

AN152

16-134513

Debugging CME Ethernet Connectivity

Introduction

Copley provides customers with free, easy to use software: "Copley Motion Explorer" (CME). Sometimes, when attempting to connect over EtherCAT or UDP, one can encounter an error. For EtherCAT, the error is: "No devices were found on the EtherCAT network. Verify that the devices are properly connected to the network and powered up."

No Devices Found X				
	No devices were found on the EtherCAT network			
	Verify that the devices are properly connected to the networ and powered up.	k		
	ОК			

For UDP, the error is: "No devices were found on the network. Verify that the devices are properly connected to the network and powered up."

No Devices Found X				
	No devices were found on the network			
	Verify that the devices are properly connected to the network and powered up.			
	ОК			

The following is an overview of the steps to debug this issue:

1. a. For EtherCAT Connection: Verify that the drive's operating mode is "CANopen over EtherCAT (CoE)" and that the drive is enabled.

b. For UDP Connection: Set bit 9 of the Network Options Parameter.

- 2. Ensure that the Windows Defender Firewall is not blocking messages.
- 3. Set a static IP address and check that the Adapter Network Category is set to private using the Windows PowerShell.

Step 1a: Verify Operating Mode over Serial (For EtherCAT only)

Connect to CME over serial. Copley Controls recommends using the SER-USB-RJ11, which we manufacture using authentic Prolific parts.

First select Tools > Communications Wizard.

۲	CME V8.0			_		\times
File	Amplifier	Tools	Help			
0			Communications Wizard			
	Copley Ne	-	Communications Log Download Firmware Download CPLD Program Manual Phase View Scope Files CME Lock/Unlock			
			ASCII Command Line			
0	Axis A		Login			
0	Axis B					
0	Axis C					
	Axis D					
				F1	2 To Disab	ole

Next, select "Serial Ports," then "Next."

Communications Wizard X
Select Device:
Serial Ports
O CAN Network
○ EtherCAT
Next > Cancel

Select the COM port in use. Click "Add," then "Next."

Communications Wizard Axis A			
Select Ports			
To add serial ports, select them from the Available Ports list, then press Add.			
To remove serial ports, select them from the Selected Ports list, then press Remove.			
Available Ports: Selected Ports:			
< Back Next > Cancel			

Click "Finish."

Communications Wizard Axis A X				
Configure Serial Ports				
Select one or more serial ports from the list, then select the baud rate.				
Selected Ports:				
\\.\COM10				
Baud Rate: 115200				
< Back Finish Cancel				

We should now be connected to the drive over serial. Next, select the Setup icon on the top left.



If the Operating Mode is not "CANopen over EtherCAT (CoE)," then perform the following steps to change it.

Click "Change Settings" followed by "Next," until reaching the "Operating Mode Options" screen.

Under "Operating Mode," select "Position" in the drop-down menu. Under "Command Source," select "CANopen over EtherCAT (CoE)."

Operating Mode Options				
Operating Mode:	Position \sim			
Command Source:	CANopen over EtherCAT (CoE)	~		

Click "Next," followed by "Finish."

A message dialog box will appear stating that the changes will be saved to FLASH memory. Click OK.

Setup		×				
Miscellaneous Options						
Commutation Mode:	apezoidal 🔵 Estimated Sinusoidal					
Use Back EMF For V Use Halls for Veloci	Velocity ity and Position					
Multi-mode Port: Diffe	erential Input v					
Count Divide: No	Saving to Amplifier Flash × Changes will be saved to Amplifier Flash.					
	< Back Finish Cancel					

Next, open the Control Panel by clicking the icon shown below.

CME V8.0 (ME4-055-03 unnamed) Axis A				
Input / Output				
CVM Control Program				

Click the Enable button outlined in red below. Notice that the Mode textbox does not display "Disabled."

Status			Monitor
8	STO: Motor Output: Hardware Enabled:	Not Active Enabled	Actual Current C A
	 Software Enabled: Positive Limit: Negative Limit: 	Not Enabled Not Active Not Active	Actual position V Counts
	 Software Limits: Motor Phase: Motion Abort Input: 	Not Active OK Not Active	Start Logging Not logging Mode: CANopen over EtherCAT (CoE)
	 CVM Control Program: Home: Network Status: 	Not Running Not Referenced	Velocity 12.5 rpm
	Gain Scheduling:	Not Active	Acceleration 16.6 rps ²
Control			Enable log Move NEG Move POS
E	Se	t Zero Position	
C	lisable	Clear Faults Reset	Close

Close the Control Panel and close CME. Continue to Step 2: Allowing CME through the Firewall.

Step 1b: Set Bit 9 of the Network Options Parameter (For UDP only)

The drive's network must be configured to use UDP protocol. Therefore, set bit 9 of the Network Options Parameter. The bit-mapping of this parameter is shown below in an excerpt from the Parameter Dictionary.

0x121	0x21B3	RF	INT16	Network Options. Configures the drive's network. Details of its meaning depend on type of network implemented in drive.				
							EtherCAT	Г
				Bits	Meaning			
				0	If set, disable some extra checks of SYNC0 configuration which were added for improved network conformance.			
				1	If set, drive will follow EtherCAT state machine even when running in a non- EtherCAT mode of operation.			
				2	If set, object 0x1002 is bit-wise OR of all axes Event Status Register (0xA0) for multi-axis drives. If clear, 0x1002 is for axis 1 only. If set, value of Network Node Id Configuration			
					J	(0xC1) will be used as network alias on powerup. If clear, alias will be set from address switches		
				4-7	Reserved.			
				8	If set, PDO mapping will be saved to flash when parameters are saved using object 0x1010			
				9	If set, use standard Ethernet protocols (UDP, Modbus TCP, TCP/IP) rather than standard EtherCAT operation			
				10-15	Reserved			

First, connect to CME over serial. Copley Controls recommends using the SER-USB-RJ11, which we manufacture using authentic Prolific parts.

First select Tools > Communications Wizard.

🎱 CME V8.0			_		\times
File Amplifier	Tools	Help			
\$		Communications Wizard			
Copley Ne	-	Communications Log Download Firmware			
	-	Download CPLD Program			
	-	Manual Phase			
		View Scope Files			
		CME Lock/Unlock ASCII Command Line			
🔿 Axis A		Login			
🔿 Axis B					
🔿 Axis C					
🔿 Axis D					
			F	12 To Disa	ble

Next, select "Serial Ports," then "Next."

Communications Wizard X
Select Device:
Serial Ports
O CAN Network
○ EtherCAT
Next > Cancel

Select the COM port in use. Click "Add," then "Next."

Communications Wizard Axis A	×
Select Ports	
To add serial ports, select them from the Available Ports list, then press Add. To remove serial ports, select them from the Selected Ports list, then press Remove.	
Available Ports: Selected Ports: COM7 Add > Add >	
< Back Next > Cancel	

Click "Finish."

Communications Wizard Axis A		×
Configure Serial Ports		
Select one or more serial ports f	rom the list, then select the baud rate.	
Selected Ports:		
\\.\COM10		
	Baud Rate: 115200	
< Bac	k Finish Cancel	

Open the ASCII Command Line by selecting Tools > ASCII Command Line.



Type the command "s f0x121 0x200" to set bit 9 of the Network Options Parameter in FLASH memory. Press the Enter key to send the command.

ASCII Cor	nmand Line	_		×
Command:	s f0x121 0x200			
Response:	ok			
	<			>
ASCII Command Line -	Clo	ose		

Type the command "s r0x121 0x200'' to set bit 9 of the Network Options Parameter in RAM. Press the Enter key to send the command.

ASCII Cor	nmand Line	_		×
Command:	s r0x121 0x200			
Response:	ok			
	<			>
			C	lose

Close CME. Continue to Step 2: Allowing CME through the Firewall.

Step 2: Allowing CME through the Firewall

CME sends EtherCAT frames in raw EtherCAT form contained in a UDP wrapper. Because it utilizes UDP packets, Windows may block them. Performing the following steps ensures that Windows will let the messages pass through the firewall.

Click on the search bar and type "Windows Defender Firewall."



🔗 Control Panel\All Control Panel Ite	ms\Windows Defender Firewall	
← → × ↑ 🔗 > Control Pan	el > All Control Panel Items > Windows Defender Fi	irewall
Control Panel Home	Help protect your PC with Windows De	fender Firewall
Allow an app or feature through Windows Defender	Windows Defender Firewall can help prevent hacker through the Internet or a network.	rs or malicious software from gaining access to your PC
Firewall Change notification settings	For your security, some settings are managed l	by your system administrator.
Turn Windows Defender Firewall on or off	Domain networks	Connected 🔗
Restore defaults	Networks at a workplace that are attached to a dom	nain
Advanced settings	Windows Defender Firewall state:	On
Troubleshoot my network	Incoming connections:	Block all connections to apps that are not on the list of allowed apps
	Active domain networks:	🔤 analogic.com
	Notification state:	Notify me when Windows Defender Firewall blocks a new app
	Private networks	Not connected 😔
	Guest or public networks	Not connected 😔
Select "Change settings."		
🔗 Control Panel\All Control Pan	el Items\Windows Defender Firewall\Allowed app	ps – 🗆 X
\leftarrow \rightarrow \checkmark \uparrow 🔗 \ll Wi \rightarrow	Allow v Č	م
Allow apps to cor	mmunicate through Windows Defend	ler Firewall

Next, select "Allow an app or feature through Windows Defender Firewall."

To add, change, or remove allowed apps and ports, click Change settings. 🗣 Change settings What are the risks of allowing an app to communicate? For your security, some settings are managed by your system administrator. Allowed apps and features: Name Public ~ Domain Private Group Policy ☑ MicroCap Yes MicroCap ✓ Yes SCCM ✓ Yes SCCM ✓ Yes

Select "Allow another app"						
@{Microsoft.MicrosoftEdge_4	1.16299.248.0_neutr	✓	✓		No	
☑ @{Microsoft.MicrosoftEdge_4	1.16299.248.0_neutr	✓	✓		No	
☑ @{Microsoft.MicrosoftEdge_4	4.19041.1.0_neutral	✓	✓		No	
@{Microsoft.PPIProjection_10	.0.16299.15_neutral			✓	No	
☑ @{Microsoft.PPIProjection_10	.0.16299.15_neutral	✓	✓	✓	No	
☑ @{Microsoft.PPIProjection 10	.0.16299.15 neutral			✓	No	× .
				Details	Remo	ve
				Allow	another a	рр

Click "Browse ... "

Add an app	×
Select the app you want to add, or click Br listed, and then click OK.	owse to find one that is not
Apps:	
Path:	Browse
What are the risks of unblocking an app?	•6
You can choose which network types to add	this app to.
Network types	Add Cancel

							100
janize • New fold	er					101 ·	
Reports ^	Name	Date modified	Type	Size			
Temporary_Files	dtplugin	2/18/2022 2:27 PM	File folder				
This PC	plugin2	2/18/2022 2:27 PM	File folder				
2D Objects	server	2/18/2022 2:27 PM	File folder				
Dealters	appletviewer.exe	11/15/2018 2:19 PM	Application	18 KB			
Desktop	idlj.exe	11/15/2018 2:19 PM	Application	17 KB			
Documents	i jabswitch.exe	11/15/2018 2:19 PM	Application	35 KB			
- Downloads	jaccessinspector.exe	11/15/2018 2:19 PM	Application	98 KB			
Music	🔲 jaccesswalker.exe	11/15/2018 2:19 PM	Application	58 KB			
Pictures	🕌 java.exe	11/15/2018 2:19 PM	Application	227 KB			
Videos	🍈 javacpl.exe	11/15/2018 2:19 PM	Application	. 85 KB			
Windows (C:)	🚮 javaw.exe	11/15/2018 2:19 PM	Application	227 KB			
nublic () named	🛃 javaws.exe	11/15/2018 2:19 PM	Application	328 KB			
Public (()pessor	💽 jjs.exe	11/15/2018 2:19 PM	Application	17 KB			
Digitalamps (\\a	i jrunscript.exe	11/15/2018 2:19 PM	Application	18 KB			
EngineeringRele	jweblauncher.exe	11/15/2018 2:19 PM	Application	278 KB			
File o	ame inunu eve				Applications	(* ever* com	"icel)

Navigate to "Windows(C:)\Program Files\Copley Motion\CME 2\jre\bin\javaw.exe," and click Open.

Click Add.

Add an app		\times
Select the a listed, and t	pp you want to add, or click Browse to find one that is not hen click OK.	
Apps:		
<u></u> ava(∏	M) Platform SE binary	
Path:	C:\Program Files\Copley Motion\CME 2\jre\bin Browse	
What are the	risks of unblocking an app?	
You can choo	se which network types to add this app to.	
Netwo	rk types Add Cancel	

If the executable is already in the list of allowed programs, the following dialogue box may appear. Click OK in this case.



Find "Java(TM) Platform SE binary" in the list of allowed programs, and make sure that all three "Domain," "Private," and "Public" are checked. Click OK.

Allowed apps and features:					
Name	Domain	Private	Public	Group Policy	^
HPSAPS				No	
iSCSI Service				No	
✓ Java(TM) Platform SE binary	\checkmark	◄		No	

Next, open CME and attempt to connect using the desired method (EtherCAT or UDP). If the issue still exists, try using a USB-to-Ethernet adapter instead of a direct connection to the computer's Ethernet port. Continue to Step 3: Setting Static IP Address and Checking the Adapter Network Category.

Step 3: Setting Static IP Address and Checking the Adapter Network Category

When using a USB-to-Ethernet adapter, a static IP address must be set, and the Adapter Network Category must be private.

To set a static IP address for the adapter, type "Network Status" in the Windows search bar and select the Network Status icon shown below.



Under "Advanced network settings," select "Change adapter options."

Advanced network settings

Change adapter options View network adapters and change connection settings.

Network and Sharing Center For the networks you connect to, decide what you want to share.



Network troubleshooter

Diagnose and fix network problems.

Double-click on the adapter connected to the drive.



Click the Properties button.

Ethernet 3 Status	×
General	
Connection	
IPv4 Connectivity: Not Connected	
IPv6 Connectivity: Not Connected	
Media State: Enabled	
Duration: 00:09:03	
Speed: 100.0 Mbps	
Details	
Activity	
Sent — 🗾 — Received	
Packets: 30 0	
Properties Disable Diagnose	
Close	9

Select the "Internet Protocol Version 4 (TCP/IPv4)" in the list shown below and click the Properties button.

Ethernet	3 Properties	×
Networking	Sharing	
Connect us	ing:	
🚍 ASD	(AX88179 USB 3.0 to Gigabit Ethernet Ada	pter
	Co	onfigure
This conne	ction uses the following items:	
	tel(R) Technology Access Filter Driver prtiClient NDIS 6.3 Packet Filter Driver ternet Protocol Version 4 (TCP/IPv4) icrosoft Network Adapter Multiplexor Protocol icrosoft LLDP Protocol Driver ternet Protocol Version 6 (TCP/IPv6) nk-Layer Topology Discovery Responder	ol v
Descriptio		openies
Transmis wide are across d	ssion Control Protocol/Internet Protocol. The a network protocol that provides communicativerse interconnected networks.	e default ation
	ОК	Cancel

Click "Use the following IP address" radio button and set a static IP address (and subnet mask). See example below. Make sure the IP address is not being used by any other device on the system.

Internet Protocol Version 4 (TCP/IPv4)	Properties ×			
General				
You can get IP settings assigned autor this capability. Otherwise, you need to for the appropriate IP settings.	natically if your network supports ask your network administrator			
Obtain an IP address automatical	ly			
Use the following IP address:				
IP address:	192.168.1.2			
Subnet mask:	255.255.255.0			
Default gateway:				
Obtain DNS server address automatically				
Use the following DNS server add	resses:			
Preferred DNS server:	10 . 112 . 224 . 201			
Alternate DNS server:	10 . 112 . 224 . 202			
Validate settings upon exit	Advanced			
	OK Cancel			

Note that now the Ethernet adapter is labeled as "Unidentified network" in the Control Panel.

. .

) Se	arch Network Cor	nections				م
ction	Rename this co	nnection	»	■ = ▼ =		?
ble unplu ernet Cor	igged inection I219	V	Ethernet Unidenti ASIX AX8	3 fied network 88179 USB 3.0) to Giga	abit
m . VPN Vir	tual Ethernet		Ethernet Enabled VirtualBo	6 ox Host-Only I	Ethernet	t Ad

Next, change the adapter network category to private. To change this setting, perform the following steps.

First, open the Windows PowerShell as an administrator. Then type the following command to retrieve information about the network adapters on the system: "Get-NetConnectionProfile". Press the Enter key.



In the screenshot above, the NetworkCategory of the adapter is set to "Public." Set it to "Private" by using the following command:

"Set-NetConnectionProfile -Name "Unidentified network" -NetworkCategory Private

Type the command into Windows PowerShell and press the Enter key.

PS C:\WINDOWS\system32> Set-NetConnectionProfile -Name "Unidentified network" -NetworkCategory Private
PS C:\WINDOWS\system32>

Now use the "Get-NetConnectionProfile" command to verify that the setting has been changed.

PS C:\WINDOWS\sys	stem32>	Get-NetConnectionProfile
Name	: analo	ogic.com
InterfaceAlias	: Ether	net 5
InterfaceIndex	: 43	
NetworkCategory	: Domai	InAuthenticated
IPv4Connectivity	: Local	lNetwork
IPv6Connectivity	: NoTra	affic
Name	: Unide	entified network
InterfaceAlias	: Ether	net 3
InterfaceIndex	: 111	
NetworkCategory	: Priva	ite
IPv4Connectivity	: NoTra	offic
IPv6Connectivity	: NoTra	affic
PS C:\WINDOWS\sys	stem32>	

Next, open CME and attempt to connect using the desired method (EtherCAT or UDP). If the issue still exists, please contact your I.T. department.

Conclusion

Perform the three steps outlined on the first page of this document to debug CME's EtherCAT or UDP connectivity. If the issue is not resolved after performing these steps, please contact your I.T. department.

Revision History

Date	Version	Revision
6/01/2022	Rev 00	Initial release