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Client: IWT
Model #: FAP4100-010
Standards: FCC 15.247/RSS-210
FCC ID: SP8-FAP4100-010
Report #: 2012044

Appendix L: Manual

Please refer to the following pages.

Coyote UGS: User & Installation Guide



Prepared by:
Innovative Wireless Technologies, Inc.

Forest, Virginia

Document # 7720-08-0300 Rev E





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1. Scope

This installation guide provides step-by-step descriptions for field emplacement of the Coyote UGS nodes. The Coyote UGS node is a multi-modality (seismic, magnetic, passive infrared) unattended ground sensor and is the core component of the Coyote Sensor System as shown in Figure 1. Individual installation guides provide instruction for the gateway and server equipment. Operational use of the sensor is found in the Coyote Sensor System User's Guide.

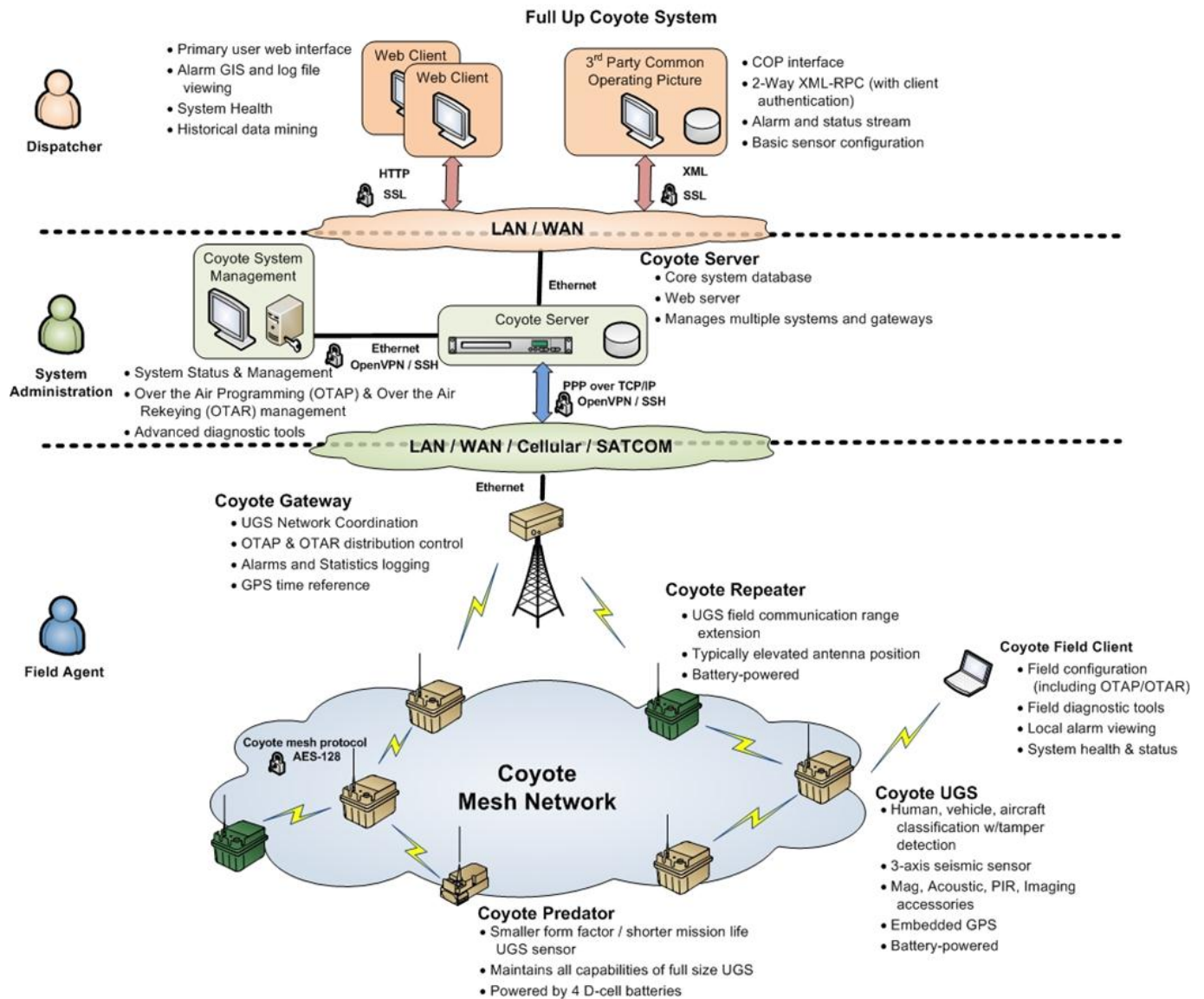


Figure 1 - Operational Coyote System Deployment

2. Unpacking and Battery Installation

2.1. Unpacking Coyote UGS Node and Accessories

Open the shipping box and unpack its contents: Coyote UGS Node, Antenna, Umbilical Cord, and Batteries (if purchased). See Figure 2.



CoyoteUGS Node: FAP4100-001



Umbilical Cable: RCL4200-010



Antenna: RAT1000-006



Battery: FAA9000-539

Figure 2 – Coyote UGS components

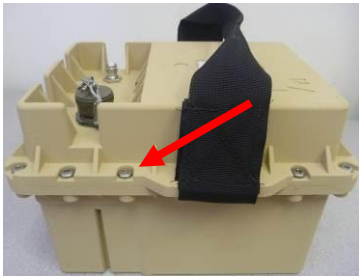
2.2. Installing Batteries

Note: Be sure to review the battery use instructions and warning labels on the battery and inside the enclosure prior to installing batteries

- a) To install batteries, remove all screws from around the edge of the Coyote UGS node and open the lid, taking care not to damage any of the wires between the lid and the electronics compartment.
- b) Insert the battery packs (1 or 2 batteries may be installed), as shown in **Figure 3**.
- c) Connect one battery cable to the top of each battery.
- d) Check the power on blinking sequence of the LED indicator. Upon power up the LED should cycle through all three colors (red, green, yellow) and then blink red while the unit performs a self-test.
 - o If the unit fails self test the LED will change to solid red.
 - o If the unit passes self-test, that the LED will turn either solid yellow or solid green depending on the radio activation status.
 - o A solid yellow indicates that the device is active but radio disabled until the next activation procedure.

- o A solid green indicates that the device is active and the radio is enabled and will actively seek a mesh network (higher power drain condition).
- e) Verify the environmental seal track is free of dirt and debris. If necessary, use compressed air to clean out the track.
- f) Insert the environmental seal in the seal track or re-insert it as necessary if it has popped out of the track at any point.
- g) Arrange the cables such that they do not impede lid closure.
- h) Screw the lid back on (**NOTE: The recommended rotational torque on the outside lid screws is 20-25 in-lbs.**)

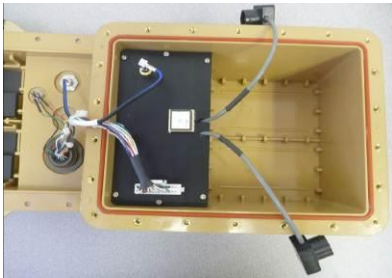
Screws (a)



Batteries Connected (c)



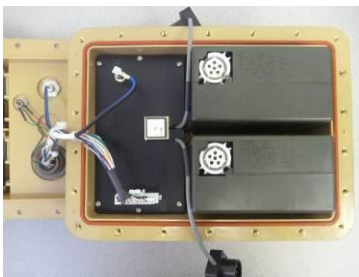
Open & Empty



Environmental Seal Installed (e)



Batteries Inserted (b)



Batteries Installed



Figure 3: Battery installation process

3. Activation Procedure

The Coyote UGS node is now ready for activation. The activation procedure should be performed in the field at the physical location of the placed sensor node. Once the node has been activated, it will begin actively searching for a GPS lock and record this position as its buried location.

3.1. Activation Steps

The activation steps require no additional equipment or tooling.

- 1) The first step is to hold the Coyote UGS node flat and hold this position for 3 seconds.
- 2) The second step is to rotate the Coyote UGS node 90 degrees to the NORTH* and hold this position for 3 seconds.
- 3) The third step is to rotate the Coyote UGS node 180 degrees to the SOUTH and hold this position for 3 seconds.
- 4) The last step is to return the Coyote UGS node to a flat position and hold this for 3 seconds.

*** Note – The NORTH bearing is relative to the “N” arrow on top of Coyote UGS housing**

The Coyote Activation Field Guide lists these steps and is accompanied by images of the Coyote UGS nodes for ease of use in the field. This can be seen in Figure 4.

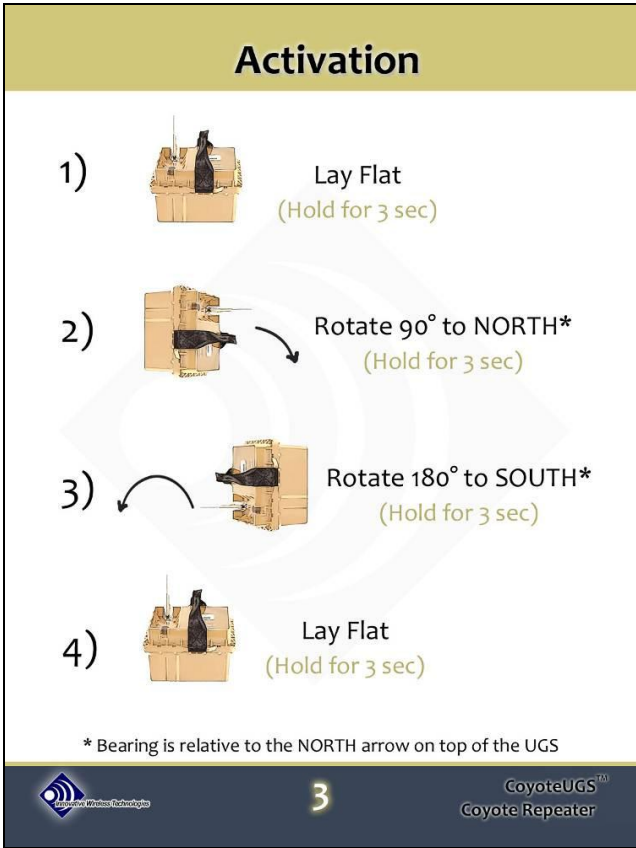


Figure 4 – Coyote UGS Activation Field Guide

3.2. LED Status Indicator

When the activation process has been successfully completed, the tri-color LED on top of the Coyote UGS node will start blinking RED. This confirms that the node has been activated and is beginning a self-test. If the self-test fails, the LED will turn solid RED. If this occurs, the Coyote UGS node will need to be deactivated by following the Deactivation procedure.



RED Blinking – Confirms successful activation and indicates self-test is in progress



RED Solid – Indicates the self-test failed. The LED will remain on until the node is deactivated

If the self-test passes, the LED will begin blinking ORANGE. During this time, it will begin searching for a GPS lock and checking for communication with the Coyote network. The node may be buried at this time, but it is advised to wait until a GPS lock and RF communication has been.



ORANGE Blinking – Indicates self-test has passed; node is searching for comms and GPS

Once the node has passed self-test and has established RF communications, the LED will begin blinking GREEN. Once the node passes self-test, establishes RF communications, and obtains a GPS lock, the LED will remain solid GREEN. At this time the node it is recommended to bury the Coyote UGS node.



GREEN Blinking – Indicates self-test has passed and the node has established RF comms



GREEN Solid – This confirms successful self-test, RF communication, and GPS lock

The nodes will attempt the self-test process and search for RF communication and GPS lock for a total of 10 minutes once the node has been activated. After 10 minutes from activation, the LED will go off and the node will begin reporting alarms. After 30 minutes from activation, the node will begin reporting tamper alarms.

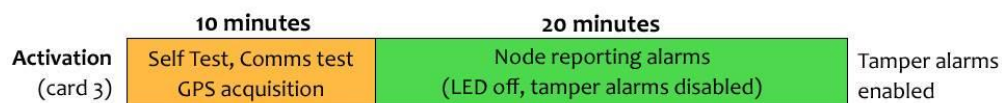


Figure 5 - Activation Timeline

A summary of the LED Status Indicators can be found on the Coyote LED Status Indicator Field Guide. This can be seen in Figure 6.

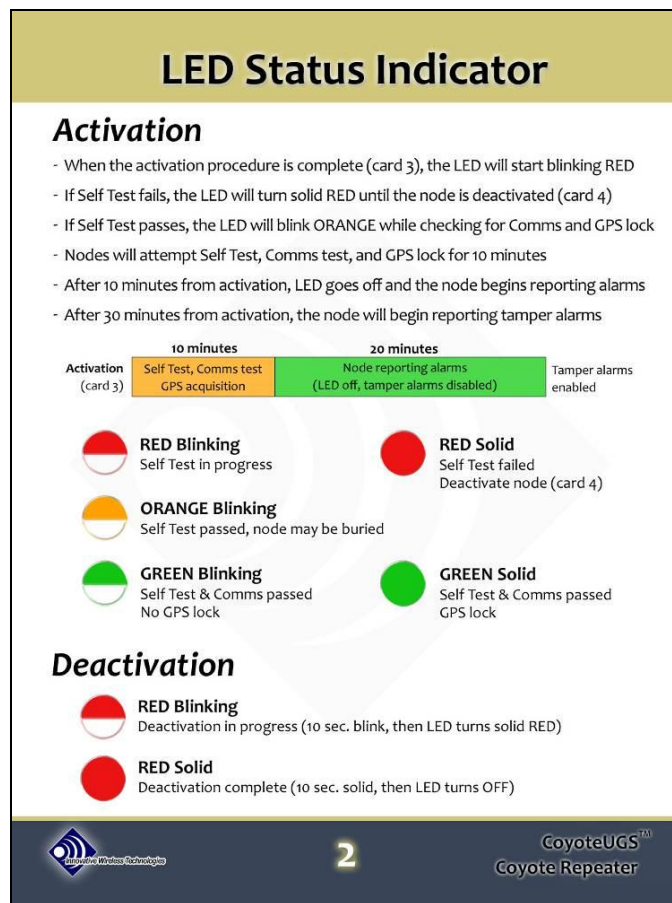


Figure 6 – Coyote UGS LED Status Indicator Field Guide

4. Deactivation Procedure

A Coyote UGS node can be deactivated after it has been activated by following a simple procedure that turns it off. This procedure is virtually identical to the activation procedure.

4.1. Deactivation Steps

The deactivation steps require no additional equipment or tooling.

- 5) The first step is to hold the Coyote UGS node flat and hold this position for 3 seconds.
- 6) The second step is to rotate the Coyote UGS node 90 degrees to the EAST* and hold this position for 3 seconds.
- 7) The third step is to rotate the Coyote UGS node 180 degrees to the WEST and hold this position for 3 seconds.
- 8) The last step is to return the Coyote UGS node to a flat position and hold this for 3 seconds.

*** Note – The NORTH bearing is relative to the “N” arrow on top of Coyote UGS housing**

The Coyote Deactivation Field Guide lists these steps and is accompanied by images of the Coyote UGS nodes for ease of use in the field. This can be seen in Figure 7.

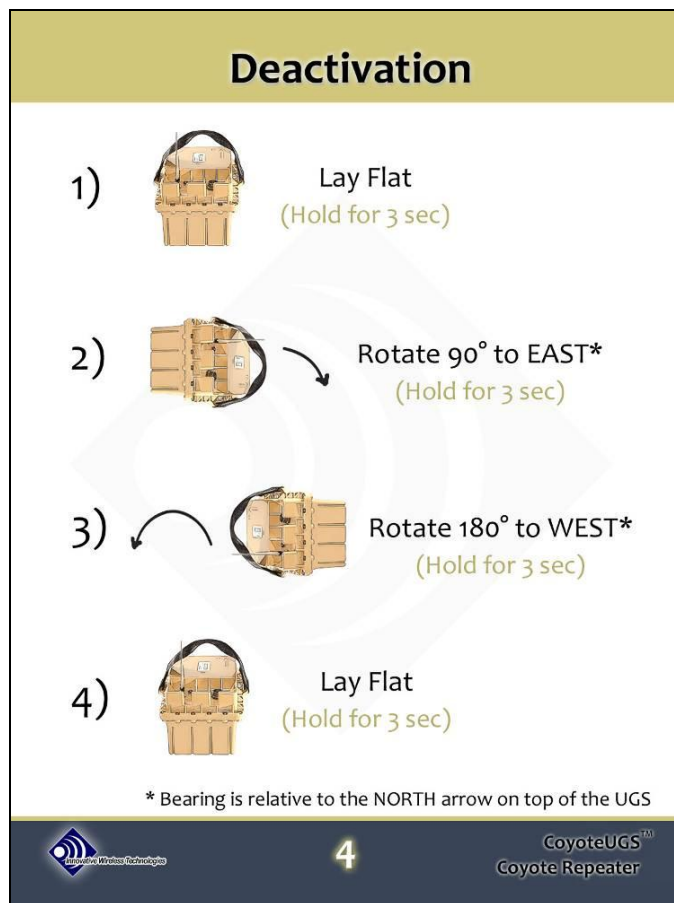


Figure 7 – Coyote UGS Deactivation Field Guide

4.2. LED Status Indicator

When the deactivation procedure has been successfully completed, the tri-color LED on top of the Coyote UGS node will begin blinking RED for 10 seconds. After the LED blinks RED for 10 seconds, it will turn solid RED for another 10 seconds before shutting off. Once the LED has turned off, the Coyote UGS is deactivated.



RED Blinking – Indicates that deactivation is now in progress (Blinks for 10 seconds)



RED Solid – Indicates that the deactivation process is complete (Turns off after 10 seconds)

5. Emplacement Procedure

Once the Coyote UGS node has been successfully activated, it is ready for emplacement. The high level steps for emplacing a Coyote UGS node after it has been activated are:

- 1) Connect any Sensor Accessories
- 2) Dig the Hole and Emplace the Coyote UGS node
- 3) Bury the Node and Camouflage it

5.1. Connecting Sensor Accessories and RF Antenna

To connect any external sensor accessories to the Coyote UGS node:

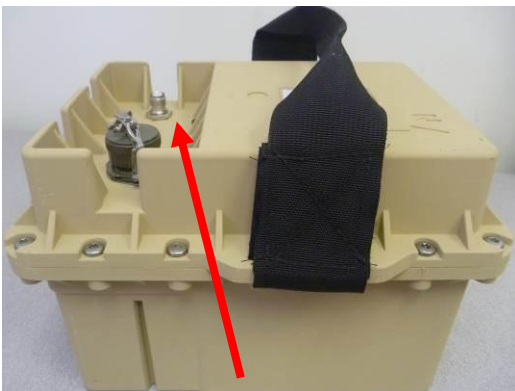
- a) Connect the male end of the umbilical cable to port J1 on the Coyote eUGS node
- b) Connect the female end of the umbilical cable to a MIDs Accessory
- c) Connect the RF antenna to port A1 of the Coyote UGS node



Plug pin end into J1 receptacle on UGS Node (a)



Plug socket end into receptacle on MIDs Accessory



Antenna port A1 (c)



PIR connect to J2 or J3 on MIDs Accessory (b)

Figure 8 - Connecting Coyote UGS antenna and accessories

5.2. Digging the Hole and Emplacing the Coyote UGS Node

The first step is to dig a hole to bury the Coyote UGS node. General guidelines for digging holes:

- a) Select a suitable location for node emplacement
- b) Dig a hole 12" (depth may be approximated ± 1 ") deep and twice the size of the Coyote UGS sensor
- c) The base of the hole should be flat



Figure 9 – Coyote UGS node being emplaced in hole

5.3. Bury and Camouflage the Coyote UGS Node

Now that the CoyoteUGS node has been successfully activated and emplaced in a hole, it is ready to be buried and camouflaged. Good seismic coupling is a key to optimal performance; therefore, care should be taken in this step to ensure this. General guidelines for burying and camouflaging:

- a) Ensure the base of the hole is flat and the base of the sensor is flat against the bottom of the 12" deep hole. Note: As a quick field measurement guide, the UGS enclosure is ~6" high and it is approximately another 6" to the base of the thicker part of the antenna
- b) Repeatedly pack the dirt around the sensor as the hole is being filled. This will remove air pockets around the sensor and enhance coupling of the earth to the enclosure



Figure 10 - Tightly pack soil around node during burial procedures

- c) Conceal the exposed components of the sensor with natural vegetation
- d) The antenna is flexible and can be mildly bent to shape it into the natural surroundings.



Figure 11 - Sensor camouflage using natural vegetation

6. Extraction Procedure

In the event a Coyote UGS node needs to be moved to a new location, the following steps should be taken to successfully extract the node.

- 1) The first thing to do is locate and dig up the node. Special care is necessary when using a shovel or other field implement to prevent accidental damage to the connectors on top of the Coyote UGS node.
- 2) Grasp and pull on the cloth strap on the top of the unit to aid in extraction. DO NOT use the antenna as a handle.
- 3) Once the Coyote UGS node has been moved, a tamper alarm will be triggered.
- 4) Brush off any dirt that is covering the LED and execute the Coyote UGS Deactivation Procedure*.

*** Note – The deactivation procedure must be completed within 5 minutes of removing the node or else a tamper action will occur**



7. Safety Information

7.1. FCC Notice

FCC ID: SP8-FAP4100-010

CAUTION: Changes or modifications to the equipment not expressly approved by Innovative Wireless Technologies, Inc. could void the user's authority to operate the equipment.

Innovative Wireless Technologies, Inc.
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IMPORTANT NOTE: This equipment complies with FCC/IC radiation exposure limits. In order to comply with these requirements, the antenna used for this device must not be co-located or operating in conjunction with any other antenna or transmitter, except in accordance with FCC/IC multi-transmitter product procedures.

The Coyote UGS must be installed 20 cm or more from any personnel in order to comply with FCC exposure requirements.

7.2. Industry Canada (IC) Notice

IC: 9568A-FAP4100010

The term "IC" before the equipment certification number signifies that the Industry Canada technical specifications were met.

This device complies with RSS-210 Issue 8 and RSS-Gen Issue 3 of the IC Rules.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

8. Revision History

Revision	Date	Changes	Author
A	11/9/08	Initial Release	K. Colling
B	6/22/09	Release	J. Grohs
C	8/4/11	Updated to reflect Generation 2 hardware	J. Colling
D	4/11/12	Added FCC and IC safety information	J. Colling
E	4/12/12	Updated FCC and IC safety information	J. Colling