



# Change log

KPA Master Development Kit 2.4.47806.0, 2021-09-24

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# 1. MDK version 2.4.47806.0, 2021-09-24

## 1.1. Linux

### 1.1.1. Features

Now Салют-ЭЛ240М1 is supported.

## 2. MDK version 2.4.46804.0, released 2021-08-17

### 2.1. Common

#### 2.1.1. Features

##### 2.1.1.1. PI mapping error trace event

A new trace event has been added to show the intersection process image offset in case of mapping error caused by write access protection.

#### 2.1.2. Fixed bugs

- External Distributed Clock does not work.

### 2.2. Linux

#### 2.2.1. Features

##### 2.2.1.1. Driver Integration Package for BeagleBone Black Xenomai

Driver Integration Package for BeagleBone Black Xenomai has been added and it consists of kernel module and KPA network driver. The timed send emulation feature is supported by the driver among others.

##### 2.2.1.2. Network driver as dedicate dynamic library

From now on KPA network driver is provided as dedicate dynamic library (netdrvrip.so) within Driver Intergration Package (DIP) for target board.

##### 2.2.1.3. Ubuntu 16.04 support

From now on MRT binaries are available for Ubuntu 16.04.

### 2.3. Xenomai

#### 2.3.1. Features

##### 2.3.1.1. Driver Integration Package for BeagleBone Black Xenomai

Driver Integration Package for BeagleBone Black Xenomai has been added and it consists of kernel module and KPA network driver. The timed send emulation feature is supported by the driver among others.

##### 2.3.1.2. Network driver as dedicate dynamic library

From now on KPA network driver is provided as dedicate dynamic library (netdrvrip.so) within Driver Intergration Package (DIP) for target board.

### **2.3.2. Fixed bugs**

- Default value of memory pool size in INI file is less than 32Mb.

## **2.4. RTX**

### **2.4.1. Fixed bugs**

- 16cpp\_04\_MasterStartupSyncMode1and2 sample can't go to the Operational state with enabled "separate IO update".

## **2.5. INtime**

### **2.5.1. Fixed bugs**

- 16cpp\_04\_MasterStartupSyncMode1and2 sample can't go to the Operational state with enabled "separate IO update".

## **3. MDK version 2.4.45419.0, 2021-09-24**

### **3.1. Common**

#### **3.1.1. Fixed bugs**

- Master does not work as DC reference clock.

## 4. MDK version 2.4.45405.0, 2021-06-25

### 4.1. Common

#### 4.1.1. Features

##### 4.1.1.1. Support of C++ Samples from MIP 1.6

From now on all Samples for C++ language of MIP 1.6 are available and work in MIP 2.x.

#### 4.1.2. Fixed bugs

- Master error 0x803A occurs at the end of C sample 31\_BenchSingleThreadParallelBuslo.



## 5. MDK version 2.4.44108.0, 2021-06-14

### 5.1. Common

#### 5.1.1. Features

##### 5.1.1.1. Timeouts handling improvement

A new timer LocalTimeMonotonic has been added to avoid wrong handling of frame receive timeouts.

The corresponding variable nsLocalTimeMonotonic was added to Process Image.

#### 5.1.2. Fixed bugs

- Exception appears on the second attempt to access CoE with CompleteAccess service.
- RPC Server hangs at Master state switching while SoE Reading OD.

### 5.2. RTX64

#### 5.2.1. Features

#### 5.2.2. RTX64 4.0.3 support

From now on Master supports RTX64 version 4.0.3.

#### 5.2.3. Default Treads Priority scheme

From now on default values for thread priorities are implemented in Master INI file and they follow a default priority scheme .

For details, refer to MRT manual.

### 5.3. Rt-Preempt

#### 5.3.1. Fixed bugs

- libecatmrpc.so name is used in .h files instead of libecatmsvr.so.

### 5.4. Windows

#### 5.4.1. Features

##### 5.4.1.1. Dedicated Tx thread for each channel

From now on in a network driver each channel for frame sending is handled in a dedicated Tx thread.

#### 5.4.2. Fixed bugs

- Master with cable redundancy hangs when cable is unplugged from PC.
- Wrong DL status is shown in slave's InfoData variable (<Slave>.InfoData.DL Status).

## 5.5. Xenomai

### 5.5.1. Features

### 5.5.2. New samples

New samples have been added:

**26\_MultiMaster** - demonstrates how to work with several Master instances in the same process.

**40\_SimplePLC** - demonstrates the usage of MIP framework from the user application.

# 6. MDK for Rt-Preempt 2.4.44103.0, 2021-05-28

## 6.1. Features

### 6.1.1. Slave PDO indexes API

Getting information on slave's PDO indexes via API. Added the following functions.

To get slave's Tx/Rx PDO indexes:

```
EcatSlaveGetPDOIndexes(hMaster, wSlaveFixedAddr, dwFlags, pdwSize,  
pwIndexes)
```

Where

IN hMaster - master handle

IN wSlaveFixedAddr- slave physical address

IN dwFlags - 1 - RxPdo, 2- TxPdo

IN/OUT pdwSize - buffer size (items) / actual items count

OUT pwIndexes - array to store indexes of the slave

To get information on slave's PDO indexes:

```
EcatSlaveGetPDOInfo(hMaster, wSlaveFixedAddr, wPdoIndex, pPDOInfo,  
pdwNameSize, ptsNameBuff)
```

Where

IN hMaster - master handle

IN wSlaveFixedAddr- slave physical address

IN wPdoIndex - PDO index

OUT pPDOInfo - pointer to store slave PDO Information

IN/OUT pdwNameSiz - buffer size in characters / actual name size excluding '\0'

OUT ptsNameBuff- array to store indexes of the slave

To get information on PDO entries:

```
EcatSlaveGetPDOEntries(hMaster, wSlaveFixedAddr, wPdoIndex, pdwSize,  
phVariables)
```

Where

IN hMaster - master handle

IN wSlaveFixedAddr- slave physical address

IN wPdoIndex - PDO index

IN/OUT pdwSize - buffer size (items) / actual items count

OUT phVariables - array to store variable handles of the slave

To get an example of these functions usage, refer to 17\_SlaveValues sample which was updated with using new API functions and printing of PDO Information .

### 6.1.2. IPv6 over EoE via INI parameter

From now on it is possible to configure the use of IPv6 over EoE with the help of INI parameter. The parameter **ethdev.ipv6.master** was added. By default, its value is 0 that means the use of IPv6 is disabled. To enable it, set 1 to this parameter.

### 6.1.3. RPC synchronization queue length INI parameter

To configure the length of RPC server queue, INI parameter **rpc.syncqueue\_length** has been added.

### 6.1.4. MIP 1.6 compatibility

MRT 2.4 is compatible with MIP 1.6. From now on it is possible to install new version of MRT 2 with MIP 1.6. It allows using an application for MDK 1.6 with extended functionality of MRT 2.4.

## 6.2. Fixed bugs

- Failed to scan a big bus (with more then 500 slaves).

# 7. MDK for RTX64 2.4.44101.0, 2021-05-14

## 7.1. Features

### 7.1.1. Virtual COM improvements

Added Virtual COM diagnostic messages. To get their description and remedies, refer to the Troubleshooting section in MRT Manual.pdf.

### 7.1.2. IPv6 over EoE via INI parameter

From now on it is possible to configure the use of IPv6 over EoE with the help of INI parameter.

The parameter **ethdev.ipv6.master** was added. By default, its value is 0 that means the use of IPv6.

### 7.1.3. Slave PDO indexes API

Getting information on slave's PDO indexes via API. Added the following functions.

To get slave's Tx/Rx PDO indexes:

```
EcatSlaveGetPDOIndexes(hMaster, wSlaveFixedAddr, dwFlags, pdwSize,  
pwIndexes)
```

Where

IN hMaster - master handle

IN wSlaveFixedAddr- slave physical address

IN dwFlags - 1 - RxPdo, 2- TxPdo

IN/OUT pdwSize - buffer size (items) / actual items count

OUT pwIndexes - array to store indexes of the slave

To get information on slave's PDO indexes:

```
EcatSlaveGetPDOInfo(hMaster, wSlaveFixedAddr, wPdoIndex, pPDOInfo,  
pdwNameSize, ptsNameBuff)
```

Where

IN hMaster - master handle

IN wSlaveFixedAddr- slave physical address

IN wPdoIndex - PDO index

OUT pPDOInfo - pointer to store slave PDO Information

IN/OUT pdwNameSiz - buffer size in characters / actual name size excluding '\0'

OUT ptsNameBuff- array to store indexes of the slave

To get information on PDO entries:

```
EcatSlaveGetPDOEntries(hMaster, wSlaveFixedAddr, wPdoIndex, pdwSize,  
phVariables)
```

## Where

IN hMaster - master handle

IN wSlaveFixedAddr- slave physical address

IN wPdoIndex - PDO index

IN/OUT pdwSize - buffer size (items) / actual items count

OUT phVariables - array to store variable handles of the slave

To get an example of these functions usage, refer to 17\_SlaveValues sample which was updated with using new API functions and printing of PDO Information .

### 7.1.4. RPC synchronization queue length INI parameter

To configure the length of RPC server queue, INI parameter **rpc.syncqueue\_length** has been added.

By default it is disabled. To enable it, set 1 to this parameter.

### 7.1.5. MRT Installer improvement

Implemented additional verification of NIC addresses set by the user for RTX and Windows sides.

The user will be notified when there is a conflict between set addresses.

For details on specifics of setting NIC addresses, refer to MDK.Readme.pdf.

## 7.2. Fixed bugs

- Master crashes while attaching to the bus on the load ENI stage.
- Wrong data delivery due to non-sequential mapping for pi delivery client.
- 19\_MailboxMultipleRequests sample crashes with an exception.
- Invalid configuration is created if there is a hot-plugged segment with another nested hot-plug segment.
- Exception appears on Master stop if Cable Redundancy was configured.
- Cannot initialize licensing.
- KPARTXFilterDrv crashes during initialization if there is a frame exchange on the NIC.
- Cannot start an external control task.

## **8. MDK for Rt-Preempt 2.4.29549.0, 2020-12-14**

### **8.1. Features**

#### **8.1.1. Timeouts handling improvement**

A new timer LocalTimeMonotonic has been added to avoid wrong handling of frame receive timeouts.

The corresponding variable nsLocalTimeMonotonic was added to Process Image.

### **8.2. Fixed bugs**

- Wrong DL status is shown in slave's InfoData variable (<Slave>.InfoData.DL Status).

# 9. MDK for RTX64 2.4.37800.0, 2020-11-27

## 9.1. Features

### 9.1.1. Explicit identification improvements

To speed-up slaves identification and reduce bus access methods, added a prohibition of explicit identification for devices which can be identified by their fixed address.

To reduce a Master start up time and the time of detecting topology changes, from now on a custom logic is used to read explicit identification value from the device.

### 9.1.2. Dynamic configuration in 05\_ManualCycleHandling sample

From now on 05\_ManualCycleHandling sample demonstrates how to dynamically allocate a configuration pool.

### 9.1.3. Mailbox requests limit depending on slaves number

Improved the way of setting mailbox requests limit.

From now on, if it is not set by the INI parameter **mailbox.maxrequestcount**, it is calculated depending on the number of slaves in the configuration which support mailbox communication.

### 9.1.4. Default task queue calculation

Implemented a mechanism of setting a default size of task queue (taskqueue.size parameter) depending on memory pool size (MemoryPoolSize parameter):

Memory pool size, Mb	Task queue
... < 64	4096
64 ≤ ... ≤ 256	8192
256 ≤ ...	16384

### 9.1.5. Up to 256 simultaneous slaves memory requests

From now on the number of simultaneous requests for reading slave's memory is increased up to 256.

### 9.1.6. Printing out INI parameters

A possibility to print all Master initialization parameters has been added. INI parameter Verbose was added. When it is enabled (Verbose=1), all parameters specified in INI file are printed out at starting Master.

### 9.1.7. New samples

New samples have been added:

**23\_AC\_SlaveConfigSelect** - demonstrates how to use Autoconfigurator functionality.

**24\_DriveRotationCiA402** - demonstrates how to work with Drive Rotation CiA402.

**26\_MultiMaster** - demonstrates how to work with several Master instances in the same process.

**40\_SimplePLC** - demonstrates the usage of MIP framework from the user application.



### 9.1.8. PI clients for reading / writing

Added PI clients with corresponding variables for reading / writing into CAN Interface driver.

### 9.1.9. Remote Autoconfigurator

From now on it is possible to access to Autoconfigurator remotely. Added:

- RPC API for Autoconfigurator;
- ecatmkpa-python improvements to scan and configure master.

### 9.1.10. Timed send support in samples

From now on the samples ManualCycleHandling and MultipleCyclesHandling support timed send mode.

### 9.1.11. RTX64 3.7 support

From now on Master supports RTX64 version 3.7.

### 9.1.12. MIP 1.6 compatibility

MRT 2.4 is compatible with MIP 1.6. From now on it is possible to install new version of MRT 2 with MIP 1.6. It allows using an application for MDK 1.6 with extended functionality of MRT 2.4.

### 9.1.13. 4-hour Demo time

We increased time of Master operating in Demo mode and for Trial versions. From now on an operating time limitation is four hours.

### 9.1.14. PI variable(s) for all inputs/outputs of the slave

Added PI variable(s) for all inputs/outputs of the slave.

### 9.1.15. Default transferring timeout calculation

Implemented a mechanism of default transferring timeout (**t**) calculation:

$$t = \text{MAX}(\text{MasterCycle} * 2, t_{\text{min}})$$

where  $t_{\text{min}} = 10$  ms

Therefore,  $t = 2 * \text{MasterCycle}$  but not less than 10ms.

Such mechanism allows to implement fast system reaction and minimize frame lost due to delay in the system

### 9.1.16. EoE support for Windows based OS

From now on it is possible to communicate between a slave and the master which is running on Windows based host, using Ethernet over EtherCAT (EoE) protocol. The name of EoE adapter is set in the INI parameter **oe.adapter** (default value is "opentaprun").

### 9.1.17. Timed send emulation with channel redundancy

A special forwarded segment and a separate queue for forwarded segments have been added to support timed send with channel redundancy.

### 9.1.18. Slaves configuration for Autoconfigurator in slavelib sub-folder

From now on slaves configuration (uESI files generated in KPA EtherCAT Studio 2) should be in the **slavelib** sub-folder of either default folder or custom folder set in KPA\_AC\_ESI\_DIR\_NAME, depending what is used.

### 9.1.19. New API call to get RPC properties

New API call EcatRPCGetCapabilities has been added. It allows to get RPC API version and transport buffer size.

```
MKPA_RPCCLIENT_EXPORT ECAT_RESULT EcatRPCGetCapabilities(  
IN ECAT_WORD connectionID,  
OUT ECAT_DWORD * pdwApiVersion,  
OUT ECAT_DWORD * pdwCapabilities,  
OUT ECAT_DWORD * pdwTransportBufferSize);
```

where

**pdwApiVersion** - version of RPC API;

**pdwCapabilities** - reserved for future use;

**pdwTransportBufferSize** - maximum size of transport buffer (can be set in INI parameter).

### 9.1.20. Asynchronous mailbox call EcatRPCReadMemoryByPosIndex

From now on EcatRPCReadMemoryByPosIndex() is called asynchronously.

### 9.1.21. Performance improvement

System performance has been improved by implementing a static update of Process Image region objects.

It reduces CPU usage at switching slave state therefore make the switching faster.

### 9.1.22. Mailbox improvement

Improved work with Mailbox protocols:

- All mailbox operations are stopped at slave state changing.
- Mailbox request execution is stopped if slave is offline.
- CoE module re-factoring.

### 9.1.23. EEPROM operations improvement

During EEPROM operations slaves are accessed sequentially, one by one.

### **9.1.24. KPA Framework improvement**

Dynamic allocation and re-allocation of items in EcatSyncQueueLoopData have been added.

### **9.1.25. Python application for RPC client**

New Python application to work with RPC client.

### **9.1.26. Writing PI inputs API**

Added API functions EcatStartWriteInputs and EcatDoneWriteInputs to write Process Image inputs.

## **9.2. Fixed bugs**

- Reading DL status cycles in case of cable redundancy break in the line.
- Framework initialization processes cycles (Init-OP cycle) if final initialization target is changed from "Ready" to "Request State".
- Memory leak happens at reading slave memory.
- No 'duplicate alias' events are printed by the sample or user application due to missing description of the event.
- A lot of Wrong Working counters events are generated.
- In case of second attempt of explicit identification for the same physical device it always accepts configured identification value regardless of the result of the value check.
- Command size limit is not checked while parsing ENI file and building a frame.

# 10. MDK version 2.4.29528.0, 2020-10-29

## 10.1. Common

### 10.1.1. Features

#### 10.1.1.1. Explicit identification improvement

To speed-up slaves identification and reduce bus access methods, added a prohibition of explicit identification for devices which can be identified by their fixed address.

#### 10.1.1.2. Auto-start RPC server in the 08\_RPCServer sample

In order to simplify RPC server start/stop procedure, added a new template parameter `PARAM_MASTER_RPC_SERVER_CREATE`.

Set this parameter to enable automatic start/stop of RPC server with specified port number (default: 5000). Then Master Processor itself starts RPC server at Master creating and stops it at Master destroying.

#### 10.1.1.3. Mailbox requests limit depending on slaves number

Improved the way of setting mailbox requests limit. From now on, if it is not set by the INI parameter **mailbox.maxrequestcount**, it is calculated depending on the number of slaves in the configuration which support mailbox communication.

#### 10.1.1.4. Dynamic configuration in 05\_ManualCycleHandling sample

From now on 05\_ManualCycleHandling sample demonstrates how to dynamically allocate a configuration pool.

### 10.1.2. Fixed bugs

- No 'duplicate alias' events are printed by the sample or user application due to missing description of the event.
- A lot of Wrong Working counters events are generated.
- Exception happens on mailbox call if slave physical address is 0.
- Exception may happen on Master exit if mailbox communication is enabled.
- In case of second attempt of explicit identification for the same physical device it always accepts configured identification value regardless of the result of the value check.

# 11. MDK version 2.4.29520.0, 2020-09-25

## 11.1. Common

### 11.1.1. Feature

#### 11.1.1.1. Timed send emulation with channel redundancy

A special forwarded segment and a separate queue for forwarded segments have been added to support timed send with channel redundancy.

#### 11.1.1.2. Custom logic for reading explicit identification value

From now on a custom logic is used to read explicit identification value from the device.

It reduces a Master start up time and the time of detecting topology changes.

#### 11.1.1.3. Operations retry at frame losing

Added a mechanism to repeat the operation (command send, EEPROM read, memory read etc.) when frame is lost. To set number of tries, a new parameter **scheduler.retries** was added to INI file, default value is 3.

#### 11.1.1.4. Default transferring timeout calculation

Implemented a mechanism of default transferring timeout (**t**) calculation:

$$t = \text{MAX}(\text{MasterCycle} * 2, t_{\text{min}})$$

where  $t_{\text{min}} = 10 \text{ ms}$

Therefore,  $t = 2 * \text{MasterCycle}$  but not less than 10ms.

Such mechanism allows to implement fast system reaction and minimize frame lost due to delay in the system.

#### 11.1.1.5. Default task queue calculation

Implemented a mechanism of setting a default size of task queue (taskqueue.size parameter) depending on memory pool size (MemoryPoolSize parameter):

Memory pool size, Mb	Task queue
$\dots < 64$	4096
$64 \leq \dots \leq 256$	8192
$256 \leq \dots$	16384

#### 11.1.1.6. Up to 256 simultaneous slaves memory requests

From now on the number of simultaneous requests for reading slave's memory is increased up to 256.

### 11.1.1.7. Printing out INI parameters

A possibility to print all Master initialization parameters has been added. INI parameter **Verbose** was added. When it is enabled (Verbose=1), all parameters specified in INI file are printed out at starting Master.

### 11.1.1.8. New error code

ECAT\_E\_FRAME\_CMD\_SIZE\_LIMIT is new error code means "Process frame error: the command size is too big to be placed into the frame".

### 11.1.1.9. INI file extension

New initialisation parameters have been added to configure Master using its INI file.

**ss.eeprom.maxrequests** - maximum number of simultaneously serviced EEPROM requests

**transition.maxcommandsperslave** - maximum number of commands to be sent to slave at a time.

**scheduler.oncepercycle** - schedule one driver send request per cycle.

**scheduler.queueing.timeout.cycles** - number of master cycles for queuing timeout.

Updated default values of the following parameters:

```
DrvTxAffinity=1,  
DrvRxAffinity=1,  
threads.count=3,  
threads.0.executors=rt,  
threads.0.priority=15,  
threads.0.affinity=2,  
threads.1.executors=work,  
threads.1.priority=2,  
threads.2.executors=sync,sys,  
threads.2.priority=15,  
scheduler.oncepercycle=1,  
scheduler.allatonce=1,  
ecatrouter.fwd.postponed=1,  
topology.maxconcurrentcmds=100,  
transition.maxcommandsperslave=100,  
transition.slavetransitionattempts=0.
```

### 11.1.1.10. Slaves configuration for Autoconfigurator in slavelib sub-folder

From now on slaves configuration (uESI files generated in KPA EtherCAT Studio 2) should be in the **slavelib** sub-folder of either default folder or custom folder set in KPA\_AC\_ESI\_DIR\_NAME, depending what is used.

### 11.1.1.11. New API call to get RPC properties

New API call EcatRPCGetCapabilities has been added. It allows to get RPC API version and transport buffer size.

```
MKPA_RPCCLIENT_EXPORT ECAT_RESULT EcatRPCGetCapabilities(  
IN ECAT_WORD connectionID,  
OUT ECAT_DWORD * pdwApiVersion,  
OUT ECAT_DWORD * pdwCapabilities,  
OUT ECAT_DWORD * pdwTransportBufferSize);
```

where

pdwApiVersion - version of RPC API

pdwCapabilities - reserved for future use

pdwTransportBufferSize - maximum size of transport buffer (can be set in INI parameter )

### 11.1.1.12. Asynchronous mailbox call EcatRPCReadMemoryByPosIndex

From now on EcatRPCReadMemoryByPosIndex() is called asynchronously.

### 11.1.1.13. Performance improvement

System performance has been improved by implementing a static update of Process Image region objects.

It reduces CPU usage at switching slave state therefore make the switching faster.

### 11.1.1.14. Mailbox improvement

Improved work with Mailbox protocols:

- All mailbox operations are stopped at slave state changing.
- Mailbox request execution is stopped if slave is offline.
- CoE module re-factoring.

## 11.1.2. EEPROM operations improvement

During EEPROM operations slaves are accessed sequentially, one by one.

### 11.1.2.1. KPA Framework improvement

Dynamic allocation and re-allocation of items in EcatSyncQueueLoopData have been added.

### 11.1.2.2. Fault notifications improvement

Separate error codes have been added to handle memory pool fails during Master initialization and to notify about certain functionality unsupported by KPA network driver.

### 11.1.2.3. Python application for RPC client

New Python application to work with RPC client.

### 11.1.3. Fixed bugs

- Mailbox counter is reset on any Slave state transition.
- Exception happens on the attempt to close a network adapter while working in timed send emulation mode.
- Repeated FoE Download operation fails with error after an interrupted attempt.
- Multimaster functionality is not available when timed send emulation is enabled.
- ECAT\_E\_FRAME\_SEND\_TIMEOUT happens on big configuration in ECAT send scheduler
- Master crashes after requesting state if Distributed Clock is enabled.
- Cycle time is up to one second while transferring from Pre-Operational to Safe-Operational states.
- Sending of multiple frames takes a lot of time.
- Getting of adapters list causes master cycle delay.
- Task queue overflow happens at scanning big bus configuration.
- Resource Manager bug fix.
- Command size limit is not checked while parsing ENI file and building a frame.
- Wrong order of master modules de-initialization.
- Fast reaction on slave requested state change, auto-recovery cycle should be aborted when a new state has been required.
- Maximum frame size: incorrect procedures of its calculation and usage for real-time context.
- Last slave on the bus is missing or not recognized.
- Memory leak happens at reading slave memory.

## 11.2. Windows

### 11.2.1. Features

#### 11.2.1.1. EoE support for Windows based OS

From now on it is possible to communicate between a slave and the master which is running on Windows based host, using Ethernet over EtherCAT (EoE) protocol.

The name of EoE adapter is set in the INI parameter **eo.e.adapter** (default value is "opentaptun").

#### 11.2.1.2. New variable to share data folder

Now to set shared data folder, the environment variable ECAT\_MASTER\_MAKE\_DATA\_FOLDER\_SHARE is used instead of CFG\_SHAREDATADIR.

#### 11.2.1.3. Review of Windows PCAP driver usage

Improved safety, synchronization and performance of PCAP driver usage.

### 11.2.2. Fixed bugs

- Master default folder is not available in the network.
- Attach to Master configured with non-existing network card is successful.



# 12. MDK for INtime 2.4.26504.0, 2020-06-18

## 12.1. Features

### 12.1.1. MIP samples installation improvement

MIP samples were moved to the Program Data folder and from now on you can install samples for different versions of MS Visual Studio among 2013, 2015 or 2017 which installed on your PC. Also, it is possible to rebuild installed samples for a new version of MS Visual Studio by using the **Change** option of MIP installer.

For details, refer to MDK Readme (MIP installation).

### 12.1.2. New samples

New samples have been added:

**26\_MultiMaster** - demonstrates how to work with several Master instances in the same process.

**40\_SimplePLC** - demonstrates the usage of MIP framework from the user application.

### 12.1.3. Slaves configuration for Autoconfigurator in slavelib sub-folder

From now on slaves configuration (uESI files generated in KPA EtherCAT Studio 2) should be in the **slavelib** sub-folder of either default folder or custom folder set in KPA\_AC\_ESI\_DIR\_NAME, depending what is used.

### 12.1.4. Printing out INI parameters

A possibility to print all Master initialization parameters has been added. INI parameter **Verbose** was added. When it is enabled (Verbose=1), all parameters specified in INI file are printed out at starting Master.

### 12.1.5. Fault notifications improvement

Separate error codes have been added to handle memory pool fails during Master initialization and to notify about certain functionality unsupported by KPA network driver.

## 12.2. Fixed bugs

- API Help item in the Start menu is displayed with a wrong name.
- Slaves follow master state if transition.disablesslavefollowstate=1.

# 13. MDK for Windows 2.4.25003.0, 2020-05-25

## 13.1. Features

### 13.1.1. Autoconfigurator

A possibility to configure the bus on the fly has been added. The Online Configuration module (Auto Configurator) allows the user application to create a bus configuration by applying slave's configuration provided by its vendor (EtherCAT Slave Information - ESI) or an extended slave's configuration generated by KPA EtherCAT Studio (user's ESI - uESI).

For details, refer to Master API Help (Getting Started/ Autoconfigurator).

### 13.1.2. MIP Samples installation improvement

MIP samples were moved to the Program Data folder and from now on you can install samples for different versions of MS Visual Studio which installed on your PC. Also, it is possible to rebuild installed samples for a new version of MS Visual Studio by using the Change option of MIP installer.

For details, refer to MDK Readme (MIP installation).

### 13.1.3. New samples

New samples have been added:

**26\_MultiMaster** - demonstrates how to work with several Master instances in the same process.

**40\_SimplePLC** - demonstrates the usage of MIP framework from the user application.

## 13.2. Fixed bugs

- API Help item in the Start menu is displayed with a wrong name.
- Memory leak on Master detach with disabled the Resource Manager service.
- Framework initialization processes cycles (Init-OP cycle) if final initialization target is changed from "Ready" to "Request State"
- Slaves follow master state if `transition.disable_slave_follow_state=1`.

## **14. MDK version 2.3.43629.0, 2020-04-20**

Initial release of KPA EtherCAT Master Development Kit 2.3 for Rt-Preempt, Windows based on version 1.6.

It includes new features:

- Asynchronous control
- Simple Tasks execution
- Multiple EtherCAT Cyclic Tasks
- Modular design
- PI-driven control
- Events based model
- EtherCAT network driver: zero copy

### **14.1. Rt-Preempt**

#### **14.1.1. Features**

- Redundant Master
- Hardware Timed send mode
- Autoconfigurator

## 15. MDK version 2.4.15804.0, 2019-12-27

Initial release of KPA EtherCAT Master Run-time 2.3 for INtime, Xenomai based on version 1.6.

It includes new features:

- Asynchronous control
- Simple Tasks execution
- Multiple EtherCAT Cyclic Tasks
- Modular design
- PI-driven control
- Events based model
- EtherCAT network driver: zero copy
- Autoconfigurator

# 16. MDK for Zynq/Zynq Ultrascale+ FreeRTOS version 2.3.41907.0, 2019-10-18

## 16.1. Features

### 16.1.1. Separate IP core for licensing

Maser licensing has been moved into the separated IP core (KPA License Provider) as an interface for getting FPGA device DNA. The corresponding hardware project and BSP were updated in accord with new IP core usage.

For more detail, refer to `Zynq.FreeRTOS.Manual.pdf`.

### 16.1.2. Xilinx Device Primitives by default

From now on Xilinx Device Primitives are used in IP cores by default. The define `XILINX_KPA` was deleted from the corresponding hardware project, IP cores were updated in accord with new default primitives usage.

## 16.2. Fixed bugs

- Hardware timed send feature does not work with A53 and R5 processors (Zynq Ultrascale+ board).
- Incorrect memory allocation. When it is impossible to allocate predefined memory pool during Master initialization, Master continues to work with system memory allocation calls instead of reporting an error.
- Benchmark sample returns the value of a current allocated memory instead of a maximum allocated memory value.

# 17. MDK for Zynq/Zynq Ultrascale+ FreeRTOS version 2.3.39209.0, 2019-07-31

## 17.1. Features

### 17.1.1. Hardware-bound license

From now on it is possible to bind Master license to the target where it runs.

For more details, refer to MRT Manual (Licensing).

### 17.1.2. New slave's variables in Process Image

From now on variables InputAll and OutputAll are available in Process image for each slave. They describe total size (BitSize) and location (BitStart) of slave's Process Data in Process Image.

**<slave\_name>.InputAll.BitSize** - total size of received data

**<slave\_name>.InputAll.BitStart** - start address of received data in Process Image

**<slave\_name>.OutputAll.BitSize** - total size of sent data

**<slave\_name>.OutputAll.BitStart** - start address of sent data in Process Image

## 17.2. Fixed bugs

- Master hangs after transferring it from Init to Bootstrap and then to Init state if EL6695 is in the bus configuration.
- An attempt to scan bus configuration is failed if the configuration was extended (e.g. added one more segment) after last successful scan.
- Master hangs on attempt to read CoE sub-indexes via SDO.
- It is impossible to attach to Master if it was detached in Safe Operation/Operational state.
- Connection with Master is lost on attempt to scan bus configuration from KPA EtherCAT Studio.

# 18. MDK for Zynq/Zynq Ultrascale+ FreeRTOS version 2.3.38100.0, 2019-06-28

## 18.1. Features

### 18.1.1. 4 hours Demo time

We increased time of Master operating in Demo mode and for Trial versions. From now on an operating time limitation is four hours.

### 18.1.2. Redundant Master support

KPA provides a new master feature - Redundant Master. It allows co-existing of several master instances started on separate target systems in a network segment, significantly increasing fault tolerance and reducing downtime. All master instances are connected to the bus and run.

For more details, refer to MRT Manual.pdf (Redundant Master section).

### 18.1.3. RPC Server support

From now on it is possible to get access to the bus which is connected to FreeRTOS target via RPC Server (for example, scanning the bus in KPA EtherCAT Studio).

## **19. MDK for Zynq/Zynq Ultrascale+ FreeRTOS version 2.3.19400.0, 2018-12-17**

Initial release of KPA EtherCAT Master Development Kit for Zynq/Zynq Ultrascale+ FreeRTOS version 2.3.



## **20. MRT for RTX64 2.2.10600.0, 2018-01-31**

Initial release of KPA EtherCAT Master Run-time 2.2 for RTX64 based on version 1.6.

It includes new features:

- Asynchronous control
- Simple Tasks execution
- Multiple EtherCAT Cyclic Tasks
- Modular design
- PI-driven control
- Events based model
- EtherCAT network driver: zero copy

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