Panoramic Power
Installation and configuration guide

Advanced 4th generation Bridge for firmware v259

Version 1 January 2018

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Regulatory compliance

Conforms to UL Std 61010-1, certified to CAN/CSA Std C22.2 No. 61010-1

ETL
c CLASSIFIED us
Intertek
4005082

The Bridge complies with the following certification requirements:

Power supply	Certified AC/DC adapter marked Limited Power Source (LPS), or NEC Class 2, suitably rated for voltage, current and ambient temperature
Electrical rating	5VDC, maximum 1A
Environmental rating	Maximum ambient temperature 60°C Pollution degree 2 Indoor use Relative humidity up to 80%

Product end of use handling (WEEE) – Waste of Electrical and Electronic Equipment

Panoramic Power is committed to protect the global environment and helping our customers with recycle responsibilities. Disposal of electrical and electronic products must be done according with the local and national regulations. You can return your product to a local collection point.

For information about your disposal or collection points, call your distributer or vendor, or contact support@panpower.com.

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About Panoramic Power® and the Bridge

The Panoramic Power System monitors electrical energy consumption at the site level as well as the individual circuit level. It detects excess usage, allowing organizations to identify and reduce energy, maintenance expenses and monitor site level consumption.

The Panoramic Power System consists of wireless, self-powered sensors engineered to allow for rapid, non-invasive installation, with almost no disturbance to operations. Sensors are easily attached to circuit breakers by just snapping them on to the outgoing electrical wire. They monitor the flow of electricity through the magnetic field it creates and also use it as power source. The sensors do not require any maintenance.

Sensors report the power consumption to the Bridge, which, in turn, transfers the circuit level information, along with readings originated by the utility meter and read through a pulse input on the Bridge to PowerRadar, the solution's cloud–based analytics platform. A single Bridge can collect data from up to 250 sensors and two utility meters and multiple bridges can be used in a single site to increase coverage.

Four generations of Bridges were developed with the fourth generation now available:

Basic entry level Bridge (PAN-2-E-EWC-US/EU)

Advanced cellular Bridge (PAN-2-H-3G-US/EU), featuring a SIM card slot.

Advanced 3rd generation Bridge (PAN-2H-3G-US/EU V3), featuring a SIM card slot and Modbus interface.*

Advanced 4th generation Bridge (PAN-2H-3G-US/EU V4), featuring a SIM card slot, Modbus interface* and two KY pulse inputs.

The table below lists the key features of each bridge.

Key features	Basic entry level Bridge	Advanced cellular Bridge	Advanced 3rd gen Bridge	Advanced 4th gen Bridge
Plug and Play Installation	✓	✓	✓	✓
Flexible mounting options	✓	✓	✓	✓
Wi-Fi / Ethernet connectivity	✓	✓	✓	✓
Cellular (3G GSM) connectivity	Via external USB dongle	Via SIM card slot or external USB dongle	Via SIM card slot	Via SIM card slot
Store and forward capability in case of network loss	X	✓	✓	✓
Modbus interface	X	X	✓ *	✓ *
Two KY pulse inputs	X	X	X	✓
Field-upgradable firmware	X	✓	✓	✓
Initial configuration	Via the Bridge Configuration Tool (Windows application)	Via built-in web interface	Via built-in web interface	Via built-in web interface

* The Modbus interface is reserved for future use.

The Advanced 3rd and 4th gen Bridge provide store-and-forward capability.
In case of a network loss that impacts connectivity with the PowerRadar® cloud platform, the Bridge stores measurements until communication is restored.

The Bridge storage capacity is shown in the table below:

# Connected sensors	# Days stored
10	10
20	5
100	5
200	0.5

Pulse input data is stored for up to 30 days.

This guide explains how to install and configure the Advanced 4th gen Bridge. For information on previous generations of Bridges, see the corresponding 'Installation and configuration guides'.

Unpacking the hardware

We recommend that you follow these unpacking instructions.

How to proceed

1. Check the box. If any damage occurred during shipment, contact your sales representative.

2. Open the box. It must include the following items:

   - Bridge
   - Cellular antenna
   - RF antenna, labeled **Rx-1** (Europe) or **Rx-2** (USA)
   - Pluggable adapters for the pulse inputs
   - Pluggable adapter for the Modbus input
   - DIN rail adapter with mounting screws
   - 5V DC wall adapter
   - 4-piece recloseable fastener with adhesive

3. Keep the box in case you need to repack the bridge.

Attaching the antennas

Before performing any connections, mount the antennas onto the Bridge as follows:

1. (European model) Screw the RF antenna labeled **Rx-1** to the connector marked **Rx-1**, as shown below.

   (US model) Screw the RF antenna labeled **Rx-2** to the connector marked **Rx-2**

2. Screw the cellular antenna to its connector.

3. Position the antennas as shown below.

Mounting the Bridge

You can install the Bridge on a flat horizontal surface, mount it on a wall using screws or the re-closeable fastener or mount it on a DIN rail.

How to proceed

1. Configure the Bridge as explained in this guide.

2. Position the Bridge at a distance of:

   Up to 2 meters from the electrical panel, if the panel is covered with a metallic cover.

   Up to 5 meters, if the panel is not covered.

3. Choose a clean and even surface, located near a power source.

4. Make sure the Bridge side vents are not blocked.

5. Attaching with screws: Use the template on the back of the Bridge to measure the distance between the two screws.

6. Adhering to the wall: Peel the adhesive backing off two pieces of the re-closeable fastener and attach them to the back of the Bridge.

   In the same way, attach the two remaining pieces of the re-closeable fastener to the wall, making sure they are aligned with the pieces on the Bridge.

7. Attaching to a DIN rail: Attach the included DIN rail adapter to the Bridge using the two screws provided. The adapter clips on to a standard DIN rail.

Connecting the Bridge

Depending on the required network configuration, you can connect the Bridge to the Internet using Wi-Fi, cellular network, or wired LAN.
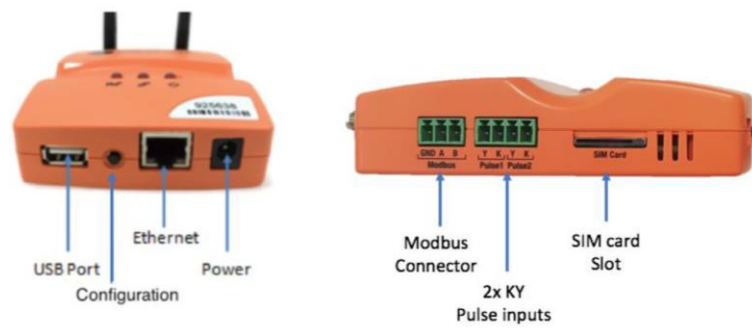
Prerequisites

An Ethernet cable for configuring the Bridge.

An Ethernet cable if you connect to the Internet via wired LAN

A SIM card if you connect to the Internet via a standard GSM network.

Connecting pulse inputs

You can connect the Bridge to a KY or KYZ pulse output of a meter.

How to proceed

1. Screw the pulse wires into the adapter connected to the pulse input.
   Make sure to screw the K wire into the K input and either the Y or Z wire
   into the Y input.

2. Plug the adapter into one of the pulse inputs on the side of the Bridge.

Pulse input electrical characteristics

Open terminal voltage: 5 V

Maximum current: 0.9 mA

Configuring the Bridge

This section assumes you are familiar with networking procedures.

1.1.1 Accessing the Bridge web interface

This section describes how to access the Bridge web interface for configuring
the relevant data communication mode.

Prerequisite

Use Internet Explorer 9.0 (and up), Google Chrome, or Firefox to access the
Bridge web interface.

How to proceed

1. On your PC, disable your Wi-Fi and disconnect the LAN cable.

2. Connect the Bridge to the power source.

3. Once the Bridge powers up, it performs a self-test after which all LEDs
   light up in sequence. For information on LED status, see 'Understanding
   the Bridge LEDs'.

4. Make sure no USB device is connected to the USB port of the Bridge.

5. Press the Configuration button for approximately 5 seconds, until the **Rx**⌇ LED lights solid red.

6. Connect the Bridge to the PC using the LAN cable, only after the **Rx**⌇ LED lights solid red (indicates Bridge is in configuration mode)

7. Activate your web browser. In the address bar, enter IP address *10.0.0.10*.
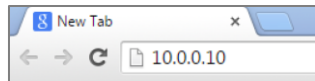
The Status page appears (it may take few minutes for the computer to connect to the Bridge's DHCP server; you can release and renew your IP address on your computer to speed the process). It displays the current configuration.

Note In some cases, first-time loading can take several minutes. If the Status page does not appear, wait a few more seconds and refresh the page in the browser.

If the page does not load, use Ctrl+F5 to refresh the page and force clear of the browser's cache.

2.1.1

3.1.1 Entering credentials
You need to enter your credentials only once for accessing any of the pages (except Status).

How to proceed
1. Select the required page in the side menu.

2. Enter the Username and Password in the Authentication Required screen.

   By default, both are *panpwr*. We recommend changing them once you access the tool. See 'Modifying the default credentials for the Bridge web interface'.

3. Select Login.

4.1.1 Configuring the Bridge for Wi-Fi connection
If the Bridge communicates with the server over Wi-Fi, you need to configure which Wi-Fi network and settings to use.

Prerequisites
Ask your network administrator for the following information:

SSID and Password to access the network

Username, certificate text, and RSA private key for networks requiring certificates.

For Wi-Fi and Ethernet connections, verify that the system administrator has opened port 8051 for inbound/outbound TCP/IP traffic. In addition, verify that DHCP & DNS ports are open (67/68, 53).

How to proceed
1. In Connection type select Connect via Wi-Fi.

2. To let the system find the SSID (network name) and Security (encryption method used), click Find networks.

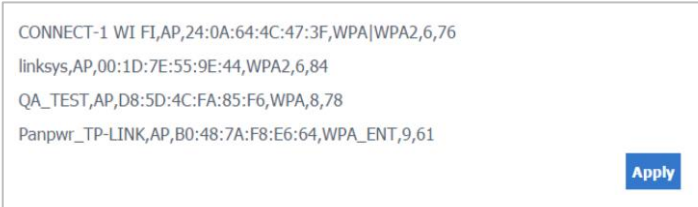   Otherwise, enter these values manually.

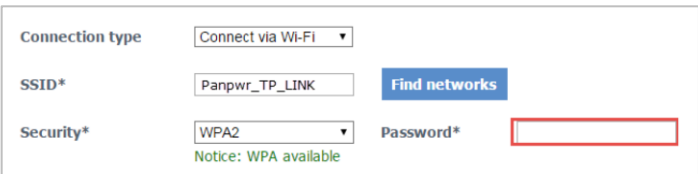The display shows a list of networks in your vicinity.

CONNECT-1 WI FI,AP,24:0A:64:4C:47:3F,WPA|WPA2,6,76

linksys,AP,00:1D:7E:55:9E:44,WPA2,6,84

QA_TEST,AP,D8:5D:4C:FA:85:F6,WPA,8,78

Panpwr_TP-LINK,AP,B0:48:7A:F8:E6:64,WPA_ENT,9,61

Apply

Note If the expected Wi-Fi network was not found, or if no network was found at all, you can click the Find Networks button again and it will reattempt to search for networks.

3. Select the network you want to use and click Apply.

Connection type	Connect via Wi-Fi ▼	
SSID*	Panpwr_TP_LINK	**Find networks**
Security*	WPA2 ▼	Password*
	Notice: WPA available	
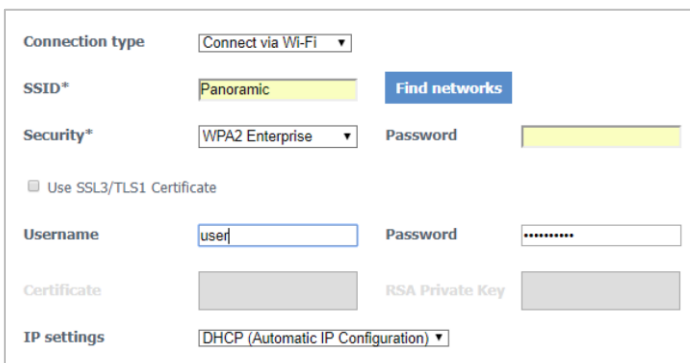
If the network supports a mixed encryption mode, the **WPA available** notice appears on the screen.

4. For Open, WEP, and WPA security, enter the password in the field shown in Step 3.

5. For enterprise WPA and enterprise WPA2 security, enter your password in the field shown below (this is for use with RADIUS server authentication).

Connection type	Connect via Wi-Fi ▼	
SSID*	Panoramic	**Find networks**
Security*	WPA2 Enterprise ▼	Password
☐ Use SSL3/TLS1 Certificate		
Username	user	Password ・・・・・・・・・
Certificate		RSA Private Key
IP settings	DHCP (Automatic IP Configuration) ▼	

6. For a network using certificates, select Use SSL3/TLS1 Certificate, and enter the Username, Certificate, and RSA Private Key.

7. In IP settings, select whether you want the bridge to get an IP address automatically (DHCP) or to assign an IP address yourself.

If you select to enter the IP address manually, a number of fields become active (IP Address, Subnet Mask, etc.). Fill them in according to your required network settings.

8. To save the configuration to the Bridge, click Save settings.

Important If you leave this page before saving your settings, they are lost.

9. To discard changes made to an unsaved configuration and return to the saved settings, select Load configuration from Bridge.

10. To use the settings displayed on the screen to configure another Bridge, select Save configuration to file.

This allows you to create different settings and save them to a file, without updating the bridge configuration.

For more information, see Loading the Bridge configuration from a configuration file.

11. To exit configuration mode, disconnect the Bridge from the power source.

12. Install the Bridge as explained in Mounting the Bridge.

13. Reconnect the Bridge to the power source.

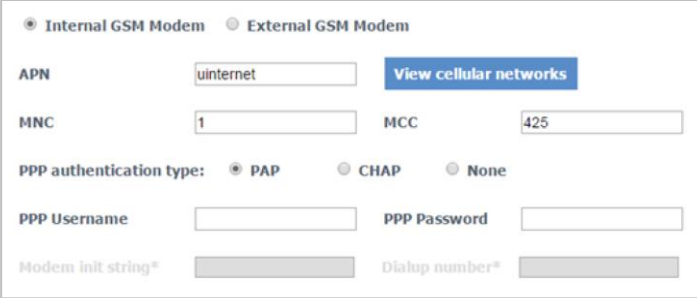### 5.1.1 Configuring the Bridge for cellular connection

Use a SIM card if you connect to the Internet via a standard GSM network.

Prerequisites

For some SIM cards, the system fills details automatically in the 'Connection Setup' page. For others, you need to get the information from the SIM card supplier or the service provider.

How to proceed

1. In Connection type select Connect via cellular.

2. You should always select the Internal GSM Modem. The external GSM Modem configuration is deprecated as of this version of the hardware.

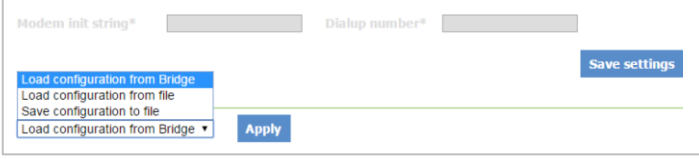3. Use the View cellular networks button to verify reception of the relevant cellular network (this can take up to 30 seconds). Then enter the APN you received from the cellular network operator. If required, enter PPP details.

4. To save the configuration to the Bridge, click Save settings.

   Important If you leave this page before saving your settings, they are lost.

5. To discard changes made to an unsaved configuration and return to the saved settings, select Load configuration from Bridge.

6. To use the settings displayed on the screen to configure another Bridge, select Save configuration to file.

   This allows you to create different settings and save them to a file, without updating the Bridge configuration.

   For more information, see 'Loading the Bridge configuration from a configuration File'.

7. To exit configuration mode, disconnect the Bridge from the power source.

8. Install the Bridge as explained in 'Mounting the Bridge'.

9. When using the Internal GSM Modem, insert the SIM card to the slot with the truncated end as shown below.

10. Reconnect the Bridge to the power source.

6.1.1 Configuring the Bridge for Wired LAN

If you use a wired connection to access the Internet, there are two methods to allocate an IP address: automatically (DHCP) or manually (Static IP).

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Prerequisites

If you need a static IP address for the Bridge, make sure to have the network setting information ready before starting the procedure.

For Wi-Fi and Ethernet connections, verify that the system administrator has opened port 8051 for inbound/outbound TCP/IP traffic. In addition, verify that DHCP & DNS ports are open (67/68, 53).

How to proceed

1. In Connection type select Connect via LAN.

2. In IP settings, select whether you want the bridge to get an IP address automatically (DHCP) or to assign an IP address manually (Static IP).

3. If you select to enter the IP address manually, a number of fields become active (IP Address, Subnet Mask, etc.). Fill them in according to your required network settings.

4. To save the configuration to the Bridge, click Save settings.

Important If you leave this page before saving your settings, they are lost.

5. To discard changes made to an unsaved configuration and return to the saved settings, select Load configuration from Bridge.

6. To use the settings displayed on the screen to configure another Bridge, select Save configuration to file.

   This allows you to create different settings and save them to a file, without updating the Bridge configuration.

   For more information, see 'Loading the Bridge configuration from a configuration File'.

7. To exit configuration mode, disconnect the Bridge from the power source.

8. Install the Bridge as explained in 'Mounting the Bridge'.

9. Reconnect the Bridge to the power source.

7.1.1 Configuring the Pulse Inputs

If you connect the Bridge to a meter's pulse output, you need to enable the pulse inputs in the Bridge configuration.

Prerequisites

Have the pulse outputs connected to the pulse input connectors on the side of the bridge

How to proceed

1. In the Pulse input tab check the checkbox next to the pulse input you wish to enable

2. Make sure the measurement frequency is set to 60 seconds

3. You can use the pulse counters to verify that pulses are counted. The counters update every 10 seconds

Loading the Bridge configuration from a configuration file

You can use the configuration file for configuring other Bridges that have similar configuration requirements. For example, if Bridges in a chain of stores share the same Internet connection type and access points, you can prepare one configuration file and use it for configuring other Bridges in these locations.

You can also load the configuration file onto the same Bridge if its configuration gets corrupted.

How to proceed

1. Access the Bridge web interface.

2. Access the Connection setup page.

3. Select Load Configuration from file.

4. Select the relevant file and click Apply.

5. If necessary, enter the password manually (for example, Wi-Fi password, SSL Password, RSA Private Key).

Modifying the Bridge administration settings

You can modify the Bridge default settings or reset all settings, including connections, to factory defaults.

8.1.1 Modifying the Default URL and/or Port of the Panoramic Power Server

Important Do not change the pre-configured address of the Panoramic Power server (*col.panpwrws.com*) and/or port number (*8051*) without explicit instructions from Panoramic Power customer support, as the bridge uses these settings to transmit sensor data to the Panoramic Power cloud.

To access these fields, select Administration in the Bridge web interface.

Administration

Main Panoramic server host	col.panpwrws.com	Port	8051
Second Panoramic server host		Port	

☐ Enable remote firmware update

Save settings

9.1.1

10.1.1 Modifying the default credentials for the Bridge web interface

You can change the default user name and password required to access the bridge configuration and Diagnostics pages.

How to proceed

1. Access the Bridge web interface.

2. Select Administration.

Bridge configuration

User Name	
Password	
Verify password	

Save settings

3. Enter the new Username and Password (up to 15 characters for each field).

4. In Verify password enter the new password again.

5. Select Save settings.

11.1.1 Resetting the Bridge Configuration to Factory Defaults

Important Restoring to factory defaults erases all of your connection settings!

How to proceed

1. Access the Bridge web interface.

2. Select Administration.

3. Click Reset to factory default at the bottom of the page.

4. At the prompt, click OK.

Viewing the Configuration Status

Access the Status page to view information such as:

Bridge versions (if asked by the support team)

Configured interface

Connection details (allocated IP, etc.)

Connection status (for example, if the Bridge managed to connect to the local network at all)

Quality of connections

How to proceed

1. (Only if you just saved configuration settings) Disconnect the Bridge from the power source and reconnect it.

2. Press the Configuration button for approximately 5 seconds, until the **Rx** LED lights solid red.

3. Access the Bridge web interface by entering *10.0.0.10* in the browser.

4. Check the status of the configuration.

   Green indicators appear in the Status page if the Bridge connects with the local network and the cloud-based Panoramic Power server.

   If the system does not reestablish connection with the Panoramic Power server, access the Diagnostics page for further testing.

Understanding the Bridge LEDs

Use the following information to familiarize yourself with the Bridge status during normal operation in Wi-Fi, cellular, or Ethernet.
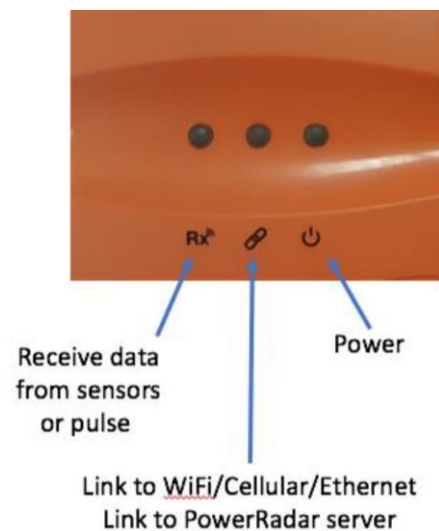
Power ⏻ LED	Bridge status
Solid green	Connected to the power source
Solid green	Firmware upgrade in progress
Solid red	Firmware upgrade has failed

Rx LED	Bridge status
Blinking green	Receiving sensor or meter data
Solid red	Configuration mode

Link 🔗 LED	Physical Link (Ethernet / Wi Fi / Cellular	Panoramic Power Server Connected
Off	X	X
Blinking orange – slow	While connecting to L2 layer	X
Blinking orange – fast	While acquiring IP address	X
Blinking green – fast	Resolving server URL	X
Blinking green – slow	Connecting to server	X
Solid orange	Authentication error	✓ (Connection established but data is rejected by the cloud)
Solid green	✓	✓

Note In some cases, it may take up to several minutes for the Bridge to obtain an IP address and at that stage the Link LED may be Off. It is recommended to wait few minutes before troubleshooting.

Verifying the Wi-Fi or cellular connectivity

You can test the connection to the Panoramic Power server or the Internet as described in this section. How to proceed

1. Access the Bridge web interface.

2. Select Diagnostics.
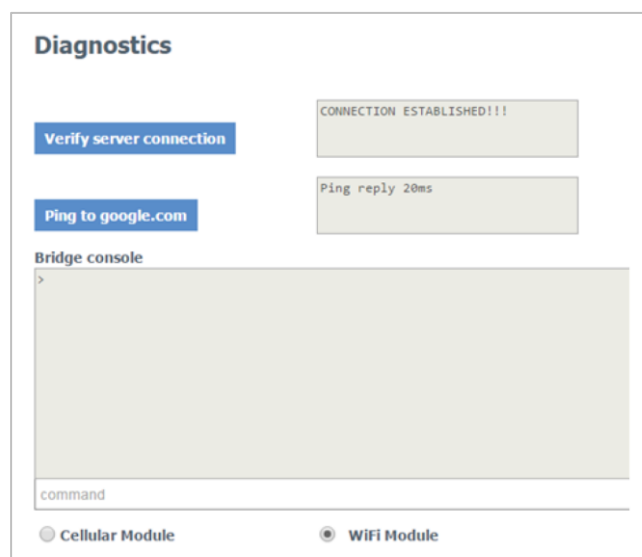
3. Click Verify server connection to make sure the Bridge communicates with the Panoramic Power server.

   If there is no connection, check the Bridge configuration parameters and network settings. The connection to the Panoramic Power server uses port 8051.

Note This method does not work if you configured the bridge to work in LAN, and your PC is connected to the bridge!

4. Click Ping to google.com to make sure the Internet connection is working.

   If there is no connection, check the Bridge configuration parameters and network settings.

Upgrading the Firmware version

This section explains how to upgrade the Bridge to the latest firmware version.

Prerequisites

Make sure you have the following items:

USB flash drive with the upgraded firmware. Or, a FAT-32 formatted USB flash drive if you need to download the firmware from your email account.

How to proceed

1. (If needed) Download the firmware to the root directory of the USB flash drive.

2. Make sure the firmware file is the only .bin file in the root directory of the USB flash drive.

3. Connect the USB flash drive to the USB port on the Bridge.

USB Port

Configuration button

4. (Only if the Bridge is not yet operational) Boot and wait for the LED self-test sequence to end.

Note If you proceed to Step 5 before the self-test sequence ends, the Bridge enters configuration mode rather than upgrade mode.

5. If the Bridge is connected to the LAN network, Disconnect it from the LAN network

6. Press the Configuration button for approximately 10 seconds approximately.

7. The ⏻ LED lights orange and green. All other LEDs are off.

8. Wait several minutes for the upgrade process to complete (up to
    5 minutes).

    After a successful upgrade the Bridge reboots. The ⏻ LED lights green, the
    Bridge returns to normal operation. A LED self-test sequence occurs, and
    the Bridge returns to normal operation.

9. Disconnect the USB flash drive.

Note If the firmware version on the USB drive is identical to the one installed,
the Bridge will not update, and the power LED will turn red. A lower version will
result in downgrading the Bridge's firmware and a reset of the Bridge
configuration.

Troubleshooting

If you encounter a problem, try the solutions listed in this section.

Otherwise, contact Customer Support for help at support@panpwr.com.

Problem
The Bridge is not receiving sensor data (**Rx** LED is off).

Solutions
Try moving the bridge closer to the electrical panel.

Verify the position of the sensors in the electrical panel: make sure they are
visible, or try moving them to the front of the panel.

Make sure the RF antenna is tightly screwed to the antenna connector of
the Bridge.

Make sure the Bridge is not in configuration mode (**Rx** LED lights red).

Problem
The Bridge is not connecting to the Panoramic Power server (🔗 LED is not
turning solid green).

Solutions
If you are using Ethernet:

Look at the LAN port (RJ-45 connector) on the Bridge. It contains two small
built-in LEDs. One of them should light solid green and the other should be
blinking orange. If this is not happening, tighten both ends of the LAN cable
or replace it.

If the ⃟ LED blinks green but does not turn solid, it means that local network connectivity is established but the Bridge can not access the Panoramic Power server. This is often caused by local firewalls blocking TCP port 8051. Please verify this with your system adminisrator.

If you are using Wi-Fi:

Verify the wireless network reception strength in the status page.
The level should be at least two, preferably three (out of five).

If no reception level is showing and 'Connecting...' is shown instead, it means that the bridge cannot establish Wi-Fi network connectivity. In this case, please verify your Wi-Fi credentials (SSID, Security Type or password).

If the ⃟ LED blinks green but does not turn solid, it means that local network connectivity is established but the Bridge can not access the Panoramic Power server. This is often caused by local firewalls blocking TCP port 8051. You can verify this using the Diagnostics tool or with your system administrator.

If you are using cellular:

Verify the cellular network reception strength in the status page. The level should be at least three (out of five).

If no reception level is showing and 'Connecting...' is shown instead, it means that the Bridge cannot establish cellular network connectivity. In this case, please verify your cellular credentials (APN, PPP credentials where needed) and make sure the SIM card has a valid and enabled data plan.

You can test the cloud connectivity using the Diagnostics tool.

Problem
The Bridge does not connect to the cellular network when using the SIM card (⃟ LED is off).

Solutions
Make sure the SIM card is in place before connecting the Bridge to the power source.

After verifying the SIM card is tightly secured in its slot, disconnect the Bridge from the power source and reconnect it.

Verify with your service provider that a data plan is enabled for your SIM card. The Bridge connects to the cellular data network only if the SIM card has a data plan.

In low reception areas it may take a while for the Bridge to connect. Enter configuration mode and check the reception bar in the Status page.

Problem

The Bridge does not return to normal operation after firmware upgrade (⏻ LED lights red).

Solution

Upgrade was unsuccessful, and the Bridge rolled back to the previous firmware version.

How to proceed

1. Disconnect the USB flash drive from the Bridge.

2. Disconnect and reconnect the power cable to the Bridge.

   The Bridge performs a self-test and the ⏻ LED lights green. The Bridge is ready for normal operation with the rolled back version.

3. Enter configuration mode and check the running firmware version in the Status page).

4. Contact Customer Support for further help.