HPRO-4G

PLS-63W Certification

Users' Guide

Document # 1193-30xx
Revision

Document Number 1193-30xx

Revision History

DATE	REV	ECO#	REASON
10/11/2018	A	02498	Initial release
10/23/2018	B	02516	Application installation instructions and ip67 test instructions added. Added instructions on assigning a static IP address.
08/10/2022			Added set up instructions for PLS63-W testing.

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1 Introduction

The HPRO set up instructions demonstrates basic functionality of the HPRO device. With these steps the user can test functionality of the various hardware functions and features. The primary purpose of these instructions is to assist with the following:

- CE/FCC Testing
- Cellular Testing
- Reliability and Environmental Testing

This User's Guide describes the following activities:

- Connecting the device to support equipment.
- Configuring minimal support equipment.
- Executing and operating the HPRO to get desirable outputs.

1.1 Prerequisites

The user of this guide should be comfortable working with low-voltage circuits, connecting wires and have a basic understand of serial ports, Ethernet, and operating terminal emulation software from a windows PC.

1.1.1 Available from Quake

Quake Part Number	*Description*
1193-5000 or 1193-5001	RED, AS-SHIPPED, HPRO-4G-B
1193-0217	1193-0217 RED, ASSY, CABLE, TEST, QCONNECT
	ANTENNA, GPS

Table 1 Quake Provided Support Equipment

1.1.2 Recommended Minimum Support Equipment

- USB-to-Serial Adapter
- Terminal Software, for example, Tera Term or equivalent. https://osdn.net/projects/ttssh2/releases/
- 12-24 VDC power source capable of supplying 2A, a 12V automotive battery is recommended
- E-SIM provisioned and activated, nano-sim slot provisioned.

2 Setup

The following instructions will describe the very basic hardware and software setup of the device and connection to minimal support equipment elements.

2.1 Hardware

The Terminal requires, two connections, an antenna connection, consisting of GNSS antenna and, connection to a power source and communication interface via the supplied interface cable. The evaluation kit provides the appropriate interface cable and antenna for these connections.

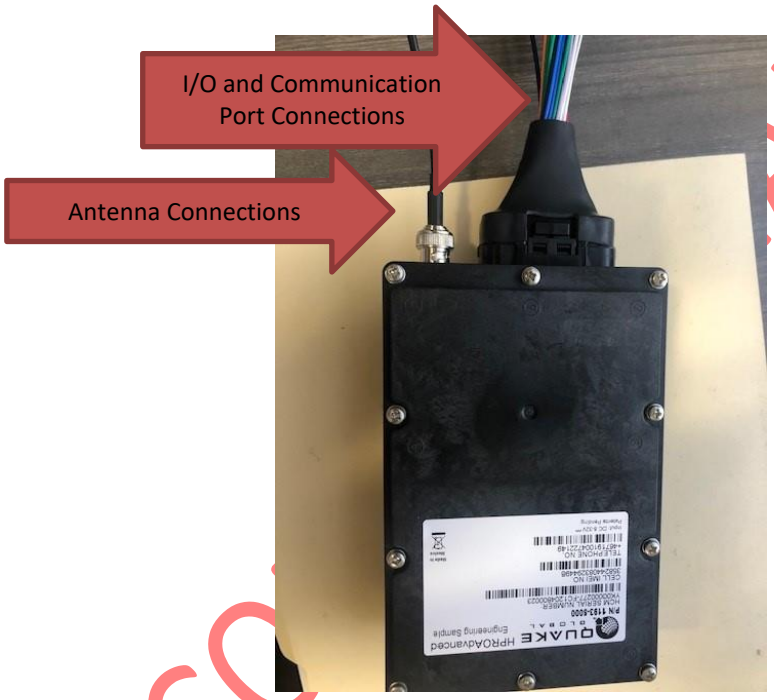


Figure 1 Interface and Antenna Cable Connections

2.1.1 Terminal Setup

The terminal may be used with a serial connection, and/or an Ethernet Connection. Both methods are described here. Quake recommends the Serial Connection method due to its simplicity. Users running QConnectATECerts with a desire to operate the Ethernet connection will need to initially connect via a Serial Connection to enable the Ethernet interface. Choose the method that best suits your use case, or, refer to the specific use cases described elsewhere in this document for guidance.

2.1.1.1 Option 1: Serial Connection

Once the Hardware is connected properly, connect the DB-9 RS-232 terminal interface cable to a host PC using a serial-to-USB adapter. Do not turn the supply 'ON' or make the final battery connection just yet.

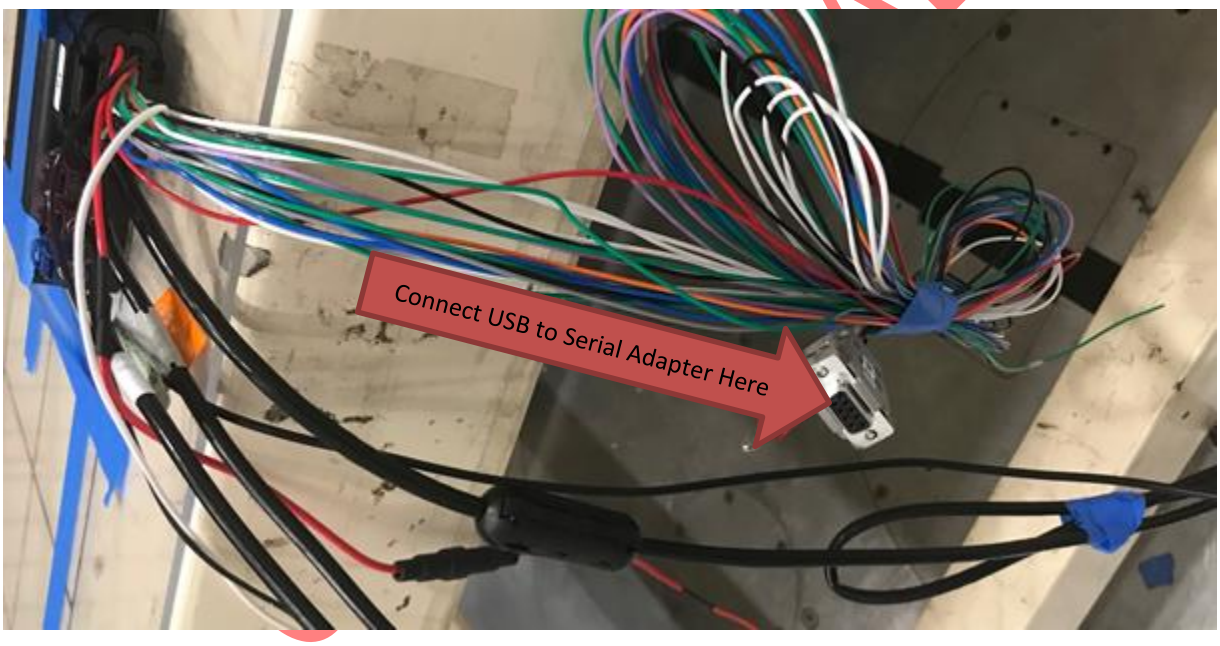


Figure 2 DB9 Serial Connection

On the host PC, utilize terminal emulation software such as TeraTerm to open a serial connection to the HPro-4G terminal. If you do not have terminal emulation software download and install TeraTerm using the link and instructions provided at the beginning of this document.

When TeraTerm launches, select 'Serial' in the connection dialog and the appropriate adapter from the dropdown dialog box.

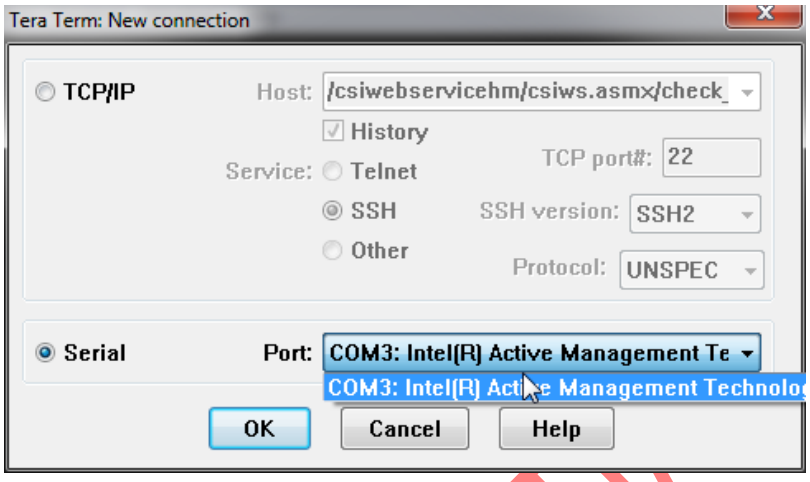


Figure 3 Create Connection

From the Setup -> Serial Port… menu item in Tera Term, set the port to 115200kbps and 8 bits, 1 stop bit.

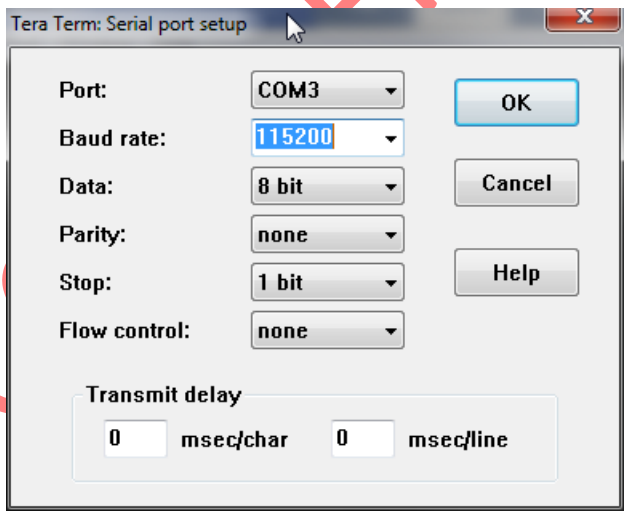


Figure 4 Set Baud Serial Port Configuration

Turn on the power supply or connect to an external battery.

Proceed to Cell OR
Proceed to WiFi OR
Proceed to GPS

2.1.1.2 Option 2: Ethernet Connection (Do not perform if serial connection used)

Configuring for an Ethernet application requires the additional step of setting the host static IP address. While the terminal is provisioned with a static IP address, the host PC will need a static IP address. Follow the instructions below to set a Windows host with a static IP address.

2.1.1.2.1 Setting the Host Static IP

To set a static IP address on a windows host open the network and file sharing center from the system tray:

Figure 5 Open Network and Sharing Center

Next, from the Network and Sharing Center, select 'Change adapter settings'.

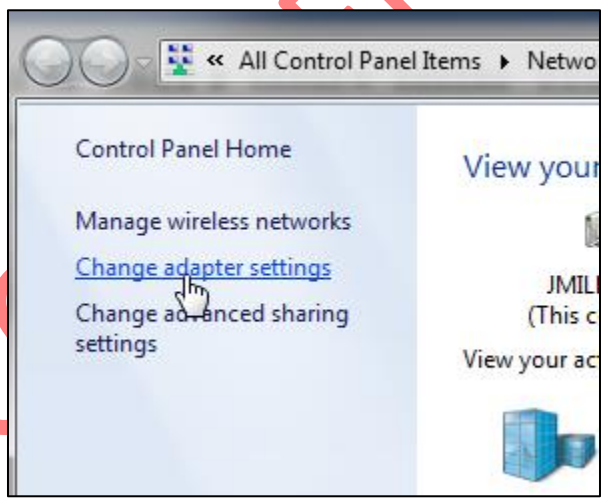


Figure 6 Changing the Adapter Settings

Locate the Ethernet adapter you intend to connect the device to, right-click and select ‘Properties’.

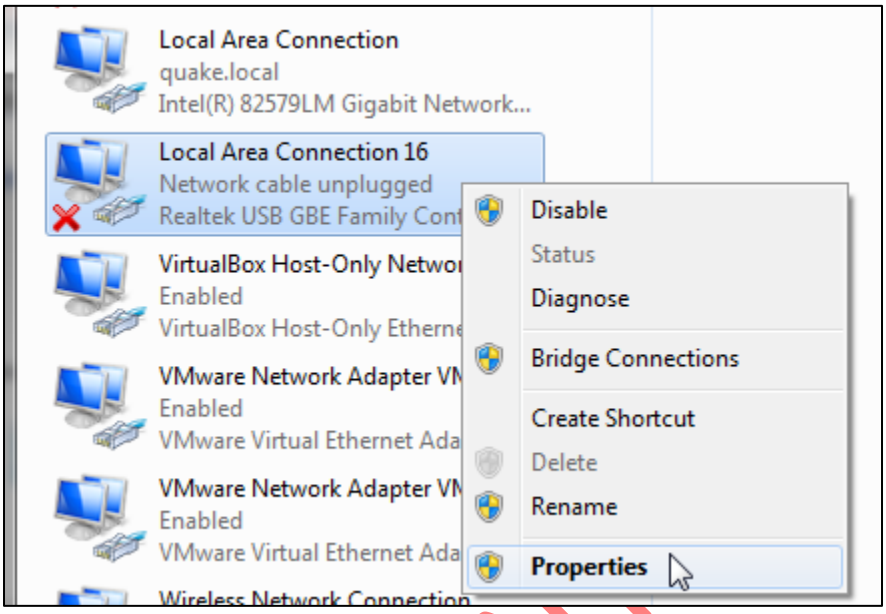


Figure 7 Adapter Properties

Locate and select the ‘Internet Protocol Version 4 (TCP/IPv4) settings and click ‘Properties’

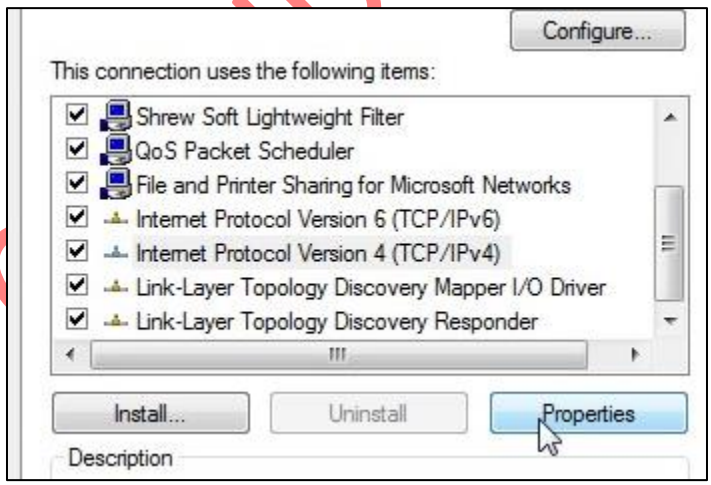


Figure 8 IPv4 Settings

Set Properties as shown below, then click 'OK'.

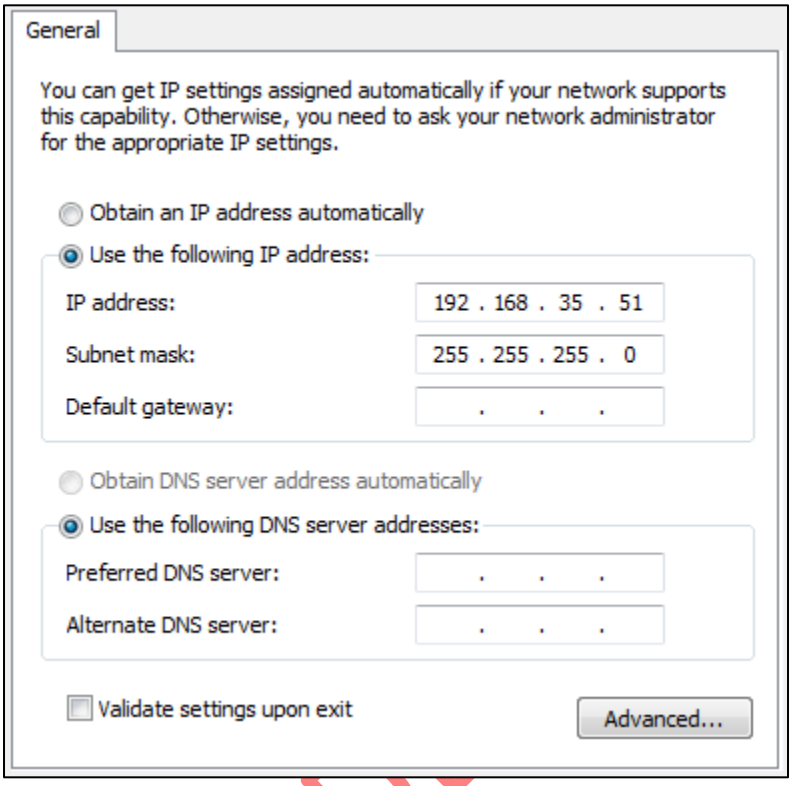


Figure 9 Setting the IP Address

The Windows host now has a static IP address.

2.1.1.2.2 Establishing the Connection with Tera Term

Connect the RJ45 Ethernet cable from the device to the host PC with a static IP address as shown above. Turn the supply 'ON' or make the final battery connection to power the unit ON.

Wait approximately 30 – 60 seconds for the device to complete its boot process before continuing.

On the host PC, utilize terminal emulation software such as TeraTerm to open a TCP/IP connection to the QConnect terminal. If you do not have terminal emulation software download and install TeraTerm using the link and instructions provided at the beginning of this document.

When TeraTerm launches, select 'TCP/IP' in the connection dialog and the appropriate adapter from the dropdown dialog box. You must use 192.168.35.10 for the Host address as shown below.

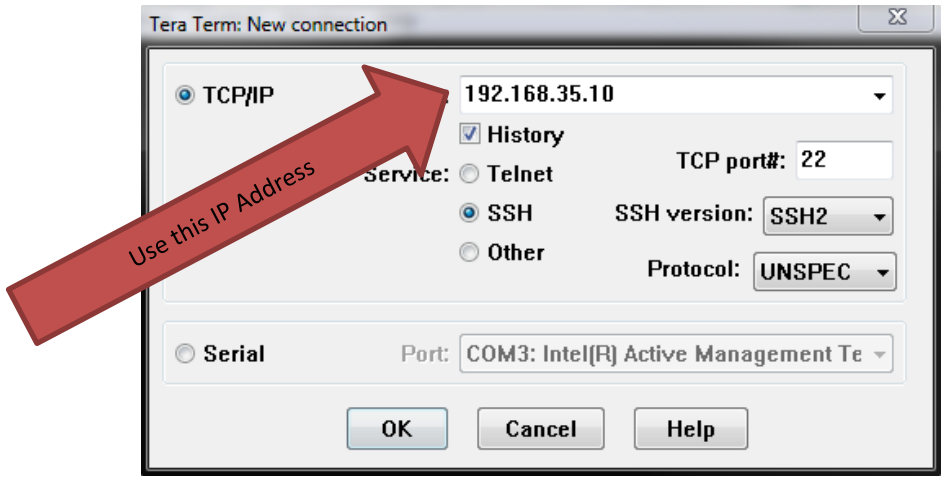


Figure 10 Create Connection

If you receive the prompt below, everything appears to be properly configured and you've waited 60-90 seconds, you may need to manually enable the Ethernet port using the Serial Connection.

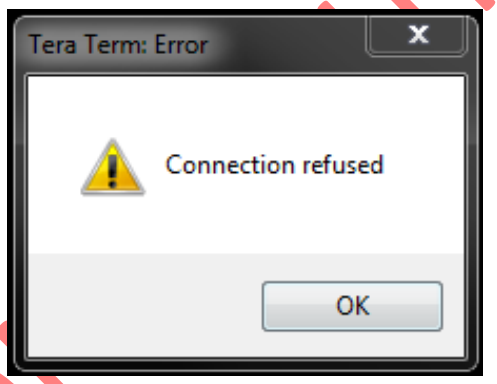


Figure 11 Connection Refused

2.1.1.2.3 Enabling Ethernet

If you are receiving 'Connection refused' as shown above it's likely your device is running a variant of the Test App which, by default, leaves the Ethernet port OFF. To turn it on, first, connect via the Serial Port using the instructions: Option 1: Serial Connection.

1. Edit /etc/network/interfaces file, file contents should look similar to:
   vi /etc/network/interfaces

```
auto lo
iface lo inet loopback

auto eth0
iface eth0 inet static
  address 192.168.10.11
  netmask 255.255.255.0
~
```

(It is important that the address on the HPro-4G match the address on the computer – you may not need to change anything.)
(Step 3 may also not be necessary, but it will not hurt anything to run again.)

2. run the command: **modprobe fec**
3. finally: **ifup eth0**

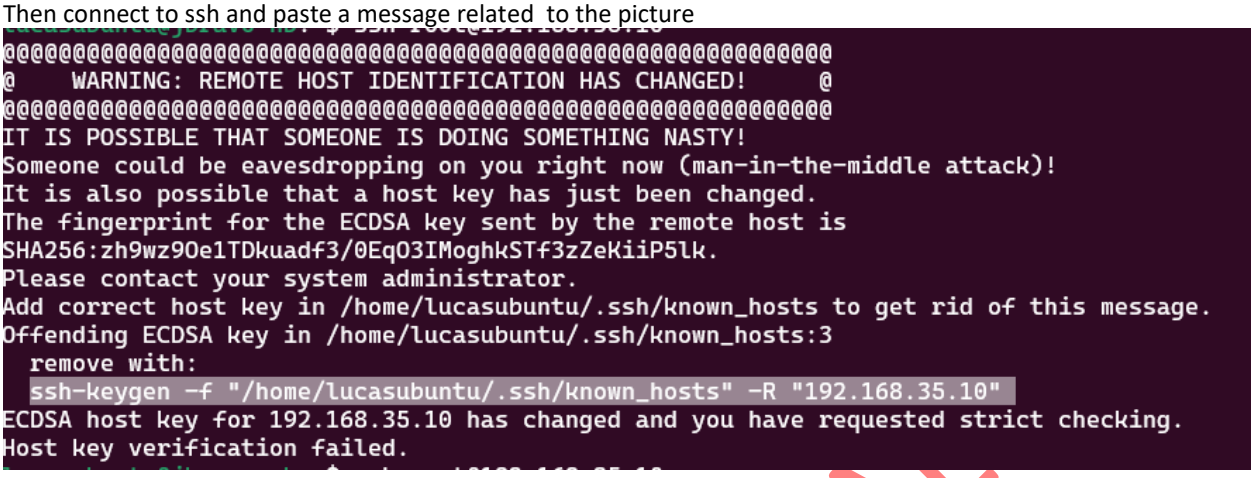
at this point ethernet should be working.
they can check by using the ifconfig command. Example:

```
# ifup eth0
Micrel KSZ8061 2188000.ethernet-1:00: attached PHY driver [Micrel KSZ8061] (mii_bus:phy_addr=
2188000.ethernet-1:00, irq=-1)
IPv6: ADDRCONF(NETDEV_UP): eth0: link is not ready
# fec 2188000.ethernet eth0: Link is Up - 100Mbps/Full - flow control rx/tx
IPv6: ADDRCONF(NETDEV_CHANGE): eth0: link becomes ready

# ifconfig
eth0      Link encap:Ethernet  HWaddr 1A:15:01:B4:A4:1A
          inet addr:192.168.10.11  Bcast:0.0.0.0  Mask:255.255.255.0
          inet6 addr: fe80::1815:1ff:feb4:a41a/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:22 errors:0 dropped:0 overruns:0 frame:0
          TX packets:6 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:2447 (2.3 KiB)  TX bytes:508 (508.0 B)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

# echo "ethernet is now up"
ethernet is now up
# ping 192.168.10.10
PING 192.168.10.10 (192.168.10.10): 56 data bytes
64 bytes from 192.168.10.10: seq=0 ttl=128 time=4.359 ms
64 bytes from 192.168.10.10: seq=1 ttl=128 time=2.269 ms

--- 192.168.10.10 ping statistics ---
2 packets transmitted, 2 packets received, 0% packet loss
round-trip min/avg/max = 2.269/3.314/4.359 ms
^C# ifconfig "ethernet is now working and fully functional"
ifconfig: ethernet is now : error fetching interface information: Device not found
# echo  "ethernet is now working and fully functional"
ethernet is now working and fully functional
```

IF Connection does not start type

Ps-> and check is you have ssh activated
If not go to :cd /etc/init.d
./S50sshd start

and then
./S50sshd restart
Then connect to ssh and paste a message related to the picture



Pasted underneath
and then go to tera term and change the date and time from the unit.
type:
`date +%Y%m%d -s "20081128"`

Depending on the type of testing, support equipment may, or may not be required.

Sub System	*Required Equipment*	*Optional Equipment*
GPIO		Switch box to set GPIO high/low
Analog		Switch box to set ADC 1 and 2 from 0 to 32VDC
Cellular	SIM Card and Cellular Antenna w/sense	
GNSS/GPS	GNSS Antenna w/sense	
CAN Ports	CAN source (Q4000 or equivalent)	
Ethernet	PC	Dedicated PC running iperf
Bluetooth	BT Peripheral	
Wi-Fi	Router	

To exit the Monitor Test type '!' or the exclamation mark. The cell and wi-fi module will be detached and shutdown.

3 FCC 15b Testing

For FCC Testing the terminal can be connected as shown below with automotive 12V battery and external antenna.

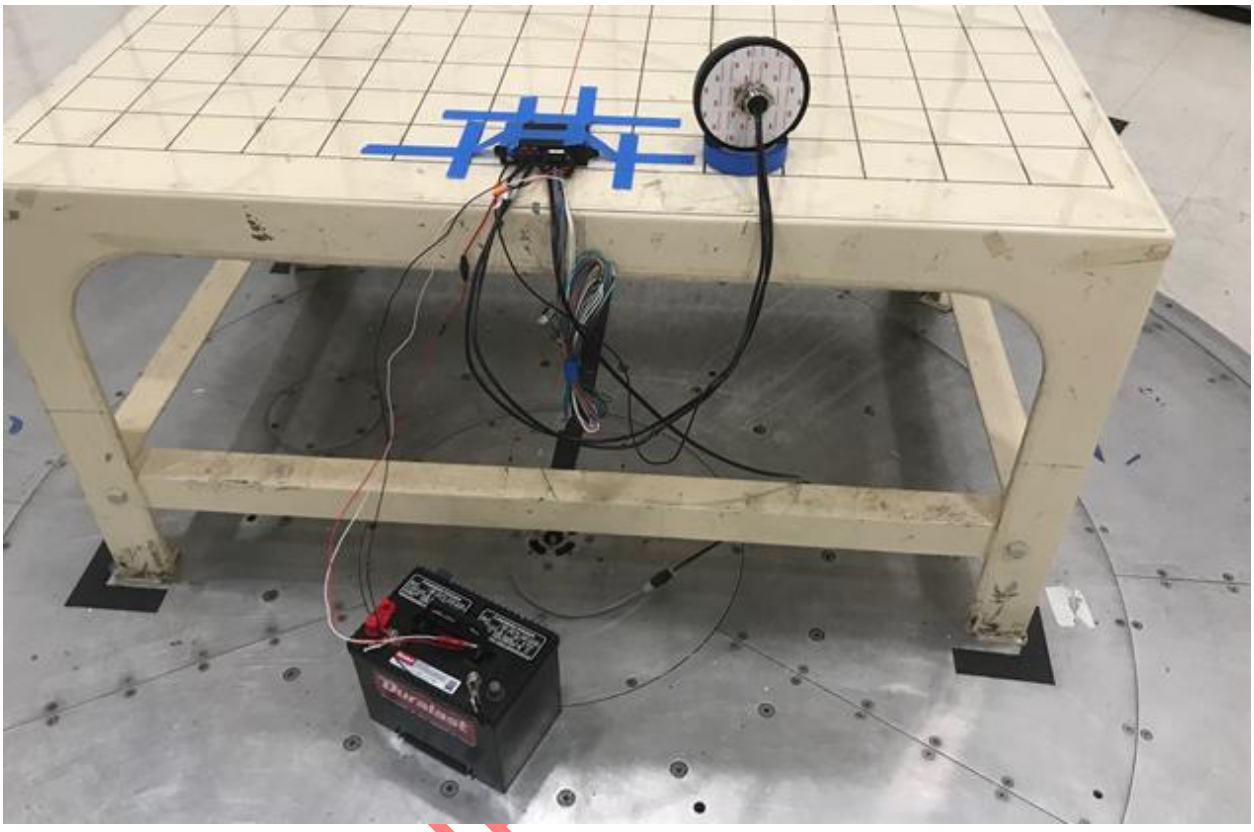


Figure 12 FCC part 15b setup

Ensure you have Tera Term installed on a laptop and follow the instructions for ether Option 1: Serial Connection or Option 2: Ethernet Connection.

4 Testing

This section describes setting up the device for testing Cell, Wi-Fi, BT and GPS.

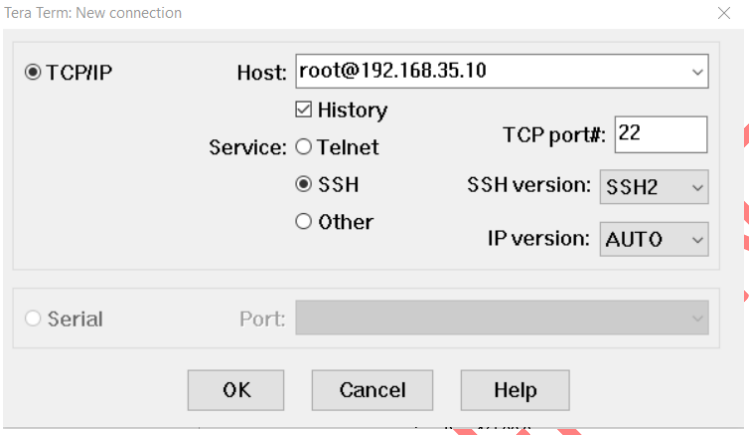
4.1 Cell Testing - Sending AT Commands

Connect to the device using terminal software in Serial mode Option 1: Serial Connection

At the login prompt, enter 'root' for user and '**`certs`**' for password (without quotation marks).

- Open Ethernet port on Tera term, by clicking on file , then click new connection.

1)Host:**root@192.168.35.10 and service : SSH**
2)Click ok



3)User Name: **root**
4)password:**`certs`**

If connection is failing type on TeraTerm serial: **ifup - a**
Return to ethernet window and repeat steps 1 and 2

type:

- **echo 89 > /sys/class/gpio/export**
- **echo out > /sys/class/gpio/gpio89/direction**
- **echo 1 > /sys/class/gpio/gpio89/value**
- **sleep 1**
- **echo 0 > /sys/class/gpio/gpio89/value**

When the USB ports come up, type:

- **microcom /dev/ttyACM2**

Type:
AT+CFUN=1,0
AT+COPS=0

```
lucasubuntu@jbravo-nb:~$ ssh root@192.168.35.10
root@192.168.35.10's password:
# echo 89 > /sys/class/gpio/export
# echo out > /sys/class/gpio/gpio89/direction
# echo 1 > /sys/class/gpio/gpio89/value
# sleep 1
# echo 0 > /sys/class/gpio/gpio89/value
# microcom /dev/ttyACM2
AT+CFUN=1,0
OK
AT+COPS=0
OK
```

(Any other desired AT commands can be entered from microcom mode)

Connect call box, run tests

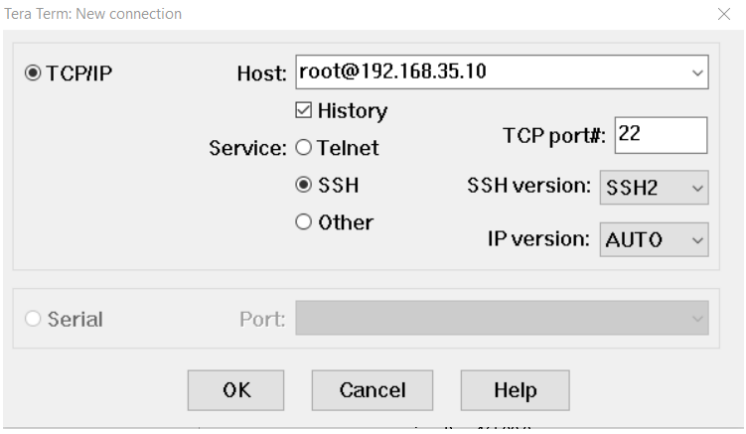
Ctrl+'x' to quit microcom mode

4.2 GPS Testing

- Open Ethernet port on Tera term, by clicking on file , then click new connection.

1)Host:**root@192.168.35.10 and service : SSH**

2)Click ok



3)User Name: **root**

4)password:**certs**

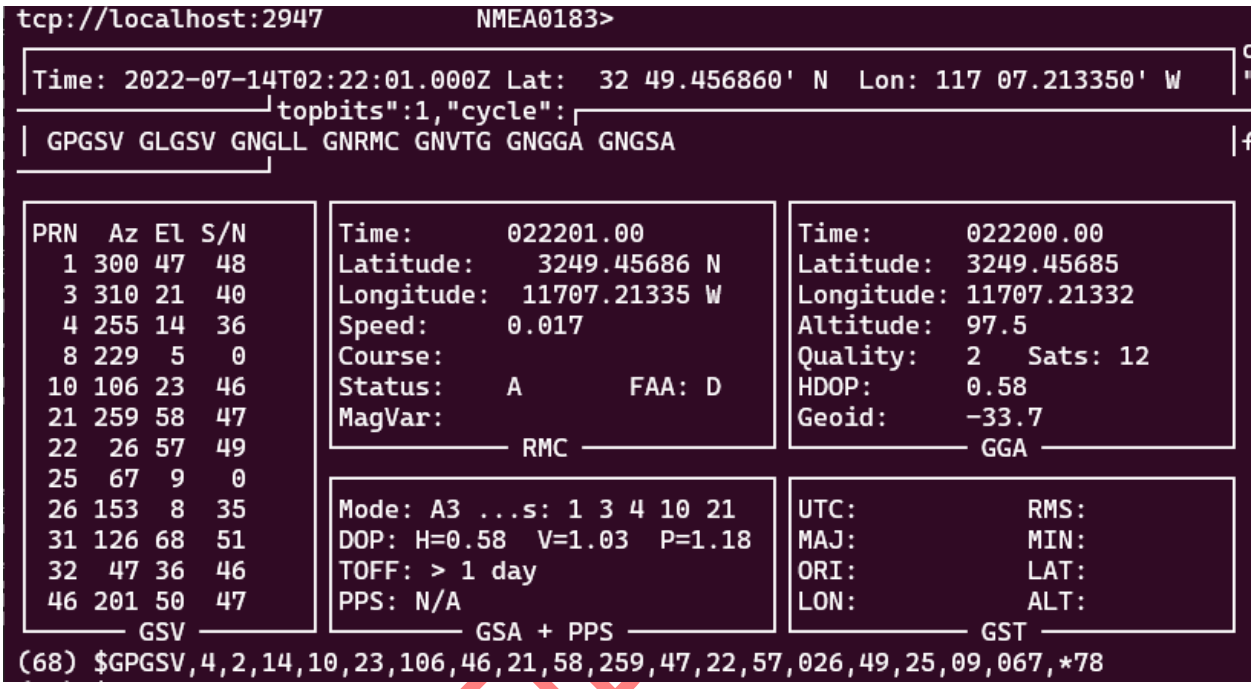
If connection is failing type on TeraTerm serial: **ifup - a**

Return to ethernet window and repeat steps 1 and 2

Type:

- **gpsmon**

It should show an image like this:

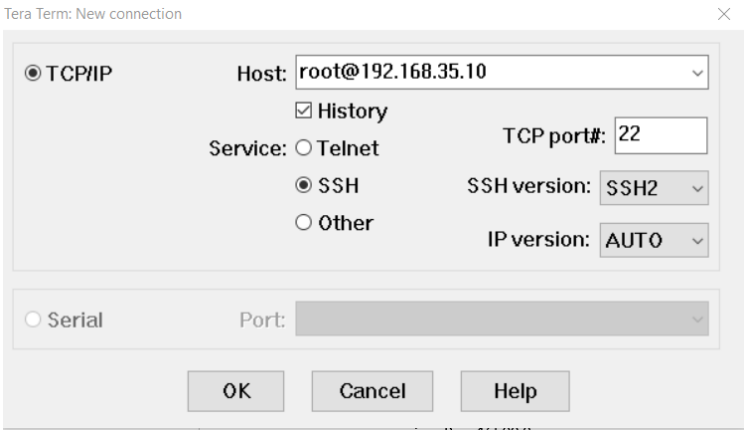


4.3 Wi-Fi Testing

- Open Ethernet port on Tera term, by clicking on file , then click new connection.

1)Host:**root@192.168.35.10 and service : SSH**

2)Click ok



3)User Name: **root**
4)password:**certs**

If connection is failing type on TeraTerm serial: **ifup - a**
Return to ethernet window and repeat steps 1 and 2

5)type: ls

Preparation:
Make sure that wifiTest is available in the list of application installed by typing 'ls'

If the device does not have the wifiTest file, please contact Quake Global.

The HPRO-4G will only be tested for the 2.4 GHz band, the following instructions are for continuous test:

This script should **only be run once**. Navigate to the 'root' directory (default location after login/pass). For general transmit functions, from the # prompt:

Type the following:
- ./wifiTest inter
- start
- cOn

1. Enter "cCh X Y Z" where **X** is the channel, **Y** is the band, **Z** is the bandwidth **[SEE EXAMPLE BELOW FOR REFERENCE]**
   a. For the selection of low/mid/high channels, type the bolded text below:
      To select Low Channel: **cCh 1 0 0**
      To select Mid Channel: **cCh 6 0 0**
      To select High Channel: **cCh 11 0 0**
2. Enter "cPow X Y" where **X** is the power set, **Y** is for the antenna selection, range is 0-3, 0 is Auto, 1 for Ant1,2 for Ant2 and 3 for both.
   a. This **only needs to be configured once**, the power range is in 0-20000 where 20000 is 20 dBm, for this setting go use the command:
      i. **cPow 16500 0**
3. Enter "cTxOn X Y" where **X** is the rate 11b/g/n and **Y** is the BW (20 or 40 MHz)
   a. Lowest setting for 2.4 GHz band is 11b 1 MBPS
      i. **cTxOn 0 0**
4. Enter "cTxOff" to turn off the transmitter.

To setup for next configuration: Return to **step 1**

To change channels: Go to **step 1** then skip to **step 3** to transmit, if power output is to remain the same.

Condensed version with an example of the output:

Low Channel:

```
linux prompt>>./wifiTest inter

>start
>cOn
>cCh 1 0 0
>cPow 16500 0
>cTxOn 0 0

EXPECTED OUTPUT:
Calibrator:: Starting TX Simulation (delay=200, rate=13, size=500, mode=0
                                     data_type=0, BW=0, gi=1, opt1=0x0,
opt2=0x0
                                     src=00:11:22:33:44:55
                                     dst=01:02:03:04:05:06)...
>cTxOff
```

Mid Channel:

```
linux prompt>>./wifiTest inter

>start
>cOn
>cCh 6 0 0
>cPow 16500 0
>cTxOn 0 0

EXPECTED OUTPUT:
Calibrator:: Starting TX Simulation (delay=200, rate=13, size=500, mode=0
                                     data_type=0, BW=0, gi=1, opt1=0x0,
opt2=0x0
                                     src=00:11:22:33:44:55
                                     dst=01:02:03:04:05:06)...
>cTxOff
```

High Channel:

```
linux prompt>>./wifiTest inter

>start
>cOn
>cCh 11 0 0
>cPow 16500 0
>cTxOn 0 0

EXPECTED OUTPUT:
Calibrator:: Starting TX Simulation (delay=200, rate=13, size=500, mode=0
```

```
                                        data_type=0, BW=0, gi=1, opt1=0x0,
opt2=0x0
                                        src=00:11:22:33:44:55
                                        dst=01:02:03:04:05:06)...
>cTxOff
```

To change between channels:

```
linux prompt>>./wifiTest inter

>start
>cOn
>cCh 1 0 0
>cPow 16500 0
>cTxOn 0 0

EXPECTED OUTPUT:
Calibrator:: Starting TX Simulation (delay=200, rate=13, size=500, mode=0
                                        data_type=0, BW=0, gi=1, opt1=0x0,
opt2=0x0
                                        src=00:11:22:33:44:55
                                        dst=01:02:03:04:05:06)...

>cTxOff
>cCh 6 0 0
>cTxOn 00

EXPECTED OUTPUT:
Calibrator:: Starting TX Simulation (delay=200, rate=13, size=500, mode=0
                                        data_type=0, BW=0, gi=1, opt1=0x0,
opt2=0x0
                                        src=00:11:22:33:44:55
                                        dst=01:02:03:04:05:06)...
```

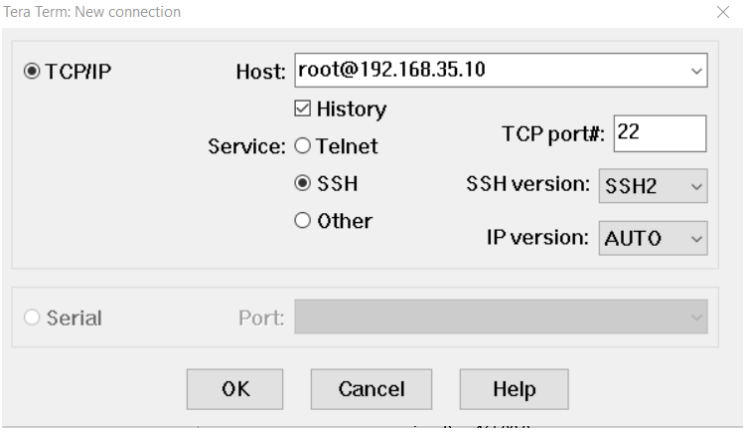
For antenna locations, see it marked in red on the top cover of the device:

4.4 BT testing

- Open Ethernet port on Tera term, by clicking on file , then click new connection.

1)Host:root@192.168.35.10 **and service : SSH**

2)Click ok



3)User Name: **root**

4)password:**certs**

If connection is failing type on TeraTerm serial: **ifup - a**

Return to ethernet window and repeat steps 1 and 2

Type:

- **cd /usr/share/wl18xx/**
- **./btup.sh**
- **./bt_test.sh -c 1 -t**

This will start a Bluetooth transmit test in channel 1, bt_test is a bash script with the following options:

Usage: **./bt_test.sh -c [channel] [-t | -r]**

Bluetooth Transmit on 2.4GHz:

-c channel select (0-78)
-t tranmit
-r receive
-h help menu

This will ensure that all radio devices are on a continuous transmit state, the cell module will be connected to a call box.

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