



Connect for Life™



R O M E 500

Administrator's Manual

DOC-0002

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1 Introduction

1.1 About This Document

This guide covers ROME software configuration and administration. It includes step-by-step instructions on how to configure the Wave2Wave Robotic Optical Engine (ROME) system as well as instructions on how to set up and administer users of the system.

1.2 Audience

This document is intended for Software Administrators of ROME equipment.

1.3 Related Documents

The ROME Hardware Installation Manual covers the installation of the ROME equipment into a rack. This document is a follow up document to help a customer administrator configure their ROME equipment once it has been installed.

This document should not be consulted until the ROME equipment is fully installed and powered up.

2 Configuring the ROME Equipment

Configuration of the ROME Equipment involves configuration of the ROME LCU and a ROME Chassis on the same rack.

To configure ROME, the administrator will be using ROME's Command Line Interface (CLI) as well as ROME Shell logging. In addition to using ROME's CLI and Shell logging, the administrator needs to use a terminal emulation application such as *Teraterm* and a FTP file management application such as *Filezilla*.

In the configuration steps outlined below, *Teraterm* and *Filezilla* have been used, as examples, to show the steps involved in configuring the ROME equipment. If the administrator uses other applications, the terminal emulation application must allow logging in both CLI and Shell mode, and the file management application must allow FTP file transfer.

If needed, *TeraTerm* installation is covered in Appendix 2.

2.1 ROME Configuration Process

The first steps in configuring the ROME LCU involves

- Initiating a Terminal Session
- Logging in as a SuperUser

Once the administrator has logged in as the SuperUser, the Initial Setup procedure will automatically run. The initial setup procedure will automatically guide the administrator through:

- Configure IP Info
- Setting the clock
- Configuring the ROME Chassis
- Rebooting

If the software image has been preloaded at the factory, the "Initial Setup Procedure" will not automatically run. The prompt will be displayed after login and the customer must enter the set-up command to configure the system.

After the Initial Set Up procedure has run, there are a few remaining tasks for the administrator to perform, including:

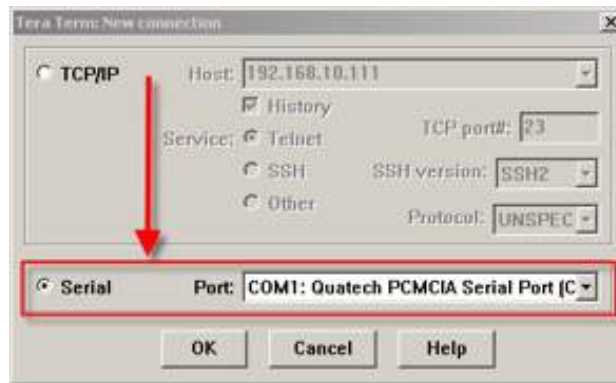
- Run a few, specific connect and disconnect tests
- Backup the ROME system

Note: During Initial Setup process, the three status LEDs will blink continuously. After completion of set up, the Green LED will be lit solid green.

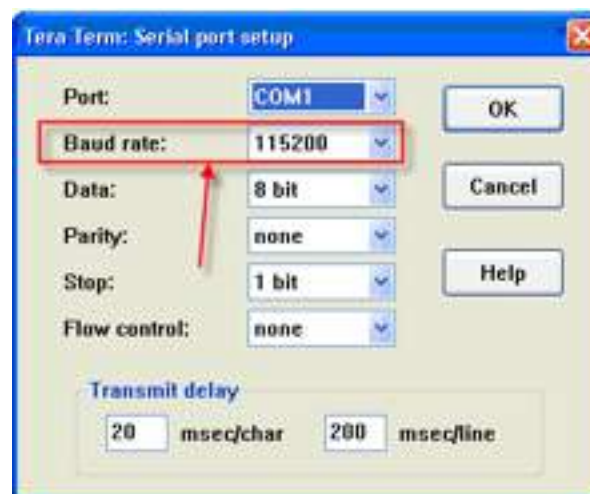
Note: If, at any point, there is an error message or incorrect behavior, please suspend set up and contact Wave2Wave.

2.1.1 Initiating a Terminal Session

- 1) Connect a laptop to the ROME LCU with a console port cable and open a terminal session. The popup shown below will open.



- 2) Select the radio button "Serial" and click ok.
- 3) Go to setup > serial port >
The following popup will open:



Set the parameters as above. In most cases, especially if TeraTerm is being used, then the only parameter that needs to be changed is the "Baud rate" (to 115200).

2.1.2 Log in as a SuperUser

Log in as a SuperUser, with the password

Note: After configuring ROME, it is important to change the password of the Superuser (see Section 2.2).

Once logged in, a message that Initial System Setup is beginning, as shown below.

Upon entering set-up, system will reboot and recovery takes approx 5 minutes.

```
Login: SuperUser
Password:

Welcome to Wave2Wave ROME Setup
Type 'setup' for configuration menu or '?' to display available commands

ROME500_CA[SETUP]#
```

Type "setup" to display the current device parameters and the setup menu.

```
Type 'setup' for configuration menu or '?' to display available commands
ROME500_CA[SETUP]# setup

Network parameters:
-----
IP address:          192.168.10.173
Subnet mask:         255.255.255.0
Default gateway:     192.168.10.1

Current date and time: 01-01-1970 00:10

Setup Menu:
-----
1) Configure network parameters
2) Configure time and date
3) Upload configuration file
4) Create backup configuration file
5) Switch to operational mode

Please select [1/2/3/4/5/q=Quit]:
```

2.1.3 Configure the IP Address

The first step of Initial Setup is to configure the IP address of the ROME equipment.

Select option 1 and follow the instructions to configure the IP address, subnet mask, and default gateway.

After filling in the information, a summary will appear so the administrator can confirm the information.

```
Setup Menu:
-----
1) Configure network parameters
2) Configure time and date
3) Upload configuration file
4) Create backup configuration file
5) Switch to operational mode
Please select [1/2/3/4/5/q-Quit]: 1
Configure network parameters
-----
Please fill the following network parameters.
- Press enter to keep the value between the brackets

IP address      [ 192.168.10.173]:
Subnet mask     [ 255.255.255.0]:
Default gateway [ 192.168.10.1]:

Network parameters:
-----
IP address:          192.168.10.173
Subnet mask:         255.255.255.0
Default gateway:    192.168.10.1

Do you want to save network parameters (y/n/m-Modify)? █
```

Press 'y' and enter to save network parameters. After this the device will reboot itself.

2.1.4 Setting the ROME Clock

The next step of Initial Setup is to set the ROME Clock.

Select option 2 to set the ROME clock.

```
Setup Menu:
-----
1) Configure network parameters
2) Configure time and date
3) Upload configuration file
4) Create backup configuration file
5) Switch to operational mode
Please select [1/2/3/4/5/q-Quit]: 2
Current date and time: 01-01-1970 00:23

Date and time menu
-----
1) Set date and time using NTP server
2) Set date and time using real time clock [RTC]

Please select [1/2/q-Quit]:
```

The administrator is given a choice of whether to use a NTP server (synchronized internet time server) or use the internal real time device clock.

To select the NTP server, press 1 and enter. Follow the instructions to identify the server address and time zone offset, (default is 2 hours).

```
Date and time menu
-----
1) Set date and time using NTP server
2) Set date and time using real time clock [RTC]

Please select [1/2/q-Quit]: 1

Configure ntp server
-----
Sntp server address [0.asia.pool.ntp.org]:
Sntp timezone offset [2]:

NTP parameters
-----
Server address:                0.asia.pool.ntp.org
Server timezone offset:        2

Do you want to save NTP parameters (y/n/m-Modify)?
```

To select the real time clock, press 2 and enter. Follow the instructions to enter the current date and time.

```
Date and time menu
-----
1) Set date and time using NTP server
2) Set date and time using real time clock [RTC]

Please select [1/2/q-Quit]: 2

Configure date and time
-----
Date MM-DD-YYYY : 12-30-2016
Time HH:MM : 09:31

Do you want to save date and time settings (y/n/m-Modify)? y
Date and time settings were saved successfully!

Current date and time: 12-30-2016 09:31
```

2.1.5 Copying the ROME Chassis Configuration File

Each LCU controls one ROME Chassis. The LCU must use a file (provided by Wave2Wave) that is specific to the corresponding chassis and must be downloaded directly to the specific chassis before the ROME Chassis can be homed.

The ROME Chassis downloads will be provided in a zip file called "initial_config.zip" within an e-mail sent directly to the Administrator. Within the zip file, there will be one folder, named "Chassis X", where X is the serial number of the Chassis. In the folder, there will be a single file called "initial_config.zip".

To upload the configuration file, choose 3 from the main menu.

The administrator will be instructed to open an FTP client, such as Filezila, and will be given the FTP parameters to use in order to connect with the ROME LCU (i.e., IP, port number, 1-time username, and password).

Once the FTP client is open and connected, copy the configuration file "initial_config.zip" to root directory.

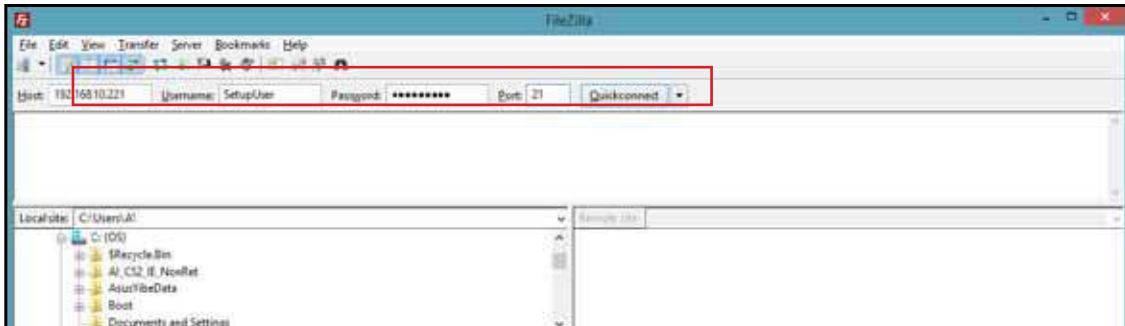
Once the file is copied using the FTP client, return to the setup session and press "y" to continue the process.

The following illustrations, shows this process. Filezila is shown as the example FTP client.

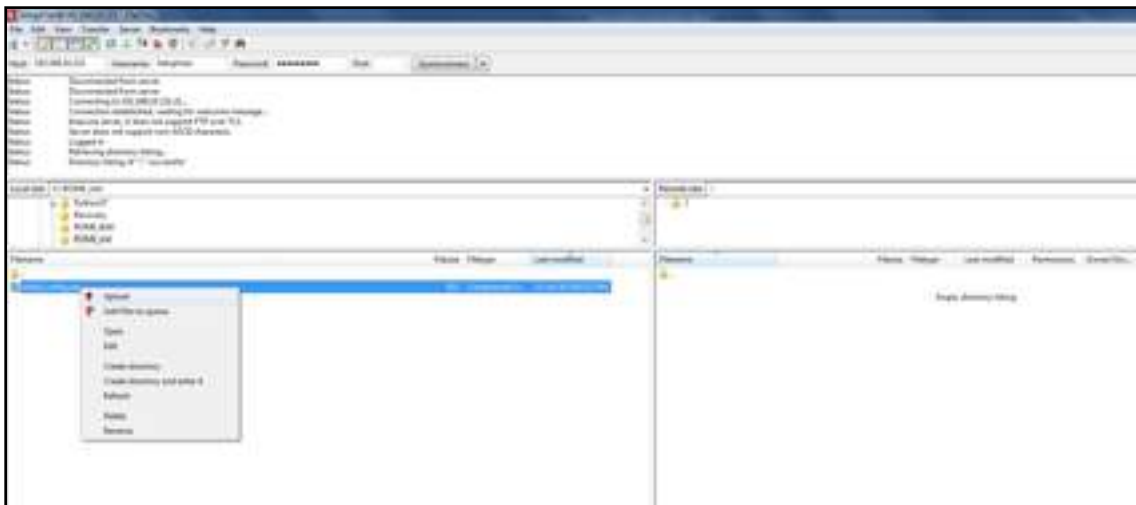
1) Press 3 to upload configuration file

```
Please select [1/2/3/4/5/q-Quit]:
Setup Menu:
-----
1) Configure network parameters
2) Configure time and date
3) Upload configuration file
4) Create backup configuration file
5) Switch to operational mode
Please select [1/2/3/4/5/q-Quit]: 3
Upload configuration file
-----
Please connect using ftp client and copy the file:
'initial_config.zip' to root directory.
FTP parameters:
-----
IP:      192.168.10.173
Port:    21
User:    SetupUser
Password: SRQy9ySQQc
Continue the process (y/n) ? y
```

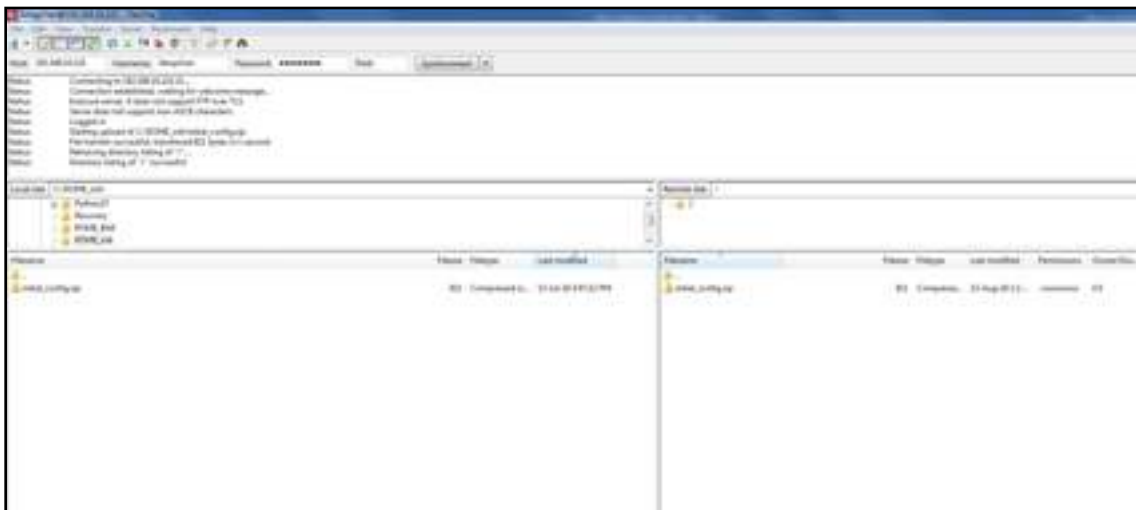
2) Open the FTP client and set the FTP parameters to connect to the ROME LCU.



3) Navigate to 'initial_config.zip' file location in the left pane, right click on the file and select Upload.



4) File copied to the root directory.



5) Return to the setup window and enter 'y' to continue the process. If the operation succeeds, a success message will appear (the file will be deleted from the root directory as part of this process).

```
Setup Menu:
-----
1) Configure network parameters
2) Configure time and date
3) Upload configuration file
4) Create backup configuration file
5) Switch to operational mode

Please select [1/2/3/4/5/q-Quit]: 4

Create backup configuration file
-----

Please wait while creating backup configuration file...

Backup file was created successfully
- The created backup file will be deleted when switching to operational mode

Please connect using FTP client and download the file backup_config.zip

FTP parameters:
-----
IP:          192.168.10.173
Port:        21
User:        SetupUser
Password:    SRQy9ySQQc
```

2.1.6 Completing Initial Setup

After the configuration file has been uploaded successfully, the administrator should choose option 5 to switch to operation mode and perform device tests.

Note: On entering operational mode, the LCU will go through a brief test mode before motion is allowed. First, all the LEDs will remain on for 2 seconds then go off for one second. Then both the Amber and Green LEDs will blink. Finally, the Amber LED will go off, and the Green LED become a solid green.

Once the Green LED is solid green, device tests can proceed.

2.1.7 Testing the Configuration

Once the administrator has entered into operational mode, a few basic tests should be performed on the equipment. Before starting connection tests, perform an <alarm show> command to confirm that there are no alarms on the system. Address displayed alarms prior to proceeding with connection tests.

Test the ROME equipment by performing a set of connects and disconnects. Which set of connections/disconnections are needed depend on the exact configuration of the ROME equipment. Please see **Appendix 3** for the appropriate device test procedures.

2.1.8 Create a Backup to Send to Wave2Wave

Once the system has been configured and tested, create an initial backup of the system.

Note: Back-up file that is retrieved from the ROME directory is already compressed and can be sent directly via email.

1) Re-Enter Setup

To access the ROME directories, the administrator must enter Setup again by typing "setup":

Since this is not the initial setup, the administrator will be asked to confirm entering the setup state.

"Switching to setup mode. Do you want to continue? (y/n)"

The administrator will answer "y" and the ROME equipment will reboot itself.

Once Rebooting is complete, the ROME unit will enter setup mode, displaying the prompt #setup.

- 2) When the device returns to setup mode, the administrator should type 'setup' to enter the setup menu. Then the administrator should enter 4 to create a backup configuration file.

```
ROME500_CA[SETUP]# setup
Network parameters:
-----
IP address:          192.168.10.173
Subnet mask:         255.255.255.0
Default gateway:    192.168.10.1

Current date and time: 12-30-2016 09:49

Setup Menu:
-----
1) Configure network parameters
2) Configure time and date
3) Upload configuration file
4) Create backup configuration file
5) Switch to operational mode

Please select [1/2/3/4/5/q-Quit]:
```

- The backup file will be prepared. Once it's successfully created, the administrator will be given information on how to connect the LCU to the FTP client.

```
Setup Menu:
-----
1) Configure network parameters
2) Configure time and date
3) Upload configuration file
4) Create backup configuration file
5) Switch to operational mode

Please select [1/2/3/4/5/q-Quit]: 4

Create backup configuration file
-----

Please wait while creating backup configuration file...

Backup file was created successfully
- The created backup file will be deleted when switching to operational mode

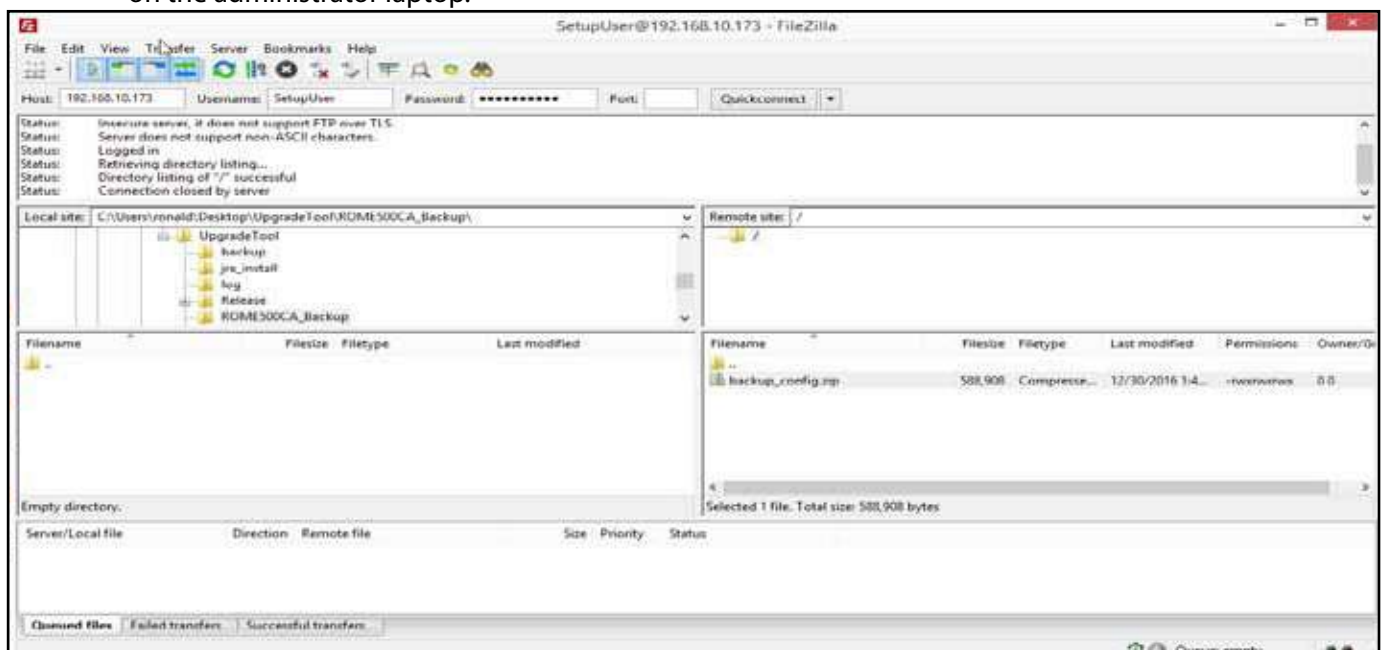
Please connect using FTP client and download the file backup_config.zip

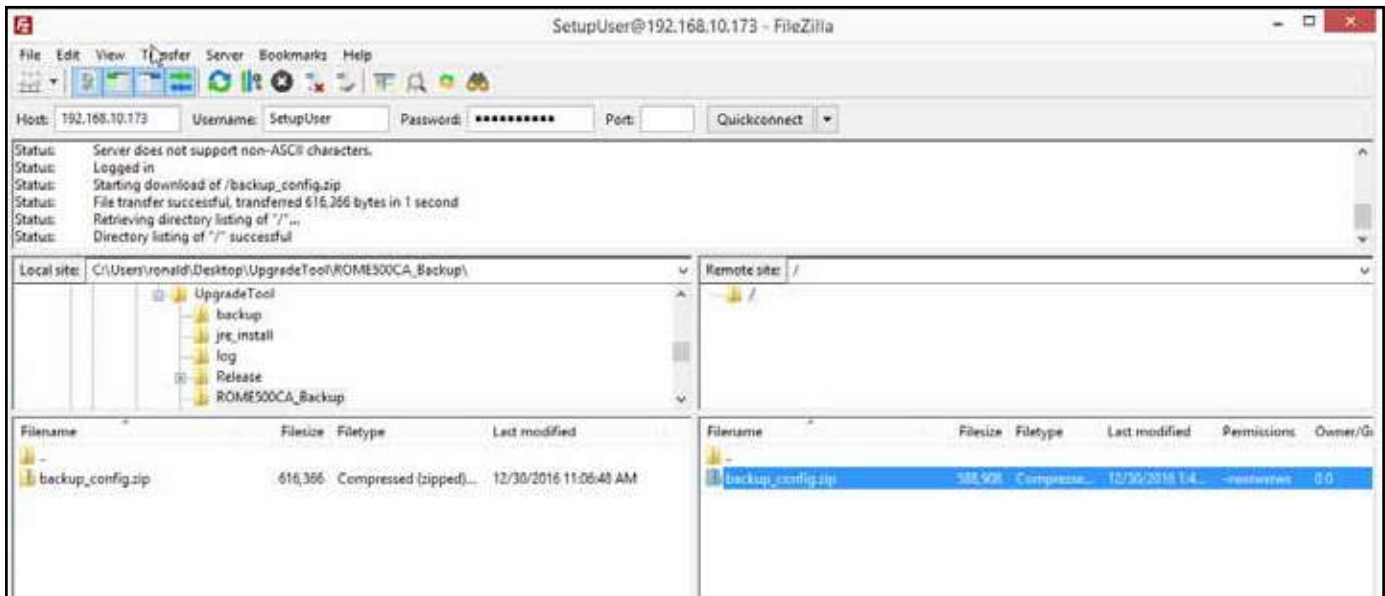
FTP parameters:
-----
IP:      192.168.10.173
Port:    21
User:    SetupUser
Password: SRQy9ySQQc
```

- Create a new folder on the administrator laptop, and give the folder a meaningful name.

Example: C:\ftphome\Initial-ROMENAME-BACKUP-date

In the FTP client, copy the backup config file from the root directory into the folder just created on the administrator laptop.





- Return to the setup window and select 5 to enter operational mode. All files will be deleted from device root directory upon selecting 'y' and enter.

```

Setup Menu:
-----
1) Configure network parameters
2) Configure time and date
3) Upload configuration file
4) Create backup configuration file
5) Switch to operational mode

Please select [1/2/3/4/5/q-Quit]: 5

Switching to operational mode
Do you want to continue (y/n) [n] ? y

Rebooting the device ...
  
```

2.2 Changing the SuperUser Password

Once ROME has been configured for the first time, the SuperUser password should be changed for security. To change a SuperUser password, the user must be logged in as a SuperUser and use the “user password” command.

This set of CLI commands will change the SuperUser password

Note: “newpassword” is a placeholder, please use a more secure password for the SuperUser.

End of Initial Setup

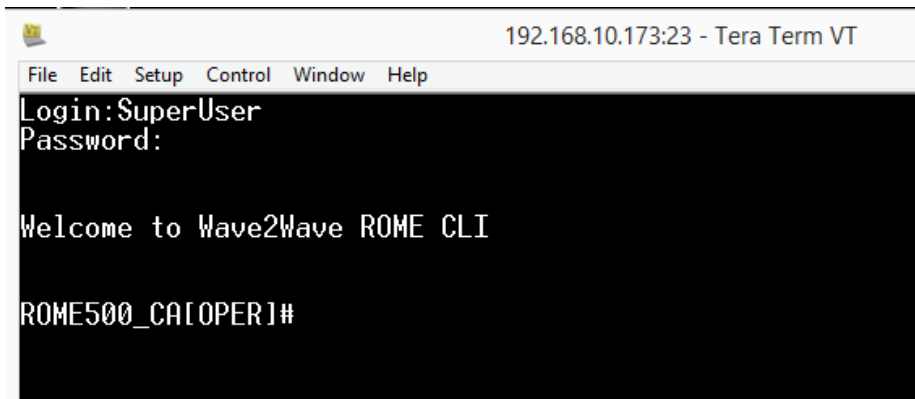
3 Other Configuration Commands

These configuration commands can be used at any time, when necessary, for maintenance and testing of the ROME equipment.

3.1 Re-configuring ROME IP Address

Note: The IP address can also be configured via the setup command.

- 1) Log in as a SuperUser, password



```
192.168.10.173:23 - Tera Term VT
File Edit Setup Control Window Help
Login: SuperUser
Password:
Welcome to Wave2Wave ROME CLI
ROME500_CA[OPER]#
```

- 2) To view the current IP address enter the CLI command: **# show board**

```
ROME500_CA[OPER]# show board
CURR SW VERSION      createDate(Dec 28 2016, 17:44:11)
ROME STATUS          adminStatus(enabled) operStatus(enabled) alarmState(Cleared)
ROME STATE           OPER
ROME NAME            ROME500_CA
ACTIVE UNITS         1
ROME TYPE            ROME500
RTOS                 VxWorks (6.8)
BOARD                ver(LCU-100) rev(7) S/N(9727-4733-2222)
MATRIX SIZE:        Same matrix sizes for all units
                    MIN_PORT_A_MATRIX 1  MAX_PORT_A_MATRIX 132
                    MIN_PORT_B_MATRIX 1  MAX_PORT_B_MATRIX 132

IP                   IP addr(192.168.10.173) subnet(255.255.255.0/0xfffff00)
                    gateway(192.168.10.1) dns(255.255.255.255)
VERSIONS             nonIffsDbVer(0) nextLoadImage(active)
ACTIVE SW DESC       active image was created at 12-28-2016 17:44
ACTIVE SW BANK       1
ACTIVE SW VER        1.2.0.1
STANDBY SW DESC      standby image was created at 12-28-2016 17:44
STANDBY SW VER       1.2.0.1
UP TIME              0 days,0 hours,6 minutes and 21 seconds (total 381 seconds)
Recovery             recovery was done
CONNECTIONS          connection execution is enabled
OPERATION COUNT      60
FPGA VER             fpga_2016Nov03_A.rbf
TIME SOURCE          RTC
AUTHENTICATION        local
CONNECTION TYPE      ssh and telnet
ROME500_CA[OPER]#
```

- 3) To change the default IP address of the ROME, use the following CLI command:

set board ipParams ipAddr [address]

where [address] is the IP address that user is assigning to the specific ROME.

- 4) To change the default Subnet mask address of the ROME unit, use the following CLI command:

set board ipParams Subnet mask [address]

where [address] is the subnet mask address.

- 5) To change the default Gateway address of the ROME unit, use the following CLI command:

set board ipParams dfltGateway [address]

where [address] is the default Gateway address.

Note: The user can change all the above 3 parameters with one command line as:

**# set board ipParams ipAddr [address] Subnet mask [address]
dfltGateway [address]**

6) To change the default DNS Server address of the ROME unit, use the following CLI command:

```
# set board ipParams dnsServer [address]
where [address] is the DNS Server address.
```

3.2 Setting the Clock

Note: The clock can also be set via the setup command.

To check the ROME clock, enter the command “show date”

Example: # show date

```
ROME500_CA[OPER]# sho date
date/time source is the internal real time clock
12-30-2016 10:03
ROME500_CA[OPER]#
```

The clock can get time information from 3 sources:

1. sntp – clock from network time server (this is the default)
2. rtc – real-time clock on the ROME CPU
3. Manual – clock on the computer

To change the clock of the ROME using the RTC follow the below example procedure:

```
# set time source rtc
# set time date mm-dd-yyyy
# set time hour hh:mm
```

Note: Setting the time source manually should be used when the ROME is not connected to the user's network LAN. Otherwise the system will update the time automatically by using the sntp.

3.3 Re-homing a ROME Chassis

Homing will initialize the ROME robotic motor positioning.

From the CLI, enter the homing command:

```
# homing unit [chassis number] run
```

The CLI screen will display notices (as shown below) to indicate that the ROME is functioning properly and can now be used.

```
ROME500_CA[OPER]#
ROME500_CA[OPER]# hom run
Unit u2 is not active
Unit u3 is not active
Unit u4 is not active
ROME500_CA[OPER]# 12-30-2016 10:05 STARTING RECOVERY
12-30-2016 10:05 RECOVERY FINISHED SUCCESSFULLY
```

Refer to the Appendix under "LED status" in order to interpret the LED colors resulting from a re-homing.

After the system has finished, it is recommended that the user open any text editor, load the relevant system logs and check for ERRORS (search for the word "ERR").

3.4 Showing Logs

There are two types of logs kept by ROME: Events and Security.

3.4.1 Event logs

Event logs show all the provisioning and technical events on the system (connections, alarms, locking and unlocking ports, homing, etc.).

In order to show logs, the command **#Show log events** is used.

3.4.2 Security Logs

Security logs show all the security events on the system, such as user creation, logins, password changes, etc. The same command is used as above, with one change:

#show log security

3.5 Creating Backups

1) Enter Setup

To access the ROME directories, the administrator must enter Setup again by typing "setup":

Since this is not the initial setup, the administrator will be asked to confirm entering the setup state.

"Switching to setup mode. Do you want to continue? (y/n)"

The administrator will answer "y" and the ROME equipment will reboot itself.

Once Rebooting is complete, the ROME unit will enter setup mode, displaying the prompt #setup.

- 2) When the device returns to setup mode, the user should type 'setup' to enter the setup menu. Then the administrator should enter 4 to create a backup configuration file.

```
Type 'setup' for configuration menu or '?' to display available commands
ROME500_CA[SETUP]# setup
Network parameters:
-----
IP address:          192.168.10.173
Subnet mask:        255.255.255.0
Default gateway:    192.168.10.1

Current date and time: 01-01-1970 00:10

Setup Menu:
-----
1) Configure network parameters
2) Configure time and date
3) Upload configuration file
4) Create backup configuration file
5) Switch to operational mode

Please select [1/2/3/4/5/q=Quit]:
```

- The backup file will be prepared. Once it's successfully created, the administrator will be given information on how to connect the LCU to the FTP client.

```

Please select [1/2/3/4/5/q-Quit]: 4
Create backup configuration file
-----
Please wait while creating backup configuration file...

Backup file was created successfully
- The created backup file will be deleted when switching to operational mode

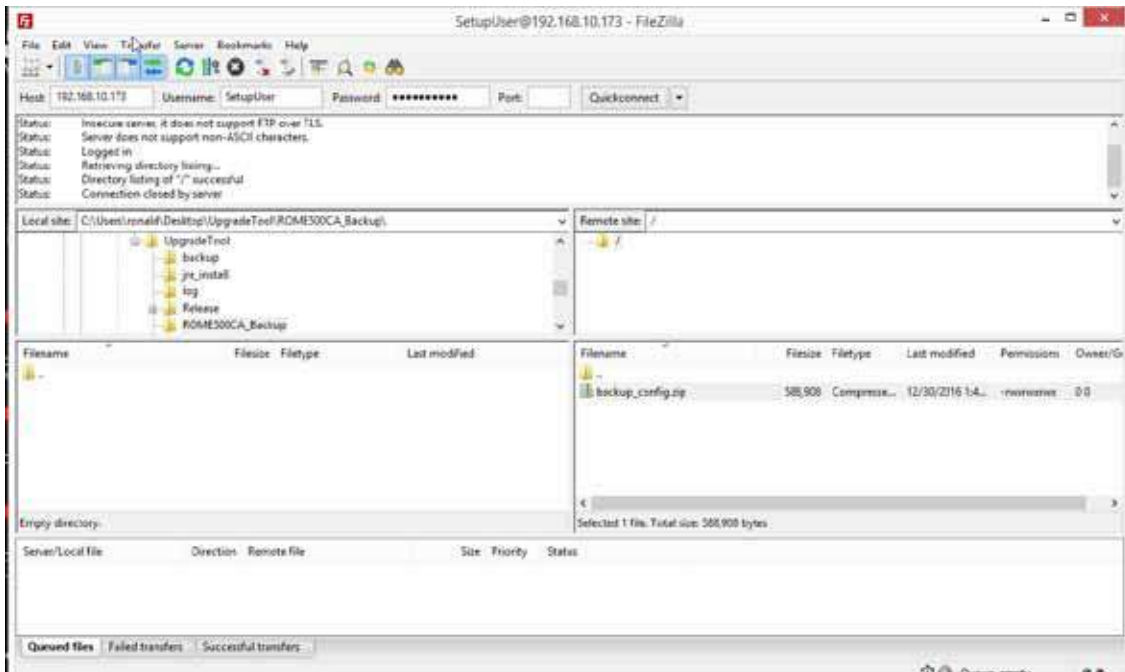
Please connect using FTP client and download the file backup_config.zip

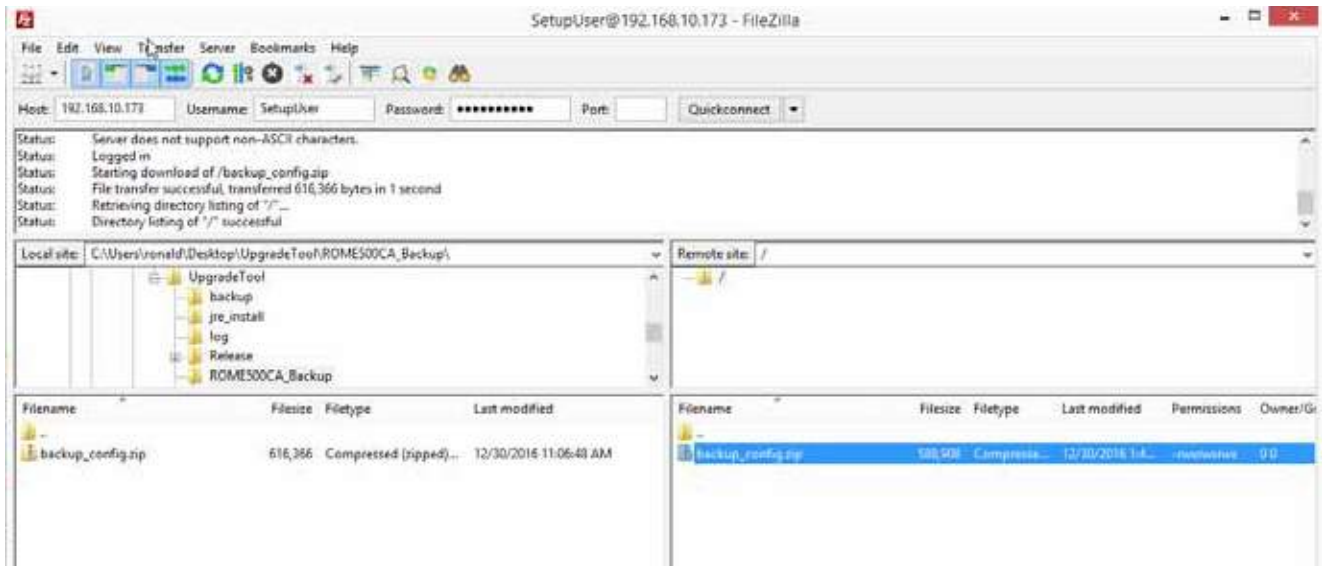
FTP parameters:
-----
IP:          192.168.10.173
Port:       21
User:       SetupUser
Password:   SRQy9ySQQc
  
```

- Create a new folder on the administrator laptop, and give the folder a meaningful name.

Example: C:\ftphome\ROMENAME-BACKUP-date

In the FTP client, copy the backup configuration file from the root directory into the folder just created on the administrator laptop.





5) Return to the setup window and select 5 to enter operational mode. All files will be deleted from device root directory upon selecting 'y' and enter.

4 User Administration

ROME supports 4 default user profiles:

- **Super User** - This user has access to all Operations/Permissions.
- **Security Administrator** - This user is able to add, configure, edit and delete users and their profiles.
- **System Administrator** - This user is able to provision connections and ports.

Users can be added to any of the above profiles/groups by the Super User or Security Administrator.

What follows below is a short tutorial on setting up and administering users. For a full set of user administration commands, please see the Command Line Interface (CLI) User Manual.

Note 1: The only two user types that can administer users are the Security Administrator and the SuperUser.

Note 2: Authentication servers, such as a Radius server, can be used with the ROME to administer and manager all users of the ROME equipment. For example, for Radius authentication servers, the CLI interface offers the command "set radius-server".

4.1 Creating a new User

To create a new user, the "users add" command is used. In this command, the user's username, initial password, and access level is set.

This command adds a new system administrator user named Fred, with a password. Fred should be reminded to change his password on his first access.

Note: Only SuperUsers can add other SuperUsers. Security Admins can add users who are Security Admins, Technicians, and System Admins.

4.2 Changing a User's access level

User's access level can be changed using the "users access" command. For example,

#users access Fred Security Administrator

Changes Fred's access level from System Administrator to Security Administrator.

4.3 Deleting, Suspending, and Re-enabling a User

A User can be deleted using the “users delete” command. For example:

#users delete Fred.

A user can be suspended for a period of time, then re-enabled using the “users disable” and “users enable” commands. For example:

#users disable Fred

#users enable Fred

4.4 Changing a User's Password

A user's password can be reset using the “user password command”. For example:

#user password Fred

#newpassword

#newpassword

The user can use this command themselves to change their password, or the Security Admin (or SuperUser) can use it to reset a password for a user that has forgotten it.

4.5 Monitoring Users

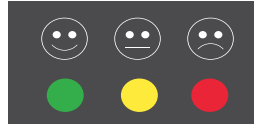
Users can see all the users currently defined on the system by using the “users show” command. In addition, this command can show those users who are currently logged on, or those users not logged on. For example:

#users show logged





lists all the users currently using the system, listing each users name and access level.

Appendix 1 - Detailed ALARM LED Table

The Wave2Wave ROME LCU front panel has three LEDs, as shown below. These LEDs provide a quick visual indication of the system's functional status.



General Rule for LED Colors

| | | |
|------------------|---|---|
| Lit Green LED |  | ROME has power and the system is functioning without problems |
| Lit Yellow LED |  | Minor/Warning Alarm |
| Lit Red LED |  | Critical/Major Alarm |
| Blinking Red LED |  | Technician mode - not necessarily an Alarm |

Detailed ALARM LED Indicator Table

| LED Status | System Mode | Comments |
|---|---|--|
| Green + Amber LED blinking; On: 2 secs, Off: 1 sec. | Power-UP | <ul style="list-style-type: none"> All LEDs operational LEDs continue blinking until power-up is complete |
| Red + Amber + Green simultaneous blinking | Setup Mode | <ul style="list-style-type: none"> System in setup or configuration mode Verify all LEDs are working |
| Green LED ON | System Ready | <ul style="list-style-type: none"> System Ready, no robot motion |
| Green LED Off | No Power | <ul style="list-style-type: none"> Power not connected or power supply failure |
| Green LED Blinking | System Initialization or robot motion | <ul style="list-style-type: none"> System is initializing as a result of a command or routine audit being executed. Connections/disconnections in progress |
| Red LED ON | Major, Critical Alarm, System in Call Tech mode | <ul style="list-style-type: none"> Reference troubleshooting guide Connect/Disconnect disabled Contact technical support |

Detailed ALARM LED Indicator Table (continued)

| LED Status | System Mode | Comments |
|--------------------|-----------------|---|
| Red LED Blinking | Technician mode | <ul style="list-style-type: none"> • System undergoing maintenance • When in CR/MJ alarm, red led also blinks while in Technician mode. |
| Amber LED ON | Minor alarm | <ul style="list-style-type: none"> • System in shell mode (Debug) • Shutdown or Pause mode (No motion) |
| Amber LED Blinking | | <ul style="list-style-type: none"> • Shutdown or Pause mode (No motion allowed) • Call Tech Activity |

In addition, each power supply has its own LED.

Detailed Power Supply Indicator Table

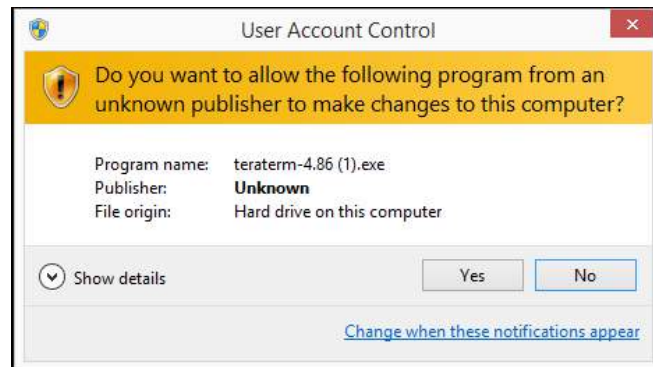
| LED Status | System Mode | Comments |
|--|----------------------|--|
| Power Supply LED Off | No Power | <ul style="list-style-type: none"> • No Input Power • Power Supply Failure |
| Power Supply LED ON and LIT Green | OK | <ul style="list-style-type: none"> • Input Power connected and within spec • Power supply on and in active or standby mode |
| Power Supply LED ON and Blinking Amber | Power Supply Failure | <ul style="list-style-type: none"> • Power input or output failure • Internal fan |

Appendix 2 - TeraTerm Installation

You can download the TeraTerm application here: <https://tssh2.osdn.jp/index.html.en>

TeraTerm Installation

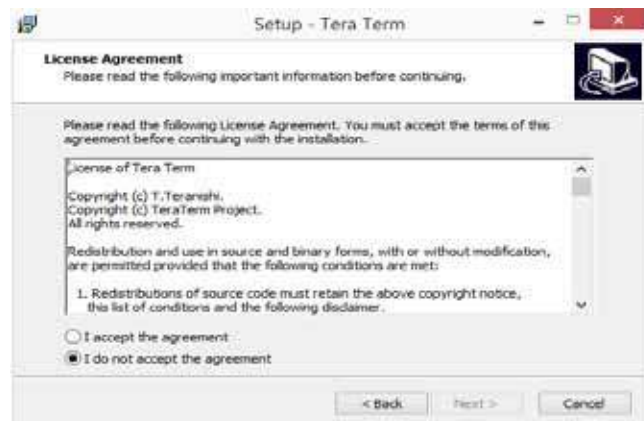
- Double click on the TeraTerm installation exe file.
- Click on run.



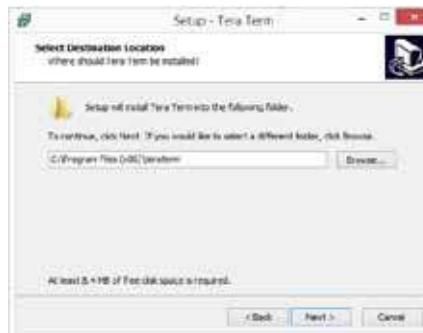
- Click on Next.



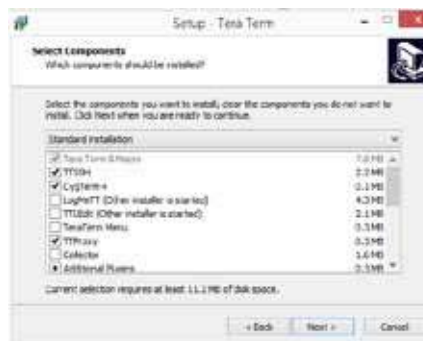
- Select the "I accept the agreement" option and click next.



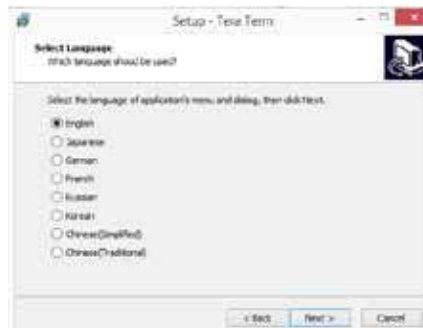
- Define the path for installing the software and click next.



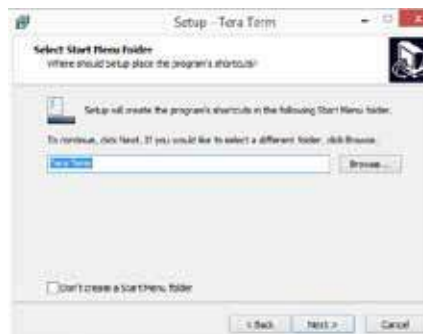
- Select "Custom Installation," unmark "CygTerm+" & "LogTT" and press next.



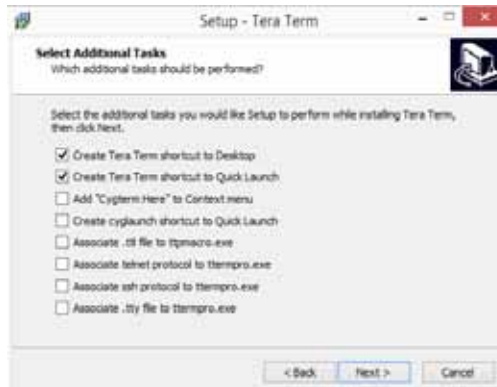
- Select the language and click next.



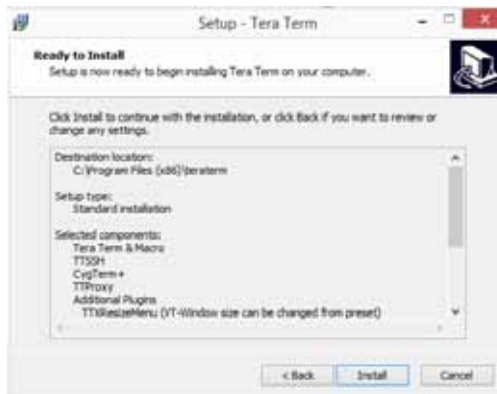
- Select the program name for the start menu folder and click next.



- Click next.



- Click install.



Please read the TeraTerm license below and visit the TeraTerm website for further details.

Appendix 3 - Device Tests for ROME Chassis Configurations

Duplex Tandem (DT):

For this configuration, perform the following connects and disconnects (checkbox provided for convenience):

- #Connection connect 1AE1 to 1AW1
- #Connection disconnect 1AE1 from 1AW1
- #Connection connect 1AE1 to 1AW128
- #Connection disconnect 1AE1 from 1AW128
- #Connection connect 1AE128 to 1AW1
- #Connection disconnect 1AE128 from 1AW1
- #Connection connect 1AE128 to 1AW128
- #Connection disconnect 1AE128 from 1AW128
- #Connection connect 1AE60 to 1AW1
- #Connection disconnect 1AE60 from 1AW1
- #Connection connect 1AE60 to 1AW60
- #Connection disconnect 1AE60 from 1AW60
- #Connection connect 1AE60 to 1AW128
- #Connection disconnect 1AE60 from 1AW128
- #Connection connect 1BE129 to 1BW129
- #Connection disconnect 1BE129 from 1BW1
- #Connection connect 1BE1 to 1BW256
- #Connection disconnect 1BE1 from 1BW256
- #Connection connect 1BE256 to 1BW1
- #Connection disconnect 1BE256 from 1BW1
- #Connection connect 1BE256 to 1BW256
- #Connection disconnect 1BE256 from 1BW256
- #Connection connect 1BE188 to 1BW1
- #Connection disconnect 1BE188 from 1BW1
- #Connection connect 1BE188 to 1BW188
- #Connection disconnect 1BE188 from 1BW188
- #Connection connect 1BE188 to 1BW256
- #Connection disconnect 1BE188 from 1BW256

Duplex East to West (DEW):

For this configuration, perform the following connects and disconnects (checkbox provided for convenience):

- #Connection connect A1 to B129
- #Connection disconnect A1 from B129
- #Connection connect A1 to B256
- #Connection disconnect A1 from B256
- #Connection connect A128 to B129
- #Connection disconnect A128 from B129

- #Connection connect A128 to B256
- #Connection disconnect A128 from B256
- #Connection connect A60 to B129
- #Connection disconnect A60 from B129
- #Connection connect A60 to B188
- #Connection disconnect A60 from B188
- #Connection connect A60 to B256
- #Connection disconnect A60 from B256

Simplex Tandem East to West (STEW):

For this configuration, perform the following connects and disconnects (checkbox provided for convenience):

- #Connection create 1AE1 to 1AW1
- #Connection disconnect 1AE1 from 1AW1
- #Connection create 1AE1 to 1AW128
- #Connection disconnect 1AE1 from 1AW128
- #Connection create 1AE128 to 1AW1
- #Connection disconnect 1AE128 from 1AW1
- #Connection create 1AE128 to 1AW128
- #Connection disconnect 1AE128 from 1AW128
- #Connection create 1AE60 to 1AW1
- #Connection disconnect 1AE60 from 1AW1
- #Connection create 1AE60 to 1AW60
- #Connection disconnect 1AE60 from 1AW60
- #Connection create 1AE60 to 1AW128
- #Connection disconnect 1AE60 from 1AW128

- #Connection create 1BE129 to 1BW129
- #Connection disconnect 1BE129 from 1BW129
- #Connection create 1BE129 to 1BW256
- #Connection disconnect 1BE129 from 1BW256
- #Connection create 1BE256 to 1BW129
- #Connection disconnect 1BE256 from 1BW129
- #Connection create 1BE256 to 1BW256
- #Connection disconnect 1BE256 from 1BW256
- #Connection create 1BE188 to 1BW129
- #Connection disconnect 1BE188 from 1BW129
- #Connection create 1BE188 to 1BW188
- #Connection disconnect 1BE188 from 1BW188
- #Connection create 1BE188 to 1BW256
- #Connection disconnect 1BE188 from 1BW256



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