

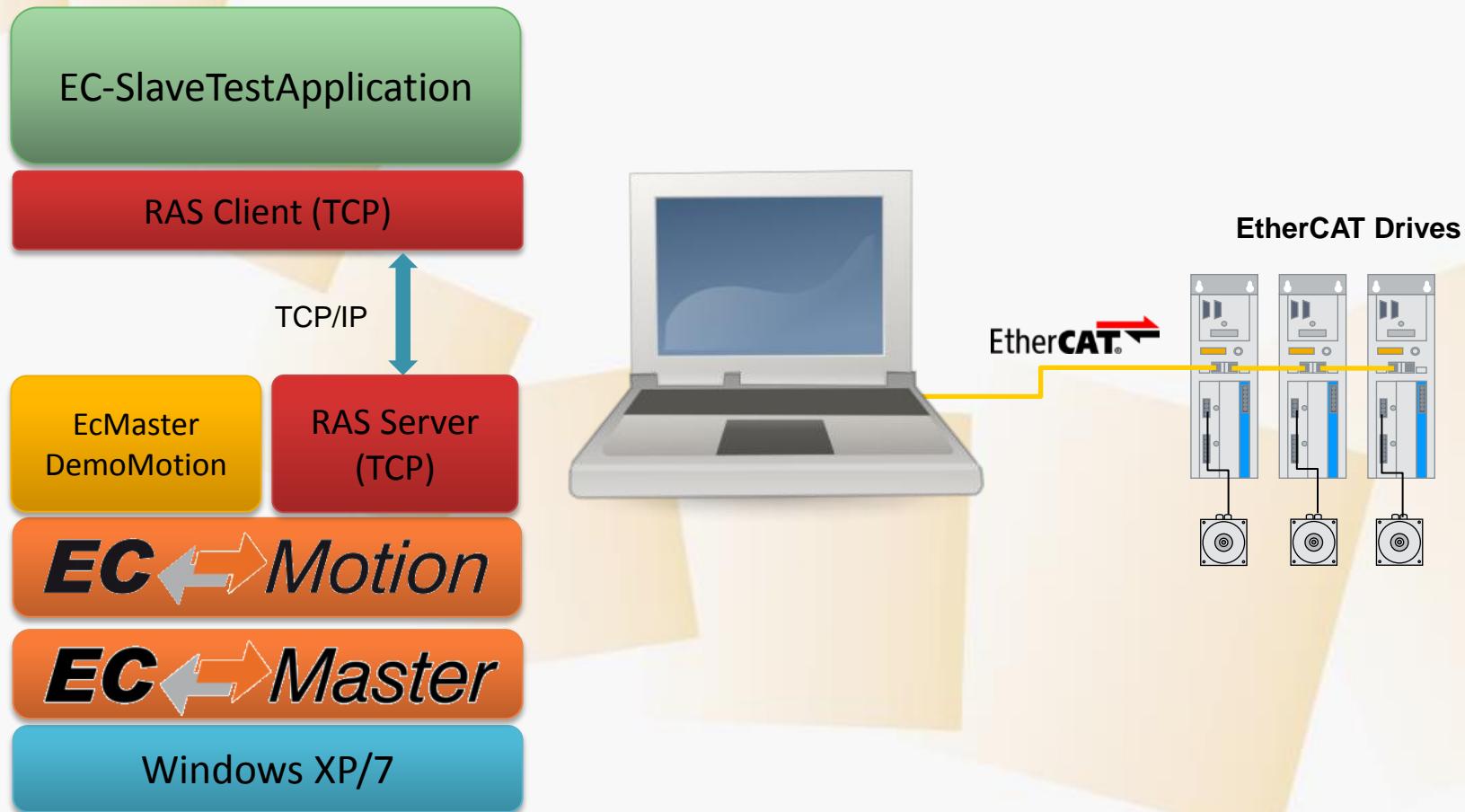


Quick Start Guide for Non-Realtime Windows

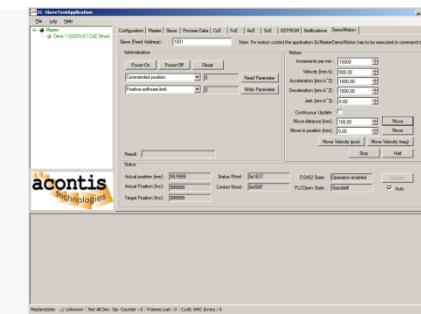
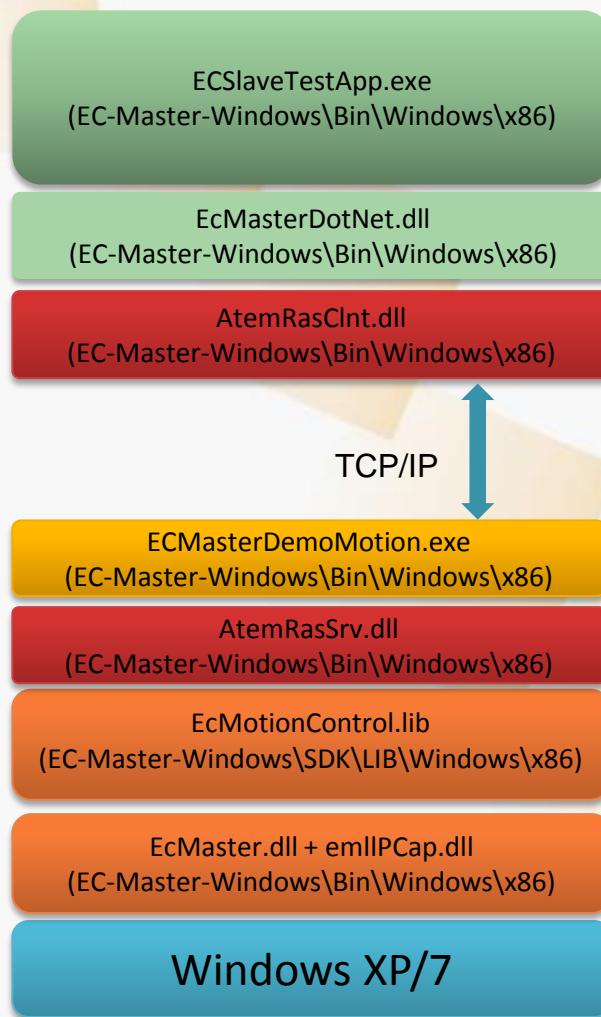
18 October 2013

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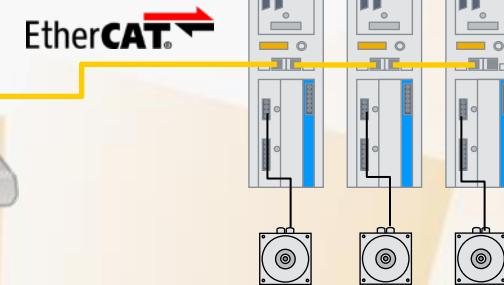
- System Architecture
- Software Modules
- Software Packages
- Installation EC-Master and EC-Motion
- Installation EC-Engineer
- ECMasterDemoMotion Input and Output Files
- Create ENI file with EC-Engineer
- Adjust DemoMotion Configuration File
- Start ECMasterDemoMotion
- Start ECSlaveTestApp
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Software Modules



EtherCAT Drives



Required

1. WinPcap Windows Paket Capture Library <http://www.winpcap.org/>
2. EC-Master EtherCAT Master Core Class B for Windows
3. EC-Master EtherCAT MasterCore Class A Add-On
4. EC-Motion Library Add-On
5. EC-Engineer EtherCAT Configuration and Diagnosis Tool

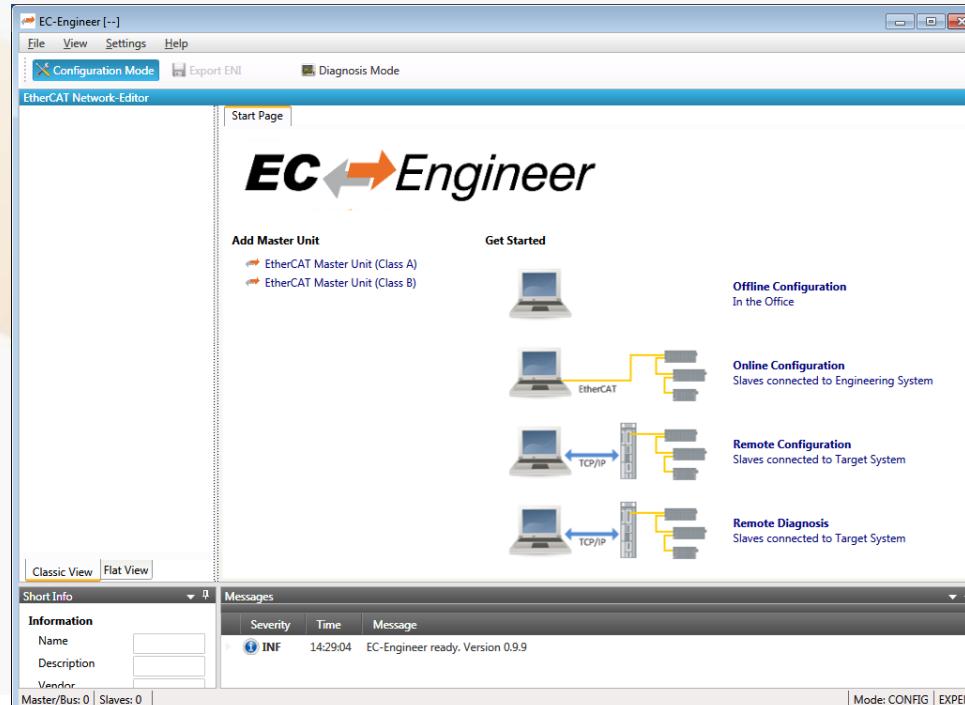
Recommended

1. Microsoft XML Notepad <http://www.microsoft.com/en-us/download/details.aspx?displaylang=en&id=7973>
2. Wireshark Network Protocol Analyzer <http://www.wireshark.org/>

- EC-Master Core Class B
 - Unpack the file EC-Master-V2.6.x.x-WinXP-Eval.zip
 - Execute setup.exe and follow the instructions
- EC-Master Core Class A Add-on
 - Unpack the file EC-Master-ClassA-AddOn-V2.6.x.x.zip into the installation folder, e. g. C:\Program Files (x86)\acontis_technologies\EC-Master-Windows
- EC-Motion Add-on
 - Unpack the file EC-Motion-V2.6.x.x-Eval.zip into the installation folder, e. g. C:\Program Files (x86)\acontis_technologies\EC-Master-Windows
- Installation of auxiliary clock driver “ECAT driver”
 - Instructions are found in the EC-Master Class A manual (Doc\EC-Master_ClassA.pdf) in chapter “2.6 DCM on Windows”
 - Please take care of operating system version (32 Bit or 64 Bit)

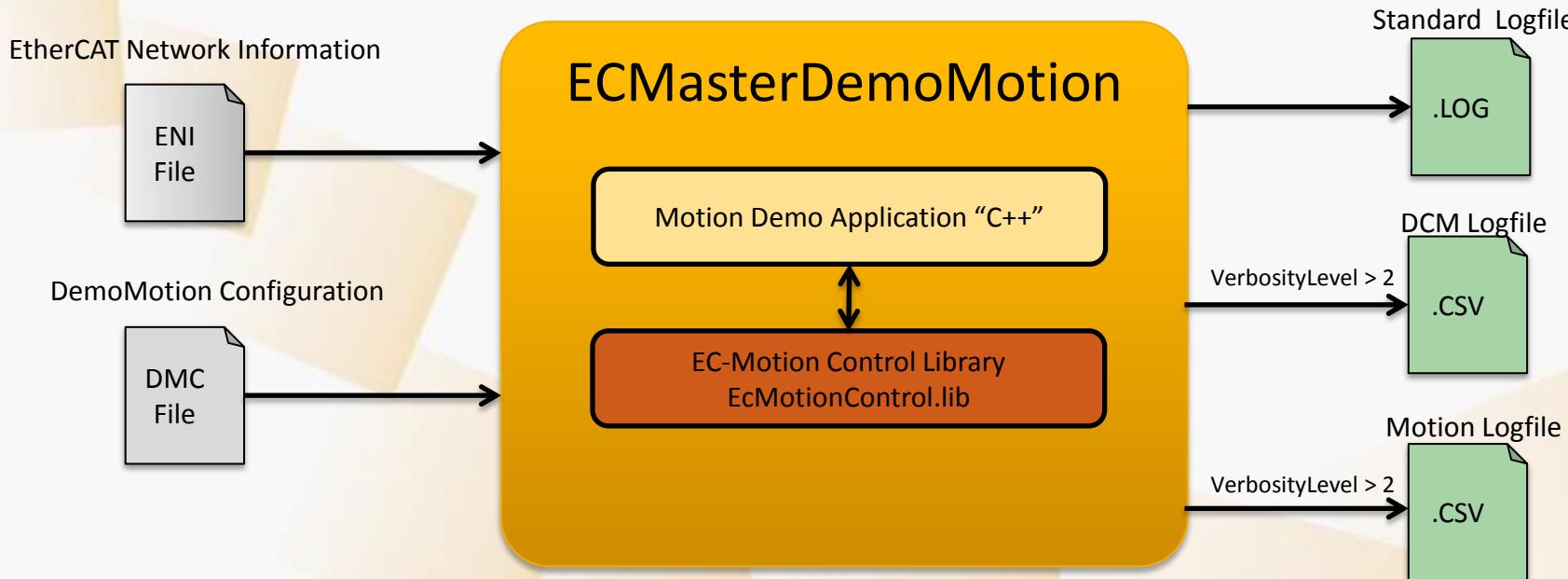
Installation EC-Engineer

- WinPcap Windows Paket Capture Library <http://www.winpcap.org/>
- EC-Engineer
 - Unpack the file EC-Engineer_Eval_V1.x.x.zip
 - Execute setup.exe and follow the instructions



- Example application shipped with complete C++ source code
- Distributed Clocks (DC) support
- By default support for 4 drives
- Supported drive operation modes: CSP, CSV and IP
- Two demo modes selected by variable S_bCmdMode
 - Independent mode: Drive moves forward and backward
 - Command mode: Communication to ECSlaveTestApp using ecatNotifyApp()

ECMasterDemoMotion Input and Output Files



- The ENI file is located in “EC-Master-Windows\Examples\EcMasterDemoMotion\Config”
- The DMC file, e. g. DemoConfigEval.xml, is located in “EC-Master-Windows\Examples\EcMasterDemoMotion\Config” and contains all input parameters
- The Standard Logfile contains all messages and errors
- The DCM Logfile shows the quality of the DCM bus shift controller
- The Motion Logfile traces the actual and target position and other values
- All Logfiles are created in the folder of the executable

Create ENI file with EC-Engineer

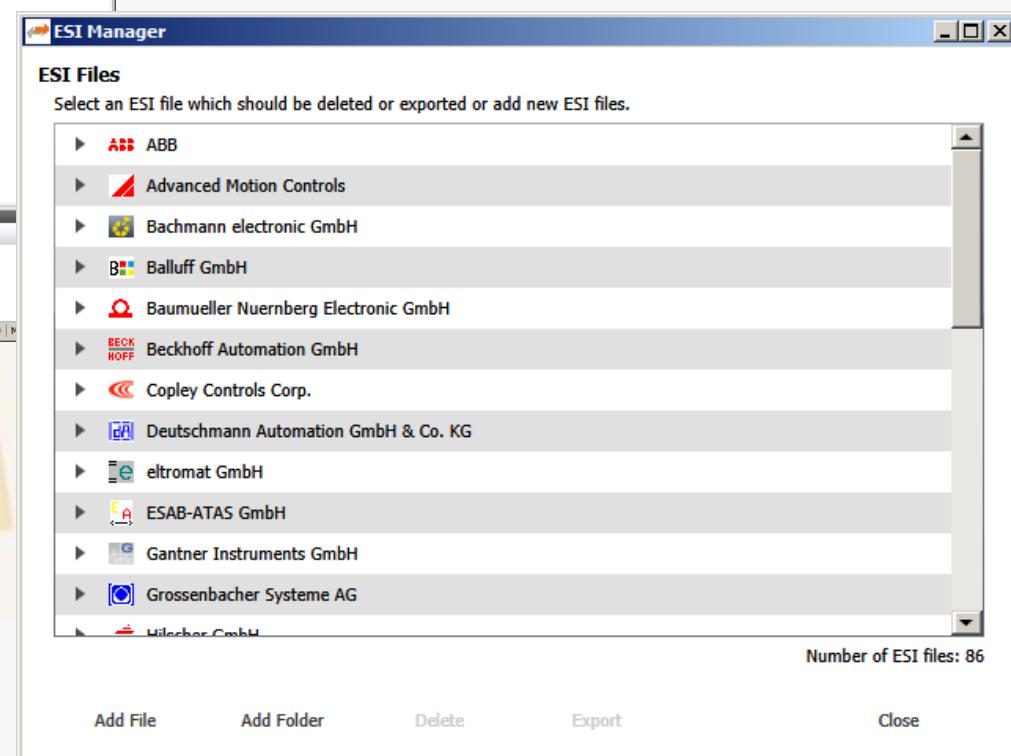
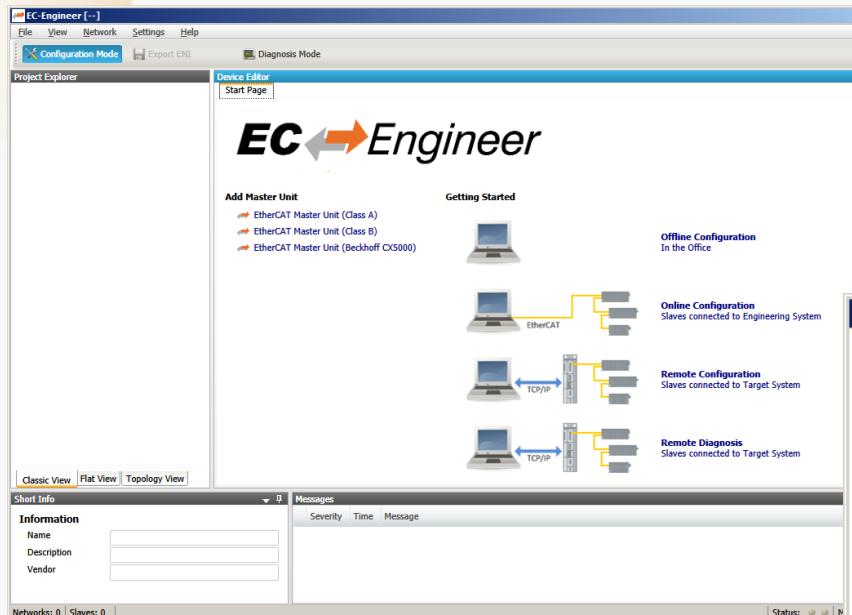
Step 1: Connect EtherCAT Slaves

- EC-Engineer comes with an integrated EtherCAT master for scanning the connected EtherCAT slaves
- Every Ethernet Network Interface with a valid Windows driver can be used
- A second, dedicated Network Interface for EtherCAT is recommended
- Warning: Do not connect any EtherCAT slaves to your Office LAN



Create ENI file with EC-Engineer

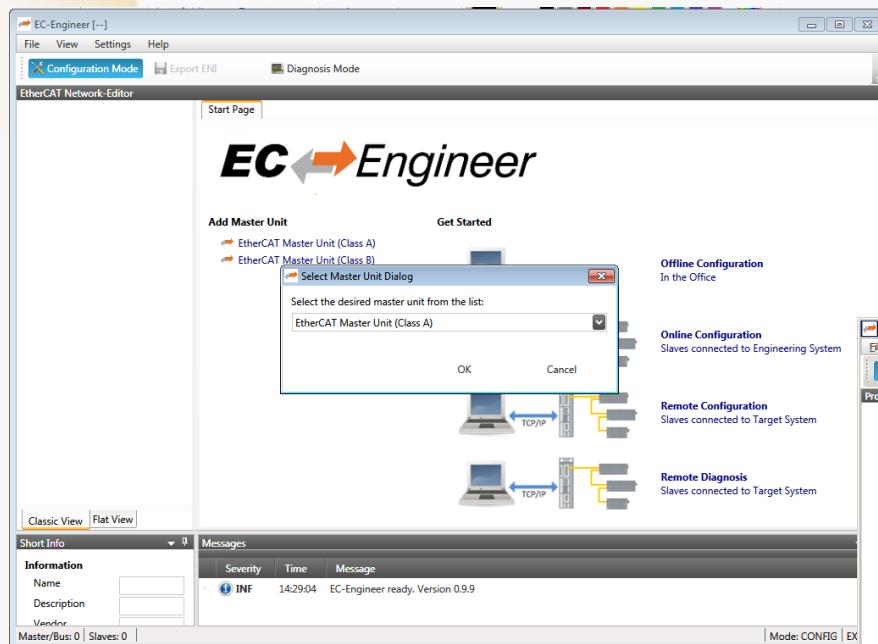
Step 2: Start EC-Engineer and add ESI file



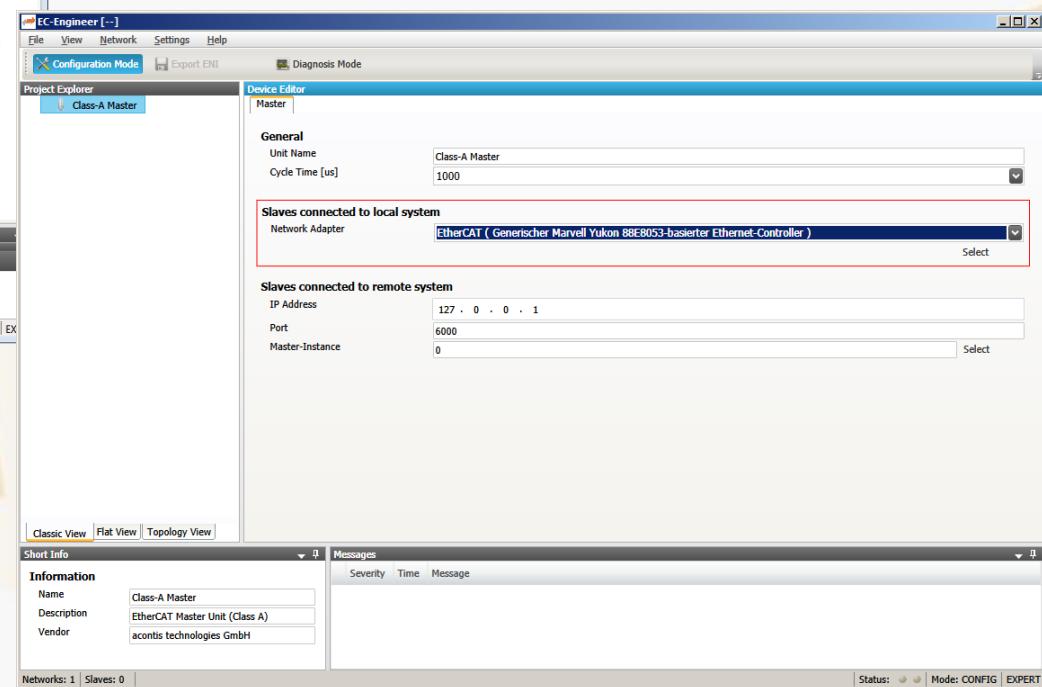
The ESI manager (located in the file menu) is used to add the EtherCAT Slave Information (ESI) file. The ESI file is provided by the drive manufacturer.

Create ENI file with EC-Engineer

Step 3: Scan connected slaves



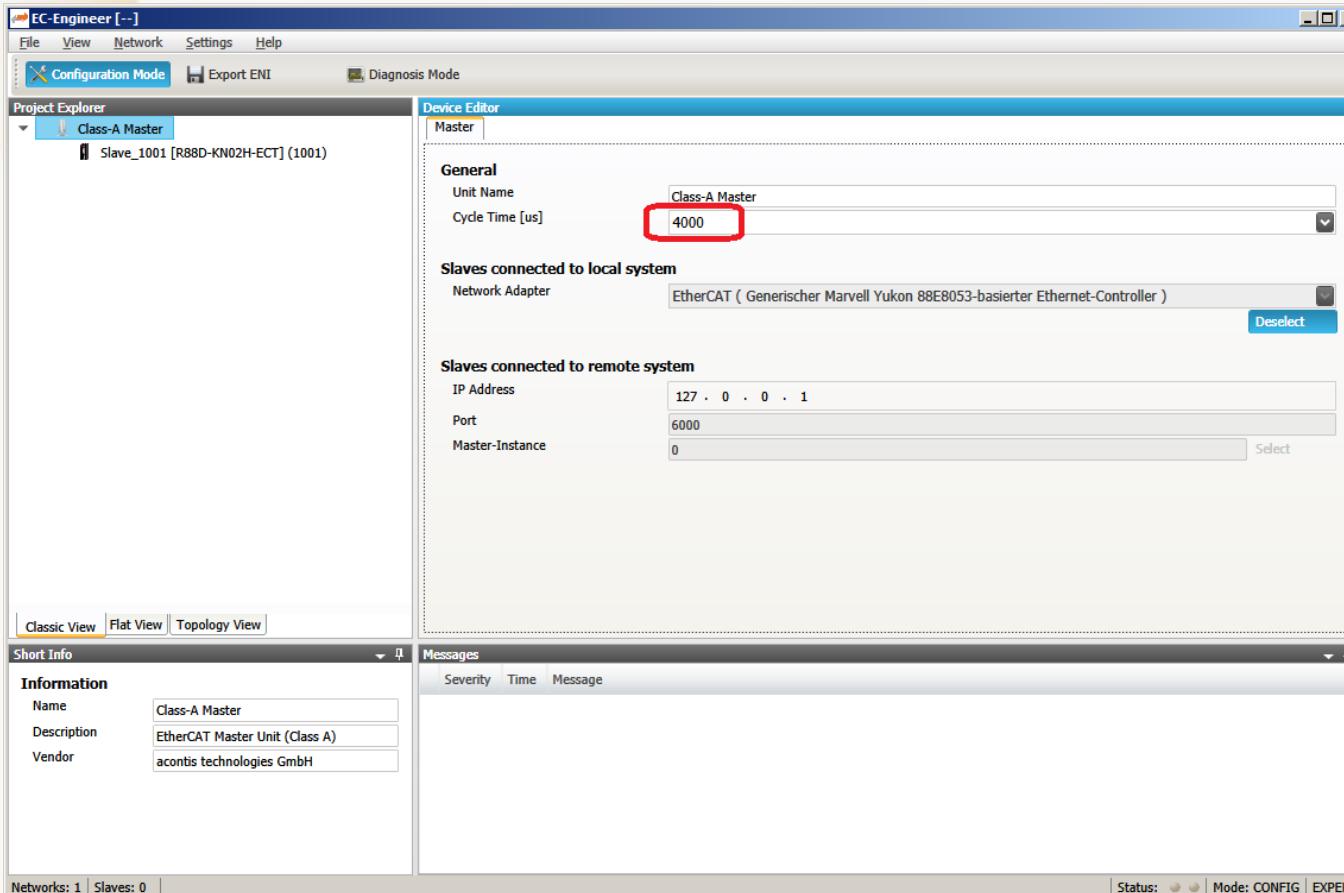
Select “Online Configuration” and “EtherCAT Master Unit (Class A)”



Choose network adapter from list and press “Select”

Create ENI file with EC-Engineer

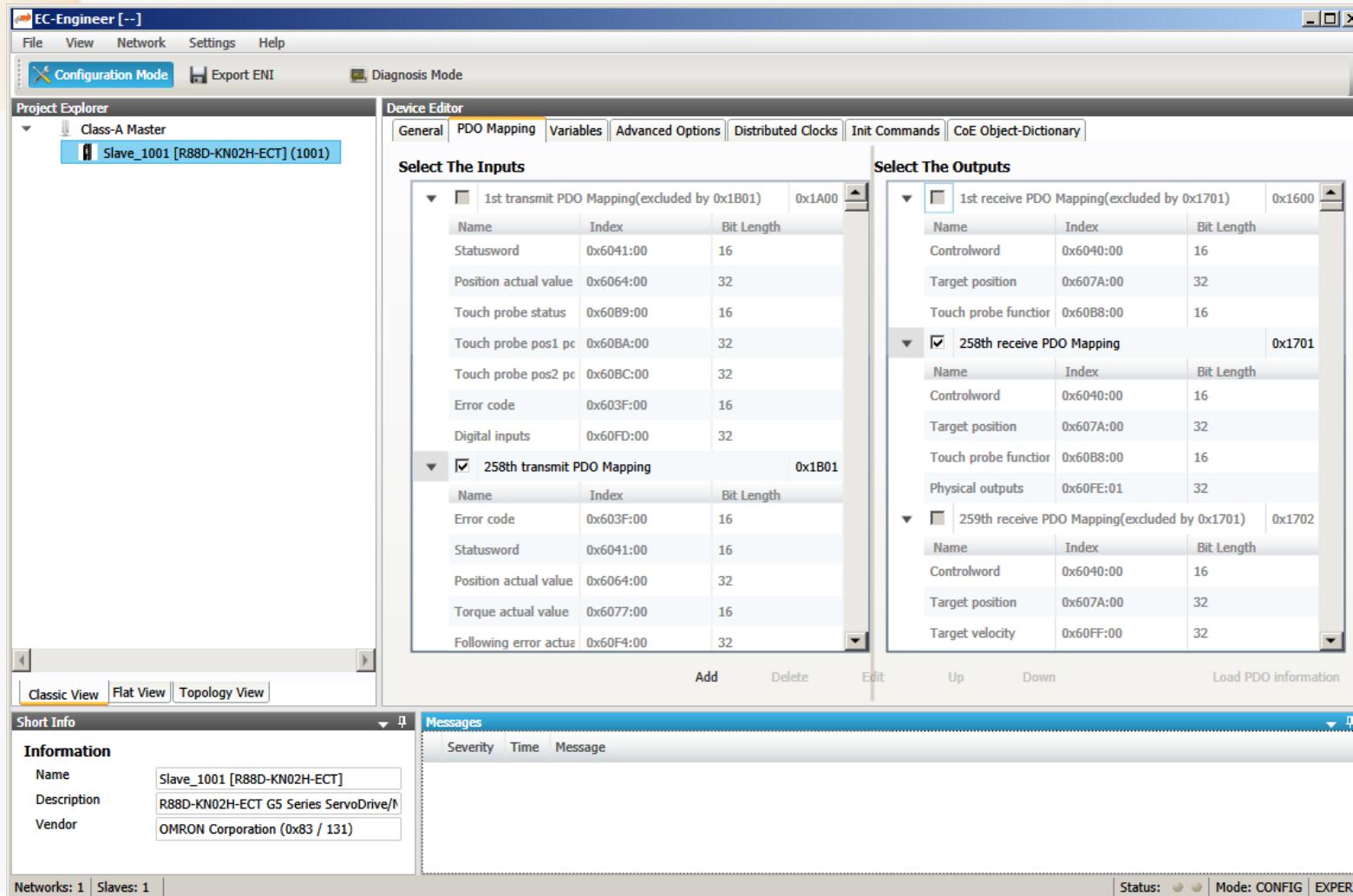
Step 4: Set cycle time to 4000 usec



On Windows a cycle time of 4 milliseconds is recommended

Create ENI file with EC-Engineer

Step 5: The found slave devices are listed in the tree



The screenshot shows the EC-Engineer software interface in Configuration Mode. The Project Explorer lists a Class-A Master and a Slave device named "Slave_1001 [R88D-KN02H-ECT] (1001)". The Device Editor tab is selected, showing the "PDO Mapping" sub-tab. The "Select The Inputs" section contains two PDO mappings:

Name	Index	Bit Length
Statusword	0x6041:00	16
Position actual value	0x6064:00	32
Touch probe status	0x60B9:00	16
Touch probe pos1 pc	0x60BA:00	32
Touch probe pos2 pc	0x60BC:00	32
Error code	0x603F:00	16
Digital inputs	0x60FD:00	32

The "Select The Outputs" section also contains two PDO mappings:

Name	Index	Bit Length
Controlword	0x6040:00	16
Target position	0x607A:00	32
Touch probe function	0x60B8:00	16

A checkbox for "258th receive PDO Mapping" is checked, and its details are shown in a sub-table:

Name	Index	Bit Length
Controlword	0x6040:00	16
Target position	0x607A:00	32
Touch probe function	0x60B8:00	16
Physical outputs	0x60FE:01	32

Below the tables are buttons for "Add", "Delete", "Edit", "Up", "Down", and "Load PDO information".

The "Short Info" panel shows the following information for the slave device:

Name	Slave_1001 [R88D-KN02H-ECT]
Description	R88D-KN02H-ECT G5 Series ServoDrive
Vendor	OMRON Corporation (0x83 / 131)

The "Messages" panel is empty.

At the bottom, status indicators show "Networks: 1" and "Slaves: 1", and mode indicators show "Status:   Mode: CONFIG EXPERT".

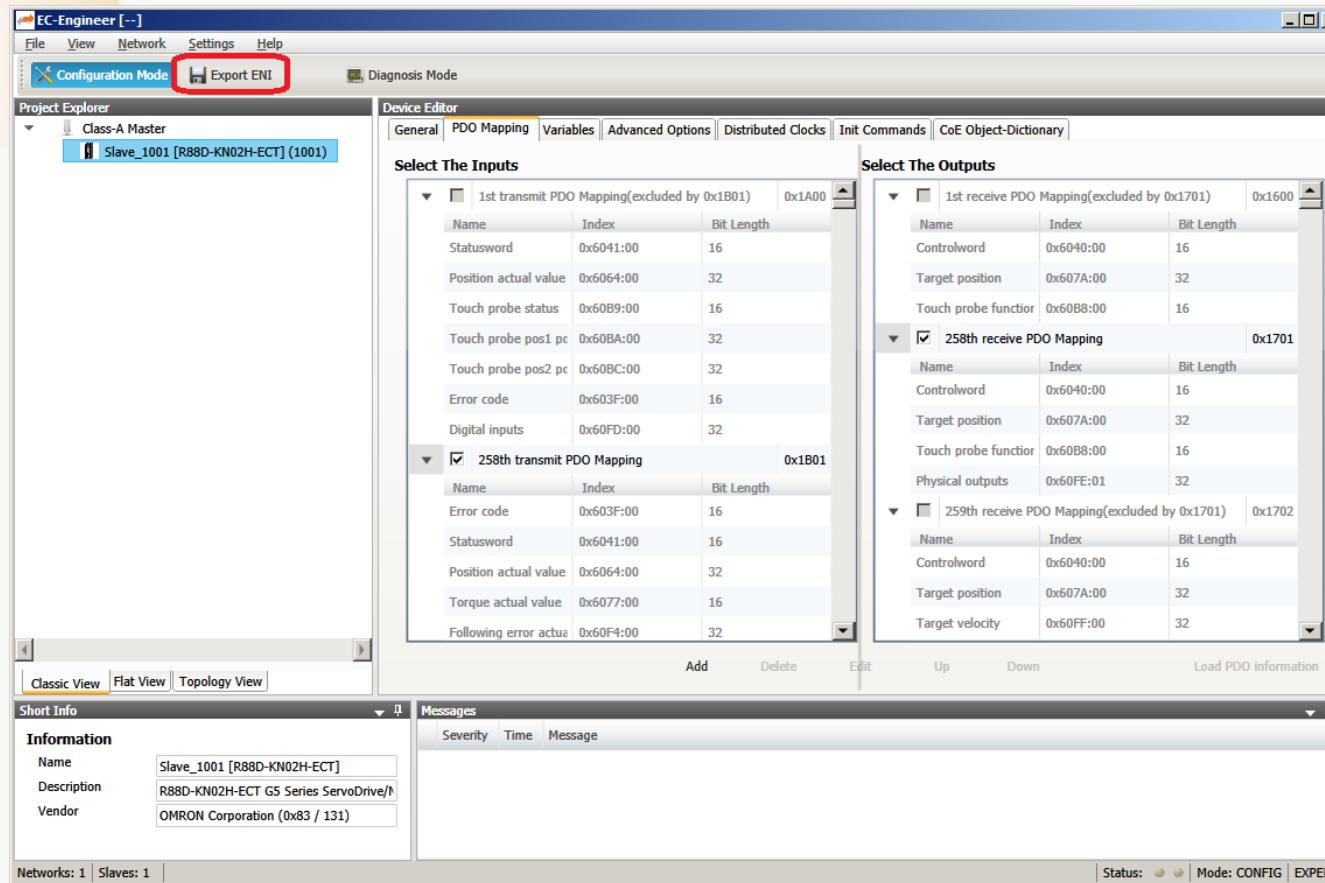
Create ENI file with EC-Engineer

Step 6: Adjust PDO Mapping and Modes of Operation

0x6060=7 Interpolated Position Mode (IP)		0x6060=8 Cyclic Synchronous Position Mode (CSP)		0x6060=9 Cyclic Synchronous Velocity Mode (CSV)	
Inputs	Outputs	Inputs	Outputs	Inputs	Outputs
0x6041 Statusword	0x6040 Controlword	0x6041 Statusword	0x6040 Controlword	0x6041 Statusword	0x6040 Controlword
0x6064 Position Actual Value	0x6062 Position Demand Value or 0x60C1 Interpolation data record	0x6064 Position Actual Value	0x607A Target Position	0x6064 Position Actual Value	0x60FF Target Velocity

Generate bus configuration with EC-Engineer

Step 7: Export ENI file

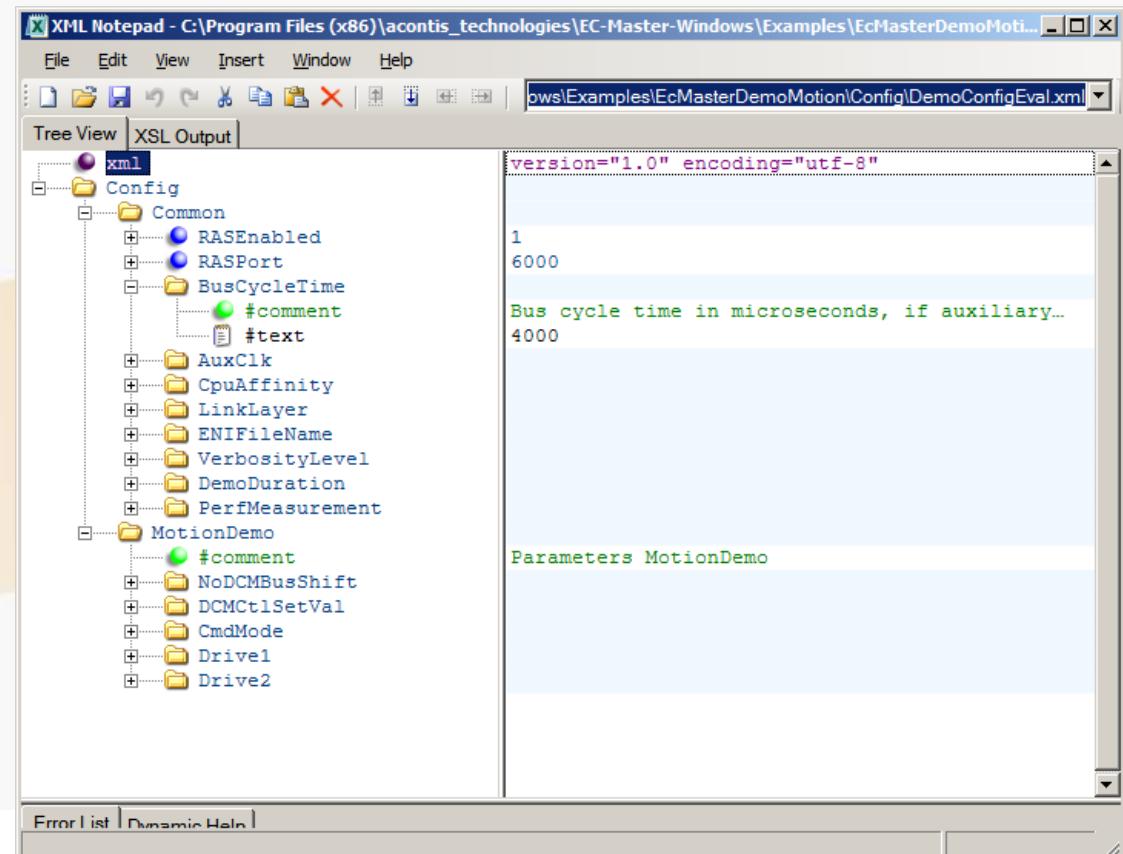


Store ENI file into folder EC-Master-Windows\Examples\EcMasterDemoMotion\Config

Adjust DemoMotion Configuration File

Step 1: Introduction

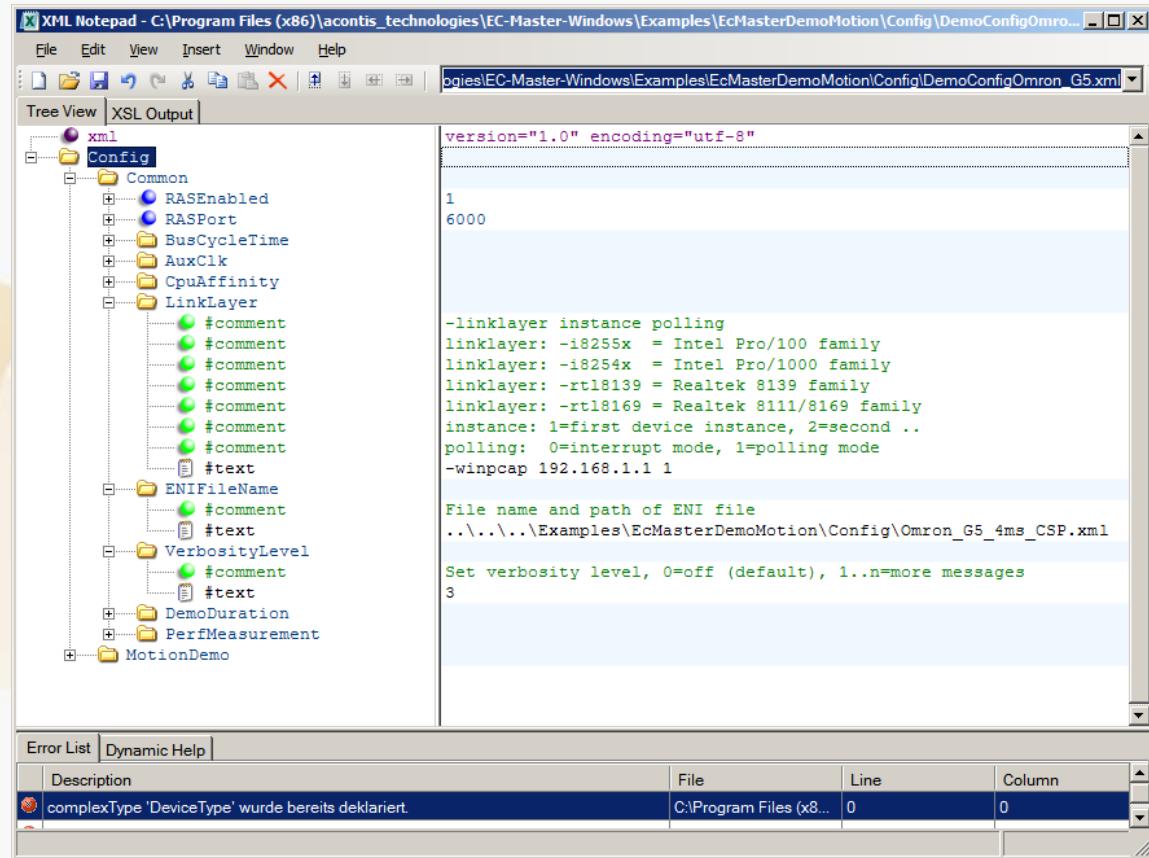
- The file, e. g. DemoConfigEval.xml is located in the folder "EC-Master-Windows\Examples\EcMasterDemoMotion\Config"
- Use Notepad or XML Notepad for editing
- In the "Common" section all general parameters are defined, e. g. "BusCycleTime"
- In the "MotionDemo" section all specific parameters for this application are defined
- All drive relevant parameters are defined in "Drive1" etc.
- ECMasterDemoMotion supports by default 4 drives



Adjust DemoMotion Configuration File

Step 2: Adjust IP address and ENI filename

- Set the IP address of the network interface used for EtherCAT into “LinkLayer”
- Set the name and path of the ENI file into “ENIFileName”



The screenshot shows the XML Notepad application displaying the contents of the file `C:\Program Files (x86)\acontis_technologies\EC-Master-Windows\Examples\EcMasterDemoMotion\Config\DemoConfigOmron_G5.xml`. The left pane shows a tree view of the XML structure, and the right pane shows the XML code.

Tree View:

- xml
- Config
 - Common
 - RASEnabled
 - RASPort
 - BusCycleTime
 - AuxClk
 - CpuAffinity
 - LinkLayer
 - #comment
 - #comment
 - #comment
 - #comment
 - #comment
 - #comment
 - #text
 - ENIFileName
 - #comment
 - #text
 - VerbosityLevel
 - #comment
 - #text
 - DemoDuration
 - PerfMeasurement
 - MotionDemo

XML Content:

```
version="1.0" encoding="utf-8"

1
6000

-linklayer instance polling
linklayer: -i8255x = Intel Pro/100 family
linklayer: -i8254x = Intel Pro/1000 family
linklayer: -rtl8139 = Realtek 8139 family
linklayer: -rtl8169 = Realtek 8111/8169 family
instance: 1=first device instance, 2=second ..
polling: 0=interrupt mode, 1=polling mode
-winpcap 192.168.1.1 1

File name and path of ENI file
..\..\..\Examples\EcMasterDemoMotion\Config\Omron_G5_4ms_CSP.xml

Set verbosity level, 0=off (default), 1..n=more messages
3
```

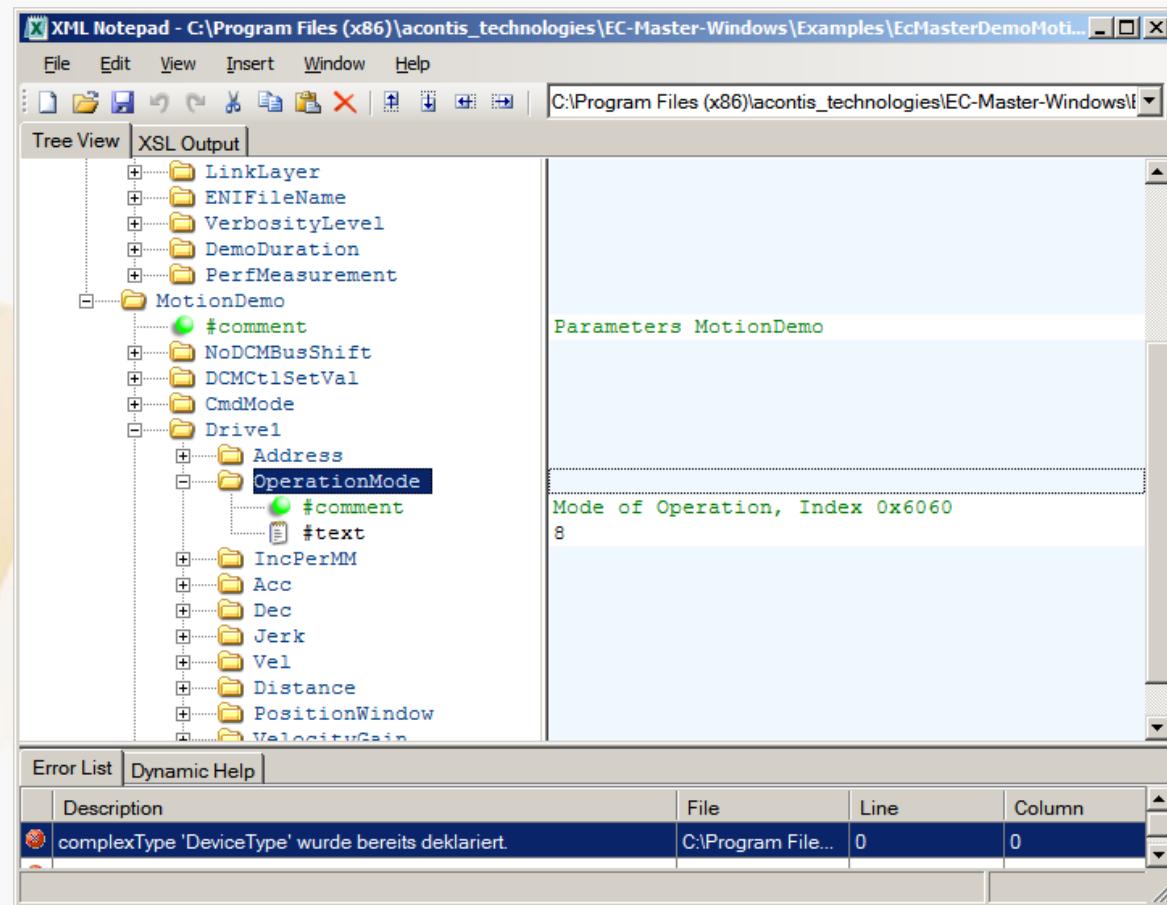
Error List:

Description	File	Line	Column
complexType 'DeviceType' wurde bereits deklariert.	C:\Program Files (x8...	0	0

Adjust DemoMotion Configuration File

Step 3: Set “Modes of Operation” for drives

- Set the operation mode into “OperationMode”



Start ECMasterDemoMotion

- Use the ECMasterDemoMotionStart.cmd to start the application

```
=====
Command mode enabled! Motion operation controlled remotely
=====

=====
Initialize EtherCAT Master
=====

Start Remote API Server now

EtherCAT Master V2.6.1 Build 04 Copyright acontis technologies GmbH
EcLinkOpen(): Use WinPcap version 4.1.2 (packet.dll version 4.1.0.2001), based on libpcap version 1.0 branch 1_0_rel0b (20091008)
EcLinkOpen(): Use network adapter "Marvell Yukon Ethernet Controller."
Bus scan successful - 1 slaves found

*****
Number : 0
Vendor : OMRON Corporation, ID 131
Product : Unknown Product Code, Code: 0x6
Revision: 0x20001 Serial Number: 184877066
ESC Type: Beckhoff ET1100 (0x11) Revision=0 Build=2
Bus AutoInc Address: 0 (0x0)
Bus Station Address: 1001 (0x3e9)
Bus Alias Address : 0001 (0x1)
Config Station Address: 1001 (0x3e9)
PD IN  Byte.Bit offset: 74.0 Size: 224 bits
PD OUT Byte.Bit offset: 74.0 Size: 96 bits
Port 0: Connected Port 1: Not_Conn. Port 2: Not_Conn. Port 3: Not_Conn.

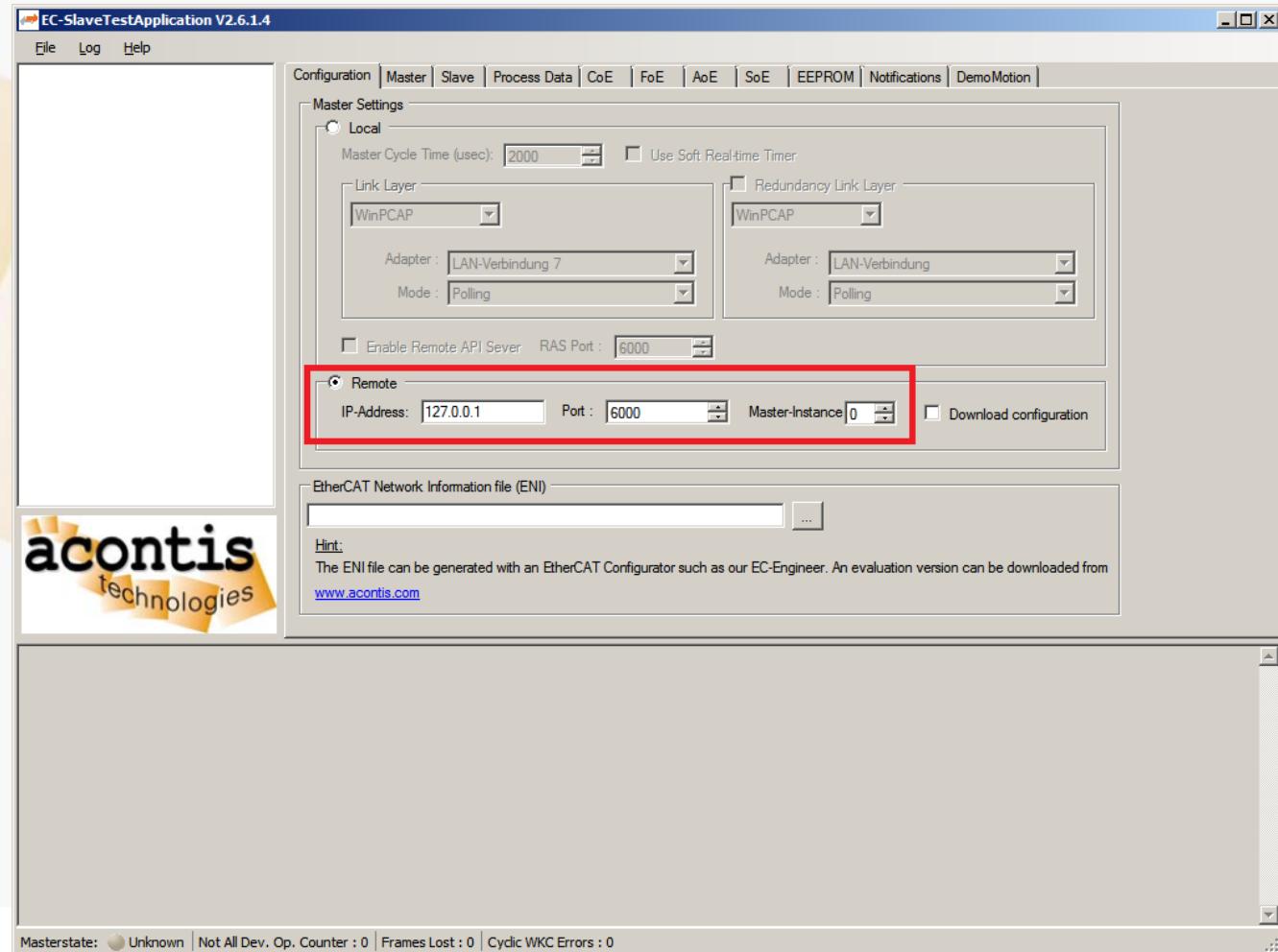
=====
Start EtherCAT Master
=====

Master state changed from <UNKNOWN> to <INIT>
Master state changed from <INIT> to <PREOP>
DCM is in sync Cur=" -3053", Avg=" -324", Max=" ,51189"
MC_Power : PLCOpen State,Unknown -> 'Disabled
Master state changed from <PREOP> to <SAFEOP>
Cyclic command WKC error on LRW - Address: 0x1000000 - WKC act/set=2/3
Master state changed from <SAFEOP> to <OP>
DCM during startup (INIT->PREOP->SAFEOP->OP)
```

Start ECSlaveTestApp.EXE and set IP address



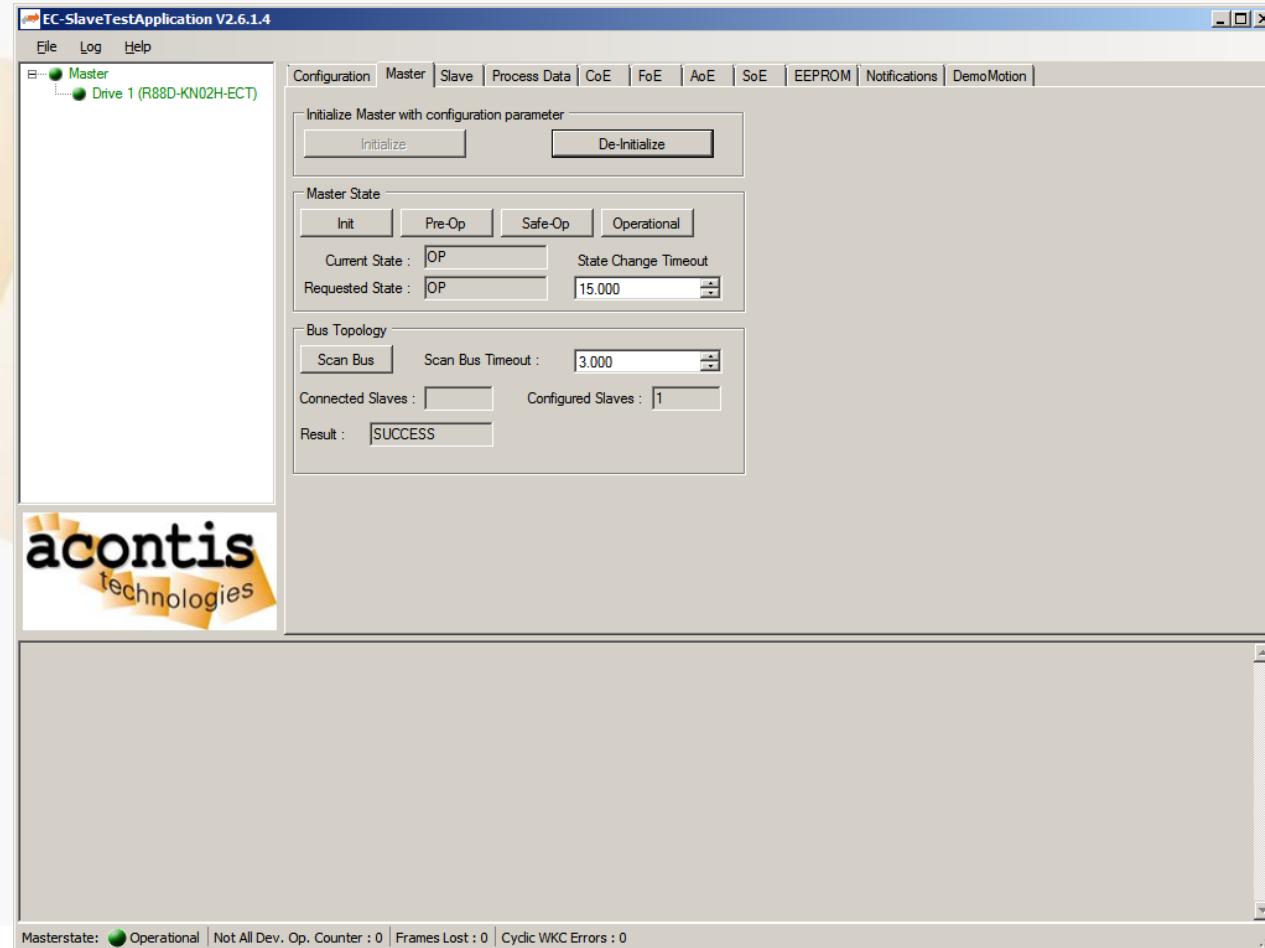
- Select “Remote” and set the address 127.0.0.1 into IP-Address



Establish connection to ECMasterDemoMotion

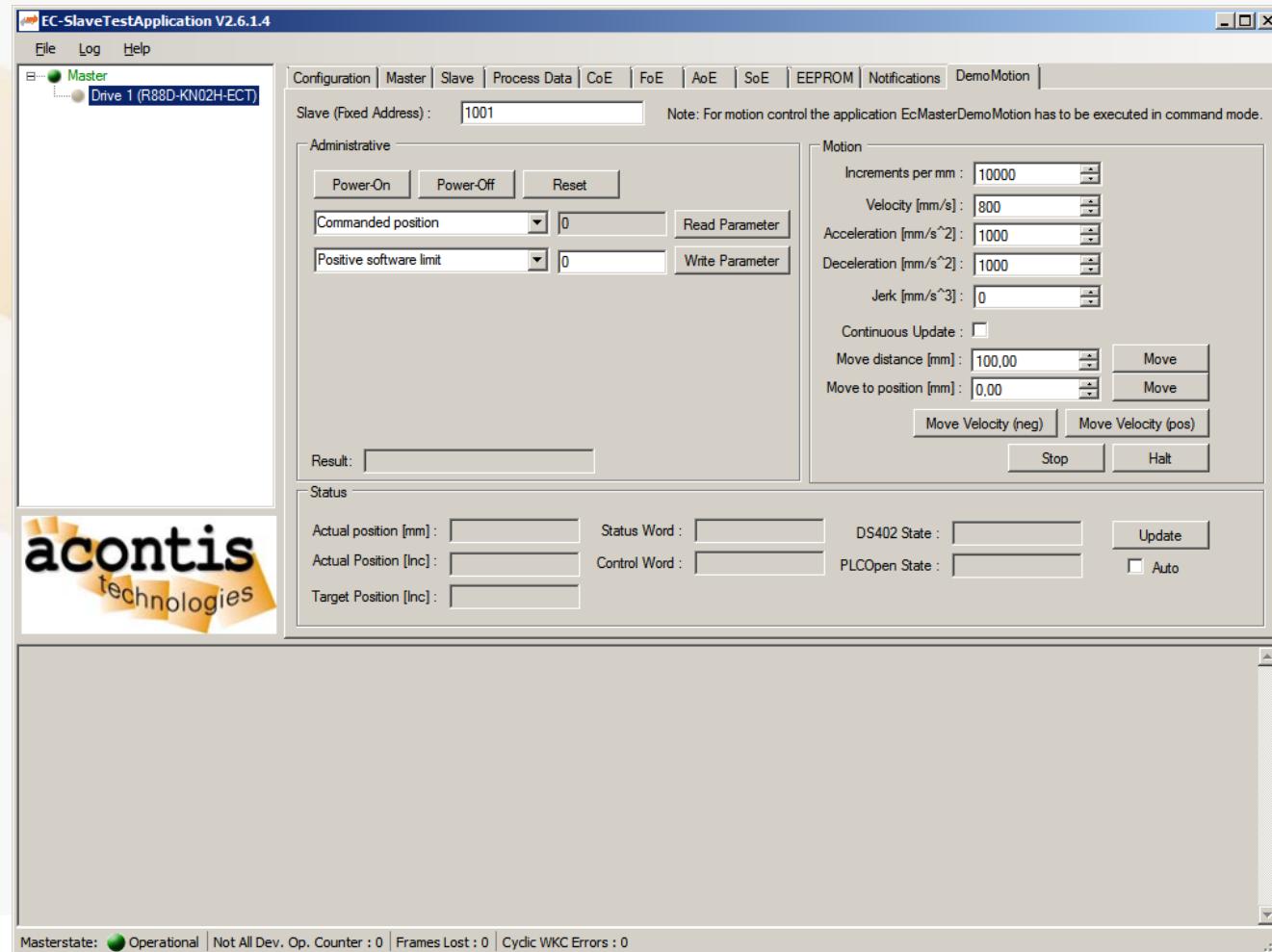
EC  **Motion**

- On tab “Master” select the button “Initialize”



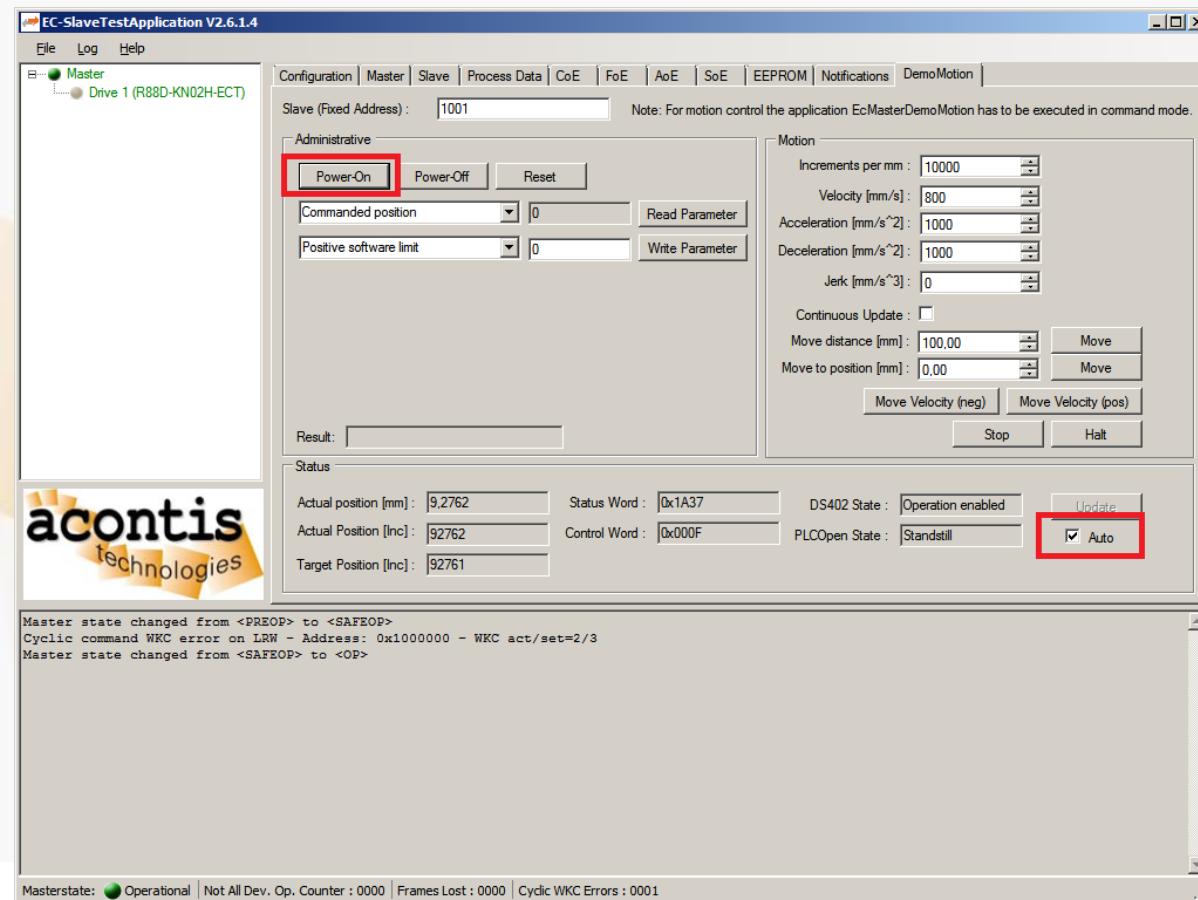
Select the first drive

- Select on tab “DemoMotion” the first drive in the tree



Power-On drive and move it

- Select the checkbox “Auto” and the values in the status area should be updated. If possible manually turn at the motor
- Select button “Power-On”



- Check the cycle time. A stable cycle time is required.

PerfMsmt 'Cycle Time' (avg/max) [usec]: 3999.8/4100.9 → o.k.

Disable CPU driver if cycle time is bad (huge jitter). Use file Files\Windows\intelppmOFF.reg to modify the appropriate registry key. A system reboot is required afterwards.

- Check PDO mapping in case of error messages like:

ERROR: Invalid PDO mapping: Target Position Object=0x607A not found

- Contact acontis technical support ecsupport@contis.com

- Required information: Drive manufacturer and model
 - Required files: ESI (EtherCAT Slave Information), ENI (EtherCAT Network Information), ECC (EC-Engineer project file), all logfiles

Next Steps

- Learn more about EcMasterDemo and the application framework
→ EC-Master Class B User Manual Chapter 3.3 “Application Framework”
- Take at closer look into the source code of ECMasterDemoMotion
Compile and debug the source code with Visual Studio
- Take at closer look at the EcMotionLibrary