

RCM Technical Note — Firmware Updates

A Guide for Updating Marway Optima RCM Firmware Versions v2.3.0 through v2.5.x All Product Models

r5 • Dec 20, 2024

Versions 2.0.0 through 2.2.1

Products with these versions can be updated to 2.2.1 in the field. However, to update to the most recent version, these products will have to be sent to the factory. A hardware change in the control board requires they be updated in a specific way that is not possible in the field. Contact support@marway.com to discuss an update.



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Preparation

Overview

This document is intended to help end users of Marway's networkable PDUs with RCM software to plan for updating the firmware in individual units.

The overall process will be to use FTP to upload three files to the PDU.

In addition to an Ethernet connection, you must also have connection to the Serial port.

Assumptions

This document assumes the PDU is normally connected to a LAN, you know the PDU's IP address, the know the PDU's root user password, and your computer is configured for the same LAN. The general procedure assumes a graphical FTP client. We show FileZilla on Windows, but the appearance and process is fairly typical for most GUI clients.

TEST FIRMWARE UPDATES ON A NON-CRITICAL PDU

It is always a good idea to test the firmware update process on a spare or non-critical PDU, if available, to ensure that the operators understand the procedure, and that it works correctly.

FIRMWARE DOWNLOADS

The latest firmware version can be found on our website. Be sure to read the notes to make sure your model can use the latest firmware version.



If your PDU is not normally connected to a LAN, there are some different first steps to get prepared. Refer to Appendix A : Preparing a Non-networked PDU.

If you plan to use a command line FTP client we strongly recommend using lftp. There are known problems with some command line FTP clients that will render the PDU inoperable. See Appendix B : Using Command Line FTP.

Switched Outlets During Update

If your PDU has switched outlets, one or more of the outlets may change state during restarts. For the most part, so long as power is continuously supplied to the PDU during the update process, the software does not change the state of the outlets while the new files are uploaded, or the PDU is restarted... EXCEPT outlets will be set to their Startup State as configured in the web Power page.

- * If an outlet is configured to be Off at startup, and it was Off before the restart, then the outlet state will not change during the restart.
- * If an outlet is configured to be On at startup, and it was On before the restart, then the outlet state will not change during the restart.
- If an outlet is configured to Last Known at startup, then (usually) the outlet state will not change during the restart. (There are some other settings which may impact this — see the discussions about Last Known Startup State in the User Guide.)

However:

- * If an outlet is configured to be Off at startup, and it was On before the restart, then the outlet will be switched off during the restart.
- * If an outlet is configured to be On at startup, and it was Off before the restart, then the outlet will be switched on during the restart.

Preparing a Maintenance Computer

- 1. **Computer** You will need a computer with TCP/IP connection to the PDU. Any desktop OS will work such as Windows, macOS, Linux, or Unix.
- 2. **Network Configuration** The procedure assumes the PDU is networked, and the TCP/IP settings have been changed for your LAN. Therefore, the laptop must also be configured to match the PDU's TCP/IP configuration.
- 3. **Root user password** You must know the password for the RCM software root user. If you don't know that, see Appendix A.
- 4. **FTP client** You'll need an FTP client application installed on the computer. There are many free and paid options for all operating systems. The most basic of FTP clients should be capable of doing what is required. GUI applications allow for simple drag and drop usage. For Windows, FileZilla is a common option. Command line clients are possible, but we highly recommend that you specifically use LFTP. It is critical to read Appendix B : Using Command Line FTP.
- 5. **Download New Firmware** Acquire the new firmware files to be installed on the PDUs. These files can be obtained from Marway at www.marway.com/docs/rcm-firmware-updates. They can be located on your computer anywhere you prefer. This guide assumes they're in a /Downloads folder.
 - 5.1. Unpack/unzip the download file. It's assumed they're unpacked in the /Downloads folder.
 - 5.2. The folder should contain at least these four files:
 - * _Read_Me_RCM.txt the release notes for the RCM version.
 - * _Update_Release_Notes.txt the release notes for the update package.
 - * rom.bin the RCM bootloader firmware.
 - * image.bin the RCM application firmware.
 - * There may be other files (.DS_Store, or _MACOSX) depending on how your laptop OS shows files intended to be invisible. These can be ignored.
 - * Keep a window open with these files as you should be able to drag and drop them for uploading in whatever FTP client you use.
- 6. Serial Console Cable You will need to have a USB to RJ45 serial conversion cable.
 - 6.1. This is the same cable that would have been used for the initial setup of the PDU.
 - 6.2. Marway part number 311118-000 (contact sales@marway.com if needed).
 - 6.3. This cable uses an FTDI serial conversion controller. The laptop may need the FTDI VCP driver installed (https://ftdichip.com/drivers/vcp-drivers/).
- 7. **Serial Console Software** Also known as terminal emulation software, virtually any popular software commonly used to connect to RS232 for this purpose will work. We show CoolTerm in this document (available for Windows, Mac, Linux on our website www.marway.com/docs/rcm).

The Update Procedure

This procedure assumes all the work in Preparing a Maintenance Computer has been completed.

Connect To Serial Console

Start with the PDU powered OFF.

- 8. Connect the cable between the PDU and computer.
- 9. Open your serial communication application, and configure the connection
 - 9.1. 8 data bits, 1 stop bit, no parity, no flow control
 - 9.2. DTR and RTS off
 - 9.3. Whatever baud rate the PDU is configured for. The factory default is 9600.
- 10. Power the PDU.

After a few moments, the serial console should show startup text including "NETWORK CONFIGURATION." If you get random unreadable characters instead, the baud rate of the serial connection is not correct. Someone may have changed it in the past. A common alternative to 9600 is the faster 115200 baud rate. Change the serial console software to use 115200. Power cycle the PDU. (If that still doesn't work, try other baud rates.)

Figure 1: Serial Console – An example serial console startup

Marway RCM Power D	istribution Unit	
NETWORK CONFIGURAT MAC Address: IPv4 Mode: IPv4 Address: IPv4 Subnet: IPv4 Gateway: Press any key wi	ION 00:40:9D:A1:B1:C1 Static 10.10.100.101 255.255.255.0 10.10.100.100 thin 5 seconds to change startup settings.	
Marway RCM Command	Line	
<pre>#> Starting up</pre>		
Connecting (10.10.100.101)	
Loading log and	settings (takes 1-2 minutes)	
Application rea	dy. (v2.5.8)	
Press return to	start entering commands (? or help).	Startup has completed here

11. Verify the serial connection is working by executing this command. This should return a few lines which confirms the serial connection is working. (The top line shows the version of the RCM firmware.)

#> getSystem version

Figure 2: Serial Console – A quick command test to make sure the Serial Console is working

Connect an FTP Client

If you're going to use a command line FTP, it is critical to read Appendix B : Using Command Line FTP.

Verify FTP Configuration

It's possible (in fact it is advisable) that FTP on the PDU is normally disabled. If you're not sure if it is enabled, you can use the serial console to view the configuration. If you know it is enabled, you can skip to Open the FTP Application.

Use the serial console

* Type the following command.

#> getFtp

* The response will look similar to this.

FTP	Enabled	=	true
FTP	Port	=	21

- * If FTP is enabled ("true"), make note of the port number.
- If it is not enabled ("false"), type the following command to enable it.

#> setFtp enable true

* The restart the PDU with this command, and wait for it to complete the startup.

#> restart

Open the FTP Application

- 12. Once the PDU is powered, and startup has completed with the FTP service enabled, you're ready to connect to the PDU using your computer's FTP software.
- 13. Every FTP application's interface for a connection is organized differently, but start a plain FTP (not SFTP or FTPS) session using the RCM "root" user name, the password for root, and the FTP port. If the connection is successful, you should see a list of files for the RCM unit under the volume name of /FLASHO.
- 14. With FTP connected, the new update files are ready to be transferred to the PDU. Assuming you're using a graphical program with a visual presentation similar to Figure 3, files can be transferred as described below.

Figure 3: An example FTP window with source and destination file lists

Most graphical FTP applications show a source and destination set of files in two panels side by side. The left is the source, and the right is the destination. Navigate the source list to the files in the RCM Firmware Update folder, which should look similar to the list on the left. The list on the right is the RCM PDU file system which will be listed after logging into the PDU with the FTP software.

Filename	Filesize	Filetype	Last modified	Filename	Filesize	Filetype	Last modified
				J			
📄 _Read_Me_RCM.txt	15,610	TXT File	7/24/2019 10:13:38 AM	퉬 Logs		File folder	7/2/2019 4:56:00 AM
📄 _Update_Release_Notes.txt	15,645	TXT File	10/21/2019 3:02:53 PM	퉬 Settings		File folder	12/31/1999
image.bin	1,967,988	BIN File	9/10/2019 1:59:24 PM	퉬 System		File folder	10/21/2019 6:17:00 AM
rom.bin	64,792	BIN File	9/10/2019 1:20:47 PM	퉬 Web		File folder	10/21/2019 7:30:00 AM
				_Read_Me_RCM.txt	15,410	TXT File	7/9/2019 2:24:00 AM

Upload _Read_Me_RCM.txt

- 15. Drag the <u>_Read_Me_RCM.txt</u> file from the left to the right panel. This copies right away and replaces the existing one.
- 16. There will not be any text displayed on the Serial Console when uploading this file.

Upload rom.bin

- 17. Drag the rom.bin file from the left to the right panel. This upload will take a few seconds.
- 18. On the serial console watch for two status statements during the upload. The first when the file is first uploaded. The second when the transfer is complete. See Figure 4 below.
 - When the second statement appears, despite what it says DO NOT RESTART just go to the next step.

```
Checksum passed, writing to flash...
Firmware updated, quit the session to restart.
```

* Rarely, but some FTP applications will force a restart of the PDU after this file completes its transfer. If the PDU appears to be restarting (the LED display will show dash characters), just wait for the restart to finish.

Note that in some FTP applications you may not see rom.bin in the list. The file is actually captured into RAM, then loaded into FLASH memory. It is not stored in the actual file system.

Upload image.bin

- 19. Drag the image.bin file from the left to the right panel. This upload will take several minutes.
- 20. On the serial console watch for two status statements. The first when the file is first uploaded. The second when the transfer is complete. See Figure 4 below.

Checksum passed, writing to flash... Firmware updated, quit the session to restart.

21. Trigger a restart by typing the restart command in the serial console.

#> restart

Figure 4: An example serial console session from startup through uploads

After startup has completed, and after both rom.bin and image.bin file have completed uploading.

```
_____
Marway RCM Power Distribution Unit
       _____
NETWORK CONFIGURATION

      MAC Address:
      00:40:9D:A4:09:48

      IPv4 Mode:
      Static

      IPv4 Address:
      192.168.15.105

      IPv4 Subnet:
      255.255.255.0

      IPv4 Gateway:
      192.168.15.1

  Press any key within 5 seconds to change startup settings.
        _____
Marway RCM Command Line
#> Starting up...
   Connecting... (192.168.15.105)
   Loading log and settings... (takes 1-2 minutes)
   Application ready. (v2.3.8)
  Press return to start entering commands (? or help).
                                                                      Startup has completed here.
   Download complete, writing to flash...
   Firmware updated, quit the session to restart.
   Checksum passed, writing to flash...
                                                                  After the two uploads have completed
   Firmware updated, quit the session to restart.
                                                                        User entered command
#> restart
```

Update Network Settings

After the first restart, if the version you started from is earlier than 2.5.10, the Serial Console will likely display "TCP/IP settings misaligned" and the unit will restart itself. This is is the new IP address monitoring system added in 2.5.10 at work.

22. Wait for the unit to restart after showing the TCP/IP messages.

Figure 5: Serial Console – Reports TCP/IP is misaligned

This is an expected result, which is part of the new TCP monitoring system added in 2.5.10.



About the TCP/IP Monitoring Update in 2.5.10

The PDU's main CPU sub-module (a third party component) stores operating system defaults in a special memory section. There have been a few cases where power brownouts were suspected to sometimes cause a PDU to revert to using DHCP instead of Static IP addressing.

As of the 2.5.10 update, TCP/IP configuration is also stored in a secondary memory system, and a new IP address monitoring system was implemented to help to ensure that the system will remain configured for Static IP addressing, and not revert to DHCP addressing during unstable power events (brownouts, etc.).

To ensure this new system is correctly configured, the IP address settings must be manually re-entered, and the system restarted one last time.

23. Re-Configure the PDU TCP/IP settings — Enter the following commands in the Serial Console, waiting for each one to return a prompt. (This assumes we set all systems to the same IP since they would not normally be connected to a network.)

```
#> setTcp dhcp off
#> setTcp ip x.x.x.x // Use your own IP Address
#> setTcp mask x.x.x.x // Use your own Mask
#> setTcp gw x.x.x.x // Use your own Gateway Address
#> restart
```

Figure 10: Serial Console - Re-enter the network settings

This shows EXAMPLE settings. Use YOUR OWN address details for your network.

```
Marway RCM Command Line
_____
#> Starting up...
  Connecting... (10.10.100.101)
  Loading log and settings... (takes 1-2 minutes)
  Application ready. (v2.5.11 )
  Press return to start entering commands (? or help).
#> setTcp dhcp off
  Setting TCP/IP dhcp to: "off"... OK.
#> setTcp ip 192.168.1.55
  Setting TCP/IP ip to: "192.168.1.55"... OK.
#> setTcp mask 255.255.255.0
  Setting TCP/IP mask to: "255.255.255.0"... OK.
#> setTcp gw 192.168.1.1
  Setting TCP/IP gw to: "192.168.1.1"... OK.
                                                                  The update is complete
                                                                     after this restart.
#> restart
```

Verify Updated Version

After the final restart completes, you could run one more command to verify the updated version.

```
#> getSystem version
```

Which will display something similar to this where the 2.5.11 (or later) is the important part, and should be the new version number matching what you uploaded:

Board	01	Version	=	Main Board: 2.5.11 (54c89)
Board	02	Version	=	Inlet Board: ver 5
Board	03	Version	=	Relay Board: ver 5

Update is Complete

At this point the Serial cable can be detached, and the system left to run.

IP Configuration

Even if the PDU is not normally networked, an Ethernet connection from a maintenance laptop or other computer to the PDU must be used.

If the PDU has never been connected to a network, it still likely has the factory TCP/IP settings as show below. A direct connection from a laptop to the PDU can be made, but you must configure the laptop to work in this address space. (Doing so is different for each OS, and each company's policies, so consult your IT personnel if needed.)

Table 1: TCP/IP Configurations

	Default PDU Config	Laptop Config
Address Mode	IPv4 Static	IPv4 Static
IP Address	10.10.100.101	10.10.100.102
Mask	255.255.255.0	255.255.255.0
Gateway	10.10.100.100	10.10.100.100

root User Password

The PDU has a default user named root. When the system ships from Marway, the password for root is set to a random set of characters that even Marway does not know.

If the PDU is not normally connected to a network, it is likely the root password has never been changed. This needs to be set now, so you can log into FTP later.

Do not try to guess the password when logging into FTP. After 5 wrong guesses, the user will be locked out. (In systems earlier than 2.5.11, if the RTC clock time has not been set, the lockout time is infinite. You must set the time (#> setSystem time), then wait 5 minutes.)

Set the root user password using this command.

```
#> setUser root password "xxxxxxx"
```

- * The password must be in quotes, and be 8-32 characters.
- * Must have at least 1 numeral in it, and at least 4 letters (can't be all letters or all numbers).
- * Including upper/lower cases and one of !@#\$%^&* is recommended but not required.

There is no need to restart. The password is effective immediately.

Figure A1: Serial Console - Set the root user password

```
Marway RCM Command Line

#> Starting up...
Connecting... (10.10.100.101)
Loading log and settings... (takes 1-2 minutes)
Application ready. (v2.5.8)
Press return to start entering commands (? or help).
#> getSystem version
Board 01 Version = Main Board: 2.5.4
Board 02 Version = Inlet Board: ver 5
Board 03 Version = Relay Board: ver 5
#> setUser root password "pP7&word"
Setting password of user root to: pP7&word... OK.
#>
```

Appendix B : Using Command Line FTP

Using the default/built-in command line FTP clients in at least Red Hat 7 and Ubuntu 22 are not compatible with the RCM firmware files. Using these FTP clients, and perhaps others, *will* render the PDU inoperable. We have not tested any other Linux variant, and cannot assure that any particular stock CLI FTP will work. We highly recommend that you specifically install LFTP and use it for RCM updates regardless of the operating system you use.

Testing has shown that the default command line FTP clients shipped in Red Hat 7 and Ubuntu 22 have a serious incompatibility with the RCM firmware files.

- * Red Hat 7 (and perhaps other versions) ships with vsftp.
- * Ubuntu 22 (and perhaps other versions) ships with tnftp.

It is likely that other versions and other OSes also have problems.

It is necessary to install alternative FTP client software. Based on Marway's testing, both LFTP and NcFTP have shown to work on Ubuntu 22, RedHat7, and macOS (which is a BSD-based Unix). Of the two, LFTP appears to be the more universally available variant in the OS package managers, and is the simplest to install and use.

Follow the steps on the following pages when using LFTP.

Connect to LFTP Client

After Ethernet and Serial cables are connected, and the PDU has completed a normal startup.

- A. Open a Terminal window.
- B. Using lftp, connect to the PDU (the IP addresses shown are examples use your own IP):

\$ lftp root@10.10.100.101

- C. You will be prompted for a the RCM's root user password. Enter that.
- D. You should then see the lftp prompt like shown here.

Figure B1: OS Terminal – Log into Iftp

The shell prompt has been minimized to just \$ for this example view.

<pre>\$ lftp root@10.10.100.101 Password:</pre>	Enter the root user password
\$ [ftp root@10.10.100.101:~>	

E. To double check that you're connected to the PDU, use the ls command to list the PDU file system contents. It should look similar to this (dates and numbers will be different), but you should see the list of the file names as seen here (Web, Settings, etc.).

Figure B2: OS Terminal — The PDU file listing

\$ lftp root@10.10.100	0.101				
Password:					
\$ lftp root@10.10.100	0.101:~> <mark>l</mark> s	S			lype Ls and enter.
drw-rw 1 noone	group2 45	56 Jan	01 2000	Web	
drw-rw 1 noone	group2 22	28 Dec	03 2024	Settings	
drw-rw 1 noone	group2 0	Mar	29 2023	Logs	
drw-rw 1 noone	group2 0	Feb	11 2022	System	
-rwlrwl 1 noone	group2 27	7766 Jan	01 06:10	<pre>9 _Read_Me_RCI</pre>	M.txt
lftp root@192.168.1.2	221:~>				

Upload _Read_Me_RCM.txt

- F. Type the word put and a space at the prompt.
- G. Drag the <u>_Read_Me_RCM.txt</u> file onto the Terminal window. This will enter the pathname of the file. The OS may put single quotes around the filename—they must be changed to **double quotes**. Press enter when done.
- H. There will not be any text displayed on the Serial Console when uploading this file.

Figure B3: OS Terminal – Upload the Read Me file

The pathname here is an example. It will be different on your specific computer.

\$ lftp root@10.10.100.101
Password:
\$ lftp root@10.10.100.101:~> ls
drw-rw---- 1 noone group2 456 Jan 01 2000 Web
drw-rw---- 1 noone group2 228 Dec 03 2024 Settings
drw-rw---- 1 noone group2 0 Mar 29 2023 Logs
drw-rw---- 1 noone group2 0 Feb 11 2022 System
-rwlrwl--- 1 noone group2 27766 Jan 01 06:10 _Read_Me_RCM.txt
\$ lftp root@192.168.1.221:~> put "/Downloads/RCM Firmware Update v2.5.11-54c89/_Read_Me_RCM.txt"
999 bytes transferred
\$ lftp root@10.10.101:~> ls
There will be some statements
showing the file copy activity, and
then show the lftp prompt again.

Upload rom.bin

- I. Type the word put and a space at the prompt.
- J. Drag the rom.bin file onto the Terminal window. This will enter the pathname of the file. The OS may put single quotes around the filename—they must be changed to **double quotes**. Press enter when done.
- K. The Serial Console will show some status when uploading this file. It will take a few seconds.
- L. Wait for the "Firmware updated, quit the session message..." but DO NOT RESTART. Move on to the next step (upload image.bin).

Note that if you list the FTP files again, you will not see rom.bin in the list. The file is captured into RAM, then loaded into FLASH memory. It is not stored in the actual file system.

Figure B4: OS Terminal – Upload the rom.bin file

The pathname here is an example. It will be different on your specific computer.



Figure B5: Serial Console – Showing the status messages during uploading of rom.bin

```
#> getSystem version
Board 01 Version = Main Board: 2.5.8
Board 02 Version = Inlet Board: ver 5
Board 03 Version = Relay Board: ver 5
#>
Download complete, writing to flash...
Firmware updated, quit the session to restart.
DO NOT RESTART at this point.
Continue to the next step.
```

Upload image.bin

- M. Type the word put and a space at the prompt.
- N. Drag the image.bin file onto the Terminal window. This will enter the pathname of the file. The OS may put single quotes around the filename—they must be changed to **double quotes**. Press enter when done.
- O. The Serial Console will show two lines of status when uploading this file. This will take several minutes.
- P. Wait for the "Firmware updated, quit the session message..." this time you can run the restart command to reboot the new firmware.

At this point, you can return to the standard procedure in Update Network Settings.

Note that if you list the FTP files again, you will not see image.bin in the list. The file is captured into RAM, then loaded into FLASH memory. It is not stored in the actual file system.

Figure B6: OS Terminal – Upload the rom.bin file

The pathname here is an example. It will be different on your specific computer.



Figure B7: Serial Console – Showing the status messages during uploading of rom.bin



Change Log

- R5 Dec 20, 2024 gw
 - Focused on products with at least 2.3.0
 - Added new steps required after 2.5.10
 - Added new sections in Appendix A and Appendix B
 - Added requirement that Serial cable be connected in order to use the command line
- R4 May 26, 2022 gw
 - Updated to include version 2.5.x
- R3 Feb 12, 2021 gw
 - No technical differences, but updates to the content for clarifications.
- R2 Oct 29, 2019 gw
 - Added serial console figures.
- R1 Oct 22, 2019 gw
 - Initial Release