Slave Stack Code
Release Notes

EtherCAT Slave Stack Code V5.12

Any mandatory changes related to this version will be posted in the Evaluation Kit Software forum of the ETG (link). (It is recommend to watch this form for any upcoming posts).

Related Documents:

- Application Note Slave Stack Code
- Application Note EL9800
- EtherCAT Slave Quick Design Guide

The documents are available with the SSC Tool installation (Help-> Documents) or can be downloaded from (http://www.beckhoff.com/english.asp?download/ethercat_development_products.htm?id=71003127100387).

Project update:

1. Install “EtherCAT Slave Stack Code Tool.exe”
2. Open the existing project
3. Run project update (Project -> Project Update)
4. Acknowledge the configuration specific change log

The SSC Tool will adapt all settings and user specific files to the new SSC version.

Changes to V5.11

New:

- Add further AL status codes
- Add datatypes
- Bootloader sample configuration
- Add timestamp object 0x10F8
- Add define “CHECK_SM_PARAM_ALIGNMENT” enable/disable process data length alignment check according ESC access configuration

Changes:

- Enhance application interface, including EoE, FoE and application main loop
- CiA402 state machine and process data alignment
- Object entry access flags handling
- CoE backup/restore: load values after the complete OD was initialized, update backup data calculation
- Update Diagnosis message handling
- Updates for Big endian platforms
- Updates for 16Bit only platforms
- In case of no mailbox support the process data sync manager are SM0 and SM1
- Update of SM parameter handling and error monitoring
- EEPROM access/emulation updates (including EEPROM access timeout handler)
- Move FoE/EoE samples to application files

For all changes please see the source files or the project update dialog of the SSCTool.

Changes to V5.10

New:

- define application interface function pointers (e.g to redirect EEPROM emulation commands)
- add CoE support for "DEFTYPE_ARRAY_OF_INT", "DEFTYPE_ARRAY_OF_SINT", "DEFTYPE_ARRAY_OF_DINT", "DEFTYPE_ARRAY_OF_UDINT", "BYTE", "WORD" and "DWORD"
- add new SDO abort code 0x6010004 (complete access not supported)
- add new AL Status Codes

Changes:

- update sample applications

- enhance synchronisation handling
- update diagnosis history handling
- enhance EEPROM access handling
- update input/output only configurations
- enhance big endian support
- update EoE handling
- move hardware independent functions from the hardware access layer to the generic stack
- check during ESM handling if the SM address and length is aligned according the ESC access
- mailbox handling enhancements
- enhance the default CoE object access

For all changes please see the source files or the project update dialog of the SSCTool.

Changes to V5.01

New:

- Support DC Sync1 signal, further synchronisation modes and options added
- Input/Output only process data support
- "USE_DEFAULT_MAIN" (if true the main function of the default application files will be used, otherwise the user need to reimplement the main function)
- "STORE_BACKUP_PARAMETER_IMMEDIATELY" (backup objects are stored when new data was written)
- Option to define only one entry description for PDO mappping objects ("USE_SINGLE_PDO_MAPPING_ENTRY_DESCR")
- New AL Status Codes (0x2E,0x52,0x70)
- New base data types added (see ETG.1020)
- New EoE service identifier
- SDO : Add Abort Code (0x06090033)
- Further Test objects are added (see SlaveStackCode Application Note)

Changes:

- Update Source Code comments according to doxygen rules
- Update include guards
- Set "Local Error Reaction" (0x10F1.1) to disable SyncManager
- Rename "LEDS_SUPPORTED" to "UC_SET_ECAT_LED"
- "SAMPLE_APPLICATION_INTERFACE": Change library interface
- Update 0x1C32/0x1C33 entries according to the ETG.1020 and the updated synchronous handling
- Change object size handler type to UINT32
- Bugfix: LED blink sequence
- "SAMPLE_APPLICATION" : Process data calculated based on assign and mapping object
- EoE Bugfix: Prevent memory leaks caused by an incomplete EoE sequence
- EoE Bugfix: Prevent blocked EoE handler by (pending Ethernet frame indication)
- "BIG_ENDIAN": add missing variable swapping
- FoE Add new error codes (0x800C,0x800D,0x800F)
- FoE: support files greater 0x8000 Bytes
- HW_GetTimer() return value changed to UINT32
- Mailbox: Prevent multiple length field swapping
- SDO: Handle ENUM access to odd memory adresses
- SDO: Check Reset SI0 on write access to PDO mapping objects
- SDO Bugfix: Mailbox length caluclation on normal and segmeted SDO response
- SDO Info Bugfix: Correct fragment number calculation on SDO Info List service

For all changes please see the source files or the project update dialog of the SSCTool.

Changes to V5.0

New:

- Add test object for Bit-Arrays (TEST_APPLICATION, 0x3007)
- Add test to create “dummy” object dictionary (huge OD to test correct handling)
- Add TxPdo Parameter object 0x1802 (EL9800_APPLICATION)
- Include library demo application (SAMPLE_APPLICATION_INTERFACE)

CHANGES:

- Fix mailbox length calculation.
- SDO access: update handling of non-accessible entries in case of complete access
- Test object 0x3004 (Alignment test object) updated.
- Add missed value swapping
- Update SDO response interface handling. (SDO_RES_INTERFACE)
- Remove alignment entry (SI33) from objects 0x1C32/0x1C33
- Update EEPROM emulation handling
- Update application specific function calles and result handling.
- Mailbox handling: return an error if length specified in mailbnox header is too large
- Update object length calculation in case of an BitArray

For all changes please see the source files or the project update dialog of the SSCTool.

Changes to V4.42

NEW:

- Add a test application to test the behaviour of an EtherCAT Master.
- Add ESC 32Bit Access
- Add EEPROM emulation support
- Support Explicit Device ID
- Support LED Indication by ESC
- Generic application interface added (described in Application Note ET9300)

CHANGES:

- Separate access types, generic switch “BYTE_NOT_SUPPORTED” is obsolete
- Update Diagnosis Implementation according to ETG.1020(V1.0.0)
- PDO Assign value validation
- Support segmented EoE
- Motorola is renamed to BigEndian
- Change local axes structure handling

See source code or SSC Tool project update to get a list of all changes and bugfixes.

Changes to V4.41

- EtherCAT state machine enhancement due to EtherCAT conformance

Changes to V4.40

- All changes are marked with "ECATCHANGE_START V4.41" and "ECATCHANGE_STOP V4.41"

UPDATED:

- Change write function for Diagnosis Object

Changes to V4.30

- All changes are marked with "ECATCHANGE_START V4.40" and "ECATCHANGE_STOP V4.40"

NEW:

- Add diagnosis message support (Object 0x10F3), emergency support is selectable
- Add hardware independent sample application ("SAMPLE_APPLICATION")
- Add define "OP_PD_REQUIRED" determine if slave requires output process data in OP state
- Merge mci and spi common functions and describe hardware access functions in Application Note ET9300 (HW0; PDO1; MBX2; MBX3; ECAT1)
- SPI_HW is merged to EL9800_HW. If the serial interface shall be used on another platform adapt the el9800 hardware access or implement new hardware access functions
- Add support for FC1100 PCI card (for Win32 platforms) new define "FC1100_HW"
- Add pending state transition support ("AL_ControlRes()")
- Add define "STATIC_OBJECT_DIC" shall be set if the device has a fixed object dictionary
- Add define "ESC_SM_WATCHDOG" use the ESC provided SyncManager watchdog or the local timer based watchdog

UPDATED:

- Change state machine handling if only input process data is supported (PDO3)

- Update defines in ecat_def.h and adapt to source code
- Update EEPROM acces support, add CRC calculation
- "ECAT_SDO_SUPPORTED" removed (slave will always support SDO if CoE is enabled
- Correct length calculation if segmented SDO is supported
- Merge Sync0 and SM watchdog to one timer
- Change mailbox flags processing order (first handle read event and then repeat toggle)
- Add CiA402 status bits changes (ETG.6010 V0.2.4)

Changes to V4.20

- Move process data specific functions from coeappl.c to ecatappl.c
- CiA402 sample implementation
    - State machine
    - input feedback
    - object dictionary
    - support up to 2 Axes
    - support cyclic synchronous position and cyclic synchronous velocity mode
- Change synchronisation check functionality (add Sync0 watchdog; change Sync0/SM event sequence check). Add bus cycle time calculation.
  Add objects (or implement functionality)
  0x1C32:02 (0x1C33:02) - Cylcle time
  0x1C32:12 - SM missed counter
  0x1C32:10 (0x1C33:10) - Sync0 cycle
  0x1C32:05 (0x1C33:05) - minCyleTime (set fixed value MIN_PD_CYCLE_TIME)
  0x01F1:02 : Sync error counter limit
- Fixed SDO read/write bug (if complete access is enabled)
- Change GetInterruptRegister() function to prevent acknowledge events. (e.g. reading an SM config register acknowledge SM change event)
- Change object dictionary handling (not for PIC18)
- file changes:
    - cia402appl.* (add) CiA402 specific objects and functions
    - el9800.* (add) specific objects and functions for EL9800_x platforms
    - objappl.* (deleted) contains obsolete code
    - chnappl.h (deleted) general objects are moved to coeappl.c; specific objects are moved to the corresponding xxxappl.h files

Changes to V4.11

- Merge MCI and SPI source code to one project.
- Delete all change comments up to version V4.08.
- Support for EL9800 from hardware version 4A (PIC24)
- Add standard Types (objdef.h)
- Delete support for
    - NIOSII_CPU
    - _C166
    - Check_SPI_Transition
    - PC_APPLICATION
- Add Support for DC Mode 1 (synchronisation to SM2/3 event and Sync0)
- Change LED Indication (create generic function for 50ms and 200ms cycle blink codes)
- Change some SPI variable names to clearly distinguish if several SPIs are used
- Add Bootmode dummy functions

Changes to V4.10

Minor bug fixes reported in the forum. Possible problems with the mailbox queue, FoE, CoE, Sdo, EtherCAT Error LED and state machine were fixed. All the changes are documented in the source files with the key words ECATCHANGE_START V4.11 and ECATCHANGE_END V4.11. Additionally these changes are described at the beginning of each C-File.

Changes to V4.08

There were some bugs fixed (AoE application, SDO Interface, Emergency handling, EtherCAT state machine). Support for PCI based EtherCAT Slave card and EtherCAT Error LED were added. Additionally the FoE Service was extended to read and write files to harddisk (only PC Application). All the changes are documented in the source files with the key words ECATCHANGE_START V4.10 and ECATCHANGE_END V4.10. Additionally these changes are described at the beginning of each C-File.

Changes to V4.07

There were some bugs fixed (Segmented SDO, Disabling EtherCAT Watchdog, Mailbox Queue). Additionally the AoE service was included (ecataoe.*, aoeappl.*), which is useful for modular devices to handle acyclic services on the local modular bus. In the example it is described how the AoE services are related to the CoE services, f.e. if the modules of a modular device have an own object dictionary (see the Modular Device Profile for details). All the changes are documented in the source files with the key words ECATCHANGE_START V4.08 and ECATCHANGE_END V4.08. Additionally these changes are described at the beginning of each C-File.

Changes to V4.06

There was a bug in the change of V4.04 and V4.05 in function SdoRes in sdoserv.c when the Switch SEGMENTED_SDO_SUPPORTED was set. The EoE-example application (respond to a ping) is working now correctly, when testing you have to check if the EtherCAT-master gets an independent IP-sub-net. The Nios example was adapted to the othr examples. Therefore the define STRUCT_PACKED2 was added because the NIOS compiler had problems with word-aligns in the EoE-structures. The source files for MCI and SPI were merged (except mcihw.* and spihw.*). Additionally there were some little changes because of the beta release of the ConformanceTest tool. All the changes are documented in the source files with the key words ECATCHANGE_START V4.06 and ECATCHANGE_END V4.06. Additionally these changes are described at the beginning of each C-File.

Changes to V4.05

There was a bug in the change of V4.04 and V4.05 in function SdoRes in sdoserv.c when the Switch SEGMENTED_SDO_SUPPORTED was set. The changes are documented in the source files with the key words ECATCHANGE_START V4.06 and ECATCHANGE_END V4.06. Additionally these changes are described at the beginning of each C-File.

Changes to V4.04

There was a bug in the change of V4.02 and V4.03 when getting the SDO Info List. The changes are documented in the source files with the key words ECATCHANGE_START V4.05 and ECATCHANGE_END V4.05. Additionally these changes are described at the beginning of each C-File.

Changes to V4.03

There was a bug in the change of V4.02 when getting the SDO Info List. Additionally there are changes to V4.03 concerning additionally functionality for the SDO interface. In V4.04 SDO responses can be sent from the application using the function SDOS_SdoRes. This could make sense if data for a SDO response has to be got from a serial interface f.e. The changes are documented in the source files with the key words ECATCHANGE_START V4.04 and ECATCHANGE_END V4.04. Additionally these changes are described at the beginning of each C-File.

Changes to V4.02

There are changes to V4.02 for the SPI access to the ESC and for the access to the SDO Info List. are documented in the source files with the key words ECATCHANGE_START V4.03 and ECATCHANGE_END V4.03. Additionally these changes are described at the beginning of each C-File.

Changes to V4.01

There are only little changes to V4.01 which are documented in the source files with the key words ECATCHANGE_START V4.02 and ECATCHANGE_END V4.02. Additionally these changes are described at the beginning of each C-File. The changes are numbered like APPL 1 or ECAT 2 so that the change description is related to the source code. For some compilers there is a packed-attribute needed. So there is a define STRUCT_PACKED added for each typedef which could overwritten in ecat_def.h.

Changes to V4.00

There are only little changes to V4.00 which are documented in the source files with the key words ECATCHANGE_START V4.01 and ECATCHANGE_END V4.01. Additionally these changes are described at the beginning of each C-File. The changes are numbered like APPL 1 or ECAT 2 so that the change description is related to the source code.

Changes to V3.20

The changes to V3.20 are documented in the source files with the key words ECATCHANGE_START V4.00 and ECATCHANGE_END V4.00. Additionally these changes are described at the beginning of each C-File. The changes are numbered like APPL 1 or ECAT 2 so that the change description is related to the source code. The change descriptions from V3.20 to older versions are eliminated.
Apart from these changes the source code is completely documented in V4.00. There were some switches eliminated to get a better overview, f.e. the mailbox and CoE will always be compiled now. Especially the parts which are not supported by the ESC10 cannot be switched off any more. So V4.00 will only run with the ESC20, the ET1100 and the ET1200.
V4.00 supports microcontrollers with motorola format and it is running with the NIOS and IP-Core too (see EtherCAT_Slave_Sample_Code_with_NIOS_II_Processor).
The CoE application was adapted to the EtherCAT Guidelines and Protocol Enhancements and the Modular Device Profile.

EtherCAT Slave Stack Code Tool V1.4.0

Changes to V1.3.2

- EEPROM Programmer: verify written eeprom data
- Support csv based application files

Changes to V1.3.1

- integration of the SSC OD Tool (generating application source files)
- update the EEPROM Programmer

Changes to V1.2.0

- EEPROM Programmer added (also available as an extra tool)
- Generate EEPROM header for EEPROM Emulation
- Enhance support for third party configurations (e.g. further platforms, further applications)
- Configure SyncManager start addresses

Changes to V1.1.0

- Setting search dialog added
- Add setting to reference user application files
- Fix unzip SSC archive error