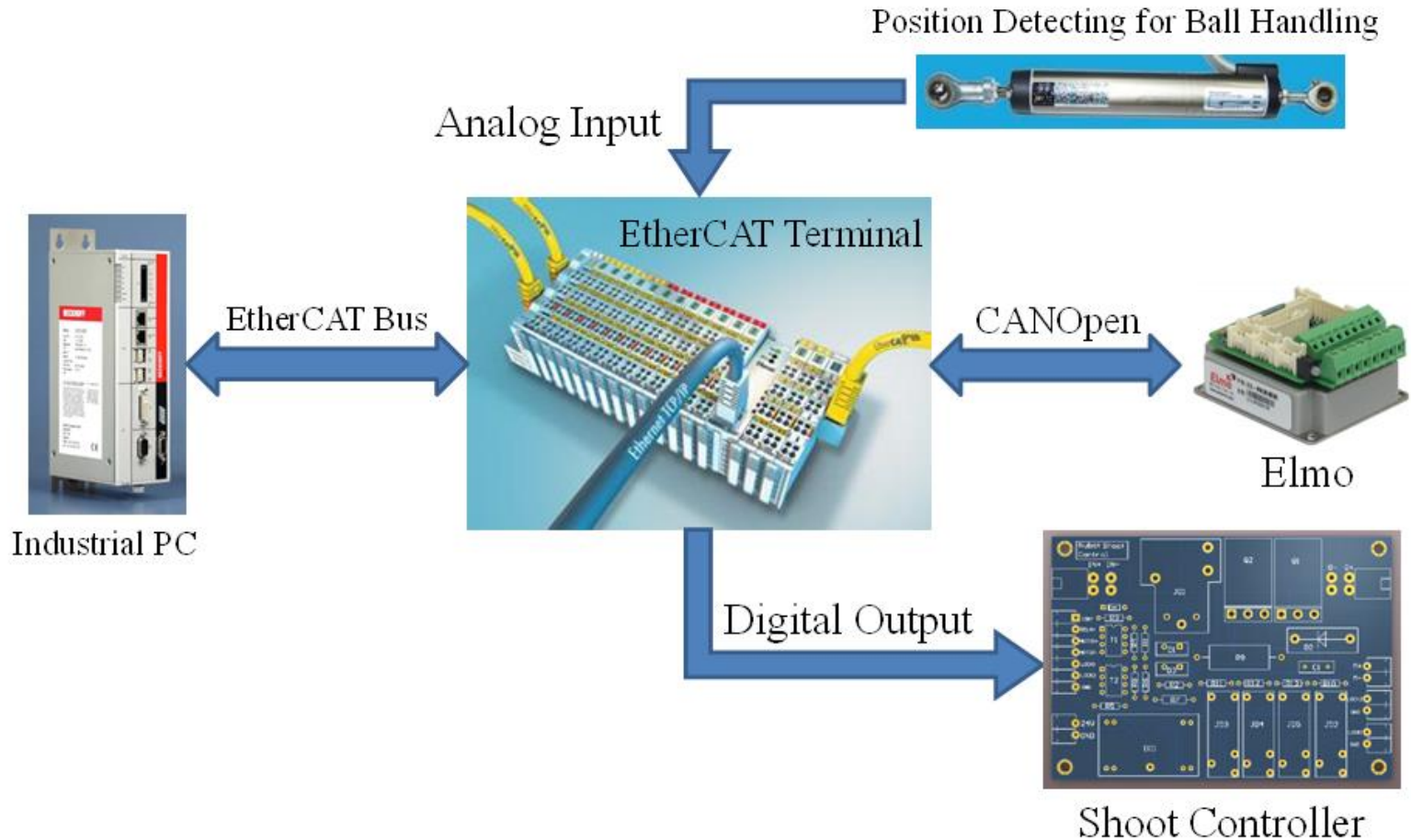# EL6751 Configuration Using SOEM under Ubuntu Linux

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For RoboCup MSL Workshop

2014.11.10, Eindhoven

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NuBot Electrical System

Position Detecting for Ball Handling

Analog Input

EtherCAT Terminal

EtherCAT Bus

Industrial PC

CANOpen

Elmo

Digital Output

Shoot Controller
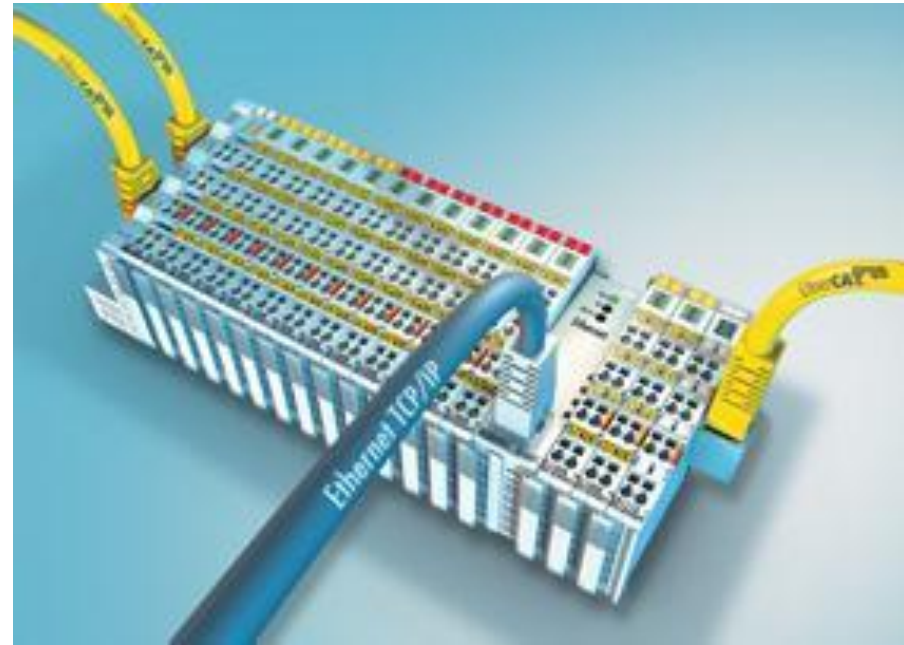
◆ Industrial PC

SIZE： (W x H x D) 65 x 231 x 116 mm (2.6" x 9.1" x 4.6")；
CPU： Intel® Core™ i7，4 Cores；
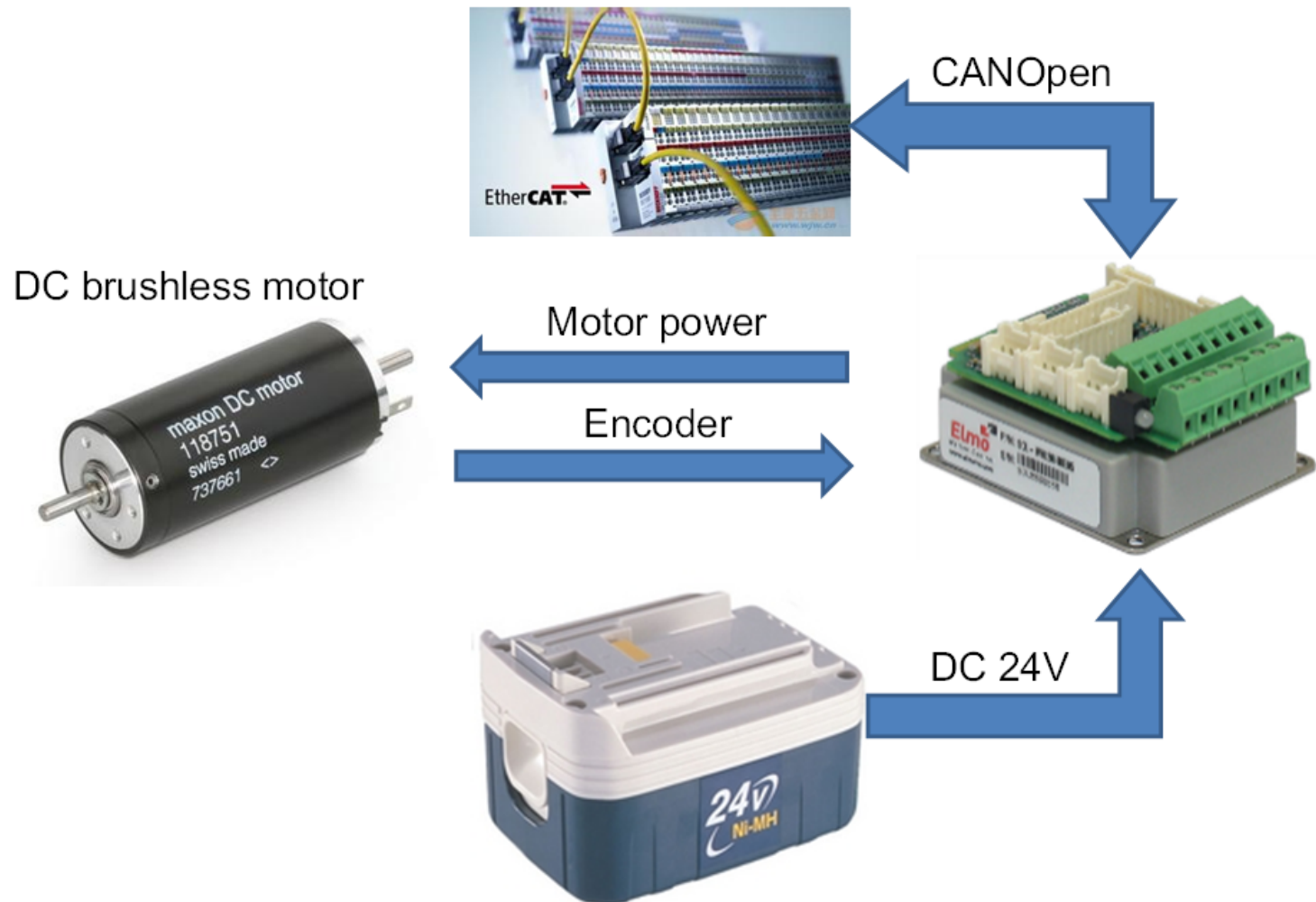RAM： 8G，DDR3；
HDD： 60G SSD；
POWER： DC 24V.

◆ EtherCAT Terminals

- **EK1100**
  The EtherCAT Coupler terminal which is essential.

- **EL2008**
  Digital Output terminal for shooting control.

- **EL6751**
  Gateway terminal to bridge EtherCAT with CANOpen.

- **EL3064-0010**
 Analog Input terminal for ball handling position detecting.

◆ Elmo motor controller

CANOpen

EtherCAT

DC brushless motor

maxon DC motor
118751
swiss made
737661

Motor power

Encoder

Elmo

DC 24V

24V
Ni-MH

◆ EL6751 Configuration Using SOEM

- SOEM is Simple Open-source EtherCAT Master.

- The configuration of EL6751 using SOEM is quite complex!

  - Few people have configured EL6751 successfully using SOEM.

- Solution:

  - Generate Startup codes and configuration codes with the help of TwinCAT, which is supported by Beckhoff.

  - Configure EL6751 with the codes generated above using simple functions of SOEM.

◆ The following is the configuration codes generation using TwinCAT

a. Open TwinCAT System Manager application
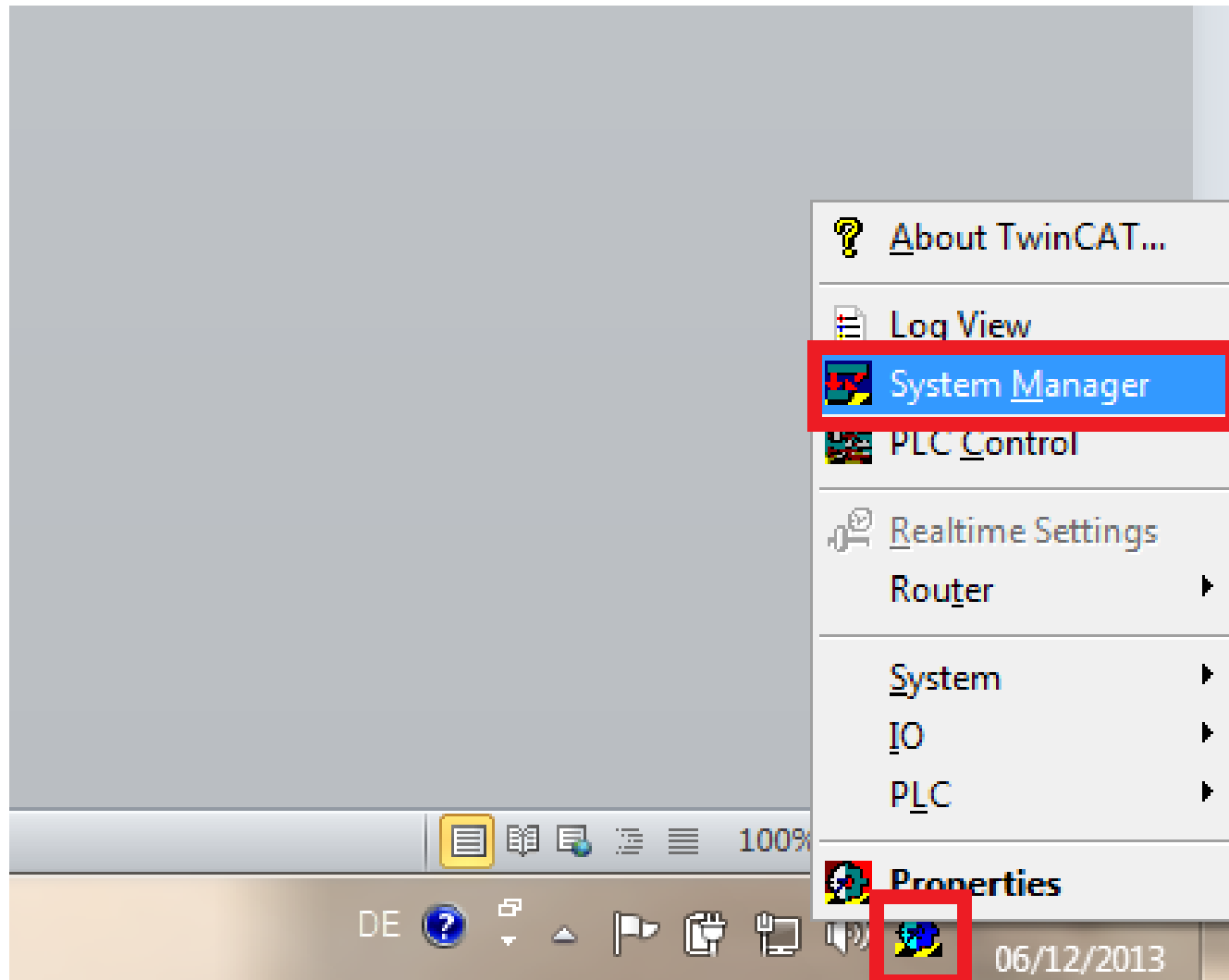
b. Create cyclic Task (necessary to give the CANopen config a cycle time)

- Create Task (name is in influent)
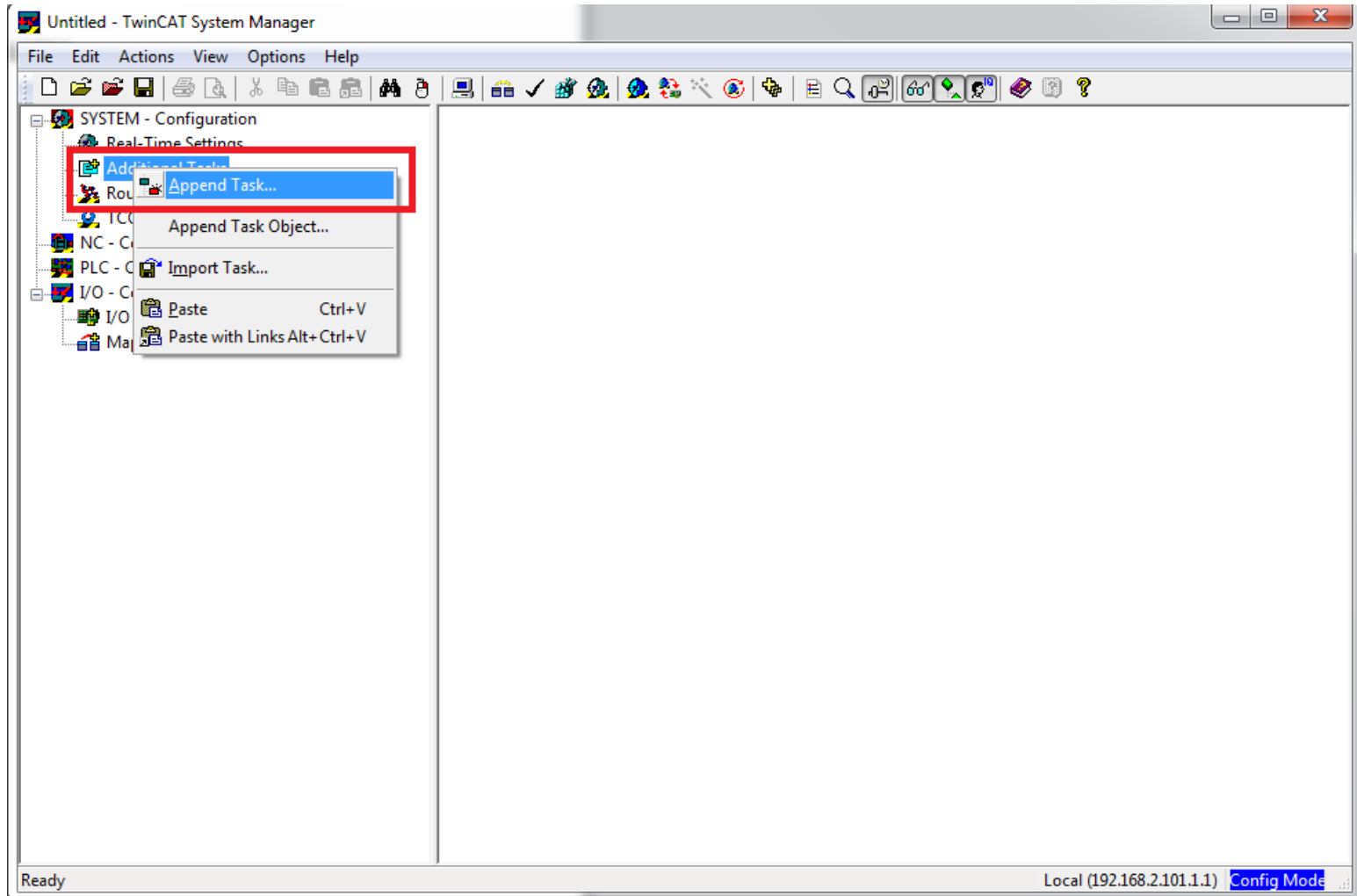
b. Create cyclic Task (necessary to give the CANopen config a cycle time)

•Enable task and set the desired cycle time as multiple of 1ms
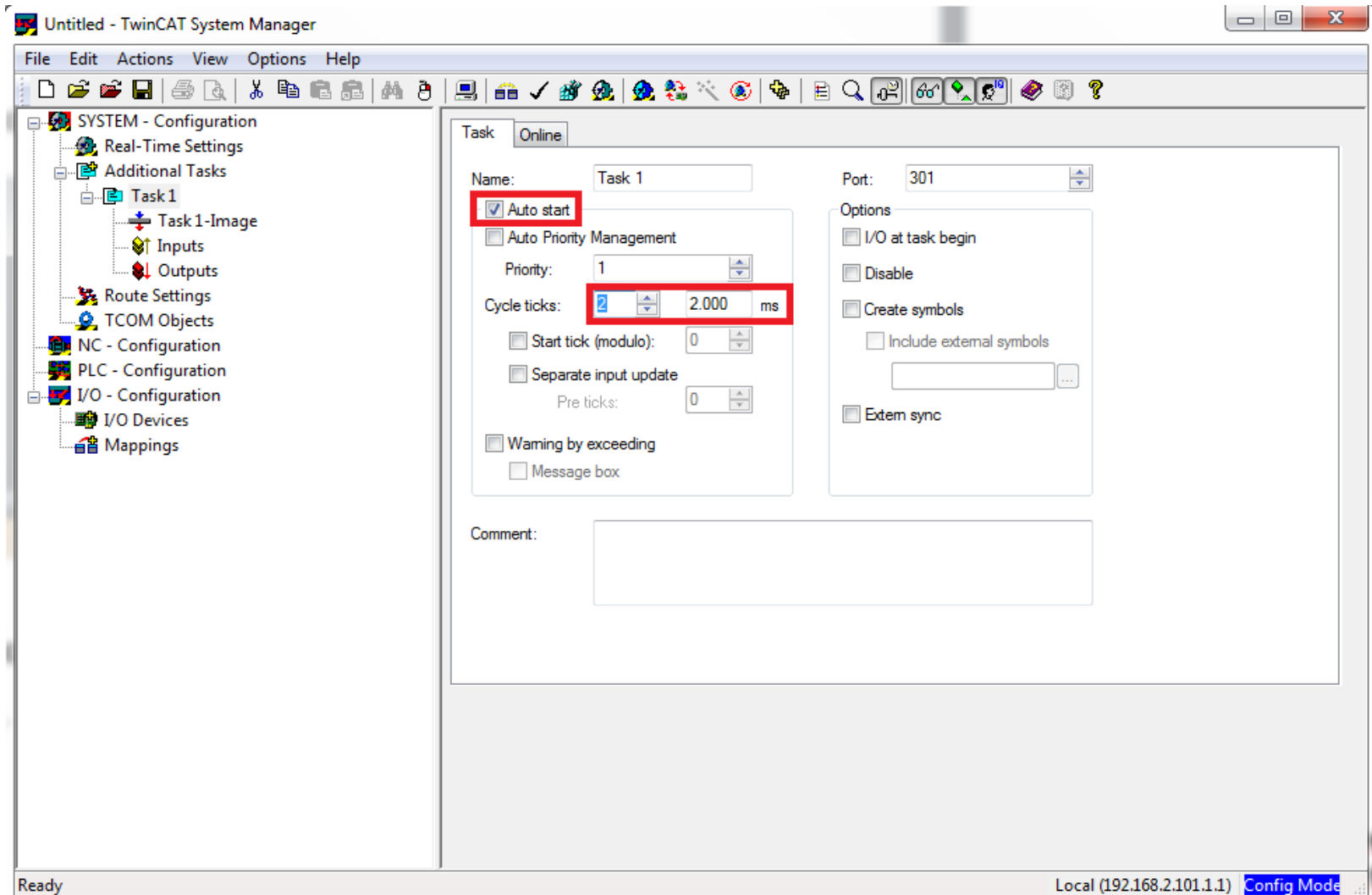
b. Create cyclic Task (necessary to give the CANopen config a cycle time)

- Create an Input variable of BYTE type (name is in influent)
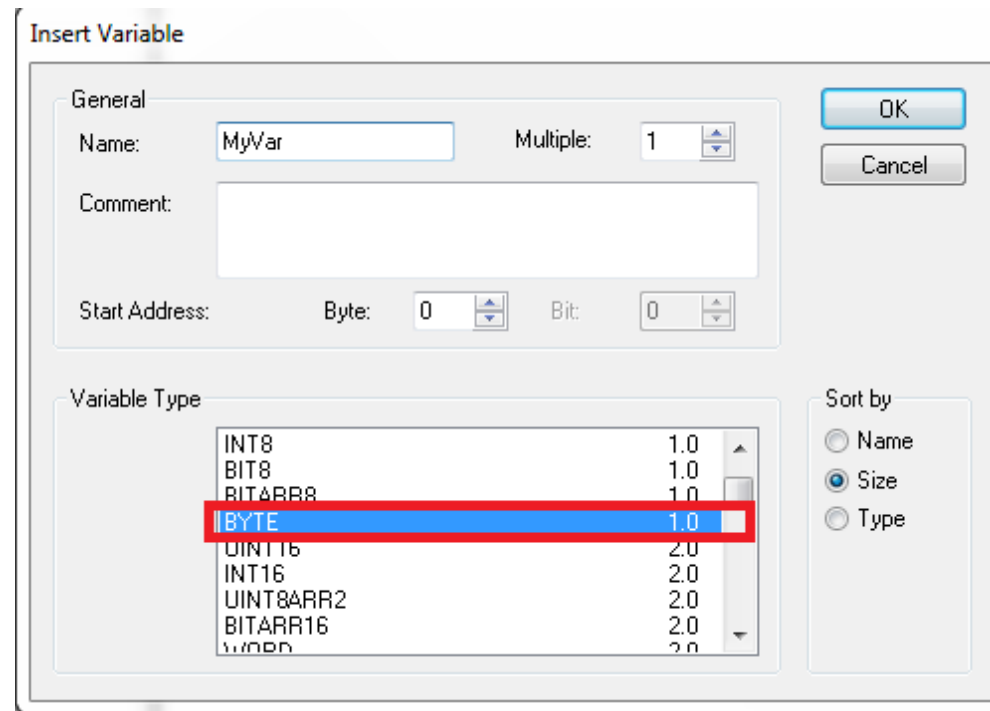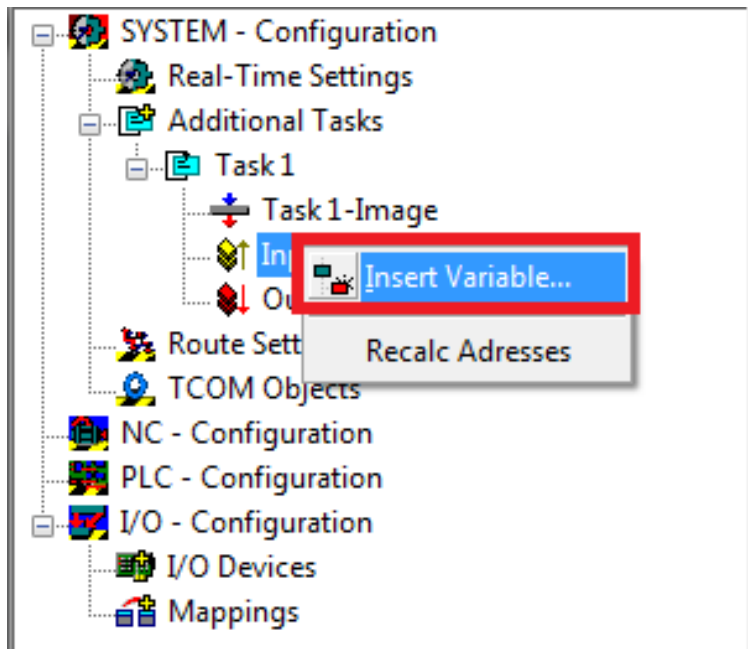
c. Configure EtherCAT network

• Append EtherCAT Master functionality
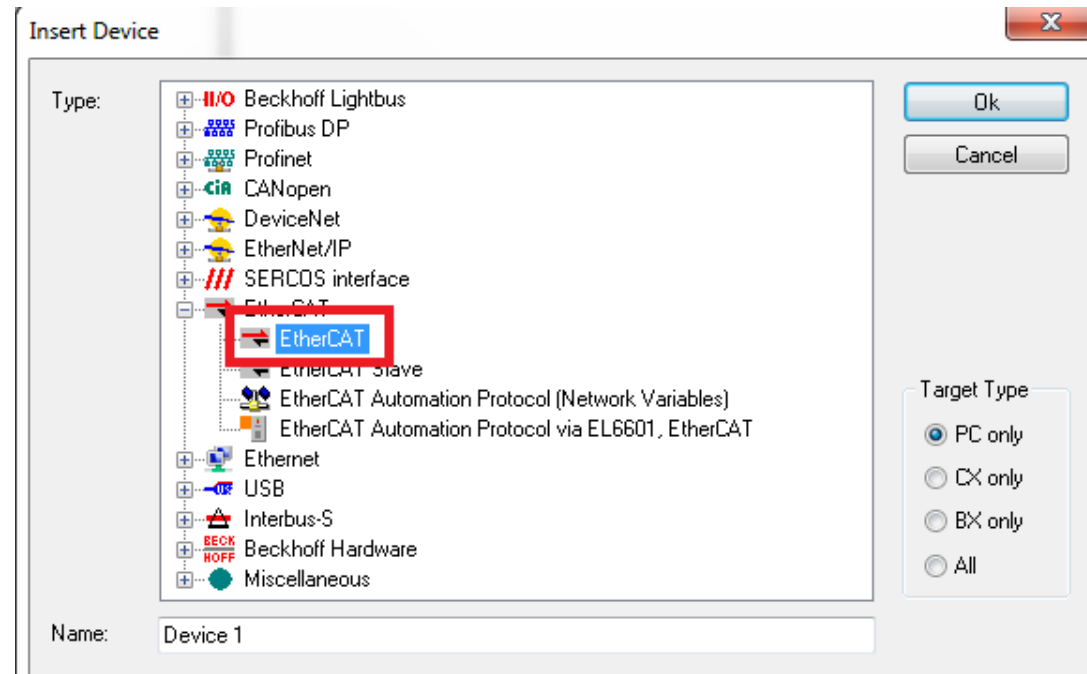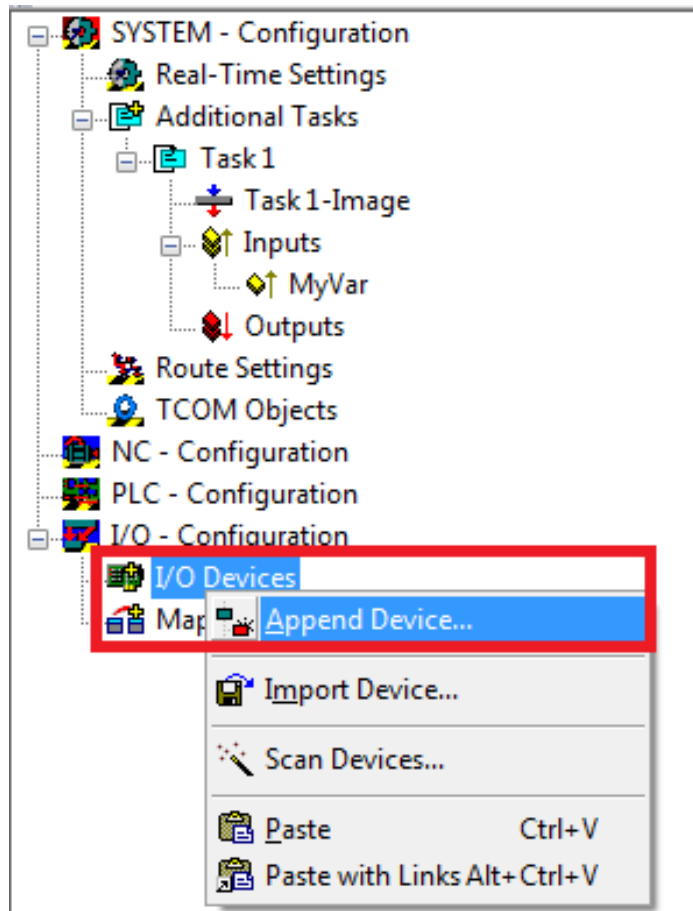
c. Configure EtherCAT network

• Append EK1100 coupler
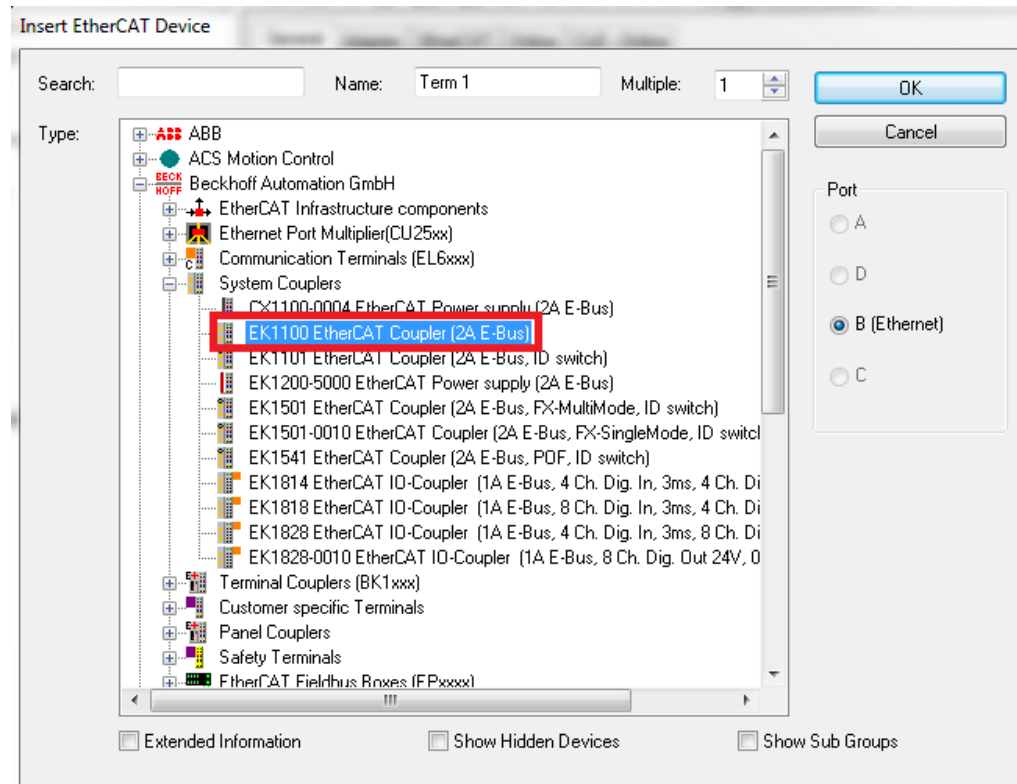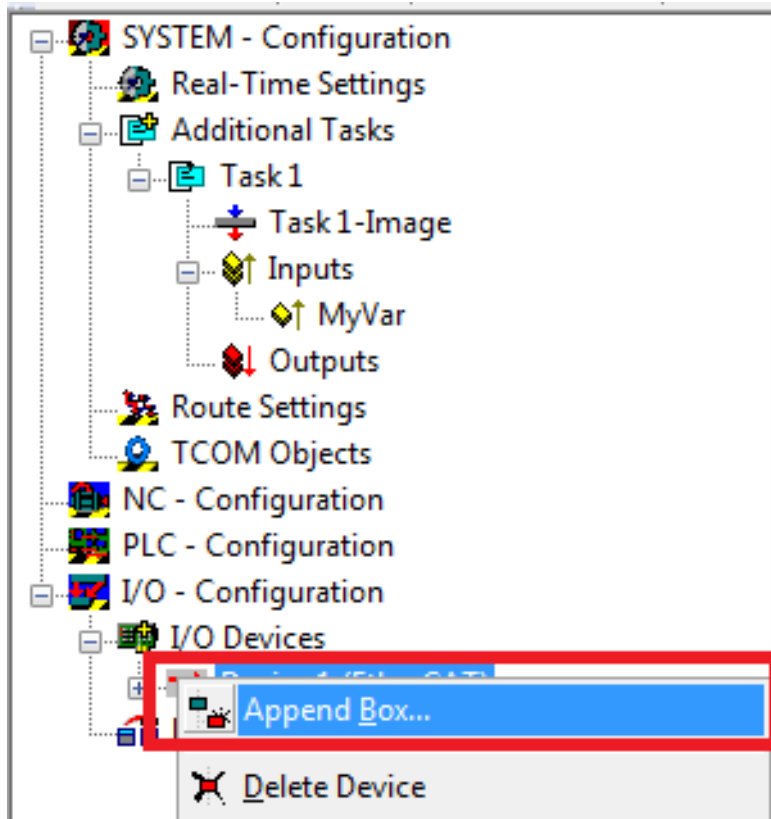
c. Configure EtherCAT network

- Append EL6751
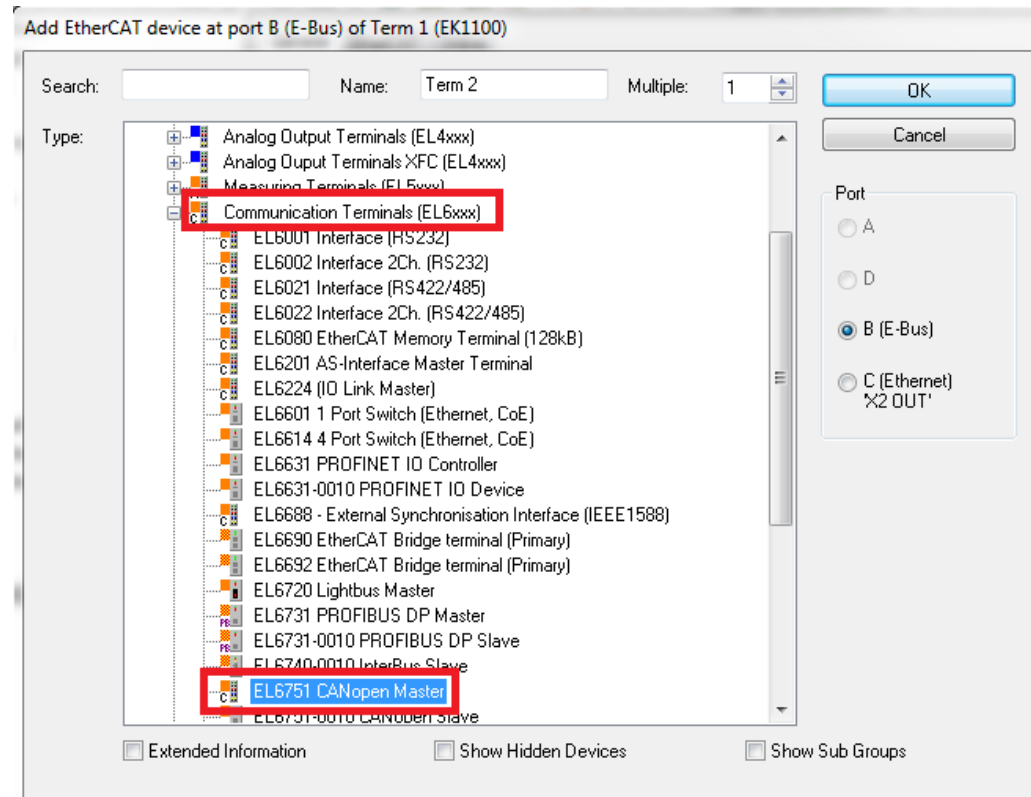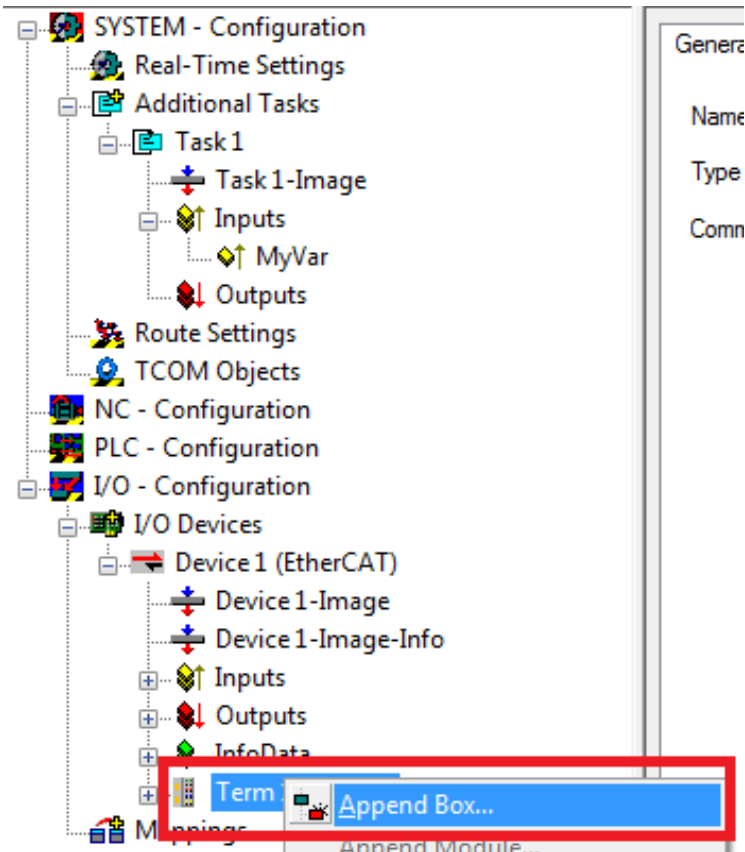
d. Append CANopen network configurator

• Append CANopen Master functionality
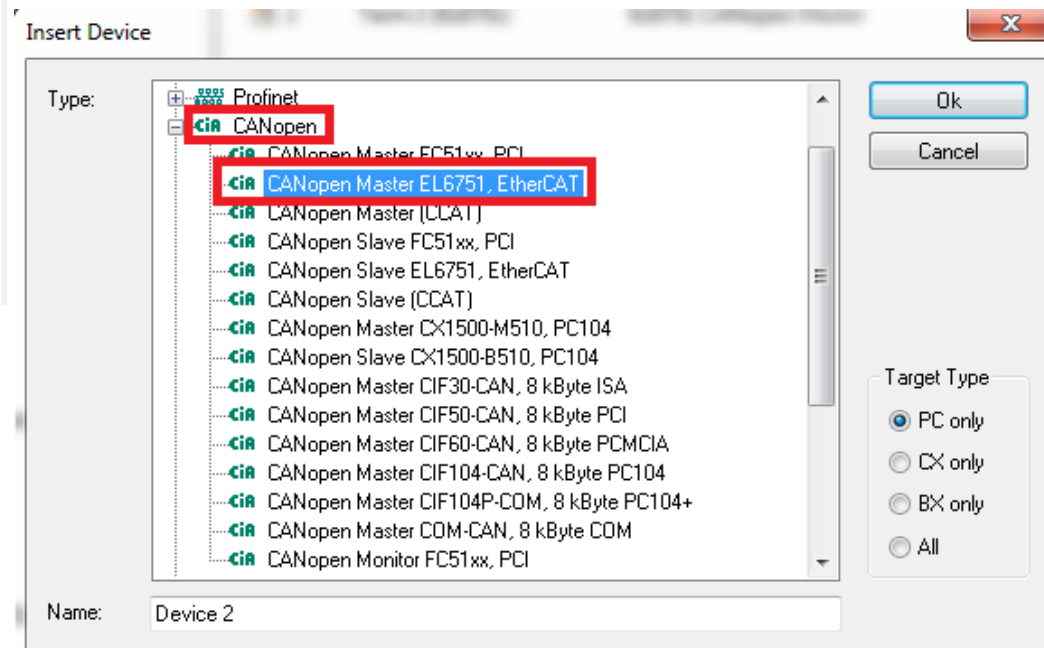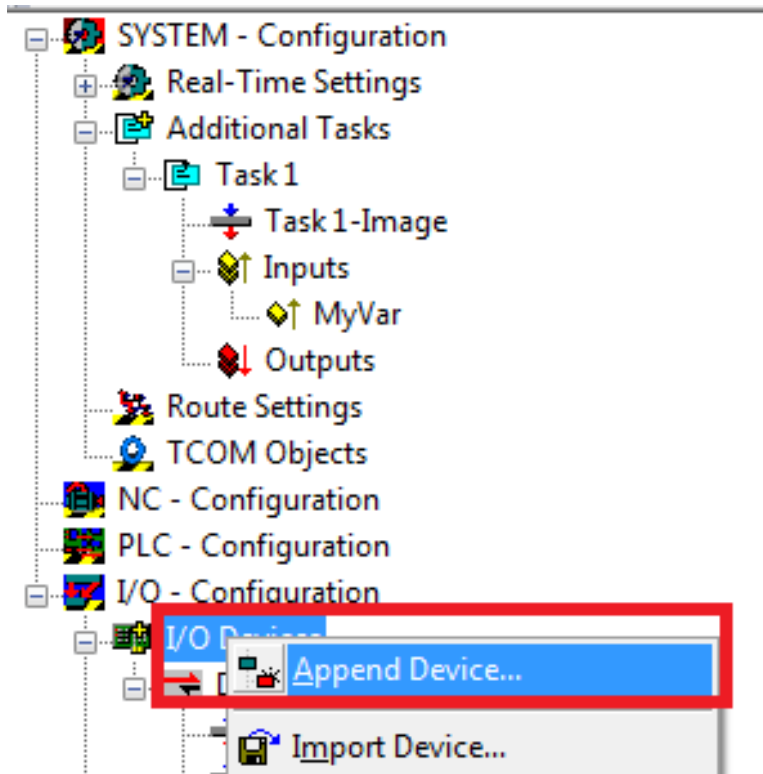
d. Append CANopen network configurator

- Check always correct association with EL6751

d. Append CANopen network configurator

• Enable MDP mapping for EL6751 (necessary to use EL6751 with non-TwinCAT masters)

d. Append CANopen network configurator

• Append the desired CANopen Slaves
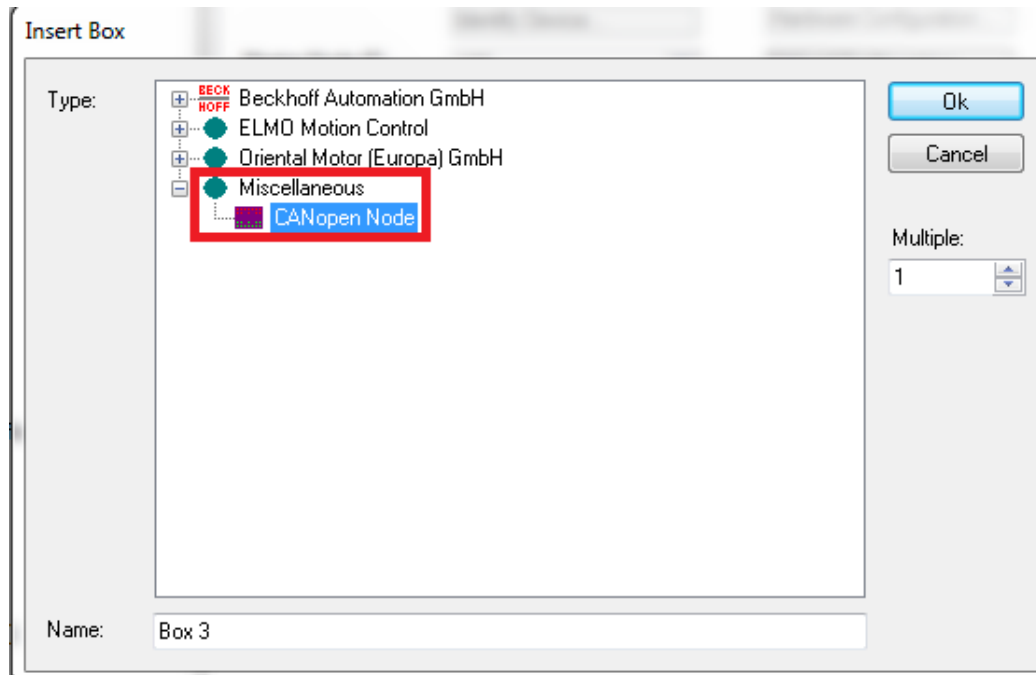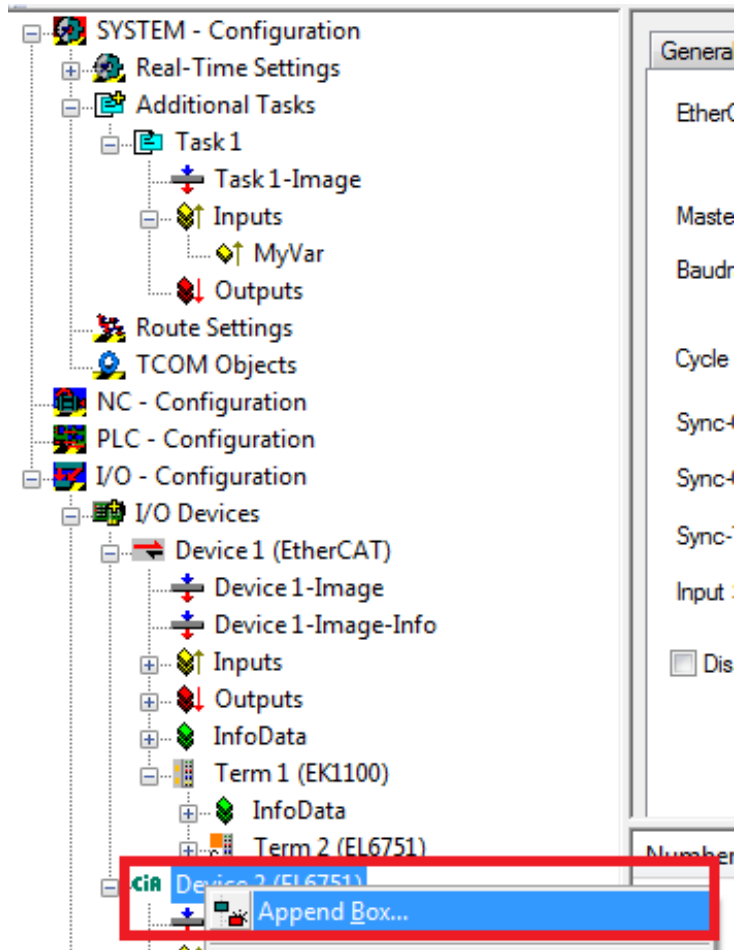
d. Append CANopen network configurator

• For CANopen slaves (Layer 7) : import properties from EDS
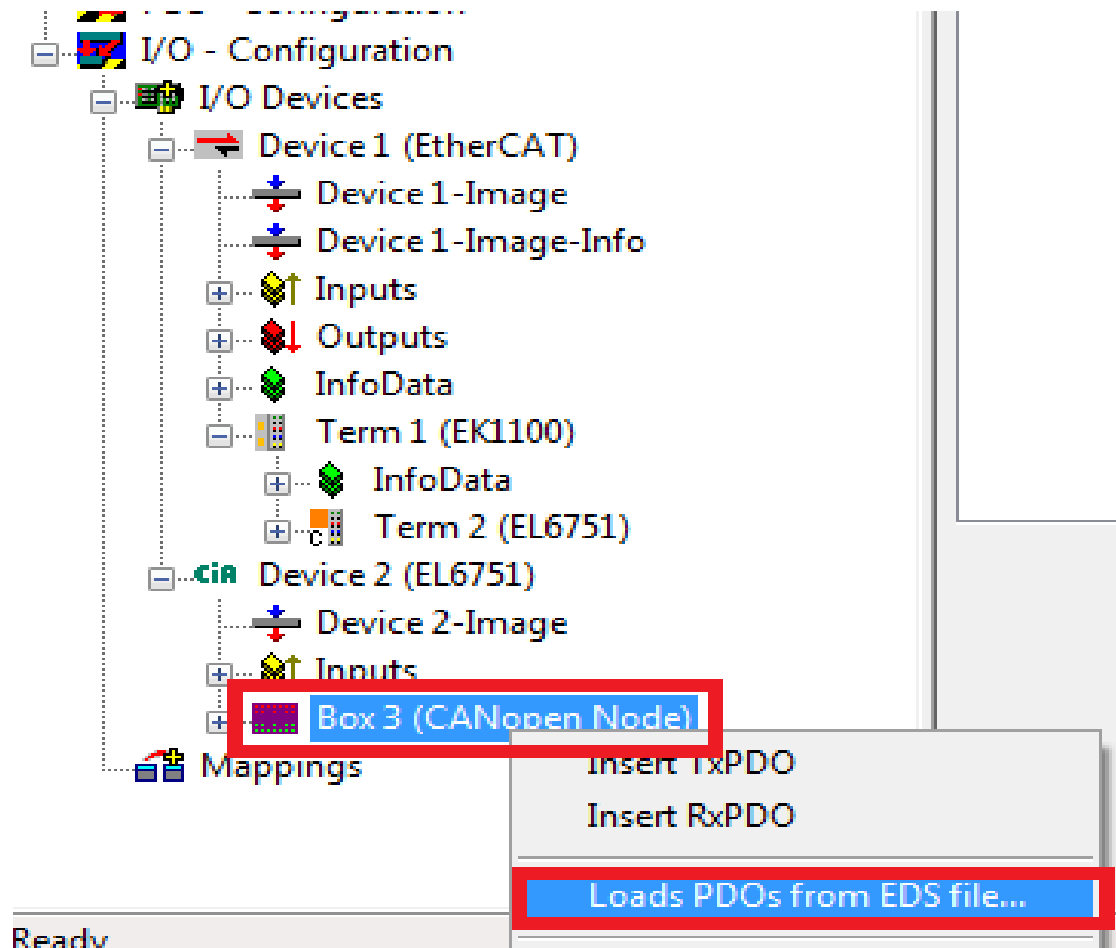
d. Append CANopen network configurator

- For CAN bus slaves (Layer 2) : disable Layer 7

e. Configure the CANopen properties of the master

• Configure network Baud-Rate and Master CAN address, as well as other properties
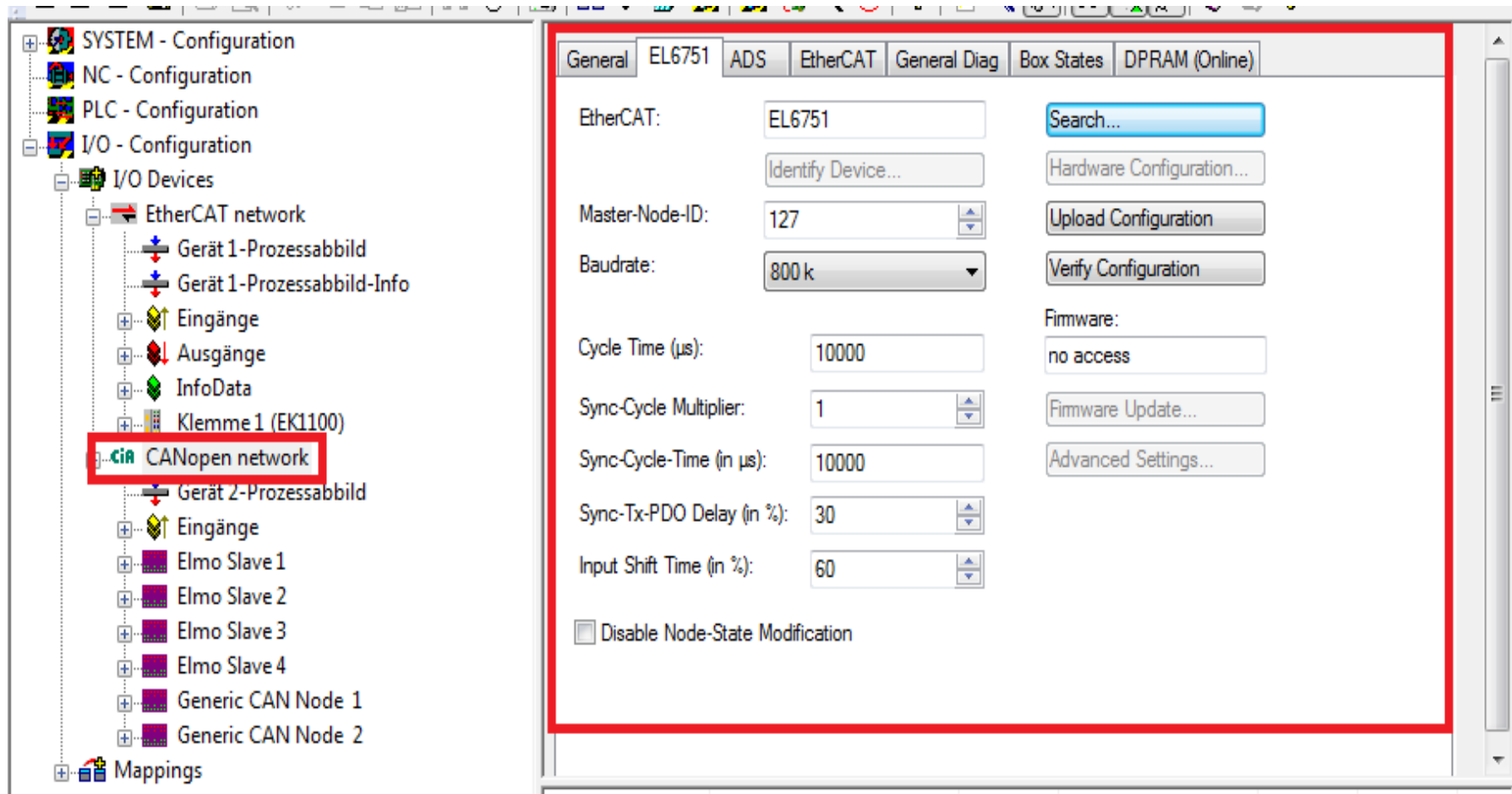
f. Configure the CANopen properties of your nodes

• For CANopen slaves : communication properties (will be EtherCAT objects 0x8yz0)

f. Configure the CANopen properties of your nodes

• For CANopen slaves : PDO properties (PDO Cob-Ids are automatically set according to the node address according to the CANopen rule, will be EtherCAT objects 0x8yz6 and 0x8yz8)
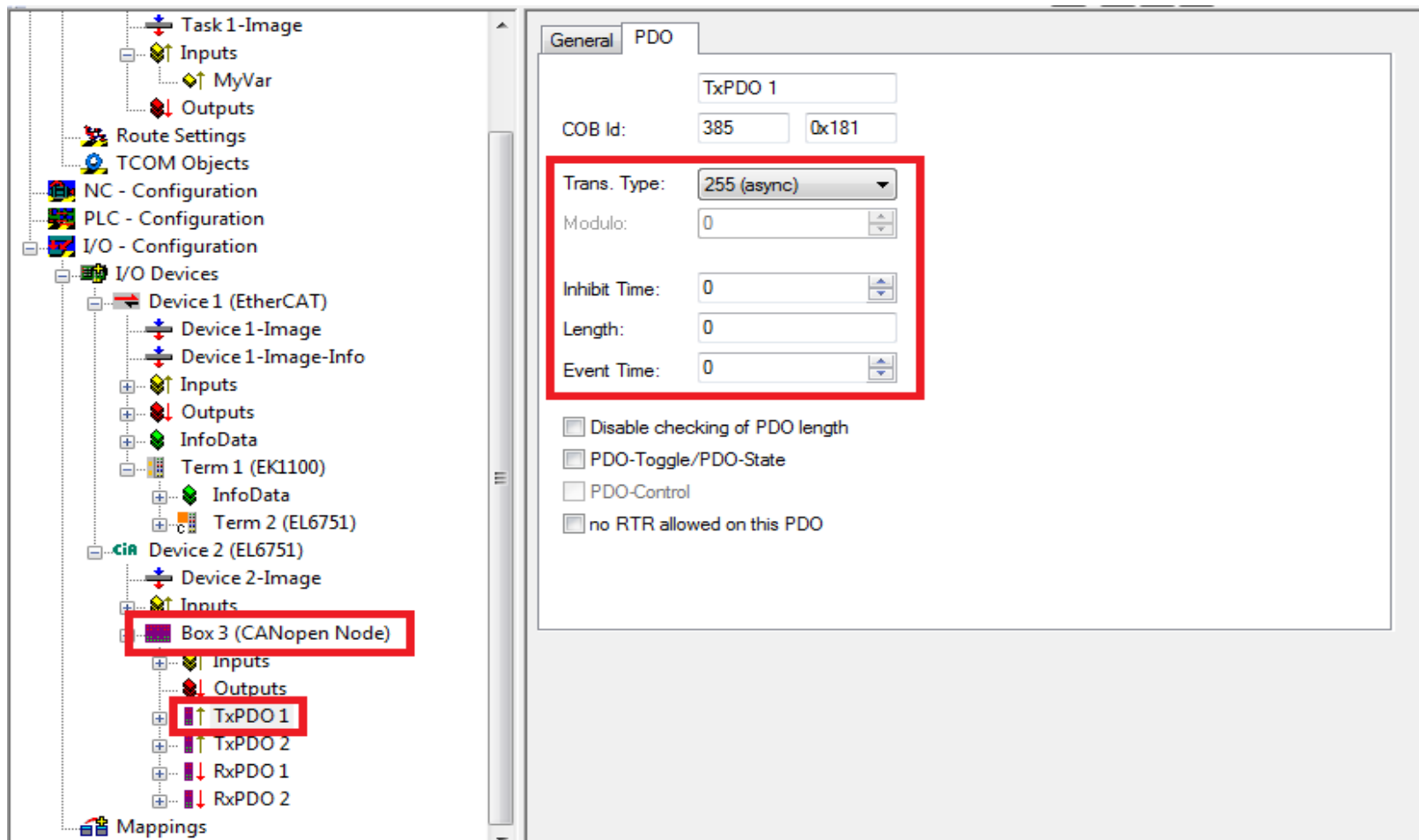
f. Configure the CANopen properties of your nodes

• For CANopen slaves : start-up SDOs (will be EtherCAT objects 0x8yz3)

f. Configure the CANopen properties of your nodes
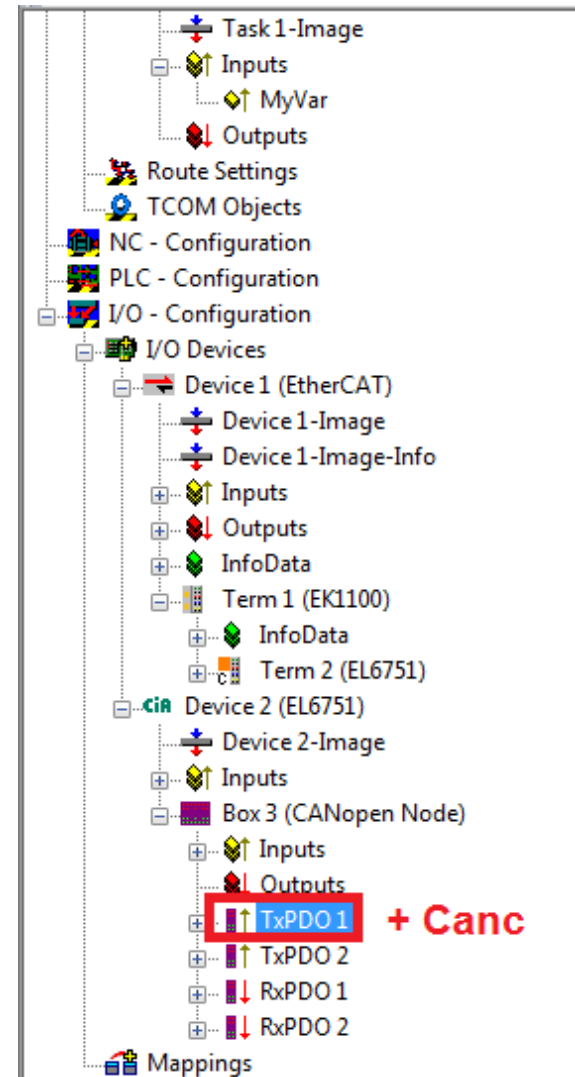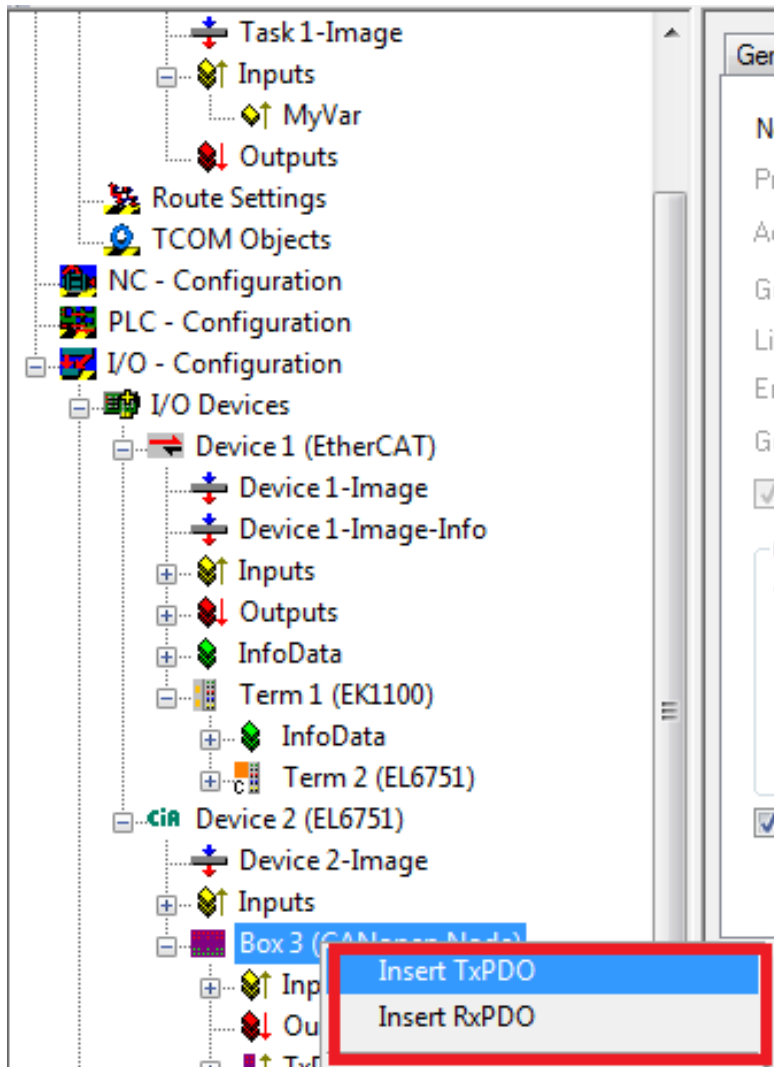
• For CAN bus slaves : set address

f. Configure the CANopen properties of your nodes
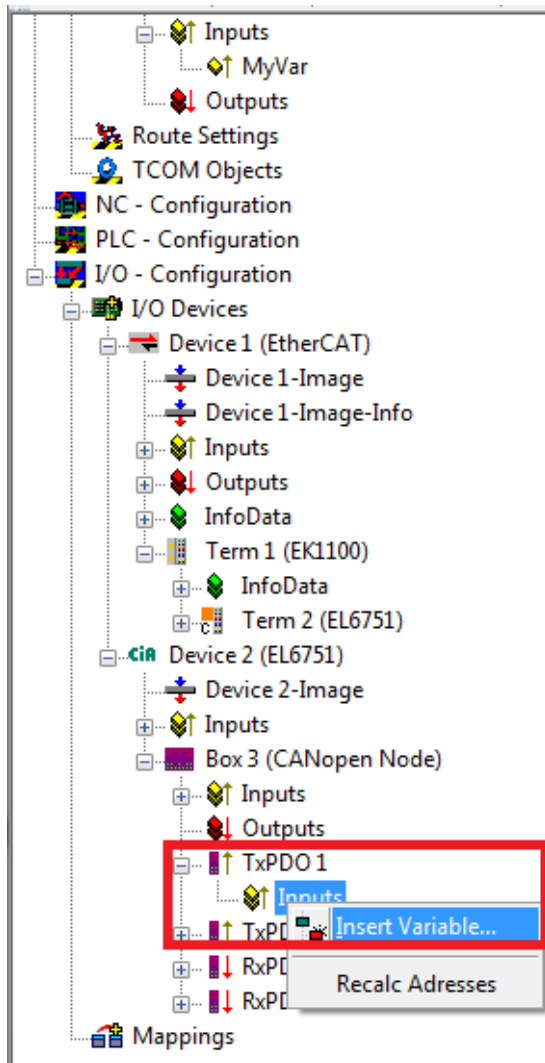
- For CAN bus slaves : freely choose Cob-Id of telegrams
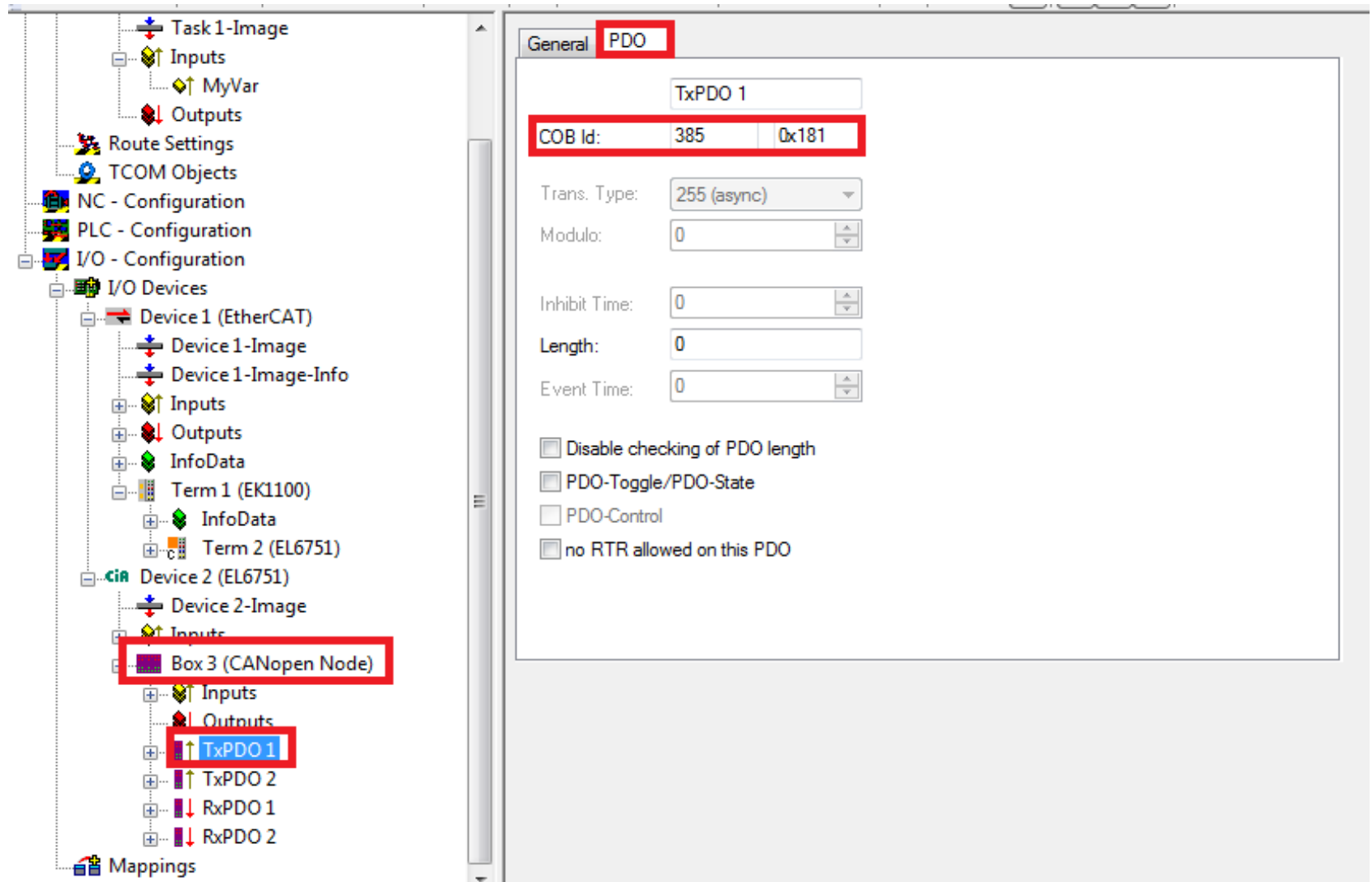
f. Configure the CANopen properties of your nodes

• For CAN bus slaves : add/remove telegrams
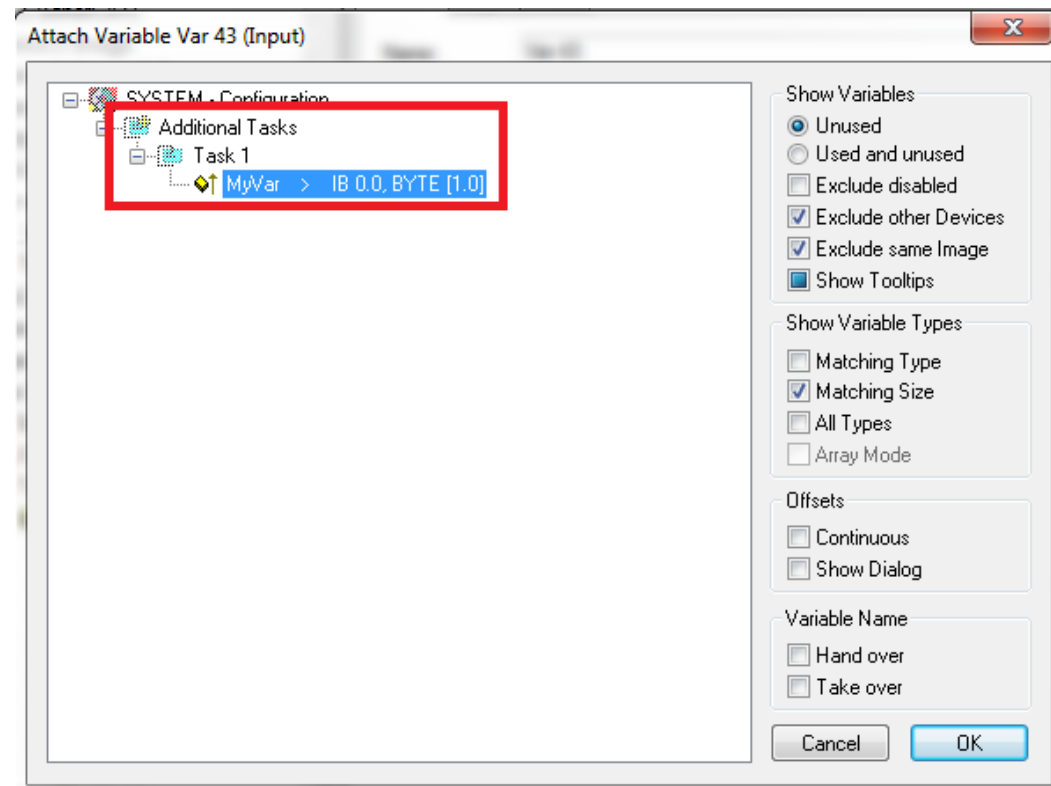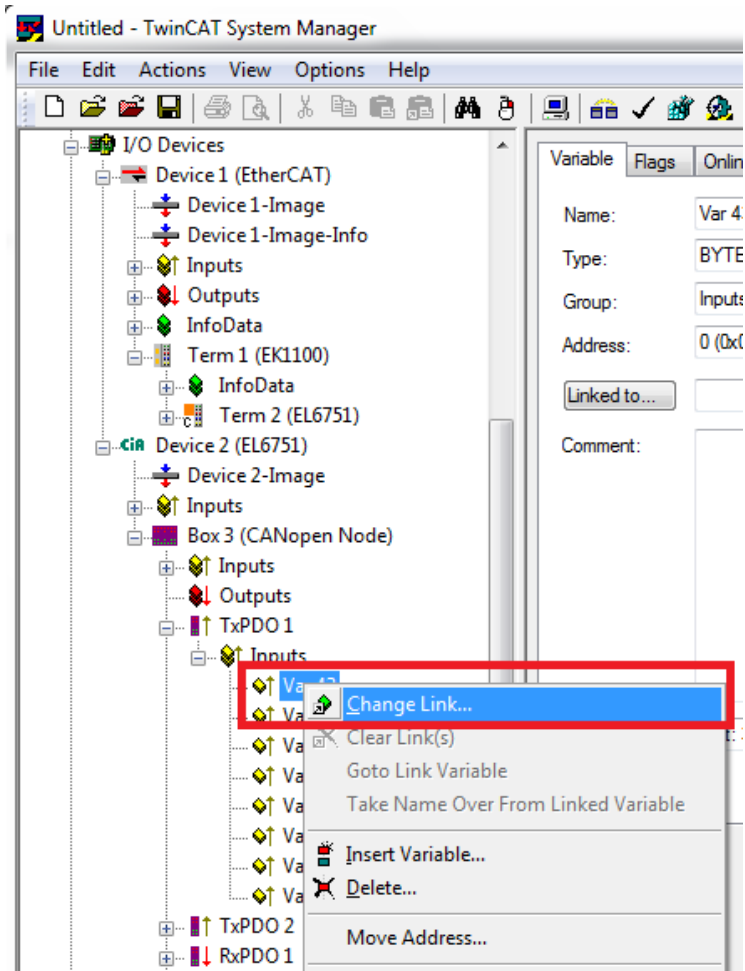
f. Configure the CANopen properties of your nodes

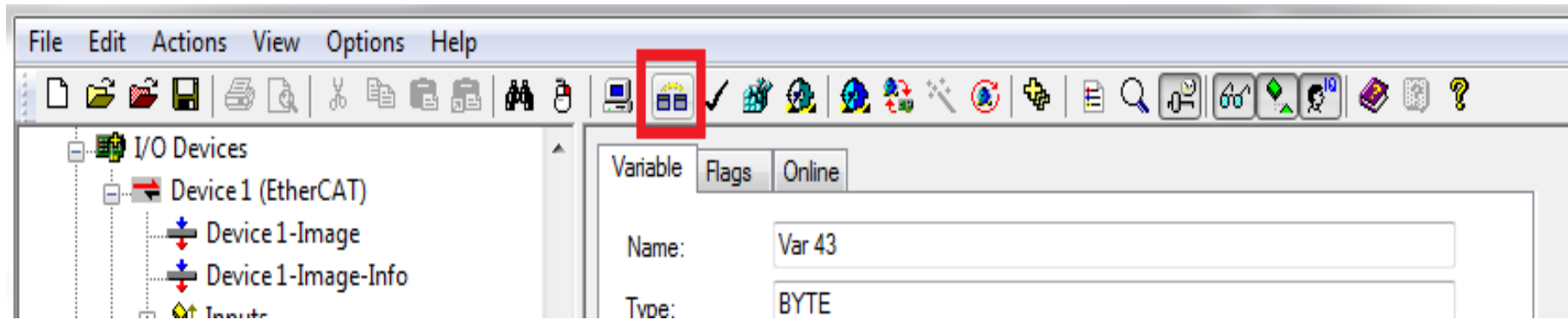• For CAN bus slaves : freely configure multiple of BYTE for each telegram (max 8 bytes)
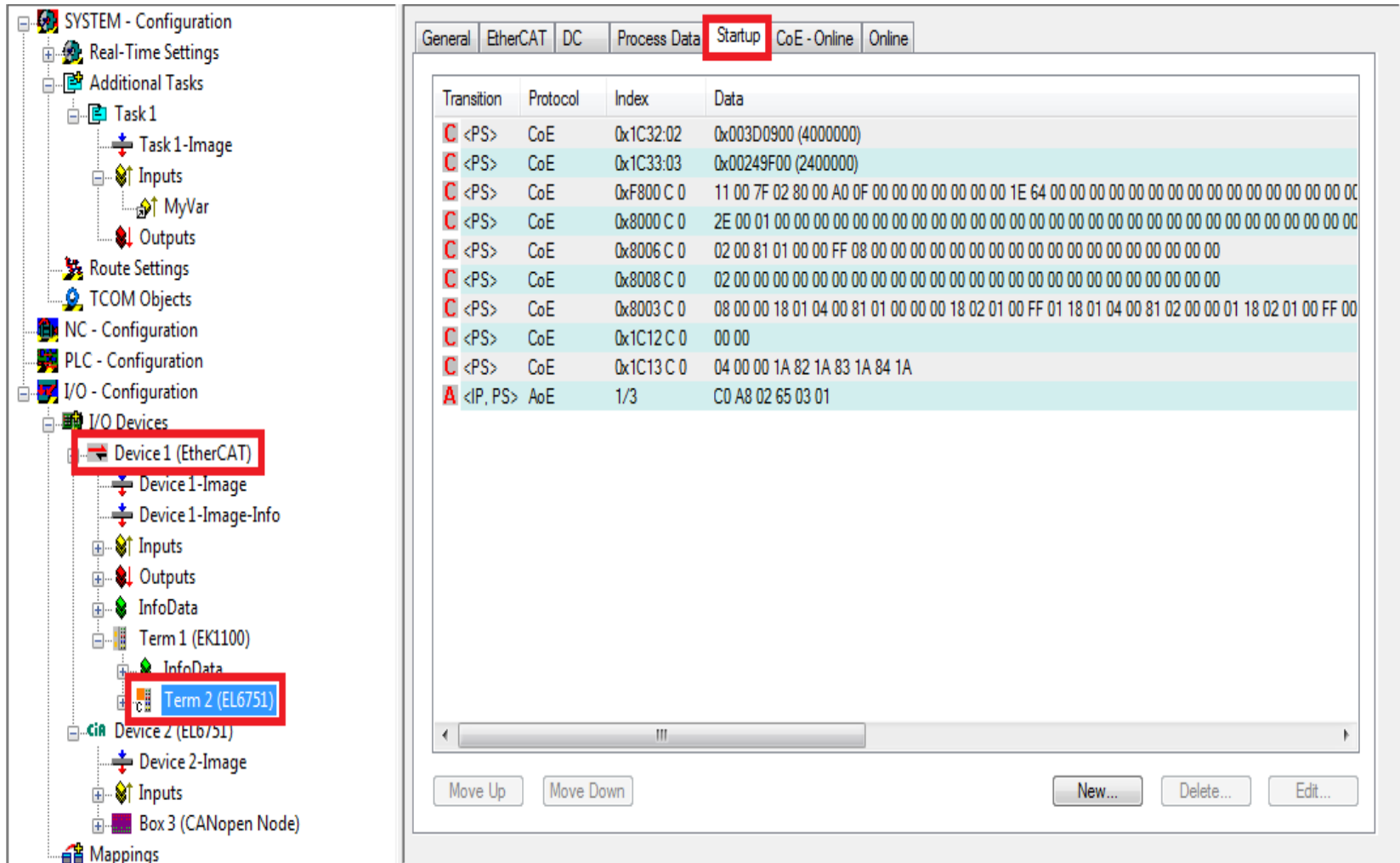
g. Link CANopen variable to cyclic Task (associate timing to CANopen)

h. Validate configuration

i. Read EtherCAT Start-Up list for EL6751 (final result of the configuration)

j. Read EtherCAT Init Commands for EL6751 (final result of the configuration)