Application Note

Communications Device

CR300 Series

CELL200-Series Cellular Module Firmware Update

App Note Code: 3T-M

Revision: 05/2019

RELIABLE SINCE 1974 MONITORING

CAMPBELL SCIENTIFIC

Table of Contents

1. Introduction

> **CAUTION:**
> To prevent data loss, collect all data from the data logger before proceeding to update the data logger operating system and cellular module firmware.

This application note contains the procedures to update the firmware of the internal cellular module used in the CR300 including model numbers CR300-CELL200, CR310-CELL200, CR300-CELL205, CR310-CELL205, CR300-CELL210, CR310-CELL210.

Updating the cellular module firmware should only be done when directed to do so by Campbell Scientific support or if cellular connectivity errors are happening. If the device is working there is no need to update the firmware. Your data logger with cellular module will continue to serve you and your application for many years to come.

The following procedures require data logger operating system (OS) version 08.01 or greater. If necessary, update the data logger OS before updating cellular module firmware, see CR300 OS update (p. 2).

These procedures do not work if using a PPP authentication username and password to connect to the cellular network. The PPP authentication username and password are provided by the cell provider and are required on specific cellular networks. You can see if you are using a PPP authentication username and password in Device Configuration Utility (Using a direct USB connection and Device Configuration Utility (p. 4)). If in this situation, either switch to a provider that does not use PPP authentication, or have Campbell Scientific update the module firmware at the factory. Refer to If you don't have direct access to the data logger nor a copy of LoggerNet (p. 15) for information on returning the data logger and module to Campbell Scientific. Customers will pay shipping and handling fees but there will be no charge for the firmware update service.

Updating the cellular module is done over the air (OTA), even with a direct USB connection to the data logger. Therefore, it can take from 5 minutes to several hours depending on signal strength between the cell tower and the module, cellular network congestion, and OTA server availability.

This OTA update uses approximately 300 KB of the cellular device data plan for each attempt. Care should be taken to plan accordingly to avoid cellular data plan overages. If you send the data logger operating system via the cellular network as well, an additional 1.5 MB of plan data usage should be planned for.

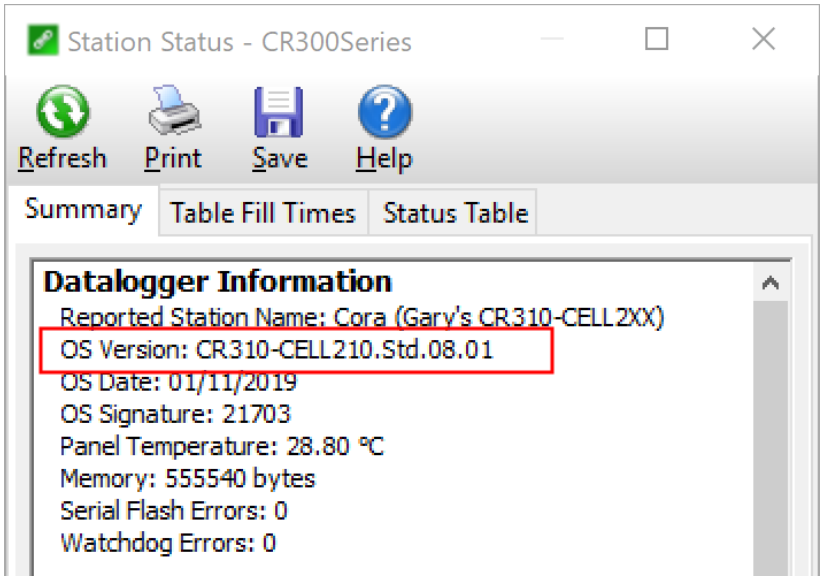
Customers who wish to have Campbell Scientific do the update may do so by RMA and sending the device in to Campbell Scientific. Customers will pay shipping and handling fees but there will be no charge on the firmware update service. The RMA firmware update service is valid until December 31, 2020.

The preferred method for updating the module firmware and data logger operating system is through a direct connection. Remote updating can be done as well but this method does not have the verbose feedback during the update process that the directly connected method has.

2. CR300 OS update

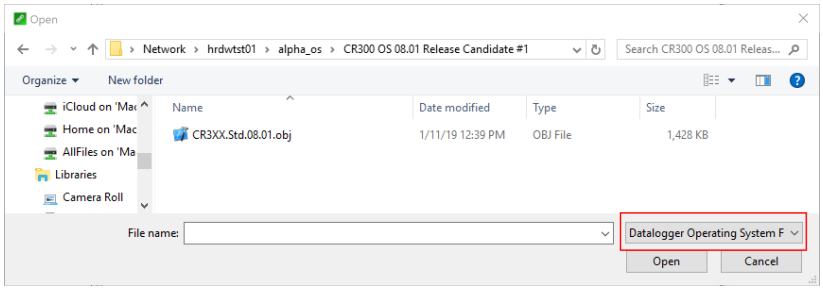
The data logger operating system (OS) must be version 08.01 or greater before updating the cellular module firmware. To update the OS it is assumed that the data logger is already set up in the LoggerNet **Setup** screen. If this has not been done, you will need to do so.

1. Open the **Connect** screen, select the station to update.
2. Click the **Connect** button and wait for the connection to be established.
3. Select **Station Status** to check the operating system version.



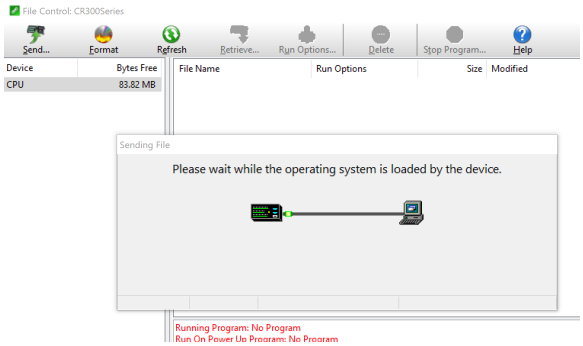
4. If the OS is less than 08.01 then close **Station Status** and return to the **Connect** screen.
    a. Click **File Control**.
    b. Click **Send**.

c. Select the drop down box next to the **File name** field and select **Datalogger Operating System Files**.



d. Select the directory containing the CR300 operating system; this is usually C:\CampbellSci\Lib\OperatingSystems. Select the operating system; it will have an obj extension.

e. Click **Open**. LoggerNet will send the operating system file to the data logger. This will take several minutes to complete. You may need to stop the running program if sending the OS file fails.

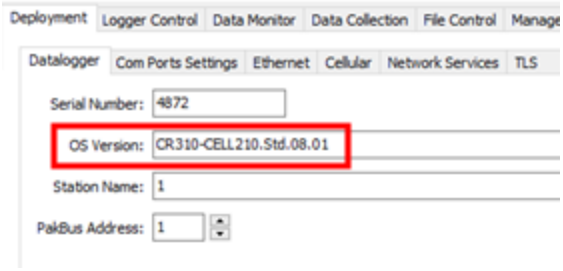


f. Once the operating system is sent, close the **File Control** window.

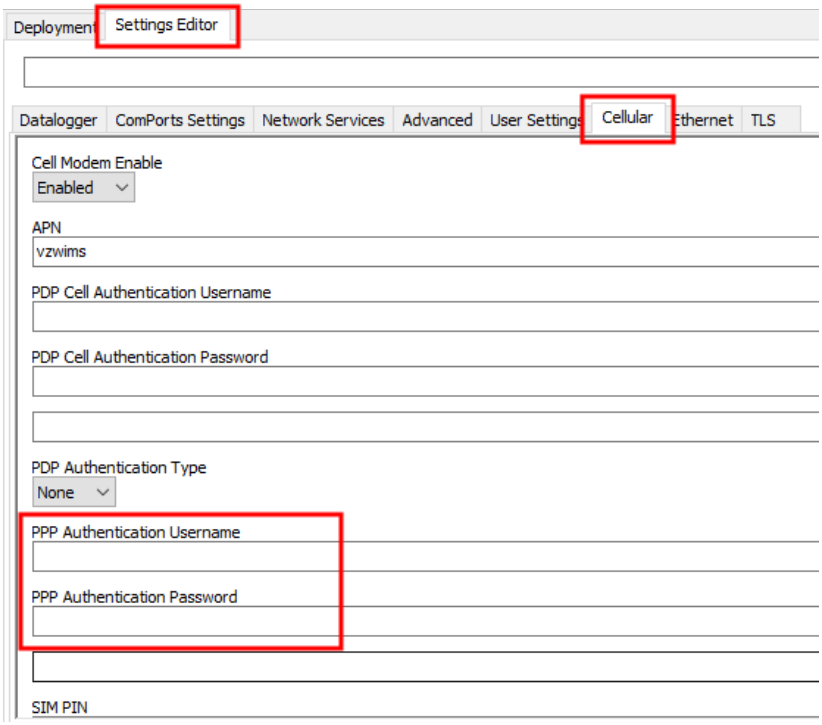
5. Select **Station Status** to check that the operating system version is now 08.01 or greater.

3. Using a direct USB connection and Device Configuration Utility

1. Get the latest version of Device Configuration Utility from the Downloads section of https://www.campbellsci.com/devconfig.
2. Connect the computer to the data logger using a USB cable supplied with CR300 data logger.
3. Ensure the data logger has 12 VDC power applied.
4. Start Device Configuration Utility. Select the CR300 data logger from the list of devices presented in the **Device Type** field.
5. Select the appropriate **Communication Port** by clicking on the **...** button. It should have CR300 listed in the name. If not, install the appropriate driver by clicking on the **Install USB Driver** button.
6. Click **Connect**.
7. Ensure the data logger has OS 08.01 or greater installed. This is shown in the **OS Version** field of the **Deployment** > **Datalogger** tab. If it is not, see CR300 OS update (p. 2)

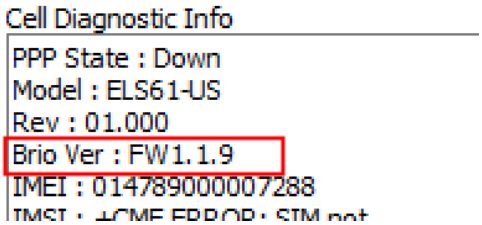


8. Select the **Settings Editor** tab then **Cellular**. The **PPP Authentication Username** and **PPP Authentication Password** fields, must not be used. If these fields contain information, you will need to have Campbell Scientific update your module firmware, see If you don't have direct access to the data logger nor a copy of LoggerNet (p. 15).



9. Scroll to the **Cell Diagnostic Info** field.

   The current version of the cellular module firmware is listed next to **Brio Ver**.



   If it is greater than the version listed below, you do not need to update the module firmware.

   - CELL200: 1.1.11 or greater

   - CELL205: 1.1.11 or greater

   - CELL210: 2.00.101.06 or greater

10. Ensure the module is online by clicking the **Deployment** tab then **Cellular**. Wait until the **State** field says **Network ready**.

11. Select the **Terminal** tab.
12. Press **Enter** until the **CR300>** prompt appears.
13. Type, in all CAPS, **CELL UPDATE** or **CELL UPDATE FILE** then press **Enter**. The **CELLULAR UPDATE FILE** command saves a trace text file of the output on the CPU of the data logger for later reference.
14. At the **Are you sure? (YES/NO)** question, type **YES** (must be all CAPS) then press **Enter**. The data logger will start updating the cellular module firmware. The update will use approximately 300 KB of the cellular plan data. The process can take from 5 to 15 minutes.

    A successful update of the -CELL200 and -CELL205 should look similar to this:

```
CR300>CELL UPDATE
 Are you sure? (YES/NO)
CR300>YES
Restarting cellular modem please wait . . .
Restarting modem in firmware update mode . . .
Waiting for modem initialization . . .
Cellular module version:FW1.1.8
Radio status:1,0
APN command sent . . .
 APN Set. Waiting for modem registration . . .
Radio status:1,0
Connect status:0,2,255
Sending firmware update command . . .
 Firmware update command sent . . .
Waiting for command reply . . .
Response received . . .
Firmware update started.
Please wait . . .
Firmware update command was successful.
 Please wait . . .
 Firmware update time : 00:30
Firmware update time : 01:00
Firmware update time : 01:30
Firmware update time : 02:00
Cellular module version:FW1.1.11
 Firmware update successful.
Cellular update finished.
```

> NOTE:
> You must see **Firmware update successful** on the line before **Cellular update finished**.

> Other messages may indicate that there was a problem.

A successful update of the -CELL210 should look like this:

```
CR300>CELL UPDATE
Are you sure? (YES/NO)
CR300>YES
Restarting cellular modem please wait . . .
Setting up modem for master reset.
Full modem reset successful.
Restarting modem in firmware update mode . . .
Waiting for modem initialization . . .
Cellular module version:2.00.101.02
 Radio status:0,0
APN command sent . . .
APN Set. Waiting for modem registration . . .
Radio status:1,0
Connect status:2,3,88
Sending firmware update command . . .
Firmware update command sent . . .
Waiting for command reply . . .
Response received . . .
Firmware update started.
Please wait . . .
Firmware update command was successful.
Please wait . . .
Firmware update time : 00:30
 Firmware update time : 01:00
Firmware update time : 01:30
Firmware update time : 02:00
Cellular module version:2.00.101.06
Firmware update successful.
Cellular update finished.
```

> NOTE:
> You must see **Firmware update successful** on the line before **Cellular update finished**.
> Other messages may indicate that there was a problem.

15. Repeat steps 8 and 9 of this section to confirm the module firmware update was successful.

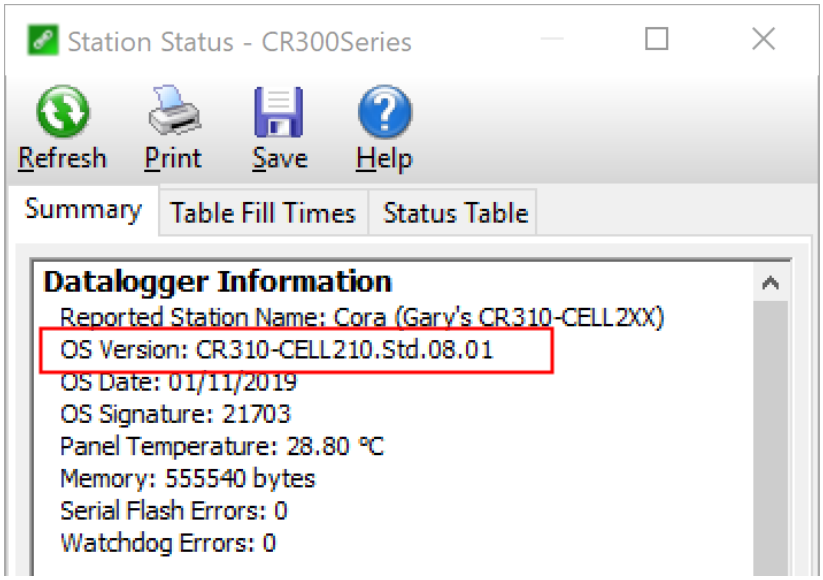
Once the cellular module update is complete, the module will come back online and the CR3X0-CELL2XX will be ready for use. If the update was not successful, the data logger with return a **Firmware update failed.** message in the terminal. Check to see if the data logger is reporting that the module is back online by checking the **State** field under **Deployment** > **Cellular**.

If **State** shows **Network ready**, try this procedure again from the beginning. If **State** shows a message that the firmware update is still in process, allow the process to complete before powering down the data logger. It could take several hours to complete.

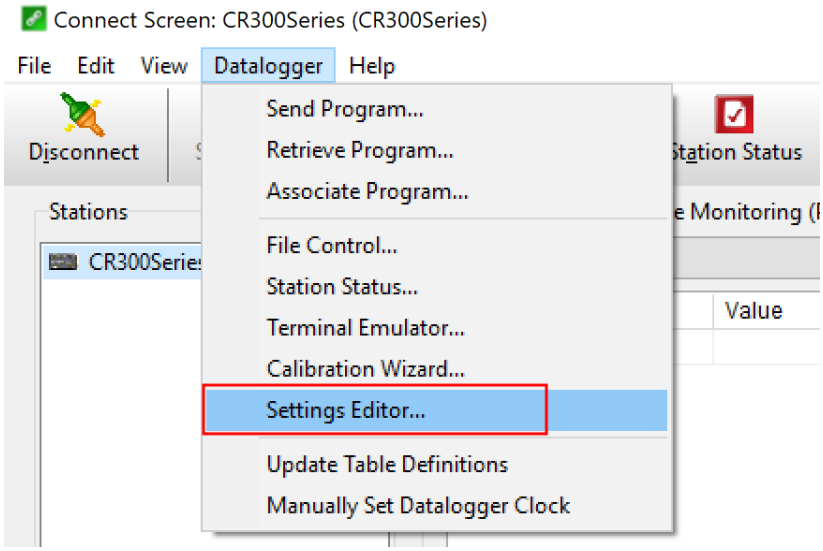
4. Remote update using LoggerNet

This is the best method to use if using the Konect PakBus® Router service to access the CR3X0-CELL2XX device. It is assumed that the data logger is already set up in the LoggerNet **Setup** screen. If this has not been done, you will need to do so.

1. From the **Connect** window, click **Station Status** to confirm the Operating System version is 08.01 or greater. If it is not, see CR300 OS update (p. 2).

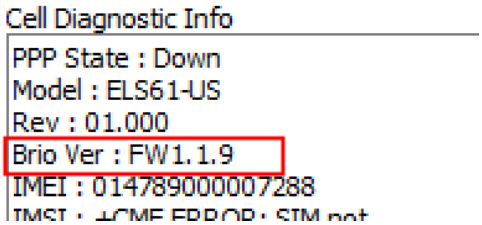


2. Select the **Settings Editor** option from the **Datalogger** file menu:



3. Select the **Cellular** tab and scroll to the bottom of the screen.

   The current version of the cellular module firmware is listed next to **Brio Ver**.



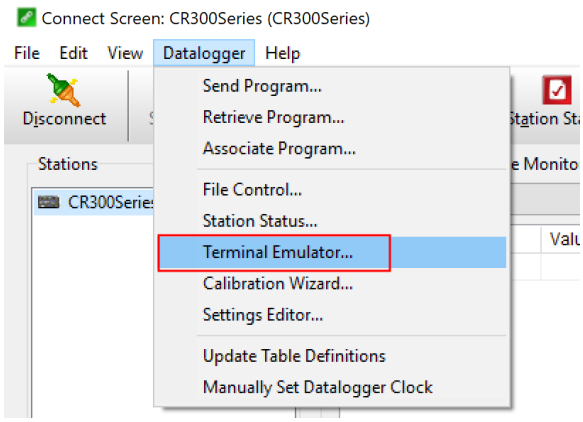
   If it is greater than the version listed below, you do not need to update the module firmware.

   - CELL200: 1.1.11 or greater

   - CELL205: 1.1.11 or greater

   - CELL210: 2.00.101.06 or greater

4. Select the **Terminal Emulator** option from the **Datalogger File** menu on the **Connect** screen:



5. Click the **Open Terminal** button.
6. Press **Enter** until the **CR300>** prompt appears.
7. Type, in all CAPS, **CELL UPDATE** or **CELL UPDATE FILE** then press **Enter**. The **CELLULAR UPDATE FILE** command saves a trace text file of the output on the CPU of the data logger for later reference.
8. At the **Are you sure? (YES/NO)** question, type **YES** (must be all CAPS) then press **Enter**.
9. The terminal will report back that the data logger is **Restarting cellular modem please wait ....** LoggerNet will disconnect.
10. Close the **Terminal** window then click **Cancel** in the **Connect** screen.
11. Wait up to 20 minutes for the modem firmware to update.
12. Repeat steps 2 and 3 of this section to confirm the module firmware update was successful.

Once the cellular module update is complete, the modem will come back online and the CR3X0-CELL2XX is now ready to be used. If the update was unsuccessful, retry this procedure from the beginning.

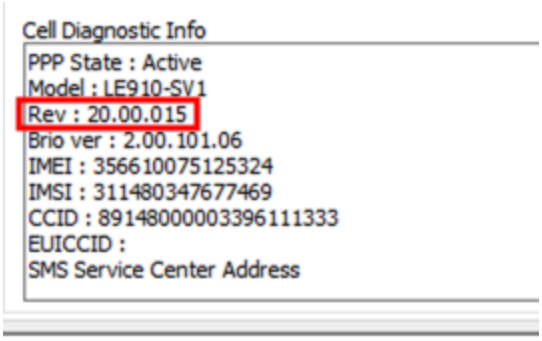
> **NOTE:**
> It could take several hours for the modem to update. If the cellular module fails the update, the data logger will return online after several hours.

5. CELL210 cellular-radio firmware update

NOTE:
Only CR3X0-CELL210 data loggers need to update the cellular-radio firmware. This update ensures that these modems will continue to be compatible with future Verizon network software updates.

1. Get the latest version of Device Configuration Utility from the Downloads section of https://www.campbellsci.com/devconfig.
2. Connect the computer to the data logger using a USB cable supplied with CR300 data logger.
3. Ensure the data logger has 12 VDC power applied.
4. Start Device Configuration Utility. Select the CR300 data logger from the list of devices presented in the **Device Type** field.
5. Select the appropriate **Communication Port** by clicking on the **...** button. It should have CR300 listed in the name. If not, install the appropriate driver by clicking on the **Install USB Driver** button.
6. Click **Connect**.
7. Ensure the data logger has OS 09.00 or greater installed. This is shown in the **OS Version** field of the **Deployment** > **Datalogger** tab. If it is not, see CR300 OS update (p. 2).
8. Select the **Settings Editor** tab then **Cellular**. The **PPP Authentication Username** and **PPP Authentication Password** fields, must not be used. If these fields contain information, you will need to have Campbell Scientific update your module firmware, see If you don't have direct access to the data logger nor a copy of LoggerNet (p. 15).

9. Scroll to the **Cell Diagnostic Info** field. If the **Rev** field shows a version less than 20.00.015, continue with the update.



10. Ensure the module is online by clicking the **Deployment** tab then **Cellular**. Wait until the **State** field says **Network ready**.

11. Select the **Terminal** tab.
12. Press **Enter** until the **CR300>** prompt appears.
13. Type, in all CAPS, **CELLULAR RADIO UPDATE** or **CELLULAR RADIO UPDATE FILE** then press **Enter**. The **CELLULAR RADIO UPDATE FILE** command saves a trace text file of the output on the CPU of the data logger for later reference.

14. At the **Are you sure? (YES/NO)** question, type **YES** (must be all CAPS) then press **Enter**. The data logger will start updating the cellular-radio firmware. The update will use approximately 300 KB of the cellular plan data. The process can take from 5 to 15 minutes.

```
CR300>CELLULAR RADIO UPDATE FILE
Are you sure? (YES/NO)
CR300>YES
Starting radio firmware update . . .
Setting up modem for master reset.
Full modem reset successful.
Cellular radio version:20.00.014
Restarting modem in module update mode . . .
Waiting for modem initialization . . .
Brio cellular module version:2.00.101.06
Radio status:0,0
APN command sent . . .
APN Set.
Waiting for modem registration . . .
Radio status:1,0
Connect status:2,3,85
Sending radio firmware update command . . .
Radio firmware update command sent . . .
Waiting for command reply . . .
Response received . . .
Firmware update started.  Please wait . . .
Radio firmware update command was successful.  Please wait . . .
Notification received.
Update progress :
13 %
Notification received.
Update progress :
60 %
Notification received.
Update progress :
100 %
Notification received.
Flashing radio firmware . . .
Radio firmware update time : 00:30
Radio firmware update time : 01:00
Notification received.
Radio update finished.
Radio firmware update finished.
```

15. If the update is successful, **Radio update finished** is displayed on the line before **Radio firmware update finished**. If the update failed, **Firmware update failed** is displayed on the line before **Radio firmware update finished**.

```
Waiting for modem registration . . .
Radio status:0,0
Connect status failure code received. Code:3
Waiting for modem registration . . .
Radio status:0,0
Connect status failure code received. Code:3
Waiting for modem registration . . .
Radio status:1,0
Connect status:2,3,99
Sending radio firmware update command . . .
Radio firmware update command sent . . .
Waiting for command reply . . .
Response received . . .
Firmware update started.  Please wait . . .
Radio firmware update command was successful.  Please wait . . .
Notification received.
Update progress :
13 %
Notification received.
Update progress :
65 %
Notification received.
Update progress :
96 %
Notification received.
Update progress :
100 %
Notification received.
Flashing radio firmware . . .
Radio firmware update time : 00:30
Radio firmware update time : 01:00
Radio firmware update time : 01:30
Radio firmware update time : 02:00
Radio firmware update time : 02:30
Radio firmware update time : 03:00
Radio firmware update time : 03:30
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Radio firmware update time : 12:00
Radio firmware update time : 12:30
Radio firmware update time : 13:00
Radio firmware update time : 13:30
Radio firmware update time : 14:00
Radio firmware update time : 14:30
Firmware update failed.
Radio firmware update finished.
```

16. Repeat steps 8 and 9 of this section to confirm the module firmware update was successful.

Once the update is complete, the module will come back online and the CR3X0-CELL210 will be ready for use. If the update was not successful, the data logger with return a **Firmware update failed.** message in the terminal. Check to see if the data logger is reporting that the module is back online by checking the **State** field under **Deployment** > **Cellular**.

If **State** shows **Network ready**, try this procedure again from the beginning. If **State** shows a message that the firmware update is still in process, allow the process to complete before powering down the data logger. It could take several hours to complete.

6. If you don't have direct access to the data logger nor a copy of LoggerNet

Customers using the Konect PakBus Router Service should contact Campbell Scientific support directly and a Support Engineer will help.

- If you use this option, please have your Konect PakBus Router connection information available. This includes the DNS, Port, PakBus address of the data logger, and TCP Password (if used).
- The Support Engineer will use the supplied information to update the CR3X0-CELL2XX.
- Customers will be responsible for any data plan overages associated with this update which could also include sending a data logger operating system.
- This service is available until December 31, 2020. After 2020, a support fee will be charged.

Campbell Scientific factory firmware updates require a returned material authorization (RMA) and completion of the "Declaration of Hazardous Material and Decontamination" form. Please contact our customer service department to obtain an RMA and acquire the form:

Phone: (435) 227-9105

Email: repair@campbellsci.com

Please refer to this application note with your request. Once you have an RMA number, please reference it on the outside of the shipping container, and ship your CR3X0-CELL2XX to Campbell Scientific. As specified in our warranty policy, you are responsible for all costs associated with returning the warranty repair to Campbell Scientific. After updating the data logger and modem, we will return it to you prepaid by surface carrier to locations within the continental United States of America. To all other locations, Campbell will return it best way CIP (Port of Entry) INCOTERMS® 2010, prepaid.

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Website: www.campbellsci.com.au

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Location: São Paulo, SP Brazil
Phone: 11.3732.3399
Email: vendas@campbellsci.com.br
Website: www.campbellsci.com.br

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Location: Edmonton, AB Canada
Phone: 780.454.2505
Email: dataloggers@campbellsci.ca
Website: www.campbellsci.ca

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Location: Beijing, P. R. China
Phone: 86.10.6561.0080
Email: info@campbellsci.com.cn
Website: www.campbellsci.com

Costa Rica

Location: San Pedro, Costa Rica
Phone: 506.2280.1564
Email: info@campbellsci.cc
Website: www.campbellsci.cc

France

Location: Vincennes, France
Phone: 0033.0.1.56.45.15.20
Email: info@campbellsci.fr
Website: www.campbellsci.fr

Germany

Location: Bremen, Germany
Phone: 49.0.421.460974.0
Email: info@campbellsci.de
Website: www.campbellsci.de

South Africa

Location: Stellenbosch, South Africa
Phone: 27.21.8809960
Email: sales@campbellsci.co.za
Website: www.campbellsci.co.za

Southeast Asia

Location: Bangkok, Thailand
Phone: 66.2.719.3399
Email: thitipongc@campbellsci.asia
Website: www.campbellsci.asia

Spain

Location: Barcelona, Spain
Phone: 34.93.2323938
Email: info@campbellsci.es
Website: www.campbellsci.es

UK

Location: Shepshed, Loughborough, UK
Phone: 44.0.1509.601141
Email: sales@campbellsci.co.uk
Website: www.campbellsci.co.uk

USA

Location: Logan, UT USA
Phone: 435.227.9120
Email: info@campbellsci.com
Website: www.campbellsci.com