Installation, Operation, and Configuration

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Qualified Persons

⚠ WARNING

Only qualified persons who are knowledgeable in the installation, operation, and maintenance of overhead and underground electric distribution equipment, along with all associated hazards, may install, operate, and maintain the equipment covered by this publication. A qualified person is someone who is trained and competent in:

- The skills and techniques necessary to distinguish exposed live parts from nonlive parts of electrical equipment
- The skills and techniques necessary to determine the proper approach distances corresponding to the voltages to which the qualified person will be exposed
- The proper use of special precautionary techniques, personal protective equipment, insulated and shielding materials, and insulated tools for working on or near exposed energized parts of electrical equipment

These instructions are intended only for such qualified persons. They are not intended to be a substitute for adequate training and experience in safety procedures for this type of equipment.

Read this Instruction Sheet

NOTICE

Thoroughly and carefully read this instruction sheet and all materials included in the product's instruction handbook before installing or operating the TripSaver II Communications via Gateway system. Become familiar with the Safety Information "Several types of safety-alert messages may appear throughout this instruction sheet and on labels and tags attached to the TripSaver II Communications Gateway. Become familiar with the Safety Information on page 4 and Safety Precautions on page 6. The latest version of this publication is available online in PDF format at **https://www.sandc.com/en/contact-us/product-literature/**.

Retain this Instruction Sheet

This instruction sheet is a permanent part of the TripSaver II Communications via Gateway system. Designate a location where users can easily retrieve and refer to this publication.

Proper Application

⚠ WARNING

The equipment in this publication is only intended for a specific application. The application must be within the ratings furnished for the equipment. Ratings for the TripSaver II Communications Gateway system are listed in the ratings table in Specification Bulletin 461-33. The ratings are also on the nameplate affixed to the product.

Warranty

The warranty and/or obligations described in S&C's Price Sheet 150, "Standard Conditions of Sale–Immediate Purchasers in the United States," (or Price Sheet 153, "Standard Conditions of Sale–Immediate Purchasers Outside the United States"), plus any special warranty provisions, as set forth in the applicable product-line specification bulletin, are exclusive. The remedies provided in the former for breach of these warranties shall constitute the immediate purchaser's or end user's exclusive remedy and a fulfillment of the seller's entire liability. In no event shall the seller's liability to the immediate purchaser or end user exceed the price of the specific product that gives rise to the immediate purchaser's or end user's claim. All other warranties, whether express or implied or arising by operation of law, course of dealing, usage of trade or otherwise, are excluded. The only warranties are those stated in Price Sheet 150 (or Price Sheet 153), and THERE ARE NO EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ANY EXPRESS WARRANTY OR OTHER OBLIGATION PROVIDED IN PRICE SHEET 150 (OR PRICE SHEET 153) IS GRANTED ONLY TO THE IMMEDIATE PURCHASER AND END USER, AS DEFINED THEREIN. OTHER THAN AN END USER, NO REMOTE PURCHASER MAY RELY ON ANY AFFIRMATION OF FACT OR PROMISE THAT RELATES TO THE GOODS DESCRIBED HEREIN, ANY DESCRIPTION THAT RELATES TO THE GOODS, OR ANY REMEDIAL PROMISE INCLUDED IN PRICE SHEET 150 (or PRICE SHEET 153).

Understanding Safety-Alert Messages

Several types of safety-alert messages may appear throughout this instruction sheet and on labels and tags attached to the TripSaver II Communications Gateway. Become familiar with these types of messages and the importance of these various signal words:

⚠ DANGER

"DANGER" identifies the most serious and immediate hazards that will likely result in serious personal injury or death if instructions, including recommended precautions, are not followed.

⚠ WARNING

"WARNING" identifies hazards or unsafe practices that can result in serious personal injury or death if instructions, including recommended precautions, are not followed.

⚠ CAUTION

"CAUTION" identifies hazards or unsafe practices that can result in minor personal injury if instructions, including recommended precautions, are not followed.

NOTICE

"NOTICE" identifies important procedures or requirements that can result in product or property damage if instructions are not followed.

Following Safety Instructions

If any portion of this instruction sheet is unclear and assistance is needed, contact the nearest S&C Sales Office or S&C Authorized Distributor. Their telephone numbers are listed on S&C's website **sandc.com**, or call the S&C Global Support and Monitoring Center at 1-888-762-1100.

NOTICE

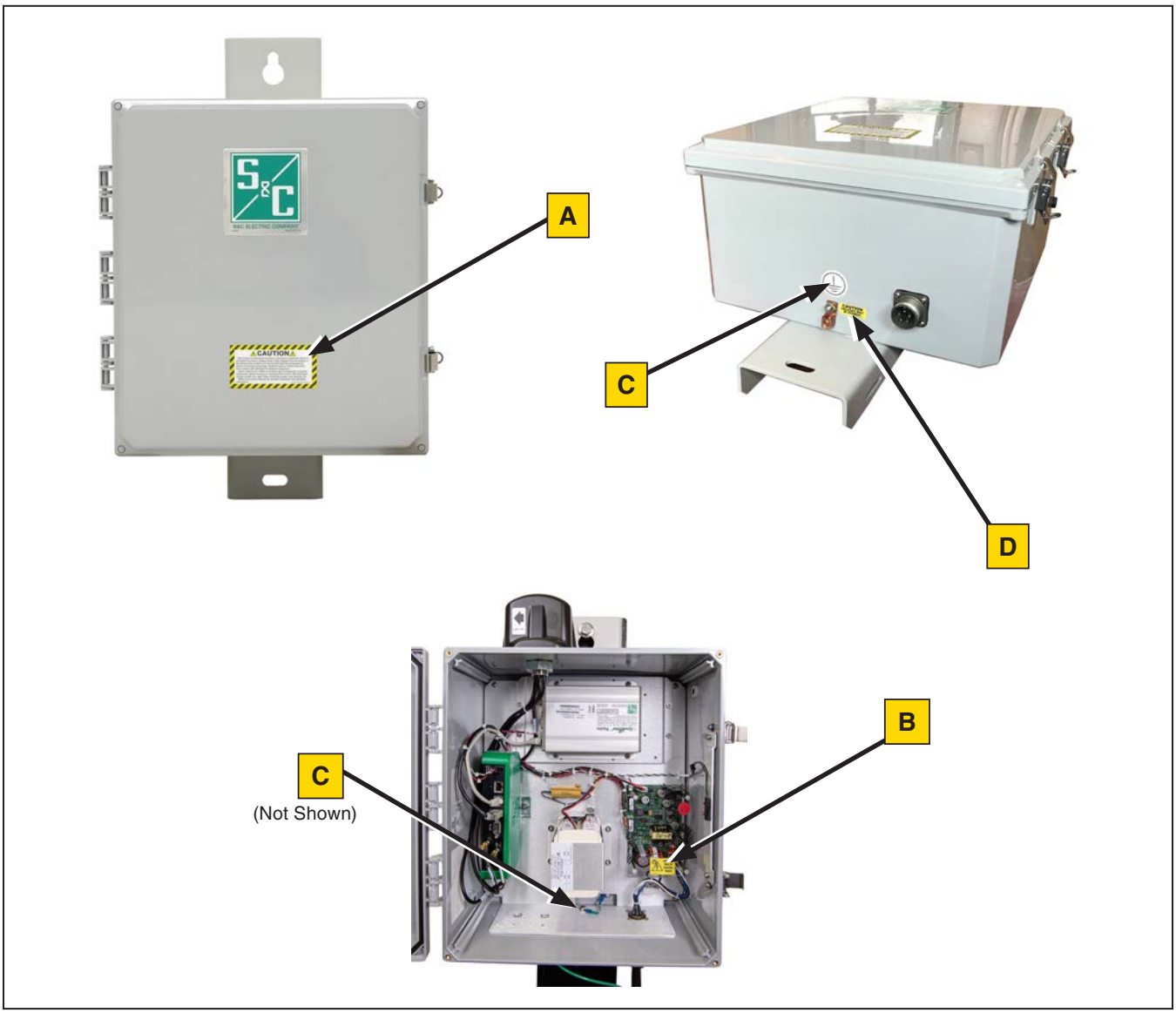
Read this instruction sheet thoroughly and carefully before installing the TripSaver II Communications via Gateway system.

Replacement Instructions and Labels

If additional copies of this instruction sheet are required, contact the nearest S&C Sales Office, S&C Authorized Distributor, S&C Headquarters, or S&C Electric Canada Ltd.

It is important that any missing, damaged, or faded labels on the equipment be replaced immediately. Replacement labels are available by contacting the nearest S&C Sales Office, S&C Authorized Distributor, S&C Headquarters, or S&C Electric Canada Ltd.

Location of Safety Labels



Reorder Information for Safety Labels

Location	Safety Alert Message	Description	Part Number
A	⚠ CAUTION	This control is connected to electrical distribution equipment...	180-000070-00 Rev A
B	⚠ CAUTION	Risk of electric shock...	180-002533-01
C	⚠ CAUTION	Earth Ground	180-002577-01
D	⚠ CAUTION	Enclosure must be grounded...	180-000710-01

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⚠ DANGER

The TripSaver II Communications via Gateway system connects to a 120/240-Vac source. Failure to observe these precautions will result in serious personal injury or death.

Some of these precautions may differ from your company's operating procedures and rules. Where a discrepancy exists, follow your company's operating procedures and rules.

1. **QUALIFIED PERSONS.** Access to a TripSaver II Communications via Gateway system must be restricted only to qualified persons. See the "Qualified Persons" section on page 2.
2. **SAFETY PROCEDURES.** Always follow safe operating procedures and rules.
3. **PERSONAL PROTECTIVE EQUIPMENT.** Always use suitable protective equipment, such as rubber gloves, rubber mats, hard hats, safety glasses, and flash clothing, in accordance with safe operating procedures and rules.
4. **SAFETY LABELS.** Do not remove or obscure any of the "DANGER," "WARNING," "CAUTION," or "NOTICE" labels. Remove tags ONLY if instructed to do so.
5. **ENERGIZED COMPONENTS.** Always consider all parts live until de-energized, tested, and grounded.
6. **MAINTAINING PROPER CLEARANCE.** Always maintain proper clearance from energized components.

Packing

A complete TripSaver II Communications via Gateway system for a new installation consists of two shipping containers. They include the following:

- The communications gateway (including radio, if specified "factory-furnished" at time of order), an optional battery if specified, and mounting hardware for securing the box to the pole
- (Optional) An ac power cable

Inspection

Examine the shipment for external evidence of damage as soon after receipt as possible, preferably before removal from the carrier's conveyance. Check the bill of lading to make sure the listed shipping containers are present.

If there is visible loss and/or damage:

1. Notify the delivering carrier immediately.
2. Ask for a carrier inspection.
3. Note the condition of shipment on all copies of the delivery receipt.
4. File a claim with the carrier.

If concealed damage is discovered:

1. Notify the delivering carrier within 15 days of receipt of shipment.
2. Ask for a carrier inspection.
3. File a claim with the carrier.

Also, notify S&C Electric Company in all instances of loss and/or damage.

Handling

⚠ CAUTION

DO NOT drop the communications gateway or subject any of its parts to undue stress during installation. Only remove the communications gateway from the carton when you are ready for installation. The communications gateway weighs about 25 lbs. (11.4 kg); follow proper lifting techniques to avoid minor injury.

Storage

TripSaver II Communications Gateways are shipped on pallets banded with plastic wrap. This packaging is designed to protect the communications gateway from freight damage. This packaging is not suitable for outdoor storage because it can pool water and damage the communications gateway. After receipt, TripSaver II Communications Gateways should be stored indoors in their shipping packaging. Storing communications gateways outdoors in the shipping packaging will void the warranty.

Returning

If for any reason the communications gateway is to be returned, place it in the original shipping carton to prevent damage during shipping. If additional shipping cartons are required, contact the nearest S&C Sales Office, S&C Authorized Distributor, or S&C Headquarters.

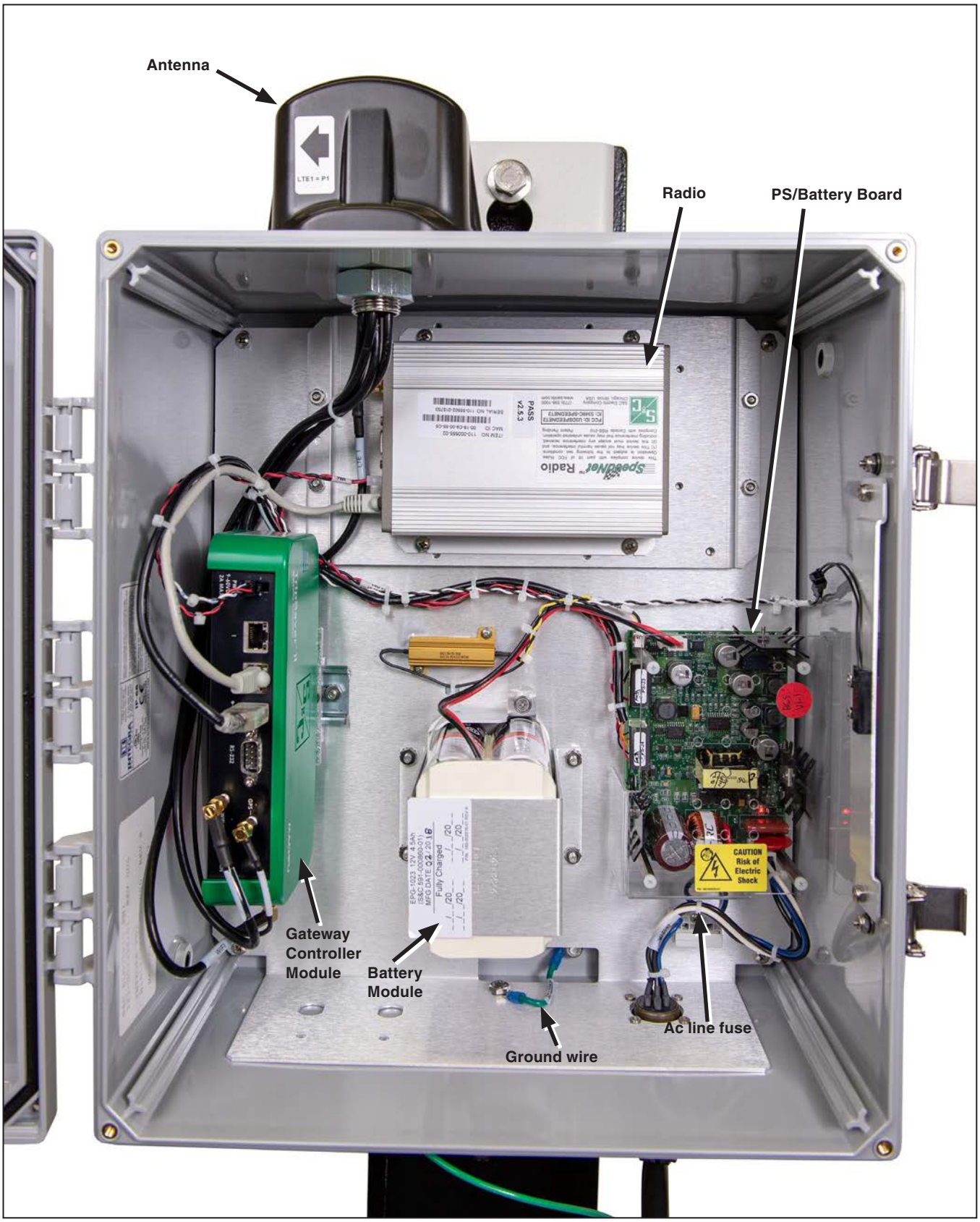


Figure 1. The TripSaver II Communications Gateway.

Mounting the Communications Gateway to a Pole

Follow these steps to mount the communications gateway:

STEP 1. Attach the communications gateway in an upright position, with the S&C logo facing you, to the pole using the upper and lower mounting bolts provided. See Figure 1 on page 8 and Figure 2.

STEP 2. Connect a #2 copper (or equivalent) ground wire from the base of the communications gateway to the ground rod.

Figure 2. Mounting the communications gateway to the utility pole.

The communications gateway antenna is directional. The communications gateway should be mounted ideally no more than 30 feet (9.1 m) below the TripSaver II reclosers to which it will be paired. There should be an unobstructed line of sight between the gateway antenna and the LCD screen of each TripSaver II recloser. S&C recommends mounting the communications gateway directly beneath and on the same side of the pole as the reclosers to which it will be paired. Do not mount the gateway perpendicular to the TripSaver II reclosers or on the opposite side of the pole.

Powering the Communications Gateway

Follow these steps to power up the communications gateway:

STEP 1. Remove the red protection cap attached to the power-connection terminal at the bottom of the communications gateway.

STEP 2. Open the box.

STEP 3. Run the ac power cable down the pole. The unterminated end of the cable should be connected to the overhead transformer.

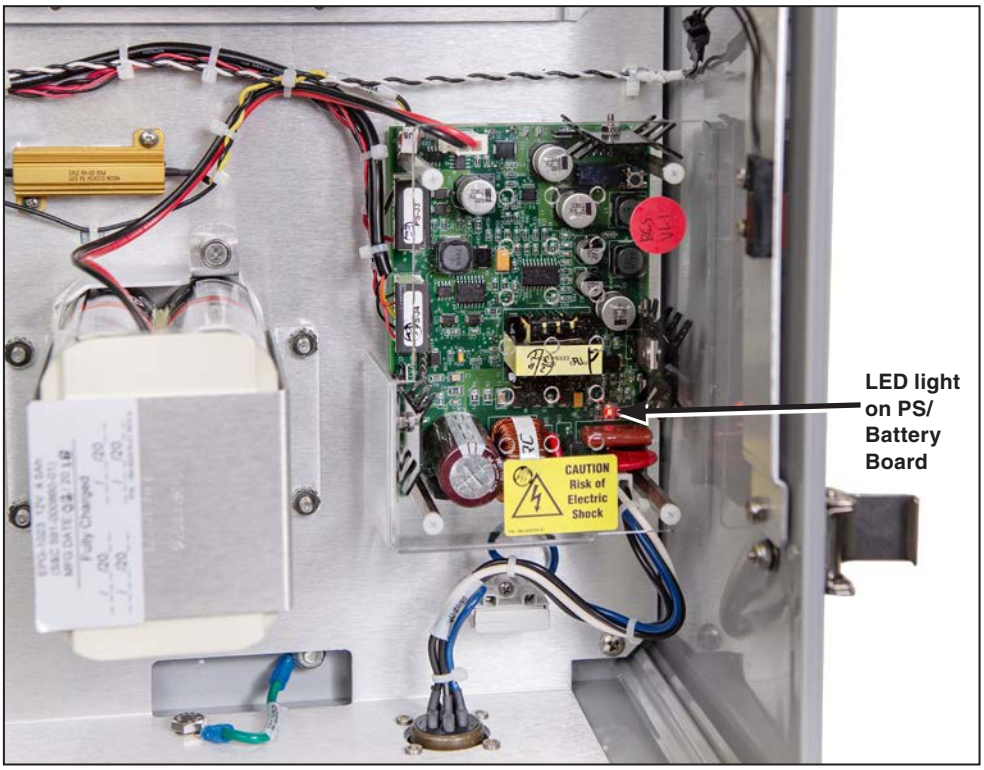


Figure 3. The communications gateway control PS/Battery Board.

STEP 4. Align the five-pin connector at the terminated end with the notch of the power connection terminal, make the connection, and tighten the ring. See Figure 2 on page 9.

STEP 5. After a short delay, LEDs on the PS/Battery board and the gateway controller should light up, indicating the communications gateway is receiving power. See Figure 1 on page 8 and Figure 3.

Note: A user-supplied disconnect switch may be required for your installation between the ac input and the PS/Battery board. Contact the nearest S&C Sales Office for details. See the power system diagram (Figure 72 on page 77).

Securing the Communications Gateway

To secure the communications gateway, close the door and use the door latches to secure the enclosure. See Figure 2 on page 9. The door latches accept locks with a maximum shackle diameter of ⅜-inches (9.5 mm).

Installing a New Radio

A radio providing field-area network capability for SCADA applications, if specified, is furnished factory-installed in the communications gateway. Alternately, the customer may install a user-furnished radio. See Figure 4.

Follow these steps to install a radio in the communications gateway:

STEP 1. Disconnect the ac power cable connected to the bottom of the gateway and then disconnect the ac-line fuse located at the lower right corner of the gateway box.

STEP 2. Install the radio on the mounting plate using user-furnished hardware.

STEP 3. The wiring harness on most radios includes a power plug and data-port connectors (Ethernet or RS-232 serial). Insert the power plug in its receptacle. As applicable, connect the Ethernet connector to Port 2 of the green gateway controller or insert the serial connector in its receptacle on the gateway controller.

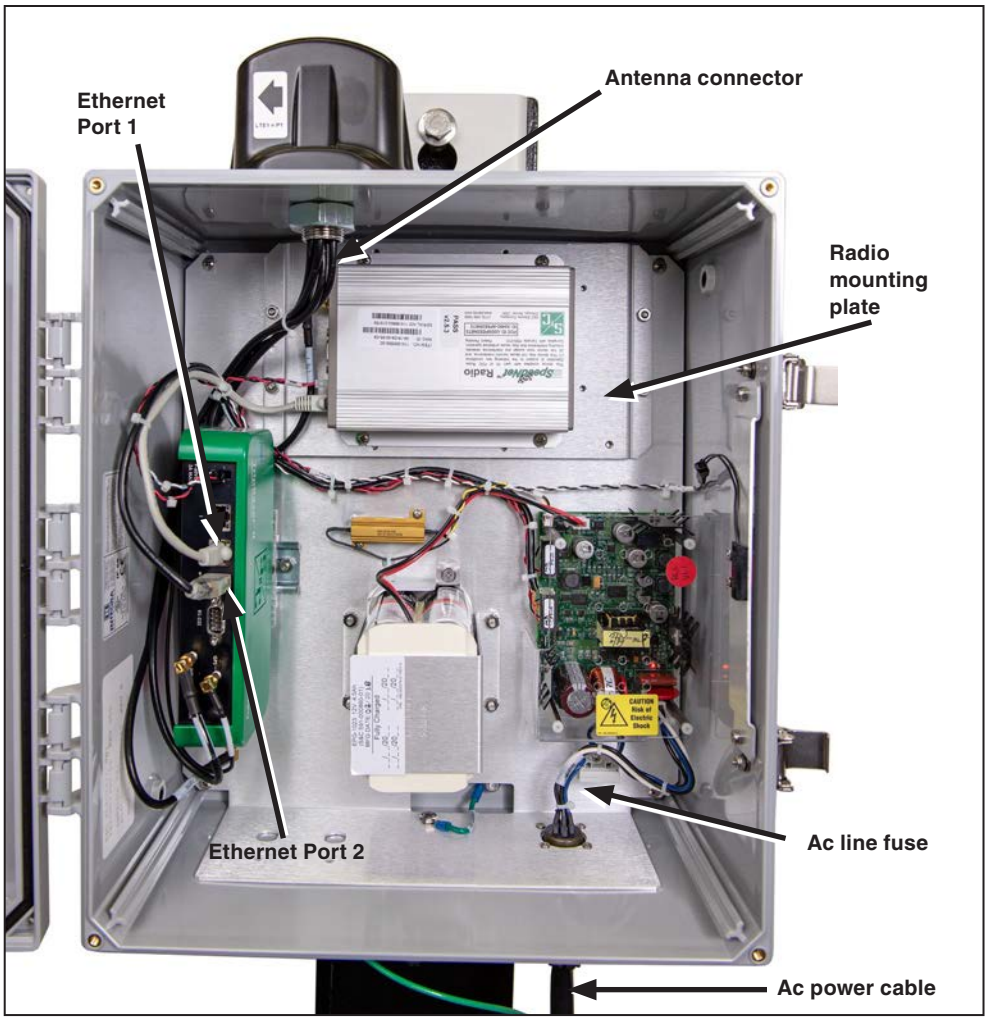


Figure 4. Installing a radio.

STEP 4. Attach the antenna connector to the user-furnished radio. If using the standard S&C-provided antenna, the applicable leads are LTE 1 (890- to 960-MHz/1710- to 2700-MHz bands) and LTE 2 (diversity). If using a remote antenna, use the leads from the surge-suppressor connector. Refer to the "Installing Remote Antenna Kit 903-002702-02/01" section on page 15 for further information.

Note: Radios may be pre-programmed or may need to be programmed via a physical cable or over the air. When programming via a physical cable, if the radio is already installed in the gateway box, remove the radio-tray assembly so the cable connection to the radio becomes easier. When programming is complete, reinstall the radio-tray assembly and replace and securely tighten the four 8⁄32-inch nuts.

STEP 5. Replace the ac line fuse located at the lower right corner of the gateway box. Reconnect the ac cable connector.

Replacing a Radio

Follow these steps to replace a radio in the gateway:

STEP 1. Disconnect the ac power cable connected to the bottom of the gateway and then disconnect the ac line fuse located at the lower right corner of the gateway box. See Figure 4 on page 11.

STEP 2. Remove the existing field-area network radio. See Figure 4 on page 11.

(a) Disconnect the power plug from its receptacle.

(b) As applicable, disconnect the Ethernet connector or the serial connector from the receptacles on the radio.

(c) Disconnect the antenna connector.

(d) Remove the radio from the mounting plate.

STEP 3. Install the new radio. Follow the procedure outlined in the "Installing a New Radio" section on page 11.

Note: S&C recommends the new radio be programmed before installation to match the configuration of the previous radio.

STEP 4. Replace the ac line fuse located at the lower right corner of the gateway box. Reconnect the ac cable connector.

Installing a New Battery

A backup battery to support the loss of control power and the **Gang Operation** feature, if specified, is furnished factory-installed in the communications gateway. For customers who initially choose not to have a backup battery, a backup battery system kit (903-002460-01) can be retrofitted to the communications gateway. See Figure 5 and Figure 6 on page 14.

Follow these steps to install the battery in the communications gateway:

STEP 1. Disconnect the ac power cable connected to the bottom of the gateway and then disconnect the ac line fuse located at the lower right corner of the gateway box.

STEP 2. Install the battery. The battery kit includes a battery, a top bracket, and hardware.

(a) The battery should be installed in the lower-middle section of the gateway.

(b) Install the battery using the two spring-loaded screws, with the connector facing outward on top.

(c) Install the top bracket using the four nuts.

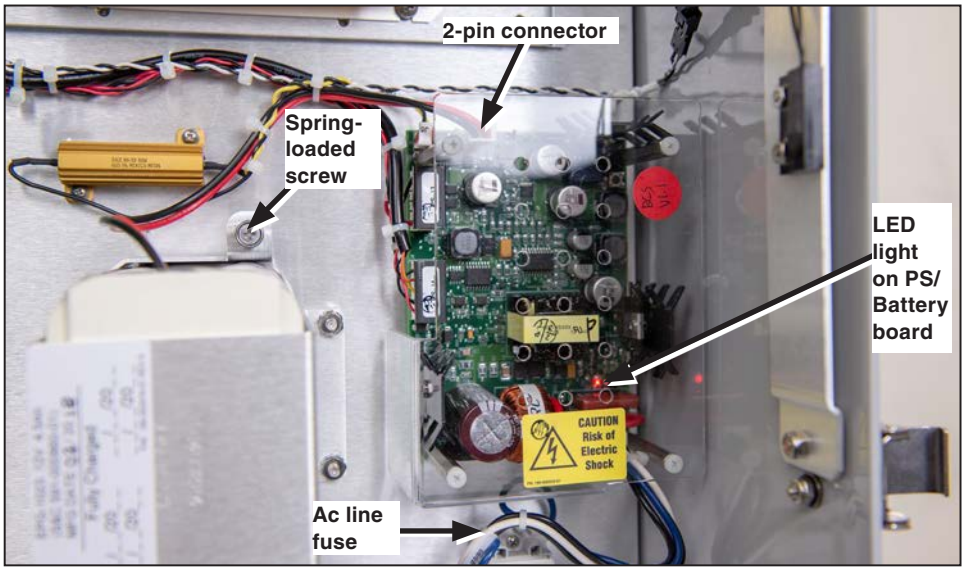


Figure 5. Disconnect the ac line fuse and install the battery.

STEP 3. Connect the battery. With the ac line fuse still removed, connect the red and black battery leads to the white 2-pin connector on the PS/Battery board. The acrylic safety cover over the PS/Battery board does not need to be removed to make this connection.

STEP 4. Replace the ac line fuse located at the lower right corner of the gateway box and leave the ac cable connector disconnected.

STEP 5. Check the LEDs on the green gateway controller. After a short delay, LEDs on the gateway controller should light up. This confirms the battery is functioning.

STEP 6. Reconnect the ac-cable connector.

Replacing a Battery

Follow these steps to replace a battery in the communications gateway:

STEP 1. Disconnect the ac power cable connected to the bottom of the gateway (See Figure 2 on page 9) and then disconnect the ac line fuse located at the lower right corner of the gateway box. See Figure 5 on page 13.

STEP 2. Remove the installed battery located in the bottom-middle section of the enclosure. See Figure 6.

(a) Disconnect the red and black battery leads from white 2-pin connector on the PS/Battery board. See Figure 5 on page 13.

(b) Unscrew the four nuts that hold the battery pack and top bracket in place.

(c) Loosen the two spring-loaded screws and remove the battery pack from the enclosure.

STEP 3. Install a new battery. Follow the procedure as outlined in the "Installing a New Battery" section on page 13.

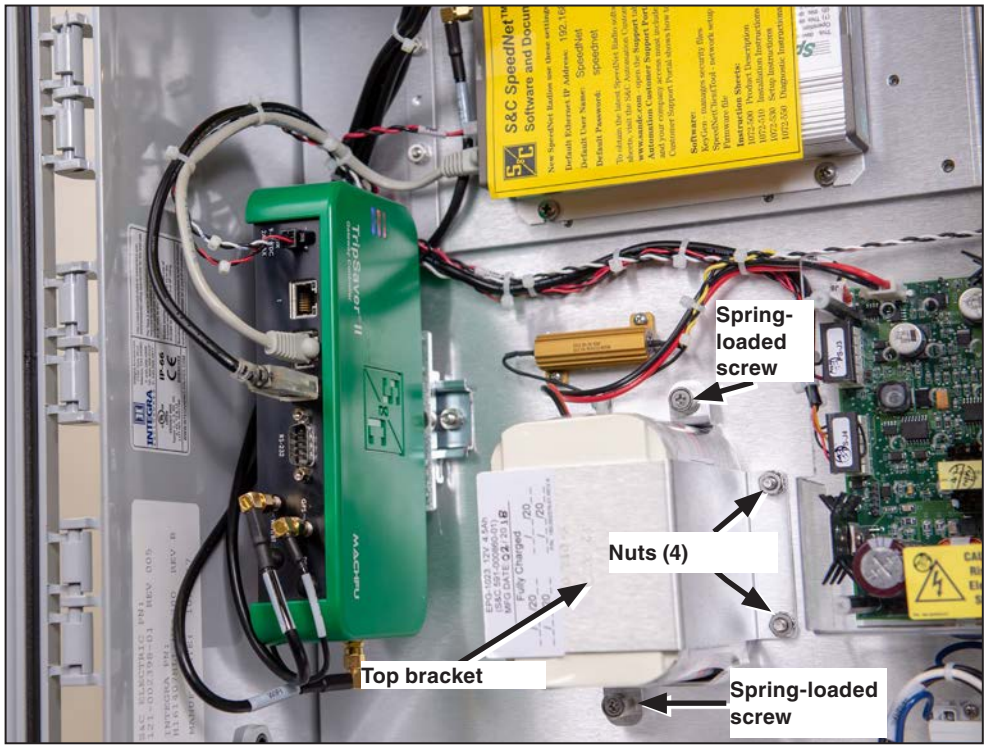


Figure 6. Battery installation.

Installing Remote Antenna Kit 903-002702-02/01

The 403- to 470-MHz, 2-dBi antenna kit includes an omnidirectional antenna with an N-male connector, pole mounting and bracket BM-1009, two pieces of shrink tubing, grounding kits for the LMR-400, and a weather-resistant cable tie. Also available are 40-foot (12.2-m) or 60-foot (18.3-m) coaxial cable-length options.

Follow these steps to install Remote Antenna Kit 903-002702-02/01:

STEP 1. Install the antenna on the antenna bracket with one U-bolt. The white antenna mast should be above the bracket, with only the brass base clamped in the bracket.

STEP 2. Attach the antenna bracket to the pole. The pole should not block the line of sight to other antennas.

STEP 3. Slip the supplied cold-shrink tube over the antenna cable and connect the end where the shrink tube was applied to the antenna. Tighten finger-tight.

STEP 4. Wrap the cable connector inside the antenna with one piece of vinyl mastic tape. Don't stretch excessively, and do not block the antenna drain holes. See Figure 7.

STEP 5. Apply the second piece of tape overlapping the end of the first piece and tightly cover the cable end of the connector.

STEP 6. Align the end of the cold-shrink tube flush with the bottom of the antenna and shrink it over the tape and cable.

Figure 7. Do not block antenna drain holes.

STEP 7. Tie-wrap the cable to the antenna bracket. Loop and secure any excess antenna cable near the pole. Use of a U-guard is recommended to protect the cables. Do not use staples. See Figure 8.

STEP 8. Slip a cold-shrink tube over the control end of the antenna cable and connect the cable to the surge suppressor at the bottom of communications gateway box. Waterproof this connector to industry standards.

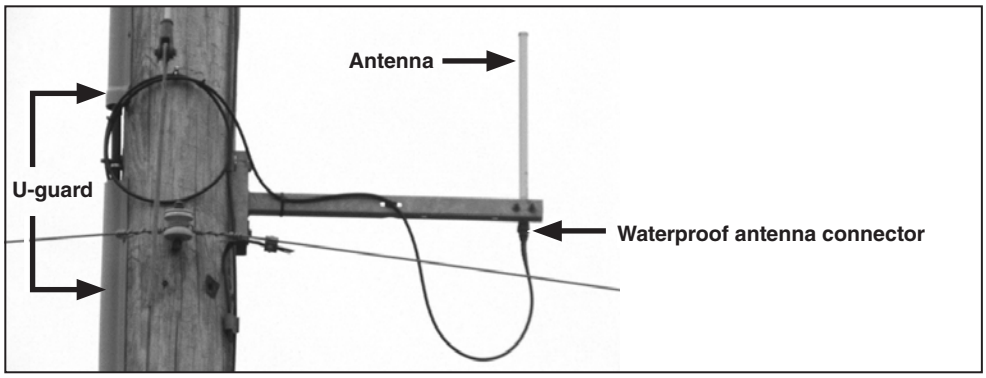


Figure 8. The remote antenna.

Installing Remote Antenna Kit 903-002701-01/02

The 890- to 960-MHz, 10-dBi antenna includes an omnidirectional Yagi antenna, a pole-mounted single antenna arm with 30-foot (9.1-m) or 50-foot (15.2-m) coaxial cable, and N-type male connectors on both ends. The customer must provide 1.375-inch (35-mm) OD pipe for the antenna.

Follow these steps to install Remote Antenna Kit 903-002701-01/02:

STEP 1. Install the antenna on the antenna bracket.

STEP 2. Attach the antenna bracket to the pole to the specified azimuth, per the network design. The pole should not block the line of sight to other antennas.

STEP 3. Slip the supplied cold-shrink tube over the antenna cable and connect the end where the shrink tube was applied to the antenna. Tighten finger-tight.

STEP 4. Wrap the cable connector inside the antenna with one piece of vinyl mastic tape. Don't stretch excessively, and do not block the antenna drain holes.

STEP 5. Apply the second piece of tape overlapping the end of the first piece and tightly cover the cable end of the connector.

STEP 6. Align the end of the cold-shrink tube flush with the bottom of the antenna and shrink it over the tape and cable.

STEP 7. Tie-wrap the cable to the antenna bracket. Loop and secure any excess antenna cable near the pole. Use of a U-guard is recommended to protect the cables. Do not use staples.

STEP 8. Slip a cold-shrink tube over the control end of the antenna cable and connect the cable to the surge suppressor at the bottom of communications gateway box. Waterproof this connector to industry standards.

Installing Remote Antenna Kit 903-002700-02/03

The 902- to 928-MHz, 3-dBi antenna includes an omnidirectional fiberglass antenna, a pole-mounted single antenna arm with 30-foot (9.1-m) or 50-foot (15.2-m) coaxial cable and N-type male connectors on both ends.

Follow these steps to install Remote Antenna Kit 903-002700-02/03:

STEP 1. Install the antenna on the antenna bracket with one U-bolt.

STEP 2. Attach the antenna bracket to the pole. The pole should not block the line of sight to other antennas.

STEP 3. Slip the supplied cold-shrink tube over the antenna cable and connect the end where the shrink tube was applied to the antenna. Tighten finger-tight.

STEP 4. Wrap the cable connector inside the antenna with one piece of vinyl mastic tape. Don't stretch excessively, and do not block the antenna drain holes.

STEP 5. Apply the second piece of tape overlapping the end of the first piece and tightly cover the cable end of the connector.

STEP 6. Align the end of the cold-shrink tube flush with the bottom of the antenna and shrink it over the tape and cable.

STEP 7. Tie-wrap the cable to the antenna bracket. Loop and secure any excess antenna cable near the pole. Use of a U-guard is recommended to protect the cables. Do not use staples.

STEP 8. Slip a cold-shrink tube over the control end of the antenna cable and connect the cable to the surge suppressor at the bottom of communications gateway box. Waterproof this connector to industry standards.

Installing Local Antenna 904-002450-02

The 403- to 470-MHz, 2-dBi antenna includes an omnidirectional antenna with an N-type male connector.

STEP 1. Remove the protection cap attached to the antenna connector terminal at the bottom of the communications gateway box.

STEP 2. Screw in the antenna to the N-type female connector.

STEP 3. Waterproof the connector to industry standards.

Replacing a Local Antenna

STEP 1. Visually inspect the antenna for damage (bent, not vertical).

STEP 2. If it needs to be replaced, remove any waterproofing material around the connector.

STEP 3. Unscrew the antenna.

STEP 4. Check to ensure the connector channel is clear.

STEP 5. Follow the procedure outlined in the previous "Installing Local Antenna" section.

Software User's Guide

Logging on to the Communications Gateway

The communications gateway is accessed via a Web browser interface. Connect a personal computer (PC) with a CAT5 Ethernet cable to the communications gateway's Ethernet Port 1. See Figure 4 on page 11. The default configuration of the communications gateway's IP gateway is 192.168.1.1 with DHCP set as "On." To join the communications gateway network, set the PC's network address to "Obtain an IP Address Automatically" and "Obtain DNS Server Address Automatically" under the PC's LAN address settings to enable a network connection to the communications gateway. Alternately, a static IP address within the 192.168.1.x network may be used. See Figure 9.

Note: To remove Windows routing conflicts, S&C recommends turning the PC's Wi-Fi radio off.

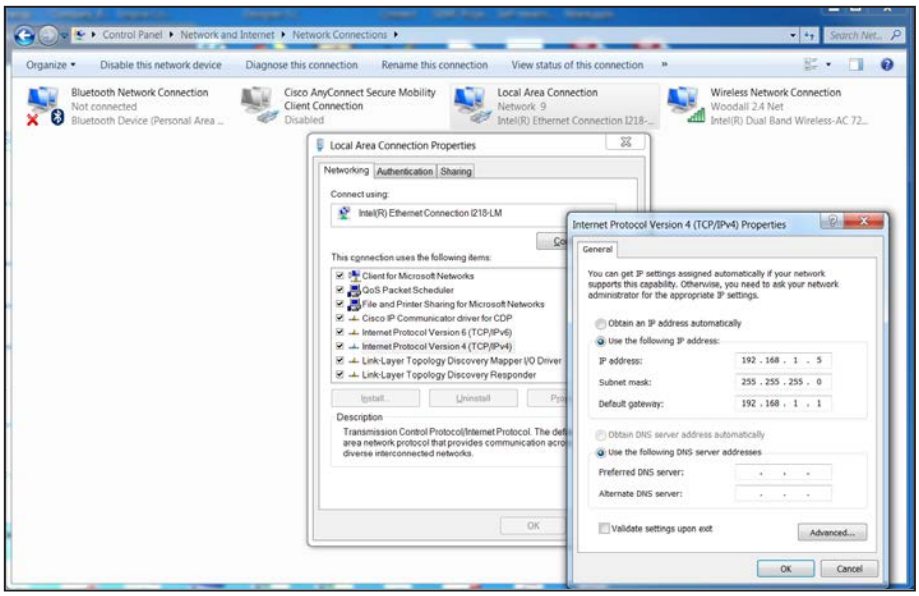


Figure 9. Setting a static IP address on the PC to connect to the communications gateway.

After allowing approximately 3 minutes for the gateway to boot, a confirmation the PC has successfully joined the communications gateway network may be observed by launching an MSDOS command window and running 'ipconfig /all' at the command prompt. An output showing all the IP interfaces for the host system will be displayed. Identify the Ethernet interface that has the cabled connection to communications gateway Ethernet Port 1 and examine the output for that interface. Screen information for the interface supporting a successful connection when using DHCP will resemble what's shown in Figure 10.

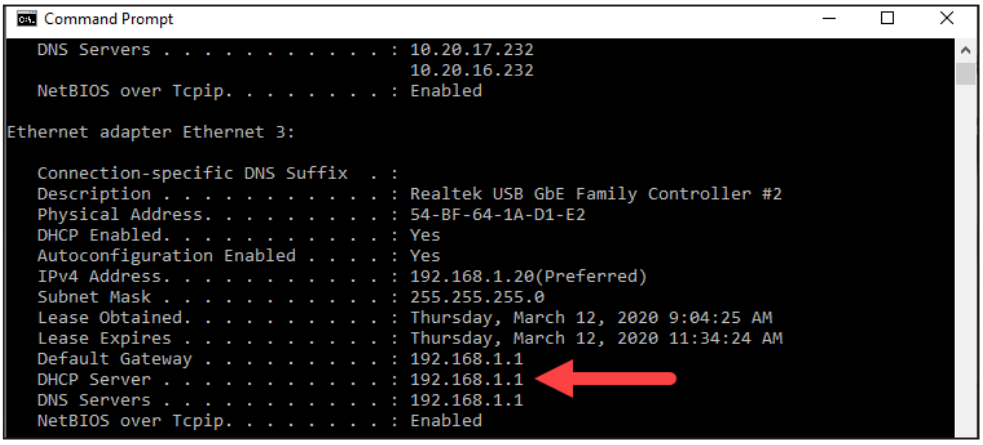


Figure 10. A successful ipconfig/all reply from the Command prompt.

Note: If the interface indicates "media disconnected," this is an indication the Ethernet connection between the host PC and the communications gateway is not functional, and it should be investigated.

NOTICE

Because the end user can change the IP address range, or even disable DHCP completely and change the communications gateway to a static IP address, it is important to make a note of any IP settings changes. When relocating or setting up a communications gateway that has had its IP settings changed, look for the IP setting configured by your service or IT department when running ipconfig/all from the MSDOS command line.

With the CAT5 Ethernet cable attached to communications gateway's Ethernet Port 1, launch a Web browser on the PC. Type 192.168.1.1 in the browser's address line. (Browsers supported include Google Chrome, Internet Explorer, and Microsoft Edge.) The *Communications Gateway Login* screen will open with a username and password challenge. See Figure 11.

Note: The default username and password can be requested from S&C by calling the Global Support and Monitoring Center at 888-762-1100 or by contacting S&C through the S&C Customer Portal at **sandc.com/en/support/sc-customer-portal/**.

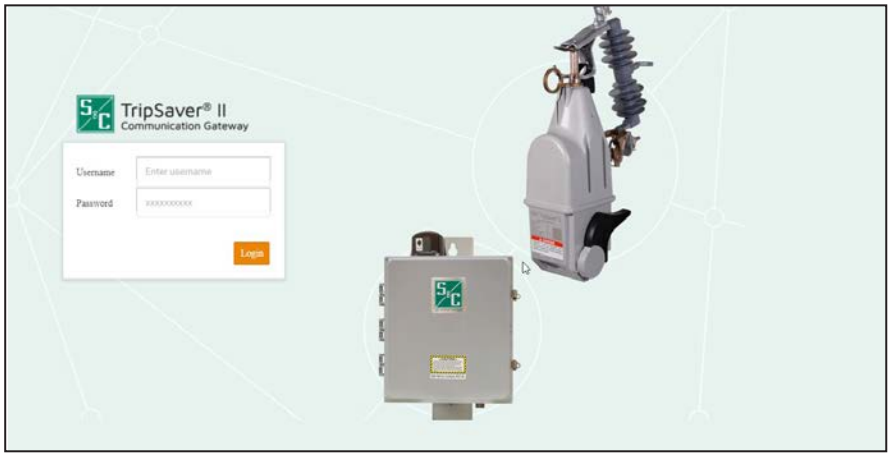


Figure 11. The *Communications Gateway Login* screen.

When logging in for the first time, users will be sent to the *Profile* screen and be prompted to change the default password.

NOTICE

With communications gateway firmware version 3.1 and later, the default password for the admin user must be changed before proceeding. See Figure 12. The new non-default password must be at least eight characters with at least one uppercase and one lowercase character. Numbers and special characters are also allowed but not required. <Space>, <Tab>, and <&> characters are not allowed. Do not lose this password. There is no way to recover a lost password in the field. A lost password will require returning the gateway controller module to S&C for re-initialization.

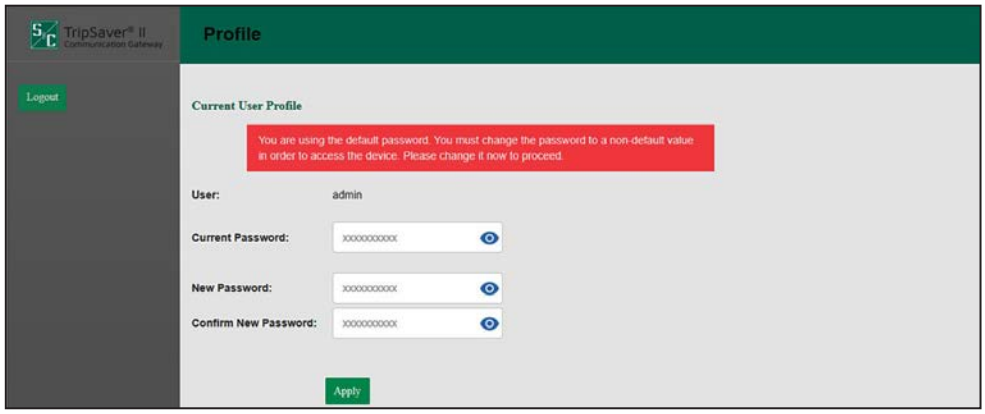


Figure 12. The *Profile* screen for changing the default password.

After a successful login, the browser will open to the communications gateway General Status screen with an application Navigation menu on the left side of the screen. The Navigation menu will remain visible for all subordinate menu interface screens. See Figure 15 on page 24.

Enabling IEC 60870-5-104 Communication Protocol in the Communications Gateway

The communications gateway is shipped configured to use the DNP3 communication protocol by default. Before starting to configure the communications gateway, S&C recommends first switching to the IEC 60870-5-104, or "IEC104," protocol. To switch to the IEC104 protocol:

STEP 1. Select "Gateway Settings" from the **Navigation** menu.

STEP 2. Scroll down to the SCADA Protocol panel. Click on the **IEC104** radio button. See Figure 13.

STEP 3. Scroll up to the top of the screen and click the **Save** button.

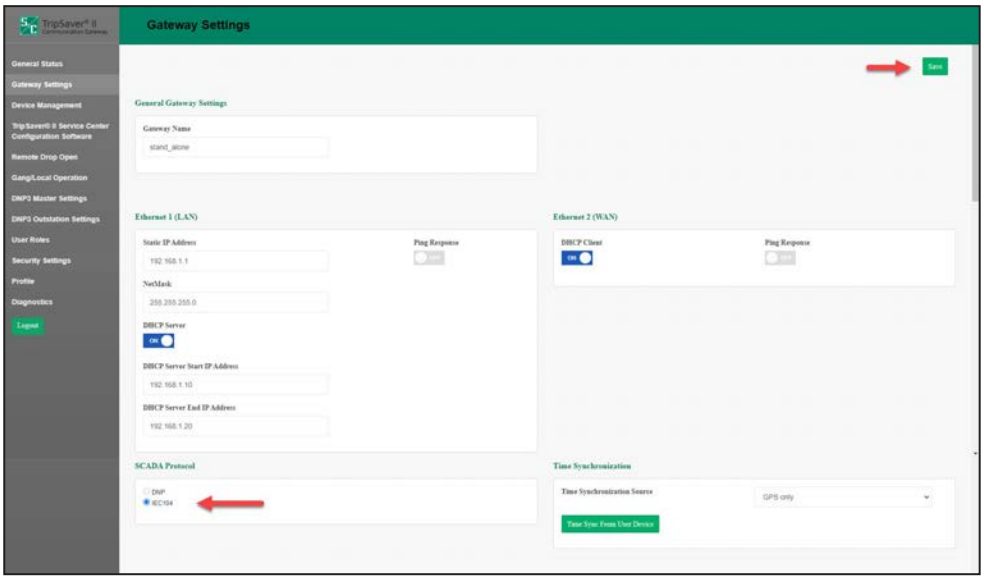


Figure 13. The IEC104 Protocol panel and Save button.

A success message will display, and the **IEC104 Setpoints**, **IEC104 Controlling Station**, and **IEC104 Controlled Station** menu items will show on the menu bar. See Figure 14.

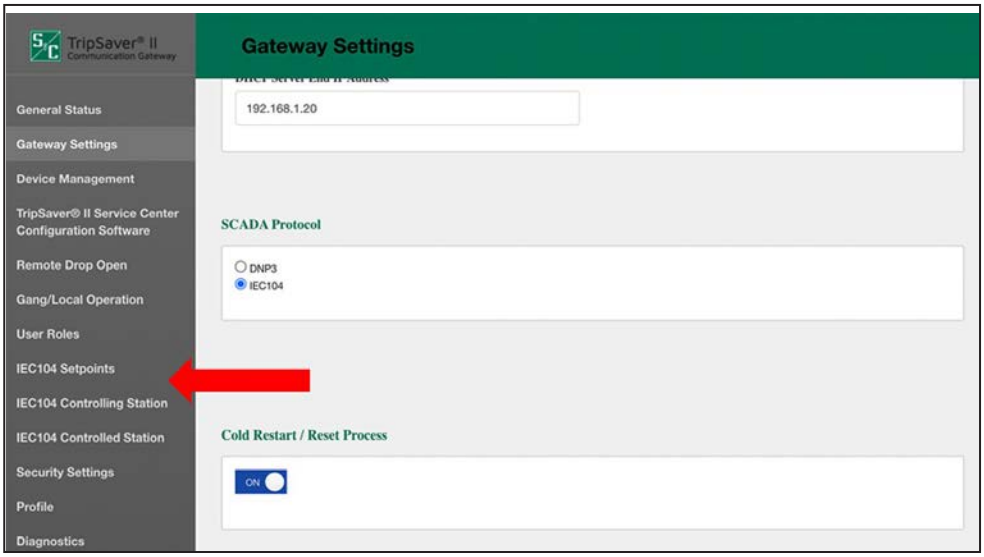


Figure 14. IEC104 enabled.

General Status

NOTICE

Simultaneous access to the Web-user interface by multiple users is not officially supported. If it is desired to have multiple users logged in simultaneously, S&C strongly recommends only one of those users be assigned the admin role. S&C also strongly recommends only one of those users modify settings on the gateway. The other users should be performing read-only activities. Also, if two users are sharing a single username and the users attempt to log in at the same time, the older session will be silently logged out.

The purpose of the *General Status* screen is informational and for display only. No edits are allowed. Field edits are permitted under respective menu sections where each field's purpose is defined.

The *General Status* screen is comprised of the "Gateway Identity," "GPS," "Gateway LAN," "Gateway WAN," "Gateway Hardware," and "SCADA Communication" panels. The "Gateway Identity" panel contains five fields: **Gateway Name**, **Gateway Serial #**, **Gateway Software Version**, **Gateway App Version**, and **Gateway Platform Version**. The "GPS" panel contains five fields: **Status**, **Time Since Last GPS Fix**, **Location**, **Satellites (In Use)**, and **System Time**. The "Gateway LAN" and "Gateway WAN" panels contain three fields each: **Link Status**, **IP Address**, and **Netmask**. The "Gateway Hardware" panel contains four fields: **Battery Present**, **Battery Health**, **Battery Voltage (Volts)**, and **Door Status**. The "SCADA Communication" panel contains the **IEC 104 Communication Status** field. See Figure 15.

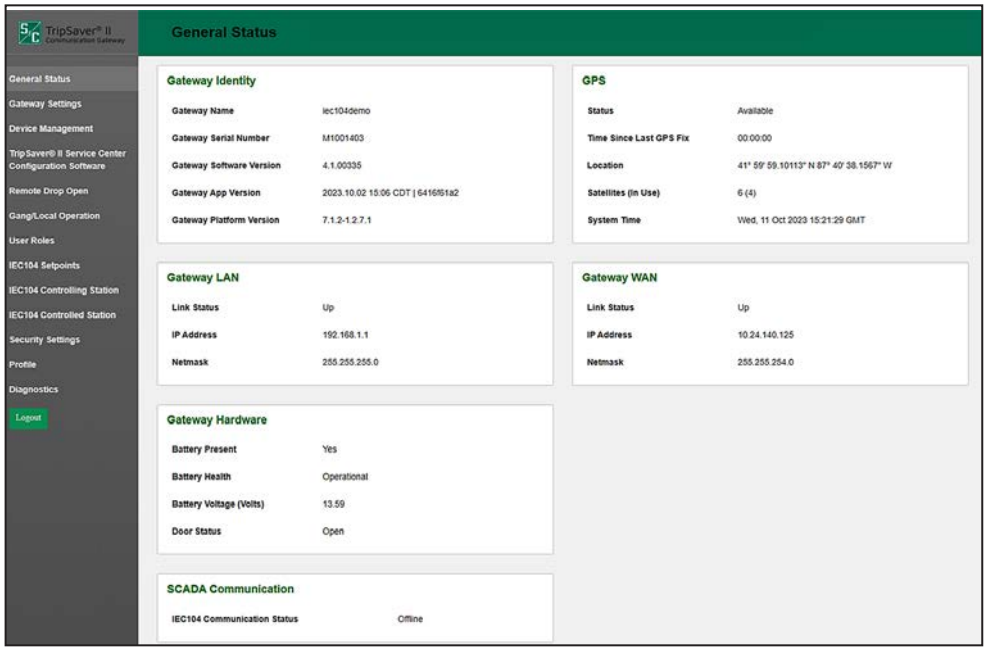


Figure 15. The *General Status* screen.

Gateway Settings

The *Gateway Settings* screen contains the "General Gateway Settings," "Ethernet 1 (LAN)," "Ethernet 2 (WAN)," "SCADA Protocol," "Time Synchronization," "Gateway Configuration," "Firmware Upgrade," "Reboot Gateway," and "Ping Station" panels.

Note: For all field edits within each menu, the Save button must be clicked on for field modifications to occur. See Figure 16.

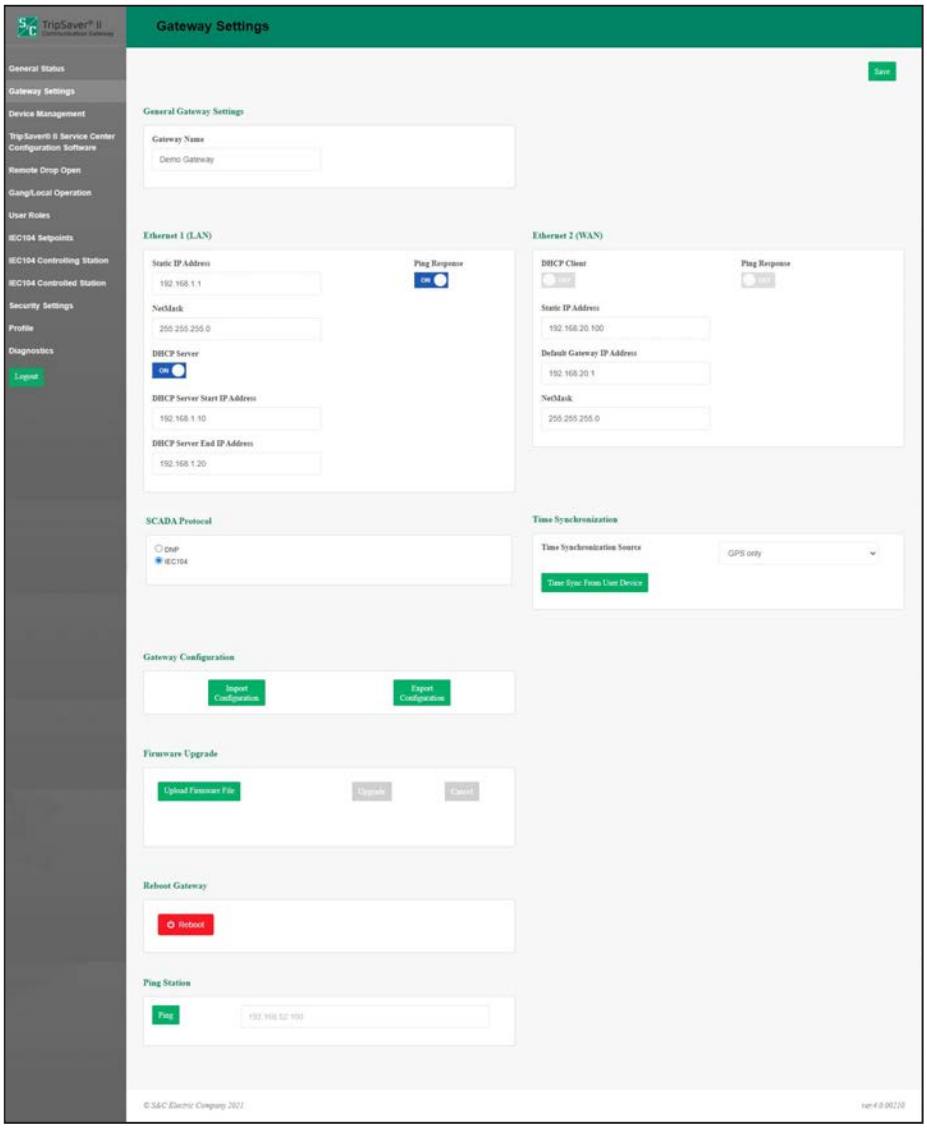


Figure 16. The *Gateway Settings* screen.

General Gateway Settings

The "General Gateway Settings" panel contains the **Gateway Name** field that allows unique naming of the communications gateway.

Enter a user-defined name for the communications gateway and click on the **Save** button. Naming of the communications gateway is limited to 50 characters. S&C recommends an intuitive naming convention for the communications gateways. See Figure 17.

Figure 17. The Gateway Name field in the "General Gateway Settings" panel.

Ethernet 1 (LAN)

In the "Ethernet 1 (LAN)" panel, the network associated with the communications gateway local area network (LAN) is defined for management devices connecting to physical Ethernet Port 1. See Figure 18. As noted earlier, the communications gateway ships with a default IP address of 192.168.1.1, a NetMask equal to 255.255.255.0, and DHCP set to "On." To modify these values for the communications gateway LAN, the **Static IP Address**, **NetMask**, and **DHCP Server** fields require identification.

Note: The **DHCP** toggle button either enables or disables dynamic host control protocol (DHCP) services on physical Ethernet Port 1.

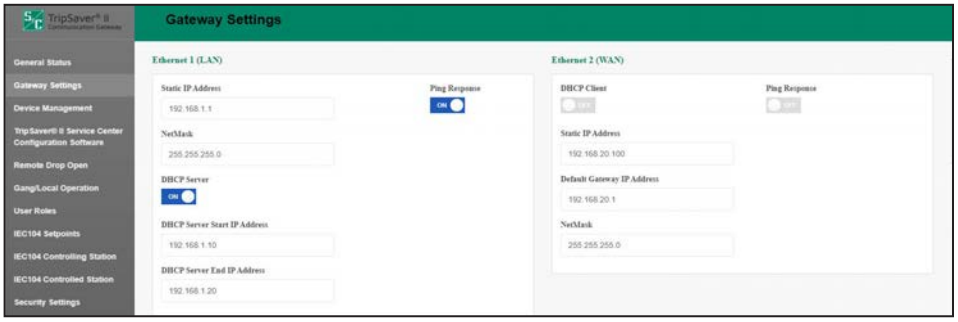


Figure 18. The "Ethernet 1 (LAN)" panel.

The fields required within this panel are determined by the **DHCP** button toggled to the **On** or **Off** positions. With **DHCP** in the **Off** position, management devices connected to communications gateway's physical Port 1 must be configured with a static IP address that resides in the communications gateway's LAN IP range identified by the **NetMask** setting in the previous field.

With **DHCP** in the **On** position, management devices connected to the communications gateway's physical Port 1 will be assigned an IP address from the specified IP range determined by the **DHCP Server Start IP Address** and **DHCP Server End IP Address** fields. Also included is a **Ping Response** toggle button. Toggling this button to the **On** position will make the gateway responsive to a ping command. This toggle button is in the **Off** position by default.

Ethernet 2 (WAN)

The "Ethernet 2 (WAN)" panel defines the IP addressing for the communications gateway's Ethernet Port 2 and subsequent network linkage and settings respective to the customer's legacy back-haul WAN network. See Figure 19.

Note: The use of these fields is for WANs that use Ethernet as a back-haul transport protocol. When the user uses serial back-haul networks or does not have a WAN, this panel will not require entries.

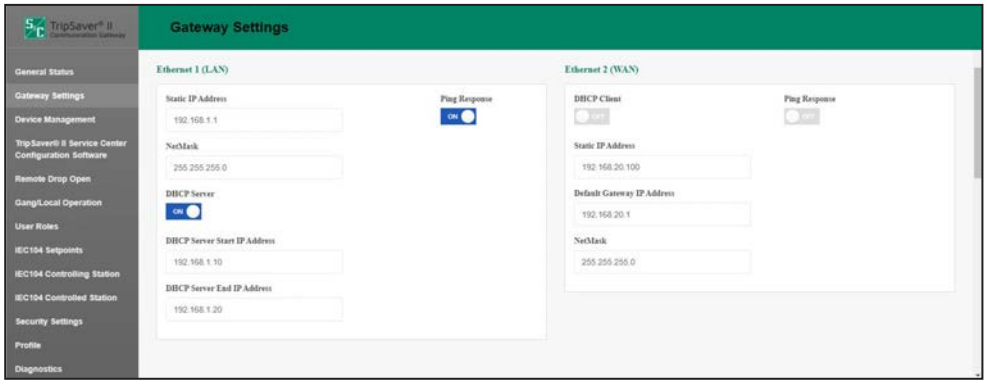


Figure 19. The Ethernet 2 (WAN) fields.

DHCP State 'Off'

Three fields require identification: **Static IP Address**, **Default Gateway IP Address**, and **NetMask**. The **Static IP Address** field is the WAN IP address assigned to the communications gateway. The **Default Gateway IP Address** field is the address of the network device "up-stream" of the communications gateway via Ethernet Port 2. All IEC104 traffic sent to the IEC104 controlling station will be routed through this default gateway.

DHCP State 'On'

No fields require identification. The communications gateway will initiate a DHCP request to the WAN's DHCP server, which will assign an IP address for all data communications over the WAN. See Figure 20.

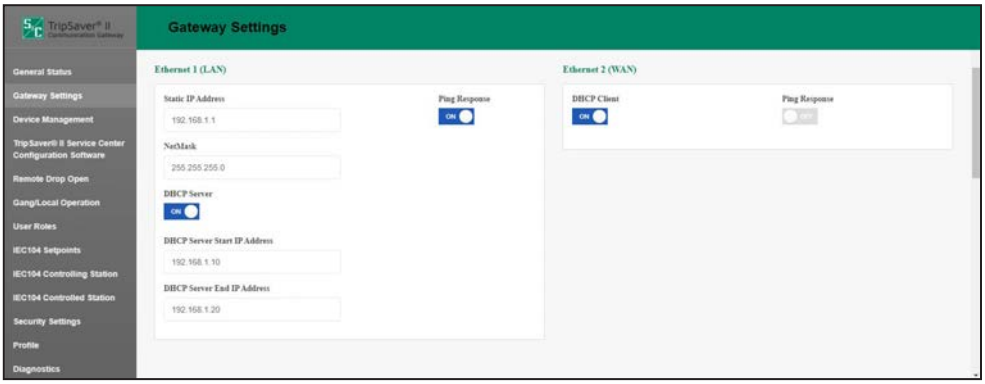


Figure 20. The Ethernet 2 (WAN) fields with DHCP set to the On position.

Note: For both the **DHCP On** and **Off** states, the **Ping Response** toggle button when toggled to the **On** position will make the gateway responsive to a ping command. This toggle button is in the **Off** position by default. Scroll up and click on the **Save** button to make changes.

SCADA Protocol

The communications gateway supports the use of the IEC 60870-5-104 protocol, or "IEC104" protocol, which is a separate communications protocol to the **DNP3** protocol the communications gateway uses by default. To switch to the **IEC104** protocol, select the **IEC104** radio button and then click on the **Save** button. To switch back to DNP3, select the **DNP3** radio button and then click on the **Save** button. Instructions can also be found in the "Enabling IEC 60870-5-104 Communication Protocol in the Communications Gateway" section on page 23. See Figure 21.

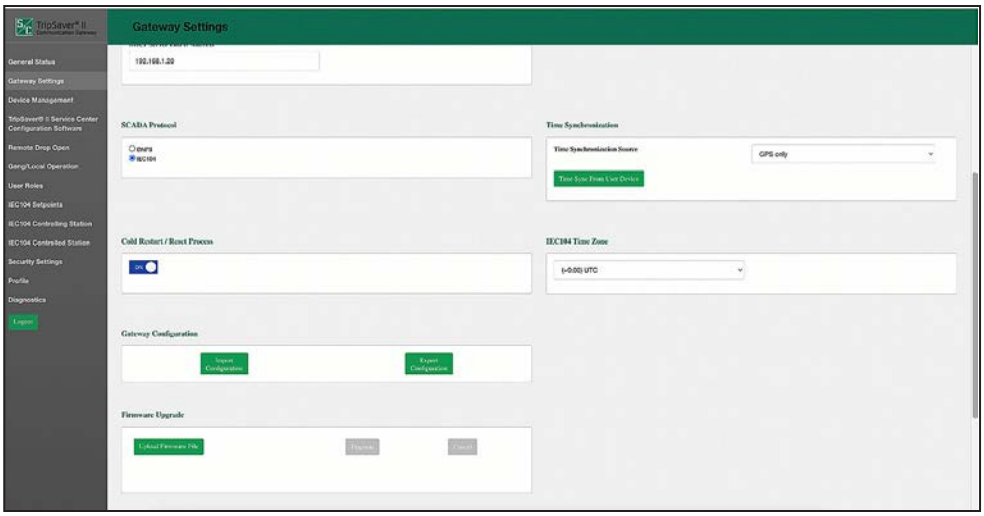


Figure 21. The SCADA protocol selection.

Note: Instructions for configuring the communications gateway using the DNP3 protocol (including the **DNP3 Cold Restart/Reset** feature) are located in S&C Instruction Sheet 461-509, "TripSaver® II Cutout-Mounted Recloser; Communications via Gateway using the DNP3 Protocol: *Installation*, *Operation*, *and Configuration*."

Note: When enabling or disabling the IEC104 protocol, if the settings have already been made with the communications gateway set to the DNP3 protocol, those settings will not be lost when the user switches to the IEC104 protocol and vice versa.

Time Synchronization

The communications gateway supports three primary methods of time synchronization: "GPS only," "SCADA only," and "GPS Primary, SCADA backup." Select the desired option from the **Time Synchronization Source** drop-down menu and click on the **Save** button.

The communications gateway also supports a fourth method of time synchronization. To perform a one-time synchronization from the user's computer accessing this Web interface, click on the **Time Sync From User Device** button. This will immediately sync the gateway's clock to the time in the user's computer. After this one-time synchronization, the gateway will continue to use its configured **Time Synchronization Source** setting to maintain its clock in the future. This option could be useful for lab purposes or for initial system deployment. See Figure 22.

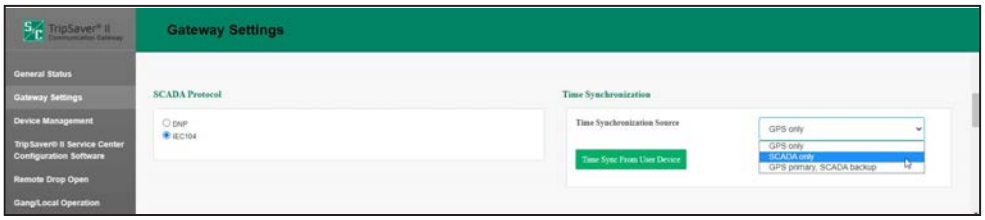


Figure 22. The "Time Synchronization" panel.

IEC 104 Time Zone

The drop\down **IEC 104 Timezone** field that allows a user to select the local time zone so it can be synchronized with whatever the SCADA time is set for **Single/Double** commands and spontaneous transmission events.

Time Synchronization Source and IEC 104 Time Zone Configuration Options

Table 1 identifies the recommended **Time Synchronization Source** and **IEC 104 Time Zone** settings when the SCADA master is providing timestamps using local time.

Table 1. Time Synchronization Settings Options

No.	Time Synchronization Source	IEC 104 Time Zone	Comments
1	GPS only	Local Time Zone	Recommended
2	SCADA only	(+0.00) UTC	Recommended
3	GPS Primary, SCADA Backup	Any	Not recommended
4	SCADA only	Any	Not recommended

When using option 3 or 4, the TripSaver II Communications Gateway could experience a high number of reboots because of a large time-synchronization delta. As such, these configuration options are not recommended.

When the SCADA master is providing timestamps using UTC time, the **IEC104 Time Zone** field must be configured as "(+0.00) UTC" to prevent rejection of **Single/Double** commands.

Gateway Configuration

The communications gateway supports a capability to perform bulk imports and exports of certain configuration data parameters. The communications gateway will use the same XML file format for both **Import** and **Export** functions. This will allow a user to configure settings in one communications gateway device, export those settings into an XML file, and then import the same settings into another communications gateway. Selecting either the **Import Configuration** or **Export Configuration** option invokes a series of dialog boxes allowing PC navigation to a configuration file for "Import" or the saving of a file for "Export." See Figure 23.

Note: When the IEC104 protocol is enabled, the export file will include all IEC104 settings and exclude all DNP3 settings. If DNP3 protocol is enabled, the export file will include all DNP3 settings and exclude all IEC104 settings.

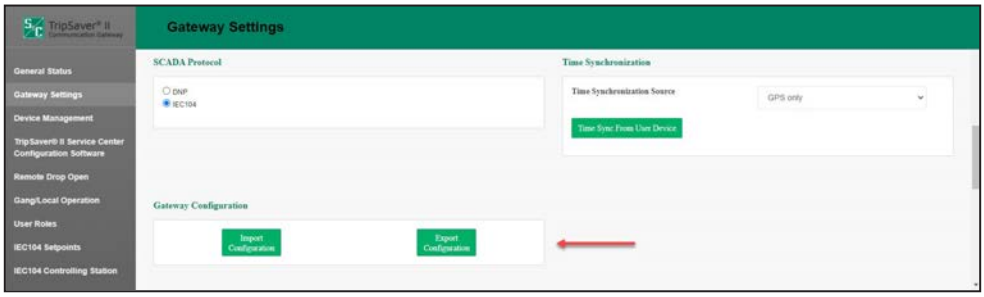


Figure 23. The Import Configuration and Export Configuration buttons.

XML File Description

The XML file format is split into two sections. The first section is encapsulated by <ConfigDB> and <configuration> tags. Each item in this section is a simple name/value pair, for example:

```
<ConfigDB>
    <configuration>
        <item value="True" name="gangOperationEnabled"/>
    </configuration>
</ConfigDB>
```

where name="gangOperationEnabled" represents the communications gateway's **Gang Operation** feature, and the associated value="True" indicates the feature is to be enabled. The list of parameters that can be included in the <ConfigDB> section of the XML is detailed in Table 2.

Table 2. Import and Export ConfigDB Parameters

Name	Description	Data Type of Value	Range of Value
IECtoggle	This setting enables the IEC 60870-5-104 protocol for SCADA communication. When set to "True," the gateway communicates via IEC 60870-5-104. When set to "False," the gateway communicates via the alternate DNP3 protocol (not defined in this specification).	Boolean	True or False
timeSyncSource	This setting defines the preferred time synchronization source(s) for the gateway. "gps" indicates the device will only rely on GPS for time synchronization. "scada" indicates the device will only rely on the IEC 104 interface for time synchronization. "gpsScada" indicates the device will use GPS as its highest priority time source but use IEC 104 as a backup if GPS is not available.	String	gps, scada, or gpsScada
devicename	User-specified device name. See the **Gateway Name** field in Figure 17 on page 26.	String	n/a
gangOperationEnabled	This setting disables the **Gang Operation** feature in the gateway, independent of the individual settings for the TripSaver II recloser. When set to "True," the **Gang Operation** feature is enabled and will operate according to the settings defined on the **Gang/Local** tab for each TripSaver II recloser. When set to "False," the **Gang Operation** feature will not operate.	Boolean	True or False
gangOperationMaxRetries	The maximum number of times the gateway will retry a **Gang** operation after timing out in its initial attempt. Used with gangOperationRetryTime. A value of zero (0) disables the **Gang** operation retry mechanism.	Integer	0 – 2592000
gangOperationRetryTime	The time interval between **Gang** operation retry attempts in seconds.	Integer	1 – 3600
enableSingleUnitOperation	This setting enables or disables the single-unit **Drop Open** feature in the gateway, independent of the individual settings for the TripSaver II recloser. When set to "True," the singe-unit **Local Drop Open** feature is enabled and will operate according to the settings defined on the **Gang/Local** tab for each TripSaver II recloser. When set to "False," the **Single Unit Operation** feature will not operate.	Binary	True or False
RemoteDropOpenEnabled	This setting enables or disables the **Remote Drop Open** feature in the gateway, independent of the individual settings for the TripSaver II recloser. When set to "True," the **Remote Drop Open** feature is enabled and will operate according to the settings defined on the **Gang/Local** tab for each TripSaver II recloser. When set to "False," the **Remote Drop Open** feature will not operate.	Binary	True or False

The second section in the XML file format is encapsulated by <IEC104> tags. This contains all the IEC104 related settings, for example:

```
<IEC104>
  <SinglePoints>
    <singlepoint eventsEnabled="1" periodicReportingEnabled="1" interrogationGroup="6" ioa="10000" codeDescription="9"/>
    <singlepoint eventsEnabled="0" periodicReportingEnabled="1" interrogationGroup="0" ioa="10001" codeDescription="4"/>
  </SinglePoints>
</IEC104>
```

The configuration settings that can be specified in this section of the document are described in Table 3.

Table 3. Import and Export Settings Configuration

Parameter Group	Attribute	Description	Data Type	Range of Value
<ControllingStations> <controllingStation/> </ControllingStations>	ipAddress	IP address of the IEC 104 controlling station. One or two IP addresses can be configured. One address is required to establish IEC 104 communication. The gateway will only allow communication with a configured address.	IP address (dotted decimal)	Any valid IP address
<ControlledStation> <controlledstation/> </ControlledStation>	maxAllowableCommandDelay	Maximum allowable time difference, in seconds, between the timestamp received in an **IEC 104** command with time and the present gateway system time when the command is received.	Integer	1 to 60
	measuredValuePollingInterval	Time interval between periodic refreshes of measured value setpoints.	Integer	15 to 300
	periodicReportingInterval	Time interval between periodic reports for any setpoints configured for periodic reporting.	Integer	15 to 3600
	backgroundReportingInterval	Time interval between background reports for any setpoints configured for background reporting.	Integer	60 to 14400
	commonAddress	ASDU common address of gateway.	Integer	1 to 65534
	w	Maximum number of IEC 104 APDUs in the receive direction before the gateway will send an acknowledgement.	Integer	1 to 32767
	k	Maximum number of IEC 104 APDUs in the transmit direction before the gateway will wait for an acknowledgement.	Integer	1 to 32767
	t1	Timeout for unconfirmed APDUs in the transmit direction.	Integer	1 to 255
	t2	Timeout to send acknowledgment in receive direction.	Integer	1 to 255
	t3	Timeout for sending test frames on an idle connection.	Integer	1 to 172800
<SinglePoints> <singlePoint/> </SinglePoints>	ioa	Information Object Address for this setpoint. Integer value starting at 10000.	Integer	10000 to 19999
	codeDescription	Integer value referring to the setpoint code description defined in S&C Instruction Sheet 461-561.	Integer	Valid values defined in 461-561.
	eventsEnabled	Indicates whether the gateway will report spontaneous events for this setpoint when the value changes. A value of “1” enables events. A value of “0” disables events.	Integer	0 or 1
	backgroundReportingEnabled	Indicates whether the gateway will include this setpoint in its periodic reports. A value of “1” enables periodic reporting. A value of “0” disables periodic reporting.	Integer	0 or 1
	interrogationGroup	Defines the interrogation group that will include this setpoint. When this is set to a value of “0,” this setpoint will only be reported as part of overall station interrogation. When this is set to a value of between “1” and “16,” this setpoint will be reported as part of overall station interrogation and as part of the specified interrogation group.	Integer	0 to 16

TABLE CONTINUED ►

Table 3. Import and Export Settings Configuration - Continued

Parameter Group	Attribute	Description	Data Type	Range of Value
<DoublePoints> <doublePoint/> </DoublePoints>	ioa	Information Object Address for this setpoint. Integer value starting at 20000.	Integer	20000 to 29999
	codeDescription	Integer value referring to the setpoint code description defined in S&C Instruction Sheet 461-561.	Integer	Valid values defined in 461-561.
	eventsEnabled	Indicates whether the gateway will report spontaneous events for this setpoint when the value changes. A value of “1” enables events. A value of “0” disables events.	Integer	0 or 1
	backgroundReportingEnabled	Indicates whether the gateway will include this setpoint in its periodic reports. A value of “1” enables periodic reporting. A value of “0” disables periodic reporting.	Integer	0 or 1
	interrogationGroup	Defines the interrogation group that will include this setpoint. When this is set to a value of “0,” this setpoint will only be reported as part of overall station interrogation. When this is set to a value of between “1” and “16,” this setpoint will be reported as part of overall station interrogation and as part of the specified interrogation group.	Integer	0 to 16
<MeasuredValues> <measuredValue/> </MeasuredValues>	ioa	Information Object Address for this setpoint. Integer value starting at 30000.	Integer	30000 to 39999
	codeDescription	Integer value referring to the setpoint code description defined in S&C Instruction Sheet 461-561.	Integer	Valid values defined in 461-561.
	scaling	Floating point scaling factor. Will be applied as a multiplication factor to the raw setpoint measurement before it is sent to the controlling station.	Float	0.001 to 1000
	fixedDeadband	Fixed deadband interval used to determine when to send a spontaneous event for the measured value setpoint. When the scaled setpoint value changes by the fixed deadband amount, the gateway sends a spontaneous event. A value of 0 (zero) disables fixed deadband checking.	Integer	0 to 50000
	percentDeadband	Percent deadband interval used to determine when to send a spontaneous event for the measured value setpoint. When the scaled setpoint value changes by the percent deadband amount, the gateway sends a spontaneous event. A value of 0 (zero) disables percent deadband checking.	Integer	0 to 99
	periodicReportingEnabled	Indicates whether the gateway will include this setpoint in its periodic reports. A value of “1” enables periodic reporting. A value of “0” disables periodic reporting.	Integer	0 or 1
	interrogationGroup	Defines the interrogation group that will include this setpoint. When this is set to a value of “0,” this setpoint will only be reported as part of overall station interrogation. When this is set to a value of between “1” and “16,” this setpoint will be reported as part of overall station interrogation and as part of the specified interrogation group.	Integer	0 to 16

TABLE CONTINUED ►

Table 3. Import and Export Settings Configuration - Continued

Parameter Group	Attribute	Description	Data Type	Range of Value
<SingleCommands> <singlecommand/> </SingleCommands>	ioa	Information Object Address for this setpoint. Integer value starting at 40000.	Integer	40000 to 49999
	codeDescription	Integer value referring to the setpoint code description defined in S&C Instruction Sheet 461-561.	Integer	Valid values defined in 461-561.
	retryBehavior	Indicates whether the gateway must retry the command when unsuccessful. A value of “0” enables retries. A value of “1” disables retries.	Integer	0 or 1
	maxRetryAttempts	The maximum number of times the command will be retried.	Integer	1 to 2,592,000
	retryInterval	Time in seconds between retry attempts.	Integer	1 to 3600
<DoubleCommands> <doublecommand/> </DoubleCommands>	ioa	Information Object Address for this setpoint. Integer value starting at 50000.	Integer	50000 to 59999
	codeDescription	Integer value referring to the setpoint code description defined in S&C Instruction Sheet 461-561.	Integer	Valid values defined in 461-561.
	retryBehavior	Indicates whether the gateway must retry the command when unsuccessful. A value of “0” enables retries. A value of “1” disables retries.	Integer	0 or 1
	maxRetryAttempts	The maximum number of times the command will be retried.	Integer	1 to 2,592,000
	retryInterval	Time in seconds between retry attempts.	Integer	1 to 3600

Import Configuration

Follow these steps to complete the **Import Configuration** function. See Figures 24 and 25.

STEP 1. Under the "Gateway Configuration" panel, click on the **Import Configuration** button. A dialog box appears.

STEP 2. Click on the **Browse** button, which invokes a Windows file navigation box.

STEP 3. Navigate to the file.

STEP 4. Highlight the file and click on the **Open** button. The highlighted file will then be identified in the dialog box.

STEP 5. Click on the **Import** button.

STEP 6. Click on the **Save** button.

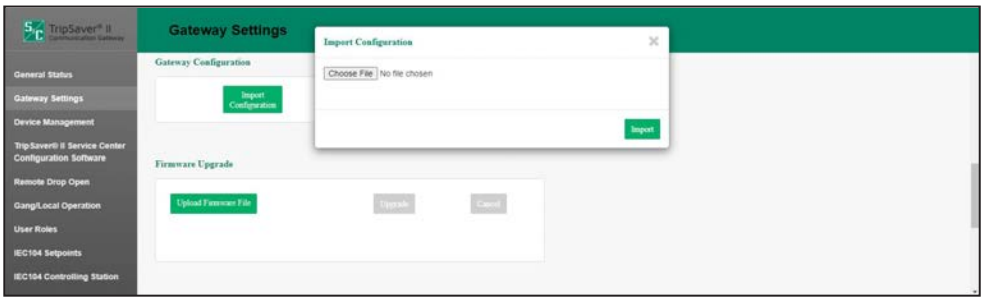


Figure 24. The Import Configuration dialog box.

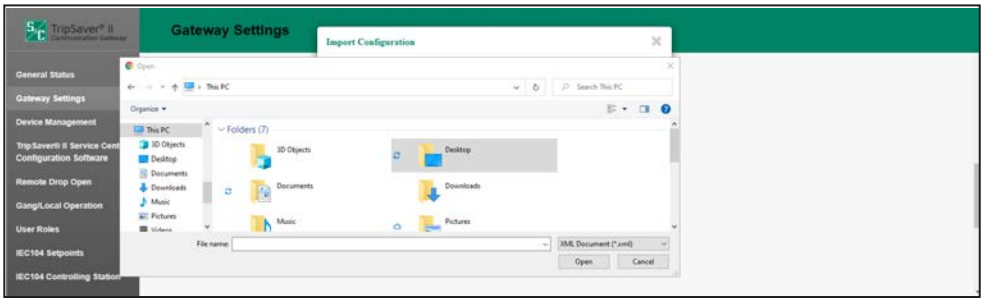


Figure 25. Import file navigation.

Export Configuration

Follow these steps to complete the **Export Configuration** function. See Figures 26 and 27.

STEP 1. On the "Gateway Configuration" panel, click on the **Export Configuration** button. A dialog box appears with a suggested filename for the exported configuration. The default name is "textFile" but can be changed.

STEP 2. Click on the **Export** button.

STEP 3. Wait a few seconds for the exported file to appear in your browser. The file will be stored in the Downloads folder

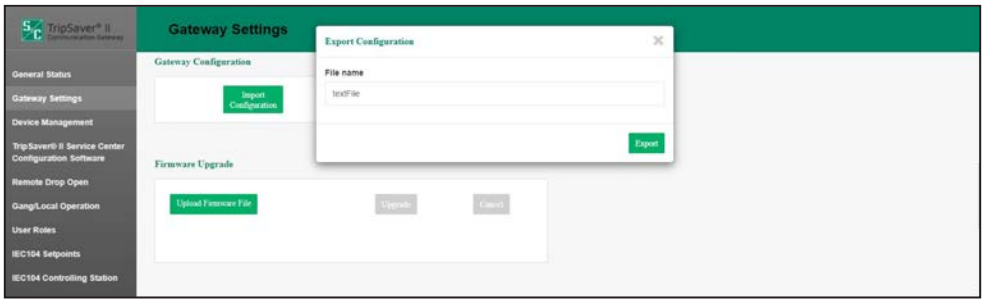


Figure 26. The Export Configuration dialog box.

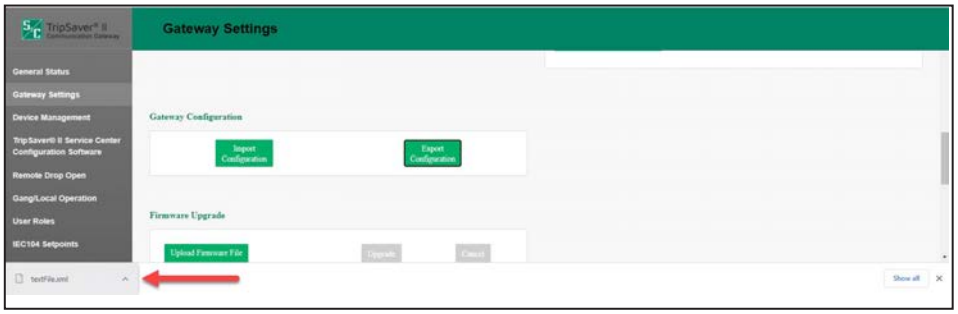


Figure 27. Export File Save navigation.

Firmware Upgrade

The "Firmware Upgrade" panel enables the loading of firmware versions onto the communications gateway. See Figure 28. Follow these steps to perform a firmware upgrade:

STEP 1. Download the firmware file. Firmware files can be found in the S&C Customer Portal at **sandc.com/en/support/sc-customer-portal/**.

STEP 2. Click on the **Upload Firmware File** button on the "Firmware Upgrade" panel. See Figure 28.

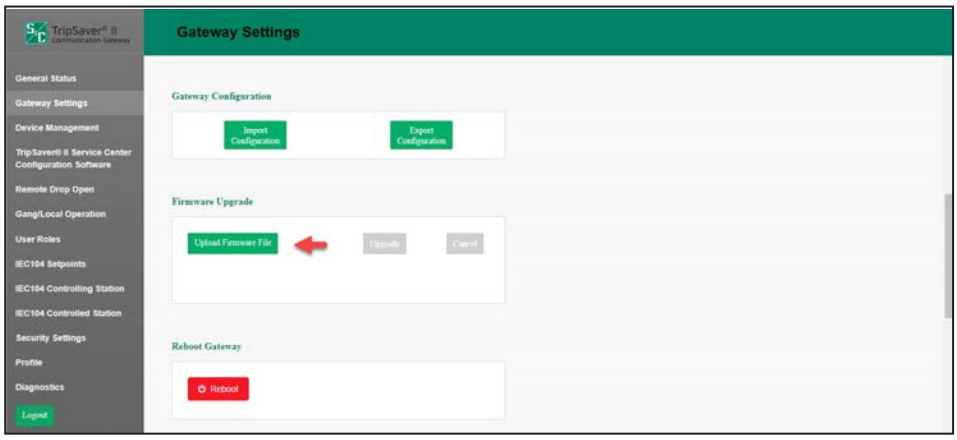


Figure 28. The Firmware Upgrade panel.

STEP 3. A Windows dialog box will open. See Figure 29. Navigate to the firmware file and select it. Click on the **Open** button.

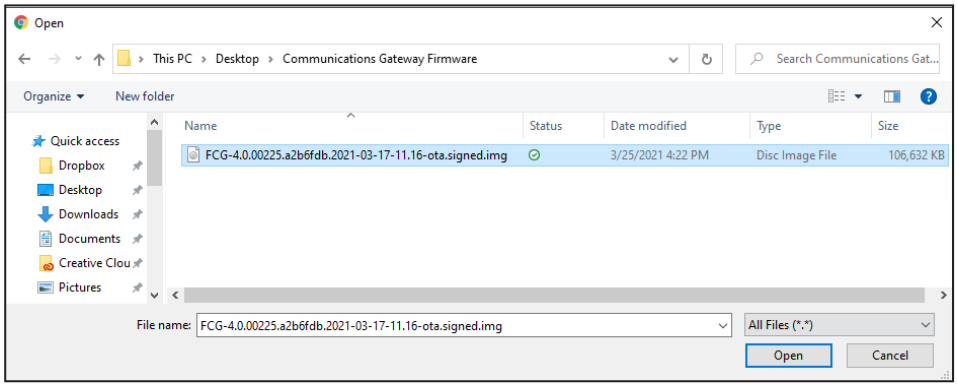


Figure 29. The Open File dialog box.

STEP 4. The file loads to the communications gateway. After the upload completes, the gateway will confirm a successful upload. See Figures 30 and 31.

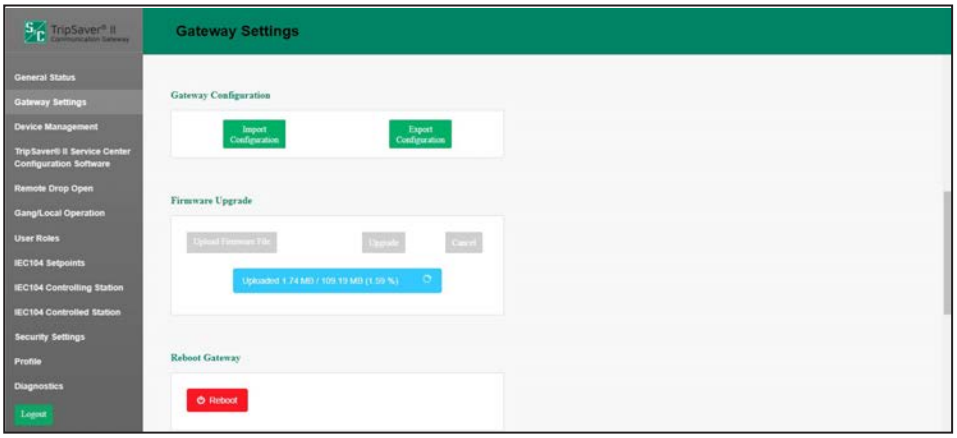


Figure 30. The Firmware Upload progress bar.

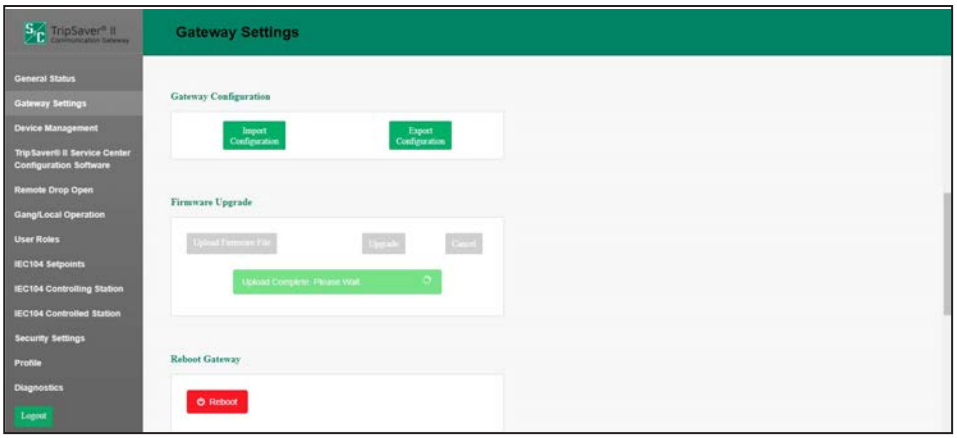


Figure 31. The Firmware Upload Complete message.

STEP 5. When it is 100% done, the communications gateway will go through a verification process to confirm it was securely signed by S&C Electric Company. See Figure 32.

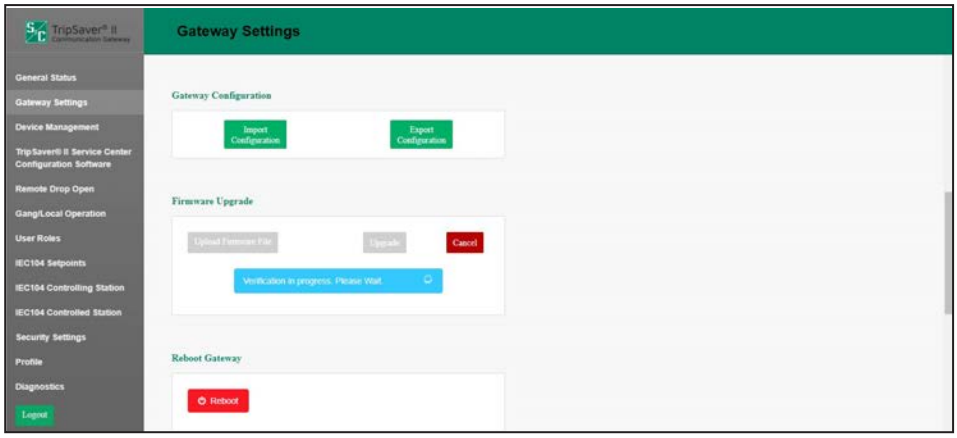


Figure 32. The firmware-verification message bar.

STEP 6. After the file is verified, a notification will appear. Click on the **OK** button to dismiss this window. The **Upgrade** button will become active. See Figure 33.

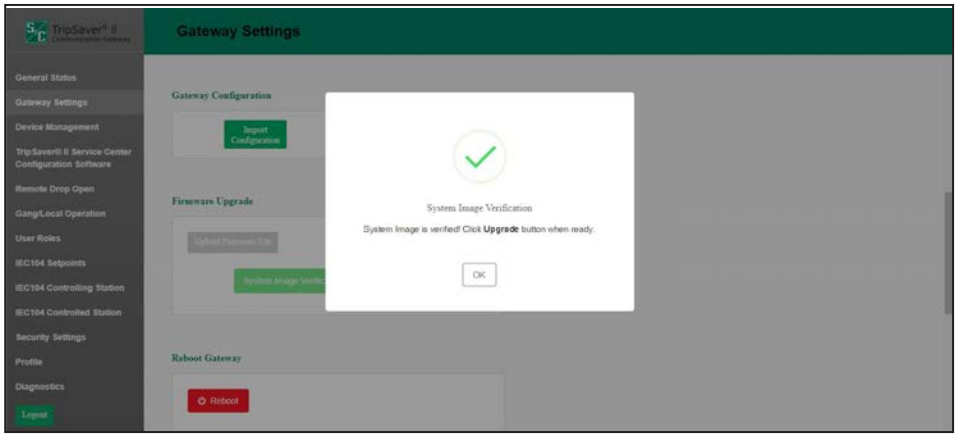


Figure 33. The dialog box showing the firmware-verification process is complete.

STEP 7. Click on the **Upgrade** button. This will start the upgrade process. See Figures 34 and 35.

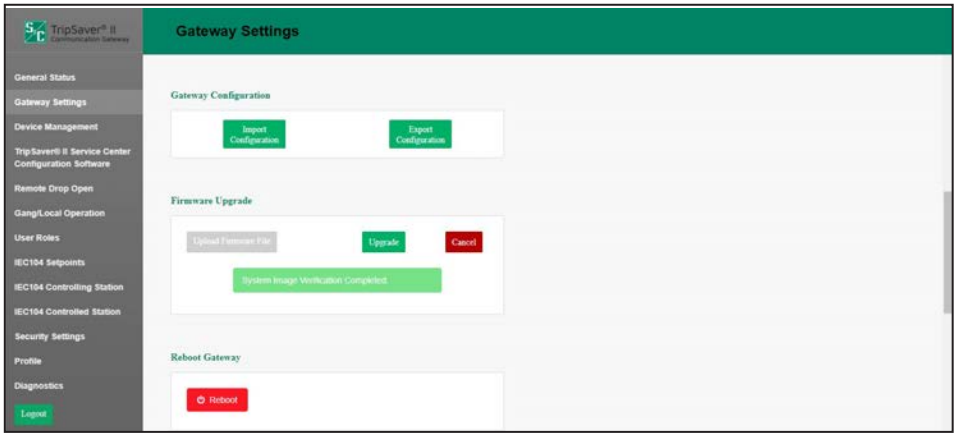


Figure 34. The Upgrade button in the "Firmware Upgrade" panel.

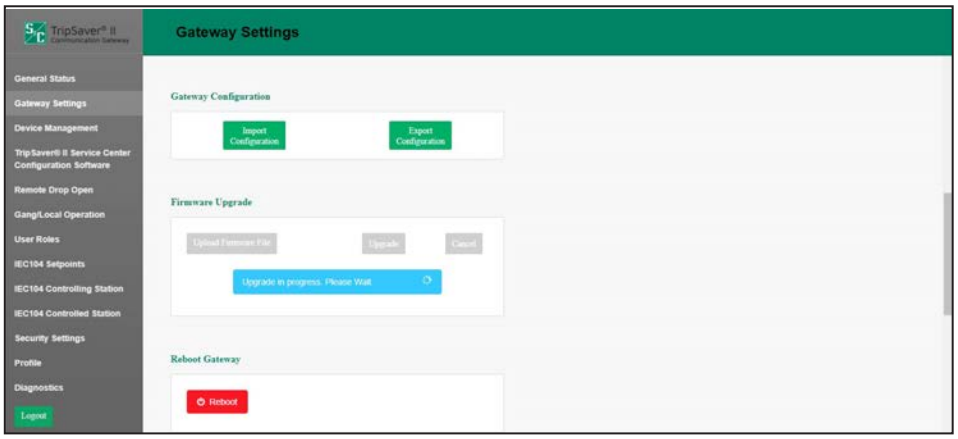


Figure 35. The firmware-upgrade process progress bar.

STEP 8. When the gateway has completed processing the upgrade, it will display a notification. See Figure 36. When the user clicks on the **OK** button on this notification, the browser will display a screen indicating the gateway is unavailable while it reboots. The gateway will take approximately 5 minutes to reboot. The user interface will automatically load the log-in page after the reboot completes. Log in and confirm the new firmware has been installed successfully by going to the *General Status* screen.

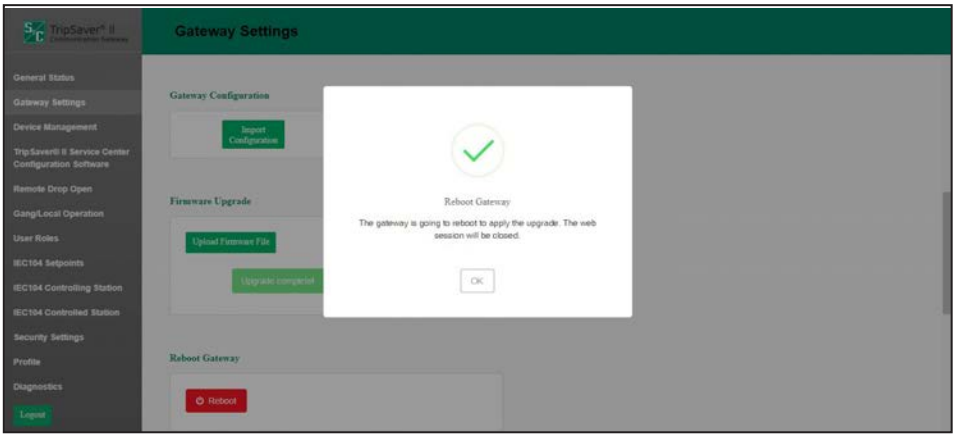


Figure 36. The dialog box showing the firmware upgrade is complete.

Reboot Gateway

The red **Reboot** button enables the user to restart the communications gateway. See Figure 37. When selected, a dialog box appears to confirm the **Reboot** command. After the user clicks on the **OK** button, the user interface will display the *Gateway Unavailable* screen. The entire reboot process requires approximately 5 minutes before communications to the communications gateway are re-established. When the reboot is complete, the user interface will automatically load the *Login* screen.

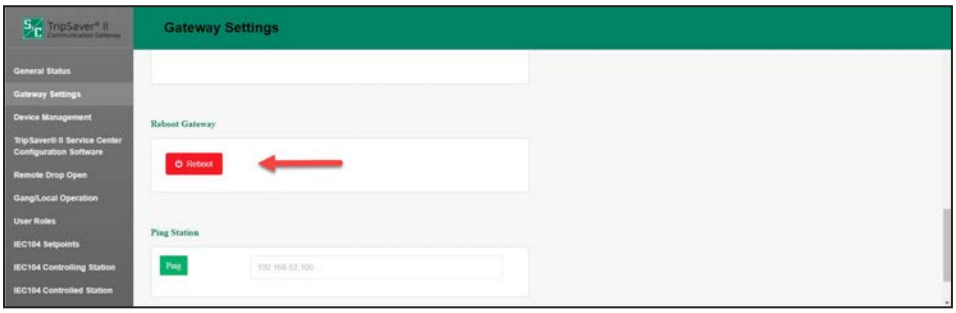


Figure 37. The Reboot Gateway button.

Ping Station

The **Ping Station** feature will allow the user to ping the SCADA controlling station or any connected IP address. This feature allows to user to confirm the gateway is correctly connected to the user's network. Type in the IP address of the SCADA controlling station or other device and click on the **Ping** button. See Figures 38 and 39. A "Success" message will appear, and the results of the ping will display as text in the "Ping Station" panel. If the ping is unsuccessful, a "Results" message will appear in the panel showing what went wrong.

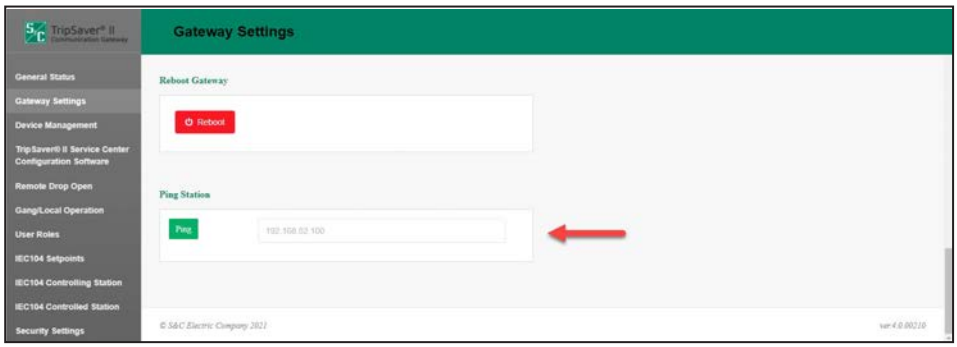


Figure 38. Location of the Ping Station button.

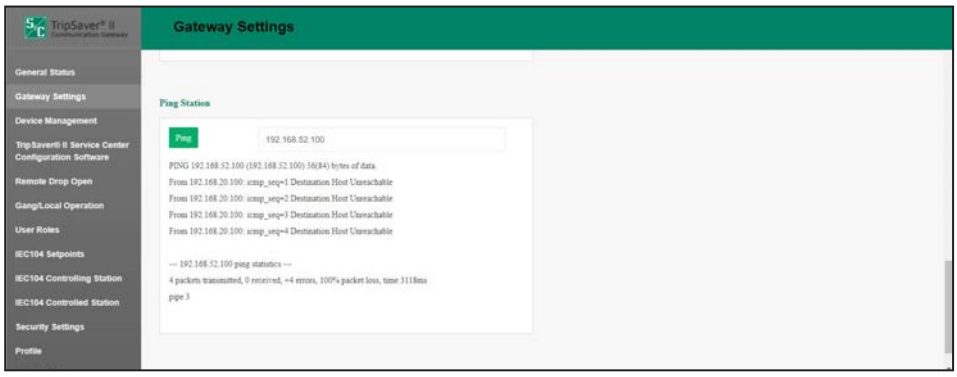


Figure 39. A ping results message.

Device Management

The purpose of the **Device Management** menu is to provide the ability to add (pair), modify, update, or delete a TripSaver II recloser. Additionally, a listing of TripSaver II reclosers with respective connection status is displayed in the window.

Note: To pair a TripSaver II recloser with the communications gateway, the recloser must be in **Gateway** mode. **Gateway** mode is set using the service center configuration software and the service center configuration kit (USB transceiver and power module). Refer to S&C Instruction Sheet 461-504, "TripSaver® II Cutout-Mounted Recloser: *Protection Setup Using Service Center Configuration Kit*," for complete instructions on connecting to a TripSaver II recloser with the USB transceiver and power module and enabling **Gateway** mode.

NOTICE

The unpairing or deleting of a TripSaver II recloser from the communications gateway will remove the recloser's wireless communications capability. To re-enable wireless (**Gateway** mode), the TripSaver II recloser must be removed from the pole and accessed via the TripSaver II Service Center Configuration Software, USB transceiver, and corded power module. Refer to S&C Instruction Sheet 461-504, "TripSaver® II Cutout-Mounted Recloser: *Protection Setup Using Service Center Configuration Kit*," for complete instructions on connecting to a TripSaver II recloser with the USB transceiver, corded power module, and ac adapter. See the "Commissioning (Pairing) a TripSaver II Recloser for Use with the Communications Gateway" section on "Service Center Pairing a TripSaver II Recloser with Firmware Version 1.8 or Later" on page 71 for a description of the pairing process.

To add a TripSaver II recloser, click on the **Add TripSaver II** button on the top right of the screen. A dialog box will appear. Enter the recloser's transceiver ID and the desired device name. See Figure 40 and Figure 41 on page 46. The transceiver ID must contain a total of 32 hexadecimal digits, separated by three periods. After the process is completed, the user will be returned to the top of the *TripSaver II Device Management* screen when the **Add** button is clicked. For full instructions on pairing a TripSaver II recloser with the communications gateway, see the "Commissioning (Pairing) a TripSaver II Recloser for Use with a Communications Gateway" section on "Service Center Pairing a TripSaver II Recloser with Firmware Version 1.8 or Later" on page 71.

Note: The **TripSaver II Device Name** field is optional and may be left blank.

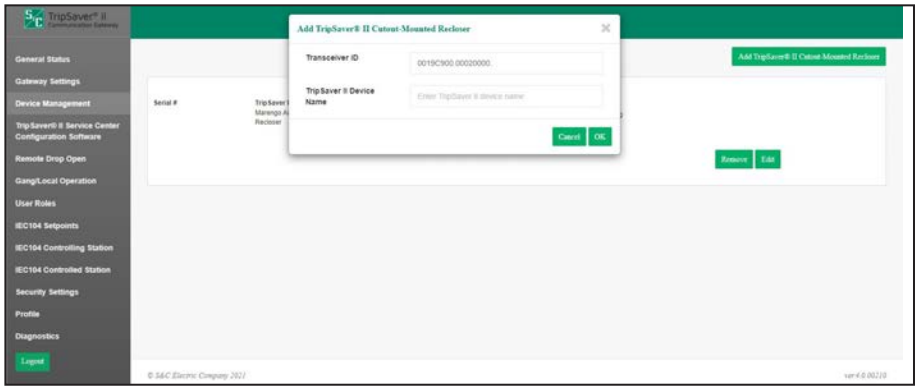


Figure 40. Pairing of a TripSaver II recloser with the communications gateway.

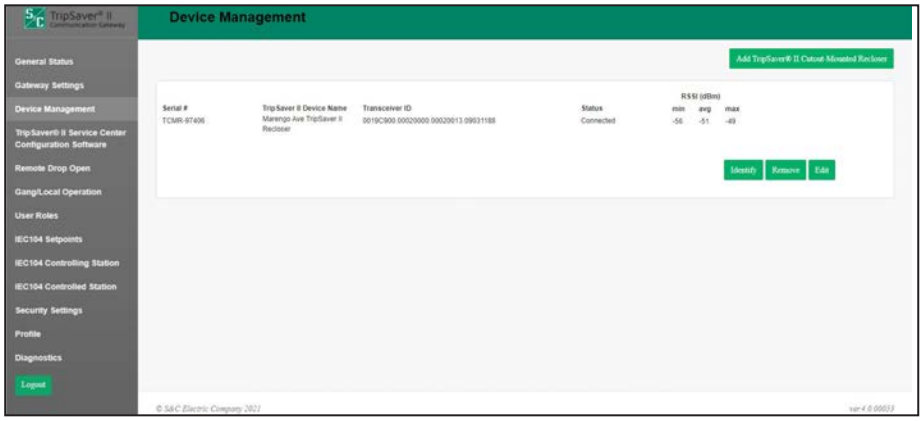


Figure 41. The *Device Management* screen showing the successful addition of a TripSaver II recloser and status.

The top *TripSaver II Device Management* screen will display on a single line the added recloser and any other TripSaver II reclosers that have their radios associated with this communications gateway. In addition to the serial number and TripSaver II recloser name, the recloser's transceiver ID, link status, and RSSI are displayed.

A TripSaver II recloser may be changed or removed by clicking on the **Edit or Remove** button. Clicking on the **Identify** button will cause the TripSaver II recloser to update its LCD screen to all blue, and then all white, and repeat. This can help to identify a specific TripSaver II recloser.

TripSaver® II Service Center Configuration Software

When connected to the communications gateway through Ethernet Port 1, the connected TripSaver II reclosers can be accessed through the communications gateway with the service center configuration software. This allows the gateway to take the place of the USB transceiver. In this panel, users may enable or disable service center configuration access while connected to the communications gateway's Ethernet Port 1. Refer to S&C Instruction Sheet 461-504 for more information about operation of the service center configuration software.

Note: The service center configuration software must be on the same computer connected to the gateway via Ethernet Port 1.

NOTICE

S&C recommends against making settings changes to the TripSaver II recloser when connected to the service center configuration software via the communications gateway. To make settings changes, remove the TripSaver II recloser from the utility pole and connect to it using the USB transceiver and corded power module.

To enable connection to the service center configuration software, click on the **Enable Service Center Configuration** toggle button to set the **On** position. See Figure 42.

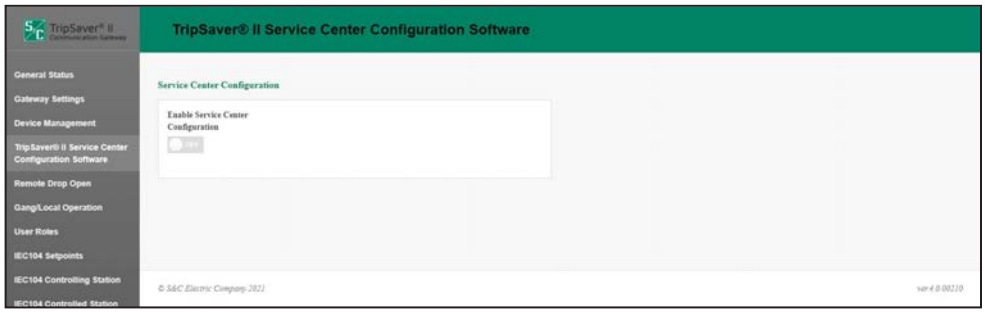


Figure 42. The Enable Service Center Configuration toggle button.

When the **Service Center Configuration** mode is enabled, a dialog box appears. See Figure 43.

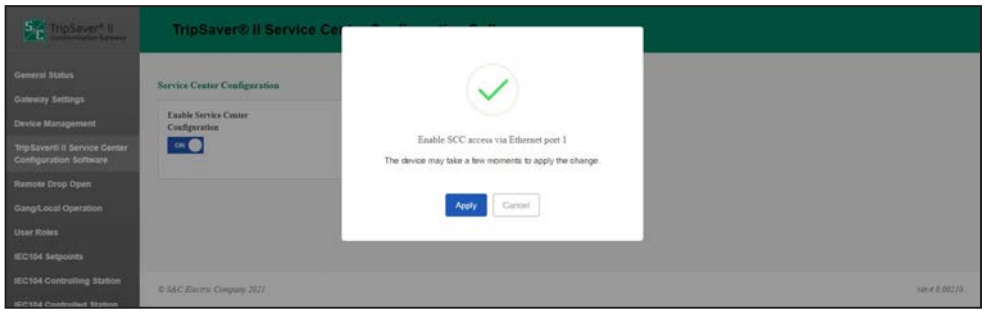


Figure 43. The "Enable SCC access via Ethernet port 1" dialog box.

When the service center configuration software is opened and the **Connect to Device** option is selected from the menu bar, a selection of TripSaver II reclosers connected to the gateway will be displayed. Select the desired recloser and click on the **Connect** button. The **Identify** button can be used to help identify a TripSaver II recloser. It will cycle the recloser's LCD screen to solid blue, and then back again. See Figure 44 on page 48.

NOTICE

When using a communications gateway to connect to a TripSaver II recloser via the service center configuration software, any configuration changes made to the communications gateway during the service center configuration software session will not be captured. The communications gateway will serve as a simple router directing the radio connection to the TripSaver II recloser. S&C recommends not making any changes to the communications gateway when using it to connect to a TripSaver II recloser via the service center configuration software.

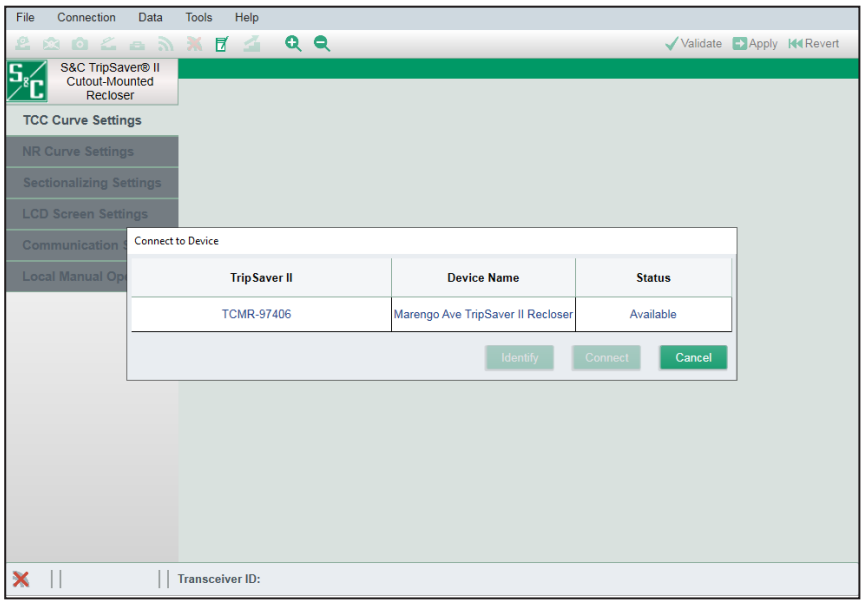


Figure 44. The service center configuration software *Connect to Device* screen.

Remote Drop Open

TripSaver II reclosers supplied with the **30-second** option ("-O") and firmware version 1.8 or later, and ordered with the **Remote Drop Open** option ("-D") factory-enabled, can be configured using the **Remote Drop Open** settings to operate when issued an **IEC104** command. To use the **Remote Drop Open** feature, the TripSaver II recloser must be properly commissioned and configured with the gateway, and a SCADA transceiver must also be properly connected to the communications gateway. See the "IEC104 Controlling Station" section on page 62 for directions on configuring the gateway with an IEC104 controlling station.

The settings on the *Remote Drop Open Settings* screen only configure the feature in the communications gateway and in any properly configured TripSaver II reclosers. To receive the command, the appropriate IEC104 points must also be set. For a full list of the IEC104 points available, refer to S&C Instruction Sheet 461-561, "TripSaver® II Communications Gateway, Outdoor Distribution (15 kV and 25 kV): *IEC 60870 Points List and Implementation*."

Each TripSaver II recloser paired with the communications gateway will appear in the device listing.

Note: Though the reclosers aren't numbered in the device listing, the recloser on top is "TripSaver II recloser #1," continuing with "TripSaver II recloser #2," and "TripSaver II recloser #3." Document this information along with the device names for later use when setting IEC104 points.

If a recloser has the **Remote Drop Open** feature ("-D" option) factory-enabled, the green **Factory-Enabled in TSII** indicator will say "Yes." See Figure 45 on page 49.

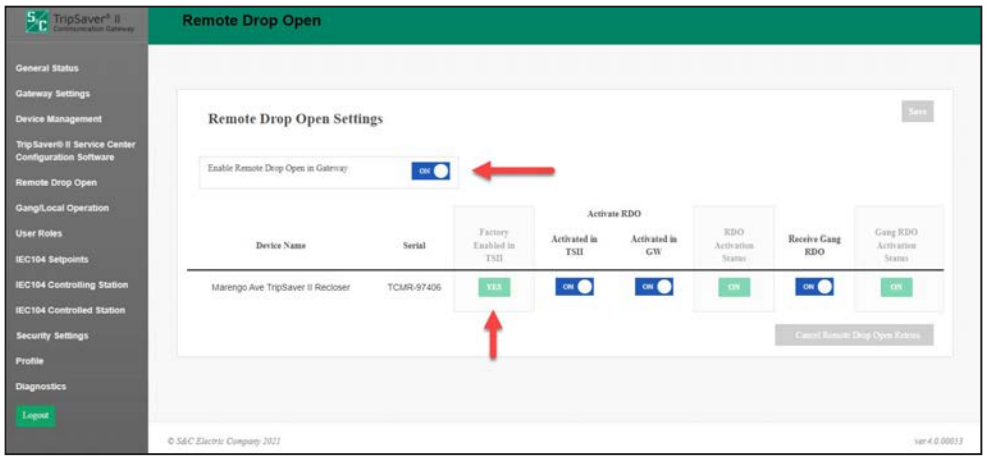


Figure 45. Enabling the Remote Drop Open feature in the communications gateway.

The **Remote Drop Open** feature is enabled in the communications gateway by toggling the **Enable Remote Drop Open in Gateway** toggle button to the **On** position. Click on the **Save** button to save settings.

Note: The **Enable Remote Drop Open in Gateway** toggle button will not erase the settings for each individual recloser when toggled to the **Off** position and then saved by clicking the **Save** button. It will turn the feature off in the communications gateway. This allows the user to locally turn remote operation off if, for example, local work is to be done on a recloser group, and then turn the feature back on without losing settings.

After the **Remote Drop Open** feature is activated in the TripSaver II recloser and in the communications gateway by toggling the **Activated in TSII** and **Activated in GW** toggle buttons to the **On** position, click on the **Save** button to save the settings. See Figure 46.

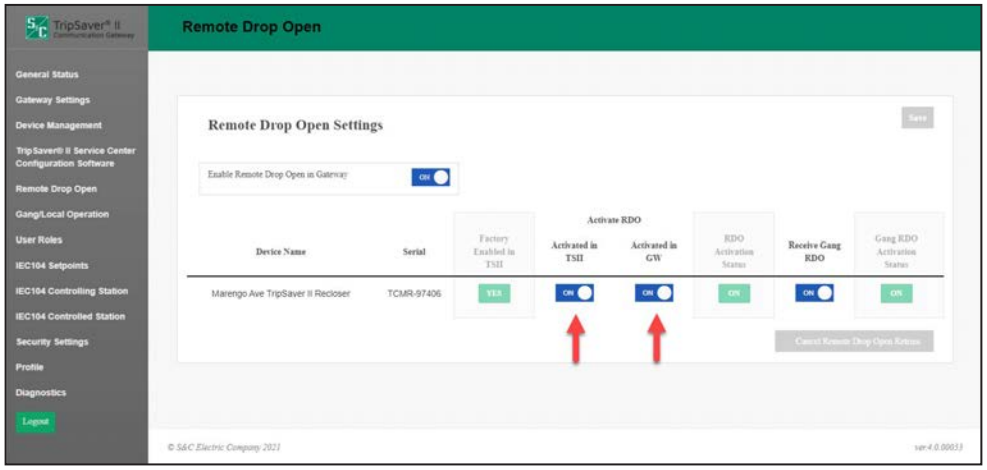


Figure 46. Activating the Remote Drop Open feature in the TripSaver II recloser and the communications gateway.

To allow the recloser to gang-operate because of a **Gang Remote** command, toggle the **Receive Gang RDO** toggle button to the **On** position. Click on the **Save** button to save the settings. Up to three reclosers can be configured to remotely gang-operate in response to an IEC104 **Communications Gateway Remote Gang Drop Open** command. See Figure 47.

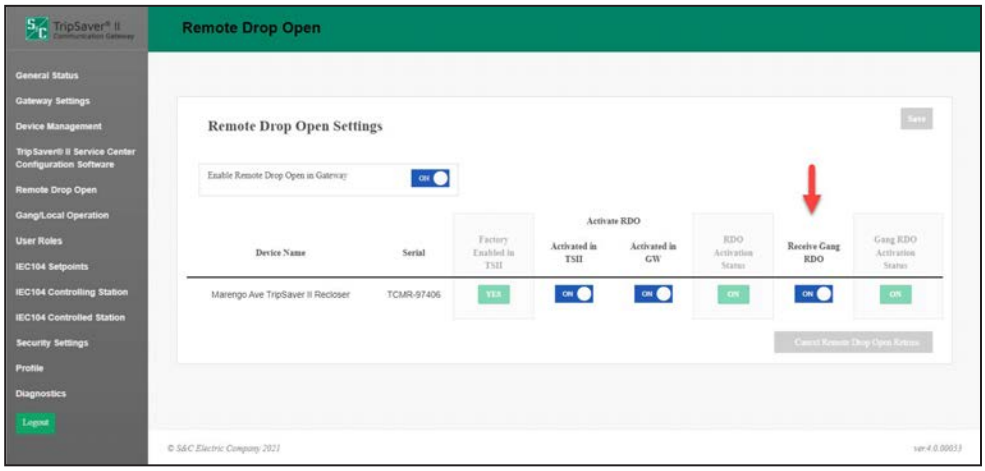


Figure 47. Enabling a remote Receive Gang operation for the TripSaver II recloser.

When a TripSaver II recloser that does not have the **Remote Drop Open** option ("-D") factory-enabled is paired with the communications gateway, the **Factory Enabled in TSII** setting will show a grey "NO" label, and the two **Activation Status** indicators will also show a grey "NO" label. See Figure 48.

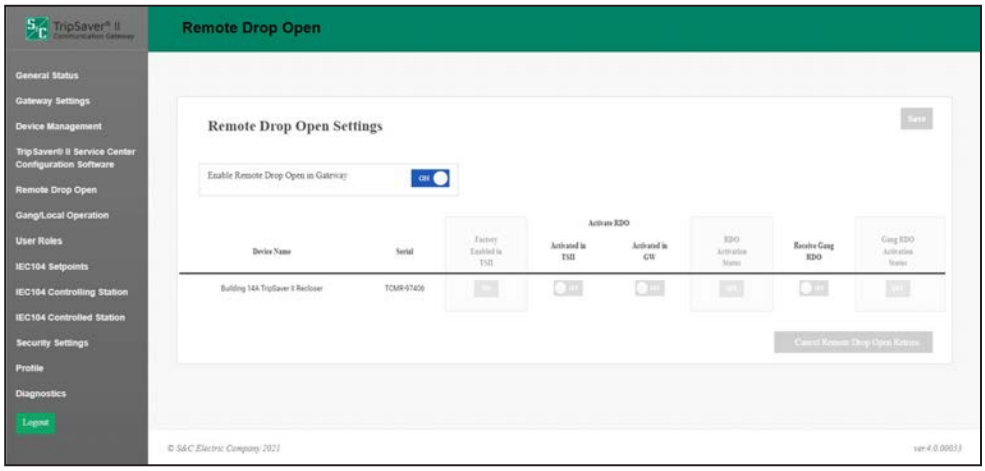


Figure 48. A TripSaver II recloser when the Remote Drop Open feature is not factory-enabled in the recloser.

Gang/Local Operation

Local Drop Open Settings

TripSaver II reclosers supplied with firmware versions 1.7 and later can be configured using the **Local Drop Open** settings to drop open when another member of the configuration group, or "gang," drops open because of a permanent fault, a **Local Manual Open (LMO)** operation, or an orientation change. (These operations are overseen directly by the gateway and are not signaled by a SCADA controlling station via IEC104.) This feature is called **Gang Operation**. If no backup battery is available in the communications gateway enclosure, this screen will be disabled. See Figure 49.

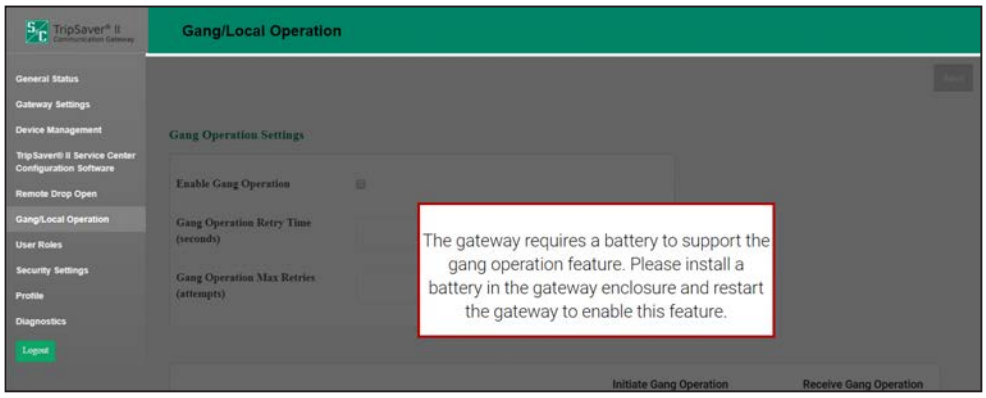


Figure 49. The communications gateway requires a backup battery for Local/Gang operation.

New to TripSaver II Communications Gateway firmware version 3.0 and later and only available with TripSaver II recloser firmware version 1.8 and later is the ability to allow a **Local Single Unit** drop-open function of TripSaver II reclosers paired with a communications gateway.

When toggled on, the **Enable Single Unit Operation** button allows a user logged in to the gateway to perform a **Local Drop Open** command for a single unit paired with the gateway by clicking on the green **Drop Open** button in the "Perform Local Command" column. This single-unit operation feature works regardless of whether the TripSaver II recloser is configured to work in a gang. For this feature to work, the **Receive Local Drop Open** setting must be enabled in both the gateway and the TripSaver II recloser by toggling the appropriate buttons to the **On** position. Click on the **Save** button after making the desired settings. See Figure 50 on page 52.

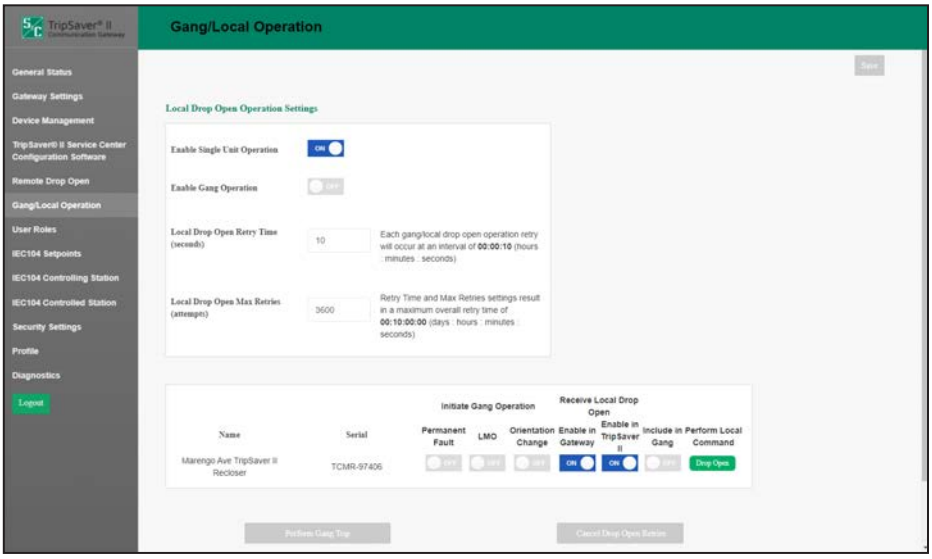


Figure 50. Enabling the single-unit Local Drop Open operation.

The **Gang Operation** feature is enabled by toggling the **Enable Gang Operation** button to the **On** position.

To be a member of a gang operation group, the TripSaver II must have the **Receive Local Drop Open** feature enabled in both the communications gateway and the TripSaver II recloser by toggling both the **Enable in Gateway** and **Enable in TripSaver II** buttons to the **On** position as well as having the **Include in Gang** button toggled to the **On** position. Click on the **Save** button after making the desired settings.

The **Enable in Gateway** toggle button must be set to allow the gateway to gang-operate the TripSaver II recloser, while the **Enable in TripSaver II** toggle button enables the same drop-open capability in the TripSaver II recloser itself. The **Enable in TripSaver II** setting can also be modified via SCADA using an IEC104 command or with the TripSaver II Service Center Configuration Software. Both the **Enable in Gateway** and **Enable in TripSaver II** toggle buttons must be toggled to the **On** position for a TripSaver II recloser to drop open because of a **Gang** operation or by using the green **Drop Open** button under the "Perform Local Command" column.

To enable a TripSaver II recloser to be an initiator of a **Gang** operation, one or more of the **Initiate Gang Operation** toggle buttons must be toggled to the **On** position. The three initiator buttons are **Permanent Fault**, **Local Manual Open** (LMO), or **Orientation Change**. See Figure 51 on page 53.

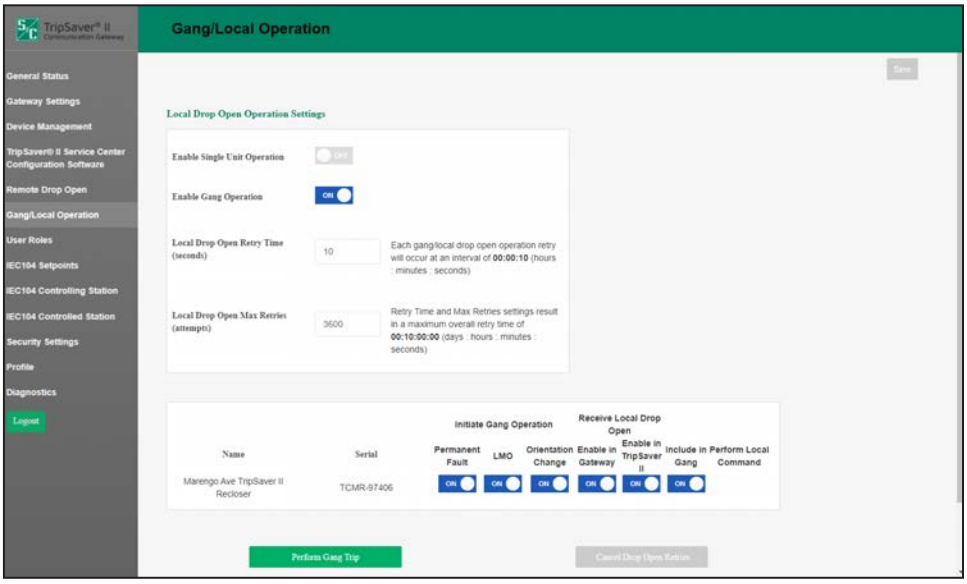


Figure 51. Enabling a Gang operation.

Two other features that should be configured are the **Local Drop Open Retry Time** and the **Local Drop Open Max Retries**. See Figure 52.

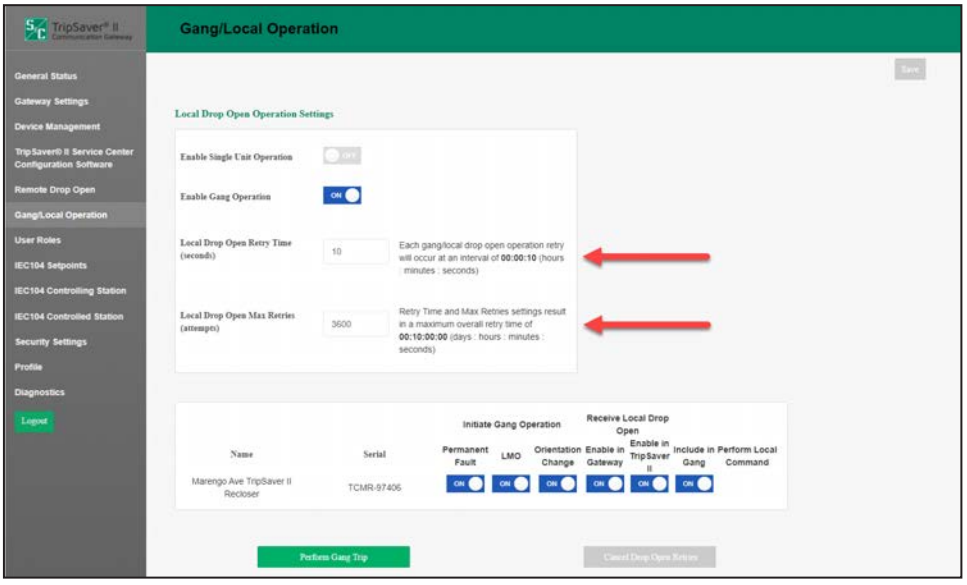


Figure 52. Configuring the Retry Time and Maximum Number of Retries settings.

The **Local Drop Open Retry Time** (seconds) field configures the time between **Drop-open** commands given to the reclosers, either directly by clicking the **Perform Local Command** button or when configured for **Gang** operation. (Range: 0-3600; default: 10)

The **Local Drop Open Max Retries** field configures (Range: 0-2,592,000) the maximum number of **Gang/Local** operation commands to be given to the reclosers configured for **Gang/Local** operation.

After making the desired settings, click on the **Save** button to save the configuration.

The **Perform Gang Trip** button can be clicked to perform a local **Gang Operation** function on user request. When this button is clicked, the user will be asked to provide a walkaway time interval, in seconds. After this time interval, the gateway will perform the **Gang Trip** operation.

⚠ WARNING

Enter a walkaway time long enough to give any personnel underneath the TripSaver II reclosers enough time to walk away. Do not stand underneath the TripSaver II reclosers during a **Gang** operation. Failure to walk away could result in severe personal injury.

The **Cancel Drop Open Retries** button will be enabled when a **Gang Operation** procedure is active and performing periodic retries. When this button is clicked, the communications gateway will immediately halt the retries and will abandon the **Drop Open** operation. See Figure 53.

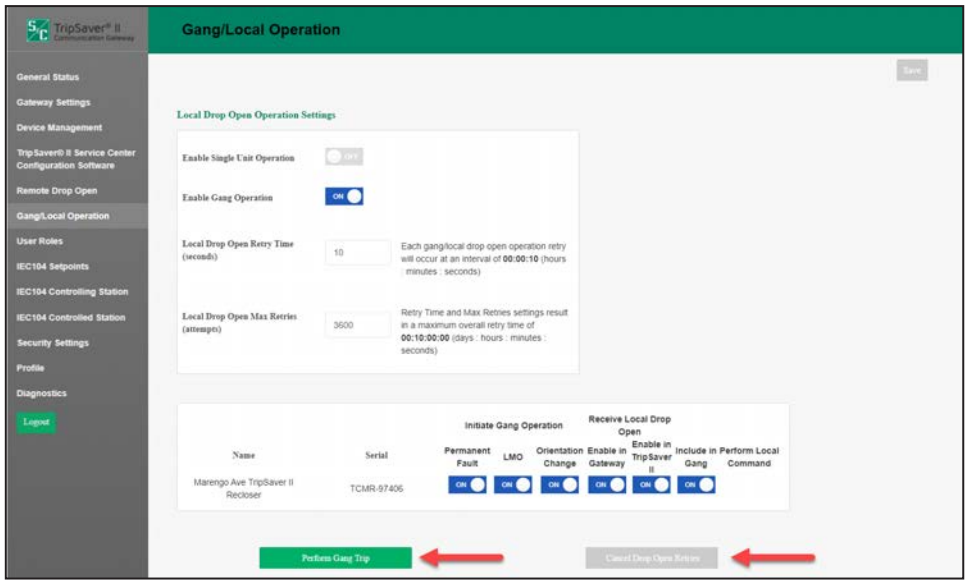


Figure 53. Performing a Gang Trip operation.

A TripSaver II recloser and a paired communications gateway can be configured for both **Single Unit Operation** and **Gang Operation** functions. See Figure 54.

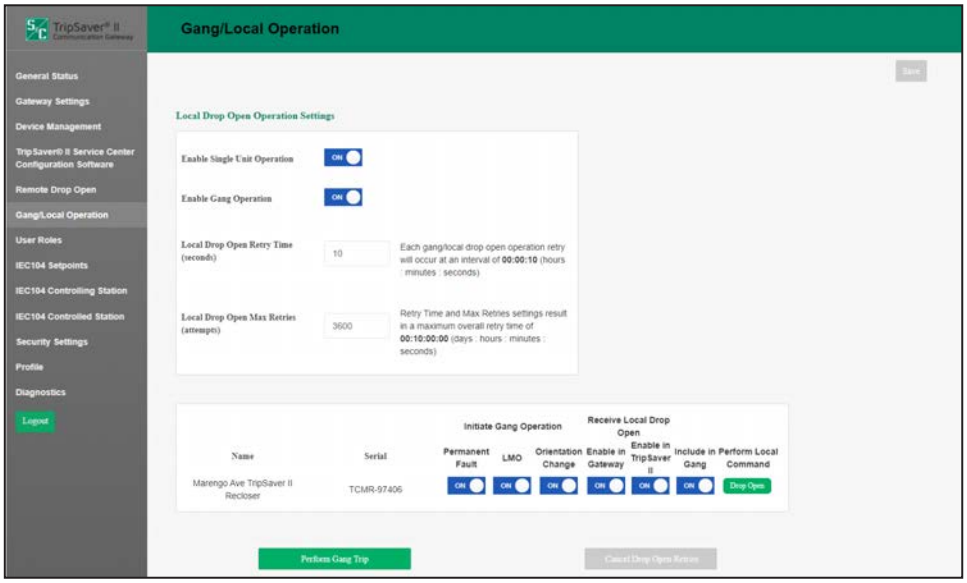


Figure 54. A Single Unit and Gang operation.

User Roles

The purpose of the **User Roles** menu is for adding users and corresponding access privileges. The types of user roles include Admin, Gateway User, TripSaver II User, and Technician. The addition of a user is initiated by clicking on the **Add User** button. A dialog box will appear with the required **User**, **Password**, and **Confirm Password** fields, and a drop-down box to select user type. See Figure 55 and Table 4 on page 56.

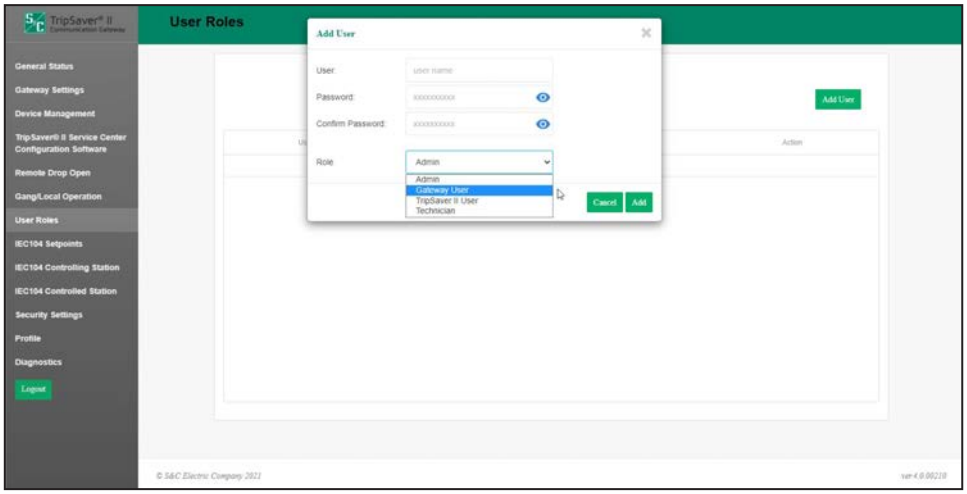


Figure 55. The *User Role* configuration screen.

Table 4. User Role Permissions

Page	Element Within Screen	Admin Role	Gateway User Role	TripSaver II User Role	Technician Role
General Status	All	Allowed	Allowed	Allowed	Allowed
Gateway Settings	Update gateway configuration	Allowed	Allowed	Allowed	Allowed
	Install firmware	Allowed	Blocked	Blocked	Blocked
Device Management	**Add/Update/Remove TripSaver II recloser** buttons	Allowed	Allowed	Allowed	Blocked
Remote Drop Open	All	Allowed	Blocked	Blocked	Blocked
Gang/Local Operation	**Configure Gang Operation** settings	Allowed	Allowed	Blocked	Blocked
	Perform Gang Trip/ Cancel Gang Trip buttons	Allowed	Blocked	Blocked	Blocked
TripSaver II Service Center Configuration Software	All	Allowed	Blocked	Allowed	Blocked
User Roles	All	Allowed	Blocked	Blocked	Blocked
IEC104 Setpoints	All	Allowed	Allowed	Blocked	Blocked
IEC104 Controlling Station	All	Allowed	Allowed	Blocked	Blocked
IEC104 Controlled Station	All	Allowed	Allowed	Blocked	Blocked
Security Settings	Configure secure tunnel	Allowed	Allowed	Blocked	Blocked
	Provision HTTPS server certificate	Allowed	Allowed	Blocked	Blocked
	Enable remote Web UI access	Allowed	Blocked	Blocked	Blocked
Profile	All	Allowed	Allowed	Allowed	Allowed
Diagnostics	All	Allowed	Allowed	Allowed	Allowed

IEC 104 Setpoints

Single Point Information Setpoint Configuration

The *Single Point Information Setpoint Configuration* screen contains configuration parameters for single-point information setpoints. The window can be opened by clicking on the **Single Point Information** button. See Figure 56.

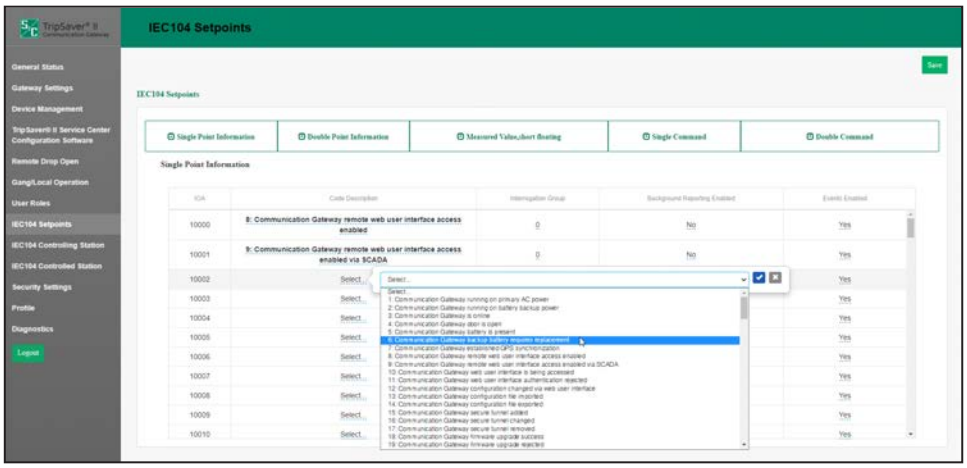


Figure 56. Single Point Information setpoint configuration.

The single-point setpoint variables are described as follows:

IOA: IEC 104 Information Object Address. These values are assigned automatically as setpoints and are mapped on this page.

Note: Single-point and double-point variables can be enabled as required, but the same code description cannot be configured on both the single-point page and the double-point page. Configuring the same point on both pages is blocked.

Code Description: These point codes representing specific status points may be assigned to individual SCADA point numbers. A full list of code-description definitions is found in S&C Instruction Sheet 461-561. Code descriptions are defined by selecting the **Code Description** field in line with the respective **IOA** field. A drop-down dialog box will appear with code definitions for all TripSaver II reclosers paired with the communications gateway. See Figure 56. When a code definition has been chosen, select the **Check Mark** icon to finalize it. Removal of a code selection can be performed by selecting the blank row in the pull-down menu and clicking on the check mark. This will result in the field being displayed as empty. Finally, click on the **Save** button.

Interrogation Group: This group defines the interrogation group that will include this setpoint. When set to a value of "0," this setpoint will only be reported as part of overall station interrogation. When set to a value of between "1" and "16," this setpoint will be reported as part of overall station interrogation and as part of the specified interrogation group.

Background Reporting Enabled: This indicates whether the gateway will include this setpoint in its background reports. A **Yes** value enables background reporting. A **No** value disables background reporting.

Events Enabled: This indicates whether the gateway will report spontaneous events for this setpoint when the value changes. A **Yes** value enables events. A **No** value disables events.

Double Point Information Setpoint Configuration

The *Double Point Information Setpoint Configuration* screen contains configuration parameters for double point information setpoints. The screen can be opened by clicking on the **Double Point Information** button. See Figure 57.

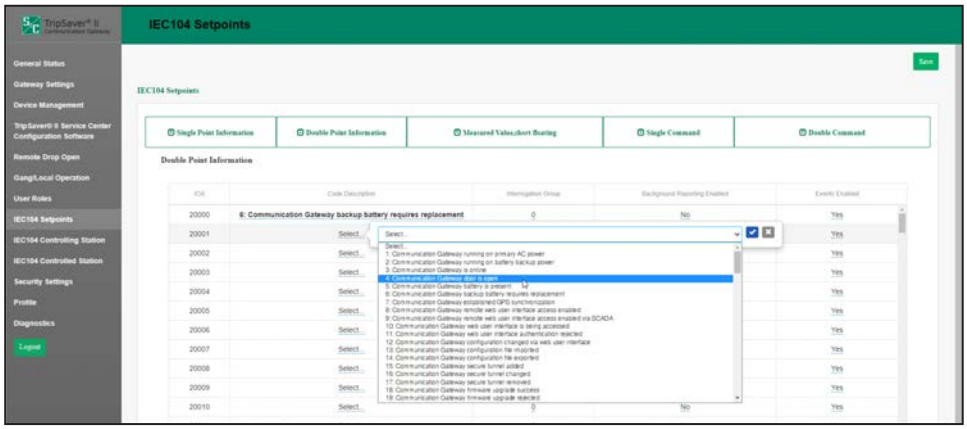


Figure 57. Double-point information setpoint configuration.

The double-point setpoint variables are described as follows:

IOA: IEC 104 Information Object Address. These values are assigned automatically as setpoints and are mapped on this page.

Note: Single-point and double-point variables can be enabled as required, but the same code description cannot be configured on both the single-point page and the double-point page. Configuring the same point on both pages is blocked.

Code Description: Point codes representing specific status points may be assigned to individual SCADA point numbers. A full list of code-description definitions is found in S&C Instruction Sheet 461-561. Code descriptions are defined by selecting the **Code Description** field in line with the respective **IOA** field. A drop-down dialog box will appear with code definitions for all TripSaver II reclosers paired with the communications gateway. See Figure 57. When a code definition has been chosen, select the **Check Mark** icon to finalize it. Removal of a code selection can be performed by selecting the blank row in the pull-down menu and clicking on the check mark. This will result in the field being displayed as empty. Finally, click on the **Save** button.

Interrogation Group: This group defines the interrogation group that will include this setpoint. When set to a value of "0," this setpoint will only be reported as part of overall station interrogation. When set to a value of between "1" and "16," this setpoint will be reported as part of overall station interrogation and as part of the specified interrogation group.

Background Reporting Enabled: This indicates whether the gateway will include this setpoint in its background reports. A **Yes** value enables background reporting. A **No** value disables background reporting.

Events Enabled: This indicates whether the gateway will report spontaneous events for this setpoint when the value changes. A **Yes** value enables events. A **No** value disables events.

Measured Value, Short Floating Setpoint Configuration

The *Measured Value, Short Floating Setpoint Configuration* screen contains configuration parameters for **Measured Value, Short Floating Value** setpoints. The screen can be opened by clicking on the **Measured Value, Short Floating** button. See Figure 58.

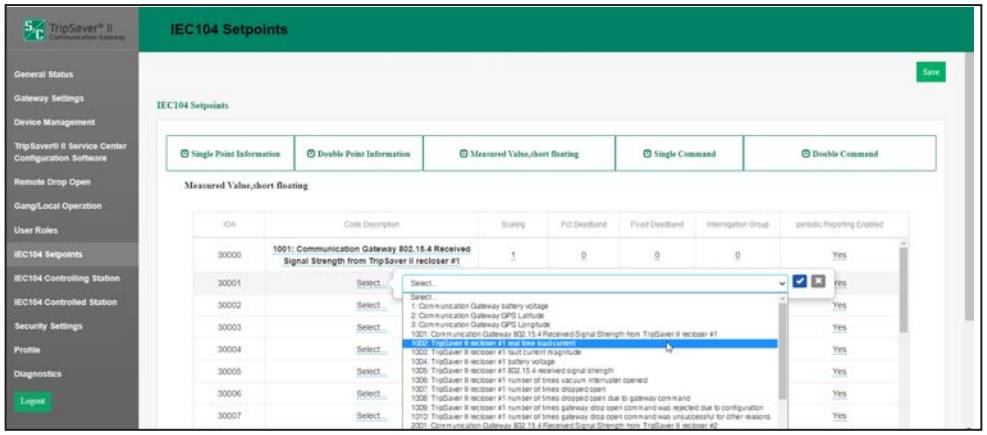


Figure 58. Measured Value, Short Floating setpoint configuration.

The **Measured Value, Short Floating** setpoint variables are described as follows:

IOA: IEC 104 Information Object Address. These values are assigned automatically as setpoints and are mapped on this page.

Code Description: Point codes representing specific measured value points may be assigned to individual SCADA point numbers. A full list of code-description definitions is found in S&C Instruction Sheet 461-561. Code descriptions are defined by selecting the **Code Description** field in line with the respective **IOA** field. A drop-down dialog box will appear with code definitions for all TripSaver II reclosers paired with the communications gateway. See Figure 58. When a code definition has been chosen, select the **Check Mark** icon to finalize it. Removal of a code selection can be performed by selecting the blank row in the pull-down menu and clicking on the check mark. This will result in the field being displayed as empty. Finally, click on the **Save** button.

Scaling: A floating point-scaling factor is used to match the measured value input requirements of the SCADA system. This will be applied as a multiplication factor to the raw setpoint measurement before it is sent to the controlling station. If the **Fixed Deadband** option is enabled for a measured value setpoint, the scaling factor will be applied before the **Fixed Deadband** limits are checked.

Pct Deadband: This field creates a range based on a percentage of the last reported value for this measured value point. The range boundary is defined by multiplying the **Percent Deadband** value against the last reported value of the measured value point. In the case where the next measured value exceeds the range either by a positive or

negative amount, the gateway will generate a spontaneous event. The default value is "0" (zero), which disables the deadband comparison. No range is created and no comparison occurs. Specifying a nonzero value creates the range and enables deadband comparison.

Fixed Deadband: This field creates a fixed deadband range relative to the last reported value for this measured value point. In the case where the next measured value exceeds the range either by a positive or negative amount, the gateway will generate a spontaneous event. The default value is "0" (zero), which disables the deadband comparison. No range is created and no comparison occurs. Specifying a nonzero value creates the range and enables deadband comparison.

Interrogation Group: This group defines the interrogation group that will include this setpoint. When this is set to a value of "0," this setpoint will only be reported as part of overall station interrogation. When this is set to a value of between "1" and "16," this setpoint will be reported as part of overall station interrogation and as part of the specified interrogation group.

Periodic Reporting Enabled: This indicates whether the gateway will include this setpoint in its periodic reports. A **Yes** value enables periodic reporting. A **No** value disables periodic reporting.

Single Command Setpoint Configuration

The *Single Command Setpoint Configuration* screen contains configuration parameters for single command setpoints. The screen can be opened by clicking on the **Single Command** button. See Figure 59.

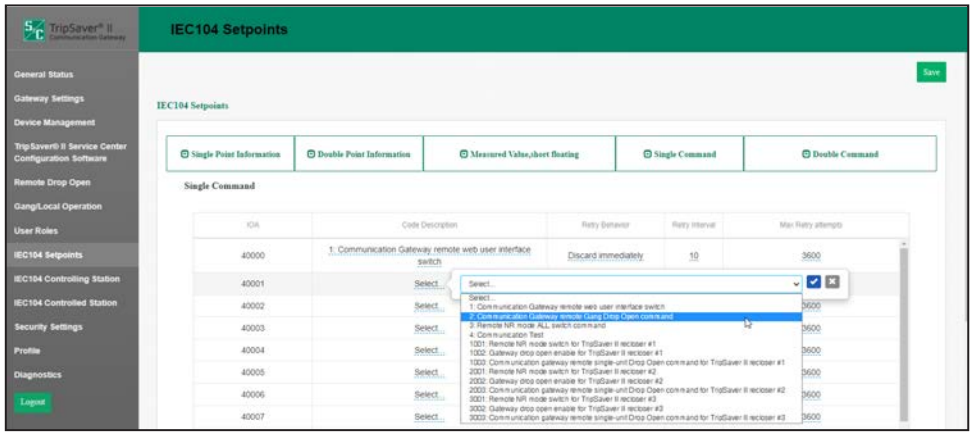


Figure 59. Single Command setpoint configuration.

The **Single Command** setpoint variables are described as follows:

IOA: IEC 104 Information Object Address. These values are assigned automatically as setpoints are mapped on this page.

Code Description: Point codes representing specific command points may be assigned to individual SCADA point numbers. A full list of code-description definitions is found in S&C Instruction Sheet 461-561. Code descriptions are defined by selecting the **Code Description** field in line with the respective **IOA** field. A drop-down dialog box will appear with code definitions for all TripSaver II reclosers paired with the communications gateway. See Figure 59 on page 60. When a code definition has been chosen, select the **Check Mark** icon to finalize it. Removal of a code selection can be performed by selecting the blank row in the pull-down menu and clicking on the check mark. This will result in the field being displayed as empty. Finally, click on the **Save** button.

Retry Behavior: This drop-down menu allows one of two selections. The **Discard Immediately** setting will ignore the **Retry Interval** and **Max Retry Attempts** settings, and the gateway will not retry the command. The **Queue/Retry for a Specified Count** setting will retry the command for the specified **Retry Interval** and **Max Retry Attempts** settings.

Retry Interval: This is the interval, in seconds, between retry attempts. (Range: 1 to 3600)

Max Retry Attempts: This is the maximum number of retry attempts that will be sent. (Range: 1 to 2,592,200)

Double Command Setpoint Configuration

The *Double Command Setpoint Configuration* screen contains configuration parameters for double command setpoints. The screen can be opened by clicking on the **Double Command** button. See Figure 60.

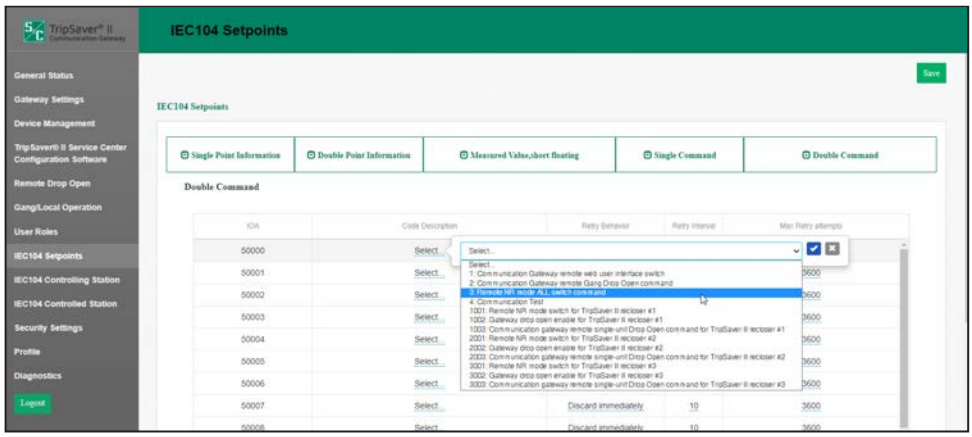


Figure 60. Double Command setpoint configuration.

The **Double Command** setpoint variables are described as follows:

IOA: IEC 104 Information Object Address. These values are assigned automatically as setpoints are mapped on this page.

Code Description: Point codes representing specific command points may be assigned to individual SCADA point numbers. A full list of code-description definitions is found in S&C Instruction Sheet 461-561. Code descriptions are defined by selecting the **Code Description** field in line with the respective **IOA** field. A drop-down dialog box will appear with code definitions for all TripSaver II reclosers paired with the communications gateway. See Figure 60 on page 61. When a code definition has been chosen, select the **Check Mark** icon to finalize it. Removal of a code selection can be performed by selecting the blank row in the pull-down menu and clicking on the check mark. This will result in the field being displayed as empty. Finally, click on the **Save** button.

Retry Behavior: This drop-down menu allows one of two selections. The **Discard Immediately** setting will ignore the **Retry Interval** and **Max Retry Attempts** settings and the gateway will not retry the command. The **Queue/Retry for a Specified Count** setting will retry the command for the specified **Retry Interval** and **Max Retry Attempts** settings.

Retry Interval: This is the interval, in seconds, between retry attempts. (Range: 1 to 3600)

Max Retry Attempts: This is the maximum number of retry attempts that will be sent. (Range: 1 to 2,592,200)

IEC104 Controlling Station

The purpose of the *IEC104 Controlling Station* screen is to update the IP settings for connecting to the IEC104 controlling station. The gateway will only allow connections from a configured IP address. To enable communication with the controlling station, IP Address #1 must be set to a valid IPv4 address.

Enter the appropriate IP address in the **IP Address #1 (required):** field. The **IP Address #2 (optional):** field can be configured to support redundancy in the controlling station. See Figure 61.

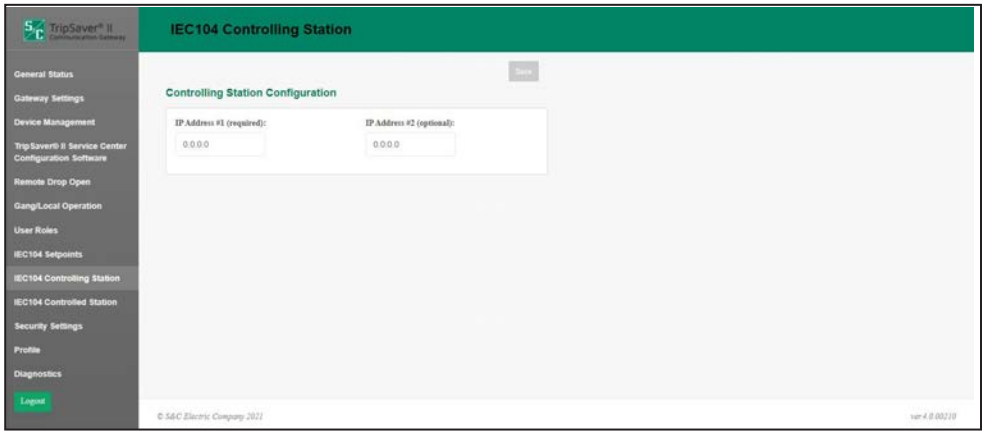


Figure 61. IEC104 controlling station configuration.

IEC104 Controlled Station

The IEC104 controlled station defines the configuration settings for the IEC104 protocol. Default values are shown in Figure 62. They are described as follows:

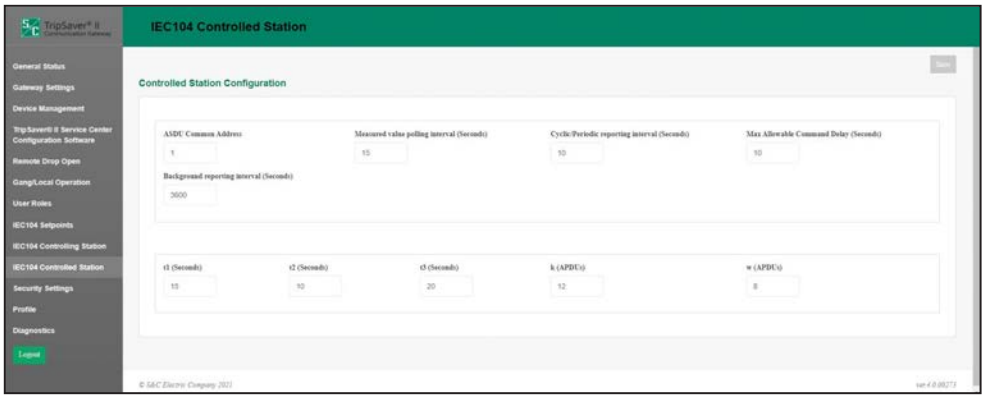


Figure 62. IEC104 controlled station configuration.

ASDU Common Address: The application service data unit (ASDU) common address is the address assigned to the gateway for IEC104 communication. (Range: 1 to 65534)

Measured Value Polling Interval (Seconds): This defines the frequency at which the gateway will refresh measured values for reporting to the controlling station. (Range: 15 to 300)

Cyclic/Periodic Reporting interval (Seconds): This is the time between IEC104 cyclic/periodic reports initiated by the gateway. (Range: 15 to 3600)

Max Allowable Command Delay: This defines the maximum allowed difference between the timestamp provided in an IEC 104 command with time and the present system time. (Range: 1 to 60)

Background Reporting Interval (Seconds): This is the time between IEC104 background reports initiated by the gateway. (Range: 60 to 14400)

t1 (Seconds): This is the timeout for unconfirmed application protocol data units (APDUs), as specified in the IEC 104 standard. (Range: 1 to 255)

t2 (Seconds): This is the send acknowledgement delay, as specified in the IEC 104 standard. (Range: 1 to 255)

t3 (Seconds): This is the keepalive interval, as specified in the IEC 104 standard. (Range: 1 to 172800)

k (APDUs): This is the maximum number of unacknowledged frames in the transmit direction, as specified in the IEC 104 standard. (Range: 1 to 32767)

w (APDUs): This is the maximum number of unacknowledged frames in the receive direction, as specified in the IEC 104 standard. (Range: 1 to 32767)

Security Settings

Secure Tunnel

The communications gateway supports the ability to tunnel all communication network traffic from the communications gateway to a customer-supplied peer. See Figure 63. Enabling a secure tunnel from the communications gateway creates an authenticated, encrypted, and integrity-protected path through which IEC104 traffic will pass.

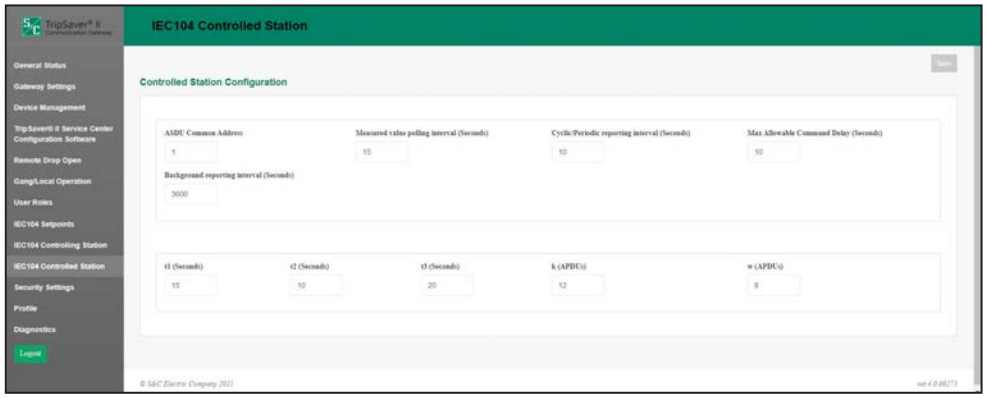


Figure 63. The Secure Tunnel button.

In the **Security Settings** menu, the communications gateway administrator can create the secure communication **OpenVPN** option.

To create a secure tunnel, click on the **Add Secure Tunnel** button and select the **Open VPN** option from the drop-down menu. A dialog box will open for field entry. When the fields are completed, click on the **Add** button to complete and add the tunnel profile.

OpenVPN Configuration

This setting allows the administrator to create an OpenVPN tunnel to encapsulate IP packets from the local interface to the remote OpenVPN server.

As with the tunnel configuration above, select the **Open VPN** option from the drop-down menu. A configuration dialog box will appear. See Figure 64.

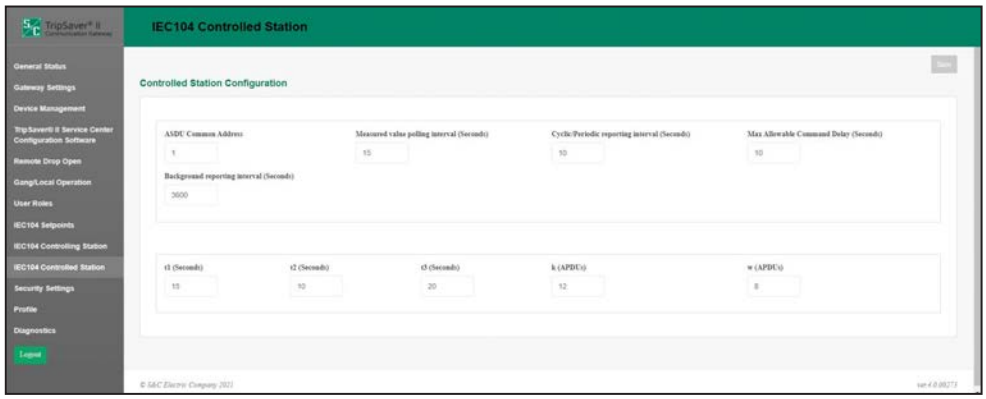


Figure 64. The Open VPN configuration menu.

Follow these steps to add OpenVPN:

STEP 1. Enter the IP (private) address of the VPN server in the **IPsec Server IP** field.

STEP 2. Enter the server port number in the **Server Port** field.

STEP 3. Enter the (private) IP address in the **Server Tunnel IP** field.

STEP 4. Select either the UDP or TCP transport protocol in the **Transport Protocol** field.

STEP 5. Choose a selection, either the 128 or 256 AES Cipher key, from the **Cipher** drop-down menu.

STEP 6. Choose a selection from the **Digest (HMAC)** drop-down menu.

STEP 7. Select either the **On** or **Off** setting for data compression in the **Compression** field.

STEP 8. Choose a selection from the **TLS Security** drop-down menu.

STEP 9. Enter a key in the **TLS Crypt Key** field.

STEP 10. Enter the CA certificate into the **CA Certificate** field.

STEP 11. Enter the device certificate into the **Device Certificate** field.

STEP 12. Enter the device private key into the **Device Private Key** field.

STEP 13. Click on the **Add** button to complete tunnel addition.

The configured OpenVPN tunnel will appear in the listing. Tunnel deletions and modifications are managed by selecting the buttons in this listing.

Remote Web Access

The **Remote Web Access** toggle button enables Web-user interface access via Ethernet Port 2. This configuration setting can only be updated by the admin user and only after the admin user has changed the default password. See Figure 65 on page 66. See the "Enabling Remote Web Access" section on page 66.

NOTICE

If a SpeedNet™ Radio is being used for the field area network radio, the remote Web user's computer will require an additional setting to be updated to enable Web access. The user must reduce the MTU (maximum transmission unit) size to a value of 500 or less. S&C recommends using an MTU size of 500 for optimal performance. To change the MTU size, the following command can be used on a Windows 10 computer: **netsh interface ipv4 set subinterface "Local Area Connection" mtu=500 store=persistent.**

Enabling Remote Web Access

NOTICE

The **Remote Web Access** feature provides similar functionality to local access via Ethernet Port 1. There are some limitations when accessing the gateway via the **Remote Web Access** feature:

- The **Drop Open** commands on the *Gang/Local Operation* screen will not be available.
- The **Enable** command on the *TripSaver II Service Center Configuration Software* screen will not be available.

Follow these steps to enable the **Remote Web Access** feature:

STEP 1. In the *Profile* screen, the gateway admin password must be changed locally from the default password.

STEP 2. On the *Security Settings* screen, the **Remote Web Access** function must be set to the **On** position. See Figure 65.

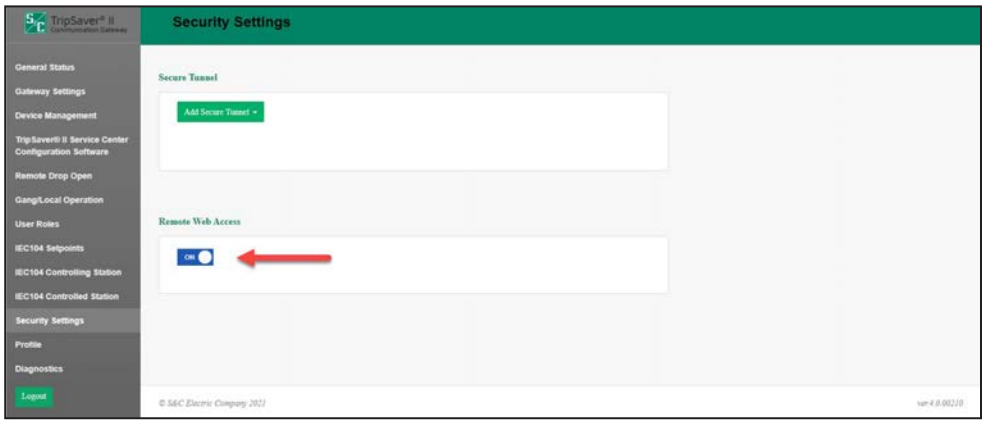


Figure 65. The Remote Web Access slide selector.

STEP 3. See Figure 66. On the *IEC104 Setpoints* screen, a **Single Command** or **Double Command** point must be configured with a code description:

"1: Communication Gateway remote web user interface switch."

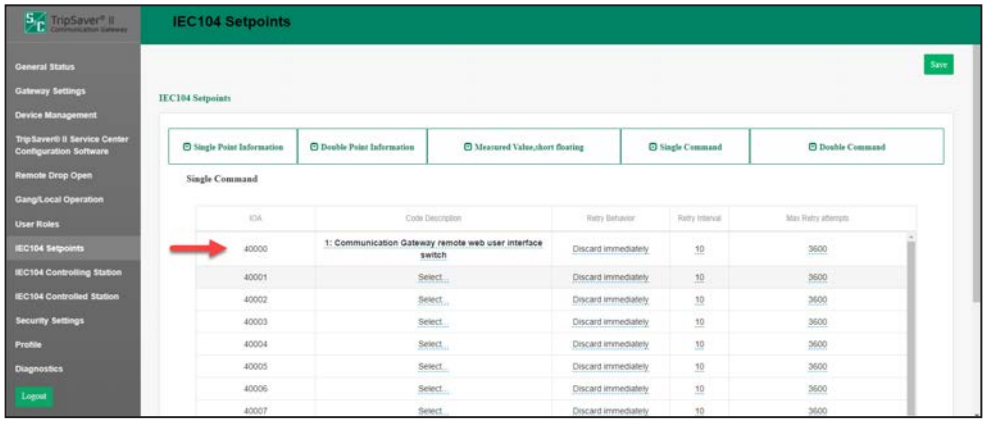


Figure 66. The remote Web access command point.

STEP 4. See Figure 67. On the *IEC104 Setpoints* screen, two **Single Point Information** or **Double Point Information** status points must be configured with the following code descriptions:

"8. Communication Gateway remote web user interface access enabled"

"9. Communication Gateway remote web user interface access enabled via SCADA"

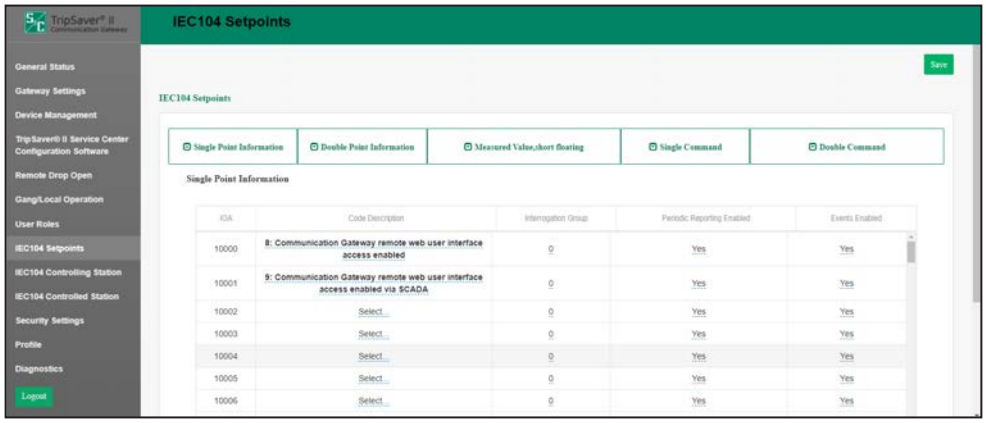


Figure 67. The remote Web access status points.

STEP 5. If a SpeedNet Radio is used for the field area network radio, the remote Web user's computer will require an additional setting to be updated to enable Web access. The user must reduce the MTU (maximum transmission unit) size to a value of 500 or less. S&C recommends using an MTU size of 500 for optimal

performance. To change the MTU size, the following command can be used on a Windows 10 computer: **netsh interface ipv4 set sub-interface "Local Area Connection" mtu=500 store=persistent.**

STEP 6. From the IEC 104 controlling station, send a single command or double command to the information object address (IOA) configured in Step 3. See Figure 66 on page 67.

STEP 7. At the IEC 104 controlling station, check the **Single Point Information** or **Double Point Information** points configured in Step 4:

"8: Communication Gateway remote web user interface access enabled" point reflects "1"/"True" value.

"9: Communication Gateway remote web user interface access enabled via IEC104" point reflects "1"/"True" value.

STEP 8. When the **Single Point Information** or **Double Point Information** points reflect the values in Step 7, the user should confirm connectivity to the communication gateway from the user's computer configured with the workaround and connected into the network connected to the SpeedNet Radio headend point. The URL should be the IP address associated with communication gateway's Ethernet Port 2.

Profile

The *Profile* screen enables the present user logged in to the communication gateway to change his or her password credentials. See Figure 68.

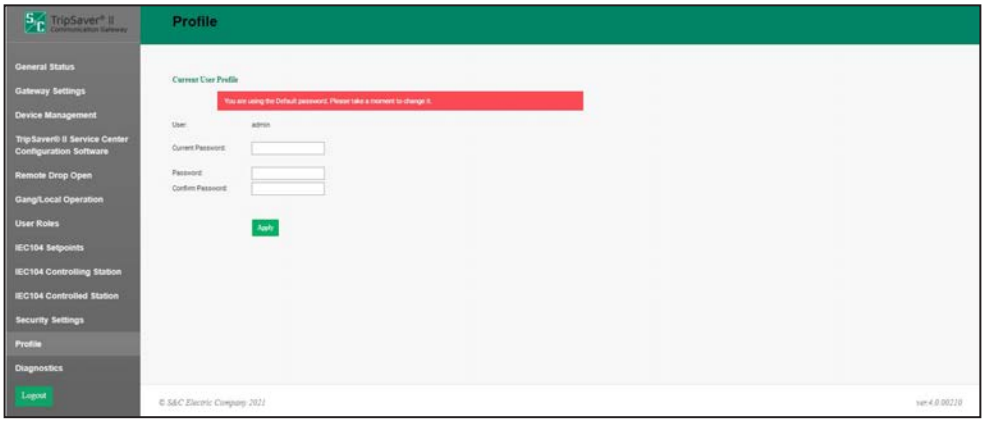


Figure 68. The *Profile* screen.

Diagnostics

The purpose of the *Diagnostics* screen is to initiate the retrieval of the Diagnostic and Event Log files. See Figure 69.

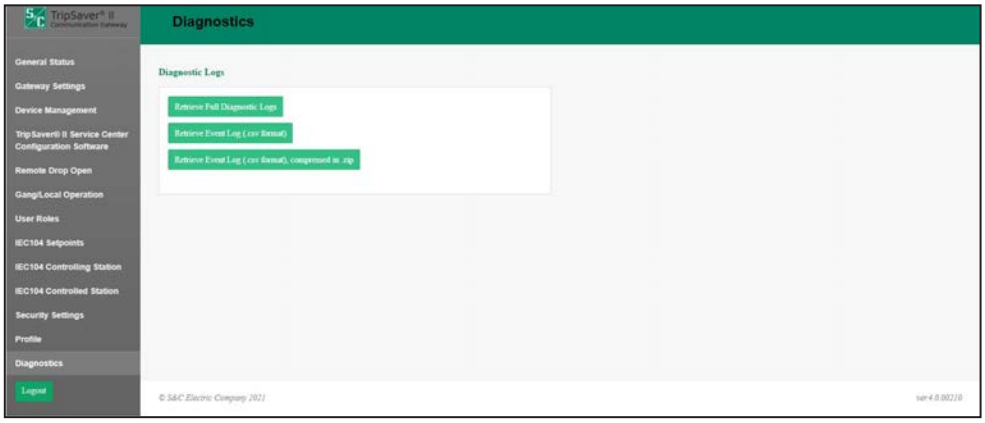


Figure 69. The *Diagnostics* screen.

When any of the **Retrieve** buttons are selected, a dialog box appears with a **Download** and **Cancel** button. See Figure 70. After clicking the **Download** button, a completion bar will display.

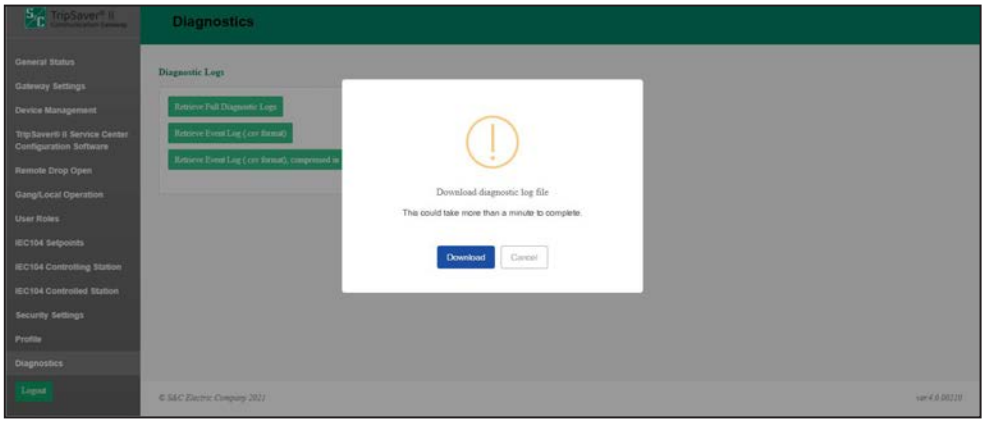


Figure 70. The Diagnostic Log download dialog box.

If the **Download** button is clicked, a notification of file download completion appears, and the log file will be saved in the computer's Download file folder. See Figure 71.

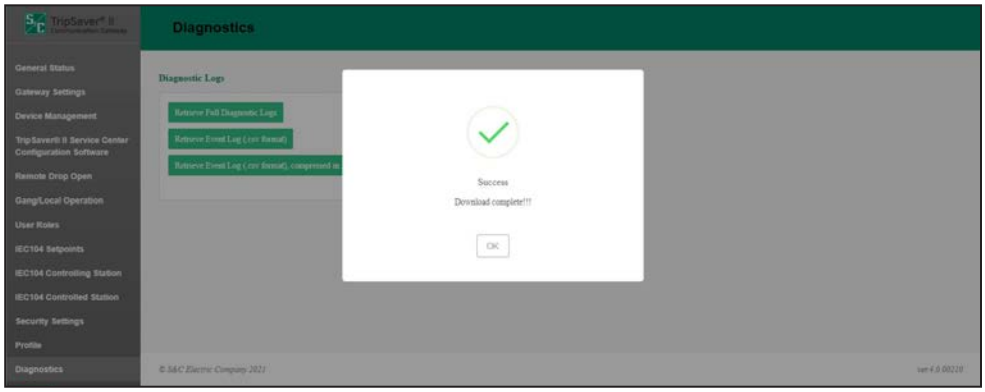


Figure 71. The diagnostic log success message.

Service Center Pairing a TripSaver II Recloser with Firmware Version 1.8 or Later

NOTICE

A quick start guide to pairing a TripSaver II recloser with the communications gateway can also be found in S&C Instruction sheet 461-521, "TripSaver® II Cutout-Mounted Recloser, Outdoor Distribution (15 kV and 25 kV): *TripSaver® II Communications via Gateway Pairing Quickstart Guide."*

⚠ DANGER

The TripSaver II Cutout-Mounted Recloser MUST be de-energized and removed from the utility pole before attaching the "corded" power module (power module with ac adapter and extension cord) to the base of the TripSaver II recloser. The corded power module is ONLY intended to be used for setup and data collection when the TripSaver II recloser is de-energized and removed from the utility pole. Failure to remove the TripSaver II recloser from the utility pole before connecting the corded power module can cause arcing, burns, electric shock, and death.

With the introduction of TripSaver II Cutout-Mounted Recloser firmware version 1.8, the TripSaver II recloser can be paired with a communications gateway at the user's service center using the power module from the service center configuration kit and the S&C Magnet Tool. S&C recommends commissioning (pairing) TripSaver II reclosers with the communications gateway one at a time. This will ensure each recloser is fully connected to the communications gateway before pairing the next recloser. Pairing the reclosers one at a time is the fastest method to pair a TripSaver II recloser and a communications gateway. TripSaver II reclosers must be furnished with the **Extended Open Interval** option, which allows up to a 30-second open interval between reclose operations.

To pair a TripSaver II recloser in the service center:

STEP 1. Using a PC loaded with Service Center Configuration Software v1.8 or later, the corded power module, a USB transceiver, and TripSaver II Service Center Configuration Software, set the TripSaver II recloser loaded with firmware version 1.8 or later to **Gateway** mode. Instructions for setting the recloser to **Gateway** mode can be found in the "Communications Settings Menu" section of S&C Instruction Sheet 461-504, "TripSaver® II Cutout-Mounted Recloser, Outdoor Distribution (15 kV and 25 kV): *For Overhead Distribution Systems: Protection Setup Using Service Center Configuration Kit.*"

STEP 2. Disconnect from the service center configuration software and remove the USB transceiver from the PC. With the power module still connected to the TripSaver II recloser, attach the magnet tool's magnet to the green S&C logo sticker on the side of the TripSaver II recloser. More information on using the magnet tool can be found in S&C Instruction Sheet 461-507, "TripSaver® II Cutout-Mounted Recloser, Outdoor Distribution (15 kV and 25 kV): *Operation Manual Enabling Pole-Top Communications Via the Magnet Tool.*" This will turn on the TripSaver II recloser's wireless communications.

STEP 3. Connect to the communications gateway with a PC as described in the "Software User's Guide" section on page 19. In the *Device Management* screen, click on the **Add TripSaver II** button. Fill in the Transceiver ID and TripSaver II Device Name (if desired), and click on the **OK** button. **Note:** The device name can be anything but is usually a description of where the TripSaver II recloser is installed.

STEP 4. When the TripSaver II recloser has been successfully paired, the device will appear in the device listing in the device panel. Periodically refresh the communications gateway's *TripSaver II Device Management* screen using the browser's **Refresh** button. The TripSaver II recloser will be listed as "connected" when pairing is complete. The pairing process could take approximately 5 minutes. If the TripSaver II recloser does not pair, see the "Troubleshooting" section on page 74.

STEP 5. When paired, disconnect the magnet tool's magnet and power module. Both the communications gateway and TripSaver II recloser will remember their pairing after being moved to the installation site and installed. The paired TripSaver II reclosers should be installed no more than 100 feet (30.5 m) from the communications gateway. For optimal performance, install the TripSaver II recloser no more than 30 feet (9.1 m) away from the communications gateway and in direct line of sight.

Field-Pairing a TripSaver II Recloser with Firmware Version 1.6 or 1.7 Installed on the Utility Pole and Powered by Line Current

For TripSaver II reclosers furnished with firmware version 1.6 or 1.7, pairing can only be performed with the TripSaver II recloser powered by line current or an external power source. (For specifications for an external power source, contact the S&C Global Support and Monitoring Center.) To pair with the communications gateway, these reclosers must be installed within 100 feet (30.5 m) of the communications gateway and be furnished with the **Extended Open Interval** option, which allows up to a 30-second open interval between reclose operations.

Note: Though S&C strongly recommends upgrading the firmware of the TripSaver II recloser to be paired with the communications gateway to version 1.8 or later, there may be a need to pair a TripSaver II recloser using an older version of the firmware with a communications gateway. For TripSaver II reclosers furnished with firmware version 1.6 or 1.7, pairing can only be performed at the installation site with the TripSaver II recloser powered by line current. This procedure can also be used when pairing a TripSaver II recloser with firmware version 1.8 or later with a communications gateway already installed in the field.

To perform field-pairing, follow these steps:

STEP 1. Using a PC loaded with Service Center Configuration Software v1.8 or later, the corded power module, a USB transceiver, and TripSaver II Service Center Configuration Software, set the TripSaver II recloser to **Gateway** mode. Instructions for setting the recloser to **Gateway** mode can be found in the "Communications Settings Menu" section of S&C Instruction Sheet 461-504, "TripSaver® II Cutout-Mounted Recloser, Outdoor Distribution (15 kV and 25 kV): *For Overhead Distribution Systems: Protection Setup Using Service Center Configuration Kit*." Disconnect the service center configuration software and remove the USB transceiver from the USB port.

STEP 2. Install the TripSaver II recloser(s) to be paired to the gateway to the utility pole, as described in S&C Instruction Sheet 461-502, "TripSaver® II Cutout-Mounted Recloser, Outdoor Distribution (15 kV and 25 kV): *Installation and Operation*," and power it via line current. Install the communications gateway no more than 30 feet (9.1 m) from the TripSaver II recloser(s) to be paired. Connect the communications gateway to ac power.

STEP 3. Connect to the communications gateway with a PC as described in the "Software User's Guide" section on page 19. In the *Device Management* screen, click on the **Add TripSaver II** button. Fill in the Transceiver ID and TripSaver II Device Name (if desired), and click on the **OK** button. **Note:** The device name can be anything but is usually a description of where the TripSaver II recloser is installed.

When the TripSaver II recloser has been successfully paired, the device will appear in the device listing in the device panel. Periodically refresh the communications gateway's *TripSaver II Device Management* screen using the browser's **Refresh** button. The TripSaver II recloser will be listed as "connected" when pairing is complete. The pairing process could take approximately 15 minutes. If the TripSaver II recloser does not pair, see the "Troubleshooting" section on page 74.

Signal Interference

Difficulties in pairing a TripSaver II recloser with a communications gateway are usually caused by signal interference. Remember, the communications gateway should be no more than 100 feet (30.5 m) away from the TripSaver II recloser and should have an unobstructed view of the recloser. The communications gateway antenna is directional, and the TripSaver II reclosers must be installed above the communications gateway, ideally on the same pole. Also, the heavy use of Bluetooth devices, cellular devices, or Wi-Fi can cause radio interference.

If radio traffic is heavy, S&C recommends moving the recloser and communications gateway closer to one another.

For optimal performance, install the TripSaver II recloser no more than 30 feet (9.1 m) away from the communications gateway and in direct line of sight.

Pairing Process Takes Longer Than Expected

Pairing a TripSaver II Cutout-Mounted Recloser should take approximately 5 minutes. In some cases, it may take up to 15 minutes. If after waiting for 15 minutes the gateway (after refreshing the browser) does not register as "connected," S&C recommends resetting wireless communications in the TripSaver II recloser by completing the following procedure:

STEP 1. Mitigate any signal interference using the techniques described in the "Signal Interference" section.

STEP 2. With the recloser removed from the utility pole, connect to the TripSaver II recloser using the service center configuration kit. (The kit includes the USB transceiver, corded power module, and ac adapter.) Detailed Instructions for connecting to a TripSaver II recloser using the service center configuration software can be found in S&C Instruction Sheet 461-504, "TripSaver® II Cutout-Mounted Recloser: For Overhead Distribution Systems: *Protection Setup Using Service Center Configuration Kit*."

STEP 3. Navigate to the **Communications Settings** menu and select the **Communications Mode** drop-down menu. Change the **Communications** mode to the **Non-Gateway Mode** setting.

STEP 4. Click on the **Apply Communications Mode** button.

Note: The **Apply Communications Mode** button will not apply any changes that have been made on any other menu screens. If changes have been made to another menu screen, such as the *TCC Curve Settings* screen, click on the **Apply** button.

STEP 5. The TripSaver II recloser is now in **Non-Gateway** mode. Select **Gateway** mode from the drop-down menu. Click on the **Apply Communications Mode** button to place the recloser back in **Gateway** mode.

STEP 6. Connect to the communications gateway, as described in the "Software User's Guide" section on page 19. Remove the TripSaver II recloser's entry on the *Device Management* screen. Disconnect the TripSaver II recloser from the service center configuration software by clicking on the **Disconnect** button.

STEP 7. Pair the TripSaver II recloser with the new communications gateway using the instructions in the "Commissioning (Pairing) a TripSaver II Recloser for Use with the Communications Gateway" section on page 71.

Pre-Installation

☐ Examine the shipment(s) and make sure it includes:

- The communications gateway
- Mounting hardware for securing the gateway to the pole
- An ac power cable

☐ Make sure the recloser uses firmware v1.6 or later for **Extended Open Interval** functionality.

☐ Always read the Danger and Warning labels.

☐ Follow your company's PPE guidelines and standard operating procedures.

Installation

☐ For the communications gateway, verify:

- The field-area-network radio is configured, installed, and connected.
- The communications gateway is mounted securely on the pole.
- The communications gateway is grounded.
- The ac power cable is connected and control power is available.
- The remote antenna (if applicable) is installed and connected.
- The communications gateway is locked for security, when configured and operational.

☐ For the TripSaver II reclosers, verify:

- The recloser is set to **Gateway** mode.
- The reclosers are powered up.

After the above steps are complete, proceed with the following if they have not already been done:

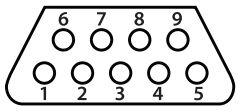
☐ Pair the communications gateway with TripSaver II recloser(s).

☐ Configure the communications gateway. To configure the communications gateway in the service center, use the three-prong ac power cable (cat. number 007-002101-01/02).

Interface Pinouts

The RS-232 port of the gateway controller module (green box) is configured as data-terminal equipment. See Table 5.

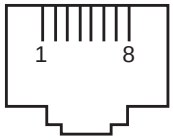
Table 5. Gateway Controller Module RS-232 Interface Pinout



Pin	Function	Description
1	NC	No Connection
2	RX from Radio	RS-232 Receive
3	TX to Radio	RS-232 Transmit
4	NC	No Connection
5	TX to Radio GND	Signal Ground
6	NC	No Connection
7	RTS to Radio	Request to Send
8	CTS to Radio	Clear to Send
9	NC	No Connection

Ethernet Ports 1 and 2 use RJ-45 connectors with the pinout shown in Table 6. They are auto-sensing for assignment of transmit and receive lines (no crossover cables required) and auto-negotiate for 10-Mbps or 100-Mbps data rates, as required by the connected device.

Table 6. Ethernet Ports Pinout



Pin	Function	Description
1	TXD+	Transmit
2	TXD-	Transmit
3	RXD+	Receive
4	NC	No Connection
5	NC	No Connection
6	RXD-	Receive
7	NC	No Connection
8	NC	No Connection

Power System Diagram

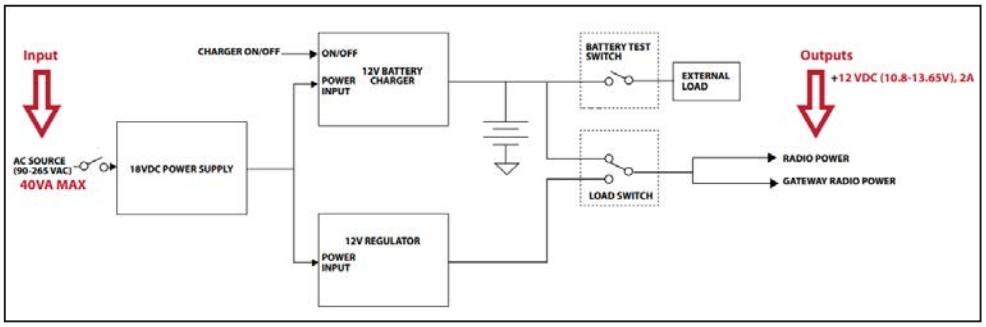


Figure 72. The communications gateway power system diagram.

Note: A user-supplied disconnect switch may be required for installation between the ac input and the PS/Battery board. Contact the nearest S&C Sales Office for details.

Understanding the Radio Mode

The TripSaver II recloser has a built-in transceiver for local communications that can be operated in either **USB Transceiver** mode or **Communications Gateway** mode. Both modes use short-range 2.4-GHz wireless communications. With a USB transceiver and a PC with the service center configuration (SCC) software, this **USB Transceiver** mode enables settings configuration and information download directly between the TripSaver II recloser and the SCC software loaded on a PC.

After pairing the TripSaver II recloser with a gateway using a PC and Ethernet cable, TripSaver II recloser-to-communications gateway functions can be enabled such as **Gang** operation, as well as long-range SCADA functions such as remote SCADA communications, and remote drop open.

Exclusive use of one radio mode at a time is required. The mode is selected by applying the side magnet, cordless power module, and line current in combinations as shown in Table 7 on page 78. Radio activation is different for firmware versions 1.7 or later, so methods for both versions are included in Table 7 on page 78.

⚠ DANGER

The TripSaver II Cutout-Mounted Recloser MUST be de-energized and removed from the utility pole before attaching the “corded” power module (power module with ac adapter and extension cord) to the base of the TripSaver II recloser. The corded power module is ONLY intended to be used for setup and data collection when the TripSaver II recloser is de-energized and removed from the utility pole. Installing the “corded” power module to a recloser on the utility pole can cause arcing, burns, electric shock, and death.

Cybersecurity–Communications Gateway Radio Mode

The TripSaver II recloser and TripSaver II Communications Gateway use open standards such as IPv6 and 802.15.4 MAC and PHY layers as a foundation for communication security.

When a TripSaver II Communications Gateway is commissioned for the first time, it generates a completely random network master key. The network master key is, therefore, unique per TripSaver II Communications Gateway and the paired TripSaver II reclosers, allowing communications only between these devices. The network master key is used to authenticate access and to derive the encryption keys for data encryption.

Upon powering up, a TripSaver II recloser will identify itself to the communications gateway and use a secure algorithm to establish an authenticated and encrypted connection to the gateway. The gateway operator must then explicitly add the TripSaver II recloser to the local network via the secure Web-user interface.

Communications between the TripSaver II recloser and the communications gateway for operational/application data is always encrypted using AES with a 128-bit encryption key derived using a one-way secure hashing function that combines the network master key learned during the pairing step above, with the key sequence numbers that are automatically changed on a periodic basis.

Table 7. Radio Mode

Gateway Mode Configuration Setting: Enabled or Disabled?	Line Power Available?	Cordless Power Module Available? ①	Side Magnet Applied?	Side Magnet Configuration Setting: Is Enabled?	Radio Mode (Firmware v1.7)	Radio Mode (Firmware v1.8 and Later)
Disabled	Yes	No	No	●	Radio off	Radio off
Disabled	●	Yes	No	●	USB transceiver	USB transceiver
Disabled	Yes	No	Yes	No	Radio off	Radio off
Disabled	Yes	No	Yes	Yes	USB transceiver	USB transceiver
Disabled	●	Yes	Yes	No	USB transceiver	USB transceiver
Enabled	Yes	No	No	●	Communications gateway	Communications gateway
Enabled	●	Yes	No	●	USB transceiver	USB transceiver
Enabled	Yes	No	Yes	No	Communications gateway	Communications gateway
Enabled	Yes	No	Yes	Yes	Communications gateway	Communications gateway
Enabled	●	Yes	Yes	No	USB transceiver	Communications gateway

① The corded ac power module should never be connected to the TripSaver II recloser when the recloser is powered by line current. See the "Danger" message on page 77.

● This could be set to "Yes" or "No" without affecting the **Radio** mode

Gateway Controller Module Indicator Lights

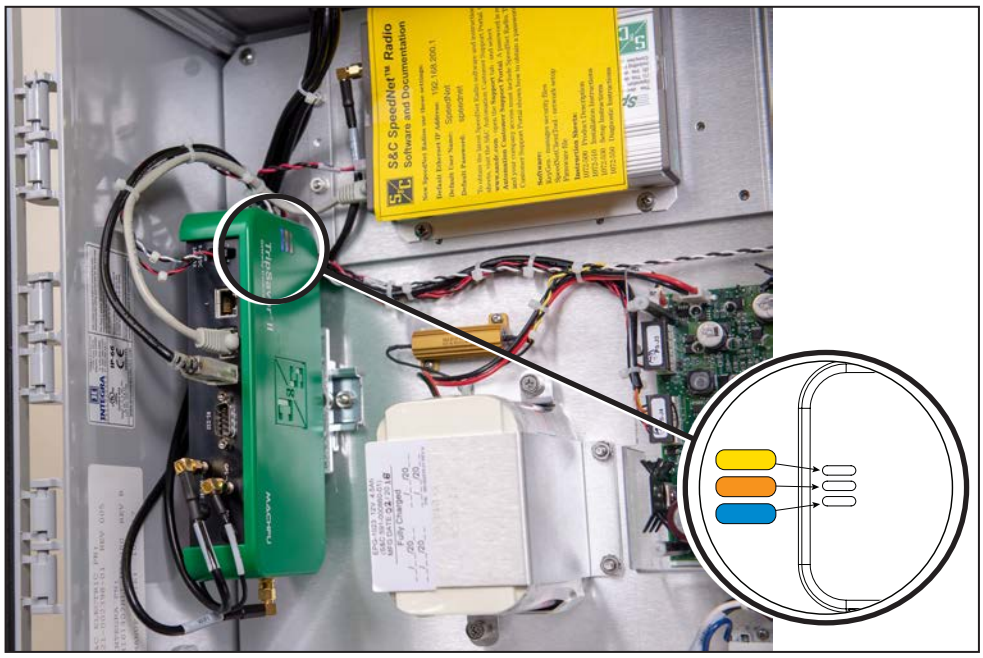


Figure 73. LED indicator lights.

Blue LED: The gateway controller module is connected to power. See Figure 73.

Orange LED: This is the "Heartbeat LED." This LED indicates various stages during the module's **Startup** sequence. When the module is first powered on, the orange LED will be off for 15 seconds and then on for 10 seconds. When the module starts initializing, the orange LED will blink rapidly for 2 seconds (8 blinks) and then stay off for 3 seconds. When initialization is complete, it blinks for 4 seconds (4 blinks) and stays off for 1 second.

Yellow LED: Always On. Reserved for future use.

Regulatory Information

This document contains statements that are required for compliance with the rules and policies of various national and international regulatory agencies. The information is current as of the date of this publication but may be subject to change without notice. For the most recent version of this Instruction Manual with the most up to date regulatory information, visit **www.sandc.com**.

United States of America–FCC (Federal Communication Commission)

This device complies with part 15 of the FCC rules and regulations regarding unlicensed transmissions. Operation is subject to the following two conditions: (1) This device may not cause harmful interference and (2) this device must accept any interference.

IMPORTANT! Changes or modifications not expressly approved by S&C Electric Company could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Canada–ISED (Innovation, Science & Economic Development Canada)

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil est conforme aux normes Industry Canada exemptes de licence RSS standard(s). Son fonctionnement est soumis aux deux conditions suivantes: (1) cet appareil ne doit pas provoquer d'interférences et (2) cet appareil doit accepter toute interférence, y compris les interférences susceptibles de provoquer un fonctionnement indésirable.

The changes or modifications not expressly approved by the S&C Electric Company could void the user's authority to operate the equipment.

CAN ICES-3 (A)/NMB-3(A)

Australia/New Zealand (ACMA)

The above-mentioned product complies with the requirements of the relevant ACMA Standards made under the Radiocommunications Act 1992 and the Telecommunications Act 1997. These Standards are referenced in notices made under section 182 of the Radiocommunications Act and 407 of the Telecommunications Act.

Brazil (ANATEL):

Atendimento à Regulamentação Anatel

Este equipamento não tem direito à proteção contra interferência prejudicial e não pode causar interferência em sistemas devidamente autorizados.

Este produto está homologado pela ANATEL, de acordo com os procedimentos regulamentados pela Resolução 242/2000, e atende aos requisitos técnicos aplicados.

Para maiores informações, consulte o site da ANATEL. www.anatel.gov.br

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