# Layout & Installation
# Guide for Ethernet & Solar/Cellular
# BlueTOAD Units

**TRAFFICAST**

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# CONTENTS

# Summary

This document is meant as a guide for helping determine the proper layout of BlueTOAD units along with installation instructions.

The instructions, both quick and detailed are for both the Ethernet BlueTOAD unit and the solar/cellular BlueTOAD unit (both pictured below). Please consult with the pre-installation checklist to ensure all items are included and you are properly set for the installation.
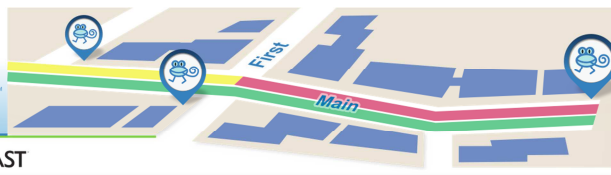
Please consult either TrafficCast or your local BlueTOAD representative if you have any questions.



**BlueTOAD Ethernet Power over Ethernet (PoE)**

**50 Watt Solar Panel**
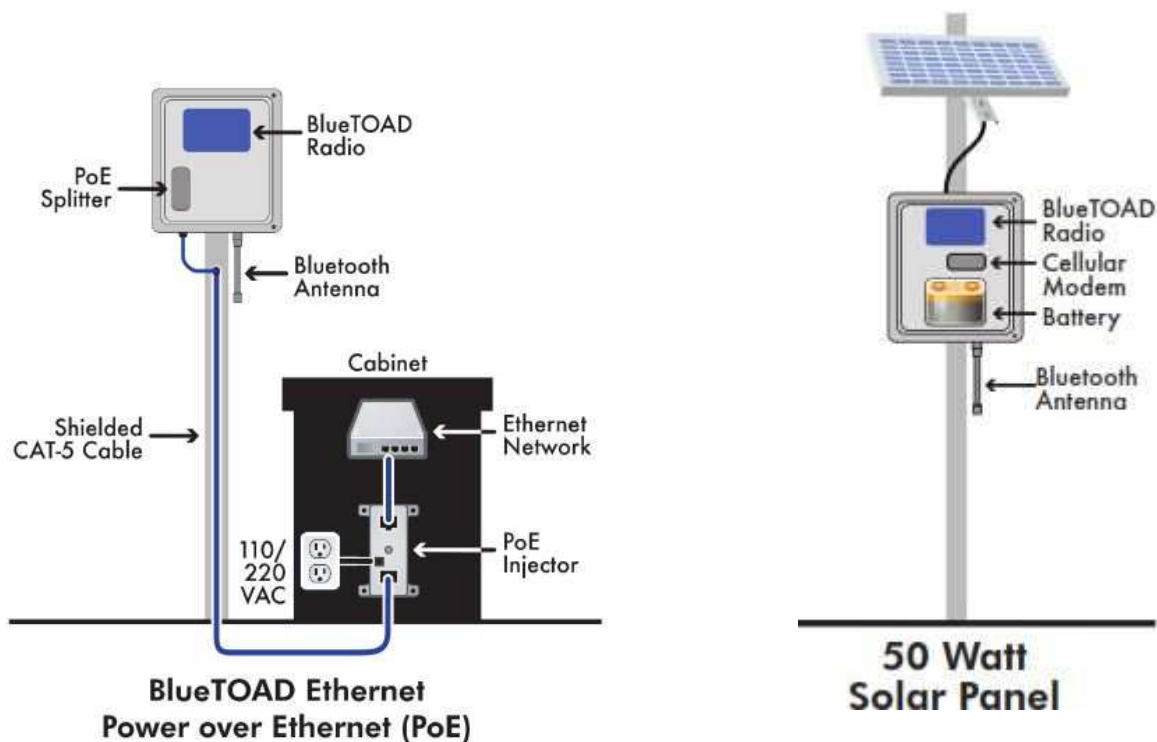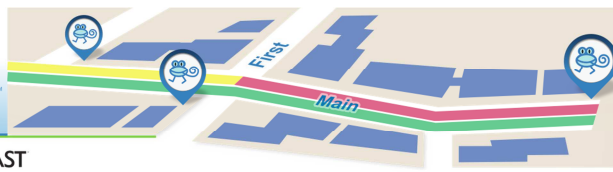
# BlueTOAD Layout Guidelines

❑ After selecting the target road segment for a speed/travel time data collection, determine how many BlueTOADs are necessary for the study by using the following information:

- o BlueTOAD has an effective detection range of approximately 250 feet radius from the antenna.

- o The minimum distance to space BlueTOAD:
  - o Ethernet BlueTOAD - 0.5 miles
  - o Cellular BlueTOAD – 0.25 miles w/ power control *

  *\* Power Control allows us to shrink the detection zone. Only available in cellular version.*

❑ The maximum distance is a function of the road type:

- o Highway max is 4 to 5 miles.

- o Arterial (no traffic lights) is 2 to 2 ½ miles.

- o Arterial (w/ traffic lights) is 1 to 1 ½ miles.

- o Dense urban is 1 mile. The number of intersections, traffic signals, or exit ramps can affect the speed/travel time and should therefore be kept to a minimum.

- o In an Origin/Destination deployment, BlueTOADs need to be installed prior to the destination as well as after. Additional BlueTOADs required is then based on the driver options (i.e. can turn left or right which will require one for each direction of travel).

# BlueTOAD Site Survey

| Site Survey Task | Solar Powered BlueTOAD | AC or POE BlueTOAD |
|---|---|---|
| Make sure that each location has an unobstructed view to the sky. | 🐸 | |
| Make sure that the solar panel can be mounted such that it is facing true south. | 🐸 | |
| Make sure that the mounting structure (i.e. sign truss, light pole, etc) can accommodate the weight loading:<br>- 50lbs for BlueTOAD w/ battery and 14lbs for 50W panel<br>- 50lbs for BlueTOAD w/ battery and 9lbs for 30W panel<br>- 9lbs for BlueTOAD – AC or POE powered (no battery) | 🐸 | 🐸 |
| Make sure that there is sufficient space that the BlueTOAD can be mount at a height that provide a clear view of the road (approximately 10 to 14 feet above ground level). | 🐸 | 🐸 |
| Make sure that there is sufficient shoulder lane width that will allow access to the installed BlueTOAD without having to have any lane closures. | 🐸 | 🐸 |
| Avoid locations that are within 320 feet of any Wi-MAX transmitters. | 🐸 | 🐸 |
| Make note of any other antenna towers in the area. | 🐸 | 🐸 |
| Make note of any train lines or frontage roads in the area. | 🐸 | 🐸 |
| Create a unique location name (i.e. street name, intersection, mile marker, etc), and note Latitude/Longitude for each proposed location. | 🐸 | 🐸 |
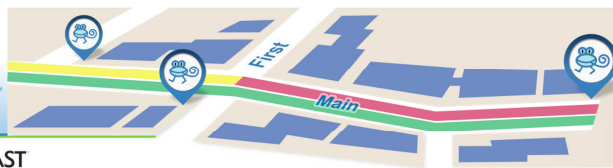
# Ethernet BlueTOAD Pre-Installation

❑ **STEP 1** - Confirm site survey checklist has been completed for all locations.

❑ **STEP 2** - Confirm all parts are present.

❑ **STEP 3** - Confirm that the network setting (e.g IP address, gateway, subnet mask, and DNS) are properly set and that all ports (69, 123, 8010) are open and set for outbound traffic.

❑ **STEP 4** - After confirming the unit is configured properly, in the presence of Bluetooth signals, power up unit and confirm all LEDs are normal after the unit initializes.

❑ **STEP 5** - Call TrafficCast*, communicate the BlueTOAD device number, indicate that the unit has been powered up, LEDs are normal, and await TrafficCast to confirm the network is seeing data from this unit.

❑ **STEP 6** - After confirmation from TrafficCast, power off the unit before installation.
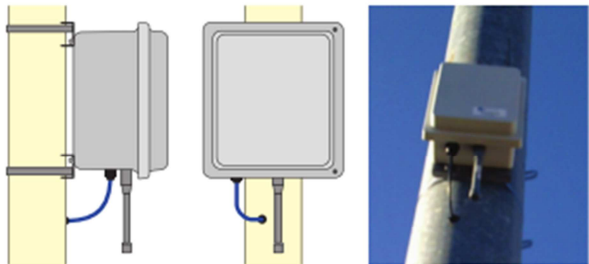
# Ethernet BlueTOAD Installation – Quick Guide (see full guide below for more details)

❑ **STEP 1** - After the BlueTOAD enclosure has been installed, plug the main CAT5 cable from the POE injector in the POE splitter.

❑ **STEP 2** - After unit has been powered on, confirm all LEDs are normal.

❑ **STEP 3** - Before leaving the location, call TrafficCast* after the unit has started detecting Bluetooth signals, communicated the device ID number and that the LEDs are normal, and  confirm from TrafficCast that the network is transmitting the data from this unit.

❑ **STEP 4** - Add each installed BlueTOAD unit to a compiled list of unit location data (keep a list of device ID, location, and installation date for each unit).

* TrafficCast Contact Info: 608-268-3941

# Ethernet BlueTOAD Installation – Full Guide

## BlueTOAD Installation Guide

**BlueTOAD™ Roadside Bluetooth™ Sensor Equipment Power over Ethernet (PoE) Configuration**

Customer Support
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## BlueTOAD Sensor Equipment Components

- CAT-5 Ethernet Cable to PCB
- PoE Splitter 5/12V DC
- Unit Status LED Indicators — S2-Bluetooth (Blue), S1-Boot (Green)
- Liquid-Tight Cable Gland — Housing for CAT-5 Ethernet Cable from PoE Injector in existing cabinet to PoE Splitter
- PCB Power Cord to PoE Splitter
- Serial Port (used for IP configuration)
- CAT-5 Ethernet Cable to PoE Splitter
- Bluetooth Antenna Cable
- Bluetooth Antenna

## BlueTOAD Unit Mounting How-To Basics

| Category | Recommended Requirements |
|---|---|
| Mounting structure | Lamp or signal poles (BlueTOAD – 10 lbs.) |
| Height | Clear immediate obstacles - 10' – 14' ground clearance ideal |
| Antenna Clearance | The device should be mounted such that the external Bluetooth antenna is as unobstructed as possible and so that it has a clear line of sight to the target road segment |
| Antenna Alignment | Use the BlueTOAD front cover (enclosure door face) as an antenna reference. |
| | If the BlueTOAD unit is mounted on side of the road, place front cover parallel to the road. |
| | If the BlueTOAD unit is mounted on the center median, place the front cover perpendicular to the road. |

# BlueTOAD Installation Guide

## 1  Mount BlueTOAD NEMA Enclosure to Structure

The BlueTOAD standard unit package includes two (2) mounting brackets and two (2) metal cable bands designed for mounting on, poles, I-Beams, or support structures up to a 14" diameter.

Secure mounting bracket with cable band slots away from enclosure

**Mounting Bracket**
**Cable Band**

**Bluetooth Antenna**

Secure mounting bracket with cable band slots away from enclosure
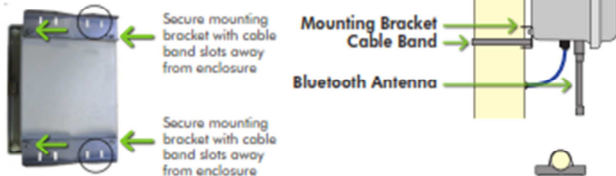
## BlueTOAD Unit Roadside Alignment

Alignment A: For roadside install, Front Cover mounted parallel to roadway.

Alignment B: For center median install, Front Cover mounted perpendicular to roadway.

**A**   **B**
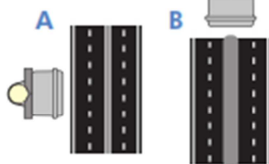
## 2  Install CAT-5 Ethernet Cable

1. Run CAT-5 cable from the roadside cabinet to where the BlueTOAD unit is mounted
2. Pass the CAT-5 Ethernet cable through the Liquid-Tight Cable Gland. The strain relief on the cable will have to be removed in order to fit through the Cable Gland. The Strain Relief can be slid away from the RJ-45 connector without cutting the relief.
3. Insert the RJ-45 connector into the PoE Splitter
4. Tighten the Cable Gland

**Strain Relief**

**CAT-5 Ethernet Cable to PCB**

**PoE Splitter 5/12V DC**

**CAT-5 Ethernet Cable to PoE Splitter**

**Liquid-Tight Cable Gland**

## 3  Connect Bluetooth Antenna

Attach Bluetooth Antenna. **Take extra precaution not to detach the cable from the connector on the BlueTOAD PCB.**

1. Secure antenna with Nut on inside of enclosure
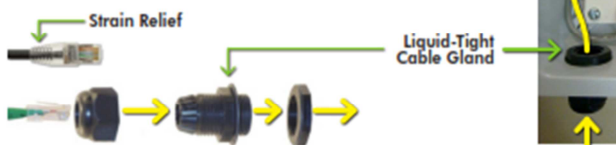2. Connect Bluetooth cable to antenna
3. Hand-tighten (with most connectors and antennae, hand-tension is preferred)

**Bluetooth Antenna Cable**

**Antenna Cable Nut**

**Bluetooth Antenna**
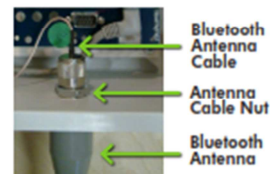
## 4  Install PoE Injector in Roadside Cabinet

1. Secure PoE injector onto flat surface inside roadside cabinet
2. Attach Ground Wire
3. The PoE injector has two (2) RJ-45 receptacles
   · Data – connects to network Ethernet switch, router, or hub
   · Data & Power – connects to the BlueTOAD unit (PCB)
4. Connect AC power supply to PoE Injector and "plug" the 110V cord to AC power outlet

**Ground Wire**

**PoE Injector**

**AC Power Supply**
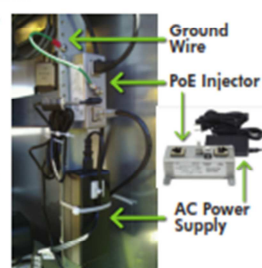
## 5  Turn ON BlueTOAD Unit

To automatically turn ON the BlueTOAD unit, plug the power cord into the mated connector on the BlueTOAD PCB.

**CAT-5 Ethernet Cable to PCB**

**PCB Power Cord to PoE Splitter**

**Unit Status LED Indicators**
S2-Bluetooth (Blue)
S1-Boot (Green)
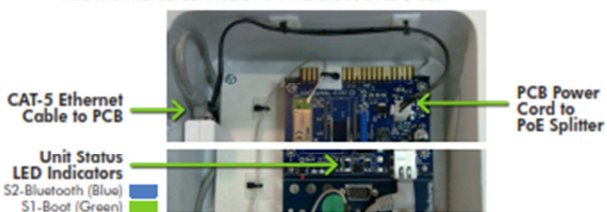
| LED | Color | At Initial Start-up | At Normal State (May take up to 3 minutes) |
|---|---|---|---|
| S1- Boot | Green | Blink - 4 times per second | Blink - 1 time per 3 seconds |
| S2-Bluetooth | Blue | Off | Blink - 3 times per 3 seconds |
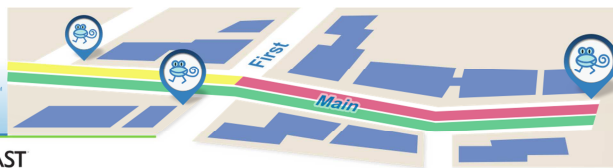
# Solar/Cellular BlueTOAD Pre-Installation

❑ **STEP 1** - Confirm site survey checklist has been completed for all locations. After confirming the unit has a SIM card inserted, in the presence of Bluetooth signals, turn the unit on and confirm all LEDs are normal.

❑ **STEP 2** - Confirm all parts are present.

❑ **STEP 3** - Add each installed BlueTOAD unit to a compiled list of unit location data (keep a list of device ID, location, and installation date for each unit).

❑ **STEP 4** – While the unit is on the ground, at each install location, open the BlueTOAD enclosure door, and with some light hitting the solar panel, attach the solar panel cable to the BlueTOAD enclosure, and confirm the "Charging" LED lights up on the Charge Controller inside the BlueTOAD enclosure, and then disconnect the solar panel cable from the enclosure.

❑ **STEP 5** - After confirming the unit has a SIM card inserted, in the presence of Bluetooth signals, power up unit on the ground (battery only, no solar power needed) by turning the main power switch to the on position, and confirm all LEDs are normal after the unit initializes.

❑ **STEP 6** - Call TrafficCast*, communicate the BlueTOAD serial number, indicate that the unit has been powered up, LEDs are normal, and await TrafficCast to confirm the network is seeing data from this unit.

❑ **STEP 7** - After confirmation from TrafficCast, power off the unit before installation on the pole commences, attached the solar power cable to complete installation.

* TrafficCast Contact Info: 608-268-3941
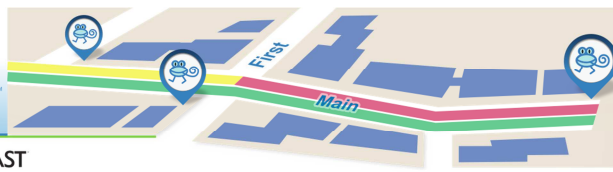
# Solar/Cellular BlueTOAD Installation – Quick Guide (see full guide below for more details)

- ❑ **STEP 1** - After the solar panel (30W or 50W) and BlueTOAD enclosure have been installed, but before turning the main power switch on, confirm the "Charging" LED is lit on the charge controller after the solar cable has been attached to the enclosure (leave solar cable attached).

- ❑ **STEP 2** - After confirming the unit has a SIM card inserted, in the presence of Bluetooth signals, turn the unit on and confirm all LEDs are normal.

- ❑ **STEP 3** - Before leaving the location, call TrafficCast* after the unit has started detecting Bluetooth signals, communicated the device ID number and that the LEDs are normal, and await TrafficCast to confirm the network is transmitting the data from this unit.

- ❑ **STEP 4** - Add each installed BlueTOAD unit to a compiled list of unit location data (keep a list of device ID, location, and installation date for each unit).

\* TrafficCast Contact Info: 608-268-3941

# Solar/Cellular BlueTOAD Installation – Full Guide (for 30W or 50W solar panel version)
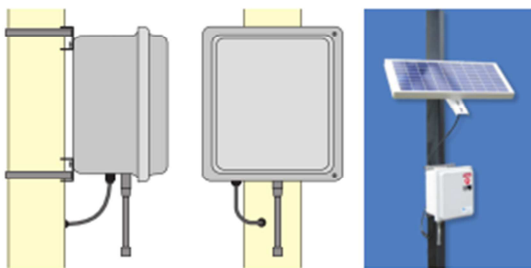


## BlueTOAD™ Roadside Bluetooth™ Sensor Equipment Solar Power Configuration

## BlueTOAD Installation Guide

### Customer Support
### 1-608-268-3941

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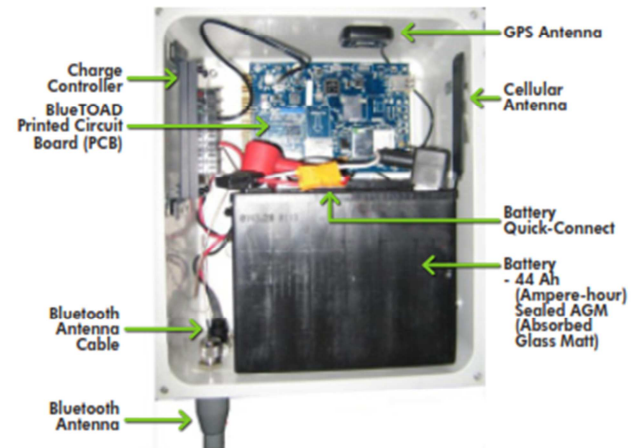TrafficCast, BlueTOAD, and all other associated logos are trademarks of TrafficCast International, Inc. All other logos and brand names are trademarks or registered trademarks of their respective holders.

REV: 022012-1

## BlueTOAD Sensor Equipment Components

- GPS Antenna
- Charge Controller
- BlueTOAD Printed Circuit Board (PCB)
- Cellular Antenna
- Battery Quick-Connect
- Battery - 44 Ah (Ampere-hour) Sealed AGM (Absorbed Glass Matt)
- Bluetooth Antenna Cable
- Bluetooth Antenna

## BlueTOAD Unit Mounting How-To Basics

| Category | Recommended Requirements |
|---|---|
| Mounting structure | Lamp or signal poles (BlueTOAD — 12 lbs.) |
| Height | Clear immediate obstacles - 10' – 14' ground clearance ideal |
| Antenna Clearance | The device should be mounted such that the external Bluetooth antenna is as unobstructed as possible and so that it has a clear line of sight to the target road segment |
| Antenna Alignment | Use the BlueTOAD front cover (enclosure door face) as an antenna reference. |
| | If the BlueTOAD unit is mounted on side of the road, place front cover parallel to the road. |
| | If the BlueTOAD unit is mounted on the center median, place the front cover perpendicular to the road. |
| Solar Panel | Southern Exposure - Please consult the Solar Electricity Handbook website, http://solarelectricityhandbook.com/solar-angle-calculator.html to obtain the optimum sun positioning angle for your solar panel, in your geographic location. |

# BlueTOAD Installation Guide

**1** **Mount BlueTOAD NEMA Enclosure to Structure**

The BlueTOAD standard unit package includes two (2) mounting brackets and two (2) metal cable bands designed for mounting on, poles, I-Beams, or support structures up to a 14" diameter.

Secure mounting bracket with cable band slots away from enclosure

**Mounting Bracket**
**Cable Band**

Secure mounting bracket with cable band slots away from enclosure

**Bluetooth Antenna**
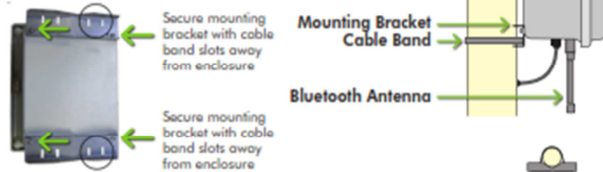
### BlueTOAD Unit Intersection or Roadside Alignment

Alignment A: For roadside install, Front Cover mounted parallel to roadway.

Alignment B: For center median install, Front Cover mounted perpendicular to roadway.

**A**   **B**
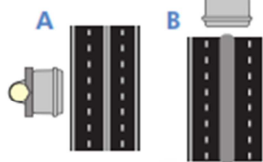
**2** **Mount Solar Panel**

1. Attach mounting bracket to solar panel.
2. Set solar panel angle as recommended by solar calculator, in your geographic location.
3. Mount Solar Panel above BlueTOAD enclosure.
4. Mount so that solar panel faces "true" South.
5. Use drill with 5/16" nut driver bit to tighten bands.

**3** **Connect Bluetooth Antenna**

Attach Bluetooth Antenna. **Take extra precaution not to detach the cable from the connector on the BlueTOAD PCB.**

1. Secure antenna with N-Type Nut on inside of enclosure.
2. Connect Bluetooth cable to antenna.
3. Hand-tighten (with most connectors and antennae, hand-tension is preferred).

**Bluetooth Antenna Cable**

**Antenna Cable Nut**

**Bluetooth Antenna**
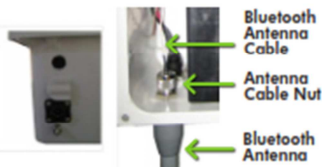
**4** **Connect Solar Panel Cable**

1. Insert solar cable plug with the mated connector on the enclosure. Plug will only insert in one position.
2. Hand tighten
3. Check to see if the "charge control light" on the charge controller is lit, ensuring proper connection.

**5** **Install Battery**

The battery comes with factory installed quick connects on the power terminals. The Battery should be installed with the terminals facing out of the enclosure.

**(The battery should be disconnected and removed during transport)**

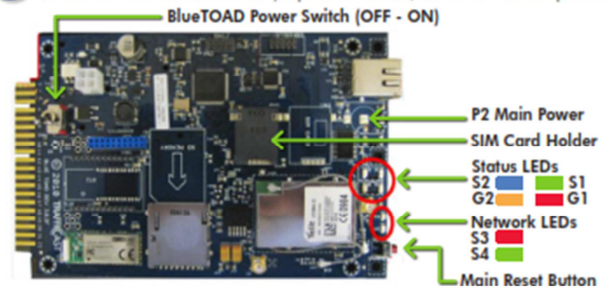**Battery will extend beyond enclosure**

**6** **Connect Battery**

The power harness from the Charge Controller has the opposite keyed, mated connector to that of the Battery Terminal. The connectors snap together.

**To Battery Terminals**

**To Charge Controller**

**7** **Turn ON BlueTOAD Unit**

To turn ON the BlueTOAD unit, flip the main On/Off Switch to ON position.

**BlueTOAD Power Switch (OFF - ON)**

**P2 Main Power**
**SIM Card Holder**
**Status LEDs**
S2 | S1
G2 | G1
**Network LEDs**
S3
S4
**Main Reset Button**

| LED | Color | At Initial Start-up | At Normal State (May take up to 5 minutes) |
|---|---|---|---|
| P2 - Main Power | White | Solid | Blink - 1 time per 3 seconds |
| S1 - Boot | Green | Blink - 4 times per second | Blink - 1 time per 3 seconds |
| S2 - Bluetooth | Blue | Off | Blink - 3 times per 3 seconds |
| G1 - Cell Modem | Red | Solid when Modem is ON | |
| G2 - Network Connect | Amber | Off | Blink - 1 time per 3 seconds |
| S3 - GPS | Red | Off | Blink - 3 times per 3 seconds |
| S4 - Cellular Signal Strength | Green | Off | Solid - SS > -60 dBm |