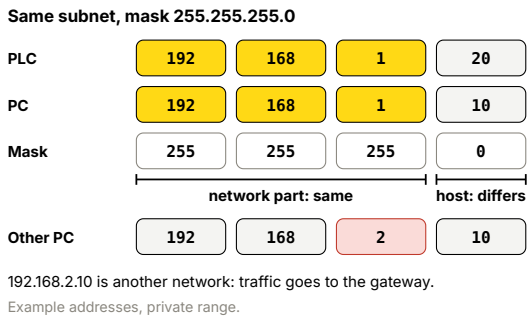
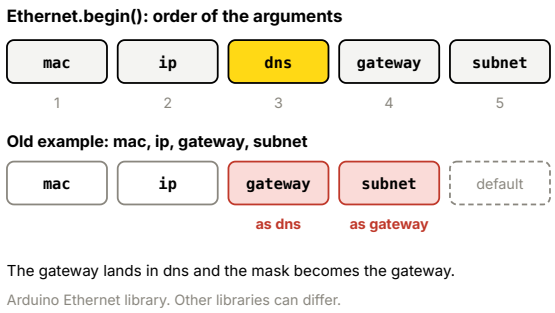
PLC on Ethernet with no ping? 6 checks

The PLC has an IP address and still does not answer the ping, or does not talk to another device. An IP alone is not enough: subnet, mask, gateway, DHCP and unique addresses decide whether two devices can talk. Check them in order, then the code. Checks 1 to 5 apply to any IPv4 device; check 6 to the Arduino Ethernet library.

Compare the addresses, then the code



Same subnet: the mask decides which part of the address must match. With 255.255.255.0, the first three numbers.



Order matters: the library reads the arguments by position. The third one is DNS, even if you meant the gateway.

Before the six checks

Power the PLC as its manual says (on Arduino PLC, USB alone does not power the Ethernet). Check the cable, the link LED, hardwareStatus() and linkStatus().

One change at a time

Test with one PC and the PLC on the same switch. Change one setting, ping again, and note the result.

Six checks, in this order

Check	What to do	Good result
1. Subnet	Compare the IP of the PLC and the PC with the mask. With 255.255.255.0, the first three numbers match and the last one differs.	Same network part, different host part.
2. Mask	The same mask on both devices. A wrong one can make a local device look remote.	Identical masks.
3. Gateway	Only used to reach other networks; on the same switch and subnet it is not used. Set the router address of your subnet.	Other networks reachable through the router.
4. DHCP or static	With DHCP, the address can change. If other devices connect to the PLC, use a reserved or fixed address agreed with IT.	The same IP after every reboot.
5. Duplicates	Disconnect the PLC and ping its IP: a reply means another device has it. Copied one example to every PLC? Change the MAC.	No reply when disconnected; one MAC per device.
6. Code	Arduino Ethernet library: `Ethernet.begin(mac, ip, dns, gateway, subnet)`. With three values, the third is DNS.	Arguments in this order.

Continues on page 2

What the symptom tells you

Symptom	Possible causes	Next step
No ping, PLC IP in another range	PLC and PC in different subnets.	Checks 1 and 2.
Ping from the PC next to it, not from another network	Gateway missing or not in the subnet.	Check 3.
After a reboot, the client cannot find it	DHCP gave a new address.	Check 4.
Fails on and off with a second PLC	Duplicate IP or MAC.	Check 5.
Right IP, no access to other networks	Arguments of begin() in the wrong order: wrong DNS or gateway.	Check 6.
hardwareStatus(): EthernetNoHardware	Controller not detected: power, hardware or library.	Before the checks: power and manual.
linkStatus(): LinkOFF	No link: cable, switch port (W5200 and W5500 only).	Before the checks: cable and link LED.

From the Arduino documentation

- If omitted, dns and gateway default to the device IP with the last octet set to 1, and subnet to 255.255.255.0.
- `Ethernet.begin(mac)` uses DHCP and returns 1 on success, 0 on failure.
- With DHCP, call `Ethernet.maintain()` regularly to renew the lease.

Example network

- PC: 192.168.1.10, mask 255.255.255.0
- PLC: 192.168.1.20, mask 255.255.255.0
- Router (gateway): 192.168.1.1
- PC and PLC: direct through the switch.
- PLC to another network: through 192.168.1.1.

On Arduino PLC and ESP32 PLC

- Industrial Shields examples use Ethernet.h, with board packages M-Duino 1.1.45 and ESP32 PLC 2.3.0 or later.
- The MAC is defined in the code: set a different one on each device (change at least the last byte).

Why duplicates are hard to find

Two devices with the same IP or MAC can each work alone. Together, replies go to one or the other, and the fault comes and goes.

Keep a list of IP and MAC per device.

References: Microsoft Learn: Understand TCP/IP addressing and subnetting basics; RFC 5227: IPv4 Address Conflict Detection; Arduino Ethernet library reference: Ethernet.begin(), Ethernet.maintain(), hardwareStatus(), linkStatus(); Industrial Shields: Ethernet troubleshooting, Ethernet connection with an ESP32 PLC or an M-Duino PLC. The manual of your PLC takes precedence over this general guide.