CyBro OPC Server User Manual

rev. 31 (applies to CyBro OPC Server v3.0.4 and later)



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General

OPC stands for "OLE for Process Control" - it is a specification standardized by OPC foundation, which enables OPC clients to access hardware data via OPC servers in a common, well defined way.

CyBro OPC Server enables OPC clients access to CyBro controllers, and attached IEX-2 modules. Clients may read and write whole memory space.

Installation

To install CyBro OPC Server, start the installation and follow instructions. Recommended install directory is "C:\Program Files\Cybrotech\CyBro OPC Server".

Setup - CyBroOpcServe	r 🔲 🗖 🗙
OPC	Welcome to the CyBroOpcServer Setup Wizard
	This will install CyBroOpcServer version 3.0.0 on your computer.
	It is recommended that you close all other applications before continuing,
	Click Next to continue, or Cancel to exit Setup.
CyBro OPC Data Access Server	
	Next > Cancel

Installation does the following:

- unpack CyBro OPC files into specified directory
- create start menu group and icons
- register OPC server to be visible for clients
- install redistributable OPC core components

Note: administrator rights are required.

To upgrade server, install new version into the same directory, without uninstalling previous one. User settings will be preserved. Before upgrading, close SCADA window and shut down OPC server.

To uninstall server, start Control Panel, Add or Remove Programs, select CyBro OPC Server and press Remove button. OPC core components must be uninstalled separetely.

Activation code

To use CyBro OPC Server, valid activation code is required. To buy activation code, contact Cybrotech support. Regarding the application size, activation code may be:

- small up to 100 tags
- medium up to 1000 tags
- large unlimited number of tags

Using the OPC server with 10 or less tags is free, no activation code is needed.

Without activation code, server may be used for development and testing. After 2 hours, warning message will pop up and server will stop. Restarting server provides another 2 hours. Number of restarts is not limited.

Configuration

OPC server configuration consist of creating a controller list and setting options.

Controllers

To create list of controllers, use Scan option or enter controllers manually.

Controlle	ers					ĺ
NAD 👻	Connection	IP address	Port num	Timeout [ms]	Retries	Status
6511	LAN	192.168.1.43	8442	500	3 🧧	ok
6512	LAN	192.168.1.9	8442	500	3 🧧	ok
9462	LAN	192.168.1.8	8442	500	3 🧧	ok
Scan				Add	Edit	Delete
					ОК	Cancel

Status column reflect actions from Controllers dialog (scan), not regular communication.

Sort order (NAD, IP address...) directly affect order of controllers displayed in project tree.

Options

Use Options dialog to set communication options and advanced details.

📴 Options	
Communication Advanced	
Tag name format: cNAD.VarName Image: Constraint of the state of the	Create log file (CyBroOPC.log) OPC communication A-bus communication Complete message
Show array element variables	System messages
Message parameters Max. size (128-1024 bytes): 512 min. Min. block usage (1-100%): 5 % ↔ 1 max. Size	
Use password to access OPC user interface	
Password:	
Register server Unregister server	Default
	OK Cancel

Default tag format is cNAD.VarName, other formats are legacy and should not be used for new projects.

High process priority may slightly improve performance if server is heavy loaded.

Log file is used only for debuging, it may significantly affect server performance. File size is not limited.

Toolbar	
Start/stop (Ctrl-D)	Open TCP/IP port and start communication.
Refresh tag (F9)	Refresh selected (one or multiple) tags. Refresh is performed by setting a read request (
Refresh all (F10)	Read all tags from curent PLC/all monitor tags. Refresh is performed by setting a read request (
Set value (Enter)	Set value of selected (one or multiple) tags. Refresh is performed by setting a write request (
Add to Mon (Ins)	Add selected (one or multiple) tags to monitor. Monitor is basically a small OPC client. Monitor may hold variables from multiple controllers, and also system variables. Unlike background refresh process, monitor does affect tag status and communication statistics.
Controllers (F5)	Open list of available controllers.
Options (F4)	Open program settings dialog.

Status panel

Network status



Communication port closed, press Start to open port and begin communication.



No communication - either no controllers are configured, or no communication requests are given.



Communication between OPC server and controllers is up and running.



Error, socket binding problem or controllers not responding.

Network status is contained in Sys.Status tag. To get more details, check Sys.OpcStatus tag.



OPC status



OPC interface is idle, no clients are connected.



OPC interface is active, at least one client is connected.

Network monitor

Controller status

Idle	CyBro is idle, no active read/write requests (background refresh doesn't count).
Ok	CyBro is active, communication is up and running, no errors detected.
Error	Communication or configuration error.

Controller status is contained in cXXXX.Sys.Status tag. To get more details, check cXXXX.Sys.PlcStatus.

Reading	A value is currently reading from the controller.
Writing	A value is currently written to controller.
OPC request	OPC client (SCADA) put a request to read/write one or more PLC tags.

Tag status

	Reading	Read request pending. Tag will be updated in next available communication cycle.
	Writing	Write request pending. Tag will be written in first available communication cycle. Tag quality becomes LOCAL_OVERRIDE until next read cycle is performed.
2	Idle	No requests are pending, tag will be refreshed in next background refresh cycle. If communication is busy because of SCADA requests, background refresh is not available, and idle tags are not updated (tag quality drops to LAST_KNOWN).

Process priority

OPC server execute three separate processes, write, read and background refresh. Write process has top priority, read process is below, and background refresh has lowest priority.



Read and write processes are initiated by OPC client requests. If no read/write requests are pending, background refresh is processed. Heavy traffic may slow down or even stop background refresh.

OPC data monitor is in essentially an OPC client. Monitor activity does affect system tags.



Tag quality

According to OPC specification, each tag has value and quality.

Value is an actual tag value, quantity. Range of possible values depends on tag type (bit, integer, long, real).

Quality is a property independent of value, and specifies how reliable the actual value is. Quality depends on how and when the value is obtained. When communication is uninterrupted, quality is always "Good". If communication channel is broken, quality first become "Uncertain", then "Bad".

A range of possible qualities is defined by OPC specification. There are three main categories, "Good", "Uncertain" and "Bad. Each category can contain additional info field, which may give a more detailed explanation about the problem cause.

CyBro OPC server implements the following qualities:

Good Value is updated regularly.

Good, local override	. Value is locally overridden using function "Set value". Tag status is red (write pending). After the write command is completed, status becomes green (reading) or gray (idle). When tag value is read next time, quality changes back to "Good".
Uncertain, last usable	. First timeout, last updated value is more than 5 seconds old. Possible reason may be a slower network update time, or communication errors. This is a warning, not error.

Bad	Value is unusable, no successful read was performed since OPC server started.
Bad, last known	Second timeout, last updated value is more that 10 seconds old. Communication is broken, value is not reliable any more.
Bad, out of service	Activation code expired. More tags than allowed by license is used, development timeout (2 hours) expired.

To adjust "Uncertain" and "Bad" timeouts, open Options/Advanced.

System tags

System tags are virtual tags created by OPC server, used to show information about OPC server and network. Two kinds of tags are available - those belonging to server, and those belonging to a PLC.

Some system tags are resettable (counter, timestamp, etc) - writing zero (or reset) will clear accumulated data and start from the begining.

To get more details about system tags, open tag list and check description for each tag.

le <u>V</u> iew <u>T</u> o	ools <u>H</u> elp	_							
Start/Stop	CO Refresh Tag	Refresh All	Set Value	Add To Monitor	Controllers	Options			
	-	Status 4	Name		Type	Timestamp	Quality	Value	Description
			c6512.Sys.M	legativeAckCount	long	11.5.2013 17:35:44	Good	0	Total number of negative acknowledges
				astNegativeAckAt	-	11.5.2013 17:35:44	Good	-	Timestamp of last detected negative ack
			c6512.Sys.F	leadCount	long	11.5.2013 17:35:44	Good	2	Number of read cycles (excluding backgr
Controller	s OPC clients		c6512.Sys.F	leadErrorCount	long	11.5.2013 17:35:44	Good	0	Number of read errors (excluding backgr
			c6512.Sys.\	VriteCount	long	11.5.2013 17:35:44	Good	0	Number of write cycles.
	ata Access Server		c6512.Sys.\	VriteErrorCount	long	11.5.2013 17:35:44	Good	0	Number of write errors.
- Monito			c6512.Sys.E	ackgroundRefresh	long	11.5.2013 17:35:44	Good	26193	Number of background refresh cycles.
	(192.168.1.8)		c6512.Sys.E	ackgroundRefresh	long	11.5.2013 17:35:44	Good	0	Number of background refresh errors.
	(192.168.1.9)		c6512.Sys.M	1onitoredTags	long	11.5.2013 17:35:44	Good	0	Total number of tags monitored by all co
C6511	(192.168.1.43)		c6512.Sys.5	ystemStatus	string	11.5.2013 17:35:44	Good	kernel	System status: "loader", "kernel".
			c6512.Sys.F	LCStatus	string	11.5.2013 17:35:44	Good	run	PLC status: "stop", "run", "pause", "erro
			c6512.cybro	_ix00	bit	11.5.2013 17:35:44	Good	0	230Vac surge protection status (0-error,
			c6512.cybro	_ix01	bit	11.5.2013 17:35:44	Good	0	24Vdc surge protection status (0-error,
			c6512.cybro	_ix02	bit	11.5.2013 17:35:44	Good	0	DCB1 combiner box surge protection sta
			c6512.cybro	_ix03	bit	11.5.2013 17:35:44	Good	0	DCB2 combiner box surge protection sta
			c6512.cybro	_ix04	bit	11.5.2013 17:35:44	Good	0	DCB3 combiner box surge protection sta
			c6512.cybro	_ix05	bit	11.5.2013 17:35:44	Good	0	DCB4 combiner box surge protection sta
C status	active		c6512.cybro	_ix06	bit	11.5.2013 17:35:44	Good	0	AC side surge protection status (0-error
	X Error		c6512.cybro	_ix07	bit	11.5.2013 17:35:44	Good	0	Main circuit breaker position (0-connecte
	Inactive		c6512.cybro	_ix08	bit	11.5.2013 17:35:44	Good	0	Binary input (0-open, 1-closed).
	📑 Reading		c6512.cybro	_ix09	bit	11.5.2013 17:35:44	Good	0	Binary input (0-open, 1-closed).
	Hiting		c6512.first_	scan	bit	11.5.2013 17:35:44	Good	0	Active during first scan only.
	🐺 OPC request		c6512.scan	overrun	bit	11.5.2013 17:35:44	Good	0	Scan time longer than 60ms caused scan
g status	Reading		c6512.gene	ral_error	bit	11.5.2013 17:35:44	Good	1	Logical or of all IEX general errors, indica
	Writing		c6512.clock		bit	11.5.2013 17:35:44	Good	0	10ms clock (5ms+5ms).
	Idle	<	6545 L L	100	1.9		~ ·	^	100 1 1 (FO . FO .)

Click column name to sort tags. To restore default tag order, click Status column.

DCOM setup

OPC 2.0 technology uses Microsoft's COM/DCOM model to exchange data between a client and a server, so DCOM permissions must be set to allow communication between DCOM objects on different computers.

As a prerequisite, latest version of OPC Core Components Redistributables must be installed (included in CyBroOpcServer instalation).

Setup mutual user accounts

To ensure a successful communication between OPC client and server computers, it is necessary to setup same user accounts on both computers. There are two things to note:

- user account must have a password.
- user account must have the same name/password on both computers.

On Windows XP and later it is also necessary to set the local security policies. Go to Control Panel / Administrative Tools / Local Security Policy or press Windows-R, type "secpol.msc" and press Enter. Next, navigate to Security Settings / Local Policies / Security Options and find the "Network access: Sharing and security model for local accounts" option and set it to "Classic - local users authenticate as themselves".

Configure system-wide DCOM settings

Press Windows-R, type "dcomcnfg" and press Enter to open Component Services. Navigate to Component Services / Computers, right-click on My Computer and select Properties.

On the Default Properties tab:

- 1. Check "Enable Distributed COM on this computer"
- 2. Set Default Authentication Level to Connect
- 3. Set Default Impersonation Level to Identify

М	y Computer Pr	operties	>
Default Protocols	COM Sec	curity	MSDTC
General	Options	Defa	ault Properties
_	COM on this computer net Services on this cor		
Default Distributed	COM Communication Pr	operties	
The Authentication	Level specifies security	/ at the pack	ket level.
Default Authentic	ation Level:		
Connect		~	
who is calling them using the client's ide			
who is calling them	and whether the applic entity.		
who is calling them using the client's id Default Imperson Identify Security for referen and that the default	and whether the applic entity.	vided if authenot anonyme	o operations
who is calling them using the client's id Default Imperson Identify Security for referen and that the default	and whether the applic entity. tion Level: be tracking can be prov- impersonation level is i nnal security for referen	vided if authenot anonyme	o operations

On the COM Security tab:

1. Under Access Permissions, click Edit Default button and add the following Group or user names:

Anonymous Logon Everyone Interactive Network System

2. Ensure that both Local and Remote Access are allowed for all groups/users above.



- 3. Do the same for Edit Limits option (if the button is not disabled).
- 4. Repeat the above three steps for Launch and Activation Permissions.

Access P	ermission	?	×	
Security Limits				
Group or user names:				
Everyone ALL APPLICATION PACKAGES Performance Log Users (Zeljko\Performance Log Users) Distributed COM Users (Zeljko\Distributed COM Users) ANONYMOUS LOGON				
	Add	Remov	/e	
Permissions for ANONYMOUS LOGON	Allow	Deny	,	
Local Access Remote Access	>			
Leam about access control and p	emissions			
	ОК	Са	ncel	

Configure specific DCOM settings

Press Windows-R, type "dcomcnfg" and press Enter to open Component Services. Navigate to Component Services / Computers / My Computer / DCOM Config. Find OPCEnum or OPC server in the list, right-click and select Properties.

1. On the General tab, set Authentication Level to "Connect".

2. On the Security tab, under "Launch and Activation Permissions", select Customize, Edit. Add the following users and ensure that all permissions are allowed for them:

Everyone Interactive Network System

3. Repeat the procedure for "Access Permissions".

4. On the Identity tab, select the user under which your OPC server will run (in case of OPCEnum, set it to "The system account"). Since CyBroOPCServer wasn't developed to run as a service, it should be set to Interactive user or This user. If Interactive user is selected, it is necessary to remain logged on at the computer in order for the OPC server to run.

CyBroOPC Data Access Server Properties ? 💌	CyBroOPC Data Access Server Properties ? 🗙	
General Location Security Endpoints Identity	General Location Security Endpoints Identity	
General properties of this DCOM application	Which user account do you want to use to run this application?	
Application Name: CyBroOPC Data Access Server		
Application ID: {C5B883BF-CE9E-4320-98D8-2DA8504E23A5}	The interactive user.	
Application Type: Local Server	 The launching user. 	
Authentication Level: Connect 🗸	C) This user.	
Local Path:	User: Browse	
	Passwurd.	
	Confirm password:	
	The system account (services only).	
Learn more about <u>setting these properties</u> .	Learn more about <u>setting these properties</u> .	
OK Cancel Apply	CK Cancel Apply	

Add exception rules to a firewall

To enable successful communication with the OPCEnum and OPC Server from the remote computer, they should be added to the firewall's exception list. This task is specific to the firewall used, so it will not be covered here, but it should be easy and straightforward.

Troubleshooting

If you does not succeed in connecting to the remote OPC server, even after you have setup DCOM permissions, there is a troubleshooting guide available at OPC Training Institute website (http://www.opcti.com/ResourceDetails.aspx?id=2). Also on their website you can find a small utility, OPC Rescue, which will help in identifying the cause of the error.

Keyboard shortcuts

Ctrl-A	Select all tags
Insert	Add selected tag(s) to monitor (controller only)
Delete	Remove selected tag(s) from monitor (monitor only)
Enter	Set tag(s) value
Space	Toggle tag(s) value (bit only)
Ctrl-Up/Down	Move selected tag(s) up/down (monitor only)
F4	Options dialog
F5	Controllers setup dialog
F9	Refresh selected tag(s)
F10	Refresh all PLC tags / all monitor tags
Alt-F4	Close OPC window
Ctrl-Alt-F4	Shutdown OPC server

Technical specifications

Server ID CyProOPC.DA2
OPC version 1.0, 1.0a and 2.0
OPC interfacesynchronous and asynchronous
Supported OS WinXP, Win7, Win8
Program executable x86 32-bit
Supported PLC kernel CyPro v2.6.4 and later
Communication Ethernet/LAN
Communication protocol A-bus/symbolic (alc file read from PLC)