Application Note Beckhoff PLC and TwinCAT System

This document guides you through the setup of proprietary vendor specific software installed on you PC. Your supervisor may provide you with additional or alternative instructions.

The document consists of standard instructions that may not fit your particular solution. Please visit our support website for latest revisions of documentation and firmware:

http://www.secomea.com

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1. Prerequisite for this guide

The following guide will assist you to setup a remote and online connection to the equipment placed on the customer site using your proprietary vendor specific software installed on you PC. A prerequisite for this guide is:

- You have an operational LinkManager installed on your PC and you are able to see the vendor specific equipment.
- You have the proprietary vendor specific software installed on your PC
- You have the Beckhoff device agent installed and configured towards a PLC on the DEV port of the SiteManager.

Note: If you are connecting to a PLC on the Uplink port of the SiteManager please follow the guide, and additionally refer to Appendix A for special precautions.

System overview

The Remote Device Management system is a complete end-to-end solution for easy and secure remote access, monitoring and management of industrial equipment for the automation- and machine builder industry.

The Remote Device Management solution enables machine builders, service providers and end-users to instantly access, monitor, and manage machines and equipment remotely and effectively over secure high speed internet connections.

The following system overview is with a SiteManager 3034 or 3134 at the customer location:



Figure 1 - System overview



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2. Logon the LinkManager

This describes how to logon your LinkManager software. If you are already logged on, please go to number 3.

- 1. Start the LinkManager from the START > Programs > Secomea Link-Manager.
- 2. Select Console menu from the LinkManager Tray Icon menu.
- 3. Login uses the GateManager certificate and password which is obtained from you GateManager administrator. Then please click **Login**.

LinkManager secomea	ch l
	Login
GateManager: Certificate: Password: Login	Secomea GateManager Demo V CN=Mif, OU=ROOT (MIF Field Engineer PC2) V •••••••• Certificates Setups Advanced

Figure 2 LinkManager login Screen

3. Click and Choose in the LinkManager

This describes how to click and choose the device you wish to get online with. If you are already online, please go to number 4.

1. Click **<Connect all>** to connect to all devices or click a specific device to connect to only this single device:



Figure 3 LinkManager Screen (example) Access to all devices or to a single device



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4. Online with Beckhoff and TwinCAT

Get online with your Beckhoff PLC:

1. Start up your TwinCAT System Manger



Figure 4 TwinCAT System Manager Screen

- 2. Click >> Choose Target <<
- 3. Click >> Search (Ethernet)

🗾 Untitled - TwinCAT System Man	ager				
File Edit Actions View Opti	ons Help				
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SYSTEM - Configuration SYSTEM - Configuration PLC - Configuration I/O - Configuration	Enter Host Name / IP:	172.24.2.126	Refresh Statu	Broadcast Search	
I/O Devices	Host Name	Connected Address	AMS NetId TwinCAT	OS Version Comment	
Mappings	CX_022623	× 172.24.2.126	5.2.38.35.1.1 2.10.1316	Win CE (5.0)	
	<				
	Houte Name (Target):	CX_022623	Houte Name (Hem	iote): MIF-PC	
	AmsNetId:	5.2.38.35.1.1	Target Route	Remote Route	
	Transport Type:	TCP/IP -	Static	Static	
	Address Info:	CX_022623	 Temporary 	 Temporary 	
	Host Name OIP	Address			
l l	Connection Timeout (s):	5	Add Route	Close	
Ready				Local (19	2.168.255.102.1.1) Config Mode

Figure 5 TwinCAT Add Route Dialog Screen

- 4. Enter Host Name / IP Enter IP address
- 5. Click >> Refresh Status <<
- 6. If this is the first time to connect to this route and no "X" appear in the "Connected", please see Figure 6



Untitled - TwinCAT System Ma	anager				
File Edit Actions View Op	tions Help			~	D
📔 🗅 😅 📽 🖬 🗐 🚳 🖪 🕷	Add Route Dialog		1		
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A Mappings	CX_022623	X 172.24.2.126	5.2.38.35.1.1 2.10.1316 Wir	n CE (5.0)	
	<	III.]		
	Route Name (Target):	CX_022623	Route Name (Remote):	MIF-PC	
	AmsNetId:	5.2.38.35.1.1	Target Route	Remote Route	
	Transport Type:	TCP/IP -	Project O Project	None Statis	
	Address Info: O Host Name IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	172.24.2.126 P Address	Temporary	 Temporary 	
	Connection Timeout (s):	5	Add Route	Close	J
Ready		,		Local (19	2.168.255.102.1.1) Config Mode

Figure 6 TwinCAT Add Route Dialog Screen

- 7. Select IP Address
- 8. Press "Add Route"

File Edit Actions View Options Help □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ <td< th=""></td<>
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B- G SYSTEM - Configuration
PLC - Configuration VO - Configuration VO Devices Mappings Choose Target System Concel Search [Eidbung]. Search [Fieldbung]. Concelion Timeout (a): 5
Ready Local (192.168.255.102.1.1) Config Mode

Figure 7 TwinCAT System Manager Screen

- 9. Choose Target System
- 10. Press "OK"



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Figure 7 TwinCAT System Manager Screen

11. Target System choosen - in this guide "CX_022623"



Figure 8 TwinCAT PLC Control Screen

- 12. Start up your TwinCAT PLC Control
- 13. Open project



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TwinCAT PLC Control - CX90	00-Nik3.pro	STREET, STREET	All and All	- 0 <mark>- X</mark>
File Edit Project Insert E	stras Online Window Help			
POU:	Copy			
MAIN (PRG)	MAIN (PRG-ST)			
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	0002			
	0004			
	0005			
	iCounter.+iCounter + 1;	iCaunter = 16#1966		
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1		Taya Ca	0/2623 (5.2.38 251 1), Run Time 1 (Lin: 1, Col. 1	ONUNE: SIM FON EP FORCE OV REAL

Figure 9 TwinCAT PLC Control Screen

14. Press "Online" in the top menu and select "login"

File Edit Project Inset Editas Online Window Help
ore demonstrations
Image: Second
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Figure 10 TwinCAT PLC Control Screen

- 15. Press "Online" in the top menu and select "Run"
- 16. You are now online with the PLC



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Appendix A, Connecting to PLC on Uplink port

With RDM firmware 11017 or earlier it is not possible automatically to install the necessary route in the Beckhoff PLC if the PLC is attached to the UPLINK interface, and not the DEV interface of the SiteManager.

This must currently be solved manually by the following procedure (keep updated on new firmware updates that may solve this issue).

 In the TwinCat System Manager, select System Manager > Chose Target.. > Search Ethernet >

duu kuule Diawg				X
Enter Host Name / IP:)		Refresh Status	Broadcast Search
Host Name CX 022623	Connected Address 172.24.2.1	AMS NetId	TwinCAT 1	OS Version │ Comment √in CE (5.0)
<]				
Route Name (Target):	CX 022623		Route Name (Remote	RDM-HKK
Route Name (Target):	CX_022623 5.2.38.35.1.1		Route Name (Remote) Target Route): RDM-HKK Remote Route
Route Name (Target): AmsNetId: Transport Type:	CX_022623 5.2.38.35.1.1 TCP/IP		Route Name (Remote) Target Route O Project	RDM-HKK
Route Name (Target): AmsNetId: Transport Type: Address Info:	ш С×_022623 5.2.38.35.1.1 ТСР/IР 172.24.2.197		Route Name (Remote) Target Route O Project O Static Temporary	I: RDM-HKK Remote Route None Static Temporary
Route Name (Target): AmsNetId: Transport Type: Address Info: Host Name	CX_022623 5.2.38.35.1.1 TCP/IP 172.24.2.197 2 Address		Route Name (Remote) Target Route O Project O Static Temporary): RDM-HKK Remote Route O None O Static Temporary
Route Name (Target): AmsNetId: Transport Type: Address Info: O Host Name Image Connection Timeout (s):	III CX_022623 5.2.38.35.1.1 TCP/IP 172.24.2.197 ⁵ Address 5		Route Name (Remote) Target Route O Project Static Temporary	: RDM-HKK Remote Route O None O Static O Temporary

2. If there is <u>NOT</u> an "X" in column "Connected" after the Add Route is pressed then the route table in the PLC is not updated correctly, and you must manually enter it through the PLC Web interface. Follow the below steps to do so.

Important: if there <u>is</u> an "X" in column "Connected" do <u>NOT</u> press "Add Route" this might overwrite the already working connection.



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Add Route Dialog				. 🔀
Enter Host Name / IP:			Refresh Status	Broadcast Search
Host Name	Connected Address 172.24.2.197	AMS NetId 5.2.38.35.1.1	TwinCAT OS V 2.10.1316 Win C	ersion Comment E (5.0)
Route Name (Target): AmsNetId: Transport Type: Address Info: O Host Name O IP /	CX_022623 5.2.38.35.1.1 TCP/IP 172.24.2.197 Address		Route Name (Remote): Target Route Project Static Temporary	RDM-HKK Remote Route None Static Temporary
Connection Timeout (s):	5		Add Route	Close

3. Connect the LinkManager to the PLC and click the **Go To Appliance** icon, which will launch the WEB interface of the Beckhoff PLC

🏉 LinkManage	er 6041 Console - HK	K_Office - Windows Internet Explore	er							
G - [也 http://10.127.128.129	9:3/console/	~		4 ×	🚼 Goog	le			P -
<u>File E</u> dit <u>V</u> ie	w F <u>a</u> vorites <u>T</u> ools	Help								
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		Disconnect Logo ROOT.demo.Toplevel.Amo	out	Sniffer	omer A					
		G1:beckhoff (SM2034-T	heWall) - 1	72.24.2	2.197					
	Agent	Address	Status	Conr	ects	Pac	kets	By	es	
				ok	fail	tx	rx	tx	rx .	
	🕄 🏾 🚷 beckhoff	172.24.2.197:987,5120,48897-48899	UP:1	1	0	1	1	38	46	
		:48898-48899 (udp)	UP:2	0	0	2	2	104	358	

- 4. Press: TwinCat > Routes, Select the PC Name (in the below example "RDM-HKK"). "Address" must show the DEV1 IP address of the Site-Manager. If not then the route is installed wrong (If the PLC is attached via the Uplink interface, the address will most likely be the LinkManager IP address, which will not work.)
- 5. Select **Add Route** to add the route manually: (If a route already exist it should be deleted)



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Name = RDM-HKK Address=172.24.2.11 AmsAddress=172.16.15.223.1.1

(The AMS Router can be found on the PC's TwinCat program):

TwinCAT System Properties	X
General System AMS Router PLC Registration	
Local Computer	
AMS Net Id: 172.16.15.223.1.1	
Remote Computers	
CX_022623 CX_076A25 NtoLaundry	
Add <u>R</u> emove <u>Properties</u>	
OK Cancel Apply	



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Appendix B, Dealing with DHCP assigned PLC address

As default the CXxxx type Beckhoff PLCs are default delivered with DHCP enabled.

This Appendix explains how you can use the SiteManager to ensure the DHCP address is always the same, or alternatively how you can access the PLC with the CERHOST program to change the DHCP setting to a fixed IP address.

B1: Using DHCP on the SiteManager DEV port

If you are connecting the PLC to the DEV port of the SiteManager, it is recommended to leave the DHCP setting, and make the IP address "static" in the SiteManagers DHCP lease table.

This will ensure that the PLC will always receive the same IP address.

1. In the SiteManager GUI, enter the DEV port on which the DHCP enabled PLC is attached.

SiteManager 1	(h
SETUP • System GateManager Rou	ting Maintenance Status Log • HELP
2 DE	EV1
IP Address:	172.24.2.1
Subnet Mask:	255.255.255.0
Auto Subnet Agent:	Enabled 👻
Proxy ARP:	Disabled 👻
Save DHC	:p>>> DNS >>

2. Ensure that DHCP is enabled. If not just enable it and it will automatically suggest a DHCP range. You may have to reboot the SiteManager to activate the DHCP:

SiteManager secomea	ch (h)
SETUP • System GateM	lanager Routing Maintenance Status Log • HELP
System Into • General Tr	ime • DEV1 DEV2 DEV3 DEV4 • UPLINK • Serial I/O DHCP Server on DEV1
DHCP Server Mode: DHCP Relay Server:	Manual or Auto
Pool Start: Pool Stop:	0.0.0.0
Lease Time: Domain Name:	86400 seconds [3600-31449600] thewall.domain
Wins Server: WINS Secondary: Cisco CallManager:	0.0.0
Sa	we Back Leases >>

3. Make sure the Beckhoff PLC is connected to the DEV1 port and is powered on after the DHCP server has been enabled.



4. Go to the DHCP Leases >>

DHCP Server on DEV1					
Active P	ool Range: 172.24.2.100 - 172.24.2.199				
DHCP Server Mode:	Manual or Auto 🔻				
DHCP Relay Server:	0,0,0,0				
Pool Start:	0.0.0.0				
Pool Stop:	0.0.0.0				
Lease Time:	86400 seconds [3600-31449600]				
Domain Name:	thewall.domain				
WINS Server:	0.0.0.0				
WINS Secondary:	0.0.0.0				
Cisco CallManager:	0.0.0.0				
S	ave Back Leases >>				

5. You should now be able to identify the PLC in the lease list by its MAC address or it's Hostname. Select the **Lock** check box and press **Save**.

Site secome	Man ea	ager			d
	SI	ETUP • System Gate	Manager Routing Mainten	ance Status Log	HELP
		System Into • General	Time • DEVI DEVI DEVI DEVI	EV4 • OPEINK • Sena	1 1/0
			DHCP Server Leases		
			Using 1 static and 1 dynamic leas Static Leases	ies	
Disable	Interface	IP address	MAC address	Hostname	Comment
	DEV1	172.24.2.181	00:14:D1:F1:84:60	TV-IP422W	Û
			Dynamic Leases		
Lock	Interface	IP address	MAC address	Hostname	Expires
	DEV1	172.24.2.199	00:01:05:02:26:23	CX_022623	2011/02/12 09:28:28
\bigcirc		Save	New Refresh	Back	

6. The MAC address of the PLC is now associated with a Static DHCP lease, which means the PLC will always receive the same IP address from the SiteManager. You are also able to change it here, in case it conflicts with another device in the network.

SiteMar secomea	nager			ch	
5	GETUP • System Gat	eManager Routing Maint	enance Status Log) • HELP	
	System Info • General	Time • DEV1 DEV2 DEV3	DEV4 • UPLINK • Se	rial I/O	
		DHCP Server Leases Using 2 static and 0 dynamic le Static Leases	ases		
Disable Interface	e IP address	MAC address	Hostname	Comment	
DEV1	172.24.2.181	00:14:D1:F1:84:60	TV-IP422W	Û	
DEV1	172.24.2.199	00:01:05:02:26:23	CX_022623	Î	
	Save	New Refresh	Back		



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B2: Set a fixed IP address on the PLC via LinkManager using CERHOST

The CERHOST client software is provided by Microsoft for obtaining remote display control of a Windows CE device.

This tool is typically used for establishing access to a CX1xxx type Beckhoff PLC to change the IP address of the PLC from the DHCP assigned IP, to a static IP address.

The CERHOST.exe utility is freeware and can be downloaded from the Beckhoff website, and various other public sites.

1. Connect with LinkManager to the PLC

Disconnect Sniffer ROOT.demo.Toplevel.EMEA.Denmark.Customert.Production Plant 1 beckhoff* (SiteManager) - 172.24.2.199 Agent Address Packets Bytes Kall tx rx tx rx ************************************	L	ink ecom	Mea	anag	ier							h
ROOT.demo.Toplevel.EMEA.Denmark.CustomerF.Production Plant 1 beckhoff* (SiteManager) - 172.24.2.199 Connects Packets Bytes Agent Address Connects Packets Bytes OW Address Connects Packets Bytes OW Address Connects Packets Bytes OW OW Fail tx rx tx rx OW OW Fail tx rx					Disconnect Logout	Service	5	Sniffer				
beckhoff* (SiteManager) - 172.22.21.99 Agent Address Con-ct Address Packets Bytes (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (2) * (ROOT.demo.Toplevel.EMEA.Denma	rk.Custon	nerF.Pro	oduction	Plant 1			
Agent Address Connects Packets Bytes (2) ✓ (4) beckhoff* 172.24.2.199;5120,987,48897-48899 IDLE 1 0 1 61 4 17.836					beckhoff* (SiteManag	jer) - 172	.24.2.19	99				
Autress Status ok fail tx rx tx rx (3) ⁴ (4) beckhoff* 172.24.2.199:5120,987,48897-48899 IDLE 1 0 1 61 4 17,836				Acont	Addross	Status	Conn	nects	Pac	kets	B	ytes
😳 🗸 🎨 beckhoff* 172.24.2.199:5120,987,48897-48899 IDLE 1 0 1 61 4 17,836				Agent	Address	Status	ok	fail	tx	rx	tx	rx
		⊚*	•	beckhoff*	172.24.2.199:5120,987,48897-48899	IDLE	1	0	1	61	4	17,836
:48897-48899 (udp) IDLE 0 0 0 0 0 0					:48897-48899 (udp)	IDLE	0	0	0	0	0	0

2. State the CERHOST.exe utility, and select Connect



3. Type in the IP address of the PLC and password if needed, otherwise leave it blank. Press OK to connect.

Connect
Hostname: 172.24.2.199
Password:
OK Cancel

Note: You cannot use the DNS name (e.g. CX_022632), as indicated in some guides, since you do not have access to the DNS server that can resolve it.



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4. You are now online with the PLC.



5. Select Start \rightarrow Settings \rightarrow Network and Dial-up Connections.





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6. If there is more than one Ethernet adapter, you can double click each of the adapter icons in the system tray, to determine which has the IP address you have connected to.

CX_022623	
File Zoom Tools Help	
Eile Edit View Advanced 🔀 😭 🧕 🔚	? ×
ICLXPNPE1 OR X	
Internet Protocol (TCP/IP)	
Address Type: DHCP	
IP Address: 172.24.2.199	
Subnet Mask: 255.255.255.0	
Default Gateway: 172.24.2.1	
Details	
Renew	
Start WellNetwork Conne TCIXPNPE1	. EN 2:56 PM

7. Right-click and select properties for the adapter, and select "Specify an IP address", and enter relevant settings:

CX_022623	
File Zoom Tools Help	
File Edit View Advanced 🔀 😭 🕒	? ×
Make New TCIXPNPE2 TCIXPNPE1 Connection	
'TcIXPNpe Real Time Ethernet NPE Driver B' Settings OK 🗴	1
IP Address Name Servers	
An IP address can be automatically assigned to this computer. If your network does not automatically assign IP addresses, ask your network administrator for an address, and then type it in the space provided.	
路Start @ Control Panel 回 Network Conne @ 二 @ 二 @ 二 Network Conne	3:13 PM 🕑 🗭

8. Press OK, and Restart the PLC to activate the new address..

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