SHM

- I8254X: Add PCI_DEVICE_I219V
- Fslfec: Read mac from eFuse for iMX6 if exists
- Set JobTask and Logging Task stack size to 0x8000 for RTOS-32 (Fix stack overflow in EcMasterDemoMotion)
- JSL-Ware implementation
- Add Npcap support for emllPcap (PCAP_OPENFLAG_NOCAPTURE_LOCAL + NDIS 6)
- SYSBIOS use IDK 1.1.0.8
- GEM: add license check
- Xenomai: use rt_timer_read instead of rt_timer_tsc
- Add instance identification by PCI location for INtime Fix wrong frame size in snarf linklayer sending corrupted frames

5.55 List of enhancements/bug fixes in V3.0.0.01

Core

- Support Master Redundancy
- Fix missed slave connection if connection up during bus scan
- Fix read/write of word/dword in EcMasterDemoDotNet
- Only enable log to link layer if bLogToLinkLayer is enabled even in level EC_LOG_LEVEL_VERBOSE
- Add EC_IOCTL_SET_IGNORE_INPUTS_ON_WKC_ERROR
- Improve unexpected cyclic frame detection detection in case of too short cycle
- Remove EcLinkMode_RANDOM
- Remove CYCFRAME_RX_CB if no cyclic frames sent.
- Add emSetMasterRedStateReq, emGetMasterRedState, EC_T_MASTER_RED_PARMS
- Fix access violation in case of some bus mismatch case
- Added EC_T_OS_PARMS::pfSystemQueryMsecCount
- Generate DC out of sync notification if DC timeout too short and go further in the master state machine
- Detected more line crossed topologies
- Fix very long default timeout for acyclic commands
- Fix Slave state machine stucking in PREOP if DC unit disabled and slave is DC configured

Platform

- Support 64Bit based PCI address in Linux
- Fix support for Intel Pro/1000 I218 and add Device ID 0x15A3
- Fix wrong frame length for I8254X to fix Store and Forward (removed CRC)
- Renesas SuperH for ARM Linux
- Change CPSW command line parameters
- CPSW link layer add am437x support for Linux
- Fix corrupted frames in ETSEC for PPC
- Remove forwarding bit check in MAC address in Winpcap for Windows 8 or later

6 New Features of V3.0

- Master Redundancy
- Splitted Frame Processing
- Junction redundancy supported together with DC
- Support revision checks with operator >=
- Slave to slave mailbox communication
- Hidden slave detection by junction redundancy

7 Migration from Version 2.8

- QNX uses –Y_gpp linker flag for demos and link layers
- ecatGetCfgSlaveInfo(): wIdentifyAdo returns 0x134 instead of 0x130 for explicit identification (conforming to ESI tag <IdentificationReg134>)
- Application calling EC_T_DC_SYNCSO_CB_PARM should consider that the start delay (default: 50ms or set by EC_IOCTL_DC_SETSYNCSTARTOFFSET) will be applied.

8 New Features of V2.9

8.1 List of enhancements/bug fixes in V2.9.0.02

Core

- Fix Master stucking in PREOP on second call to emSetMasterState if first one failed during DC initialization
- Fix unexpected line crossed notification in case of junction redundancy line break
- Add EC_IOCTL_SB_SET_JUNCTION_REDUNDANCY_ENABLED
- Fix missed slave connection if connection up during bus scan
- Add bAcycDistributionDisabled to EC_T_DC_CONFIGURE
- Add bIsRefClock to EC_T_BUS_SLAVE_INFO
- Fix persistent bus mismatch status even if no slaves are connected and full hot-connect configuration
- Don't generate erroneous line crossed notification on closed junction redundancy segment
- Detect EL9010 disconnection
- Fix static error introduced by disconnecting and reconnecting RefClock
- CoE InitCmds now also using optimized algorithm to reduce network load
- Add identification value check support
- Add Intel 82576NS
- Fix immediately expiring dwDcmInSync timeout
- Add emDcmGetAdjust API function
- Reorder InitCmd for Omron slaves to protect against WKC error during falling transitions to PREOP
- Reduce static error introduced by disconnecting and reconnecting RefClock

- Don't notify if emCoeSdoUploadReq / emCoeSdoDownloadReq returns with error. Even not if slave is not present.

Platforms

- CPSW link layer add am387x support for Linux
- SHEth link layer implementation
- Renesas RzG NoOs implementation

8.2 List of enhancements/bug fixes in V2.9.0.01

Core

- Reduce memory peak during emConfigureMaster, XML-Parser optional
- Add Memory Pool
- emDcmGetStatus returns DCM_E_MAX_CTL_ERROR_EXCEED if dwDcmInSync timeout elapsed
- Fix erroneous line crossed notification on main reconnection at crossed first slave if enhanced line crossed detection is not enabled
- Increase MAX_NUMOF_MASTER_INSTANCES to 12
- Reorder InitCmd for Omron slaves to protect against slave error during falling transitions to PREOP
- Add dwDcmInSync to EC_T_MASTERDEFAULTTIMEOUTS_DESC passed to EC_IOCTL_SET_MASTER_DEFAULT_TIMEOUTS
- Fix support for previous PhysAddr 0 in PreviousPort tag needed for CX system
- Fix FoE transfer errors for password "1"
- Detected more line crossed topologies

Platforms

- Fix C++11 compiler errors for ATECAT_PLATFORMSTR Linux, QNX, Xenomai, WinCE, RTEMS
- Fix "Instance not found" for RTL8139 and CCAT Link Layer on Linux and QNX
- Fix system lock-up in Logging for RTX64
- Linux uses Aux clocks instead of sleep and support DCM MasterShift

Examples

Fix occasional missing slave tree refresh on init Master in EC-STA

9 Migration from Version 2.7

9.1 API change for emClntQueueRawCmd

- Fixed Master ID and Client ID at emClntQueueRawCmd.
- Removed obsolete OsSetSharedLibraryLocation.

10 New Features of V2.8

Core

- Topology information returned even if line crossed detected
- Detailed line crossed information returned even if redundancy is used

10.1 List of enhancements/bug fixes in V2.8.1.04

Core

- Detected more line crossed topologies
- Fix sometimes erroneous HC slave identification behind bus mismatch
- Fix persistent line crossed information after reconnection if "not connected Port A" was detected before
- OsSystemTimeGet() returning 1 day too much
- Fix CoE Emergency for small header lengths
- EC_NOTIFY_JUNCTION_RED_CHANGE works again (broken in V2.8)

10.2 List of enhancements/bug fixes in V2.8.1.03

Core

- Fix notification only forwarded to instance 0 by RAS client
- Fix endless bus scan if topology change delay is too big compared to the SB timeout
- Fix 30s delay in emConfigureMaster() if job task suspended and EC_IOCTL_INITIATE_UPDATE_ALL_SLAVE_STATE was called before
- Fix missing bus scan after permanent frame loss because of 2 slaves with port A not connected if EC_IOCTL_INITIATE_UPDATE_ALL_SLAVE_STATE was called before
- emGetBusSlaveInfo() returns EL9010_SLAVE_ID in adwPortSlaveIds if EL9010 connection was detected

10.3 List of enhancements/bug fixes in V2.8.1.02

Core

- Generate EC_NOTIFY_LINE_CROSSED if connected port detected without slave assignment
  (EC_IOCTL_SB_SET_NOTIFY_UNEXPECTED_CONNECTED_PORT)
- emBlocknode is not supported if line crossed detected by concerned slave
- Fix emWriteSlaveRegister and emReadSlaveRegister over RAS only accessing to first instance
- Improve detection of red link disconnection during enhanced line crossed detection
- Wait one cycle after opening ports with slave behind to reduce the amount of bus scan iteration

- Fix missing topology change delay on slave connection during enhanced line crossed detection
- Fix endless bus scan if topology change delay is huge and enhance line crossed detection is enabled
- Fix emDcmConfigure doesn't apply settings for MasterShift

10.4 List of enhancements/bug fixes in V2.8.1.01

Core

- Fix missed topology changed detection in some cases
- Fix crash in ENI parsing if HC group has more members than configured slaves
- Fix erroneous slave disappear notification in case of topology change at beginning of bus scan (ecbtsms_getbusslaves)
- Add support for ecatConfigureMaster(eCnfType_None, ...) to de-configure.

Examples

- Fix EcMasterDemoMulti (use em...-API instead of ecat...-API)

10.5 V2.8.0.06

Core

- Fix topology change while scan during redundancy port close and open states of enhanced line crossed detection (hangs on slave reset at main adapter)
- Reset topology information of each bus slave at bus scan start
- Detect and retrigger bus scan on slaves count changes on main and red link
- Fix erroneous topology change detection generating timeout during bus scan
- Fix occasional wrong propagation delays behind branching slaves. Port receive times were not read if DC unit disabled!
- emForceProcessDataBits(): Multiple forcing of same variable doesn´t create an new entry in force list. Old entry will be updated with new value
- Don't wait for timeout if topology change occurs during red port reopen on enhanced line crossed detection
- Fix endless bus scan on link disconnection if enhanced line crossed detection is used
- Fix topology error on line break
- Add ecatGetMasterParms, ecatSetMasterParms
- Protection against lock up due to unsupported topologies
- Add support init Master without link layer
- Detect new connection at slave at redundancy line during enhanced line crossed detection
- Disable PDI watchdog for slaves with device emulation to protect against DL status interrupt storm

Platforms

- Add Intel I219-LM

- Change emllPcap to not modify LinkParms in EcLinkOpen
- Fix handle leak on Linux for Link layers

10.6 List of enhancements/bug fixes in V2.8.0.05

Core

- Fix skipped standard InitCmd before MbxInitCmd if slave reappears (-> Fix Timeout: 'eoe init')
- Fix topology change delay sometimes not applied on link reconnection
- Logging in demo application always with timestamp
- Apply topology change delay on InitMaster if redundancy is configured
- Fix discarded EC_NOTIFY_SLAVE_UNEXPECTED_STATE
- Integrate MasterShift in master stack
- Missing red line information in emGetBusSlaveInfo if line break and enhanced line crossed detection enabled

Platforms

- ETSEC: add possibility to not use DMA buffers

10.7 List of enhancements/bug fixes in V2.8.0.04

Core

- Fix emGetBusSlaveInfo returns EC_E_NOTFOUND in some case of line crossed slave
- Detect more line crossed topologies
- Fix OEM support for PPC

Platforms

- Removed obsolete and defect OsSetSharedLibraryLocation from Linux, Xenomai, and RTAI

10.8 List of enhancements/bug fixes in V2.8.0.03

Core

- Detect more line crossed topologies
- Fix occasional EoE dead-locks after corrupt fragments from EtherCAT causing resource leak
- Fix erroneous line crossed notification in case of enhanced line crossed detection enabled
- Fix bad bus index management on slave disappear

Platforms

- CPSW: add possibility to not use DMA buffers

10.9 List of enhancements/bug fixes in V2.8.0.02

Core

- Add EC_LINKIOCTL_GET_SPEED
- Fix bad bus index management on slave disappear
- DC In-Sync settle time has to restarted after deviation is outside the limit
- Fix erroneous line crossed notification in case of line break and enhanced line crossed detection enabled
- Return correct topology information in case of line crossed
- Cancel pending EoE frame is slave disappear
- Add OEM support

10.10   List of enhancements/bug fixes in V2.8.0.01

Core

- Return correct topology information in case of line crossed
- Line crossed detection returns detailed information like without redundancy
- Fix crash in ecatGetSlaveOutpVarInfo if slave address does not exist

10.11   List of enhancements/bug fixes in V2.7.4.01

Core

- Fix EoE communication hangs sometimes after repeated PS and SP slave transitions
- Fix no more notification after a bad FoE transfer was done skip MbxInitCmd during retry MbxInitCmd
- skip MbxInitCmd during retry MbxInitCmd
- Fix RtosFiles use if EXCLUDE_ECWIN_SHM is defined in examples
- Fix crash in case of manipulated ENI
- Fix crash in bus topology state machine if ecatConfigureMaster() returns some errors like e.g EC_E_XML_INVALID_CMD_WITH_RED
- GetNumConnectedSlavesMain() returns same value as GetNumConnectedSlaves() in case of redundancy is not used
- Fix SetMasterState returns EC_E_NOERROR even if slave error detected during transition
- ecatGetSlaveInpVarInfoNumOf() now return an error when providing an invalid fixed station address
- DCM Bus Shift Mode: In-Sync settle time has to restart after controller error is outside the In-Sync limit.
- Supporting Element "Disabled" in CoE and SoE InitCmds
- New API emDcmGetBusShiftConfigured() and emDcIsEnabled()
- Fix master change to state even if a slave doesn't
- Fix missing file size information in FoE download / upload notification

Platforms

- EC-Win: Fix RtosFiles use if EXCLUDE_ECWIN_SHM is defined in examples
- Support Linux Version 4.x

10.12   List of enhancements/bug fixes in V2.7.3.08

Core

- Fix erroneous init command error handling let master switch to state
- Add EtherType check at emEthDbgMsg to prevent sending corrupt frames
- Fix progress indication for FoE download at BUSY operation (was: pMbxTfer->MbxData.FoE.dwTransferredBytes > dwFileSize!)
- Round up acyclic frame size during copy to link layer buffer in order to prevent misalignment for XilinxStandalone EMAC link layer

Platforms

- JDDemo refactoring - use state machine
- XilinxStandalone - use custom delete to prevent threading issues
- Add ARM support for eTSEC link layer (TWR-LS1021A-PB board)
- Fix wrong identity mapping assumption during DMA memory allocation under
- Add dynamic memory mapping to VxWorks 7.0 using vmLib (if available)
- Add support for KSZ9031RNX to fslfec link layer

10.13   List of enhancements/bug fixes in V2.7.3.07

Core

- Don't consider explicit device ID request bit during all devices are OP check (erroneous EC_NOTIFY_NOT_ALL_DEVICES_OPERATIONAL)
- Fix illegal mailbox polling on slave reconnection (erroneous EC_NOTIFY_MBXRCV_INVALID_DATA)
- Fix Mbx Cmd default timeout for FoE
- Fix MbxInitCmd retry

Platforms

- Starterware: LinkOsDbgAssert only for DEBUG

10.14   List of enhancements/bug fixes in V2.7.3.06

Core

- Don't send EoE if mailbox init cmds are pending
- Fix timeout handling regression from V2.7.3.05

10.15   List of enhancements/bug fixes in V2.7.3.05

Core

- Fix duplicated BRD AL Status command if BRD AL Status command configured as last command of a cyclic entry containing several cyclic frames
- Fix possible crash using frame logging with link layer supporting AllocSendFrame
- Fix parsing DataType WORD, DWORD, BITARR8, BITARR16, BITARR32 from ENI. Also BOOLEAN, INT24, BYTE, BITARR8, BITARR16, BITARR32, INTEGER8, INTEGER16, INTEGER24, INTEGER32, INTEGER40, INTEGER48, INTEGER56, INTEGER64, UNSIGNED8, UNSIGNED16, UNSIGNED24, UNSIGNED32, UNSIGNED40, UNSIGNED48, UNSIGNED56, UNSIGNED64, REAL32, REAL64
- Fix long delay if emDeinitMaster is called without jobtask running
- Fix ecatFoeSegmentedUploadReq, ecatFoeSegmentedDownloadReq to not use Master global default timeout, but timeout duration given by application
- Fix erroneous bus mismatch if configuration contains mandatory and HC slaves (bug since V2.7.3.03)
- Line crossed detection returns detailed information like without redundancy

Platforms

- Add Xenomai_armv6-vfp-eabihf
- Use OsMemcpy instead of memcpy as default for OsMemcpyPdIn, OsMemcpyPdOut

10.16   List of enhancements/bug fixes in V2.7.3.04

Core

- Fix crash in emHCGetSlaveIdsOfGroup, if provided buffer is bigger than the required one.
- Generate DCM InSync notification for MasterShift

Platforms

- Added: link status by application for EMAC link layer (optional)

10.17   List of enhancements/bug fixes in V2.7.3.03

Core

- Fix reorder configured slave with Superset-ENI

Platforms

- Fix demos for EC-Win-CE start without ENI file

10.18   List of enhancements/bug fixes in V2.7.3.02

Core

- Fix frameloss on line fixed if redundancy is used with a DC configuration

Platforms

- Added: Examples support RtosFiles if EXCLUDE_ECWIN_SHM is defined
- Fix: Implement EC_LINKIOCTL_FLUSHFRAMES for CPSW to protect against race condition in SendFrame
- Fix cache_init linkage for DW3504, GEM, CPSW for QNX
- Fix: IRQ 0 is a valid interrupt for RTOS-32
- Fix packing of EC_T_MBX_DATA_COE_INITCMD (size of EC_T_MBXTFER differed on Windows vs. Linux)
- Fix SIGPIPE on Linux when socket disconnected

10.19   List of enhancements/bug fixes in V2.7.3.01

Core

- Added: previous address check during group identification
- Add optional EC_NOTIFY_REFCLOCK_PRESENCE
- Added: Generate EC_NOTIFY_SLAVE_ERROR_STATUS_INFO notification in case of AL status error detected during InitCmd
- Add EC_IOCTL_ADDITIONAL_VARIABLES_FOR_SPECIFIC_DATA_TYPES
- Add dedicated Device Name, Hardware Version, Software Version for each Master instance
- Fix: Remove FoE progress notification for emFoeFileDownload and -Upload
- Fix permanent frame-loss in some case of cable reconnection and simultaneous topology change
- Fix: Realloc buffer during ecatConfigureMaster(GenPreopEni) if buffer is too small
- Fix FoE error text to "Downloaded file name is not valid in Bootstrap state"
- Fix memory leak on multi-instance reconfiguration

Platforms

- Added: DCM MasterShift support to DW3504, GEM, SockRaw
- Add optional turn off PHY access and setting link status from application to GEM
- Fix emlll8254x for PPC platforms (broken since 2.7.2.09)
- Fix TCP connection time-out detection for non-BSD sockets

10.20   List of enhancements/bug fixes in V2.7.2.21

- Add InitCmd retry if acyc command queue full
- Add dwSlaveDelay and dwPropagDelay to EC_T_BUS_SLAVE_INFO
- Fix emVoeWrite
- Fix parsing DataType WORD, DWORD, BITARR8, BITARR16, BITARR32 from ENI
- Add enabling/disabling of EC_NOTIFY_SLAVE_INITCMD_RESPONSE_ERROR
- Add ENI parsing of /EtherCATConfig/Config/Slave/ICmds/ICmd/Timeout and /EtherCATConfig/Config/Master/InitCmds/InitCmd/Timeout
- New API emForceProcessDataBits(), emReleaseProcessDataBits(), emReleaseAllProcessDataBits()
- Fix parsing DataType "BIT" from ENI

10.21   List of enhancements/bug fixes in V2.7.2.20

- Fix cmds exceeding process data image check if EC_IOCTL_ONLY_PROCESS_DATA_IN_IMAGE is used
- Tolerate line break during ecatConfigureMaster(GenPreopEni). Behavior on line fixed undefined
- Fix EcLinkOpen does not return for optimized link layer under Windows if PAE is enabled

10.22   List of enhancements/bug fixes in V2.7.2.19

- Single device failure does not stop rest of hot connect group to reach required state if EC_IOCTL_ALL_SLAVES_MUST_REACH_MASTER_STATE set to FALSE
- Fix delayed SYNC signal if no 64Bit DC slave on the network on reconnect
- Fix erroneous behavior on reconnect if EC_IOCTL_INITIATE_UPDATE_ALL_SLAVE_STATE is called cylically

10.23   List of enhancements/bug fixes in V2.7.2.18

- Trigger DCM controller once at the end of DC state machine if no DC slaves connected to force InSync state and resume MasterState request from waiting for DCM InSync
- Fix occasional access violation in DC window monitoring on DC slaves disconnection

10.24   List of enhancements/bug fixes in V2.7.2.17

- Cancel DC state machine if MCSM order is cancelled and was waiting for DC
- Set order state to running on resume and not pending to reduce delay
- DCM BusShift automatically InSync if 0 DC slaves connected
- Trigger topology change on permanent frameloss to generate EC_NOTIFY_HC_TOPOCHGDONE
- Fix erroneous bus mismatch notification on recovering from permanent frameloss
- Add handle to EC_T_MBX_DATA_COE_INITCMD and process return value of pfnCallback of EC_T_ADD_COE_INITCMD_DESC to skip InitCmd
- Fix erroneous line crossed information returned by GetBusSlaveInfo

10.25   List of enhancements/bug fixes in V2.7.2.16

- Support dwHandle passed by pfnCallback in EC_IOCTL_ADD_COE_INITCMD
- Fix bad comment string passed by pfnCallback (EC_IOCTL_ADD_COE_INITCMD)
- Restart DC state machine if RequestMasterState order was interrupted in WAIT_FOR_PREOP state
- MCStateMachine order RequestMasterState only interrupted TopologyChange. Not by DLStatusIrq or AlStatusrefresh or SlaveError anymore
- Fix EoE to not send frame back to src port (overriding MAC-to-port mapping)
- FslFec add possibility to not use DMA buffers

- Add disabling support for EC_NOTIFY_ALL_DEVICES_OPERATIONAL
- Add ENI check for Cmds exceeding process data image
- Fix timeout in SetMasterState if all DC slaves removed at DC getting in sync
- EC_NOTIFY_LINE_CROSSED generated only during bus scan or topology change even if master is not configured
- Fix occasional lock-up in CoE transfer API calls if slave firmware crashes. (affects emFoeFileDownload, emFoeFileUpload)
- EC_NOTIFY_JUNCTION_RED_CHANGE not enabled by default
- GEM: add possibility to use PHY on another MAC
- GEM: add possibility to not use DMA buffers
- Fix erronous timeout handling of DC ARMW burst command if BulkInLinkLayer is used

10.26   List of enhancements/bug fixes in V2.7.2.15

- Don't wait for WKC stabilization on recover from permanent frameloss
- Priorized event processing in MCStateMachine: TopologyChange, DLStatusIrq, SlaveError, ALStatusIrq
- Add LLDbgMsgHook, LLDbgMsgHookVaArgs to fix crash at Linux_x64 (don't re-use EC_T_VALIST!)
- MCStateMachine order RequestMasterState only interrupted by DLStatusIrq or TopologyChange. Not by AlStatusrefresh or SlaveError anymore
- Support bIgnoreFailure and pfnCallback in EC_IOCTL_ADD_COE_INITCMD
- Fix access violation if MbxSlave without MbxInitCmd fail to change state with AL status error

10.27   List of enhancements/bug fixes in V2.7.2.14

- Fix race condition between MCStateMachine and HCStateMachine accessing BTStateMachine
- Add EC_IOCTL_ADD_COE_INITCMD
- Add bCrossedLineDetected to EC_T_BUS_SLAVE_INFO
- Fix erronous bus scan on link disconnect
- Fix "No free buffer" error for CPSW link layer
- Add EC_NOTIFY_SLAVE_STATECHANGED for INIT on state change request
- Fix race condition in bus scan
- Add ecatIsTopologyChangeDetected
- Fix expected state info at EC_NOTIFY_SLAVE_UNEXPECTED_STATE
- Send acyclic AL status BRD if no cyclic one is available to detect topology change while buis scan
- Fix race condition between ecatConfigureMaster(GenPreopEni) and bus scan
- Window monitoring only consider DC configured slaves (SYNC or Latch)
- EEPROM API always use fix addressing
- Acyclic system time distribution for bus cycles starting with 500us
- Returns comment correctly in EC_NOTIFY_COE_INIT_CMD and SIZEOF_EC_T_ERROR_NOTIFICATION_SLAVE_INITCMD_RESPONSE_ERROR

- Support CoE not expedited SDO Upload InitCmd
- Don't use temporary address outside max bus slave range anymore, but always full rescan until master configured

10.28 List of enhancements/bug fixes in V2.7.2.13

- Use temporary address outside max bus slave range until master configured
- Apply topology change delay on red reconnection
- Add dwBusyDone, dwBusyEntire at EC_NOTIFY_MBOXRCV on FoE BUSY and dwFileSize generally at EC_NOTIFY_MBOXRCV for FoE progress tracking
- EC_T_INIT_MASTER_PARMS.dwFoEBusyTimeout marked as obsolete as it is not used
- Fix delayed FoE continue on temporary out of acyclic frames
- Fix pdwOutDataLen for emFoeFileUpload

10.29 List of enhancements/bug fixes in V2.7.2.12

- Fix missing WKC recalculate on SetSlaveState for fullmanual mode
- Support abort of segmented FoE transfers
- Support 'H' tag in port physic for fast hot connect slave

10.30 List of enhancements/bug fixes in V2.7.2.11

- Support FoE BUSY for segmented file transfers
- After RefClk dis-/reconnection, SYNC0 can be reactivated calling only SetSlaveState(), no need to call SetMasterState() anymore
- Call FreeLibrary() for LinkLayer under RTX
- Fix AoE InitCmd sent with uninitialized data (only header)
- GetBusSlaveInfo still returns old information after last slave was disconnected
- Add bFixed, byCcs and bCompleteAccess to EC_T_MBX_DATA_COE_INITCMD used for EC_NOTIFY_COE_INIT_CMD
- Support UTF-8 xml files
- EC_NOTIFY_SLAVE_PRESENCE and EC_NOTIFY_SLAVE_STATECHANGED coming in the wrong order
- Fix emGetSlaveState return zero slave state when called mismatching bus slave IDs
- Fix erroneous state change disregarding detected bus mismatch

10.31 List of enhancements/bug fixes in V2.7.2.10

- Support junction redundancy with cascaded ESC like Omron GX-JC06-H
- Process external BusShift request for eDcmMode_Off
- Fix stalled IRQ thread on ecatDeinitMaster for Linux (needs also atemsys V1.2.11)
- Add EC_NOTIFY_COE_INIT_CMD
- Add emMbxTferAbort for segmented FoE transfers
- Fix ecatDeinitMaster hangs if evaluation expired
- Fix erroneous VLAN header due to uninialized memory

- Fix missing SlaveStateChanged(INIT) notification on start-up
- Prevent null-pointer crash on RAS connection drop
- Use clock_gettime in OsSystemTimeGet for Linux to prevent from cycle violation
- DW3504 Add support for helio board
- RZ/T1 enable FPU for job task (crash fix)
- Fix Examples can use ecatResetSlaveController
- Fix occasional crash accessing the adapters registers in RTX2012
- Evaluation version now expires after 1 hour
- Fix crash in FoE Upload in case buffer is too small
- Remove assert for failing cmds in case of cable disconnect and obsolete client in case it was concurrently dropped (false positive)
- Cancel pending bus scan in ecatConfigureMaster if GenOpEni or GenPreOpEni is used
- Select first DC slave as reference clock if reference clock is missing and EC_IOCTL_ALL_SLAVES_MUST_REACH_MASTER_STATE set to FALSE
- Add MbxPolling to EC_T_MASTERDEFAULTTIMEOUTS_DESC

10.32   List of enhancements/bug fixes in V2.7.2.09

- Stop initcmd correctly and stabilize slave state machine if AL status error is detected during transition
- Wait for pending bus scan in ecatConfigureMaster if GenOpEni or GenPreOpEni is used
- Notify DCM InSync if no DC slaves found on the network and all slaves are optional or EC_IOCTL_ALL_SLAVES_MUST_REACH_MASTER_STATE set to FALSE
- GetBusSlaveInfo returns MASTER_SLAVE_ID and MASTER_RED_SLAVE_ID at the port connected to network adapters
- Lock mailbox frame splitting. Race condition was disturbing EoE
- Support more than 10 link layer instances for WinCE
- Link layer should implement EC_LINKIOCTL_IS_REPEAT_CNT_SUPPORT if DC BulkInLinkLayer can be done by frame repeat counter.
- Add segmented FoE upload
- Fix wrong slaves list in EC-STA if HC group are absent
- Support hot connect full manual mode

10.33   List of enhancements/bug fixes in V2.7.2.08

- Add R6040 support for Linux
- Add support for DOS extender G032
- Support 64Bit DMA physical address for QNX6
- Optimized link layers for Windows disable IRQ resource per default
- Fix occasional corruption in DiagSlaveObjects
- Fix EEPROM state machine hangs if BusSlaveMemoryPool too small (MaxBusSlave set to 1)
- Add dwFileNameLen at ecatFoeSegmentedDownloadReq
- Add InitCmd retry timeout at EC_IOCTL_SET_MASTER_DEFAULT_TIMEOUTS

- Replaced deprecated GetSlaveInfo, GetSlaveInfoEx by GetBusSlaveInfo, GetCfgSlaveInfo
- Fix InitCmd retry failed

10.34   List of enhancements/bug fixes in V2.7.2.07

- Slave requested state set to UNKNOWN on (re)connect
- Fix marshalling for PPC if IoCtl returns error
- Fix state machine endless waiting for acyc frames when cable disconnected
- Add support for Renesas RZ/T1 chip

10.35   List of enhancements/bug fixes in V2.7.2.06

- Don't retry acyclic frames if link is disconnected
- Introduce DC parameter bBulkInLinkLayer to repeat frames within link layer during DC burst
- ecatDcmGetStatus() returns now EC_E_NOERROR only if DCM is InSync, otherwise EC_E_NOTREADY, EC_E_BUSY, or specific error code
- Fix timeout in ecatConfigureMaster() if master is configured with GenPreop and link is disconnected during bus scan
- Fix erroneous marshaling error messages on if remotely called IOCTL returns an error code
- Fix timeout in ecatConfigureMaster() if master was configured with GenPreop before. (EC-Engineer remote configuration failure for running master)
- Fix crash if MasterInitParms.dwMaxBusSlaves too small

10.36   List of enhancements/bug fixes in V2.7.2.05

- Apply limitation to acyclic frames in INIT and PREOP (DC burst still allowed)
- Introduce EC_IOCTL_SET_COPYINFO_IN_SENDCYCFRAMES to change the place where copy info are processed
- Reduce frame loss calling ecatSetSlavePortState() at main or red line
- Fix erroneous line break notification on dis-/reconnection at main or red line
- Slave slicing improved (Slave state machines in FIFO, GetBus/CfgSlaveByXxx use hash table)
- Fix real-time violation in OsSystemTimeGet for RTX8

10.37   List of enhancements/bug fixes in V2.7.2.04

- Support cycle below 1ms under INtime
- Fix offset for Inputs.BusTime and Inputs.DevicesState
- Add notification in RAS-Server on receiving error from socket
- Introduce EC_IOCTL_SET_MASTER_DEFAULT_TIMEOUTS to adjust master default timeout
- Add wIdentifyData to the EC_T_BUS_SLAVE_INFO
- Fix slave slicing in OnMasterTimer for HC config
- Fix erronous line break notification at main adapter during redundancy line reconnection

- Fix multiple bus scan if link was disconnected
- Fix missing object index/subindex information in EC_T_PROCESS_VAR_INFO_EX in some GenOpEni cases
- Allocate more memory for GenOpEni (8k for master + 8k per slaves)
- Always add DC related master InitCmd to GenOpEni to disable SYNC signals on the network
- Add segmented FoE download
- Add notification in RAS-Server on receiving error from socket
- Remove assert on duplicated socket shutdown
- Handle EPIPE like ECONNRESET
- Ignore HotConnect/GroupName in ENI
- dwTferId of the VoE notification eMbxTferType_VOE_MBX_READ set to SlaveId

10.38 List of enhancements/bug fixes in V2.7.2.03

- eUsrJob_SendAcycFrames returns number of sent frames
- Fix denied SdoTransfer to master objects if master not configured

10.39 List of enhancements/bug fixes in V2.7.2.02

- Fix erroneous bus mismatch on line break in the middle
- Fix endless ARMW burst state in DC state machine if reference clock disconnected during DC initialization
- Fix endless repeating of acyclic commands is case of permanent frame loss
- Fix ecatRegisterClient for RAS 64Bit server and 32Bit client
- Fix race condition skipped InitCmds during transition from MbxInitCmd to InitCmd
- Fix wrong shift value between SYNC signals of hot connected DC slaves if no 64Bit DC slave was present before.
- Fix Eeprom API for PPC
- EcJdDemo: Add wait when switching from Fast to Standard mode
- EcJdDemo: Memory leak fix
- Xilinx Standalone: Fix incorrect OsQueryMsecCount implementation
- Fix crash if ENI contains MbxInitCmd with more than 256 Bytes Data
- Add Trace Data from ENI

10.40 List of enhancements/bug fixes in V2.7.2.01

- Add DC slave support for GenOpENI
- Fix race condition skipped InitCmds during transition from MbxInitCmd to InitCmd
- Fix assert if both TCP partners initiating socket shutdown in parallel.
- Add instance identification by PCI location for Linux.
- Return valid SlaveIDs for mismatching bus slaves
- Add Trace Data
- emReadSlaveRegister and emWriteSlaveRegister APIs don't return immediately EC_BUSY but wait with timeout in case of bus scan is running
- Fix wrong propagation delay in case of reference clock is not at the first star topology level (e.g behind an EK100 junction)
- Add DW3504 link layer

- Fix all warnings for Xilinx Standalone
- Protect OsMalloc, OsFree, OsRealloc with OsLock for Xilinx Standalone
- Change delivery structure for Xilinx Standalone
- Round up to 4 bytes packet length for In-DMA mode (Xilinx Standalone)
- Integrate ISR fix and remove interrupt enable/disable for Xilinx Standalone

10.41   List of enhancements/bug fixes in V2.7.1.10

- Restore undocumented EC_IOCTL_SB_SET_BUSCNF_VERIFY
- APIs using SlaveIds are usable even if master is not configured
- Fix erroneous slave slicing in some states generating erroneous EC_NOTIFY_LINE_CROSSED notifications
- Fix erroneous EC_NOTIFY_SLAVE_STATECHANGED notifications order in case of state changed during slave dis-/reconnection
- Fix CPU affinity setting and SIGXCPU on Xenomai.
- Fix GCC warnings for fully optimized compiling ("-O3").
- Don't apply timeout to the complete state machine request but only on critical states to protect against endless loop
- Fix wrong DC start time on following slave state change
- Consider DC InSync if no DC slaves connected to not stop master statemachine if EC_IOCTL_ALL_SLAVES_MUST_REACH_MASTER_STATE set to FALSE
- Fix missing DC InSync notification on start
- Add C4985 to the disabled warnings list for Windows CE 7

10.42   List of enhancements/bug fixes in V2.7.1.09

- Removed EC_IOCTL_SB_SET_BUSCNF_VERIFY
- Fix crash if memory on new client connection exceeded
- Discard PDOs of disabled sync managers from ENI
- Adapter reset on disconnection can be enabled by EC_LINKIOCTL_FEATURECONTROL
- Fixed SIGXCPU (real-time violation warning) for Xenomai

10.43   List of enhancements/bug fixes in V2.7.1.08

- Improve slave slicing during bus scan
- Send full cyclic frames containing commands addressing not connected slaves when using STANDARD layout
- Fix multi-instance for optimized link layers on Windows
- Fix access violation if application's SDO upload buffer too small
- Apply topology change delay on link dis-/connection
- Fix support for CPSW on Beagle Bone Black
- Allow CoE complete access to SubIndex 1
- Fix ecatUnregisterClient (RAS) for PPC and add error checks
- Fix checks in ecatRegisterClient (RAS) if target runs out of memory

10.44   List of enhancements/bug fixes in V2.7.1.07

- Fix wrong notified slave intermediate state
- Refactoring of flushing, queuing and sending of acyclic frames for supporting link layers with just one acyclic frame buffer

10.45   List of enhancements/bug fixes in V2.7.1.06

- Fix green screen on RAS connection under RTX64 2014
- Fix selectlinklayer.cpp for ETSEC under VxWorks

10.46   List of enhancements/bug fixes in V2.7.1.05

- Fix command line parsing in examples if executable name contains spaces
- RTX64 delivery is now for RTX64 2014
- EC_NOTIFY_FRAME_RESPONSE_ERROR for unexpected cyclic frames (e.g. delayed)
- Set notification code additionally in error notification descriptors
- Re-implement EC_IOCTL_INITIATE_UPDATE_ALL_SLAVE_STATE
- EC_NOTIFY_SLAVE_STATECHANGED notify all intermediate states
- Added default IP socket stub linkage for EC-Win (RTOS-32)
- SwapData Tag in PDO entry supported
- Add Xenomai support
- Clear error code and error info for all notifications (reserved area)

10.47   List of enhancements/bug fixes in V2.7.1.04

- New layout eCycFrameLayout_IN_DMA
- Support API emGetSrcMacAddress
- EC_IOCTL_DCM_GET_LOG returns current DCM logging values
- Don't send abort command to slave if application buffer was too small for the SDO upload and no more data are pending

10.48   List of enhancements/bug fixes in V2.7.1.03

- Fix ecatFoeFileDownload in DEVICE_STATE_BOOTSTRAP
- Add ecatMbxTferAbort support for CoE Download, CoE Upload
- Add Pro/1000 HardCodedPhySettings (EC_LINKIOCTL_FORCELINKMODE)

10.49   List of enhancements/bug fixes in V2.7.1.02

- **Fix ENI support from ET9000 (Skip EL9010 and EL9011)**
- Fix slave error acknowledge in bus scan
- Fix ecatSetMasterState(INIT) in case of slaves error during last SetMasterState
- Also send cyclic frames when transitioning to lower state (see ETG.1020 chapter "ESM Behaviour")
- Fix fixed address double check at the end of bus scan

10.50 List of enhancements/bug fixes in V2.7.1.01

- Add LinkLayerRefClock to DCM
- Refactor XML-Parser to minimize footprint and increase performance
- Fix occasional EoE lock-up
- Change Pro/1000 to not monitor link change IRQ anymore
- Change MSGQUEUE_MAX_MESSAGES from 4 to 40
- Fix to display requested slave state (was current state) in EC-SlaveTestApp
- Add EC_LINKIOCTL_GET_ETHERNET_ADDRESS
- Support erroneous ENIs with Error Indication Ack Device Emulation
- Add OS Layer for VxWorks 7
- Fix alignment issues for Starterware
- Deprecated notification codes removed:
  EC_NOTIFY_EOE_MBXRCV_WKC_ERROR,
  EC_NOTIFY_COE_MBXRCV_WKC_ERROR,
  EC_NOTIFY_FOE_MBXRCV_WKC_ERROR,
  EC_NOTIFY_SOE_MBXRCV_WKC_ERROR, EC_NOTIFY_CMD_MISSING
- EC_IOCTL_GET_PDMEMORYSIZE returns PD size without extended variables
  (e.g. system time) if EC_IOCTL_ONLY_PROCESS_DATA_IN_IMAGE is used
- Return SDO abort codes only if transfer aborted by slave
- Always synchronize slave state machine with device state on slave reappear
- Support EoeRegisterEndpoint if ENI has no EoE
- Fix access violation if corrupted ENI with same station address assigned to
  several slaves is used
- Activate incomplete HC group if
  EC_IOCTL_ALL_SLAVES_MUST_REACH_MASTER_STATE set to FALSE after
  mismatch detected (bus scan must be re triggered)
- Add EcMasterDemoDotNet
- Fix access violation in EoeRegisterEndpoint if ENI has no EoE
- Don't open auto-closed port if bus scan is triggered by the application and
  topology change manual mode is used
- Also accept CoE aborts from slave on e.g. SDO Info Request
- Add support for CCAT under RTOS-32
- Fix IdentificationAdo/Data returned by ecatGetCfgSlaveInfo() in case of explicit
  device identification
- Tolerate atemsys-handle closings due to e.g. system()-calls under Linux
- Fix UnitType in COE_ENTRYDESC from WORD to DWORD
- Fix deadlock in ecatDeinitMaster in case of CoE / SoE emergency was previously
  detected
- Support several EoE endpoints
- NDISUIO link layer send frames as broadcast because multicast / promiscious
  mode are not always supported
- Adjust cyclic frames at the beginning of the transition according ETG.1020
  chapter "ESM Behaviour"
- Extend auto-negotiation timeout to 7s and bypass state link status state machine
  during initialization of Pro/1000 link layer
- Mailbox Polling Command Length reduced to from 10 to 2 bytes

- Add support for Renesas RIN32M3 chip
- Fix native RTOS-32 evaluation package to not require EC-Win
- Change FecType and PhyInterface as part of link layer parameters
- Add support for Intel Pro/1000 I218
- Add support for Intel Pro/1000 I217
- Fix RAS disconnects on API time-outs
- Don't drop Ethernet frame from EoE while sending InitCmds
- Fix timing for cycle time below 1ms under RTOS-32
- Fix bus mismatch detection for discreet constraints with HC
- Fix spurious EoE error (re-entrancy issue)
- Added ecatScanBus
- Fix wrong DCM offset after topology changed with continuous run-time measuring
- Add support for reference clock change on the fly (using EtherCAT junction)
- Don't disable all SYNC signals during topology change
- Fix erroneous drift too high status if DCM SetVal was changed on the fly
- Fix wrong topology changed detection with monitoring Ethernet switch
- Disable DC window monitoring while DC state machine is running
- Improve slave slicing during bus scan
- Fix AtemRasSrv.lib linker errors on RTX8
- Fix skipped 64th copyinfo entry

11 Migration from Version 2.6

- ecatInitMaster parameters have been restructured and renamed from EC_T_INITMASTERPARMS to EC_T_INIT_MASTER_PARMS
- Linklayer parameters have been restructured and renamed. EC_T_LINK_PARMS included in all EC_T_LINK_PARMS_AdapterName
- ecatDcmConfigureBusShift and ecatDcmConfigureMasterShift replaced by ecatDcmConfigure
- EC_NOTIFY_SLAVE_DISAPPEARS and EC_NOTIFY_SLAVE_APPEARS replaced by EC_NOTIFY_SLAVE_PRESENCE
- In EC_T_SB_MISMATCH_DESC wBusAliasAddress was renamed to wIdentificationVal and is the last identification value read from slave according to the last used identification method
- EC_IOCTL_SET_NOTIFICATION_CTL replaced by EC_IOCTL_SET_NOTIFICATION_ENABLED.
- **Since V2.6.1.4, ecatDeinitMaster does not change to INIT anymore. It is up to the application to change the EtherCAT state**.
- Bus cycle time must be given in EC-Master init parameters.
- **Application is responsible to set Mbx objects to idle**
  (see e.g. ecatCoeSdoDownloadReq)
- Provide Master and Link Instance Id for EoE Link Open (see EC_T_LINK_OPENPARMS_EOE)
- EcErrorText has been remove, use ecatGetText() instead
- EC_T_MBXTFER.MbxData.dwFoETransferredBytes is obsolete, use EC_T_MBXTFER.MbxData.FoE.dwTransferredBytes instead.

- OsDbgMsg is deprecated. Use LogMsg to log to buffer and OsPrintf when logging from buffer instead.
- Time-out for ecatCoeSdoDownloadReq, ecatCoeSdoUploadReq must be given.

12 New Features of EC-Master V2.6

12.1 List of enhancements/bug fixes in V2.6.2.15

- Enhancement: Add support for SYS/BIOS operating system
- Enhancement: Add RGMI support for CPSW link layer
- Enhancement: Support different revision checks (high word, low word, dword)
- Improvement: Removed printf-s for RTX and Starterware
- Improvement: Replaced EC_E_CANCEL with EC_E_SLAVE_ERROR on slave error for ecatSetMasterState
- Bug Fix: Re-establish link when line break fixed at master port (GEM)
- Bug Fix: Fix EoE-Endpoint integration for Linux

12.2 List of enhancements/bug fixes in V2.6.2.14

- Bug Fix: GEM link layer clock source
- Enhancement: Add EoE-endpoint LinuxTAP
- Improvement: Better performance with notifications over RAS
- Bug Fix: small memory leak on configure master

12.3 List of enhancements/bug fixes in V2.6.2.13

- Enhancement: Add support for PMX-1000 link layer emllR6040
- Bug Fix: EcLinkSendAndFreeFrame of RTL8139 link layer always free frame even if it cannot be sent
- Bug Fix: mbx time-out on non-conforming mbx tfer abort from slave
- Enhancement: Explicit device ID commands repeated until identification value is available

12.4 List of enhancements/bug fixes in V2.6.2.12

- Enhancement: Add ADS adapter functionality to support TwinCAT 3 remote configuration
- Bug Fix: Fix erroneous DC OutOfSync notifications in case of redundancy line break
- Enhancement: Unlimited amount of copy info is now supported
- Enhancement: Add Xenomai support
- Bug Fix: Fix crash if bus slave count exceeded
- Bug Fix: Bus cycle below 250us are now supported again if DC and redundancy are used
- Bug Fix: Fix erroneous EC_NOTIFY_SLAVE_UNEXPECTED_STATE notification for slaves not present on the network
- Enhancement: EC-Win Eval deliveries support now RAS over RtosShm
- Enhancement: Add CPSW support for VxWorks/ARM

- Bug Fix: Fix EC_NOTIFY_CYCCMD_WKC_ERROR false positive on Master shutdown

12.5 List of enhancements/bug fixes in V2.6.2.11

- Bug Fix: Fix timing for cycle time greater than 1ms under QNX
- Enhancement: Introduce disconnection state machine for I8254X to protect against erroneous send frame on reconnection (Not enabled by default, #define I8254X_USE_DISCONNECTION_STATEMACHINE is needed)
- Enhancement: EC-Win deliveries support now RAS over RtosSHM
- Enhancement: Add init command comment to the EC_NOTIFY_SLAVE_INITCMD_RESPONSE_ERROR
- Bug Fix: Multi-instance works again

12.6 List of enhancements/bug fixes in V2.6.2.10

- Bug Fix: Cyclic frame generation: Moving BRD AL status to first frame is now considering that this command doesn't fit into this frame and an extra frame has to be created.
- Enhancement: Add DIStatus to EC_T_BUS_SLAVE_INFO
- Enhancement: RAS trace support is disabled by default
- Enhancement: Linklayer IOCTL can be tunneled through the master API adding EC_IOCTL_LINKLAYER, EC_IOCTL_LINKLAYER_MAIN or EC_IOCTL_LINKLAYER_RED bit mask to the IOCTL code
- Bug Fix: Process variables contains slave fixed address even if ENI contains no PDO information for this slave (e.g. BK1120 configured with ET9000)
- Enhancement: Closing port 0 is now supported by ecatSetSlavePortState
- Enhancement: Add permanent frame loss detection to be able to start network with closed port in the middle
- Bug Fix: SDO transfer request API work again over RAS
- Bug Fix: Windows CE VirtualDrv doesn't try to reuse previously allocated DMA memory anymore
- Enhancement: During falling transition master send unchanged cyclic frames until the target state is reached
- Enhancement: EC_IOCTL_SB_ACCEPT_TOPOLOGY_CHANGE executes a full discovery of the network, opening all closed ports

12.7 List of enhancements/bug fixes in V2.6.2.9

- Bug Fix: Fix occasional exception for DCM

12.8 List of enhancements/bug fixes in V2.6.2.8

- Bug Fix: Fix missing EC_NOTIFY_SLAVE_STATECHANGED on SetMasterState to INIT
- Bug Fix: DC and DCM InSync notification generated after line reconnection
- Bug Fix: Fix erroneous DC start time by long bus cycle

- Enhancement: Skip clearing FMMU during master InitCmd for transition back to INIT to protect for slave error state
- Enhancement: Add I82578 IDs (desktop version of I82577)
- Bug Fix: Fix SetMasterState returns too fast
- Bug Fix: Fix invalid cyclic frame if STANDARD or DYNAMIC layout is used and frame start with BRD AL Status

12.9 List of enhancements/bug fixes in V2.6.2.7

- Enhancement: Introduce acyclic system time distribution for bus cycles longer than 250us
- Bug Fix: Fix error during CycCmdCreate if EC_IOCTL_ADD_BRD_SYNC_WINDOW_MONITORING was call and STANDARD layout is used
- Bug Fix: Topology change manual mode supports reconnect of main/red line. No frames sent on the previously disconnected line until EC_IOCTL_SB_ACCEPT_TOPOLOGY_CHANGE is called
- CER - Fix timeout during DC initialization if EC_IOCTL_ADD_BRD_SYNC_WINDOW_MONITORING is used with standard cyclic frame layout

12.10　　 List of enhancements/bug fixes in V2.6.2.6

- Bug Fix: Bus scan is now successful with line break before ecatConfigureMaster was called
- Bug Fix: DCM bus shift controller continue to work even if m_dwInSyncLimit was reached
- Bug Fix: Fix timeout during DC initialization dynamic cyclic frame layout used and EC_IOCTL_ADD_BRD_SYNC_WINDOW_MONITORING was called
- Bug Fix: Erroneous frame loss notification in case of multiple frames in cyclic entry
- Bug Fix: Erroneous flooding redundancy line break notification in case of multiple cyclic entries
- Bug Fix: Fix missing DC system time in PDIn area

12.11　　 List of enhancements/bug fixes in V2.6.2.5

- Bug Fix: Improve slave slicing during bus scan
- Bug Fix: Don't send notifications any more if RAS connection terminates
- Enhancement: Added throttling of identical unexpected slave state notifications
- Bug Fix: RAS over Message Queue Windows CE supported again
- Bug Fix: Fix dead lock in EoE blocking in some case the communication with one EoE
- Enhancement: Introduce ecatAoEWriteControl
- Enhancement: GEM link layer now read MAC address from adapter

12.12 List of enhancements/bug fixes in V2.6.2.4

- Enhancement: RTX64 support
- Enhancement: Added ecatSoeWriteReq, ecatSoeReadReq
- Bug Fixed: Fixed SockRaw for Linux
- Bug Fixed: Setting system timer according to bus cycle time for QNX (cycles below 1ms)
- Enhancement: Windows CE entry point move to tmain()
- Enhancement: Enhance ecatSetSlavePortState to support redundancy

12.13 List of enhancements/bug fixes in V2.6.2.3

- Bug Fixed: CCAT link layer did not load on Linux/x64
- Enhancement: Topology change delay handling improved
- Enhancement: ECMasterDemoDc for RTAI

12.14 List of enhancements/bug fixes in V2.6.2.2

- Bug Fix: ecatCoeGetODList (RAS) returned EC_E_INVALIDSIZE in case of any error
- Bug Fix: ecatSetSlaveState always returned EC_E_BUSY if slave denies BOOTSTRAP
- Bug Fix: Open eventually blocked ports on bus scan if bus slave list empty
- Enhancement: RTIP stub integration for RTOS32Win
- Bug Fix: Bus Scan doesn't block anymore after link is reconnected while master is in state Unknown
- Enhancement: Reduced memory consumption for notification store in RAS-server.
- Bug Fix: Input data are now updated again also if link layer is in interrupt mode
- Bug Fix: No disconnect if an IDLE command timeouts in RAS-client.

12.15 List of enhancements/bug fixes in V2.6.2.1

- Bug Fix: Fix wrong "connection lost" in some case of multiple RAS calls
- Enhancement: Info about supported mailbox protocols now part of object 0x3xxx and EC_T_BUS_SLAVE_INFO
- Enhancement: Cyclic Frames now created dynamically based on master state
- Bug Fix: RTOS-32: Intel Pro/1000 Link Layer. Correct Hardware-ID now selected
- Enhancement: Protect multiple use of 1 adapter in WinPcap link layer. Support Adapters with no protocols installed using AdapterId
- Bug Fix: Fix erroneous bus scan if eUsrJob_MasterTimer is called more frequently than eUsrJob_SendAllCycFrames

12.16 List of enhancements/bug fixes in V2.6.1.5

- Enhancement: Introduce EC_IOCTL_MASTEROD_SET_VALUE
- Bug Fix: Fix dead lock in SlaveSateMachine on some disconnect/reconnect use cases

- Bug Fix: Fix slave InitCmds retry mechanism
- Enhancement: Add support for Xilinx Zynq link layer GEM
- Bug Fix: Fix false EC_NOTIFY_JUNCTION_RED_CHANGE on slave re-connect
- Bug Fix: ecatGetCfgSlaveInfo() returns the configured station and autoinc addresses
- Enhancement: Support distinguish stop/reconfigure at EC_NOTIFY_CLIENTREGISTRATION_DROPPED
- Enhancement: Add GenPreopENIWithCRC
- Bug Fix: Enable AL Status Interrupt for slaves with InitCmd failure again
- Bug Fix: Fix Master waiting for all slave state changes in case of slave slicing
- Bug Fix: Fix station address marshalling for CoE Emergency
- Bug Fix: DCM BusShift controller: monitoring of m_dwInSyncLimit takes care of negative controller values (nCtlErrorNsec)
- Enhancement: Master object dict. objext 0x2001 bit definitions in header file
- Enhancement: Example application without class CEmDemoCommon

12.17 List of enhancements/bug fixes in V2.6.1.4

- Enhancement: Introduce EC_IOCTL_MASTEROD_SET_VALUE
- Bug Fix: Fix returned variable information in case of slave has several input or output SM
- Bug Fix: eCnfType_GenPreopENI always start counting slaves from 1
- Bug Fix: The following APIs are now returning immediately if EC_NOWAIT is provided as time out value: ecatCoeSdoDownloadReq(), ecatCoeSdoUploadReq(), ecatFoeUploadReq(), ecatFoeDownloadReq() ecatVoeWriteReq(), ecatAoeReadReq(), ecatAoeWriteReq()
- Enhancement: Support for INTEGRITY
- Bug Fix: Fix DC never get InSync (window monitoring) in case of redundancy line break between ref clock and DC slave on a 2 slaves network
- Enhancement: Modify TopologyChange WKC Threshold to 64 in case of frameloss otherwise 2 in case of slave (dis)connection

12.18 List of enhancements/bug fixes in V2.6.1.3

- Bug Fix: Fix wrong behavior of OK bit in object 0x2001 of the master OD.
- Enhancement: Support for RTAI
- Bug Fix: Fix propagation delay measurement in case of the reference clock is behind a bus coupler or a junction and is not part of the "main ring"
- Enhancement: Added link layer for Xilinx Virtex5 PPC440x5 target
- Bug Fix: DC initialization waits for InSync correctly even if EC_IOCTL_ADD_BRD_SYNC_WINDOW_MONITORING was called
- Bug Fix: DC InSync information is now correct in master OD
- Bug Fix: Fix emGetProcessDataBits returning wrong data in case of offset and length were both byte aligned

12.19 List of enhancements/bug fixes in V2.6.1.2

- Enhancement: ECMasterDemo compiled for EC-Win always use the shared memory for ENI and logging
- Bug Fix: Fix wrong sanity check in Set/GetProcessDataBits
- Enhancement: Apply the topology change delay if new slave with link established on a closed port is found to prevent from frame loss.
- Enhancement: Topology change manual mode supports reconnect of main/red line. Reconnection port stay closed until EC_IOCTL_SB_ACCEPT_TOPOLOGY_CHANGE is called.
- Enhancement: Introduce PCI location for link layer instance identification.

12.20 List of enhancements/bug fixes in V2.6.1.1

- Enhancement: Support RAS client disconnect without deregistration.
- Bug Fix: Fix access violation for FoE Mbx object after abort FoE transfer.
- Bug Fix: Fix dead lock in bus topology state machine with border close enabled.
- Enhancement: Add identification and port descriptor information to EC_T_CFG_SLAVE_INFO returned by ecatGetCfgSlaveInfo()
- Enhancement: Add junction redundancy change notification.

12.21 List of enhancements/bug fixes in V2.6.0.8

- Enhancement: Wait for DC slaves InSync during DC initialization when window monitoring is enabled
- Enhancement: WinPcap link layer can use adapter GUID for identification
- Enhancement: Realtek RTL8111E supported
- Enhancement: Add slave slicing for slave state machine. Change ordering of slave slicing from 1, 6, 11 to 0, 1, 2
- Bug Fix: Fix consecutive SDO transfer after abort SDO transfer
- Enhancement: Refresh process data only if WKC is less or equal to the configured WKC
- Bug Fix: Fix access violation during bus scan with redundancy line break between mandatory slave when hot connect slaves are present
- Enhancement: Add previous port information to EC_T_CFG_SLAVE_INFO returned by ecatGetCfgSlaveInfo()

12.22 List of enhancements/bug fixes in V2.6.0.7

- Enhancement: Support eCnfType_GenPreopENI after bus mismatch detected
- Enhancement: Add support for I210
- Bug Fix: Fix access violation on repeated cable connect/disconnect
- Enhancement: Support local ring topology using junction slaves
- Enhancement : Support CCAT link layer
- Bug Fix: Bus mismatch notification contain more information to be correctly used by ecatBlockNode
- Enhancement: Improve mailbox repeat handling to not disturb other mailbox transfer running parallel

- Bug Fix: Fix timeout in scan bus due to reused MCSM order
- Enhancement: New API MbxTferAbort, supported by FoE fransfer
- Enhancement: Requesting master state again to the current state sets back every slave on bus to the master state
- Bug Fix: Fix dead lock in master state machine in case of slave state change error
- Enhancement: Add EEPROM check for Alias Address

12.23   List of enhancements/bug fixes in V2.6.0.6

- Enhancement: Eliminate EC_IOCTL_INITIATE_UPDATE_ALL_SLAVE_STATE and EC_NOTIFY_UPDATE_SLAVE_STATE_DONE
- Bug Fix: Prevent from race condition and fix access violation in BT Statemachine during ecatConfigureMaster(eCnfType_GenPreopENI)
- Enhancement: Default DC Timeouts depending on bus cycle time (dwBusCycleTimeUsec)
- Bug Fix: Set MbxTfer.eTferStatus to eMbxTferStatus_TferReqError in case of transfer error happens during an overlapped call
- Enhancement: Add support for RTL8103
- Enhancement: Generate EC_NOTIFY_MBOXRCV notification during ecatFoEDownloadReq with the amount of bytes transferred
- Bug Fix: Apply the topology change delay if new slave with link established on a closed port is found to prevent from frame loss
- Enhancement: Introduce EC_IOCTL_SB_SET_TOPOLOGY_CHANGE_AUTO_MODE and EC_IOCTL_SB_ACCEPT_TOPOLOGY_CHANGE. Restriction: Does not protect against auto open of port 0 on main line reconnection
- Bug Fix: Handle the slaves after the disconnected main line as the end of the incomplete group

12.24   List of enhancements/bug fixes in V2.6.0.5

- Bug Fix: Fix SetMasterState(eEcatState_SAFEOP) returns timeout if job task doesn't run closely to function call ecatConfigureMaster()
- Enhancement: Support starting without slaves connected if a hot connect only configuration is used, even if the configuration contains DC slaves
- Bug Fix: Fix SetMasterState(eEcatState_SAFEOP) returns timeout if DCM master shift regler is used with a network configuration containing no DC slave
- Bug Fix: Fix slave error acknowledgement by new slaves during the bus scan
- Enhancement: Application should implement printf in DbgMsgHook(), returning EC_TRUE doesn't make the OS layer call printf since V2.5.3.4
- Bug Fix: Distributed clock unit always considered to be enabled for slaves based on ET1200 ESC
- Bug Fix: EC_IOCTL_DC_SLV_SYNC_STATUS_GET always returns InSync if sync window monitoring is disabled
- Bug Fix: Prevent from race condition in case slave disappears and reappears with error state set

12.25   List of enhancements/bug fixes in V2.6.0.4

- Bug Fix: Reestablish bus mismatch detection if first slave is wrong
- Bug Fix: Fix WKC error notification using SupersetENI Feature Pack
- Bug Fix: Fix VoE repeating mailbox
- Bug Fix: GetNumConnectedSlavesMain() and GetNumConnectedSlavesRed() returns 0 if link is disconnected
- Enhancement: DCM MasterShift controller can be reset by the master (e.g. RefClk slave disconnected)
- Enhancement: New APIs: emGetSlaveInpVarInfoEx(), emGetSlaveOutpVarInfoEx(), emFindOutpVarByNameEx(), emFindInpVarByNameEx()
- Bug fix: Fix race condition and memory leak in RAS client and server
- Bug fix: Cyclic frames minimum size of 60bytes is now guaranteed
- Bug Fix: Fix access violation on slaves disconnection while continuous propagation delay measurement is enabled

12.26   List of enhancements/bug fixes in V2.6.0.3

- Bug Fix: Fix sometimes wrong unexpected slave state notification at start
- Bug Fix: Fix BusSlave sometimes with BusScanStatus set to EC_E_NOTREADY
- Bug Fix: DCM Bus Shift Controller: Improved quality for bus cycle times of >= 2 msec
- Bug Fix: GenPreopENI configuration works again.

12.27   List of enhancements/bug fixes in V2.6.0.2

- Bug Fix: First slave on bus should be first mandatory slave or head of a hot connect group.
- Bug Fix: Fix EoE InitCmd (SetIP) support
- Enhancement: Bus scan is always handled in the same way. No more full and enhanced scan differentiation
- Enhancement: Acknowledge slave error by new slaves during the bus scan
- Bug Fix: Fix unexpected slave appears notification in case of bus scan triggered by the application
-

12.28   List of enhancements/bug fixes in V2.6.0.1

- Bug Fix: RAS Fix race condition in ecatMbxTferDelete causing in some case a page fault
- Bug Fix: Fix endless bus scan in case of link disconnected (since V2.5.3.2), avoiding the master de-initialization
- Enhancement: ScanBusStatus of BusSlave set to NOTREADY during bus scan
- Enhancement: Added notification on slave state change
- Bug fix: Avoid huge system time differences in case of line break and wrong OutOfSync notifications by the first DC slave on the redundancy line

- Bug fix: Fixed duplicated notification receiving from remote connections.
- Enhancement: EC_NOTIFY_SB_MISMATCH notification to RAS client added.
- Bug fix: EC_IOCTL_DC_SLV_SYNC_STATUS_GET returns InSync in case of sync window monitoring is disabled
- Bug fix: Link layer works with 82540 adapters again
- Bug fix: ecatSetSlaveState validates target state according to master state.
- Enhancement: Get-/SetSlaveState speed up (unnecessary polling on bus removed).
- Bug fix: Fixed SendAllCycFrames if Master is not configured to prevent false-positive "frame loss" error at start-up of e.g. EcMasterDemoSyncSm.
- Bug fix: RTX: Fix wrong cycle if BusCycleTime > 1000 in the example
- Enhancement: Handle the slaves after a line break with bus mismatch as the end of the incomplete group
- Bug fix: Fixed Master state change whith no slaves on bus when all configured slaves are hotconnect.
- Bug fix: Notifications fixed if EC_IOCTL_ALL_SLAVES_MUST_REACH_MASTER_STATE is used.

13 Migration from Version 2.5

The following hints have to be considered when migrating from version 2.5.

13.1 EC_T_CFG_SLAVE_INFO changed

- Checks for EC_T_CFG_SLAVE_INFO.bIsOptional replaced by EC_T_CFG_SLAVE_INFO.dwHCGroupIdx == 0

13.2 Slave state is always updated automatically

- EC_IOCTL_INITIATE_UPDATE_ALL_SLAVE_STATE and EC_NOTIFY_UPDATE_SLAVE_STATE_DONE are not defined anymore. EC_NOTIFY_SLAVE_UNEXPECTED_STATE can be used to detect that slaves are not in the master state. Verbose slave state change information can be enabled with EC_IOCTL_SET_NOTIFICATION_CTL.

14 New Features of AT-EM V2.5

- No restriction anymore using DC and redundancy simultaneously
- API to trace the EtherCAT traffic ecatLogFrameEnable()
- New demo framework using a separate timing task and myApp functions
- New API ecatGetCfgSlaveInfo() and ecatGetBusSlaveInfo()
- Explicit device ID support

14.1 List of enhancements/bug fixes in V2.5.3.4

- Enhancement: Keep AlStatusCode information until next slave state change
- Bug fix: Order timeout of the master control state machine started at API call

- Bug fix: Fix wrong DCM offset in case of DCM controller error detected before controller reset was executed
- Bug fix: Fix wrong master state behavior in case of GenPreopENI configuration

14.2 List of enhancements/bug fixes in V2.5.3.3

- Enhancement: Explicit device ID support (Restriction: Slave must answer the ID request within the current bus cycle)
- Bug fix: Fix different crash cases using VoE
- Bug fix: SlaveTestApp, process data were not correctly flashed if size of process image was very small.

14.3 List of enhancements/bug fixes in V2.5.3.2

- Bug Fix: Fix post time stamping in EcLinkSendFrame to assure a correct difference between host time and bus time in case of DC
- Enhancement: Support more than 4 cyclic entries
- Bug Fix: Fix endless state canceling the master state machine if master device state is unknown (for example timeout because of link disconnected)
- Bug Fix: Rtos-32: 0x00000000 is supported if returned by RTReserveVirtualAddress
- Enhancement: Bus mismatch error generated for bad revision and/or serial number if check is enabled as InitCmd
- Bug Fix: Intel Pro/1000 - Windows CE native: If physical memory address is > 2GB the memory couldn't be mapped due to a compiler/cast problem.
- Bug Fix: Fixed memory leak in object dictionary read function CoeGetEntryDesc2()
- Enhancement: Reducing dynamic memory allocation in RAS client and server
- Bug Fix: Fixed memory leak in bus topology management.
- Enhancement: ecatSetSlaveState(): The only allowed transition from BOOTSTRAP is to INIT state. Check added.
- Bug Fix: Fix endless topology change loop / wrong number of connected slave in case of link disconnected

14.4 List of enhancements/bug fixes in V2.5.3.1

- Bug Fix: Fix exception in LinkDbgMsg (since 2.5.2.3)
- Enhancement: New API ecatGetCfgSlaveInfo() and ecatGetBusSlaveInfo()
- Enhancement: EC_IOCTL_ALL_SLAVES_MUST_REACH_MASTER_STATE. If set to 0, Master state can be reached even if slaves are missing or cannot reach the state
- Enhancement: Master object dictionary: Vendor ID, product code and device name could be defined in EcType.h

14.5 List of enhancements/bug fixes in V2.5.2.3

- Enhancement: ecatConfigureMaster() can generate ENI file based on connected slaves to reach PREOP state.
New type EC_T_CNF_TYPE eCnfType_GenPreopENI.
- Enhancement: DC filter depth registers always set to default or optimized value. A slave, previously refclock, never come InSync after being reconnected as normal DC slave
- Enhancement: Reduce number of malloc() during XML parsing
- Enhancement: Optimize frame handling for link layers not supporting AllocSendFrame like WinPcap
- Bug Fix: RTX: Multiple process can access the same link layer simultaneously

14.6 List of enhancements/bug fixes in V2.5.2.2

- Bug Fix: Fixed ecatSoeWrite(). Wasn't working since version 2.5.0.2
- Bug Fix: Fix loss frames on redundancy line fixed due to max acyclic frames count set to 1
- Bug Fix: Block mailbox polling while mailbox read is execute due to repeating mailbox
- Bug Fix: By slaves with EoE support, repeating mailbox is now supported for the other mailbox protocols
- Enhancement: Slave state is read by appearing slave
- Bug Fix: Fix exception in RAS client if system is overloaded on startup
- Enhancement: DC initialization not skipped anymore if SetMasterState(INIT) runs into timeout

14.7 List of enhancements/bug fixes in V2.5.2.1

- Bug Fix: Support redundancy with DC even if INCLUDE_HOTCONNECT is not defined
- Enhancement: RTX2012 support
- Bug Fix: Distance between frames and SYNC0 was sometimes random (when DCM controller could not run before DcStartTime was calculated)
- Enhancement: Reference clock disconnection supported
- Bug Fix: Number of InitCmds Retry are now correct
- Bug Fix: If BRD AL Status is the first command in the cyclic frame, then the next command was skipped.
- Bug Fix: ecatGetSlaveInfo() now returns the correct revision number in case this number is equal to zero in the EEPROM.
- Enhancement: New API ecatAoeReadWrite() and ecatAoeReadWriteReq()
- Enhancement: PPC support for ECMasterDemoMotion

14.8 List of enhancements/bug fixes in V2.5.1.2

- Bug Fix: Support redundancy with DC even if INCLUDE_HOTCONNECT is not defined

- Enhancement: Master OD info service returns no empty slaves anymore for 0x3000, 0x8000, 0x9000 and 0xA000 objects
- Bug Fix: DC window monitoring generate EC_NOTIFY_DC_SLV_SYNC in case of only one DC enabled slave is present on bus
- Bug Fix: Fix wrong controller error calculation in case of emDcmConfigureBusShift() is called several time after DCM was running
- Bug Fix: Hot connected 64bit DC slave is now correctly initialized on a bus with only 32bit DC slaves
- Enhancement: Reference clock disconnection supported
- Bug Fix: Fix race condition and memory leak in RAS client and server
- Bug Fix: All EcMaster API return EC_E_INVALIDSTATE if called before ecatInitMaster()
- Bug Fix: RTL8169 link layer support now redundancy mode
- Bug Fix: Fix access violation in some case of redundancy with crossed connection
- Enhancement: DCM Master Shift now supports DC configurations with SYNC0 and SYNC1 with different cycle times
- Enhancement: Only FoE is allowed in Bootstrap. Other mailbox transfer return immediately EC_E_INVALID_SLAVE_STATE
- Bug Fix: RAS server: Fixed memory leak in case of stop while mailbox transfer objects are allocated. API emMbxTferCreate()
- Bug Fix: Hardware workaround for chips 8168B and 8168C
- Enhancement: Default InSync Window for DCM bus shift controller is 5 % of bus cycle time

14.9 List of enhancements/bug fixes in V2.5.1.1

- Enhancement: New configuration type "DataDiag" without CRC check to download on remote target
- Bug Fix: Autonegotiation timeout back to 5s in Pro/1000 link layer
- Enhancement: Master state machine wait for DCM InSync at the end of PS transition. New notification EC_NOTIFY_DCM_SYNC
- Enhancement: DCM bus shift based on bus cycle time information and get faster in sync. DCM bus shift works even if "Sync window monitoring" is not enabled

14.10   List of enhancements/bug fixes in V2.5.0.6

- Bug Fix: Crossed line handling fixed. Bus mismatch on crossed line is the default behavior
- Bug Fix: Object 2002 Subindex 4 (Number of DC slaves found) in master OD returns amount of slaves with DC enabled
- Bug Fix: Inhibit WKC error notification while HC is waiting for manual continue
- Enhancement: Sync window monitoring considers only DC slaves after the reference clock
- Enhancement: Device ID 1526 (82576 Intel Gigabit ET2 Quad Port Server Adapter) added
- Bug Fix: ecatSetMasterState() return after dwTimeout also in case of an InitCmd error

14.11　　List of enhancements/bug fixes in V2.5.0.5

- Bug Fix: Link Layer Intel Pro/1000 Forced speed of I82577 and I82579 to 100Mbit/s, because PHYs automatically choose 10Mbit/s after reset even with auto-negotiation
- Enhancement: Bus mismatch if IN/OUT connectors are swapped configurable (default: no). See EC_IOCTL_SB_SET_ERROR_ON_CROSSED_LINES
- Bug Fix: Mailbox transfer request are set into timeout in case of the transfer could not be initiated due to instable master state.
- Enhancement: New API emGetSrcMacAddress to get source MAC address
- Enhancement RAS-Server: Better performance for notification transfer to client

14.12　　List of enhancements/bug fixes in V2.5.0.4

- Enhancement: Don't assign temporary fixed address to slaves already present on the bus because of duplicity. Always generate temporary address for new slaves
- Enhancement: Sync window monitoring access the DC slaves individually. The notification EC_NOTIFY_DC_SLV_SYNC is only sent if Slaves are in sync.
- Bug Fix: Fix access violation in the handling of CoE and SoE emergency request
- Bug Fix: Link layer dynamic loaded libraries unloaded in OsReleaseLinkLayerRegFunc
- Bug Fix: Cyclic frames are not sent anymore after ecatSetMasterState(INIT) returns timeout

14.13　　List of enhancements/bug fixes in V2.5.0.3

- Enhancement: Runtime data of VirtualDrv in device descriptor (no static data anymore)
- Enhancement: Add Linux x86, 64 Bit support
- Enhancement: Intel Pro/1000 / Improve start with disconnected link
- Enhancement: Intel Pro/1000 / Add support for I82579 (DeviceID 0x1502 / 0x1503)
- Enhancement: Disable DCM bus shift, calling emDcmConfigureBusShift with NULL parameters
- Enhancement: Intel Pro/1000 Mailbox transfer objects EC_T_MBXTFER created for overlapped API are reusable

14.14　　List of enhancements/bug fixes in V2.5.0.2

- Bug Fix: Fix race condition in MCSM for never consumed order
- Enhancement: Use standard sleep in link layers instead of usec loop while adapter initialization to reduce CPU consumption
- Bug Fix: DCM in sync flag set in master object dictionnary when DCM bus shift used
- Enhancement: MSI support for RTX link layers
- Enhancement: SOE API returns supported elements

- Enhancement: Bus scan always read revision and serial number information from the EEPROM
- Enhancement: GetSlaveInfo returns information about connected slaves
- Enhancement: DCM bus shift is not related to sync signal period of the reference clock anymore
- Bug Fix: Fix not notified cyclic command WKC error for mandatory slaves
- Bug Fix: Fix wrong DC slaves count in master object dictionary
- Bug Fix: Add FreeLibrary() of link layer DLLs for Windows, Windows CE, RTX
- Bug Fix: RTL8139 link layer support not page aligned IO memory

14.15   List of enhancements/bug fixes in V2.5.0.1

- Restriction: Line crossed detection not supported
- Bug Fix: VirtualDrv use giisr only for interrupt from the registry
- Bug Fix: Fix last hotconnect group of the ENI is not handled correctly on HotConnect
- Enhancement: Trigger the port receive times latching within the cyclic commands (NOP cmd on register 0x900)
- Enhancement: New APIs ecatDcContDelayCompEnable() and ecatDcContDelayCompDisable()
- Bug Fix: Fix Beckhoff ESC don't follow the reference clock sometimes (since 2.4)
- Enhancement: New API ecatLogFrameEnable() and ecatLogFrameDisable()
- Enhancement: VLAN supported again
- Enhancement: emNotifyApp() and ecatNotifyApp()
- Enhancement: AtemVmf.cpp now includes again dcm.csv log file support
- Bug Fix: Fix HotConnect groups go down to INIT and back on topology change
- Enhancement: DC supported in redundancy mode
- Bug Fix: Handle new topology change detected before new slave error detected
- Enhancement: In case of HC group cannot reach master state, don't loop over INIT state
- Bug Fix: Fix timeout issue in HC manual mode. HC monitored by only one
- Enhancement: Write fixed address of recognized slaves even if bus mismatch detected
- Bug Fix: Fix crash in line crossed notification

15 Migration from Version 2.4

The following hints have to be considered when migrating from version 2.4.

15.1 API change for SOE

- The deprecated parameter *EC_T_BYTE byElementFlags* of the SOE functions *ecatSoeWrite, ecatSoeRead, ecatSoeAbortProcCmd* has been changed into *EC_T_BYTE* pbyElementFlags* in order to returns the processed element.

15.2 Bus cycle configuration added to ECMasterDemo

- Enhancement: The bus cycle time can be configured using the "-b <cycle time>" command line parameter.

15.3 AUXCLK support reduced in ECMasterDemo

- Due to internal refactoring the auxiliary clock support for QNX6 and CeWin below 4.0 was removed from the ECMasterDemo.

16 New Features of AT-EM V2.4

- Added ADS over EtherCAT (AoE)
- No restriction anymore using DC and hot connect simultaneously
- DC continuous measuring supported
- Support for real-time operating system INtime
- Support for real-time operating system T-Kernel
- AT-STC Slave Test Center supports ESC register/memory access
- AT-STC Slave Test Center supports FOE transfer

16.1 List of enhancements/bug fixes in V2.4.1.7

- Bug Fix: "BeforeSlave" Tag in ENI is now handled as Boolean
- Bug Fix: DCM master shift synchronization issue when the DC start time cannot be setup in all the slaves at once (DC start time recalculated)
- Enhancement: IN/OUT crossed line detection in non redundancy mode

16.2 List of enhancements/bug fixes in V2.4.1.6

- Enhancement: New API ecatGetSlavePortState
- Enhancement: Requesting lower master state cancel current pending master state request
- Enhancement: Slaves with sync out unit assigned to PDI are now supported
- Enhancement: IN/OUT Crossed line detection in redundancy mode
- Enhancement: EC_T_HC_DETECTALLGROUP_NTFY_DESC present group mask for 3200 HC groups
- Enhancement: Hot connect manual mode
- Bug Fix: Fix possible endless loop by BlockNode on BusMismatch

- Bug Fix: Fix CoE unknown SDO abort code for PPC
- Enhancement: Add device ID 82573E (0x108B)
- Bug Fix: Support wrong mailbox size warning during SDO info service
- Bug Fix: Fix memory corruption in variable list if DC is enabled

16.3 List of enhancements/bug fixes in V2.4.1.5

- Bug Fix: Fix free() on uninitialize member variable (VxWorks not working in 2.4.1.4)
- Bug Fix: Fix memory leak in INtime

16.4 List of enhancements/bug fixes in V2.4.1.4

- Bug Fix: The mailbox protocol EoE is now working again. (Version V2.4.1.2 and V2.4.1.3 are not able to handle EoE)
- Bug Fix: Pro/1000 link layer works with adapters between 82546 and 82560 again
- Enhancement: Mask WKC error on LWR while master state is not OP
- Enhancement: Trigger bus scan after a new slave has been connected to a slave not supporting autoclose and his physical address already exist on the bus
- Bug Fix: Hot connected groups are set into master state again (error in 2.4.1.3)
- Enhancement: BusTime information in process data input image through variable "Inputs.BusTime"
- Enhancement: EC_IOCTL_SET_MBX_RETRYACCESS_COUNT and EC_IOCTL_SET_MBX_RETRYACCESS_PERIOD
- Bug Fix: Fix handling of acyclic frames lost during the "open port" action in the bus scan

16.5 List of enhancements/bug fixes in V2.4.1.3

- Bug Fix: Process data compatibility mode works again (EC_IOCTL_SET_PD_OFFSET_COMPAT_MODE)
- Bug Fix: Fix access violation after call to ecatConfigExcludeSlave() on first slave
- Enhancement: Content of file myapp.cpp included into ATEMDemo2.cpp. Files myapp.cpp und myapp.h no longer used.
- Bug Fix: Fix race condition between ecatBlockNode() and ecatOpenBlockedPorts()

16.6 List of enhancements/bug fixes in V2.4.1.2

- Enhancement: vxWorks link layer attach dynamically to the SysLoSal
- Enhancement: DCM use sync signal information of the first DC slave if sync signal of the reference clock is not enabled
- Bug Fix: ecatBlockNode wait for bus scan finished to have a valid bus slave list after the call returns
- Enhancement: Topology changes detected using AL status WKC monitoring (for slaves without event mask support or switch placed between master and first slave)

- Bug Fix: Serialize state change against mailbox transfers.
- Enhancement: Reset DL status interrupt detected flag in bus scan to prevent for superfluous DL status interrupt handling
- Bug Fix:Cyclic WKC error notified before ReturnPDOutBasePointer() / ReturnPDInBasePointer()
- Enhancement: Full scan not triggered anymore after enhanced scan returning bus mismatch. Only one bus mismatch notification on hot connect
- Bug Fix: ecatReadSlaveEEPRom() doesn't return the right amount of data if the previous call failed.
- Bug Fix: ecatConfigureMaster() return with error when file not found (did crash before)
- Bug Fix: ecatPerfMeasInit() overwrites heap memory (measurement array)
- Enhancement: EC_NOTIFY_HC_TOPOCHGDONE is thrown consecutive two times within one busscan with unequal result codes.

16.7 List of enhancements/bug fixes in V2.4.1.1

- ecatGetProcessData/ecatSetProcessData now also works with Memory Provider in dynamic mode.
- New error returned: EC_E_DC_SLAVES_BEFORE_REF_CLOCK
- DC continuous measuring is now supported, propagation delays are recalculated on topology changes (DC slaves can be hot connected everywhere on the bus)
- Now a bus scan is performed after closing ports with ecatBlockNode.
- Inhibit link debug messages if link is disconnected
- EC_IOCTL_DC_SLV_SYNCPULSE_RESTART and EC_IOCTL_DC_SLV_SYNC_RESTART not supported any more. Master or single slave must go to Pre-Op and Op again to restart DC and signals.
- Port operations are now re-validated with an additional command and are repeated if not successful.
- Port operation command is not expected to be return and is therefore now sent in an explicit single frame. These acyclic commands do not longer run into timeout in this case
- The notification EC_NOTIFY_SB_MISMATCH has returned an invalid port in case of an incomplete HotConnect group.
- Busscan run into an endless loop in some cases in connection with port operations. (endless dl-status interrupts)
- ecatOpenBlockedPorts now set ports in mode Auto-Close
- ecatBlockNode now callable with EC_NOWAIT as timeout value (asynchronous).
- If port operations (e.g. with ecatBlockNode) run into timeouts, internal request will possible not released. Further port operations run into timeout at this state.
- ecatBlockNode on a optional slave node now blocks always the complete hot connect group.

16.8 List of enhancements/bug fixes in V2.4.1.99 (beta)

- New master init parameter implemented to set up the maximum number of pre-allocated bus slave objects within the master (EC_T_INITMASTERPARMS.wMaxBusSlaves) If the maximum number of bus

slaves exceeds while scan bus or topology change (HotConnect), EC_E_MAX_BUS_SLAVES_EXCEEDED will be returned.
- Mailbox polling for InitCmds activated after SyncManager0 AND SyncManager1 are successfully initialized (not on sending the command)
- Clear statistic counter in slaves on "ClearStatistics"
- Bug Fix Realtek Link Layer 8168
  End of TX descriptor ring was not detected if NIC is still sending.
  Depending on the frame size this happened more frequently.
- Complex safety process variables are now itemized for the process variable read functions such as emGetSlaveOutpVarInfo(), emGetSlaveInpVarInfo().
  "FSOE_4098", "FB Info 1", "FB Info 3", "FSOE_4096", "FSOE_4099"
- Only first command of cyclic frames has command index set to increase the maximum count of cyclic commands
- EC_IOCTL_UPDATE_ALL_SLAVE_STATE and EC_IOCTL_UPDATE_ALL_SLAVE_STATE_NOWAIT obsolete, master triggers update automatically

16.9 List of enhancements/bug fixes in V2.4.0.3

- Bug Fix: Access violation possible in case the EoE-endpoint is in use together with further mailbox transfer.
- Bug Fix: EC_NOTIFY_SLAVE_UNEXPECTED_STATE notifications sometimes occurred after powered on of hot connect groups.
- Enhancement: New API emGetNumConnectedSlavesMain() and emGetNumConnectedSlavesRed()
- Add new device ID 0x10DE (82567LM3)
- Bug Fix: Wrong PD Offsets using ET9000 Build2006
- Enhancement: INtime Link-OS-Layer interrupt mode support

16.10   List of enhancements/bug fixes in V2.4.0.2

- Bug Fix: In case the ENI contains a mailbox init command that is sent on transition from INIT to PREOP a slave could not set to INIT and back OP.
- Enhancement: DC refactoring, state change is now possible on single DC slave
- Enhancement: Introduce EC_IOCTL_SB_SET_TOPOLOGY_CHANGED_DELAY
- Bug Fix: Pass through server will not be stopped after ecatConfigureMaster was called
- Bug Fix: Sleep was missing in the order waiting loop for ecatGetSlaveState calls.
- Enhancement: Pre-allocated slave object in the master object dictionary now depends on EC_T_INITMASTERPARMS.wMaxBusSlaves.
- EC_IOCTL_SB_MEMORYPOOLRESIZE is not longer supported.
- Bug Fix: A breakpoint prior the EEPROM funktion calls now not longer lead to timeout.

16.11   List of enhancements/bug fixes in V2.4.0.1

- Bug Fix: Physical mailbox polling was not re-started in each case after a previously disconnected slave (mandatory slave) was connected again.

- Enhancement: Corresponding error codes are now returned in case of a received error mailbox from the slave. EC_E_MBXERR_SYNTAX, EC_E_MBXERR_UNSUPPORTEDPROTOCOL, EC_E_MBXERR_INVALIDCHANNEL, EC_E_MBXERR_SERVICENOTSUPPORTED, EC_E_MBXERR_INVALIDHEADER, EC_E_MBXERR_SIZETOOSHORT, EC_E_MBXERR_NOMOREMEMORY, EC_E_MBXERR_INVALIDSIZE
- Enhancement: Introduce EC_NOTIFY_EEPROM_CHECKSUM_ERROR
- Bug Fix: EEPROM write access run possibly into timeout in case of working counter error.
- Enhancement: Improvement of the hot connect handling. Disconnected slaves handled as disconnected even if reconnected before bus scan was finished
- New Intel Pro/1000 device type supported. Device ID: 0x10F5

17 New Features of AT-EM V2.3

- RAS Server now available for QNX
- Pass Through Server added as Feature Pack
- Support for Realtek Gigabit NIC (RTL8111 / RTL8168 / RTL8169)
- HotConnect operation switched to AutoClose Mode detection instead of Cyclic Working Counters
- Support for 64Bit Windows
- AT-STC EtherCAT Slave Test Center
- Added Vendor specific protocol over EtherCAT (VoE)

18 Migration from Version 2.0

If the ENI file is build with Beckhoff ET9000 or TwinCAT the process data are now located at different offset. The offsets are now matching to values in the variable sections in the ENI file. For compatibility reasons it may be useful to work with the old offsets. Enabling the old offsets is done via calling the function ecatIoControl(EC_IOCTL_SET_PD_OFFSET_COMPAT_MODE, EC_NULL).

19 Migration from Version 1.7

The following hints have to be considered when migrating from version 1.7.

19.1 Link Layer Interrupt Mode

Due to internal speed enhancements the link layer currently can only be executed in polling mode. A future version of the stack will support the link layer mode again by signaling an event to the application.

19.2 Notification handling

Notification processing in the demo application of version 1.7 was implemented in the tEcJobTask(). As CPU time consumption may be high, this would have a high impact to the real-time behavior of the cyclic operation.
The call to CEmNotification::ProcessNotificationJobs() shall NOT be executed in the tEcJobTask(). The new demo application was adjusted accordingly.
The functions CEmNotification::InitJobQueue() and DeinitJobQueue() are removed. Calling these functions are not longer necessary.

19.3 Public ecat structures

The structures in AtEthercat.h, needed to call ecat API functions, are now packed. Applications have to be rebuilt.

20 Supported CPU architectures

The following 32 bit CPU architectures are supported in little endian mode:

- x86
- ARM9
- XScale
- PowerPC

21 Supported compilers

The EtherCAT master stack was built and tested with the following compilers:

- Microsoft Visual C++ 6.0
- Microsoft embedded Visual C++ 4.0 (x86, ARM, XScale)
- GNU compilers for VxWorks 5.4 up to VxWorks 6.7 (x86)
- DIAB compiler for VxWorks 6.3 up to VxWorks 6.7 (x86)
- GNU compiler for QNX 6.3.2, QNX 6.4
- GNU compilers for VxWorks 5.5 (ARM9)
- GNU compiler used for rcX version 1.0 and 2.0 (ARM9)

22 Notes and known Limitations

- EL9010: The EL9011 device has to be used instead if distributed clock and redundancy are used simultaneously.