



acontis technologies GmbH

EC-Master

EtherCAT® Master Stack

Version 2.9

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
 - Synchronous and asynchronous modes
 - Master triggered and user triggered data update
 - Memory provider interface for user application synchronization
- Error detection and diagnosis, e.g.
 - Bus scan with bus topology/configuration check
 - Lost cable connection or missing EtherCAT slave response
 - Wrong EtherCAT slave reaction (not all slaves responded)
 - Slave operation monitoring
 - 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)
- EtherCAT Bus Scan
 - Slave detection without existing bus configuration
 - Slave EEPROM information service
 - Topology detection
 - Slave Alias Addressing support
- Slave EEPROM Read/Write Support
- Slave to slave communication via master (“CopyInfos” in ENI file)
- Feature Pack EoE Endpoint
- Feature Pack Cable Redundancy
- Feature Pack Hot Connect
- Feature Pack Master Object Dictionary
- Feature Pack External Synchronization

2 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_SYNC_SO_CB_PARM` should consider that the start delay (default: 50ms or set by `EC_IOCTL_DC_SETSYNCSTARTOFFSET`) will be applied.

3 New Features of V2.9

- Reduce memory peak during emConfigureMaster
- XML-Parser optional
- emRescueScan()

3.1 List of enhancements/bug fixes in V2.9.2.23

Core

- Add handling of remaining 32Bit Os Counter Tick Measurements for Performance Measurement
- Fix invalid read in ENI parsing if data type of variable is unknown
- Fix invalid read in EC_COPYBITS_INLINE (last byte at buffer with odd length)
- Deny V2.x ... V2.7, V2.8 RAS Clients

Platform

- Fix 64Bit Os Counter Tick Measurement for VxWorks at ARM
- Extend IcSS LinkLayer for Emerson TI AM5728 Board
- DW3504 Remove cable connected check in EcLinkAllocSendFrame

3.2 List of enhancements/bug fixes in V2.9.2.22

Platform

- added new Link Layer Altera/Intel Triple Speed Internet

3.3 List of enhancements/bug fixes in V2.9.2.21

Core

- Fix ScanBus returns EC_E_NOERROR instead of EC_E_LINK_DISCONNECTED if master was not configured and link was disconnected
- Fix crash under Windows 10 64Bit if linklayer instance not found
- Setup GMIItoRGMII converter independent of PHY access for GEM. Configurable TX/RX DMA Desc buffer count for GEM, DW3504, R6040 and SHEth
- Fix parsing variables of Specific Data Types
- Fix ENI variable type parsing for STRING
- Fix handling of delayed CoE Frames

Platform

- Fix unexpected master version print under VxWorks

3.4 List of enhancements/bug fixes in V2.9.2.20

Core

- Fix erroneous EC_E_MAX_BUS_SLAVES_EXCEEDED in case of topology change while scan at the end of the network

Platform

- Use clock_gettime in OsQueryMsecCount for QNX to support multiprocessor system

3.5 List of enhancements/bug fixes in V2.9.2.19

Core

- 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
- Force topology change at the end of ecatRescueScan
- Fix wrong DC start time after ecatSetMasterstate(INIT) in case of 64Bit distribution due to Master InitCmd BWR 0x910 in IP transition
- Fix erroneous bus mismatch when new bus slaves have been recorded during DL interrupt handling

Platform

- Antaios: Commit Profichip modifications (burst mode)
- Add OsInit() to DIIMain of AtEmRasCInt. To increase performance under Windows because of timeBegin(1)
- GEM: Implement Marvell 88E1510 specific LED initialization

3.6 List of enhancements/bug fixes in V2.9.2.18

Core

- Fix missing EC_NOTIFY_NOT_ALL_DEVICES_OPERATIONAL notification after slaves disappear
- Add FoeUploadReq() and FoeDownloadReq() to RAS
- Add EC_IOCTL_SET_ZERO_INPUTS_ON_WKC_ERROR
- Fix crash in Object 0x2006 Mailbox Statistics Object on write access
- Return correct variable type instead of DEFTYPE_NULL for ARRAY types like DEFTYPE_ARRAY_OF_BYTE

3.7 List of enhancements/bug fixes in V2.9.2.17

Core

- Fix bus slave leak in case of hot connect group members appear in quick succession
- Fix parsing of port descriptor (ESC:0x0007) considering "not configured" port as configured. Erroneous line crossed notification by cable redundancy

Platform

- Support GEM for Xenomai
- GEM Xilinx GMIITORGMI Converter support
- Add instance identification by PCI location for Windows

3.8 List of enhancements/bug fixes in V2.9.2.16

Core

- Protect against negative memory usage returned by `ecatGetMemoryUsage()`
- Call `OsHwTimerGetInputFrequency()` before `OsHwTimerGetCurrentCount()` to allow some run once initialization
- Add missing previous slave information in some bus mismatch notification in case `ecatConfigExcludeslave()` has been called before
- Fix FoE with RAS server V2.4.2.07
- Fix missing `EC_NOTIFY_SLAVES_STATECHANGED` notification for reappeared slave which is set to origin state by `ecatSetSlaveState`

Platform

- `atemsys` for Linux V1.3.11 IO-Control to enable access to ARM cycle count register(CCNT)

3.9 List of enhancements/bug fixes in V2.9.2.15

Core

- Fix unexpected `EC_NOTIFY_NOT_ALL_DEVICES_OPERATIONAL` notification while waiting for `ecatHCAcceptTopoChange()`
- Fix master init-commands for `eCnfType_GenPreopENI`, `eCnfType_GenOpENI`
- Fix crash in EoE Endpoint after `ecatConfigureMaster()`

Platform

- Add device ID for I219
- Fix linklayer instance selection in INTIME

3.10 List of enhancements/bug fixes in V2.9.2.14

Core

- Fix set slaves to INIT on reconnection in manual mode
- Fix topology detection if first slave isn't matching
- Add `DcStartTimeGrid` support for `LinkLayerRefClock`

Platform

- Sysbios RAS support added for ECM on AM572x
- Updated to `atemsys` V1.3.10 Support PRU ICSS in Device Tree, Ubuntu 18.04, Kernel 4.9.90, Xenomai 3.0.6 x64 Cobalt

3.11 List of enhancements/bug fixes in V2.9.2.13

Core

- Use standard DC loop control values for all Hilscher ESC again
- Return code of initiating error instead of SDO abort code (E.g. segmented CoE upload with too small buffer)
- Fix repeated `EC_NOTIFY_CYCCMD_WKC_ERROR` notifications if hot-connect group disappears

- Eliminate zero bytes malloc during ecatInitMaster()

3.12 List of enhancements/bug fixes in V2.9.2.12

Platform

- EC-Master license unlocking for EC-Win with VMF license query

3.13 List of enhancements/bug fixes in V2.9.2.11

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
- Enhance bus topology detection for hot connect slaves with invalid identification values
- Fix unexpected EC_NOTIFY_CYCCMD_WKC_ERROR notification if hot-connect group disappears
- Fix occasional crash related to unregister client / MbxTfers in RAS
- Abort pending transfer in ecatMbxTferDelete in RAS
- Fix missing port descriptor correction for slaves with invalid descriptors after second bus scan

3.14 List of enhancements/bug fixes in V2.9.2.10

Core

- RescueScan returns EC_E_TIMEOUT if timeout elapsed within BusScan
- Add EC_IOCTL_SET_ZERO_INPUTS_ON_WKC_ZERO
- Adjust EoE retry access period dynamically to increase bandwidth usage
- Use standard DC loop control values for old Hilscher ESC again (build < 20)
- Fix crash in emConfigExtend() in case of max bus slaves exceeded
- Set WkcState bit if hot-connect group disappears
- Fix FoE data display (binary / ASCII) in EC-SlaveTestApp

Platform

- INCLUDE_PASS_THROUGH_SERVER enabled for Windows CE
- Fix EcMasterDemoMulti for Linux
- Fixed mmap problem in ICSS on linux
- New Infineon XMC 4800

3.15 List of enhancements/bug fixes in V2.9.2.09

Core

- 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 missing data at uploads (AoE, CoE, FoE) in RAS (regression since V2.9.2.08)
- Fix ecatSetMasterState sticks after timeout in some cases

- Fix erroneous line crossed detected in case of line break
- Fix constant Input-WKC-State error for slaves with mailbox
- Fix ecatNotifyApp() always return zero dwNumOutdata in RAS (broken since 2.9.1.09)
- 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

Platform

- Fix EC_IOCTL_ISLINK_CONNECTED in ETSEC

3.16 List of enhancements/bug fixes in V2.9.2.08

Core

- Fix crash during port operation
- Add emSlaveSerializeMbxTfers and emSlaveParallelMbxTfers to RAS
- Fix crash in emRasCIntRemoveConnection while transfer is pending

3.17 List of enhancements/bug fixes in V2.9.2.07

Core

- Fix EC_NOTIFY_MBOXRCV in RAS client returning sometimes erroneous 0 values
- Fix leak in client management if connection terminates while a notification is pending
- Extrapolate propagation delay of DC slaves without coherent port receive times (e.g. ESC20)
- Fix overwriting of mailbox objects in asynchronous mailbox RAS-APIs (emCoeSdoUploadReq/emCoeSdoDownloadReq)
- Fix race condition in RAS client while accessing emMbxTferCreate and emMbxTferDelete
- Fix MaxSubIndex at object descriptions of 0x10F3, 0x2004
- Fix mailbox read response stuck if acyclic frame queue is full
- Fix GetBusSlaveBySlaveId returns a bus slave even though the slave id is invalid
- Fix missing mailbox read response command if acyclic frame queue is full

Platform

- Set MSG_NOSIGNAL at socket send to prevent from unexpected SIGPIPE

3.18 List of enhancements/bug fixes in V2.9.2.06

Core

- Fix resource leak in virtual EoE switch if frames are received at a port where destination MAC is registered
- Fix API lock by RAS (connection lock instead of global lock)
- Fix bus slave leak during emConfigExtend leading to erroneous EC_E_MAX_BUS_SLAVES_EXCEEDED errors in some cases

- Fix RAS protocol corruption in case of concurrent send requests at server
- 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)
- Protect against sending empty EoE fragments (deny empty frames) Affects EoE-Endpoints
- Fix GenPreopENIWithCRC
- Fix race condition in ecatConfigureMaster(GenPreopENI / eCnfType_GenOpENI) if a scan bus is running

Platforms

- Updated to atemsys V1.3.08 (Add support for Linux kernel >= 4.13.00)

3.19 List of enhancements/bug fixes in V2.9.2.05

Core

- Fix erroneous offset between external and internal SYNC signals in case of SyncToTimerIrq or different DCM SetVal are used in DCX mode
- Fix notify EC_NOTIFY_CYCCMD_WKC_ERROR immediately if cyclic command not related to hot-connect (Broken since 2.9.1.14)
- Fix process variable to PDO assignment in case of several sync managers sharing same <Send>/<Recv> entry (Broken since 2.9.2.01)
- Support EC_NOWAIT at ecatCoeGetODList, ecatCoeGetObjectDesc, ecatCoeGetEntryDesc
- Fix Renesas NoOs Timer issue
- Fix Re-register client in EcMasterDemoRasServer
- Fix GetBusSlaveBySlaveId returns a bus slave even though slave id is invalid due to bus mismatch
- Fix buffer overflow caused by DCM LinkLayerRefClock logging
- Add VoE tab to EC-SlaveTestApp
- Add TwinSafeLoader support (OBJ8XXX, SI 2 Slave Type String)
- Fix Master State Summary Object 0x2001, SI 13 in case of eDcmMode_Off
- Flush the queue of the other line containing old frames by cable redundancy
- Fix DCM configuration parameter handling
- Fix DC start time offset calculation in DCX mode
- Fix race condition in McSM order management

Platforms

- EC-Win EVAL license unlocking

3.20 List of enhancements/bug fixes in V2.9.2.04

Core

- Add DCM configuration parameter EC_T_DCM_CONFIG_BUSSHIFT::bUseDcLoopCtlStdValues
- Add protected version support to SockRaw
- Fix 32Bits internal and external counters by DCX

- Fix hot connect mode border close
- Fix missing notifications in manual topology change mode
(EC_IOCTL_SB_SET_TOPOLOGY_CHANGE_AUTO_MODE = EC_FALSE)

Platforms

- Add Npcap support for emllPcap (PCAP_OPENFLAG_NOCAPTURE_LOCAL + NDIS 6)

3.21 List of enhancements/bug fixes in V2.9.2.03

Core

- Fix time-out handling in emConfigExtend()
- Detected more line crossed topologies (down merge V3.0.0.03)
- Update dwStateChangeDebug at ecatSetMasterParms
- Fix too many WkcStateImage offsets in some cases if more than one MasterSyncUnit exists
- Cyclic frame send fix with VLAN enabled for DC slaves
- 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
- Fix Superset-ENI exclude individual slaves
- Master Object Dictionary 2006: Remove wrong size check for subindex 0

Platforms

- CPSW: cyclic frames should have higher prio as acyclic
- Fix not received frames for some RTL8169 cards
- Added support for new board TI AM3359-ICEV2 to PRUICSS Link Layer (RT Linux)
- I8254X: Add device IDs for I219LM and I219V

3.22 List of enhancements/bug fixes in V2.9.2.02

Platforms

- PRU-ICSS Link Layer adopted for Linux
- EoF not reached workaround for EC-Master-RTOS-32 lib under VS2015
- Added new PRU-ICSS Link Layer for VxWorks

3.23 List of enhancements/bug fixes in V2.9.2.01

Core

- 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

- CPSW Link Layer fix Port 2 on AM57x
- Fix EcatDrv for Windows x64 (WdfColInstaller01007 instead of WdfColInstaller01009)

3.24 List of enhancements/bug fixes in V2.9.1.16**Core**

- Fix EC_IOCTL_SET_SLVSTAT_PERIOD with dwPeriod = 0
- Deny invalid SoE parameters at ecatSoeRead, ecatSoeWrite, ... (add EC_E_SOE_ERRORCODE_INVL_DRIVE_NO, EC_E_SOE_ERRCODE_NO_ELEM_ADR)
- Add EoE protocol to Mailbox statistics
- Don't count access to master object dictionary at Mailbox statistics
- Fix Master OD Object 0x2020, SubIndex 14: Link Layer Driver Ident

Platforms

- Removed malloc/free wraps for Xenomai 3 (Cobalt)
- Updated to atemsys V1.3.07 for Linux / Xenomai

3.25 List of enhancements/bug fixes in V2.9.1.15**Core**

- Cancel pending EoE transfer if slave is disconnected
- Fix emGetMemoryUsage
- Support 32Bits internal and external counters by DCX
- Fix ecatScanBus() returns EC_E_BUSCONFIG_MISMATCH if slave identification failed
- Fix second PCI device usage for Linux and Xenomai
- Use correct PCI domain in atemsys for Linux and Xenomai
- Fix unidentified slaves after bus mismatch behind a junction slave

Platforms

- Reduce amount of interrupts by using bAckErrInIrq by RTL8169

3.26 List of enhancements/bug fixes in V2.9.1.14**Core**

- emMbxTferAbort() applied to all FoE transfers, not only the segmented ones
- Don't call OsQueryMsecCount() in EcTimer::IsElapsed() if timer not started
- Fix crash in DCM mode LinkLayerRefClock after reconnection
- 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

Platforms

- Add bAckErrInIrq to EC_T_LINK_PARAMS_RTL8169
- Fix atemsys xenomai2 interrupt handling (atemsys V1.3.04)
- Support SyncToTimerIrq for DcmMastershift and DcmBusShift under RTOS-32

3.27 List of enhancements/bug fixes in V2.9.1.13**Core**

- 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)
- Fix crash in EC_IOCTL_GET_CYCLIC_CONFIG_INFO if Class B master was not configured before

Platforms

- Change OsMemcpy to improve performance on Xenomai/ARM (Link Layer handles unaligned memory access)
- Fix atemsys version check (atemsys V1.3.03)

RAS

- Fix unexpected RAS client disconnection after configuration download

3.28 List of enhancements/bug fixes in V2.9.1.12**Core**

- Enhance invalid ENI detection
- Fix Wkc recalculation only in case of hot-connect or modified configuration (ecatConfigExcludeSlave)
- Fix setting DCM SetVal to 0 apply the default SetVal instead of 0
- Fix erroneous master state change even though scan bus returned an error
- Fix access violation due to multiple assignment of same Client ID
- Change FoE MAX_FILE_NAME_SIZE from 32 to 64
- Change default DCM InSyncLimit to 25us
- 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

Platforms

- Fix support for Intel Pro/1000 I218LM
- Support Yocto Linux

3.29 List of enhancements/bug fixes in V2.9.1.11**Core**

- Don't open the red port during propagation delay measurement if the port was closed intentional

- Fix 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.
- Add emAoeWriteControl
- 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 parameter BOOTSTRAP at ecatSetMasterState
- Fix INPUTs temporary discarded on slave re-connect (AUTO_ADJUST_CYCCMD_WKC)

3.30 List of enhancements/bug fixes in V2.9.1.10

Core

- Log DCM differences greater than 10% of the cycle if verbosity level 2 in EcMasterDemoDc / EcMasterDemoMotion
- Enable DC window monitoring in case of DCM timeout elapsed during startup
- Fix crash 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
- Add line cross notification to RAS

Platforms

- Fix RTOS-32 VS2015 linkage (remove LinkOsVsnprintf)
- 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 secondary mode switch of AuxClk timing task for Xenomai

3.31 List of enhancements/bug fixes in V2.9.1.09

Core

- eUsrJob_SendCycFramesByTaskId returns EC_E_INVALIDINDEX if TaskId not found
- Fix wait for DC / DCM in case of EC_IOCTL_SET_ADJUST_CYCFRAMES_AFTER_SLAVES_STATE_CHANGE is used
- Fix DCM mode was changed even if ecatDcmConfigure returned error
- Set slaves first to master state if previous call to ecatSetMasterState returns error
- Allow EC_NOWAIT in emTferSingleRawCmd(). Fix emSetSlaveState returns EC_E_INVALIDPARAM
- Fix client re-registration in EcMasterDemoRasServer
- 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 FoE mailbox statistics (PPC)

Platforms

- Add interrupt mode for Xenomai (needs also atemsys V1.2.16)
- Add CPSW and EMAC support for VxWorks 7

3.32 List of enhancements/bug fixes in V2.9.1.08

Core

- Protect for unnecessary mailbox repeating during cable redundancy handling in DC state machine
- Fix file name length reading to not exceed given buffer for FoE up- and download
- Fix Mailbox Statistics FoE counting direction (read/write) fixed, cumulated counting fixed.
- Fix EC_IOCTL_SET_BUS_CYCLE_TIME modifies init master parameter dwBusCycleTimeUsec
- Link layers return EC_E_NOTSUPPORTED instead of EC_E_INVALIDCMD if IOCTL is not supported

3.33 List of enhancements/bug fixes in V2.9.1.07

Core

- 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
- Add
EC_IOCTL_SET_ADJUST_CYCFRAMES_AFTER_SLAVES_STATE_CHANGE
- Fix erroneous RAS disconnection at the end of large FoE transfer
- Fix DC start time calculation in DCM mode MasterRefClock
- Fix WKC calculation for split 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 DCX with external memory provider write request callback
- Fix missing client ID information during FoE progress notification causing "Out of mailbox notification memory!" errors
- Add ecatPerfMeasSetIrqCtlEnabled
- Fix Syntax variant 1: EcMasterDemoMotion [DemoConfigFileName]
- 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 include minimum time
- Fix always trigger DC state machine if topology change detected
- Master Object Dict. History Object. Big Endian Support for notifications.

- Fix DCM mode LinkLayerRefClock and add bLogEnabled, nCtlSetVal parameters

Platforms

- Intel I219 support
- DCM MasterShift support for Xenomai
- Fix SockRaw default link layer parameter to fix starting with ENI (DisableForceBroadcast only for EAP)
- Fix erroneous filtering of own traffic in WinPcap linklayer for Windows 8 and above
- Remove CRC in RecvFrame from CPSW and ETSEC

3.34 List of enhancements/bug fixes in V2.9.1.06

Core

- Fix access violation in ecatSetMasterState() during ecatConfigureMaster() sometimes
- Fix access violation during ecatconfigureMaster(GenPreOp) sometimes
- Fix bus mismatch errors if a slave needs more than one cycle to return its identification value (Ado 0x134)

3.35 List of enhancements/bug fixes in V2.9.1.05

Core

- Fix frame leak during Configure Master
- Fix DC and redundancy even if link layers don't enhanced line crossed detection
- Fix connection drop if read data from socket take more time than watchdog
- Add Master OD Object 0x2006 Mailbox Statistics Object
- Add ecatGetMasterInfo, EC_IOCTL_CLEAR_MASTER_INFO_COUNTERS
- Start DC window monitoring only after DCM or DCX is in sync
- Add ecatConfigExtend

Platforms

- Fix logging priority for Xenomai3 in Examples
- Add PhyInterface and UseDmaBuffers parameters to DW3504

3.36 List of enhancements/bug fixes in V2.9.1.04

Core

- SupersetEni supports 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 Mastershift.bCtlOff = EC_TRUE in EC_T_DCM_CONFIG_DCX disabled erroneously DCX controller too
- Fix SPOC for GetCfgSlaveInfo, GetBusSlaveInfo, ReadSlaveIdentification, SetSlaveDisabled, SetSlaveDisconnected

3.37 List of enhancements/bug fixes in V2.9.1.03

Core

- Adjust DC slave register 0x0934 in DCM mode BusShift to minimize synchronization jitter
- Fix CopyInfo copy 0 on WKC error

3.38 List of enhancements/bug fixes in V2.9.1.02

Core

- Add ecatSetSlaveDisabled
- Add ecatSetSlaveDisconnected
- Add EC_IOCTL_SET_AUTO_ADJUST_CYCCMD_WKC_ENABLED
- Add EC_IOCTL_SET_AUTO_ACK_AL_STATUS_ERROR_ENABLED
- Add EC_IOCTL_DC_FIRST_DC_SLV_AS_REF_CLOCK
- Add emGetMemoryUsage
- Add sending InitCmds of transition II and PP
- Add CoE Index, SubIndex info at EC_NOTIFY_MBOXRCV for ecatCoESdoUploadReq and ecatCoESdoDownloadReq
- 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
- Add RTLockHeap() to LinkOsMapMemory() for RTOS-32 to protect for race condition
- All APIs return EC_E_INVALIDSTATE if master instance was not initialized
- Add RtosCommStart to EC-Win demo programs
- Add ETSEC VxWorks DIAB support
- Fix topology detection if slave with matching fixed address (duplicate) is connected
- Fix propagation delay calculation in DCM modes and LinkLayerRefClock
- Fix no external synchronization error handling in DCX with EL6695
- Fix erroneous bus time calculation in 64 bit timestamp emulation
- Fix CoeSdoUploadReq in CoeSdoDownloadReq EcMasterDotNet
- Don't read mailbox when slave is in INIT
- Send master InitCmds to new slaves with FPRD instead of BRD
- Execute DC initialization for bridge slaves even if there is no DC configuration for them in the ENI file
- Configure all DC slave controller registers 0x0934 and 0x0930 in the same way
- Update pbyElementFlags at ecatSoeWriteReq, ecatSoeReadReq
- Reduce time to get InSync in DCM mode MasterRefClock
- Add FoeDownloadReq to EcMasterDotNet

Platforms

- Add support for Xenomai3 x86Cobalt and x86Mercury
- RTX64: add RAS Server and change library extension from .lib to .rtdll
- Linux: Update atemsys from 1.2.13 to 1.2.15
 - Add support for Linux Kernel 2.6.18
 - Add udev auto-loading support via DTB

3.39 List of enhancements/bug fixes in V2.9.1.01

Core

- Master Object Dictionary use `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

Platforms

- VxWorks7: support new VxBus
- EcWin: remove unused code for `EXCLUDE_ECWIN_SHM`
- EcWin: DCM Mastershift for RTOS-32

3.40 List of enhancements/bug fixes in V2.9.0.09

Core

- Add DCX mode - External synchronization

Platforms

- Add `PCI_DEVICE_I219V`
- Fslfec: Read mac from eFuse for iMX6 if exists

3.41 List of enhancements/bug fixes in V2.9.0.08

Core

- Fix long delay (20s) in `SetMasterState` if slaves are absent
- Don't process `PotentialRefClock` tag as `ReferenceClock` tag
- Add `EC_IOCTL_SET_GENENI_ASSIGN_EEPROM_BACK_TO_EC`

Platforms

- Add JSL-Ware implementation
- Force process priority class to *time critical* only in case of threads created with highest priority (e.g. **not** for remote diagnosis with EC-Engineer, EC-STA).
- Fix stack overflow in example programs for RTOS-32

3.42 List of enhancements/bug fixes in V2.9.0.07

Core

- Fix error parsing "read hot connect prev address" identify command (Ado 0x10)
- 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 in EcMasterDemo

Platforms

- SYSBIOS use IDK 1.1.0.8

3.43 List of enhancements/bug fixes in V2.9.0.06

Core

- Fix error in EC_COPYBITS

3.44 List of enhancements/bug fixes in V2.9.0.05

Core

- Fix error 0x98110021 during EC-Engineer remote configuration

Platforms

- GEM: add license check

3.45 List of enhancements/bug fixes in V2.9.0.04

Core

- Fix missing topology change delay in some case of redundancy 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

Platforms

- Xenomai: use rt_timer_read instead of rt_timer_tsc
- Add instance identification by PCI location for INtime

3.46 List of enhancements/bug fixes in V2.9.0.03

Core

- Fix compiler errors with EXCLUDE_LINE_CROSSED_DETECTION
- Reorder InitCmd for Omron slaves to protect against error 83 during falling transitions to PREOP
- Fix wrong frame size in snarf link layer sending corrupted frames
- Fix long delay if emDeinitMaster is called without jobtask running
- Fix missed slave connection if connection up during bus scan

- 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 in case of too short cycle
- Add sanity checks in EcMemPool
- 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 stuck in PREOP if DC unit disabled and slave is DC configured
- Fix emGetSlaveInpVarInfoEx() missing index and sub index

Platforms

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

3.47 List of enhancements/bug fixes in V2.9.0.02

Core

- Fix Master stuck 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 blsRefClock 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

3.48 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

4 Migration from Version 2.7

4.1 API change for emCIntQueueRawCmd

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

5 New Features of V2.8

Core

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

5.1 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)

5.2 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

5.3 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

5.4 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 (ecbtms_getbuslaves)
- Add support for ecatConfigureMaster(eCnfType_None, ...) to de-configure.

Examples

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

5.5 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 a 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

5.6 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

5.7 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

5.8 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

5.9 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 if slave disappear
- Add OEM support

5.10 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 ecatGetSlaveOutputVarInfo if slave address does not exist

6 Supported CPU architectures

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

- x86
- ARM9
- XScale
- PowerPC

7 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)

8 Notes and known Limitations

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