EC Motion

Quick Start Guide for Realtime OS

18 October 2013

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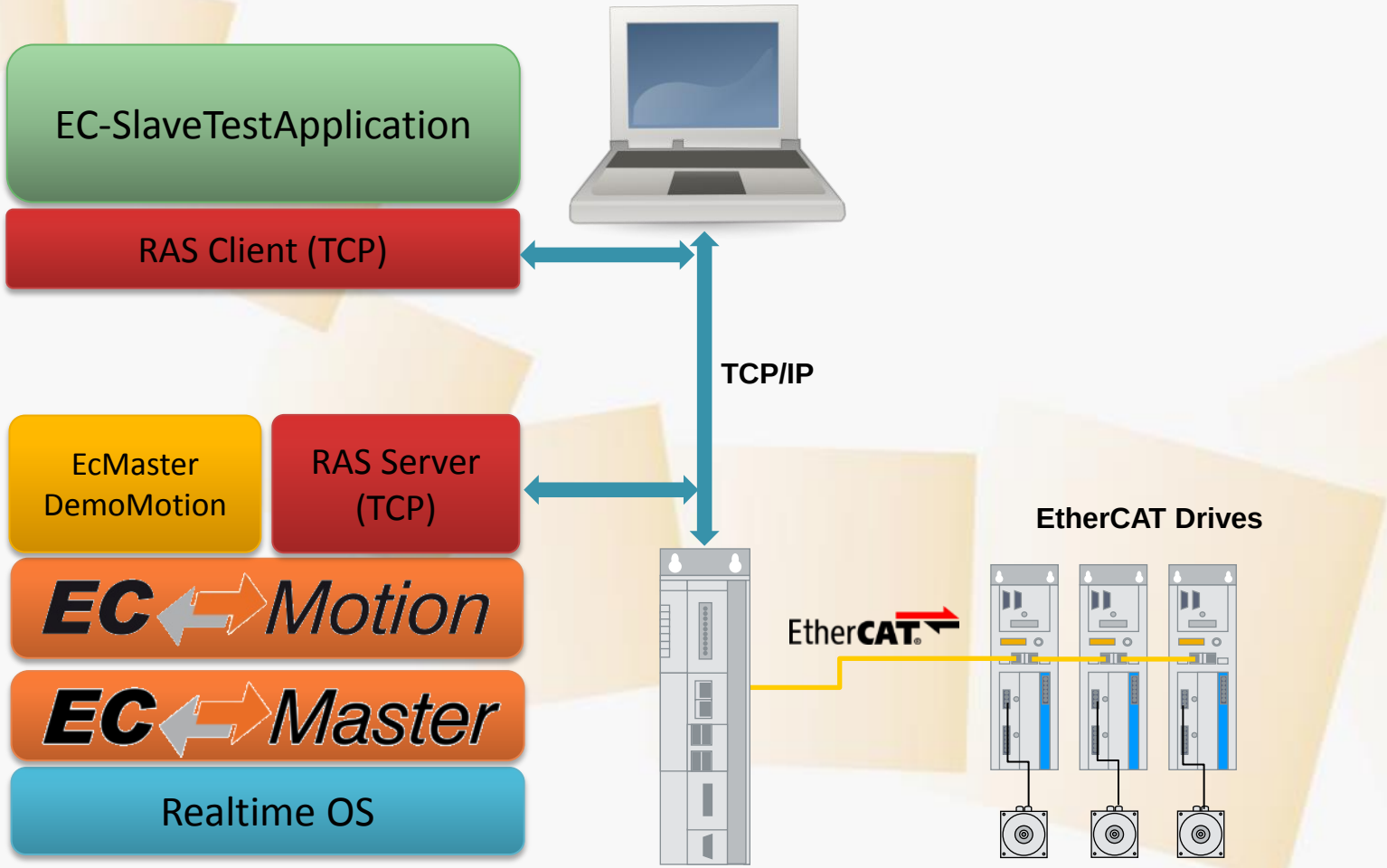
System Architecture

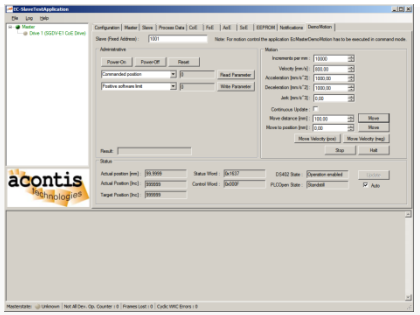


Software Modules

ECSlaveTestApp.exe
(EC-Master-Windows\Bin\Windows\x86)

EcMasterDotNet.dll
(EC-Master-Windows\Bin\Windows\x86)

AtemRasClnt.dll
(EC-Master-Windows\Bin\Windows\x86)



TCP/IP

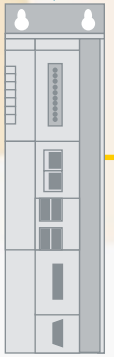
ECMasterDemoMotion

AtemRasSrv

EcMotionControl.lib

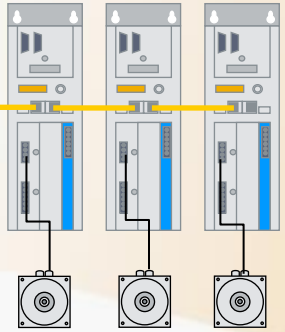
EcMaster + Link-Layer

Realtime OS



EtherCAT

EtherCAT Drives



Software Packages

EC Motion

Required

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

Recommended

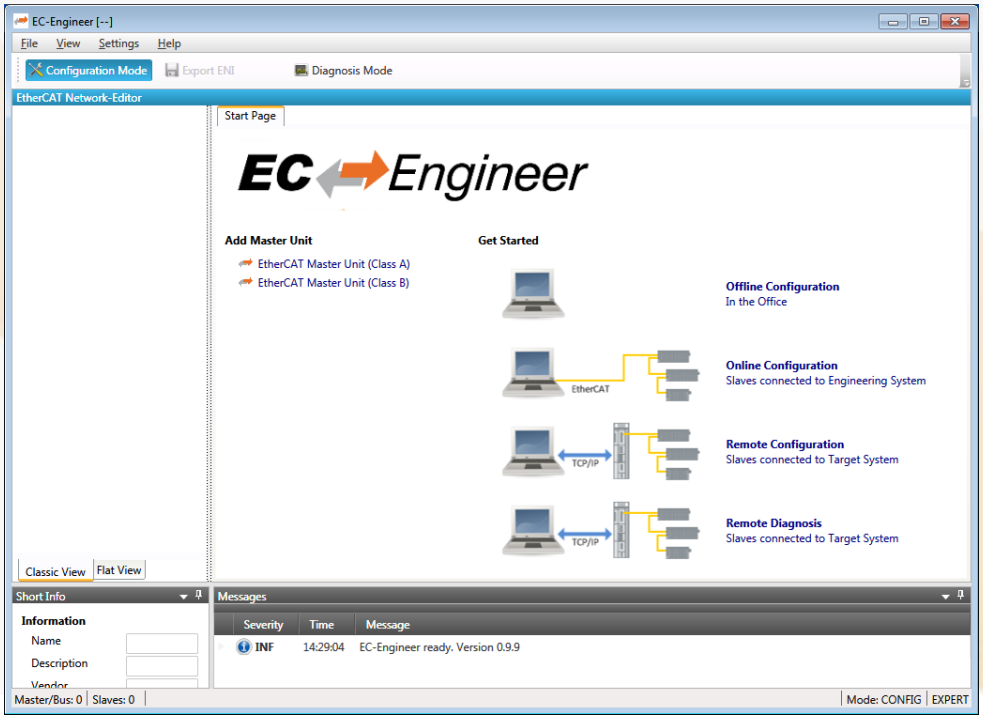
1. Microsoft XML Notepad http://www.microsoft.com/en-us/download/details.aspx?displaylang=en&id=7973
2. WireShark Network Protocol Analyzer http://www.wireshark.org/

Installation EC-Master and EC-Motion

- EC-Master Core Class B
  - Unpack the file EC-Master-V2.6.x.x-NNN-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-NNN
- 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-NNN

Installation EC-Engineer

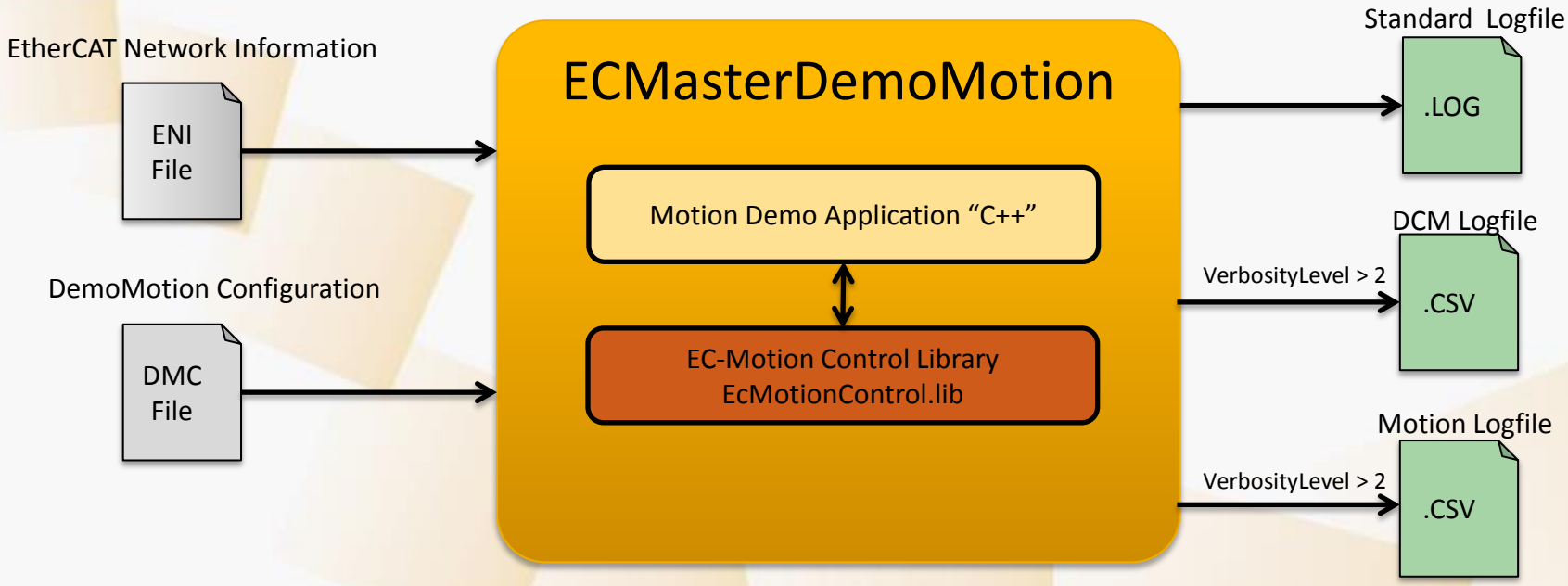
- WinPcap Windows Paket Capture Library http://www.winpcap.org/
- EC-Engineer
  - Unpack the file EC-Engineer_Eval_V1.x.x.zip
  - Execute setup.exe and follow the instructions



ECMasterDemoMotion features

- 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

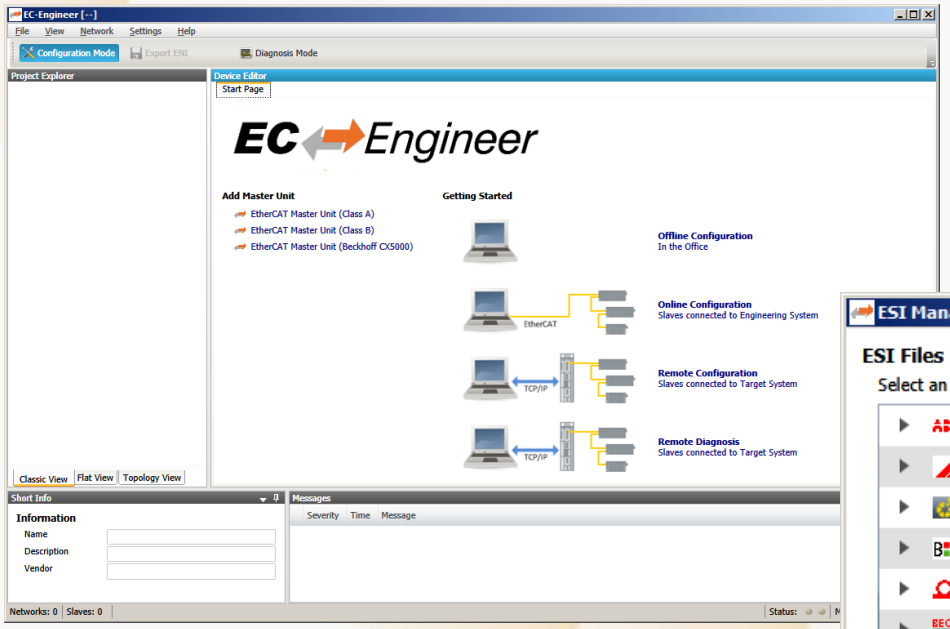


- The ENI file is located in "EC-Master-NNN\Examples\EcMasterDemoMotion\Config"
- The DMC file, e. g. DemoConfigEval.xml, is located in "EC-Master-NNN\Examples\EcMasterDemoMotion\Config" and contains all input parameters
- The Standard Logfile contains all messages and errors
- The DCM Logfile shows 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

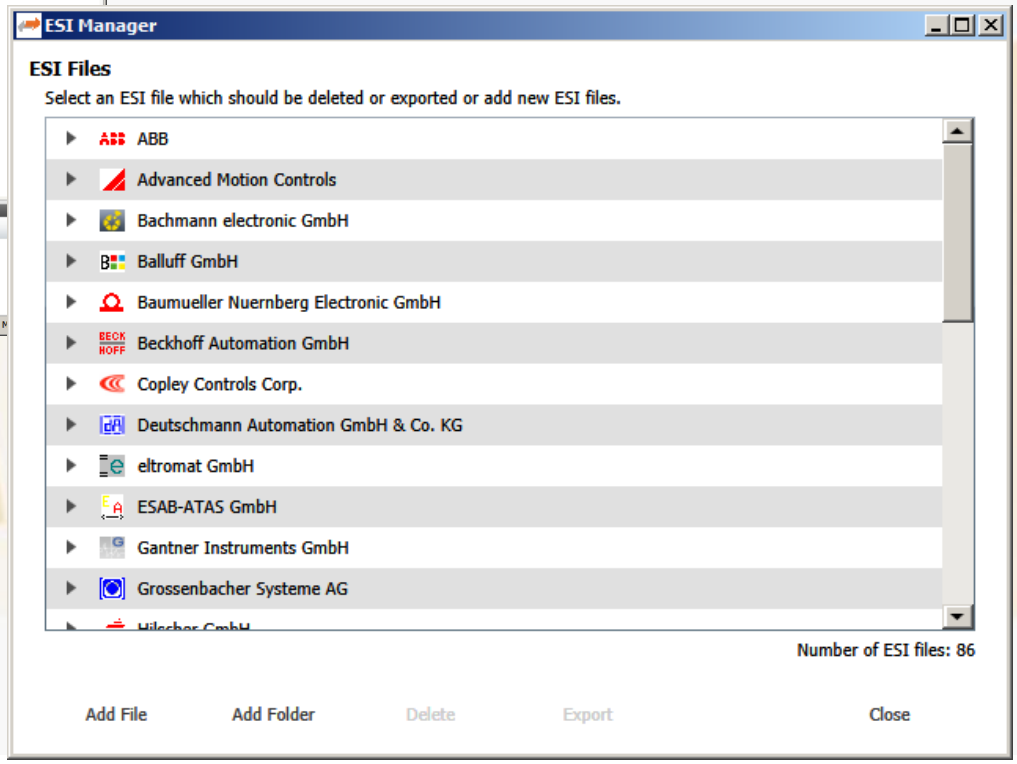
Create ENI file with EC-Engineer
Step 1: Connect EtherCAT Slaves

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

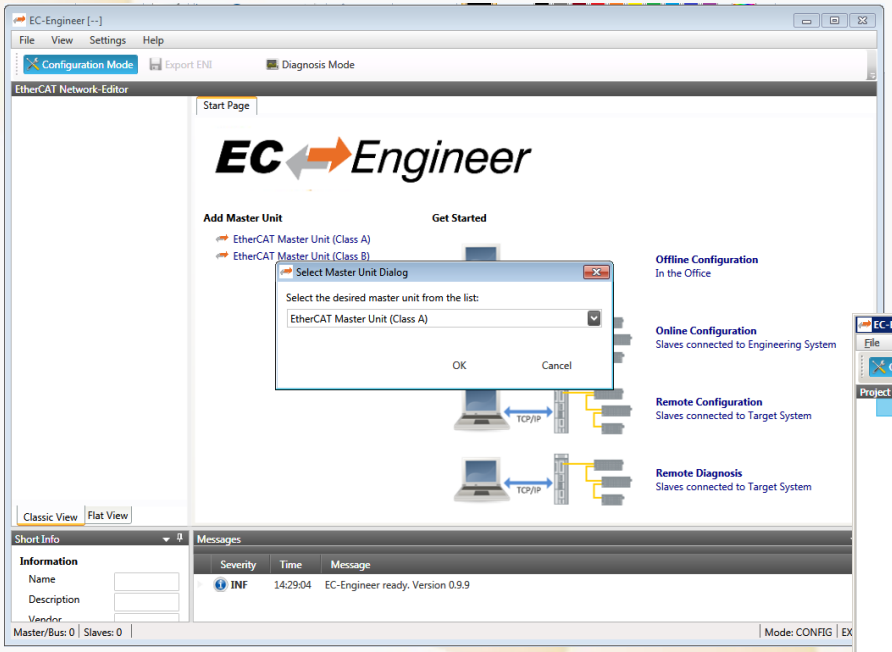
Create ENI file with EC-Engineer
Step 2: Start EC-Engineer and add ESI file



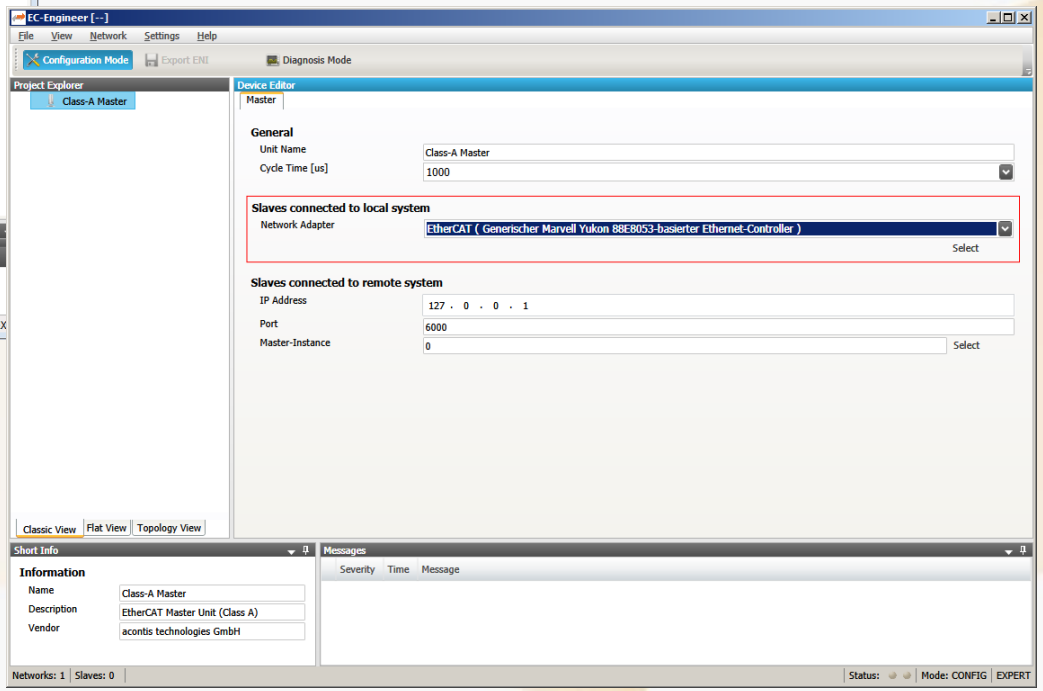
The ESI manager (located in the file menu) is used to add the EtherCAT Slave Information (ESI) file.
The ESI file is provided by the drive manufacturer.



Create ENI file with EC-Engineer
Step 3: Scan connected slaves

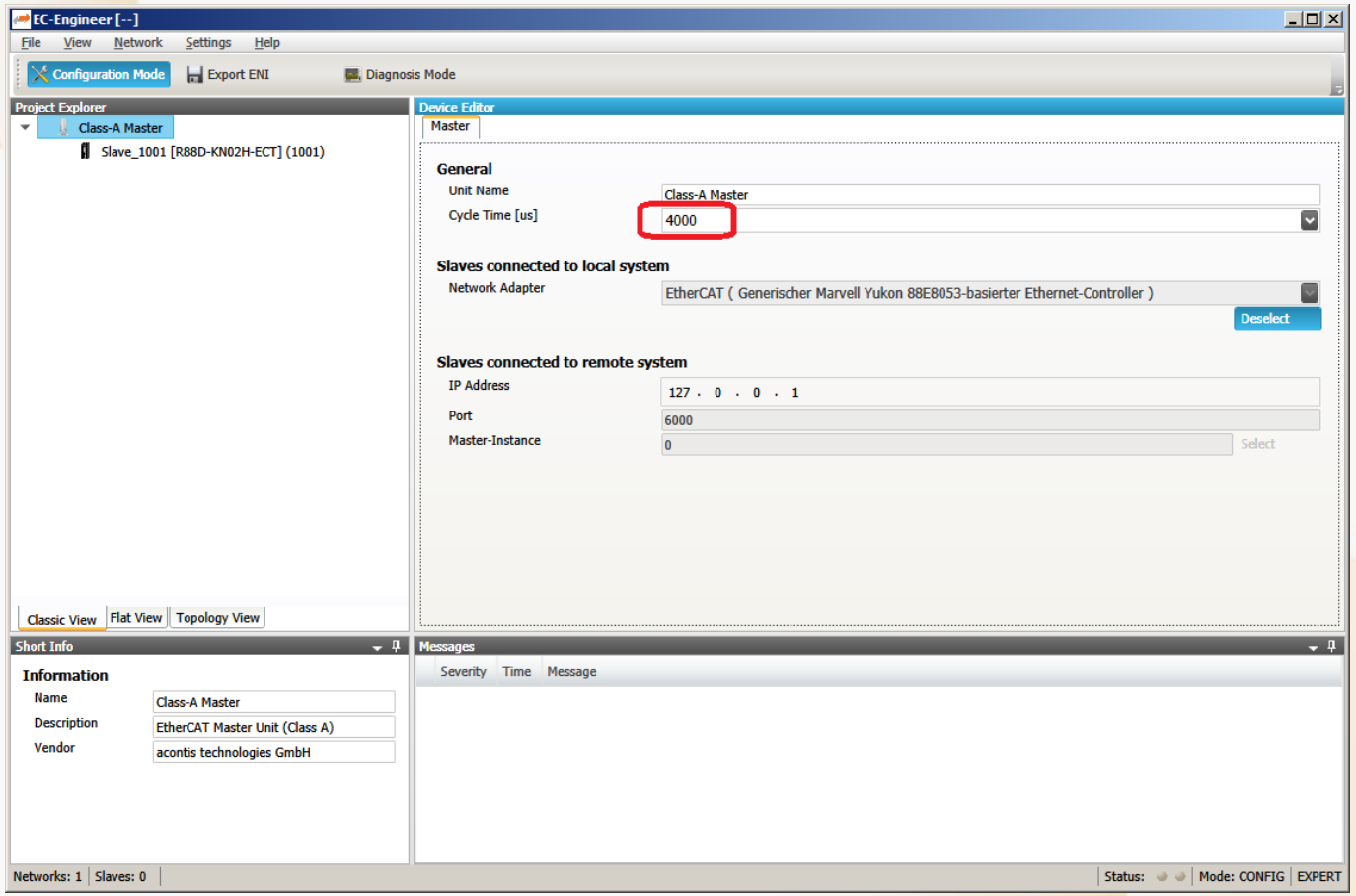


Select “Online Configuration” and “EtherCAT Master Unit (Class A)”

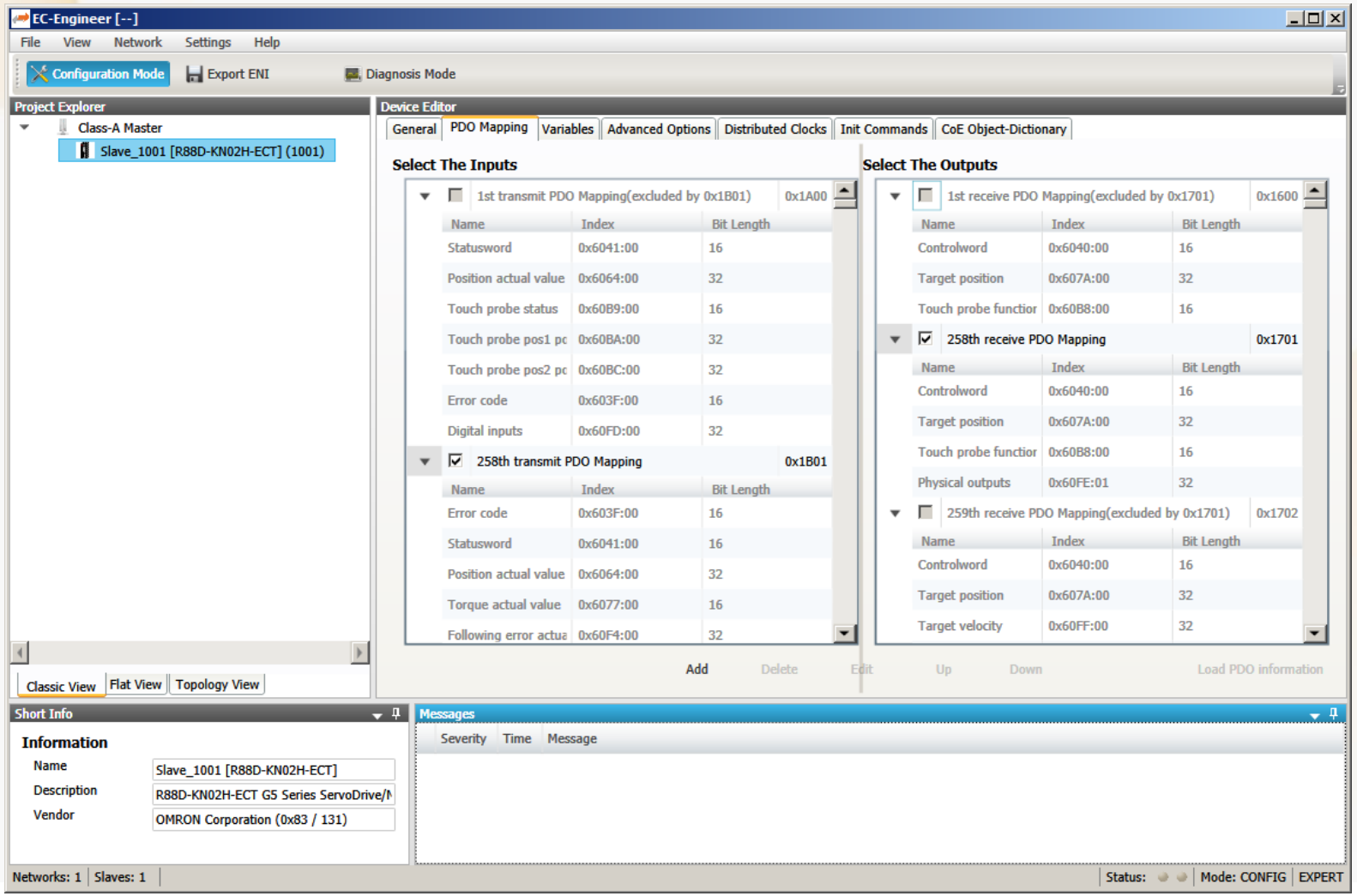


Choose network adapter from list and press “Select”

Create ENI file with EC-Engineer
Step 4: Set cycle time to 1000 usec



Create ENI file with EC-Engineer
Step 5: The found slave devices are listed in the tree

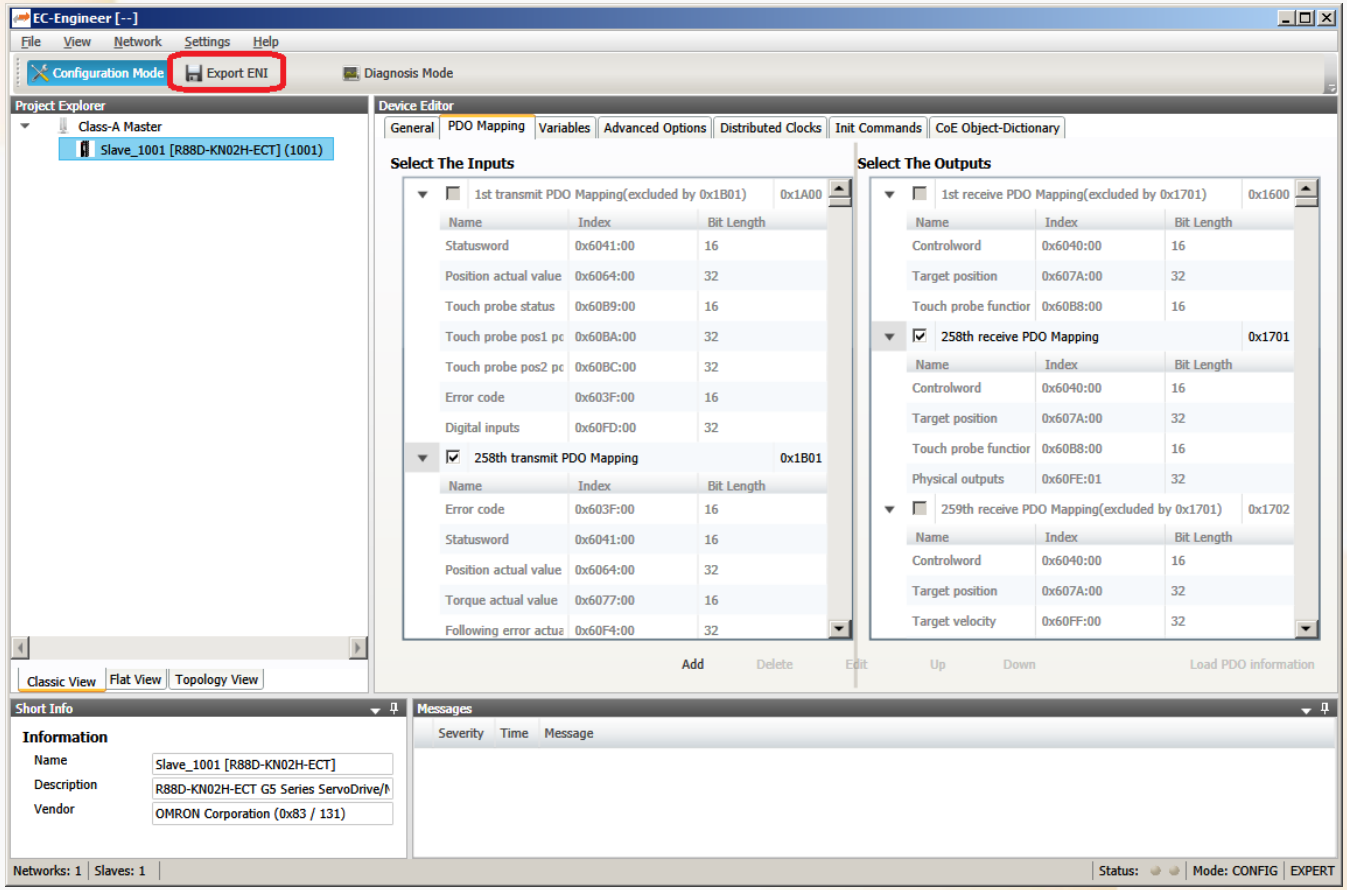


Create ENI file with EC-Engineer
Step 6: Adjust PDO Mapping and Modes of Operation

EC Motion

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

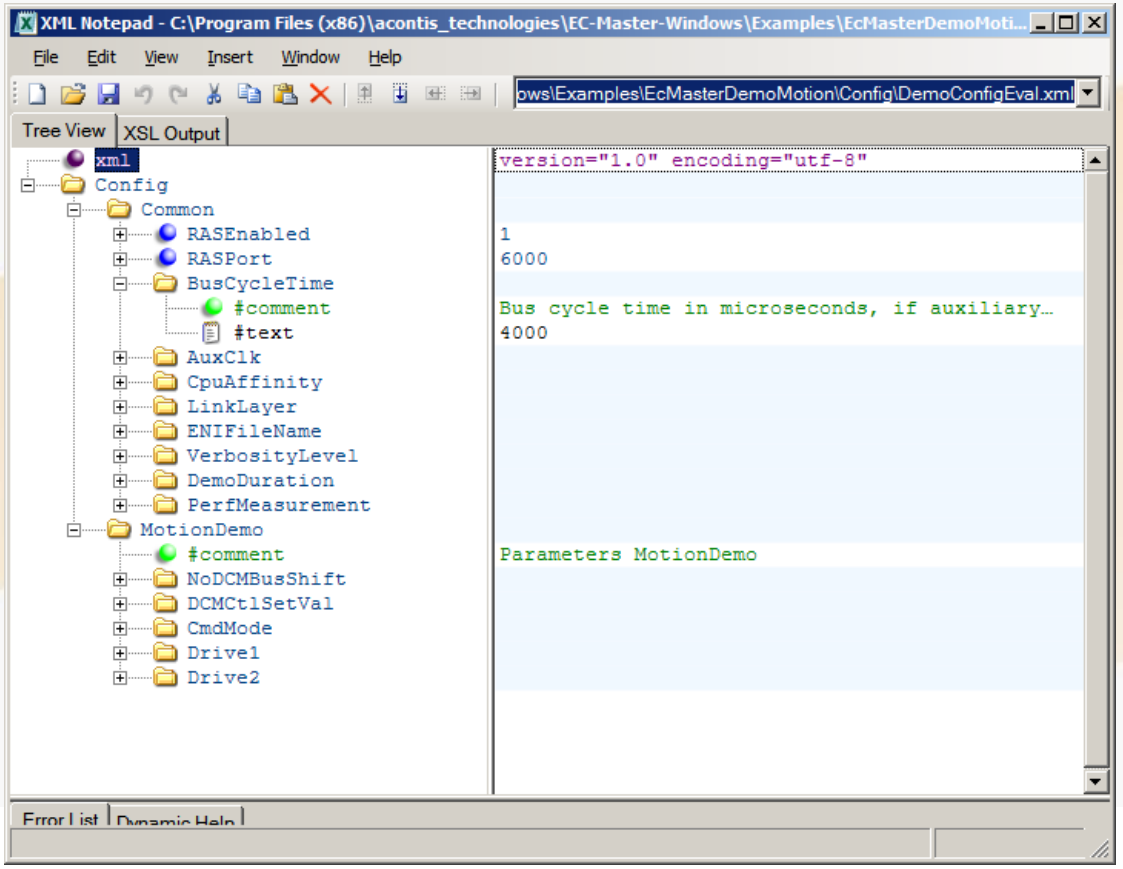
Generate bus configuration with EC-Engineer
Step 7: Export ENI file



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

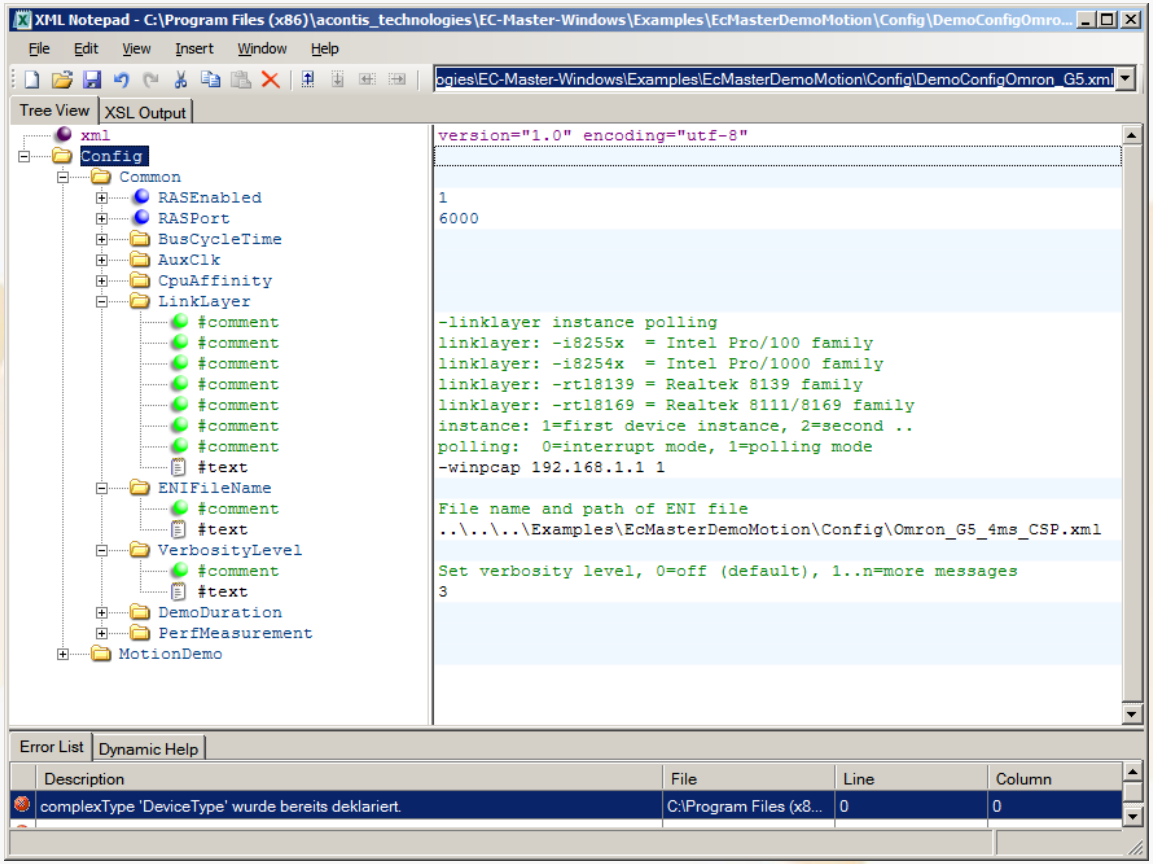
Adjust DemoMotion Configuration File
Step 1: Introduction

- The file, e. g. DemoConfigEval.xml is located in the folder “EC-Master-NNN\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



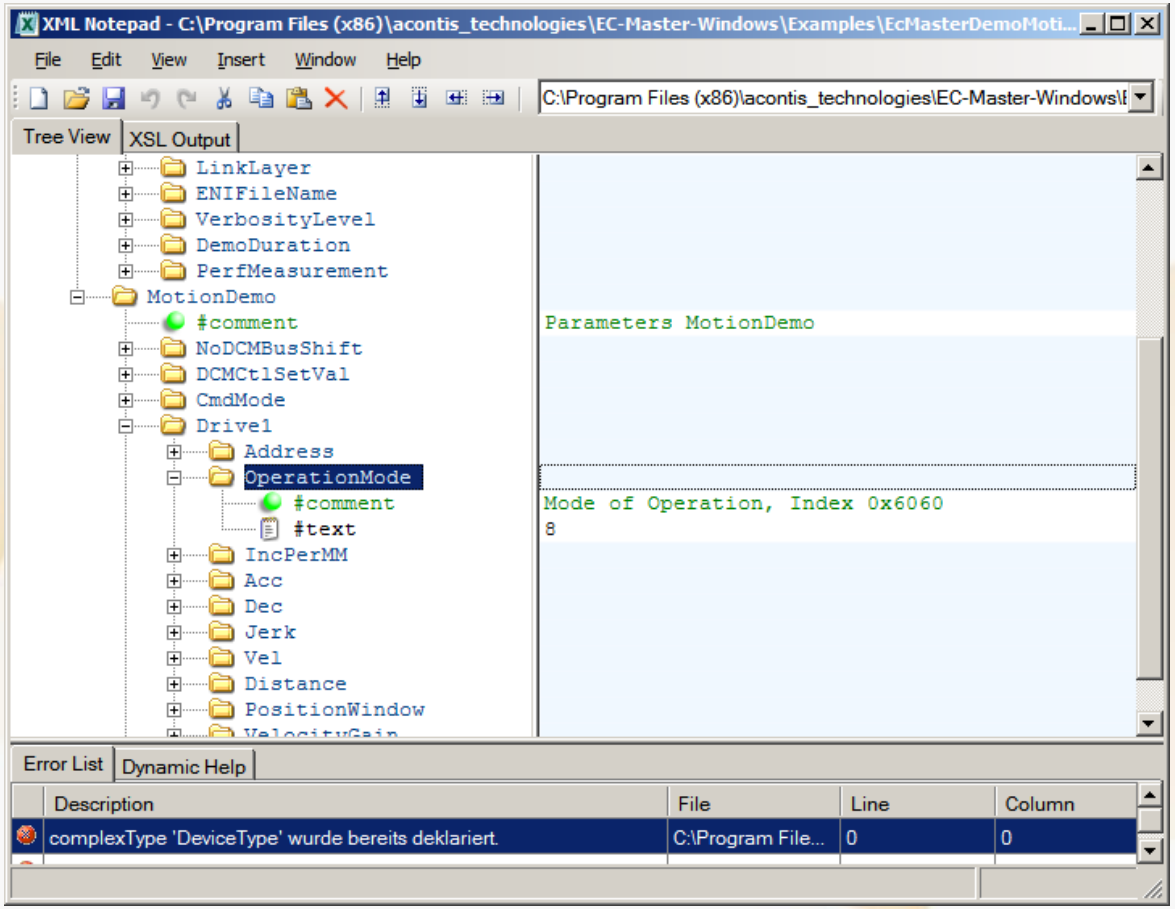
Adjust DemoMotion Configuration File
Step 2: Adjust link layer settings and ENI filename

- Select the link layer (network interface card) used for EtherCAT into “LinkLayer”
- Set the name and path of the ENI file into “ENIFileName”



Adjust DemoMotion Configuration File
Step 3: Set “Modes of Operation” for drives

- Set the operation mode into “OperationMode”



Start ECMasterDemoMotion

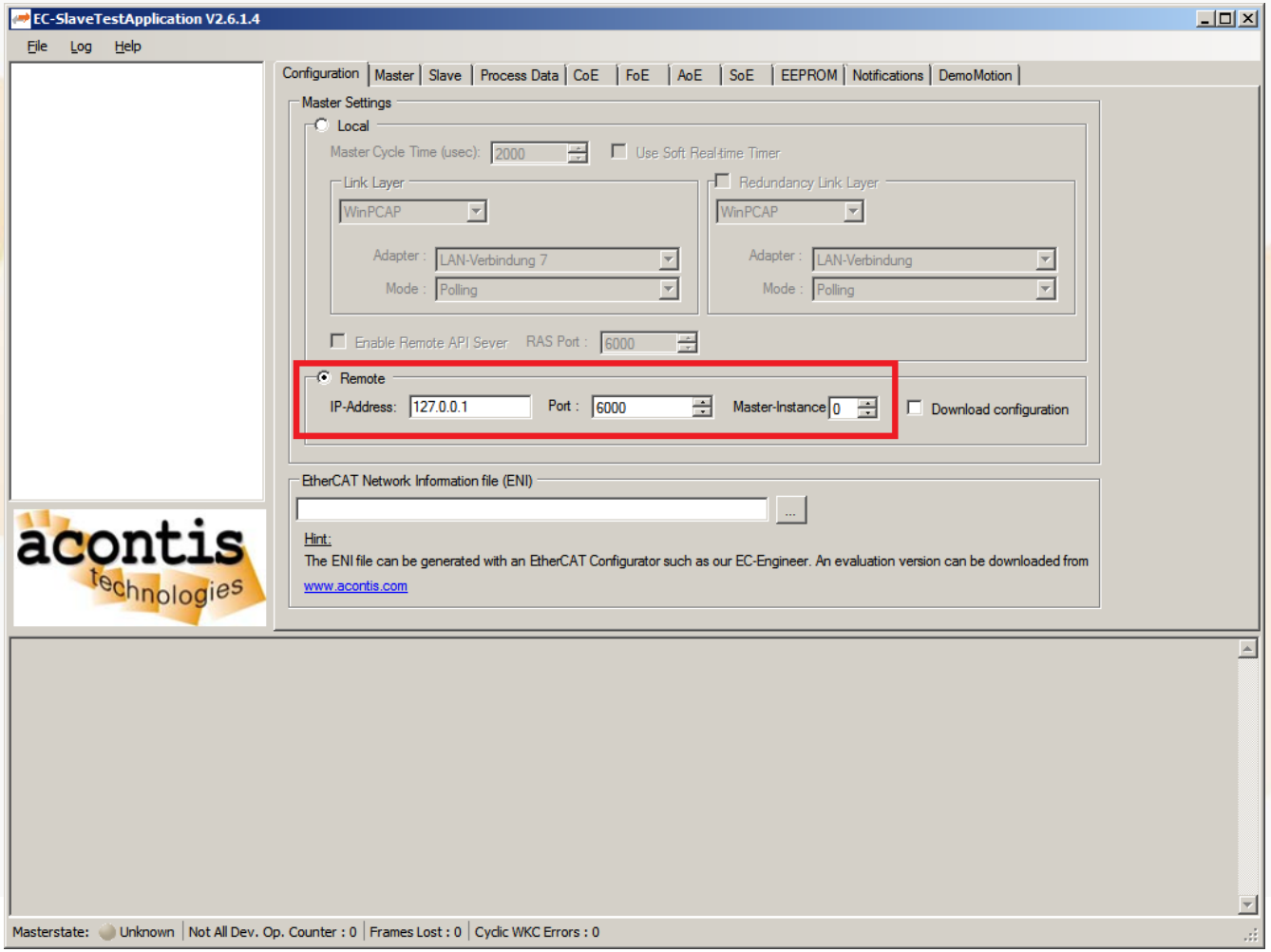
EC Motion

- 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 o
n 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)
```

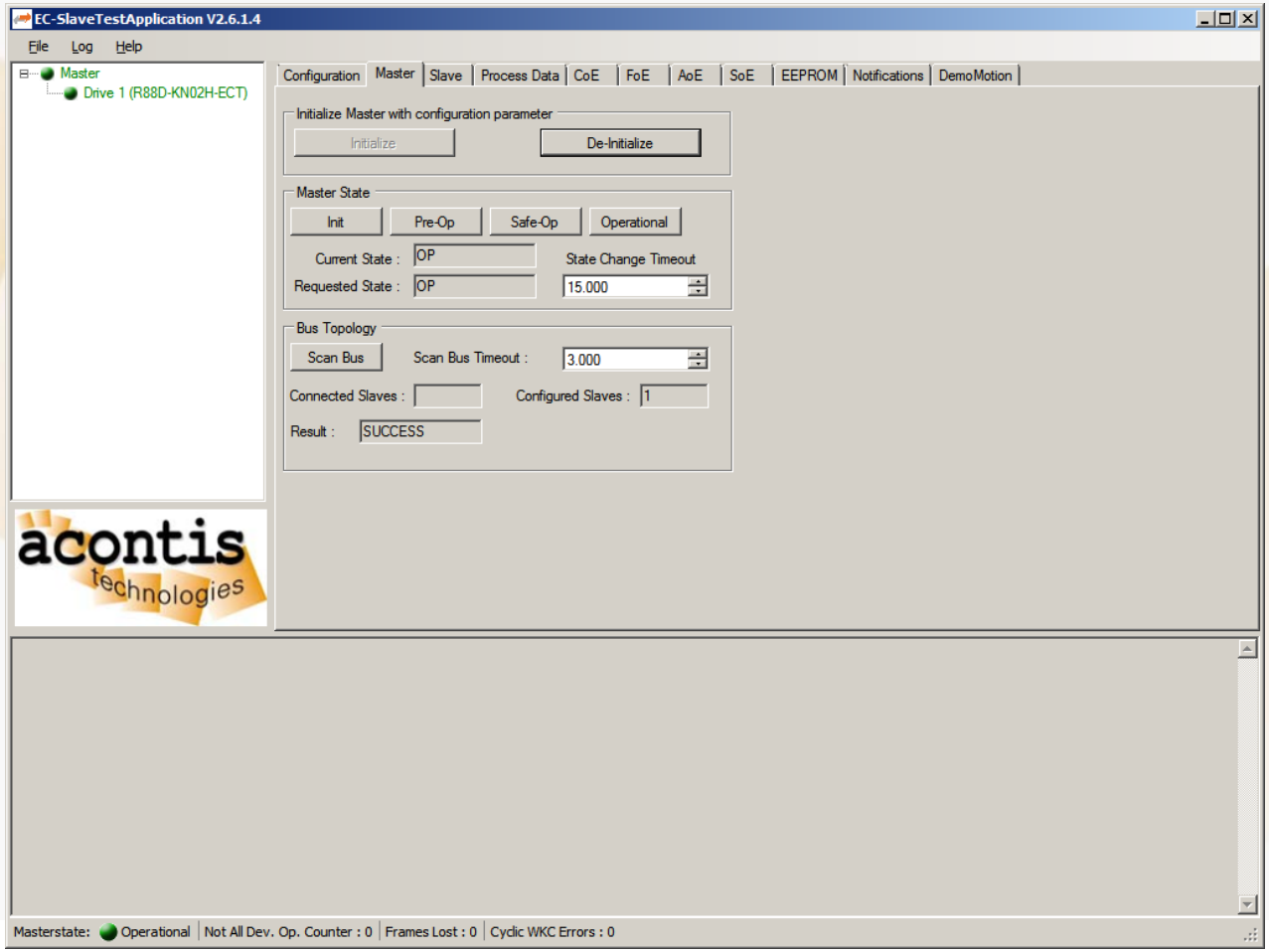
Start ECSlaveTestApp.EXE and set IP address

- Select “Remote” and set the address of the Realtime OS into IP-Address



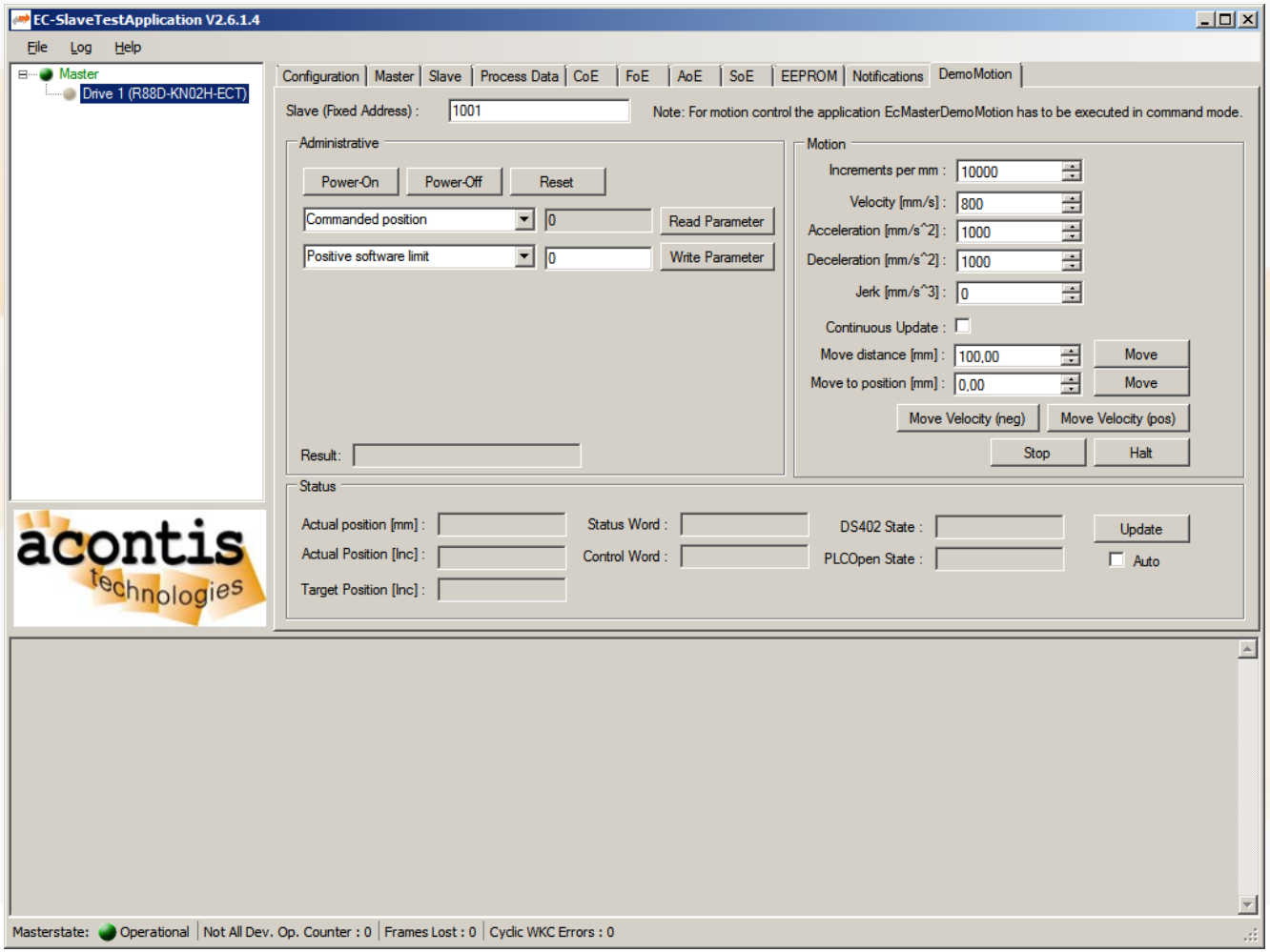
Establish connection to ECMasterDemoMotion

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



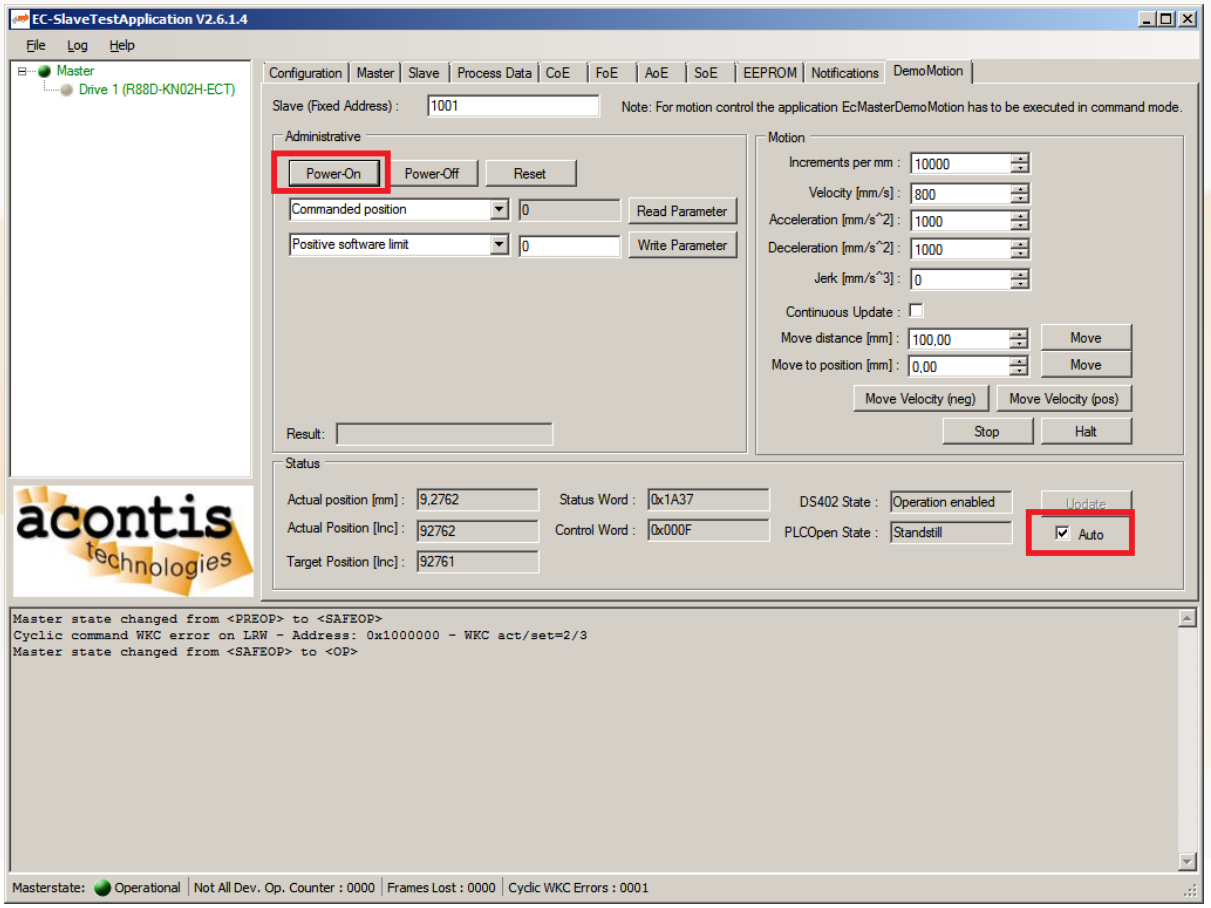
Select the first drive

- 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”



Troubleshooting

- Check the cycle time. A stable cycle time is required.
  `PerfMsmt 'Cycle Time ' (avg/max) [usec]:  999.8/1000.9 → o.k.`
- Check PDO mapping in case of error messages like:
  `ERROR: Invalid PDO mapping: Target Position Object=0x607A not found`
- Contact acontis technical support ecsupport@acontis.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