EC-Master Quick Start Guide

Setup an EtherCAT network with acontis products

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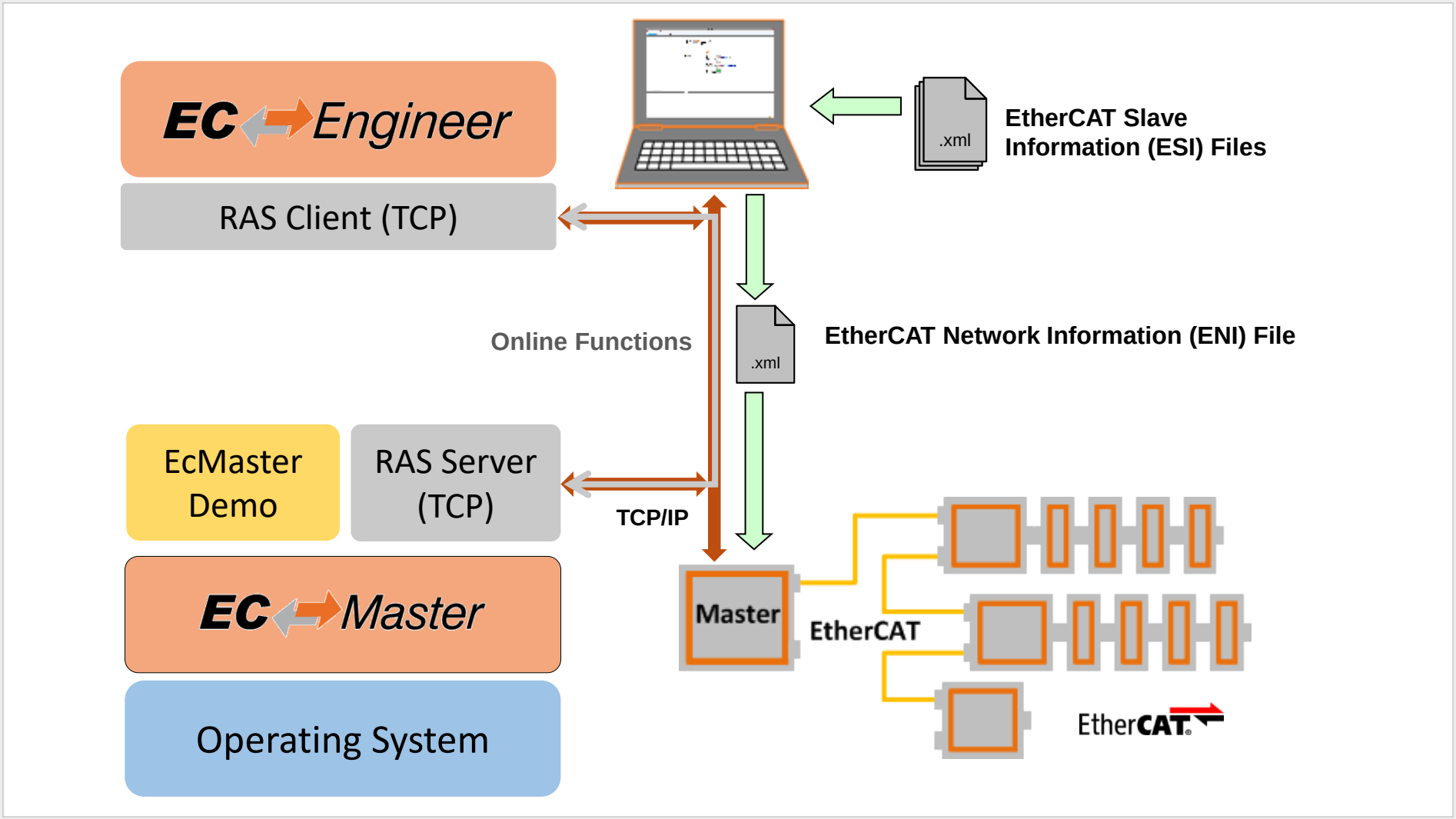
- Install EC-Master
- Run EcMasterDemo without configuration (ENI file)
- Create network configuration with EC-Engineer
- Run EcMasterDemo with configuration (ENI file)
- Online diagnosis of network with EC-Engineer

EtherCAT System Architecture



Install EC-Master

- Install the EC-Master from the compressed file
- Optionally extract add-ons and Real-time Ethernet drivers into the installation folder
- Follow operating system-specific steps described in chapter “Platform and Operating Systems (OS)” of the user manual

Run EcMasterDemo without ENI file

- Connect the EtherCAT slave(s)
- Check which network adapter is used for EtherCAT, e.g. eth1
- Run EcMasterDemo on Windows
  - `cd Bin\Windows\x64`
  - `EcMasterDemo.exe -ndis <ip-address> 1 -v 3 -b 4000`
- Run EcMasterDemo on Linux
  - `cd Bin/Linux/x64`
  - `./EcMasterDemo -sockraw eth1 -v 3 -b 4000`
- Run EcMasterDemo on QNX
  - `ifconfig en1 destroy`
  - `cd Bin/QNX71/x64`
  - `LD_LIBRARY_PATH=. ./EcMasterDemo -i8254x 1 1 -v 3 -b 4000`

For other operating systems, please follow steps described in chapter
“Platform and Operating Systems (OS)” of the user manual

Run EcMasterDemo without ENI file

- Master commands all slaves to PREOP state:

```
0000003094: Line Crossed........: no
0000003094: Line Crossed Flags..: 0x0
0000003094: Cfg Station Address.: 0x03e9 (1001)
0000003094: ***************************************************************************
0000003094: Slave ID............: 0x00000001
0000003094: Bus Index...........: 1
0000003094: Bus AutoInc Address.: 0xffff
0000003094: Bus Station Address.: 0x03ea (1002)
0000003094: Bus Alias Address...: 0x000d (  13)
0000003094: Vendor ID...........: 0x00000002 = Beckhoff Automation GmbH
0000003094: Product Code........: 0x07D43052 = EL2004
0000003094: Revision............: 0x00100000   Serial Number: 0
0000003094: ESC Type............: Beckhoff ET1200 (0x12)  Revision: 0  Build: 2
0000003094: Connection at Port A: yes (to 0x00000000)
0000003094: Connection at Port D: no (to 0xFFFFFFFF)
0000003094: Connection at Port B: no (to 0xFFFFFFFF)
0000003094: Connection at Port C: no (to 0xFFFFFFFF)
0000003094: Line Crossed........: no
0000003094: Line Crossed Flags..: 0x0
0000003094: Cfg Station Address.: 0x03ea (1002)
0000003094: PD OUT   Byte.Bit offset: 0.0   Size: 4 bits
0000003094: ***************************************************************************
0000003101: Master state changed from <UNKNOWN> to <INIT>
0000003127: Master state changed from <INIT> to <PREOP>
```

Generate bus configuration with EC-Engineer

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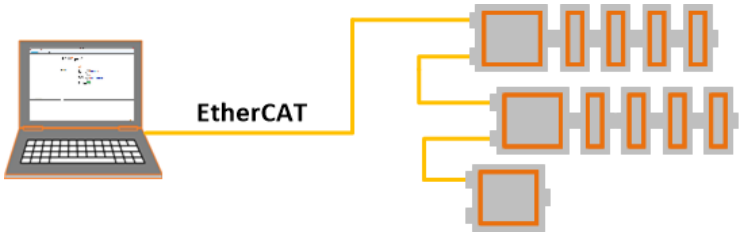
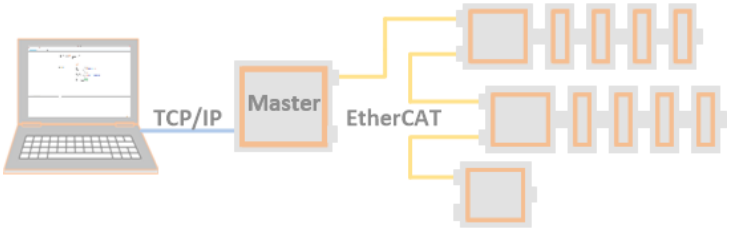
EC-Engineer Operating Modes

*Offline **Configuration**:*
(In the Office)

*Online **Configuration**:*
Slaves connected to
Engineering System

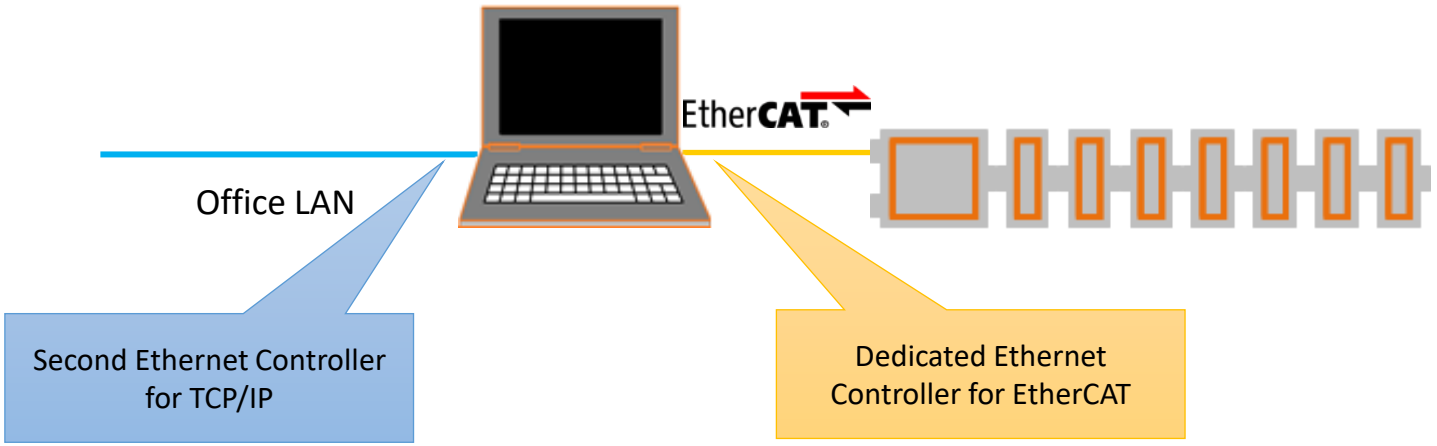


*Remote **Configuration**:*
Slaves connected to
Target System

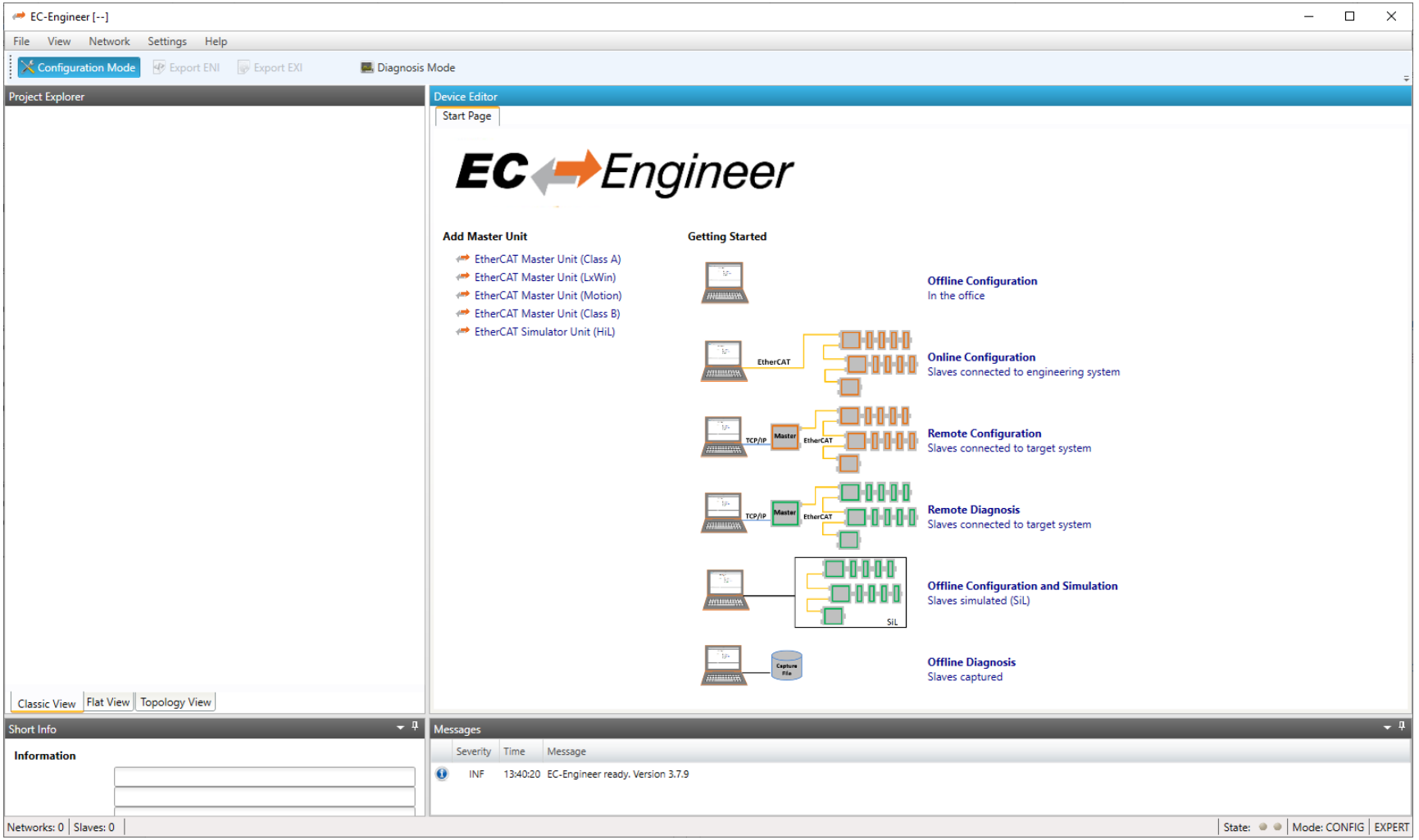


Generate bus configuration with EC-Engineer
Step 1: Connect EtherCAT Slaves

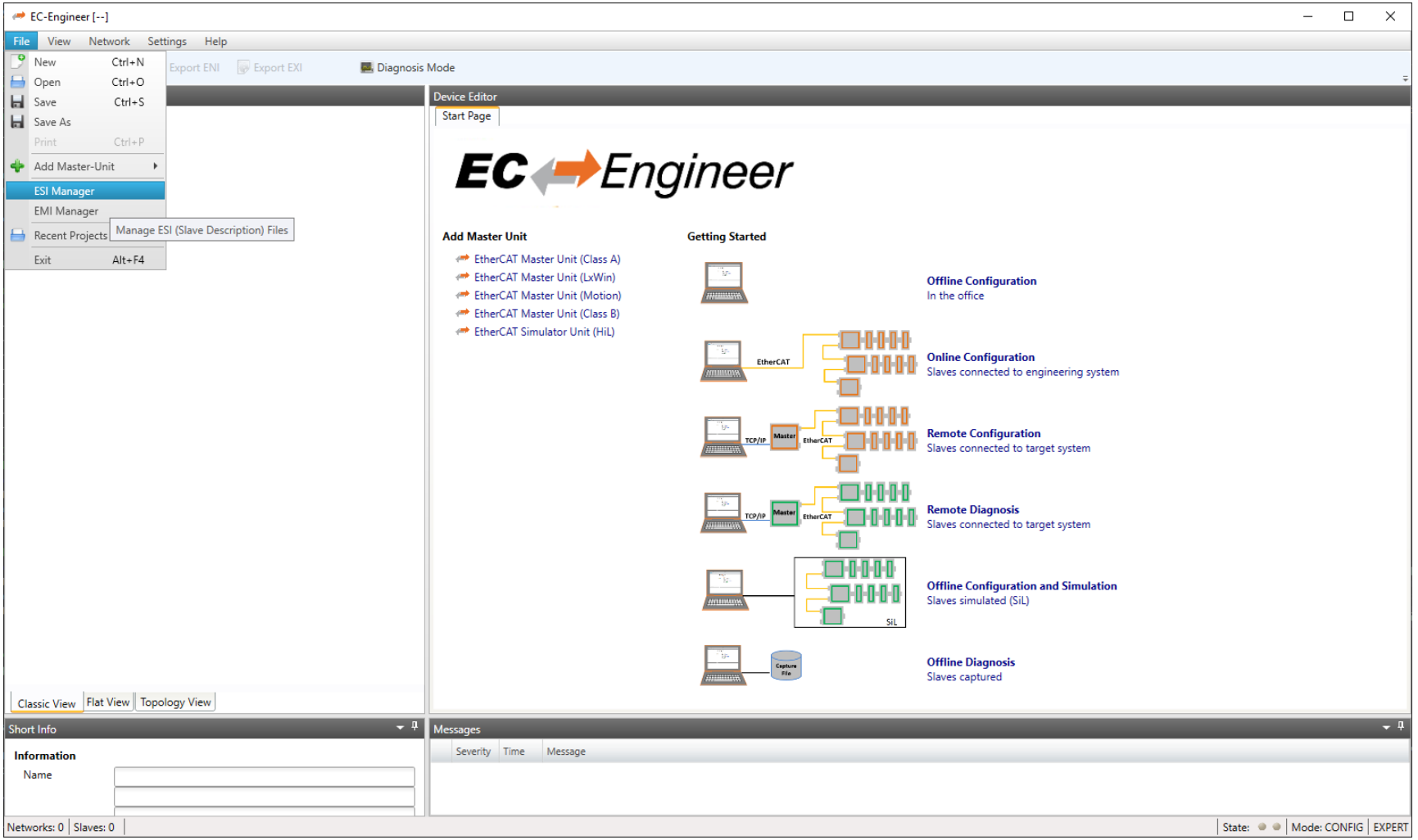
- EC-Engineer comes with an integrated EtherCAT master for scanning the connected EtherCAT slaves
- Every Ethernet Network Interface with a valid Windows driver can be used
- **Warning**: Do not connect any EtherCAT slaves to your Office LAN
- A second, dedicated Network Interface for EtherCAT is recommended



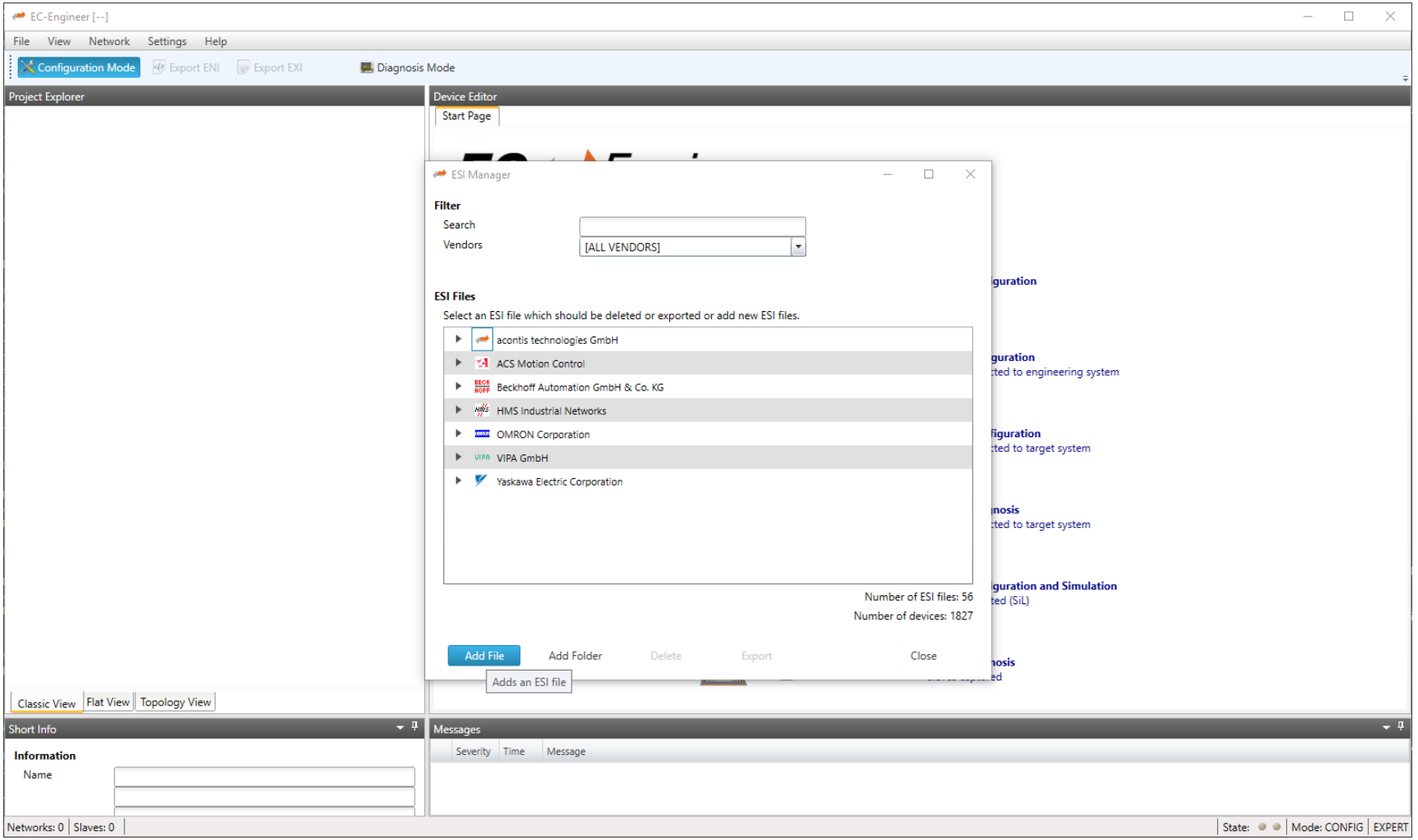
Generate bus configuration with EC-Engineer
Step 2: Install and start EC-Engineer



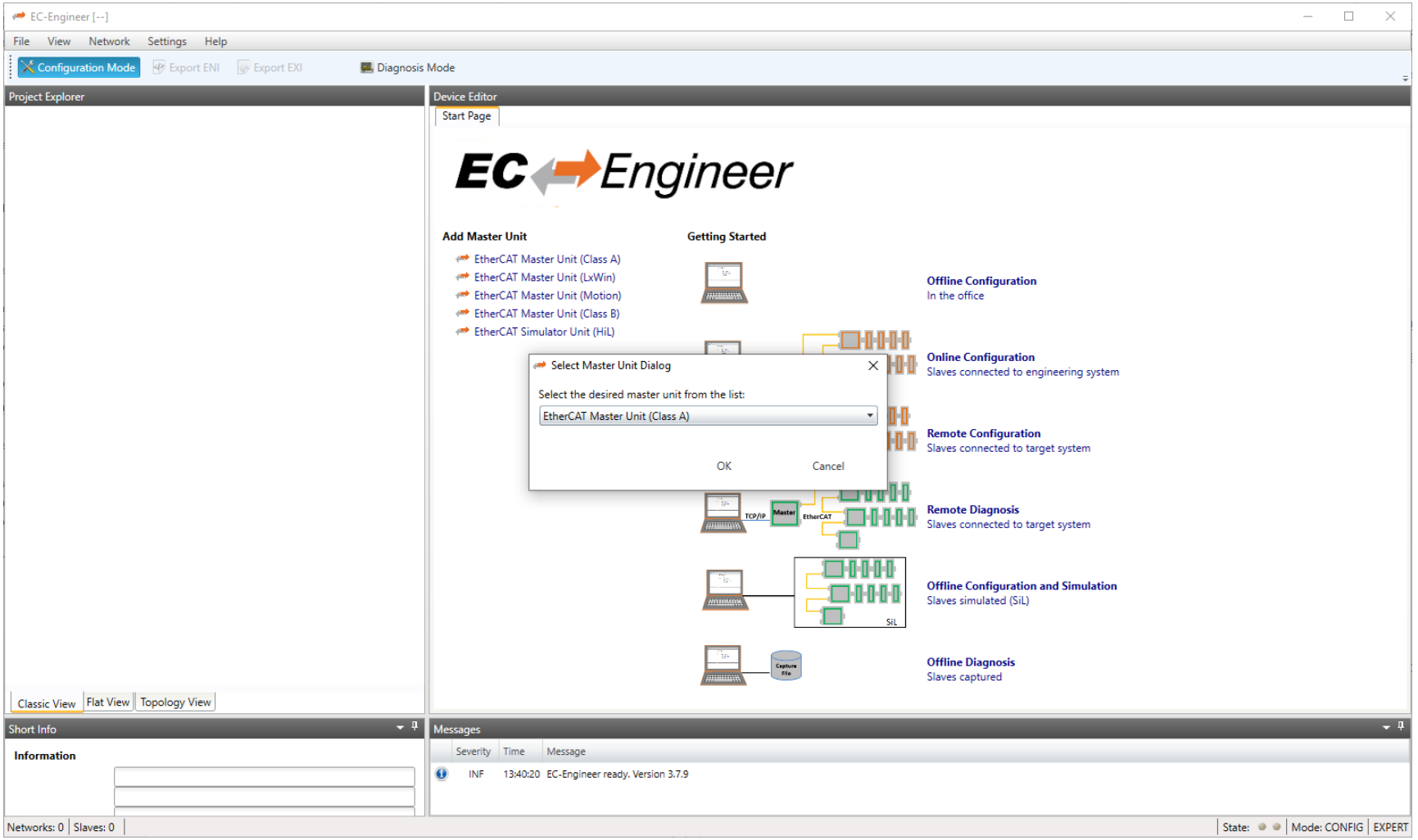
Generate bus configuration with EC-Engineer
Step 3: Open ESI Manager



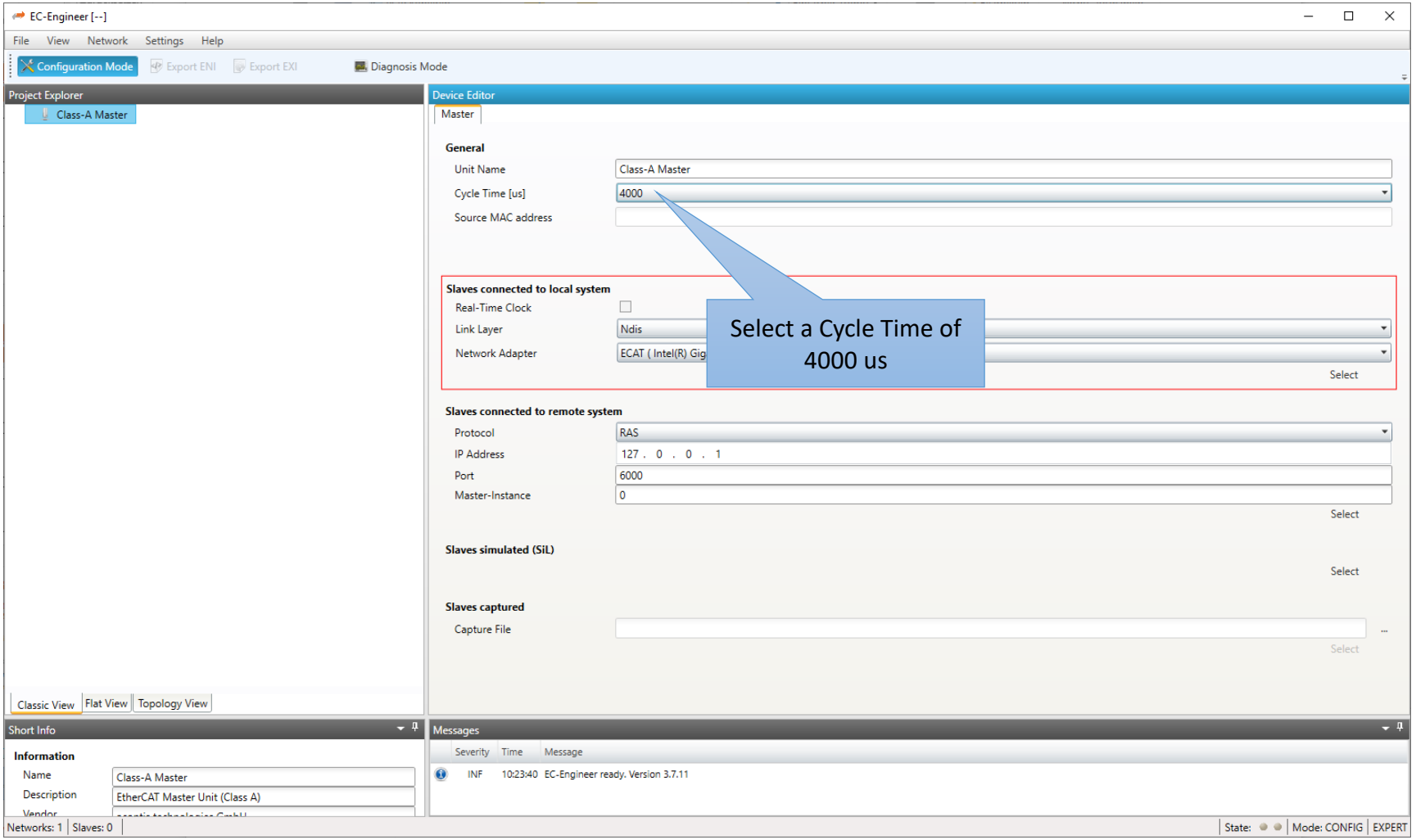
Generate bus configuration with EC-Engineer
Step 4: Add the appropriate ESI File



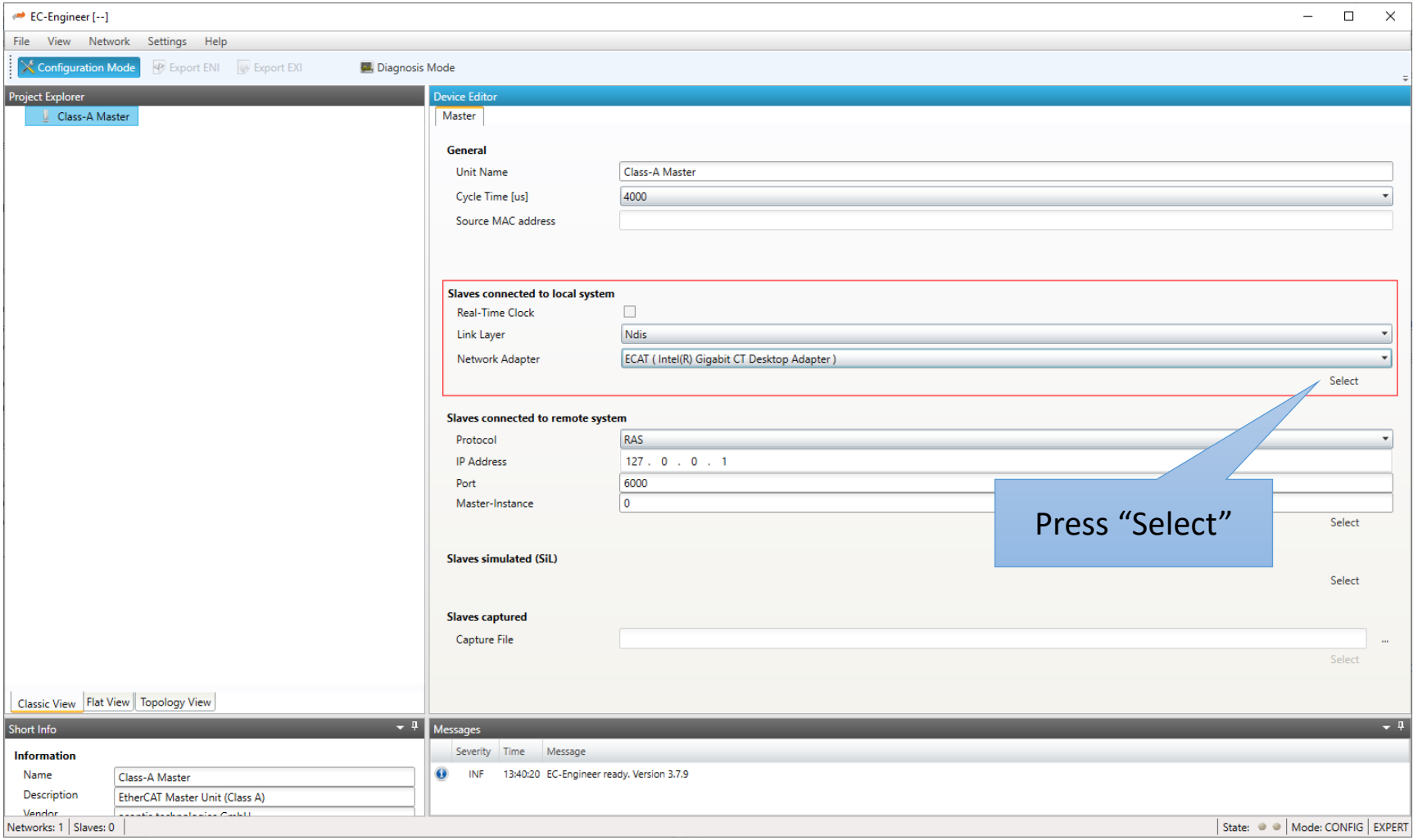
Generate bus configuration with EC-Engineer
Step 5: Select “Online Configuration” and “EtherCAT Master Unit (Class A)”



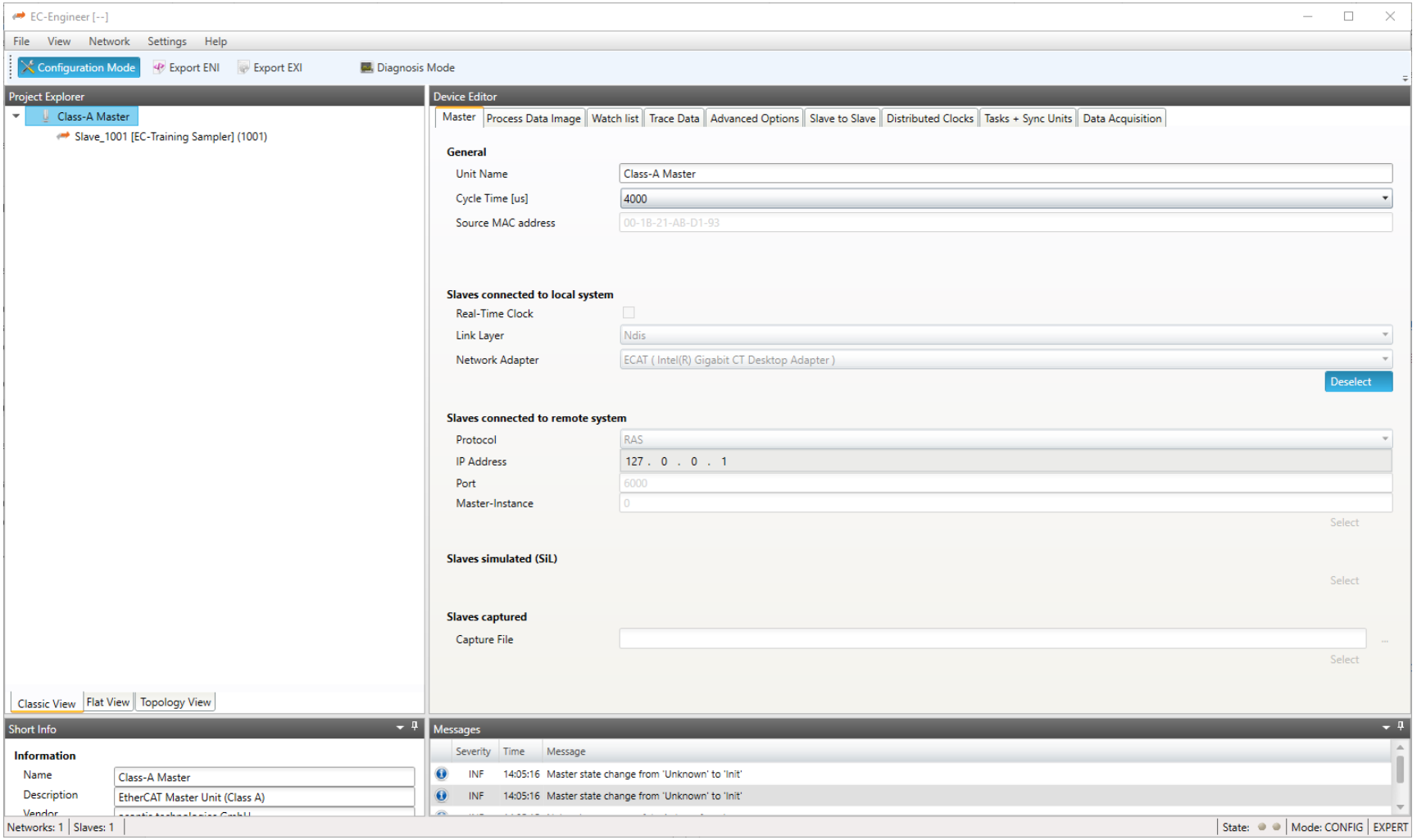
Generate bus configuration with EC-Engineer
Step 6: Select a Cycle Time of 4000 us



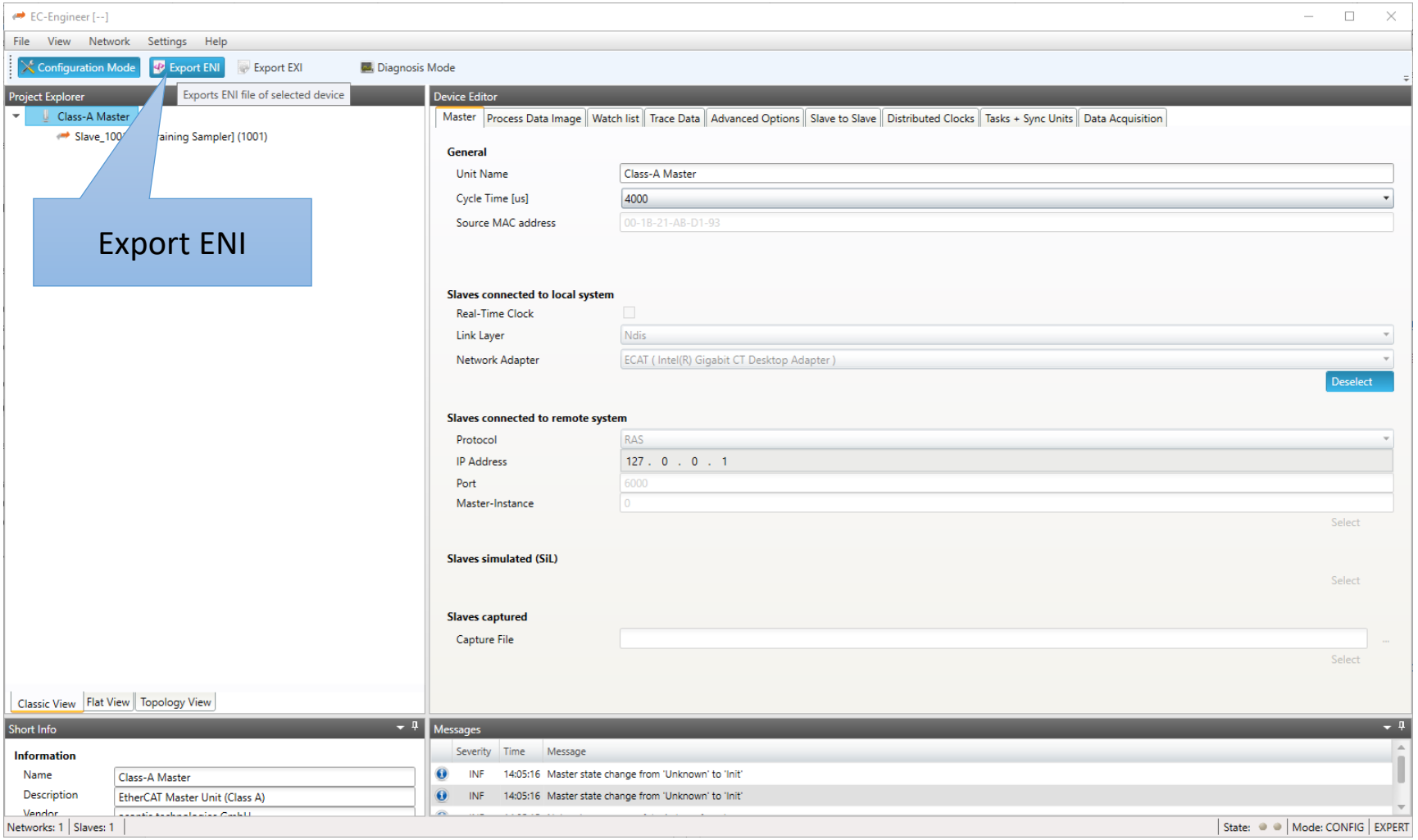
Generate bus configuration with EC-Engineer
Step 7: Choose network adapter from list and press “Select”



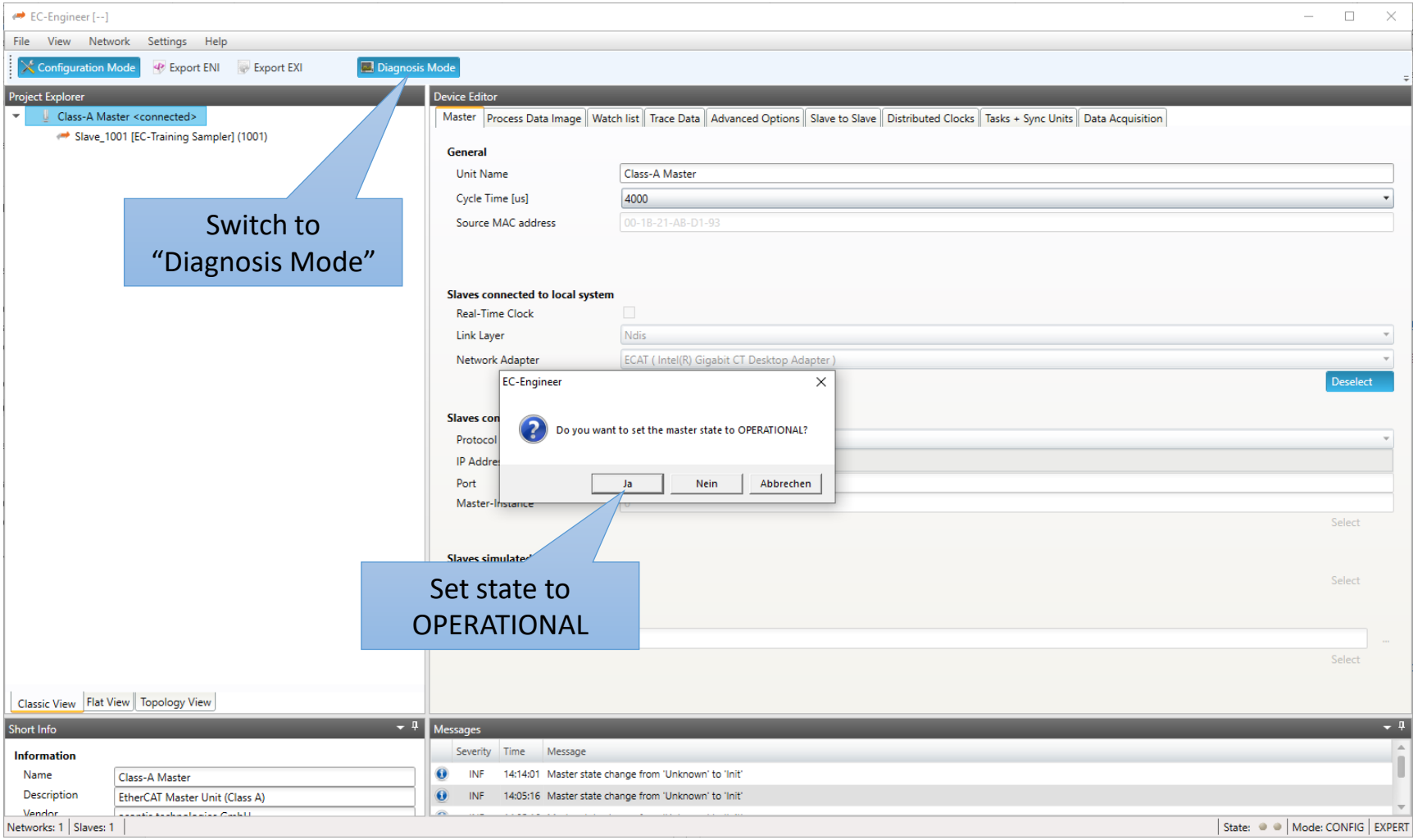
Generate bus configuration with EC-Engineer
Step 8: The found slave devices are listed in the tree



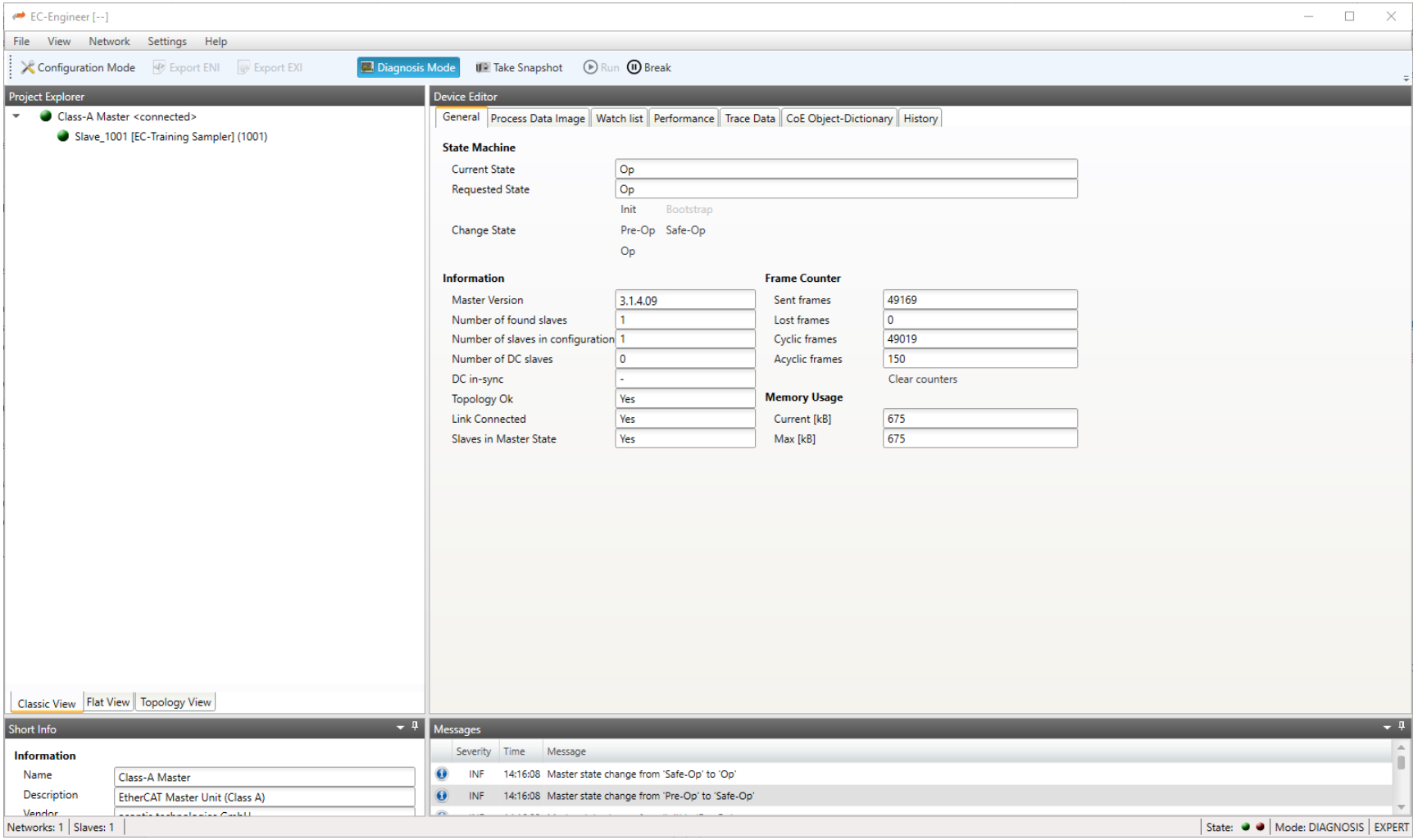
Generate bus configuration with EC-Engineer
Step 9: Export ENI file to *D:\eni.xml*



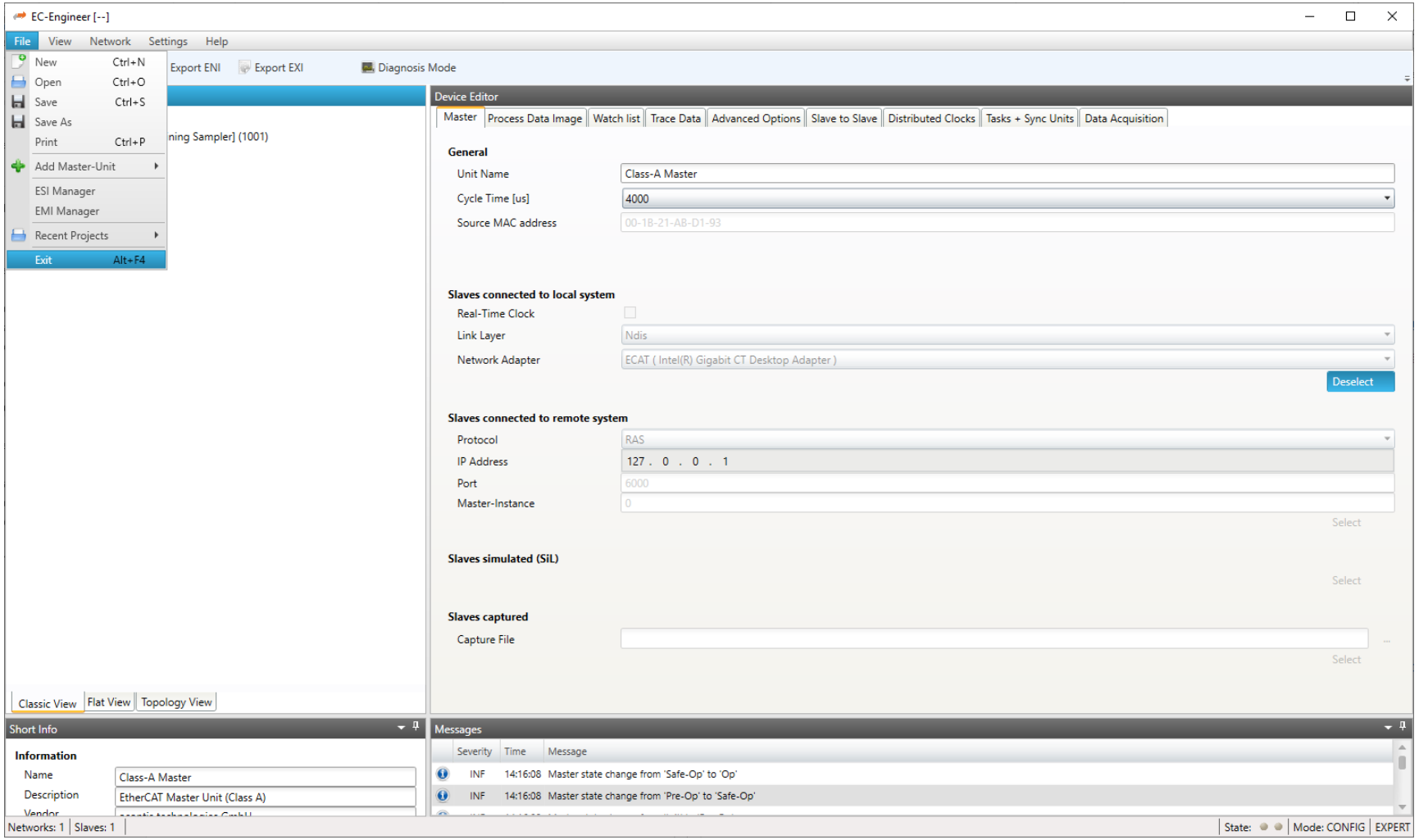
Generate bus configuration with EC-Engineer
Step 10: Switch to “Diagnosis Mode” and set state to OPERATIONAL



Generate bus configuration with EC-Engineer
Step 11: Bus is OPERATIONAL



Generate bus configuration with EC-Engineer
Step 12: Switch back to “Configuration Mode” and Exit



Run EcMasterDemo with ENI file

- Transfer ENI to target device (if not Windows)
- Append ENI path, e.g. *-f D:\eni.xml* to Command Line Parameters
- Master commands all slaves to OP state:

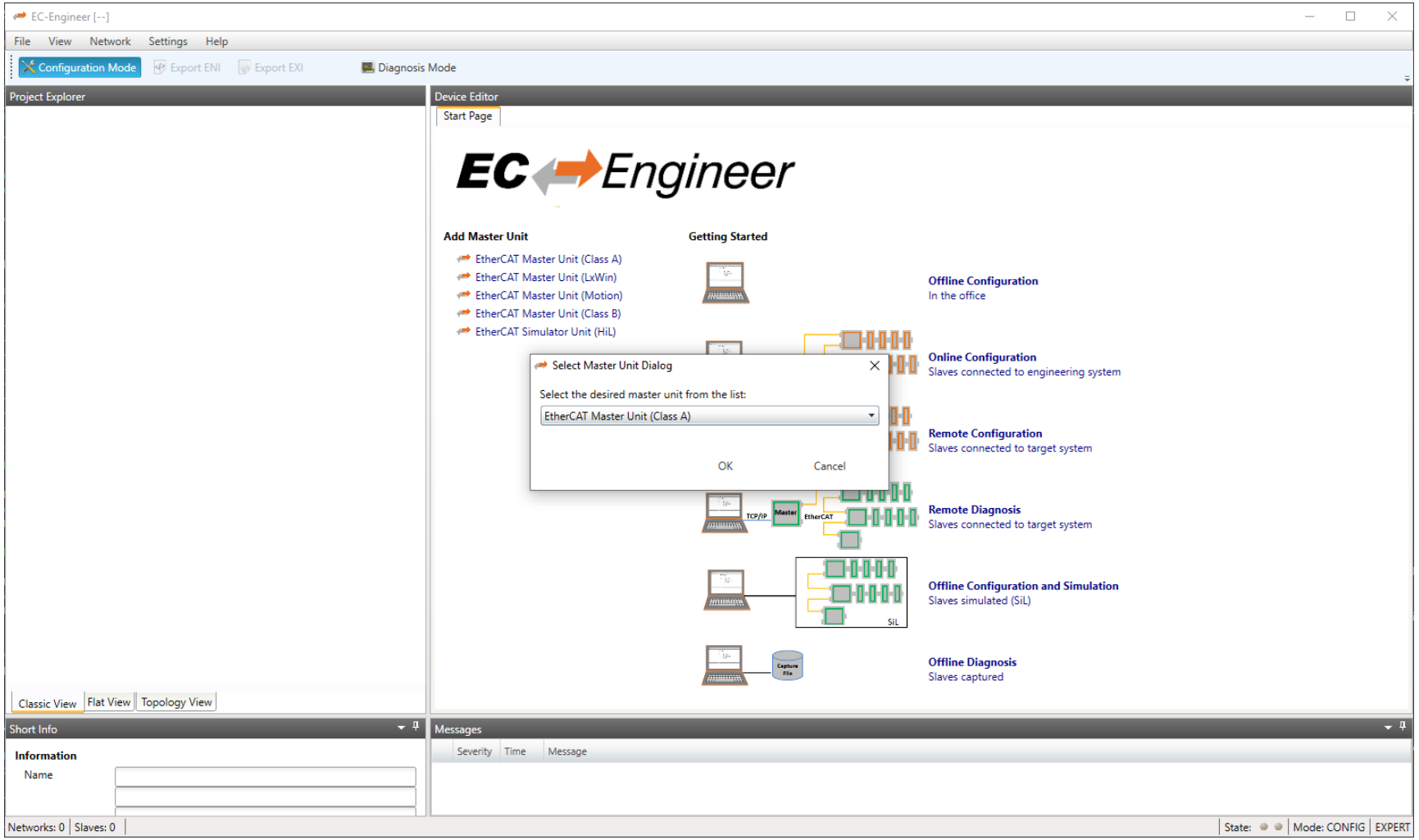
```
0000000182: Bus scan successful - 1 slaves found
0000000185: ***************************************************************************
0000000185: Slave ID.............: 0x00000000
0000000185: Bus Index............: 0
0000000185: Bus AutoInc Address.: 0x0000 (   0)
0000000185: Bus Station Address.: 0x03e9 (1001)
0000000185: Bus Alias Address...: 0x0000 (   0)
0000000185: Vendor ID............: 0x00004154 = acontis technologies GmbH
0000000185: Product Code.........: 0x00000101 = Unknown
0000000185: Revision.............: 0x00000000   Serial Number: 0
0000000185: ESC Type.............: Infineon (0x98)  Revision: 1  Build: 1
0000000185: Connection at Port A: yes (to 0x00010000)
0000000185: Connection at Port D: no (to 0xFFFFFFFF)
0000000185: Connection at Port B: no (to 0xFFFFFFFF)
0000000185: Connection at Port C: no (to 0xFFFFFFFF)
0000000185: Line Crossed.........: no
0000000185: Line Crossed Flags..: 0x0
0000000185: Cfg Station Address.: 0x03e9 (1001)
0000000185: PD IN    Byte.Bit offset: 0.0   Size: 72 bits (MSU  0)
0000000185: PD OUT   Byte.Bit offset: 0.0   Size: 72 bits (MSU  0)
0000000185: ***************************************************************************
0000000217: Master state changed from <UNKNOWN> to <INIT>
0000000361: Master state changed from <INIT> to <PREOP>
0000000471: Master state changed from <PREOP> to <SAFEOP>
0000000520: Master state changed from <SAFEOP> to <OP>
0000000525: EcMasterDemo will stop in 600s...
```

Online diagnosis of network with EC-Engineer
Step 1: Start EcMasterDemo

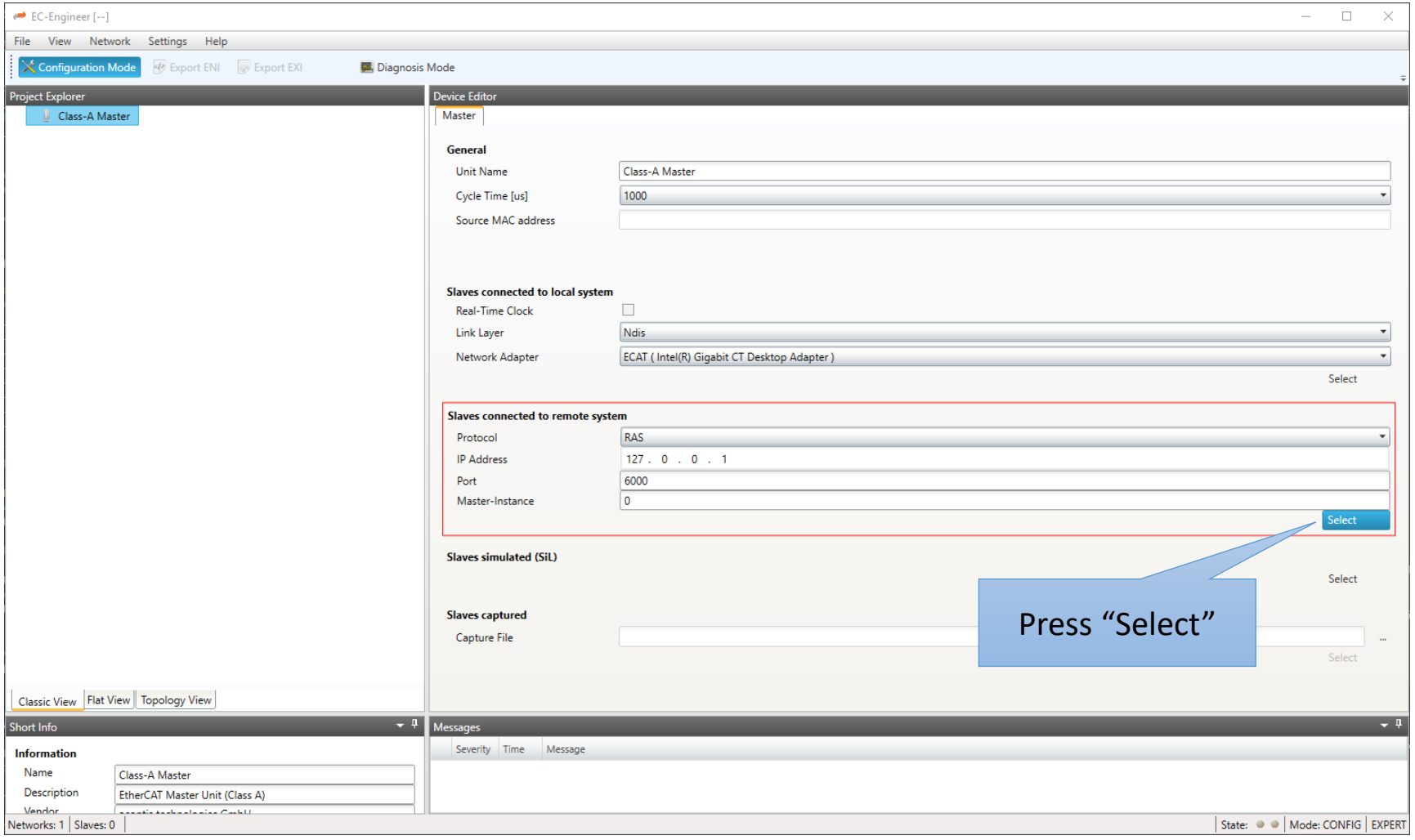
- Append *-sp* to Command Line Parameters
- Start EcMasterDemo

```
0000000019: emllNdis(\DEVICE\{866DDD08-2B16-4778-84F7-D985180E2DA6}): Ecat Ndis Driver Version 3.1.3.4
0000000019: EtherCAT network adapter MAC: 00-1B-21-AB-D1-93
0000000072: Protected version, stop sending ethernet frames after 60 minutes if not licensed!
0000001966: Bus scan successful - 1 slaves found
0000001992: ********************************************************************************
0000001992: Slave ID.............: 0x00000000
0000001992: Bus Index............: 0
0000001992: Bus AutoInc Address.: 0x0000 (   0)
0000001992: Bus Station Address.: 0x03e9 (1001)
0000001992: Bus Alias Address...: 0x0000 (   0)
0000001992: Vendor ID............: 0x00004154 = acontis technologies GmbH
0000001992: Product Code.........: 0x00000101 = Unknown
0000001992: Revision.............: 0x00000000   Serial Number: 0
0000001992: ESC Type.............: Infineon (0x98)  Revision: 1  Build: 1
0000001992: Connection at Port A: yes (to 0x00010000)
0000001992: Connection at Port D: no (to 0xFFFFFFFF)
0000001992: Connection at Port B: no (to 0xFFFFFFFF)
0000001992: Connection at Port C: no (to 0xFFFFFFFF)
0000001992: Line Crossed.........: no
0000001992: Line Crossed Flags..: 0x0
0000001992: Cfg Station Address.: 0x03e9 (1001)
0000001992: PD IN    Byte.Bit offset: 0.0   Size: 72 bits (MSU  0)
0000001992: PD OUT   Byte.Bit offset: 0.0   Size: 72 bits (MSU  0)
0000001992: ********************************************************************************
0000002250: Master state changed from <UNKNOWN> to <INIT>
0000003433: Master state changed from <INIT> to <PREOP>
0000004331: Master state changed from <PREOP> to <SAFEOP>
0000004739: Master state changed from <SAFEOP> to <OP>
0000004761: EcMasterDemo will stop in 600s...
```

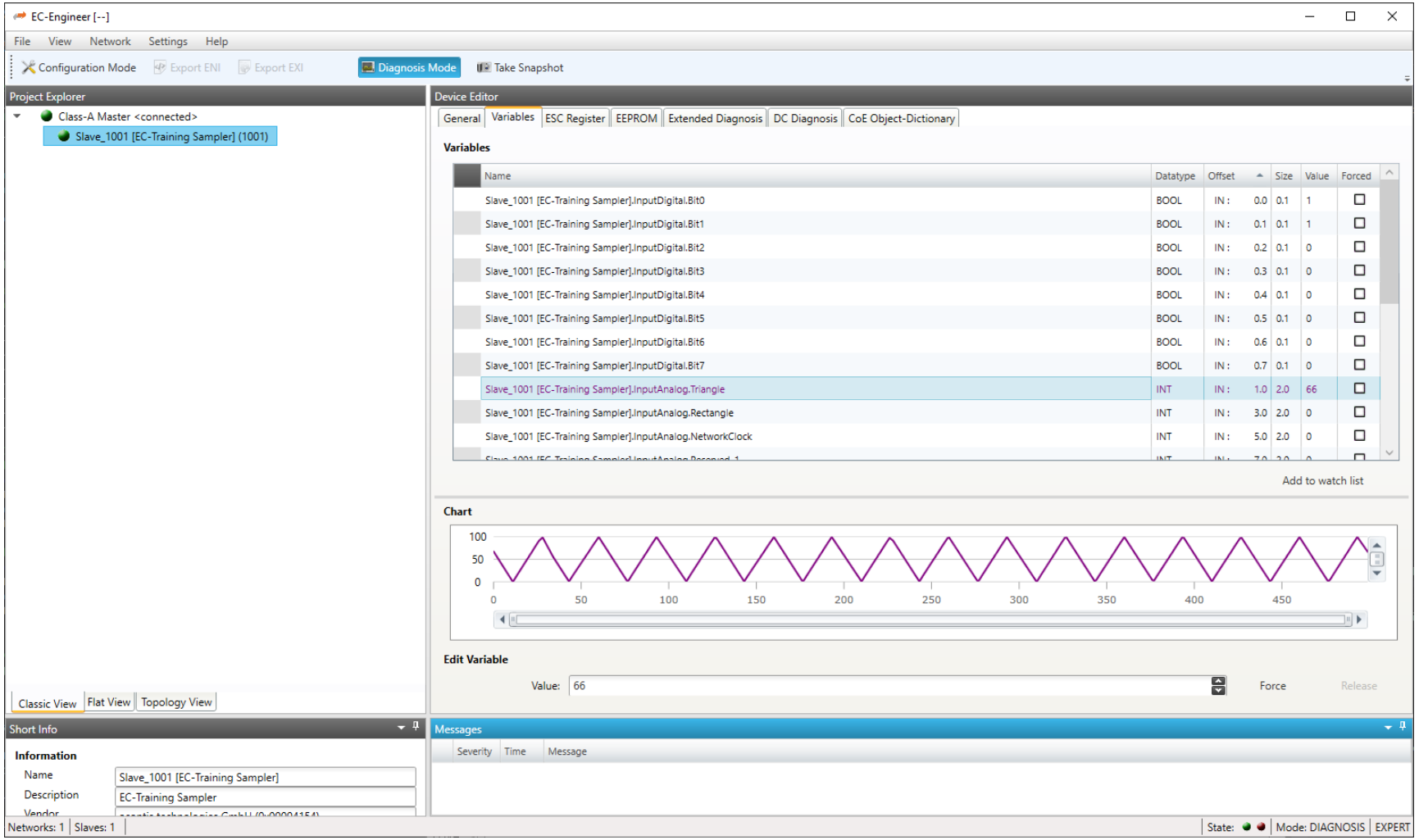
Online diagnosis of network with EC-Engineer
Step 2: Start EC-Engineer and select “Remote Diagnosis”



Connect EC-Engineer to EcMasterDemo
Step 3: Choose “Slaves connected to remote system”



Online diagnosis of network with EC-Engineer
Step 4: Select Slave and check input and force output variables



Test EC-Engineer online functions

- Monitor inputs
- Force outputs
- Slave states
- Change master and/or slave state
- CoE Object Dictionary
- Extended Diagnosis