EcoNode Series Gateways

C/C++ Development Guide

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1 Hardware Resources

The EcoNode series gateways are high-performance embedded computing platforms designed to run OpenEMS. They support large-scale deployments of IoT and energy management system devices. Equipped with a high-performance 64-bit processor, the gateways feature various interfaces including RS485, RS232, AI, DI, DO, and support for over 250 common PLC protocols and power acquisition protocols. They offer excellent protocol conversion and acquisition functions, configuration control capabilities, breakpoint recovery, remote management, serial and network transparent transmission, and operate in wide temperature ranges.

EcoNode gateways provide extensive hardware and software resources. Depending on the model, they typically include multiple serial ports, CAN, DI/DO, DAC/ADC, USB, Bluetooth, and support for 4G/5G, WiFi, and Ethernet communications. Some models also support LoRa. The default software operating system is Ubuntu 16.04 or higher, allowing users to easily install applications, set up development environments, and port various third-party resources.

The EcoNode gateways offer open development interfaces, enabling users to develop business software independently or build cloud-edge collaborative systems based on the provided SDK. They support multiple development languages such as C/C++, Node.js, Java, and Python. This document will provide a detailed guide on the C/C++ development process and related matters, with "development" and "code writing" referring specifically to C/C++ development work.

The EcoNode series gateways are advanced embedded computing platforms designed for running OpenEMS and supporting large-scale IoT and energy management system deployments. They utilize high-performance 64-bit processors and offer a range of interfaces and connectivity options, including RS485, RS232, AI, DI, DO, and support for over 250 protocols. The gateways are versatile, supporting various communication networks and operating systems, and are equipped for extensive hardware and software development. Users can develop software independently or use the provided SDK for cloud-edge systems, with support for multiple programming languages including C/C++.

2 Hardware Resources

The EcoNode gateways come in various models with different resource configurations. The specifics for each model are listed below:

2.1 EcoNode605

Name	Node	Description
COM2	/dev/ttymxc1	RS232
COM4	/dev/ttymxc3	RS485
LAN1	eth0	Default IP Address : 192.168.3.105.
LAN2/WAN	eth1	

Table 1: EcoNode605 Interface Resources

2.2 EcoNode605

Name	Node	Description
COM1	/dev/debug	RS232
COM2	/dev/ttymxc1	RS232
COM3	/dev/ttymxc2	RS485
COM4	/dev/ttymxc3	RS485
COM5	/dev/ttymxc4	RS485
COM6	/dev/ttymxc5	RS485
COM7	/dev/ttymxc6	RS485

COM8	/dev/ttymxc7	RS485
DI1	gpio_5	/sys/devices/virtual/rock_gpio/gpio_5/value
DI2	gpio_6	
DI3	gpio_7	
DI4	gpio_8	
DI5	gpio_9	
DO1	gpio_1	/sys/devices/virtual/rock_gpio/gpio_1/value Relay Output /sys/bus/iio/devices/iio\:device0/in_voltage5_raw Vout=Vin/2 D = Vout*（2 ^ 12）/ Vref (2 ^ 12=4096) Vout=Vin*47/ 197 D = Vout*（2 ^ 12）/ Vref Default IP Address : 192.168.3.105 DHCP
DO1	gpio_2	
DO1	gpio_3	
DO1	gpio_4	
AI1	in_voltage5_raw	
AI2	in_voltage9_raw	
LAN1	eth0	
LAN2/WAN	eth1	

Table 2: EcoNode605 Interface Resources

2.3 EcoNode605

Name	Node	Description
COM0	/dev/ttyS0	RS485
COM1	/dev/ttyS3	RS485
COM2	/dev/ttyS5	RS232
IO1	gpio_one	/sys/class/rock_gpio/gpio_one 11: Set to output high level 10: Set to output low level 00: Set to input mode
IO2	gpio_two	
IO3	gpio_three	
IO4	gpio_four	
LAN/WAN	eth0	Default IP Address : 192.168.3.105

Table 3: EcoNode605 Interface Resources

3 Software Resources

The EcoNode series gateways use a customized version of Ubuntu as the operating system. This allows users to fully leverage the software resources available in the Ubuntu ecosystem and easily port Linux-compatible open-source resources. This feature greatly facilitates application development and environment setup.

The essential software for the factory development process includes, but is not limited to:

Software	Function
ps	process viewing
top	dynamic process monitoring
vim	text editing
iptables	firewall management
route	Routing Table Management
nodejs	JavaScript Runtime Environment
python	Python Runtime Environment
lldpID	LAN Discovery Software

dmt_client	Device Management Platform Client Software
smartTunnelDev	Peer-to-Peer Remote Transmission Software
comTrans	Serial Port Transmission Software
SPC	Gateway Configuration and Data Acquisition Software

Table 4: Gateway Software Resources

Recommended Development Installations：

Software	**Function**	
valgrind	Vulnerability Scanning Tools	
gdbserver	gdb Debug Server	
tcpdump	Network Packet Capture Tools	
tracert	Traceroute	apt install inetutils-traceroute traceroute
perf	Performance Profiling Tools	apt install linux-tools-common

Table 5: Recommended Development Software Installations