MARWAY
POWER SOLUTIONS

RCM Technical Note — Critical Update 2.3.5

Update Information for:
Critical Bug Due to SystemSettings Import File
Present in Versions 2.3.0 through 2.3.4

February 22, 2021 • r1

We Recommend All PDUs with 2.3.x be Updated

❖ To prevent the possibility of the PDU from triggering the reboot looping bug, all PDUs with firmware versions 2.3.0–2.3.4 should be updated to 2.3.5 (or later if available).

❖ The update process is a standard in-field firmware update procedure.

❖ This update does not qualify for an RMA.

❖ Firmware versions prior to 2.3.0 (e.g. 2.0.x, 2.1.x, 2.2.x) do not need to be updated. They do not have the feature which triggers the bug.

About the Firmware Bug

Marway Optima PDUs with RCM firmware version 2.3.0 through 2.3.4 have a critical firmware error in the main board which may cause the firmware to get stuck in an endless reboot loop during startup. We recommend that all units with these firmware versions should be updated to version 2.3.5 (or later if further releases become available).

The Trigger and Consequences of the Bug

Steps to trigger the bug

- The settings file /FLASH0/Settings/SystemSettings.txt must be in the PDU's file system.
- Specifically, this file must include a setting option named temperatureUnits. The value or even absence of a value does not matter.
- The PDU is restarted. During the startup process the SystemSettings.txt file contents will be imported to populate user-defined System settings.
- The import action triggered by temperatureUnits will cause a crash, resulting in the PDU rebooting itself. The import process did not complete, so the file is not renamed as would normally occur, and the import attempt is triggered again. The cycle will continue to repeat.

How does the file get there?

- The file is not generated automatically, and would only exist if an operator places it there.
- The file could have been manually created with hand-written settings content, could have been exported from the same PDU previously, or could have been exported by another PDU. In both the exported cases, the file would have started out as SystemSettings_Exported.txt. An operator would alter the name, and upload it over FTP to a PDU for importing. The presence of SystemSettings_Exported.txt is not a problem.

Can the bug be avoided?

The bug can be avoided by never uploading a SystemSettings.txt file to be imported — but obviously this strategy is effective only if someone is aware to not trigger the problem with the file. Therefore, it is recommended to update all affected PDUs to avoid accidental triggers.

The Models Which are Affected

All RCM PDU models[1] shipped after July 16, 2019 and before February 22, 2021.
All RCM PDUs shipped before July 16, 2019 have versions 2.2.x or earlier, and are not affected.

Essentially any PDU with Marway's RCM firmware version 2.3.0, 2.31, 2.3.2, 2.3.3, or 2.3.4 is affected. This generally corresponds to the dates noted above.

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[1] Unless the PDU was shipped intentionally with a contractually required older version of firmware.

How to Check RCM Firmware Version

The firmware version is reported on multiple user interfaces.

Web Browser

- Log into the PDU normally.
- View the System page.
- Look for the Firmware Versions panel on the right side.
- The first line starting with Main Board shows the firmware version.

Telnet or SSH

- Log into the PDU normally.
- Execute the command `#> getSystem version`
- There will likely be a multi-line response. The first line shows the RCM version.

Serial Console

- If you're accustomed to using the serial console, it accepts the same commands as Telnet or SSH.
- Execute the command `#> getSystem version`
- There will likely be a multi-line response. The first line shows the RCM version.

SNMP

- A PDU already connected to an SNMP browser or manager can be queried.
- Navigate a GET request to /iso.../mgmt/mib-2/system/sysDescr (OID .1.3.6.1.2.1.1.1.0)
- The response will include the RCM version.

Corrective Action

We recommend that all units with firmware versions 2.3.0, 2.3.1, 2.3.2, 2.3.3, 2.3.4 be updated to version 2.3.5 (or later if further releases become available).

Updating the firmware of a PDU is to be done in the field by the customer.

Acquire Firmware Update Files

http://www.marway.com/docs/rcm-bulletin-235

- This document and "RCM Technical Note—Firmware Updates" (the standard reference for updating RCM firmware files) are available at the web page link noted above in a single combined PDF labeled "RCM Bulletin 2.3.5 and Firmware Update Guide"

- The firmware files themselves may also be downloaded from that same web page.

- As of this writing, v2.3.5 has been released to correct the bug described in this document. At the time you view the web page, a newer 2.3.x release may have replaced 2.3.5. Install whatever version is made available on that page.

RCM Technical Note — Firmware Updates

A Guide for Updating RCM Firmware
From v2.0.0 Through v2.3.x

February 2021 • r3

Contents

Update Procedure

Overview

This document is intended to help end users of Marway's networkable PDUs with the 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 (two binary files, and one updated release notes "Read_Me" file). There's an advantage to monitoring the process using the Serial Console connection (as was used during the PDU's initial setup, and described in the User Guide), but it is not required for a successful update.

> **TEST FIRMWARE UPDATES ON A NON-CRITICAL PDU**
>
> It is very important to test the firmware update process on a spare or non-critical PDU, if available, to ensure that it works correctly for your PDU models and existing versions. Given the wide range of custom products Marway builds, not every product and firmware update path has been factory tested.

Versions

There are some notable differences with each point release (2.0.0, 2.1.0, 2.2.0, and 2.3.0). When there's a maintenance update (e.g., 2.1.0 is updated to 2.1.1), there's generally no feature changes, only bug fixes.

Version 1.0, 1.1, and 1.2 were run on a different internal hardware platform. Units running version 1 cannot be updated to version 2.

The version 2 releases are forward compatible. Any earlier version can be updated to any later version. It is not necessary to go through sequentially incremental updates. It is acceptable to update from 2.0.0 directly to 2.3.x.

Preparation

You will need the following:

1. Any personal computer (Windows, macOS, Linux, or Unix) connected to the same Ethernet network as the target PDUs. (Technically, mobile devices and OSes such as iOS and Android could be used as well if you can access the firmware update files, and have an FTP client app.)

2. 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.

3. Acquire the new firmware files to be installed on the PDUs. These files can be obtained by contacting support@marway.com and asking for the latest RCM Firmware Update files. They can be located on your computer anywhere you prefer. This guide will assume they're in a /Downloads folder.

4. Optionally, but recommended, use the PDU's serial console to monitor the update progress.

   ❖ You will need a USB to RJ45 serial cable (Marway part number 311118-000), the FTDI VCP driver installed in your computer (https://ftdichip.com/drivers/vcp-drivers/), and serial console client software (a.k.a. terminal emulation software) on the computer. The setup of these items is covered at length in the *Optima RCM Software User Guide and Reference* documentation "Getting Started" section available from our website at www.marway.com/docs/rcm.

Get Serial Connected

If you're planning to use the serial console, complete these steps. Otherwise, skip this section.

5. Connect the cable between the PDU and computer.

6. Open your serial communication application, and configure the connection — 8 data bits, 1 stop bit, no parity, no flow control, DTR and RTS off, and whatever baud rate the PDU is configured for. The factory default is 9600, but it may have been changed during the PDU setup.

    ❖ To determine what the serial port baud rate is, log into the PDUs web interface, and open the System page. The panel named Serial Port displays the baud rate value.

7. With the PDU powered and the startup process complete, open/start a serial session with your software.

8. To confirm a connection to the PDU, press Return. A prompt of `#>` should appear. If it does not, something in the serial session configuration is not correct. It may require some experimentation.

9. When you have a `#>` prompt, type `getSystem` and press Return. This will return several lines of information about the PDU including a line labeled `Board 01 Version`. That line shows the RCM software version of the main board. Seeing this information also confirms the serial connection is working.

Unpack the Firmware Update Files

As the warning sidebar on the previous page notes, not all models and firmware update paths can be tested. We ship many custom products which we do not have inventory instances of, and firmware updates tend to be very rare. Updates should be performed only when a recommended update or feature requirement is important to the operation of the PDU.

Therefore, Marway generally prefers to be aware when customers are wanting to update the firmware on their PDUs. As of this writing, update files are not available on the web site. The update files can be obtained by contacting support@marway.com and asking for the desired or latest RCM Firmware Update files.

10. The update files should have been delivered as a single ZIP file. Unpacking the ZIP should result in a folder with four files in it. The folder name should be something like /RCM Firmware Update vX.X.X-xxxxx where the Xs are something like v2.3.0-1b272.

11. The folder should contain four files:

    ❖ _Read_Me_RCM.txt — the release notes for the RCM version.

    ❖ _Update_Release_Notes.txt — the release notes for the update package. Usually there will be little information, but it may have some notes which expand on this Guide.

    ❖ image.bin — the RCM application firmware.

    ❖ rom.bin — the RCM bootloader firmware.

Get FTP Connected

It's possible (in fact it is advisable) that FTP on the PDU is normally disabled. To verify its status, log into the PDU's web interface, and open the Networking page.
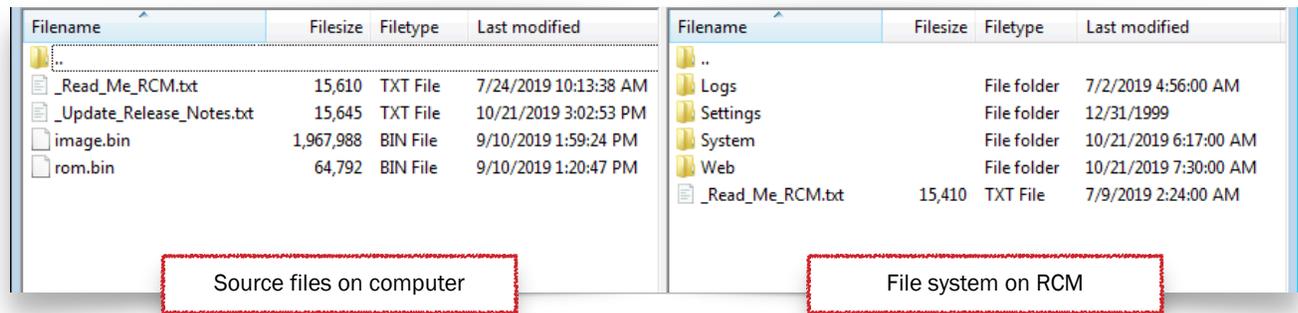
12. If FTP is enabled, make note of the port number it is configured to use.

13. If it is not enabled, check the Yes setting option, and press the Save button. When the save action has completed, open the System page, and press the System Restart button. (The PDU must be restarted in order to activate the FTP service.)

14. 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.

15. 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 on the RCM unit under the volume name of /FLASH0.

Figure 1: An example FTP window with source and destination file lists.

Most FTP applications are going to show a source and destination set of files. 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.

Filename	Filesize	Filetype	Last modified
..			
_Read_Me_RCM.txt	15,610	TXT File	7/24/2019 10:13:38 AM
_Update_Release_Notes.txt	15,645	TXT File	10/21/2019 3:02:53 PM
image.bin	1,967,988	BIN File	9/10/2019 1:59:24 PM
rom.bin	64,792	BIN File	9/10/2019 1:20:47 PM

Source files on computer

Filename	Filesize	Filetype	Last modified
..			
Logs		File folder	7/2/2019 4:56:00 AM
Settings		File folder	12/31/1999
System		File folder	10/21/2019 6:17:00 AM
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

File system on RCM

Upload the New Files

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 the above, files can be transferred as described below.

16. Drag the _Read_Me_RCM.txt file from the left to the right panel (replacing the existing one).

17. Drag the rom.bin file from the left to the right panel. **Wait at least 30 seconds before moving on.**
    - ❖ 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.
    - ❖ If you're connected to the serial console you'll see two status statements during the upload. The first when the file is first uploaded. The second when the transfer is complete. When the second statement appears, you can move on (do not restart yet, just go to the next step).

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

18. Drag the image.bin file from the left to the right panel. **Wait for the PDU to reboot itself. This will take several minutes.**
    - ❖ If you're connected to the serial console you'll see two status statements. The first when the file is first uploaded. The second when the transfer is complete. When the second statement appears, you can move on.

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

    - ❖ If you're connected to the serial console, and you see the above two lines after the upload of the image.bin file, you can trigger a restart by typing the #> restart command in the serial console.)
    - ❖ If you're not connected to the serial console, wait for the PDU to reboot itself (takes several minutes).

Figure 2A: An example serial console startup session for version 2.2 and earlier.

After startup has completed, perform the steps outlined in "Upload the New Files"

```
------------------------------------------------------------------------------
Marway RCM Power Distribution Unit
------------------------------------------------------------------------------

NETWORK CONFIGURATION
  MAC Address:        00:40:9D:A4:09:33
  IPv4 Mode:          Static
  IPv4 Address:       192.168.15.104
  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... (will take 1-2 minutes)

   Connecting: IPv6 FE80::240:9DFF:FEA4:933 on eth0:3
   Connecting: IPv4 192.168.15.104 on eth0

   Ready. Press return to start entering commands.
```

Startup has completed here.

Figure 2B: An example serial console startup session for version 2.3.0 and later.

After startup has completed, perform the steps outlined in "Upload the New Files"

```
------------------------------------------------------------------------------
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. (v2.3.5)

   Press return to start entering commands (? or help).
```

Startup has completed here.

Figure 3: An example serial console session from startup through uploads for version 2.3 and earlier.

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. (v2.3.5)


   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...

   Firmware updated, quit the session to restart.                After the two uploads have completed

#> restart                                                      User entered command
```

After the PDU Restart

This section describes some things you may notice after the update.

Startup Display Changes

If you're connected to the serial console during and after the update, the general format and startup messages may appear slightly different. As of v2.3.0, the startup text displayed on the serial console has been changed (see figures 2A and 2B). Likewise, the text displayed on the LED display (if your unit has one) may also appear slightly different, and have slightly different messages.

First-Time Formatting

Depending on which old/new versions are involved, if you're connected to the serial console during the first startup after the update, you may see some FORMAT messages displayed. This is formatting storage space for new settings options added in the update (the existing settings will be unchanged).

Figure 4: Formatting during the first startup after updating

Some version updates may include formatting steps during the first startup such as these examples.
(Your system may be different)

```
   Press any key within 5 seconds to change startup settings.


   --------------------------------------------------------------------------------
Marway RCM Command Line
   --------------------------------------------------------------------------------

#> Starting up...

   Connecting... (192.168.15.104)

   Loading log and settings... (takes 1-2 minutes)

FORMAT User/x: 1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16  17  18  19  20

FORMAT Relay2: 1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16  17  18  19  20
21  22  23  24  25  26  27  28  29  30  31  32  33  34  35  36  37  38  39  40  41
42  43  44  45  46  47  48  49  50  51  52  53  54  55  56  57  58  59  60  61  62
63  64  65  66  67  68  69  70  71  72  73  74  75  76  77  78  79  80  81  82  83
84  85  86  87  88  89  90  91  92  93  94  95  96  97  98  99  100  101  102  103
104  105  106  107  108  109  110  111  112  113  114  115  116  117  118  119  120
121  122  123  124  125  126  127  128

   Application ready. (v2.3.1)

   There are 2 entries in the Startup Log (run #> viewStartupLog).


   Press return to start entering commands (? or help).
```

Log Entries

After the first startup after the update, the Startup log may have entries related to first-time formatting if such a step was necessary. The System Log will have an entry noting the "RCM version changed from X to Y" version.

System Information

The new version should be reported on the System web page and in the getSystem CLI command (serial, Telnet, or SSH).

Switched PDU Notes

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.

Version Release Highlights

Below are the highlights of the key changes made in each update to the version 2 series. See the file in the version update files named _Read_Me_RCM.txt for a complete list.

v2.3

- ❖ In NEW units shipped from the factory, the default state of outlets is ON. (Prior to this the default was OFF. We've had several requests to have the outlets enabled so the PDU is functional when there may no plans/provisions to access the software initially. Those who will be doing software setup can change the default Startup State to OFF if desired.)
- ❖ After a Factory Reset, via Serial, web page, or command line, the default Startup State of outlets will be ON.
- ❖ Removed IPv6 settings. There has been little interest in using it, and not all services were capable of running on IPv6, so it has been removed.
- ❖ Added temperature and humidity (T/H) sensor Setpoints and Alerts. These behave just like the setpoints and alerts for power objects. Prior versions have had sensor data, but not setpoints and alerts.
- ❖ Added T/H sensor data, setpoints, and traps to SNMP. Data is presented in the SNMP standard table of entPhySensorTable. Setpoints and other Marway-specific details are in custom tables. Note that regardless of the PDU's configuration for degrees F or C for web and CLI, the SNMP values are always in degrees C.
- ❖ Added on-demand CRC check of bootloader and application binary in FLASH. It's viewable in the web System > Firmware Versions panel, via CLI using the command `getSystem crc`, and via RESTful API via `GET /system/1/crc`.

- Added new CLI command syntax for outlet switching: `#> setOutlet 1 on|off|cycle`
- Updated SNMP entPhysicalTable.entPhysicalContainedIn to more accurately show the lineage of outlets to their source phase.
- Updated output of `viewLog` CLI command to include a DateTime column. (We were trying to keep the width minimized, but yeah, who doesn't want to see the date and time?)

v2.2

- Added the ability to use CA (public or private) Signed Certificates for HTTPS.
- Updated key_exchange for SSL/TLS to SHA256.

v2.1

- Added the ability to configure ports for Telnet and SSH, as well as the ability to enable/disable each protocol individually.
- Prior to 2.1.x, any user allowed to use Telnet/SSH was automatically given all user privileges. As of 2.1.0, privileges may be individually assigned for users with access to Telnet/SSH.
- Logging of user actions is now more precise in showing who and through which protocol the action was performed. (Prior to 2.1.0, actions performed via SSH could not log the exact user name.)
- Temperature and humidity probe data was added to the LED display.
- RESTful API was expanded to retrieve setpoint details for inlet volts and amps.

v2.0

- v1.0's main capability was remote outlet switching with a basic set of HTTP/S, Telnet, SSH, and FTP networking protocols.
- v2.0 added inlet power monitoring with setpoints and alarms
- Alerts for power alarms and a variety of system events was added.
- A basic RESTful API was added.
- Temperature and humidity probe data could be displayed on the web dashboard, and by CLI command.

Document Change Log

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