GE Grid Solutions

Enterprise File Synchronization from G500 Sync Manager

Configuration Guide

SWM0104 Version 1.00 Revision 0 Associated Software Release: Version 1.00



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About this Document

Purpose

This document describes how to setup an enterprise server on a Windows-based computer to synchronize files from G500 device(s) that use the Sync Manager application (RSYNC/SSH protocol). This document outlines and details the procedures regarding:

- Installation and setup of CopSSH and cwRsyncServer tools on the computer. These are 3rd party software applications that have been tested with the G500 Sync Manager.
- Configuration of G500 Sync Manager Application to synchronize files to the enterprise server. The example is for ARRM files, but other user related files / folders may be synchronized too (e.g. Logs).

Once the data is present in the Windows Enterprise computer, the sharing of folders and files from this computer to Enterprise users is outside of scope of this document and can be achieved using any IT / Windows standard sharing methods.

Intended Audience

This document serves as a reference for systems integrators who wish to setup enterprise server on Windows-based computer to synchronize files from G500 Sync Manager device(s).

Additional Documentation

For further information about the Enterprise File Synchronization from G500 Sync Manager, refer to the following documents:

- G500 Substation Gateway, Software Configuration Guide, SWM0101
- G500 Substation Gateway, HMI Online Help

1. Overview

1.1 G500 Sync Manager

The Sync Manager is a G500 application that can be used to securely and automatically copy files from a location on your G500 device to a specified directory on a remote device. The application monitors the specified local directory for changed or added files. To reduce bandwidth demands on your network, only files found to have been changed or created since the last synchronization will be transferred. This utility employs the *rsync* protocol to perform this function, secured by an SSH layer.

Multiple file sets can be configured for synchronization in the G500, to send data to one or multiple target remote devices, using one or multiple user authentications.

1.2 Copssh software

Copssh is a 3rd party Windows-based software that enables SSH server on Windows-based computer.

1.3 cwRsyncServer software

cwRsyncServer is a 3rd party Windows-based software that enables rsync utility on Windows-based computer.

1.4 Installation Steps

- 1. Install cwRsyncServer and Copssh softwares on Windows-based computer acting as Enterprise Server (Refer chapter 2. Installation of copssh and cwRsyncServer)
- 2. Configure G500 Sync Manager Application (Refer to chapter 3. Configuring G500 Sync Manager)
- 3. Setup public key authentication between G500 (client) and enterprise server (Refer to chapter 4. Setting up Public Key Authentication).

2. Installation of copssh and cwRsyncServer

This chapter describes how to install Copssh and cwRsyncServer software on Windowsbased Enterprise Server.

2.1 Software

 Obtain the commercial version of cwRsyncServer software from: <u>https://www.itefix.net/cwrsync</u>

Note: obtain the server version of cwRsync, i.e., cwRsyncServer.

• Obtain the commercial version of Copssh software from: <u>https://www.itefix.net/copssh</u> **Note**: GE DE GA has no commercial / reseller agreements in place with ITeF!x

2.2 Installation

cwRsyncServer software must be installed before Copssh.

Note: Before starting the installation, ensure that any previous installation of cwRsyncServer and Copssh is completely uninstalled.

Follow Appendix A to completely uninstall cwRsyncServer and Copssh before proceeding with below steps.

2.2.1 cwRsyncServer

1. Start installation of cwRsyncServer by running its setup program. Follow the steps below to complete the installation.

Note: The cwRsyncServer setup program must be run as administrator by Right click on the program, and selecting "Run as administrator" (Windows 7).

2. cwRsyncServer Setup dialog appears. Click "Next".



3. Click "I Agree" on the "License Agreement" window.

🚆 cwRsyncServer 4.0.5 Setup
License Agreement Please review the license terms before installing cwRsyncServer 4.0.5.
Press Page Down to see the rest of the agreement.
** License Information for cwRsync, Rsync, Cygwin **
======================================
Permission is hereby granted, free of charge, to any person obtaining a
If you accept the terms of the agreement, click I Agree to continue. You must accept the agreement to install cwRsyncServer 4.0.5.
Nullsoft Install System v2.45 < Back I Agree Cancel

4. On the "Choose Install Location" window, click "Next" to select the default location.

Note: Ensure that destination folder is "**C:\Program Files\ICW**" on a 32-bit operating system or "**C:\Program Files (x86)\ICW**" on a 64-bit operating system. If not, manually update the installation location.

😤 cwRsyncServer 4.0.5 Setup	x
Choose Install Location Choose the folder in which to install cwRsyncServer 4.0.5.	Ş
Setup will install cwRsyncServer 4.0.5 in the following folder. To install in a different folder, click Browse and select another folder. Click Next to continue.	
Destination Folder C:\Program Files\ICW Browse	
Space required: 0.0KB Space available: 149.1GB	
Nullsoft Install System v2.45 — Cancel	

5. On the "Service Account" window, click "Install" to select default service account name and password.

🛱 cwRsyncServer 4.0.5	Setup		
Service Account Rsync server will be se	tup as a windows service with	he logon credentials b	elow:
cwRsyncServer requ accept the values su ym7AZBoiiK2609) or the account will be e	ires a dedicated service accour ggested by the installer (user: specify your own values. Exist ntitled with the user privilege 'k	It for full functionality. SvcCWRSYNC, passwo ng accounts are allowe Igon as service'.	You can either ord: ed. In all cases,
Service account:	þνcCWRSYNC		
Type password:	•••••		
Confirm password:	•••••		
Nullsoft Install System v2.	45	Back Install	Cancel

6. On the "Installation Complete" window, click "Close" to complete the installation.

🛱 cwRsyncServer 4.0.5 Setup	
Installation Complete Setup was completed successfully.	<mark>Ĝ</mark>
Completed	
Show details	
Nullisort Install System V2.45	Cancel

2.2.2 Copssh

1. Start installation of Copssh by running its setup program. Follow the steps below to complete the installation.

Note: The Copssh setup program must be run as administrator by Right click on the program, and selecting "Run as administrator".

2. On the "Copssh Setup" window, select "Next".



3. Click "I Agree" on the "License Agreement" window.

🛱 Copssh 3.1.4 Setup
License Agreement Please review the license terms before installing Copssh 3.1.4.
Press Page Down to see the rest of the agreement.
GNU GENERAL PUBLIC LICENSE Version 3, 29 June 2007
Copyright (C) 2007 Free Software Foundation, Inc. < <u>http://fsf.org/</u> > Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.
Preamble
The GNU General Public License is a free, copyleft license for software and other kinds of works.
If you accept the terms of the agreement, click I Agree to continue. You must accept the agreement to install Copssh 3.1.4.
Nullsoft Install System v2.45 < Back I Agree Cancel

4. On the "Choose Install Location" window, click "Next" to select the default location.

Note: Ensure that destination folder is "**C:\Program Files\ICW**" on a 32-bit operating system or "**C:\Program Files (x86)\ICW**" on a 64-bit operating system. If not, manually update the installation location to match the installation location of the cwRsyncServer installation folder.

😭 Copssh 3.1.4 Setup	
Choose Install Location Choose the folder in which to install Copssh 3.1.4.	â
Setup will install Copssh 3.1.4 in the following folder. To install in a different Browse and select another folder. Click Next to continue.	folder, click
Destination Folder C: \Program Files \ICW \	Browse
Space required: 19.0KB Space available: 149.1GB	
Nullsoft Install System v2.45	Cancel

5. On the "Service Account" window, click "Install" to select default service account name and password.

😭 Copssh 3.1.4 Setup		
Service Account OpenSSH server will be	e setup as a windows service wit	th the logon credentials below:
Copssh requires a de the values suggester specify your own val YOUR USER ACCOUI THEY WILL BE DENIE administrator rights a	edicated service account for full d by the installer (user: SvcCOP lues. Existing accounts are allow NTS OR BUILT-IN ACCOUNTS like D FOR LOGON. In all cases, the and some user privileges depend	functionality. You can either accept SSH, password: IWxd12hrIIV063) or ved. HOWEVER, PLEASE DON'T USE e administrator FOR THAT PURPOSE. e account will be entitled with ding on the operating system. Check
Service account:	þνcCOPSSH	
Type password:	•••••	
Confirm password:	•••••	
Nullsoft Install System v2.	.45 < E	Back Install Cancel

6. Since cwRsyncServer is already installed, installer will warn that ICW Base is already installed, and upgrade/repair will be performed. Click "OK".

🛱 Copssh 3.1.4 Setup	
Installing Please wait while Copssh 3.1.4 is being installed.	ß
Stop OpenSSHServer service	
ICW 2.1.0 Setup	×
ICW Base version 2.0.6 is found on this system. An upgrade/ be performed.	'repair will
ОК	Cancel
Nullsoft Install System v2.45 ————————————————————————————————————	Cancel

7. At the end of installation, Setup program will notify to activate user(s) that are allowed to use OpenSSH server. Click "OK" to complete the installation.

G ICW OpenSSHServer 2.0.4 Setup	
Installing Please wait while ICW OpenSSHServer 2.0.4 is being installed.	
Start sshd service	
G ICW OpenSSHServer 2.0.4 Setup	×
ICW OpenSSHServer 2.0.4 is installed as a service. No users are OpenSSHServer by default. Use 'Activate a user' from start me activation.	allowed to use nu for user
	ок
Nullsoft Install System v2,45	ose Cancel

8. On the "Installation Complete" window, click "Close" to complete the installation.

🛱 Copssh 3.1.4 Setup	
Installation Complete Setup was completed successfully.	â
Completed	
Show details	
Nullsoft Install System v2.45	
< Back Close	Cancel

9. Open Services Microsoft Management Console (MMC), from Control Panel → Administrative Tools → Services.

10. Double click on "Openssh SSHD" service to open its properties.

Ensure that its Startup type is set to "Automatic", and service is already in Started state.

Openssh SSHD Properties (Local Computer)
General Log On Recovery Dependencies
Service name: OpenSSHServer
Display name: Openssh SSHD
Description:
Path to executable: C:\Program Files\ICW\bin\cygrunsrv.exe
Startup type: Automatic
Help me configure service startup options.
Service status: Started
Start Stop Pause Resume
You can specify the start parameters that apply when you start the service from here.
Start parameters:
OK Cancel Apply

2.2.3 Create Users in Windows computer

- 1. The users intended to be configured in G500 Sync Manager sync sets must exist in the Windows computer.
- 2. Use the Windows Control Panel / User management interface to add all users as needed. They should be "user" class, with password set to "user cannot change" and "no expire". The password used here will not be used for G500 Sync Manager actions (Windows account only). These users have no need to login into the Windows computer account, and these credentials should be used only for the purpose of establishing sessions between the G500 and the Enterprise server.

New User			? 🗙	
<u>U</u> ser name:	rsync_user2			
<u>F</u> ull name:	Name 2			
Description:	User for D400 Sync	Manager		
Password:	•••••	,		
Confirm password:				
User <u>m</u> ust change password at next logon				
✓ User cannot change password				
Pass <u>w</u> ord never expires				
Account is disa <u>b</u> led				
Help		Create	Cl <u>o</u> se	

2.2.4 Activate Users

A Windows computer existing user must be activated before it can use OpenSSH service. This user will be used to sync files on this Windows-based computer from the G500 Rsync Manager. The user name must match the one configured in the G500 Sync Manager (each sync set has an option for a user name, they can be either common or distinct).

Depending on the software version, the dialog to activate users may be different.

2.2.4.1 Method 1

1. Start "Copssh Control Panel" from Start Menu All Programs Copssh Copssh Control Panel Go to User tab.

Note: The "Copssh Control Panel" program must be run as administrator.

S COPSS	H Control	Panel				
Status	Users	Configuration	SFTP	About		
Activated	l users					
						Add
						Delete
Shell:	Linu	x shell and Sftp			Ŧ	
V Passv	vord aut	thentication				Apply
V Public	key aut	thentication			Keys	
🗸 Allow	TCP for	warding			 	

2. Click "Add" to activate a user: "Copssh User Activation" wizard opens.

Activate a user for Copssh access
Copssh User Activation
This wizard allows you to activate a user for Copssh access. After activation, a user will be able to access resources available via Copssh.
Eorward Cancel

3. Click "Forward": User selection interface opens. A local or domain user can be utilized on Windows-based computer for Copssh access.

Local User: Select a local user from the "User" drop down list.

Rectivate a user for Copssh access		
Select a user		
	Domain:	es-d3bz7bs
	User:	geenergy 💌 domain_user
		Last Back Forward Cancel

Activate a user for Copssh access		
Select a user		
	Domain:	domain_name
	User:	▼ domain_user
		Back Eorward Cancel

Domain User: Enter domain name and user name in respective fields.

4. Click "Forward": Select options interface opens.

Retivate a user for Copssh access	5	
Select options		
	Access type:	Linux shell and Sftp 💌
	Home directory:	C:\Users\geenergy
	Options:	Allow password authenticationAllow PKA authentication
		Allow TCP forwarding
		<u>B</u> ack <u>Forward</u> <u>Cancel</u>

5. Ensure that "Home directory" is set to "C:\Users\<user_name>", where user_name is user selected in previous step. If not, manually update the "Home directory" field.

Note: This is typical home directory on Windows 7 computer.

- 6. Deselect "Allow TCP forwarding" option.
- 7. Click "Forward": Confirm activation interface appears.

Retivate a user for Copssh access	
Confirm activation	n 🔀
	User es-d3bz7bs\geenergy will be activated with the following options: Access type: Linux shell and Sftp Home directory: c:\users\geenergy Password authentication: yes Public key authentication: yes TCP forwarding: no NB! User names must be specified in lowercase during login. There is NO NEED to specify domain names.
	<u>Back</u> <u>Apply</u> <u>Cancel</u>

8. Verify details and click "Apply" to activate user.

2.2.4.2 Method 2

- 1. Use the direct entry under Start Menu \rightarrow All Programs \rightarrow Copssh \rightarrow Activate User.
- 2. Select the user name from the drop down list, and the other options as in the following figure.
- 3. Ensure you don't select the option to create keys; these will be created by the G500.

4. Click on Next.

🕞 copSSH User Activation Wizard	
User name rsync_user2	Command shell /bin/bash
For domain users: Add domain name followed by a backslash (DOMAIN\user for example)	 Remove copssh home directory if it exists Create keys for public key authentication Create link to user's real home directory
Nullsoft Install System v2,40	Next > Cancel

A confirmation dialog will be presented, click on OK.

🕞 UserActivationWizard 2.0 Setup	×
User rsync_user2 is activated successfully and can establish an ssh connection to this machine now.	
ОК	

3. Configuring G500 Sync Manager

You can configure the settings of the G500 Sync Manager through the **Sync Manager** menu under G500 Config Tool (g500cfg). G500 applications must be restarted after changes to the configuration of Sync Manager.

3.1 Enable Sync Manager

Enable Sync Manager Application using option "Enable Sync Manager" under "Configure Sync Manager" menu, in the G500 Config Tool (g500cfg). When Sync Manager is enabled, a private/public key pair is generated.

Note: Files from the G500 are securely copied to the remote device over an SSH connection. To facilitate authentication on this link, a private/public key pair are used.

When a key set is generated, the files are stored in the G500 under **/mnt/datalog/SSHKeys/SyncMgr/**. You should copy the public key file (*id_rsa.pub*) from this location and store it in the appropriate location on the remote device. Refer to chapter 4. Setting up Public Key Authentication for details.

3.2 Configure Sync Sets

Up to 8 sync sets can be created at any time. The following settings can be configured for each set:

Setting	Description	Range
Sync Set ID	A unique number used by the system to identify the sync set. Not editable; automatically assigned.	Auto-incremented from 1. Once a number has been assigned, it is never reused.
Destination IP Address	The IP address of the enterprise server where the files are to be copied.	Valid IPv4 address belonging to the Windows computer server
Destination User Name	The username used for SSH authentication on the enterprise server.	1 to 128 ASCII characters These are user names activated in section 2.2.3 Create Users in Windows computer
Source Path Name	The absolute directory pathname that will be synched to the remote device. Note : ARRM files are kept in /mnt/datalog/arrm folder in G500. You can specify this folder or a device specific sub-folder.	2 to 120 ASCII characters pointing to a valid location on the G500 file system
Destination Path Name	The absolute directory pathname that the files will be copied to. Note : If destination folder is C:\ARRM\G500_1\ on enterprise server, specify destination path name as /cygdrive/c/ARRM/G500_1	2 to 120 ASCII characters pointing to a valid location on the remote device's file system

Table 1 Configure Sync Sets - Settings

Setting	Description	Range
Check and rsync Interval	The amount of time, in seconds, that the Sync Manager waits before checking the source path for changes. If changed or created files are detected, an rsync operation is triggered. Typical value: 60 seconds	60 to 86400 seconds
Forced rsync Interval	The amount of time, in seconds, that the Sync Manager waits before a forced rsync operation is triggered, regardless of detected changes.	60 to 86400 seconds
	This will recreate files that have been deleted from the remote device as well as forcing the transfer of files whose changes may not have been detected due to MD5 collision, an extremely rare occurrence.	
	Typical value: 300 seconds	

Notes:

- The Sync Manager will only copy files to the remote Windows-based computer. Files are not deleted from the remote system if these are deleted from the G500 after synchronization. If files are deleted from the remote system, it will be recreated during the next sync operation.
- A forced rsync will be performed upon each startup of your G500 device.
- The path equivalence between the Windows computer file system and the G500 destination path name is as following:

Windows file system:

<drive_letter>:\<path1>\<path2>\

G500 Sync Manager destination path:

/cygdrive/<drive_letter>/<path1>/<path2>

(the drive letter must be lower case, and path strings same case as seen in Windows file system)

For e.g.:

Windows path:

C:\ARRM\Sub_01\

Corresponds to the following in G500 Sync Manager:

/cygdrive/c/ARRM/Sub_01

4. Setting up Public Key Authentication

G500 uses public key authentication to authenticate itself to Enterprise Server. When Sync Manager application is enabled in G500, it creates a public key (**id_rsa.pub**). This public key is required to be transferred to Enterprise Server.

4.1 Update Permissions to SyncMgr Folder

When a key set is generated, the files are stored in /mnt/datalog/SSHKeys/SyncMgr/.

In order to copy the key from this folder to the computer, the permissions of this folder need to be updated after the Sync Manager is enabled (this must be performed every time a new set is generated or after G500 restarts or re-logins).

Upon exiting the G500 Config Tool (g500cfg), execute the following command at the G500 prompt:

sudo chmod ug+x /mnt/datalog/SSHKeys/SyncMgr

(if prompted for a password, enter the password associated with the root account).

4.2 Copy key from G500 to the Windows computer

1. On the G500 the Sync Manager's public key **id_rsa.pub** is available in /mnt/datalog/SSHKeys/SyncMger/ folder.

This key must be transferred to the Windows computer. Depending on the copSSH software version and Windows OS version, the target location of the key file may be different.

- 2. <C:\Users\<user name>\.ssh> folder is present
 - If an \.ssh\ folder exists in the C:\Users\<user name>, the public key shall be transferred to that **\.ssh** folder on the Enterprise Server.
- 3. <C:\Users\<user name>\.ssh> folder is <u>NOT</u> present
 - If an \.ssh\ folder does not exist in the C:\Users\<user name>, the public key shall be transferred to the installation path of the software, typically:

"C:\Program Files\ICW\home\<user name>\.ssh" on a 32-bit operating system or

"C:\Program Files (x86)\ICW\home\<user name>\.ssh" on a 64-bit operating system.

 The public key file in the Windows \.ssh folder must have the name authorized_keys

There can be only one such file per user.

First time a G500 is added to a user, rename the copied **id_rsa.pub** to **authorized_keys**

If configuring multiple G500 units to sync files to an Enterprise Server, using the same user name, the public key content (one text line) from the *id_rsa.pub* of each G500 shall be appended to the already existent *authorized_keys* file on Enterprise Server using a text editor. Each public key is a single line entry in *authorized_keys* file; ensure that it is not broken in multiple lines while copying and pasting.

- 5. Ensure the user permissions are updated as shown in 4.1
- 6. Transfer Sync Manager's public key to Enterprise Server using WinSCP program or USB pen drive.

Note: The WinSCP program must be run as administrator by Right click on the program, and selecting "Run as administrator".

7. If this is the first G500-user, rename id_rsa.pub to authorized_keys

(In the left-side window of WinSCP, right click on file \rightarrow Rename), or use a text editor to append the new key to an existing file "authorized_keys".

8. Repeat this for every user and G500 station.



9. Reboot the G500 and the Windows computer.

The system is now ready to operate.

A. Uninstalling cwRsyncServer and Copssh

This chapter describes how to uninstall cwRsyncServer and Copssh softwares.

- 1. All active users must be deactivated first. To deactivate a user, use "copSSH User Activation Wizard". Start "copSSH User Activation Wizard" from Start Menu → All Programs → Copssh → Deactivate Users.
- Open Services Microsoft Management Console (MMC), from Control Panel → Administrative Tools → Services. Right click on service "Openssh SSHD", and select "Stop" to stop it.
- 3. Uninstall Copssh software from Start Menu → All Programs → Copssh → Uninstall COPSSH.
- Uninstall cwRsyncServer software from Start Menu → All Programs → cwRsyncServer
 → Uninstall cwRsyncServer Server.
- 5. Delete Copssh service user from Control Panel → User Accounts → Manage User Accounts → Select SvcCOPSSH user → Click "Remove".
- 6. Delete cwRsync service user from Control Panel → User Accounts → Manage User Accounts → Select SvcCWRSYNC user → Click "Remove".

B. Diagnostics

B.1 G500 Diagnostic Logs

- Connect to G500 HMI
- Click on "System Logs" button on the power bar
- Select "Diagnostic Log" tab
- Filter Application field for "B048"
- Export logs to CSV file using "Export data" button
- If rsync command error is reported, check destination IP, user name, destination folder details mentioned in the message.
- If error message "Check destination server connectivity and SSH public key authentication with it" is reported, check:
 - o IP connectivity to Enterprise Server
 - Correct installation of cwRwyncServer and Copssh softwares
 - o Configuration of SSH keys in Enterprise Server

B.2 Copssh Event Log on Enterprise Server

Depending on the copSSH software application version, the following log may not be available.

- Start "Copssh Control Panel" from Start Menu → All Programs → Copssh → Copssh Control Panel → Go to Status tab.
- Check status of Copssh service
- Open "Copssh events" log; check whether access requests from G500 IP are reaching and successful to Enterprise Server.

C. List of Acronyms

Table 2 List of Acronyms

Abbreviation	Description		
SSH	Secure Shell		
ARRM	Automatic Record Retrieval Manager		
DCA	Data Collection Application		
DPA	Data Presentation Application		
DTA	Data Translation Application		
HMI	Human Machine Interface		
IED	Intelligent Electronic Device		
RTDB	Real Time Data Base		
RTU	Remote Terminal Unit		

MODIFICATION RECORD

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