acontis technologies GmbH

SOFTWARE

EC-Master

Feature Pack EoE-Gateway

Version 3.2

Edition: June 18, 2025

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Contents

1 Introduction **4**

2 Prerequisites **5**
2.1 EC-Master installation 5
2.2 Information about IPv4 networks, EoE IP addresses (ENI) 5

3 EC-EoE Gateway for Windows **6**
3.1 Installation 6
3.2 EoE IPv4 configuration 7
3.3 Gateway configuration and run control 8

4 EC-EoE Gateway for Linux **10**
4.1 Installation 10
4.2 Ubuntu systemd service 10
4.3 Manually running EcEoeGateway application 11

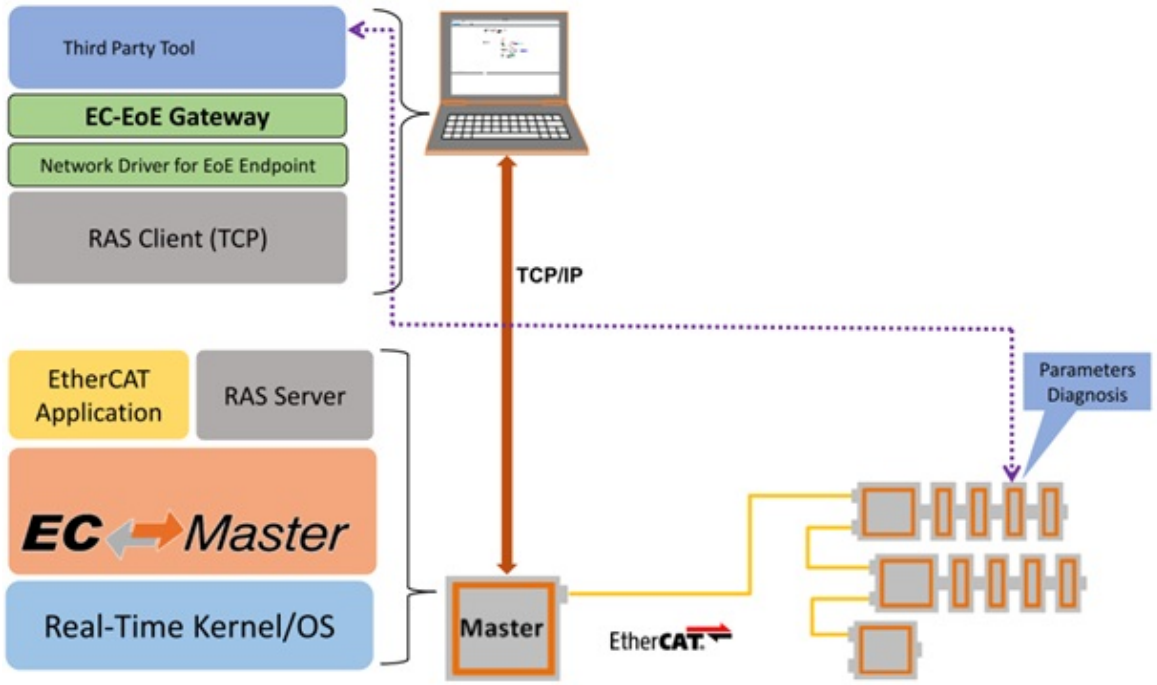
5 Diagnosis and troubleshooting **12**

1 Introduction

The EC-EoE Gateway is a helper application to enable virtual networking with EoE devices.

The *Network Driver for EoE Endpoint* is the interface to a virtual network (TAP) adapter installed at the operating system and is part of the EC-EoE Gateway. The RAS connection is a TCP/IP connection between the EC-EoE Gateway and the Master. The Master must open the *RAS Server* TCP port in order that the EC-EoE Gateway can connect using its *RAS Client*.

A Third-Party Tool can use TCP/IP to communicate with slave.



2 Prerequisites

2.1 EC-Master installation

The IPv4 address and TCP port and the instance ID (default: 0) of the EC-Master is needed for configuration.

The EC-Master application must open the *RAS Server* TCP port (default: 6000, API *emRasSrvStart(), -sp*).

Firewalls must be configured accordingly to allow the TCP connection.

2.2 Information about IPv4 networks, EoE IP addresses (ENI)

The IPv4 addresses of the EoE devices are manually assigned in the EtherCAT network configuration using EC-Engineer or another EtherCAT configuration tool and are finally part of the ENI file loaded at EC-Master.

The EoE devices and the TAP adapter must be **in the same IPv4 subnet** and it must be **independent of the other network addresses** used on the EC-EoE-Gateway system.

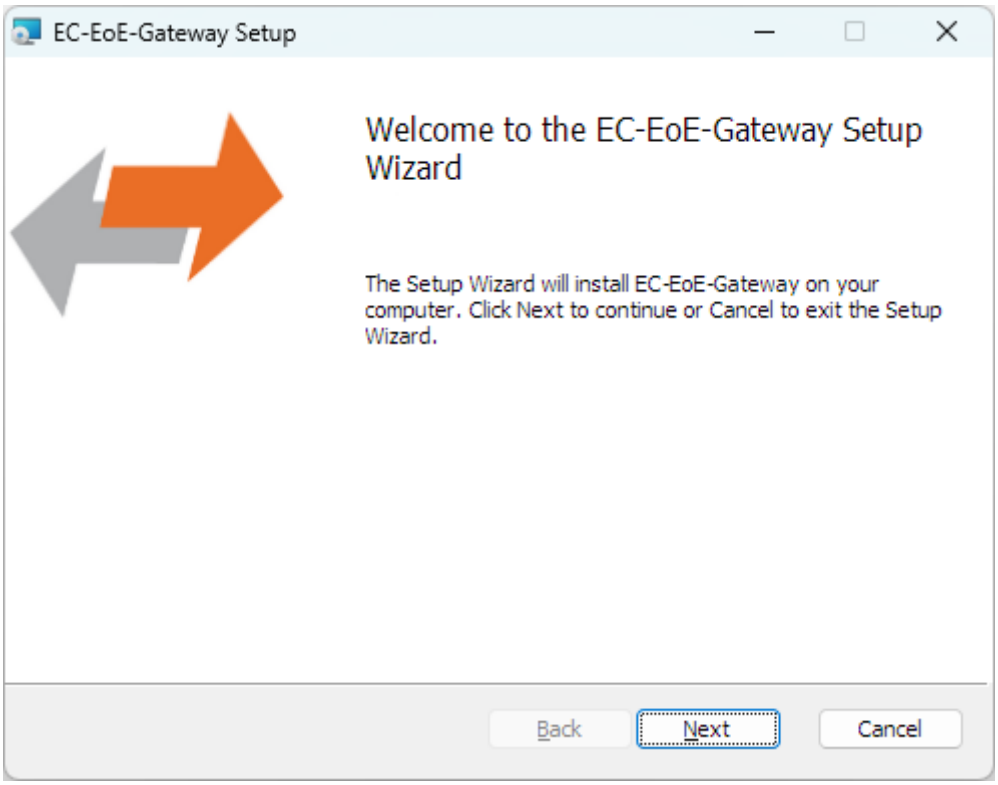
The IP addresses of the slave must be in the same subnet as of the EC-EoE-Gateway (TAP adapter).

The ENI file itself is not needed at the EC-EoE-Gateway with RAS.

3 EC-EoE Gateway for Windows

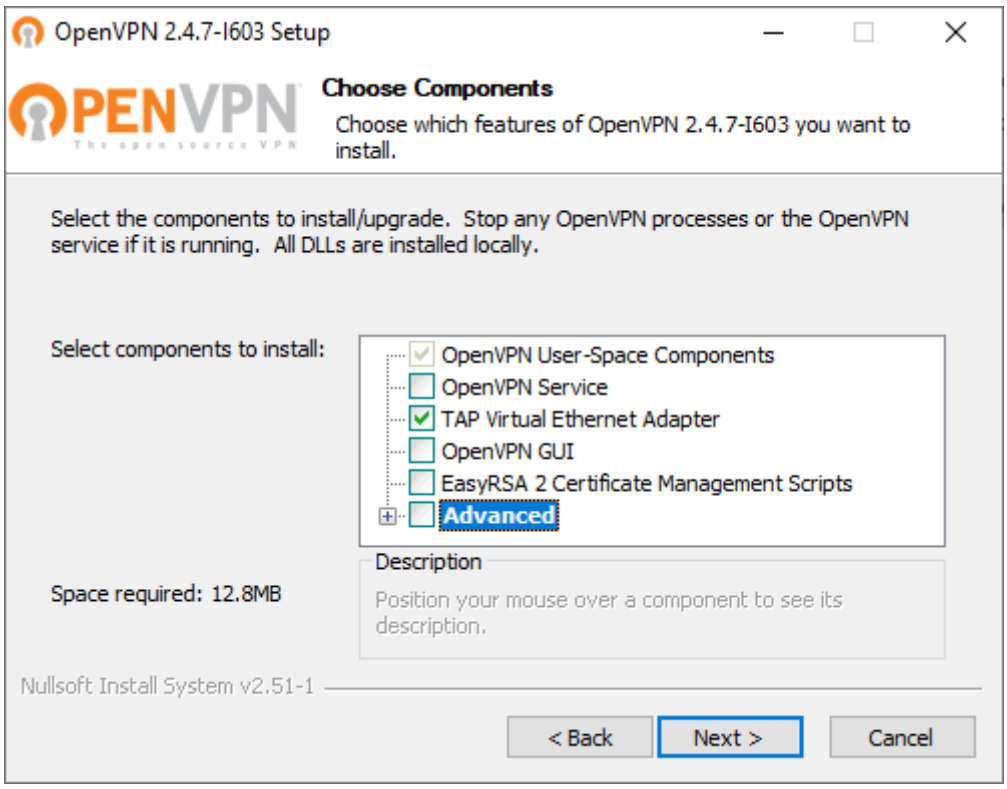
3.1 Installation

The EC-EoE-Gateway for Windows package contains `EcEoeGatewaySetup.msi` used for installation:



Additionally the TAP-Windows driver from OpenVPN (https://openvpn.net/community-downloads/) must be installed.

Note: The OpenVPN Service or traffic encryption is not related to the EC-EoE-Gateway. Only the *TAP Virtual Ethernet Adpater* component is required (https://github.com/OpenVPN/tap-windows6/releases).



After both installers finished, the TAP adapter and the EC-EoE-Gateway must be configured and started as described below.

3.2 EoE IPv4 configuration

The EoE devices and the TAP adapter must be **in the same IPv4 subnet** and it must be **independent of the other network addresses** used on the EC-EoE-Gateway system.

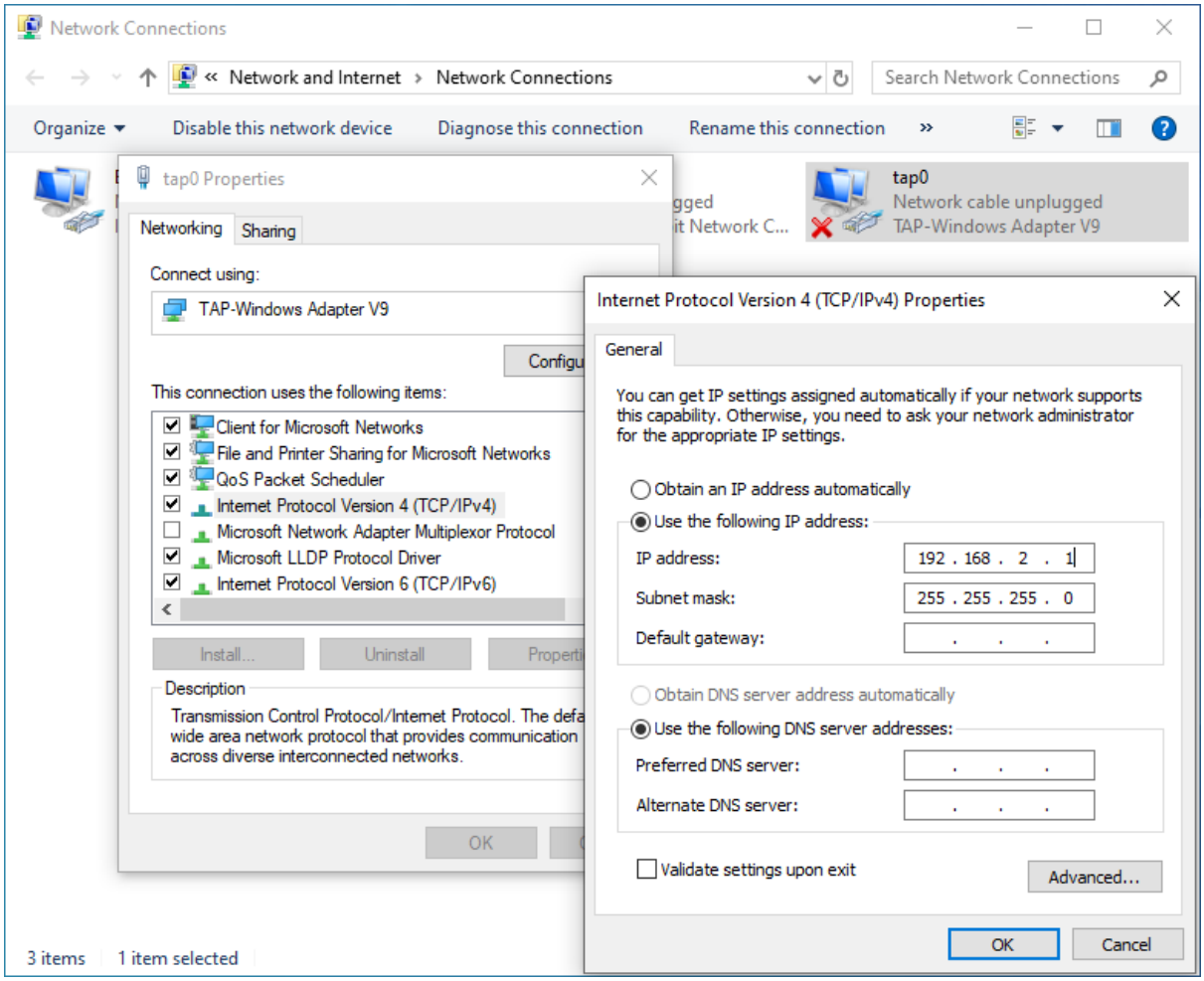
Example of independent subnets for LAN and EoE:

```
LAN: 192.168.0.1, netmask 255.255.255.0 (192.168.0.x)
EoE: 192.168.2.1, netmask 255.255.255.0 (192.168.2.x)
```

The command *ipconfig /all* shows the ip addresses and netmasks of the networks. The EoE network must be independent from the other network addresses.

The IPv4 addresses of the EoE devices are manually assigned in the EtherCAT network configuration using EC-Engineer or another EtherCAT configuration tool and are finally part of the ENI file loaded at EC-Master.

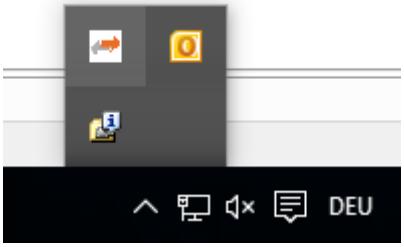
The IPv4 address for EoE must be assigned at the TAP adapter:

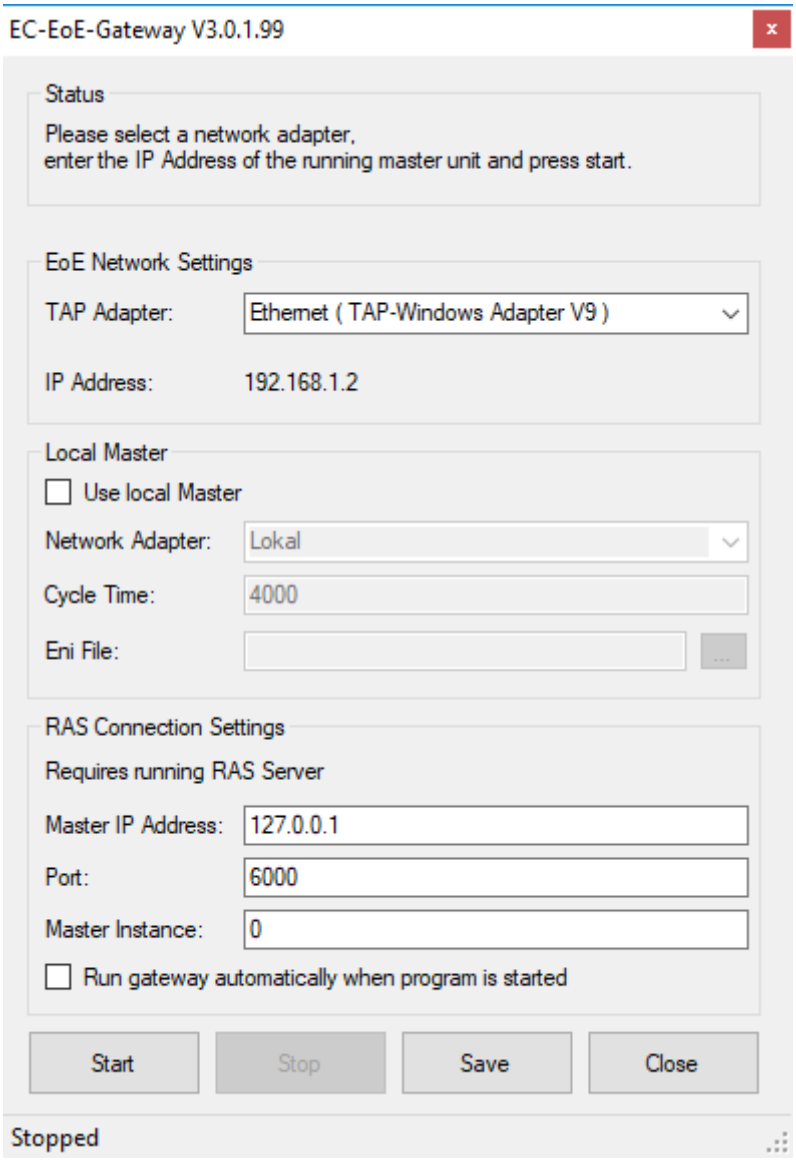


Note: Disabling and re-enabling the “NonAdmin Access” on the TAP driver can sometimes fix communication issues.

3.3 Gateway configuration and run control

Configuration and run control are available by double click or right click to the EC-EoE-Gateway’s tray icon:





You have to select your network TAP-Windows adapter at first. Then enter the IP Adress of the running master unit, the port, the master instance and press *Start*.

Start will automatically save your config, so it is available if you start the program again. You can also *Save* your config without starting the gateway.

Press *Stop* if you like to stop the gateway.

If you click *Close* or on the *x* in the top right corner, the window will minimize to the tray icon again and the gateway is still running if you did not press stop before.

To close the gateway you have to *Close* the tray icon.

If you like the gateway to start as soon as the tool is started, you only have to select the *checkbox*, save your config and the tool will try to connect automatically at the next start.

If you like to start the tool with windows, please put it in the autostart folder.

There is also a possibility to use a local master. Therefore, click the box *Use local Master*, select the *Network Adapter*, set the *Cycle Time* and the *ENI file* and press *Start*.

4 EC-EoE Gateway for Linux

4.1 Installation

1. The EC-EoE Gateway package contains all needed files to be extracted, e.g. in `/opt/EC-EoE-Gateway`.
2. The following steps install the linux TAP adapter on the EC-EoE Gateway's Linux system:

   ```
   $ apt-get install uml-utilities
   $ tunctl -t tap0
   ```

3. IPv4 configuration

   The TAP's subnet must match the configured IP addresses of the EoE slaves and must be independent from all existing networks, e.g. LAN, Wifi, etc..

   Example of independent subnets for LAN and EoE:

   ```
   LAN: 192.168.0.1, netmask 255.255.255.0 (192.168.0.x)
   EoE: 192.168.2.1, netmask 255.255.255.0 (192.168.2.x)
   ```

   The following steps configures the interface (non-persistent!):

   ```
   $ ip link set tap0 up
   $ ip addr add 192.168.2.1/24 dev tap0
   $ ifconfig tap0 mtu 200 up
   ```

Persistent IPv4 setup depends on the various ways available on Linux according to distribution, installed network manager, etc. and is therefore beyond the scope of this manual. The Linux distribution's user manual or support can provide the needed information.

4.2 Ubuntu systemd service

The following files to integrate EC-EoE-Gateway as an Ubuntu systemd service are contained in the package.

The following files from `/opt/EC-EoE-Gateway/Files/Linux` should be placed in `/etc`:

- `/etc/systemd/system/eceoegateway.service`
- `/etc/eceoegateway.conf`

4.2.1 Configuration and run control

1. All configuration options are in `/etc/eceoegateway.conf`:

   ```
   RAS_SERVER_IP=127.0.0.1 # RAS server IP address
   RAS_SERVER_PORT=6000 # RAS server TCP port
   TAP_NAME=tap0 # TAP adapter name
   EC_EOE_GATEWAY_INSTALL_DIR=/opt/EC-EoE-Gateway # installation directory
   EC_EOE_GATEWAY_OS=Linux
   EC_EOE_GATEWAY_ARCH=x64
   ```

2. *systemctl start eceoegateway* starts the service
3. *systemctl enable eceoegateway* enables startup on boot. This needs IPv4 configured persistently.
4. *service eceoegateway status* shows the status of the service

4.2.2 Logging

Log messages from the EC-EoE-Gateway are available as follows:

- *journalctl -f -u eceoegateway.service*
- Log files in `/var/log/eceoegateway`

4.3 Manually running EcEoeGateway application

Instead of running EC-EoE-Gateway as an Ubuntu systemd service, it can also be manually sstarted as a standalone application.

The EcEoeGateway binary must be started with command line parameters, e.g.

```
$ LD_LIBRARY_PATH=. ./EcEoeGateway -eoetap tap0 -rem 127.0.0.1:6000 -t 0 -log
↪  /var/log/eceoegateway
```

The full command line usage is printed to the console if the EcEoeGateway binary is started without arguments.

5 Diagnosis and troubleshooting

Logs
The EcEoeGateway logs should be considered before any other diagnosis.

Network verification:
Begin by pinging the EoE devices (e.g.192.168.2.2) with the -s 0 option to send raw packets. If it fails, verify that the TAP connection's status is connected and the send/receive statistics reflect the requests using the ifconfig command. If not, check that the IP addresses are correct (see IPv4 configuration above) and that the connection to the RAS service is established (see below).

Service and software checks
Utilize the netstat command to confirm an established connection between the systems. If the connection is not established, check if the eceoegateway service is running. If the eceoegateway service is running, inspect log files for any error messages that might indicate the root cause of the issue.

EtherCAT specific checks
Check that the slave's EtherCAT state is PREOP, SAFEOP, or OP using e.g. EC-Engineer. If the state is correct, analyze the EtherCAT traffic to identify using filter "ecat_mailbox.eoe".

Network setup review
Finally, assess the need for routing and firewall configurations that might be interfering with the connection. Ensure these network components are configured to support the TAP adapter and the connection to the RAS server.