



Server Technology's Monitoring Solution Featuring Bluetooth® Wireless Technology and the ST Eye® Mobile App (for Apple iOS) – Part Numbers KIT-STEYE-01 and KIT-STEYE-10

Purpose

This technical note provides functional information about Server Technology's innovative solution featuring secure Bluetooth® wireless technology for mobile monitoring using an Apple iOS device (iPad or iPhone).

This unique solution for the data center is the first time Bluetooth wireless technology has been paired with Server Technology's PRO2 products for **immediate mobile access to device operational data**.

Important Note About the Bluetooth® Module:

All Server Technology PDU products labeled "Bluetooth Ready" **do not** have the capability of transmitting or receiving data by radio wave.

Using Server Technology's ST Eye® mobile app, version 2.1, you can remotely monitor critical information about a PRO2 unit – with easy access to power and environmental data – displayed directly on your iPad/iPhone via the ST Eye user interface.

The following areas of the Bluetooth® wireless technology solution are covered in this document:

- Hardware connection between the Bluetooth module and the PRO2.
- Security issues for the data center when using this solution.
- Discoverability of the Bluetooth module.
- User interface of the ST Eye mobile app for the Apple iOS device.
- Configuration of the firmware parameters used in the Bluetooth solution.

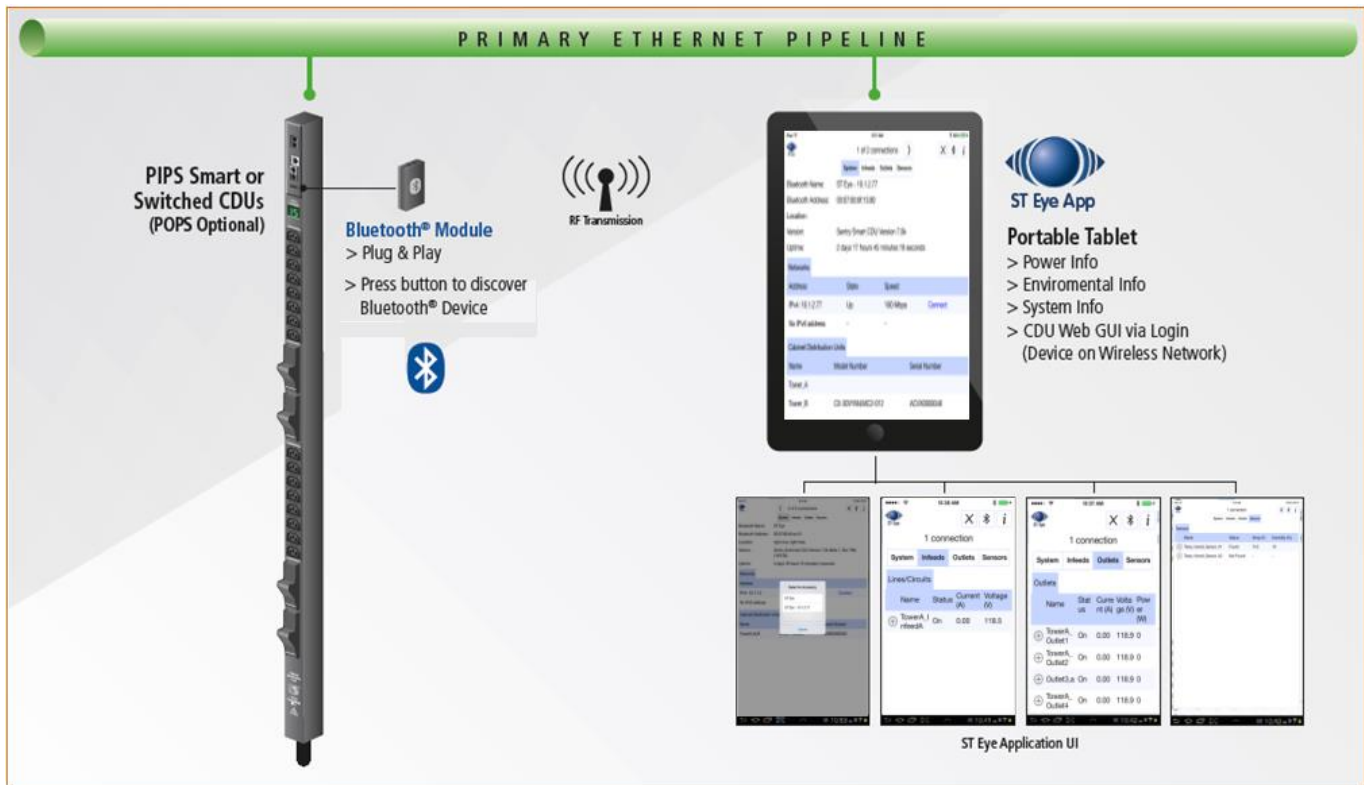
Why Use This Solution?

Server Technology's mobile monitoring solution offers the following significant benefits for the data center:

- Easy connection with Bluetooth® technology for quick and easy mobile monitoring of critical PRO2 information right at the cabinet.
- Server Technology's **free** ST Eye mobile app and user interface for mobile monitoring. No other app or a purchased license key are required to get started with this solution. The ST Eye mobile app can be installed from the Apple iTunes Store <http://www.apple.com/itunes/>
- Use your own iPad/iPhone in the data center anytime for instant access to the PRO2. Locked cabinets and hot aisle device access are no longer obstacles for obtaining immediate device data.
- A physical connection is not required at the cabinet between a computer and the PRO2 (via the network or serial port) to obtain PRO2 data.
- If your iPad/iPhone is connected to the wireless network in the data center, ST Eye will also allow mobile access for login to the PRO2 via the secure web interface of the firmware.

System Overview

The following system illustration identifies key hardware and software components for this wireless solution:



System Overview of Mobile Monitoring Using Bluetooth Wireless Technology

System Overview

As shown in the illustration above, several items are part of Server Technology’s mobile solution:

Server Technology PRO2

Server Technology’s intelligent Switched or Smart PRO2 and ready-made for connection to the Bluetooth® module.

The Bluetooth® Module

The separate, external Bluetooth wireless device connected to the PRO2 via a locking cable. The module establishes a secure connection for the overall solution.

ST Eye®

Server Technology’s free mobile application for download to the iPad/iPhone. The ST Eye app makes system, infeed, outlet, and sensor data available from the PRO2 for mobile viewing and monitoring

Data Center Security

Server Technology has addressed the key areas of security in the Bluetooth® technology solution:

Secure Bluetooth® Communications

The Server Technology solution provides a secure and wireless way to obtain power data. Server Technology's mobile application, ST Eye, uses the improved technical methods from the Bluetooth® core specification, version 2.1, known as "secure simple pairing," which eliminates security vulnerabilities found in older Bluetooth systems.

The Server Technology Bluetooth connection in this solution is encrypted with the EO stream cipher to prevent passive eavesdropping. The encryption key is established using the Elliptic-Curve-Diffie-Hellman (ECDH) key exchange. To prevent differential crypt-analysis attacks against the cipher, the encryption key is rotated every packet. New keys will be established before they are reused.

Based on recommendations from the National Institute of Standards and Technology (NIST), several options have been programmed into the solution to limit the discoverability of PDUs:

- Users can lower the range of the Bluetooth module to prevent connections from colocation neighbors.
- Sensitive data is not transmitted over the connection, such as user credentials.
- The pin code used for hardware authentication is hashed to prevent recovery.
- No commands are available via the ST Eye mobile app to modify the state of the PRO2.
- Limited Discoverability Feature – The ST Eye app is shipped with limited discoverability so the Bluetooth module does not broadcast until the user explicitly instructs the module to do so by pressing a button or by making a configuration change.

The user can also rely on ST Eye's unique QR code discovery method to connect out-of-band to a PRO2 used in this solution. The QR code method prevents eavesdroppers from discovering Bluetooth modules in a colocation environment.

In conclusion, the Server Technology solution uses the security improvements mentioned above to prevent published attacks against the Bluetooth technology connection. The solution successfully balances security and ease-of-use.

Note: This encryption does not prevent unwanted Bluetooth communications if a user somehow gains access to the address of the Bluetooth module.

Security of the Bluetooth® Module

Within the existing security of the Bluetooth® module, the ST Eye mobile app security also relies on the physical security of the module itself, as well as the short distances under which the Bluetooth module can communicate.

In addition, Server Technology added a check in the firmware not to allow any modifications to any part of the firmware system through a Bluetooth connection. This means firmware system data cannot be changed through the Bluetooth port on the PRO2 unit, even if there was physical access to a remote Bluetooth port, or even if the mobile phone app was hacked in the attempt to write system data.

Security Measures

To access the Bluetooth® information using the ST Eye mobile app, the following items must be in place:

- Users must be physically present in the data center.
- Users must have a mobile device with them on which the ST Eye app was installed.
- Users must be able to physically press the pushbutton on the Bluetooth module to initiate communication.
- Once connected to the Bluetooth module using the ST Eye mobile app, all that users can do is **view** PRO2 operational information – no user control actions can be performed.
- The only way to move from the ST Eye mobile app to the firmware user interface for the PRO2 is to place the iPad/iPhone on the data center's wireless network. The firmware username and password will then be required for login and access to the PRO2.

Overall Security

Security of the solution using the Bluetooth® wireless technology is ensured with the combination of:

- Inherent Bluetooth security
- Required physical access to both the data center and the Bluetooth module

In addition, considering the fact that the user can only **view** PRO2 information when using the ST Eye mobile app, all these noted safeguards actually make a hacking attempt pointless.

Before You Begin

You will need the following items to start using the Bluetooth® solution, but note that you do not need to purchase a separate software license key.

Server Technology PRO2 Units

Server Technology's intelligent PRO2 units (Smart or Switched products).

Note: Power Infeed Power Sensing (PIPS) is standard and enabled on all shipped PRO2 units. PIPS technology provides power monitoring per infeed/inlet to the PRO2 to monitor current, voltage, power (W), apparent power, crest factor, reactance, power factor, and accumulated energy (kWh).

Firmware

Firmware, version 8.0 or later, is required to allow configuration of several parameters used in the solution. The PRO2 products will only operate with firmware 8.0.

Mobile Device

An Apple iOS iPhone/iPad, up to version 9.3, for displaying PRO2 data.

ST Eye Mobile Application

Server Technology's mobile app, ST Eye, downloaded on the iPad/iPhone. No other apps are required.

The Bluetooth® Technology Hardware Kits

Initial deployment of the Bluetooth® solution is provided by Server Technology as a bundle that will be shipped with two major components:

- Switched or Smart PRO2, and
- Hardware kit (part number KIT-STEYE-10) with a 10' locking cable.

Later deployment of PDUs for the Bluetooth® solution will offer another hardware kit (part number KIT-STEYE-01) with a 1' locking cable, if a shorter cable length is preferred.

Note: KIT-STEYE-01 (with the 1' locking cable) or KIT-STEYE-10 (with the 10' locking cable) can be purchased separately as an optional accessory without a PRO2.

Both hardware kits (KIT-STEYE-10 and KIT-STEYE-01) contain the following items:

- Locking Cable
- Bluetooth® Module
- QR Code Label (used for the Google Android solution; can be discarded for the Apple iOS solution)

Locking Cable

The locking cable establishes a physical connection between the Bluetooth® module and the PRO2. One end of the cable connects to the module and the other end connects to the AUX port of the PRO2.

Part number KIT-STEYE-10 – contains a 10' cable (bundled with the PRO2 for initial shipments of the Bluetooth solution).

Part number KIT-STEYE-01 – contains a 1' cable (available for future purchase as a separate and optional accessory).

Bluetooth® Module

The Bluetooth® module is the small wireless device that is physically connected by the locking cable to the PRO2.



Bluetooth Module and Connection to the PRO2

QR Code Label

A single QR Code label, as follows, is included in your kit:

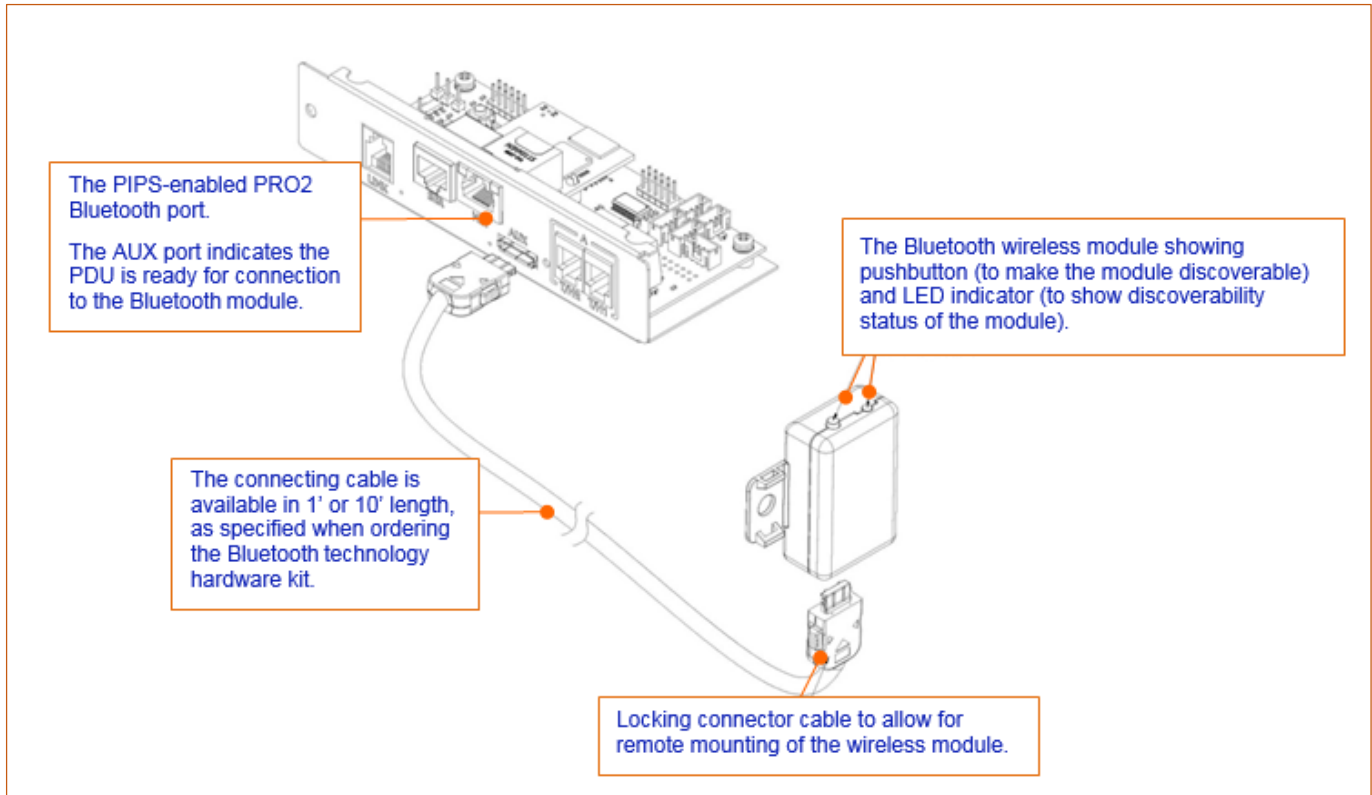


Note: Although this QR Code label is a component in your Apple iOS kit, the label is used only for the Bluetooth® solution with Google Android mobile devices.

When using Apple iOS devices, the label is unnecessary and can be discarded.

Making the Bluetooth® Wireless Connection

This illustration shows the overall hardware connection of the PRO2 to the separate Bluetooth® module:



Hardware Connection Using Bluetooth Wireless Technology

Bluetooth® Ready Sticker

A separate “Bluetooth Ready” sticker is factory-placed on the PRO2 to identify the device as ready to be used in the mobile solution.



Even if this sticker is missing, you can still tell if a PDU in your equipment layout is ready for the mobile monitoring solution by the AUX port installed specifically to connect to the Bluetooth module.

Important: All Server Technology PDU products labeled “Bluetooth Ready” do not have the capability of transmitting or receiving data by radio wave.

Discoverability of the Bluetooth® Module

The Bluetooth® module communicates with the PRO2 to establish a secure Bluetooth connection that makes operational data from the PRO2 available for viewing.

The module has a pushbutton on one side that is pressed to make the module discoverable. To be discovered, first the module must be in proper discoverability mode, based on firmware settings, described below.



QR Code Label on the Bluetooth Module

LED Indicator Discoverability Status:

A blue LED indicator (located next to the pushbutton on the module) shows discoverability status of the module.

- Light flashing = module is discoverable; flashing occurs when pushbutton on the module is pressed.
- Light off = module is not discoverable.
- Light on = module is connected.

Firmware Discoverability Settings

Firmware, version 8.0 or later, uses the following user-configured settings to set the discoverability status of the module:

Firmware Discoverability Settings	
Setting	Description
Enabled	Bluetooth® module is discoverable – even without pressing the pushbutton.
Limited	(Default) Pushbutton on the Bluetooth® module must be pressed to make the module discoverable for 60-seconds.
Disabled	Bluetooth® module is never in discoverable mode.

The above discoverability settings, along with other Bluetooth® parameters, are available for configuration by the firmware administrative-user account.

For more information, see [Configuring Bluetooth Parameters Using Firmware](#) in this document.

Discovering a Bluetooth® Module:

For a Bluetooth module to be discovered, the ST Eye app must be installed on the iPad/iPhone, and the module must be in a discoverable state – this means a flashing light on the module. The firmware setting that determines the status of the module must be Enabled or Limited (default). The setting cannot be disabled.

Working with the ST Eye Mobile App



Server Technology's ST Eye app works over a secure connection with Bluetooth® wireless technology to locate PRO2 units in the data center that have been made ready for the mobile monitoring solution with an attached Bluetooth module.

ST Eye collects key operational data from the PDUs and displays the information for viewing on the iPad/iPhone.

Getting Started Checklist

Before using the ST Eye app, make sure the following steps have been done:

- Ordered and received the Bluetooth technology hardware kit from Server Technology.
- Connected the Bluetooth module to a PRO2 unit via the Bluetooth port.
- (Optional) Configured Bluetooth module discoverability state (Enabled, Limited, or Disabled) via the firmware.

Note: The Bluetooth module and the firmware, version 8.0 or later, ship with the default "Limited" discoverability setting (requires pushbutton to be pressed when discovering the module.) For more information about these values, see the Firmware Discoverability Settings table on the previous page.

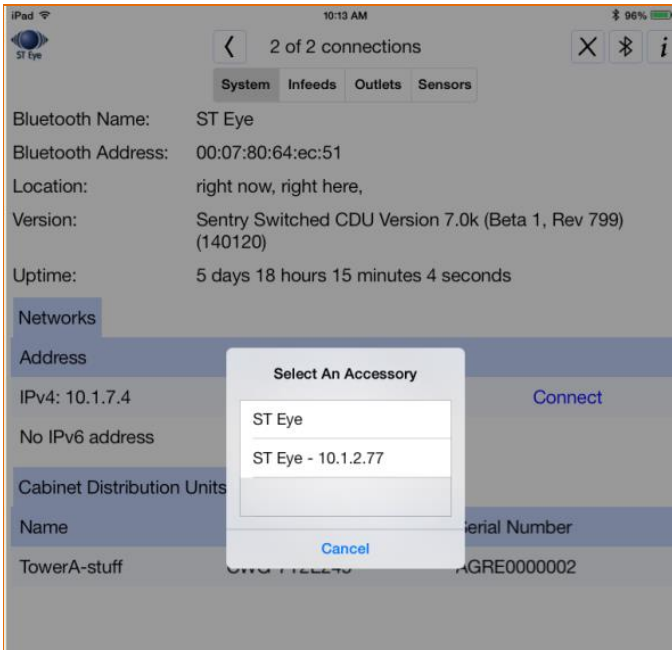
- Install the ST Eye mobile app from the iTunes Store.

Making the Connection

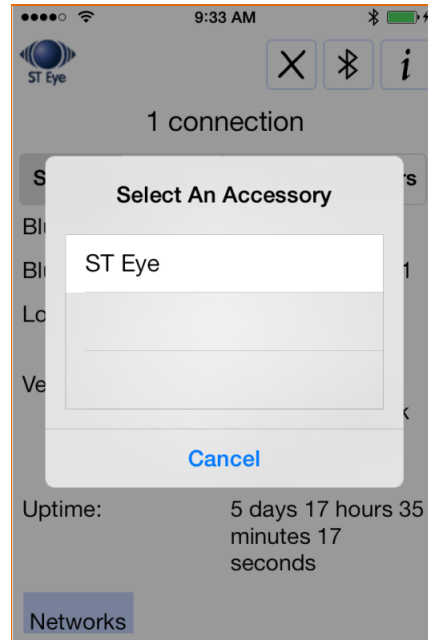
If the iPad/iPhone has active connections with any ST Eye modules, device data will be displayed. The data refreshes every 10 seconds.

Multiple ST Eye modules can be connected at a time, and they can be navigated with the left and right buttons in the top bar of the app. Only one connection is allowed at a time to a specific module.

If there are no connected modules, the “Select an Accessory” window displays, as follows:



System Tab (iPad)


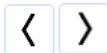





System Tab (iPad)

The “Select an Accessory” window discovers and lists all Bluetooth modules that are discoverable (blinking light on the module), or are already paired.

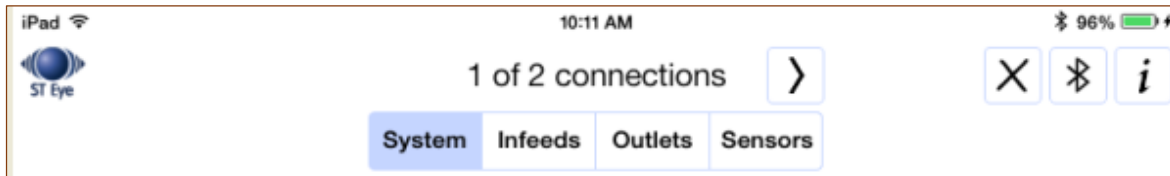
Selecting a module from the list closes the accessory window and initiates an attempt to connect to the module. The connection takes about 1-3 seconds.

ST Eye for Apple iOS – Application Buttons

Button	Name	Description
	ST Eye	Click to reach Server Technology’s ST Eye web page.
	Left/Right Arrows	Shows for navigation only when two or more devices are connected.
	Disconnect	Displays only when a device is connected. Disconnects the iPad/iPhone from the Bluetooth connection with the module currently displayed, which may take a few seconds. The connection stays alive until it times out or until you press the Disconnect button.
	Bluetooth	Shows the “Select an Accessory” window. Select a module from the list to connect to it.
	About	Displays the ST Eye About screen for assistance: Shows the app version and brief description, and provides links to more product information and to Server Technology’s Technical Support.

Device Information Tabs

Operational data collected from a PDU displays as soon as the unit is connected. The data appears in a ribbon of four separate information tabs on the iPad/iPhone, opening in the default System tab:



System: Default display tab; shows general, non-power information about a PDU, such as network and PDU data. Also provides a Connect link to the firmware for a PDU.

Infeeds: Shows the operational details for single-phase and 3-phase infeeds.

Outlets: Provides the operational details for the outlets in each PDU.

Sensors: Displays the current status of an environmental sensor with readings for temperature and humidity.

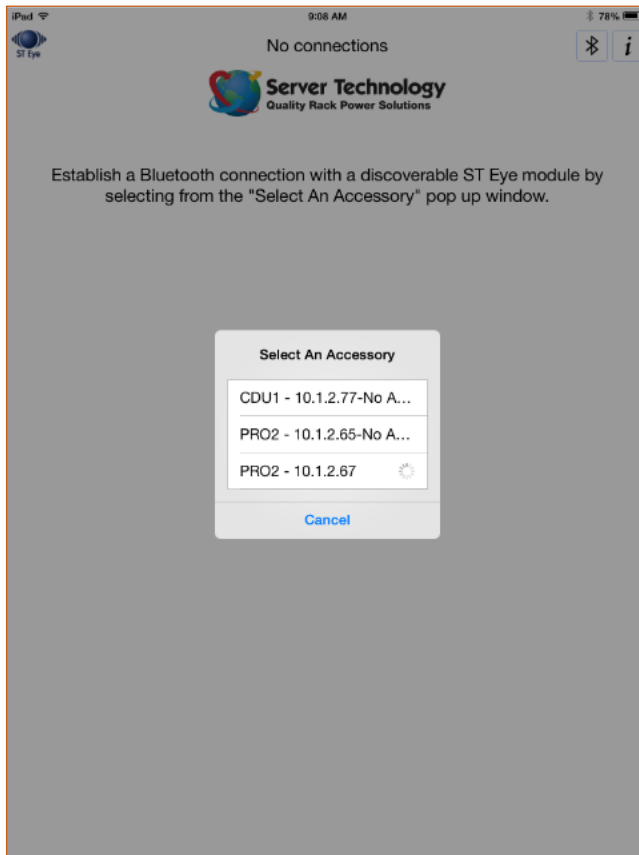
Note: When no outlets are available, the iPad/iPhone will disable the Outlets tab.

ST Eye User Interface

Main Screen (Connection Screen)

Allows you to establish a Bluetooth connection using a discoverable ST Eye module.

From the list, select the Server Technology product, either CDU1 or PRO2.

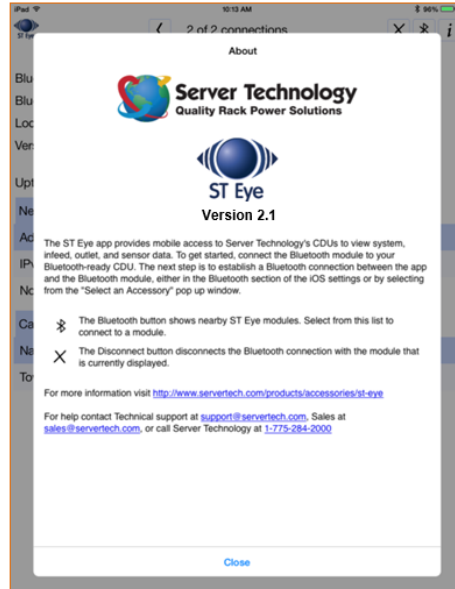


About Screen

Displays the current ST Eye version, a brief description of the app, and links to more product information and to Server Technology's Technical Support.



About Screen (iPad)

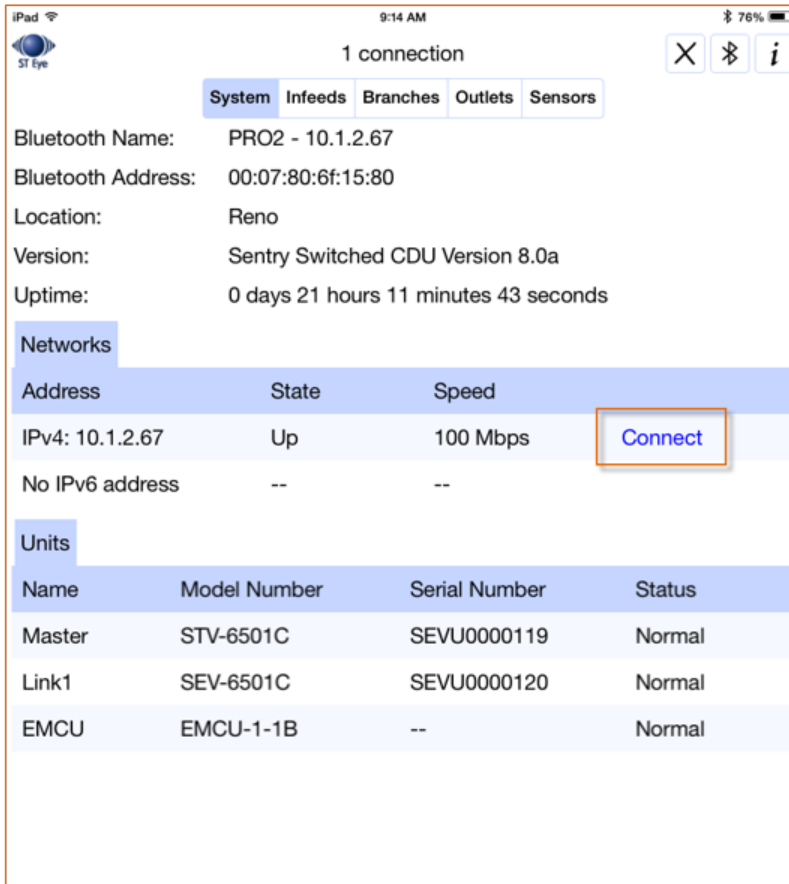


About Screen (iPhone)

Note: For the rest of this document, the ST Eye screen examples show how the user interface looks on an iPad. However, these iPad screens are similar to what you will see on your iPhone.

System Tab

The default information screen that displays general, non-power information about a PDU, such as network and unit data.



Note:

The Connect link to the right of a network address in the list (noted above in the screen examples) allows access to the firmware Web interface.

Login to the firmware is required. The link uses http/https (with Wi-Fi) and the port, as configured on the firmware. If both http and https are enabled, https will be used.

The iOS device must be connected to the wireless network in the data center to allow access to the firmware.

Infeeds Tab

Shows operational details for single-phase infeeds as well as data for 3-phase infeeds: cords, lines, and phases.

1 connection

System Infeeds Branches Outlets Sensors

Cords

Name	Status	VA Capacity Used (%)	Power (W)
⊕ Cord_AA	Normal	7.77	483
⊕ Cord_BA	Normal	0	0

Lines

Name	State	Current (A)
⊕ AA:L1	On	2.06
⊕ BA:L1	On	0.00

Phases

Name	Status	Current (A)	Voltage (V)
⊕ --	Normal	2.06	235.9
⊕ --	Normal	0.00	236.3

Infeeds Tab – Cords

Displays overall operational status and details for each cord:

The screenshot shows an iPad interface for monitoring power systems. At the top, it displays 'iPad', '9:51 AM', and '69%' battery. Below the status bar, there's a header '1 connection' with control icons (X, Bluetooth, info). A navigation bar contains 'System', 'Infeeds' (selected), 'Branches', 'Outlets', and 'Sensors'. A sub-tab 'Cords' is active, showing a table with columns: Name, Status, VA Capacity Used (%), and Power (W). Two cords are listed: Cord_AA and Cord_BA. Cord_AA has a status of 'Normal', 7.77% VA capacity used, and 483W power. Cord_BA has a status of 'Normal', 0% VA capacity used, and 0W power. Below each cord entry is a detailed view showing ID, State, Capacity (VA), Apparent Power (VA), Energy (kWh), Power Factor, and Frequency (Hz). Below the cords table, a 'Lines' section shows a table with columns: Name, State, and Current (A). Two lines are listed: AA:L1 (On, 2.06A) and BA:L1 (On, 0.00A). A 'Phases' section is partially visible at the bottom.

Name	Status	VA Capacity Used (%)	Power (W)
Cord_AA	Normal	7.77	483
ID: AA State: On Capacity (VA): 6240 Apparent Power (VA): 485 Energy (kWh): 178.8 Power Factor: 1.00 Frequency (Hz): 60			
Cord_BA	Normal	0	0
ID: BA State: On Capacity (VA): 6240 Apparent Power (VA): 0 Energy (kWh): 80.6 Power Factor: -- Frequency (Hz): 60			

Name	State	Current (A)
AA:L1	On	2.06
BA:L1	On	0.00

Infeeds Tab – Phases

Reports the phase status, voltage, power factor, and more. Look for Normal status and the phase voltage and power factor should be operating within defined thresholds.

The screenshot shows the 'Infeeds' tab with the following data:

Name	Status	Current (A)	Voltage (V)
AA:L1	On	2.06	235.8
BA:L1	On	0.00	236.3

Phase AA1 Details:

ID:	AA1
State:	On
Power (W):	484
Apparent Power (VA):	486
Energy (kWh):	178.8
Crest Factor:	1.8
Power Factor:	1.00
Reactance:	Resistive
Voltage Deviation (%):	13.3

Phase BA1 Details:

ID:	BA1
State:	On
Power (W):	0
Apparent Power (VA):	0
Energy (kWh):	80.6
Crest Factor:	--
Power Factor:	--
Reactance:	--
Voltage Deviation (%):	13.6

For the 3-Phase Circuits:

The following Circuit values will display in red if:

- Circuit status is No Comm, Fan Fail, Over Temp.
- Circuit VA Capacity Used is greater than 80%.

For the 3-Phase Lines:

The following Line values will display in red if:

- Line Load Status is Overload, Read Error, No Comm.
- Line Status is Off/Error, On/Error, No Comm, Off/Fuse, On/Fuse.
- Line Current Capacity Used is greater than 80%.

Branches Tab

Displays branch status to support the Branch Current Monitoring (BCM) feature of the PRO2, which allows thresholds to be configured on the branch circuit for notification before a breaker trips.

Branch status should be Normal and branch current should be within defined thresholds. Branch threshold range values are affected by changing the current capacity of an over-current protector (OCP).

Branch names are set internally on the PRO2 at factory assembly and cannot be changed.

The screenshot shows the ST Eye mobile application interface. At the top, it displays 'iPad', '3:50 PM', and '77%' battery. Below the status bar, there is a '1 connection' indicator and three icons: a close button (X), a Bluetooth symbol, and an information icon (i). The main navigation bar includes 'System', 'Infeeds', 'Branches' (selected), 'Outlets', and 'Sensors'. Below the navigation bar, there are two sections:

Over-Current Protectors

Name	Status	Capacity (A)
AA:Breaker_1	Normal	20
AA:Breaker_2	Normal	20
BA:Breaker_1	Normal	20
BA:Breaker_2	Normal	20

Branches

Name	Status	Current (A)
AA:Branch_1	Normal	0.00
AA:Branch_2	Normal	1.98
BA:Branch_1	Normal	0.00
BA:Branch_2	Normal	0.00

Branches Tab – Over-Current Protectors (OCPs)

Displays operational status and current capacity (A) for any OCP connected to the PRO2 unit. If there are no OCPs on the unit, the OCP tab will not be available.

Not all PRO2 units will have an OCP; therefore, branch threshold range values will be affected by changing the current capacity on the OCP. The operating status of the OCP should be Normal.

1 connection

System Infeeds **Branches** Outlets Sensors

Over-Current Protectors

Name	Status	Capacity (A)
AA:Breaker_1	Normal	20
AA:Breaker_2	Normal	20
ID: AA2 State: On		
BA:Breaker_1	Normal	20
BA:Breaker_2	Normal	20

Branches

Name	Status	Current (A)
AA:Branch_1	Normal	0.00
AA:Branch_2	Normal	1.99
ID: AA2 State: On Current Capacity Used (%): 9.9		
BA:Branch_1	Normal	0.00
BA:Branch_2	Normal	0.00

Outlets Tab

Provides a list of outlets in the PDU. All outlets in each unit:

Note: When no outlets are available, the Outlets tab will be disabled.

Name	State	Status	Current (A)	Power (W)
Master_Outlet_1	Idle On	Normal	0.00	0
Master_Outlet_2	Idle On	Normal	0.00	0
Master_Outlet_3	Idle On	Normal	0.00	0
Master_Outlet_4	Idle On	Normal	0.00	0
Master_Outlet_5	Idle Off	Normal	0.00	0
Master_Outlet_6	Idle On	Normal	0.00	0
Master_Outlet_7	Idle On	Normal	0.00	0
Master_Outlet_8	Idle On	Normal	0.00	0
Master_Outlet_9	Idle On	Normal	0.00	0
Master_Outlet_10	Idle On	Normal	0.00	0
Master_Outlet_11	Idle Off	Normal	0.00	0
Master_Outlet_12	Idle On	Normal	0.00	0
Master_Outlet_13	Idle On	Normal	0.00	0
Master_Outlet_14	Idle On	Normal	0.00	0
Master_Outlet_15	Idle On	Normal	0.00	0
Master_Outlet_16	Idle On	Normal	0.00	0
Master_Outlet_17	Idle Off	Normal	0.00	0
Master_Outlet_18	Idle On	Normal	1.99	478

Details reported from the PDU show outlet ID and the POPS data fields.

The following values will display in **red** if:

- Outlet Load Status is Overload, Read Error, No Comm.
- Outlet Status is Off/Error, On/Error, No Comm, Off/Fuse, or On/Fuse.
- Outlet Load is greater than 80% of the capacity.

Outlets Tab – Scrolled Down

	System	Infeeds	Branches	Outlets	Sensors
(+) Master_Outlet_17	Idle Off	Normal	U.UU	U	
(+) Master_Outlet_18	Idle On	Normal	1.98	478	
(+) Master_Outlet_19	Idle On	Normal	0.00	0	
(+) Master_Outlet_20	Idle On	Normal	0.00	0	
(+) Master_Outlet_21	Idle On	Normal	0.00	0	
(+) Master_Outlet_22	Idle On	Normal	0.00	0	
(+) Master_Outlet_23	Idle On	Normal	0.00	0	
(+) Master_Outlet_24	Idle On	Normal	0.00	0	
(+) Master_Outlet_25	Idle On	Normal	0.00	0	
(+) Master_Outlet_26	Idle On	Normal	0.00	0	
(+) Master_Outlet_27	Idle On	Normal	0.00	0	
(+) Master_Outlet_28	Idle On	Normal	0.00	0	
(+) Master_Outlet_29	Idle On	Normal	0.00	0	
(+) Master_Outlet_30	Idle On	Normal	0.00	0	
(+) Link1_Outlet_1	Idle On	Normal	0.00	0	
(+) Link1_Outlet_2	Idle On	Normal	0.00	0	
(+) Link1_Outlet_3	Idle On	Normal	0.00	0	
(+) Link1_Outlet_4	Idle On	Normal	0.00	0	
(+) Link1_Outlet_5	Idle On	Normal	0.00	0	
(+) Link1_Outlet_6	Idle On	Normal	0.00	0	

Outlets Tab – Expanded

1 connection

System Infeeds Branches **Outlets** Sensors

Outlets

Name	State	Status	Current (A)	Power (W)
Master_Outlet_1	Idle On	Normal	0.00	0
Master_Outlet_2	Idle On	Normal	0.00	0
Master_Outlet_3	Idle On	Normal	0.00	0
Master_Outlet_4	Idle On	Normal	0.00	0
Master_Outlet_5	Idle Off	Normal	0.00	0
Master_Outlet_6	Idle On	Normal	0.00	0
Master_Outlet_7	Idle On	Normal	1.98	478
ID:		AA7		
Capacity (A):		15		
Voltage (V):		241.3		
Current Capacity Used (%):		13.2		
Apparent Power (VA):		478		
Energy (Wh):		110180		
Crest Factor:		1.4		
Power Factor:		1.00		
Reactance:		Resistive		
Master_Outlet_8	Idle On	Normal	0.00	0
Master_Outlet_9	Idle On	Normal	0.00	0
Master_Outlet_10	Idle On	Normal	0.00	0
Master_Outlet_11	Idle Off	Normal	0.00	0

Sensors Tab

Shows the current status of each environmental sensor. Descriptive sensor name is displayed along with sensor readings for temperature and humidity.

Temperature Sensors		
Name	Status	Temperature
Temp_Sensor_A1	Normal	28.3 C
Temp_Sensor_A2	Normal	27.8 C
Temp_Sensor_B1	High Warning	29.1 C
Temp_Sensor_B2	Normal	28.7 C
Temp_Sensor_E1	Normal	26.5 C
Temp_Sensor_E2	Normal	27.0 C

Humidity Sensors		
Name	Status	Humidity (%)
Humid_Sensor_A1	Normal	20
Humid_Sensor_A2	Normal	21
Humid_Sensor_B1	Normal	20
Humid_Sensor_B2	Normal	20
Humid_Sensor_E1	Normal	22
Humid_Sensor_E2	Normal	26

Notes:

- The sensors displays temperature in Celsius (C) or Fahrenheit (F), depending on the setting of the PDU. For the screen examples, temperature value is Fahrenheit (F).
- If the sensor status is Lost or No Comm, the value in the Status field will be displayed in red.

Configuring Bluetooth® Parameters Using the Firmware

If a PDU has been equipped for the mobile monitoring solution using Bluetooth® technology, the AUX serial port will be installed on the PDU, and the following parameters will be available in the firmware, version 7.0j or later, for configuration by the administrative-user account.

Firmware Bluetooth Parameters	
Parameter	Description and Valid Values/Range
The Bluetooth Module Name	Descriptive name of the Bluetooth module that displays in the list of discovered modules on the iPad/iPhone. The default module name is “ST Eye”. The name cannot be blank; maximum length is 31 characters.
Discoverability Status	Settings that determine the current status of the pushbutton on the Bluetooth module. <ul style="list-style-type: none"> Always – The Bluetooth module is discoverable, even without pressing the pushbutton. Limited – (Default). The pushbutton on the Bluetooth module must be pressed to make the module discoverable for 60-seconds. Never – The Bluetooth module is never in discoverable mode.
Pin Code	The pin code is available for legacy Bluetooth modules that require a pin to pair the module. Although not used in current Bluetooth modules, the pin code is supported if needed. Default is 9611; must be 4-digits; range is 0000 to 9999.
Transmission Power	Designated transmission power (dbm) for the Bluetooth module. Note that lowering the transmission power reduces the effective range of the module. Range is -6 to 4 dbm; default is 0.

The Bluetooth parameters can be configured using either the Web Interface or Command Line Interface (CLI) of the firmware as described below.

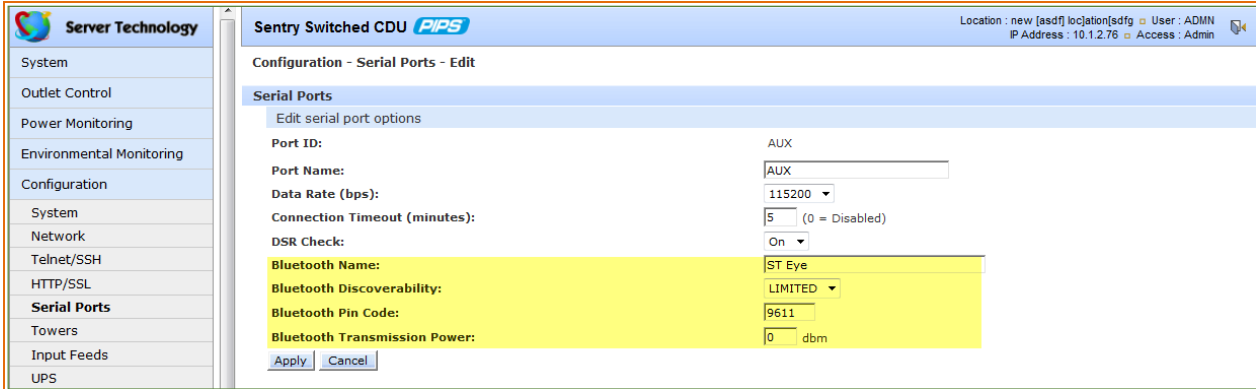
From the Web Interface

1. Go to **Configuration > Serial Ports**:

The screenshot shows the web interface for 'Sentry Switched CDU PIPS'. The left sidebar contains navigation options: System, Outlet Control, Power Monitoring, Environmental Monitoring, Configuration, System, Network, Telnet/SSH, HTTP/SSL, and Serial Ports. The main content area is titled 'Configuration - Serial Ports' and 'Serial Ports'. Below this, there is a table with the following data:

Port ID	Port Name	Data Rate (bps)	Connection Timeout (minutes)	DSR Check	Action
CONSOLE	CONSOLE	9600	5	On	Edit
AUX	AUX	115200	5	On	Edit

2. For the AUX port, click the **Edit** link.



- On the Edit page for the AUX port, configure the Bluetooth® parameter fields for name, discoverability, pin code, and transmission power using the values and ranges as noted in the previous table.

From the CLI

At the Switched CDU: (or Smart CDU:) prompt (using the values and ranges noted in the previous table), issue one or more of the following commands, as needed:

- `set bluetooth name` – Provide a custom descriptive name for the Bluetooth® module.
- `set bluetooth discover` – Enter “always”, “limited”, or “never” for the discoverability status of the module.
- `set bluetooth pincode` – Configure a 4–digit numeric value for the pincode of a legacy module.
- `set bluetooth transpwr` – Designate transmission power (dbm) for the module.

Common Troubleshooting Solutions

The indicator on the module does not respond to button presses.

- Has the PDU had sufficient time to boot, between 1 and 2 minutes, depending on conditions?
- Check that both ends of the cable are securely connected to the PDU and to the module.
- Check that the Bluetooth® module discoverability setting on the PDU is set to Limited. If desired, you have the option to choose to set discoverability to always be Enabled or Disabled. The disabled state has security advantages, so it may be a policy not to enable module discoverability.

The Apple application indicates “Invalid response. Confirm that SC-PAUTH is disabled. Trying again in 10 seconds.”

- Check that the setting for SCPAUTH on the PDU is disabled. Using the Command Line Interface (CLI) on the PDU, issue the **show scpauth** command.
- If SCPAUTH is enabled, issue the **set scpauth disabled** command on the CLI.

The Apple application indicates “Invalid response. Please confirm that SCP is enabled for the AUX port. Trying again in 10 seconds.”

- Check that the setting for SCP on the PDU's serial aux port is enabled. Using the Command Line Interface (CLI) on the PDU, issue the **show ports** command.
- If SCP is disabled on the aux port, issue the **set port scp aux enabled** command on the CLI.

The Apple application indicates “Invalid response. Please confirm that MRV Emulation is disabled. Trying again in 10 seconds.”

- Check that the setting for SCP Emulation on the PDU's serial aux port is None. From the Web interface for the PDU, go to **Configuration > Serial Ports > Aux...Edit**
- From the Web interface, if SCP emulation is not None on the aux port, change the option to None.

The application appears to connect to the module but is disconnected before any information is collected.

- Check that the Bluetooth® radio on the mobile device is enabled.
- Check that the setting for SCP on the PDU's serial aux port is enabled. Issue the **show ports** command on the CLI.
- If SCP is disabled on the aux port, issue the **set port scp aux enabled** command on the CLI.
- Check that the setting for port speed on the PDU's serial aux port is 115200 baud. Issue the **show ports** command on the CLI.
- If the SCP port speed on the serial aux port is not 115200 baud, issue the **set port speed aux 115200** command on the CLI.
- Check that the configuration flag bits 17 and 18 on the PDU are cleared. Issue the **debug sct** command on the CLI. Record the value of the `cfg_flg`s, and verify the logical comparison: `cfg_flg`s and `0x30000 = 0`.

- If the configuration flag bits 17 or 18 on the PDU are set (cfg_flags and 0x30000 > 0), then issue the **set cnfg 0xFFFCFFFF 0x0** command on the CLI.
- Check that the setting for SCPAUTH on the PDU is disabled. Issue the **show scpauth** command on the CLI.
- If SCPAUTH is enabled, issue the **set scpauth disabled** command on the CLI.
- Check that the setting for SCP Emulation on the PDU's serial aux port is None. From the Web interface for the PDU, go to **Configuration > Serial Ports > Aux...Edit**.
- From the Web interface, If SCP emulation is not None on the aux port, change the option to None.
- Try moving the mobile device closer to the ST Eye Bluetooth® module. Specifically, try removing cabinet doors and other conductive surfaces from in-between the communication path. A long-term solution might be to increase the rpower setting on the PDU, and/or repositioning the module.

The application cannot discover the module.

- Check that the indicator on the module is flashing.
- While the indicator on the module is flashing, initiate a Bluetooth discovery on the ST Eye application.
- Try moving the mobile device closer to the ST Eye module. Specifically, try removing cabinet doors and other conductive surfaces from in-between the communication path. A long-term solution might be to increase the rpower setting on the PDU, and/or repositioning the module.

Repair Misconfigured Bluetooth® PDU.

1. Log into the PDU using the Command Line Interface (CLI).
2. Issue **set cnfg 0xFFFCFFFF 0x0**
3. Issue **set port speed aux 115200**
4. Issue **set port scp aux enabled**
5. Issue **set scpauth disabled**

Note: This command will erase any configured SCP username and password for all serial ports.

6. Log into the PDU using the Web interface.
7. Go to **Configuration > Serial Ports > Aux...Edit**
8. Change the SCP Emulation option to **None**

Further Investigation

When an issue cannot be easily resolved, gathering more information about the product, as listed in the following procedures, can facilitate troubleshooting.

Get PDU information:

1. Log into the PDU using the Command Line Interface (CLI).
2. Set up the terminal to log all communications.
3. Issue the **debug support** command.
4. Issue the **show ports** command.

Get ST Eye Module Information:

1. Login to the PDU with the Command Line Interface (CLI).
Note: If logging in through the serial port, the console port baud rate must be set to 115200.
2. Set up the terminal to log all communications.
3. Issue the **connect aux** command.
4. If step 3 results in a "Connect failed --Target DSR inactive", check that both ends of the cable are securely connected to the PDU and to the module. An insecure connection may cause the PDU not to recognize that a module is connected.
5. Issue **at**
6. If an OK was received in step 5, issue the following three commands in the order shown:

set<Enter>

set c config<Enter>

iapcp reset<Enter>

Configuration Examples

show ports

```
Port ID: Console Port Name: CONSOLE
  DSR Check: ON RFTAG: Enabled CLI: Enabled SCP: Disabled
  Data Rate: 115200 Connection Timeout: 5 minutes
Port ID: Aux Port Name: AUX
  DSR Check: ON RFTAG: N/A CLI: Disabled SCP: Enabled
  Data Rate: 115200 Connection Timeout: 5 minutes
Bluetooth Settings:
  Name: STi Test Bed
  Discoverability: LIMITED
  Pin code: 9611
  Transmission power: 0 (dbm)
Command successful
```

set c config

```
SET CONTROL CONFIG 0000 2000 0000 510c
```

iapcp reset

```
IAPCP OK 05
```

Configuration Examples (continued...)

set

```
SET BT BDADDR 00:07:80:64:ec:51
SET BT NAME STi Test Bed
SET BT CLASS 8000ec
SET BT AUTH * 9611
SET BT IDENT BT:47 f000 5.0.2 Bluegiga iWRAP
SET BT LAP 9e8b33
SET BT PAGEMODE 2 2000 1 0 1
SET BT PAIR bc:20:a4:e6:5c:c3 9c8524da68d6cee43e59d6975915ac9c
SET BT PAIR e4:92:fb:44:92:5f eb18a1b9739c5e44882caadf6d29254b
SET BT PAIR e4:40:e2:1f:c6:e9 10c8198099cb19a6c112be4b0af9af86
SET BT PAIR 88:9b:39:73:04:7c d6701f1e308f2a5ddc9660519bd2eeaf
SET BT POWER -2 3 -2
SET BT ROLE 0 f 7d00
SET BT SNIFF 50 8 1 7
SET BT SSP 3 0
SET BT MTU 200
SET CONTROL BAUD 115200,8n1
SET CONTROL BIND 0 10 R set bt page 4 2000 1 0 1
SET CONTROL BIND 1 10 R blink 08 150 150
SET CONTROL BIND 2 10 R del 0 60000 set bt page 2
SET CONTROL BIND 3 10 R del 1 60000 blink
SET CONTROL BIND 4 10 R del 2 60100 pio set 08 00
SET CONTROL BIND 5 4 F blink
SET CONTROL BIND 6 4 F pio set 08 00
SET CONTROL BIND 7 4 F del 3 100 reset
SET CONTROL CD 04 0
SET CONTROL ECHO 8
SET CONTROL ESCAPE 43 00 1
SET CONTROL GAIN 0 5
SET CONTROL INIT set bt page 2 2000 1 0 1
SET CONTROL MSC DCE 00 00 00 00 00 00
SET CONTROL PIO 0c 00
SET CONTROL READY 00
SET PROFILE SPP ST Eye SCP
SET PROFILE IAP PROD:"ST Eye" MF:"Server Technology" MDL:"ST Eye" \
PROTO:"com.servertech.scp" SEED:"2XCKTJR8HL" APP:"com.servertech.ST-Eye" \
SN:"00:07:80:6f:15:4f" FW:1.0.0 HW:1.0.0 WRAP
SET
```

Regulatory Compliance

Federal Communications Commission (FCC)

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

Contact Technical Support



Experience Server Technology's FREE Technical Support

Server Technology understands that there are often questions when installing and/or using a new product. Free Technical Support is provided from 8 a.m. to 5 p.m. PST, Monday through Friday. After-hours service is provided to ensure your requests are handled quickly no matter what time zone or country you are located in.

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