



EOSS SDR SYSTEM

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Revision History

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Legal

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Introduction

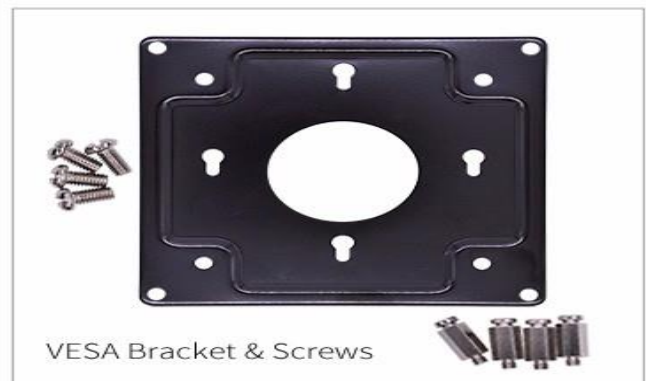
Edge of Space Sciences (EOSS) has always been the leader in high altitude ballooning in the United States. For many years TrackPoint, the excellent tracking program written by Nick Hanks N0LP, has been the standard for tracking and recovery of payloads, helping EOSS maintain a perfect record for payload recovery. In order to use TrackPoint, the operator should be an Amateur Radio Operator as the software is designed to transmit the trackers position, which is performed over Amateur Radio frequencies. The software relies on the Microsoft Windows operating systems.

Recently, Jeff Deaton, N6BA, and Jeff Shykula, N2XGL, recently developed a Linux based software program that does not require an Amateur Radio license to operate. This allows for students or others to track balloon flights in the field without having to obtain their Amateur Radio License.

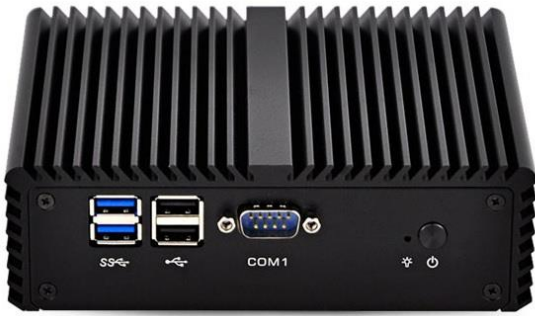
EOSS SDR-based Tracker Equipment List

- EOSS SDR Kit Includes:
 - o Computer and Power Supply & Two Wi-fi Antennas
 - Wi-Fi ID: EOSS-XX, where “XX” unique to each unit. The unit number is on the front of the computer.
 - Wi-Fi Password: “HAB2Space!” without quotes!
 - o SDR Dongle (USB)
 - o GPS Receiver (USB)
 - o Small Fan (USB)
 - o Short USB Cable
 - o Long USB Cable
 - o Power Cable: 19-inch length with 5.5 mm x 2.5 mm Barrel connector (6 Foot is available direct from Powerwerx – Part number Powerwerx DC-25ST)
- User Supplied
 - o VHF Antenna with SMA male connector (Required)
 - o DC-to-DC Converter (Optional)
 - Powers computer which powers SDR and GPS dongles
 - Isolates SDR-based Tracker from vehicle 12 electrical system
 - Example:
 - Unit from Mini-box.com (N6BA has good experience with this unit)
 - Between vehicle 12 system & SDR Tracker Equipment
 - \$60 for converter & \$5 for enclosure

Package Contents



Computer Front



Computer Rear





EOSS SDR System Startup

Note: Power must be off before connecting accessories.

1. Connect the Wi-Fi Antennas to the rear of the computer. Note that there are two antennas.



2. Plug the GPS antenna into the upper USB connections at the rear of the computer. USB 3 connections are blue and are identified as SS  USB 2 connections are black and are identified as . Either USB can be used.



3. Plug in the USB extension cable for the SDR dongle into the lower USB port



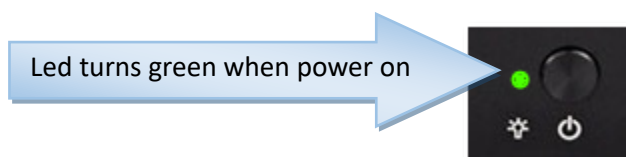
4. Plug the power connector onto the power plug. This is identified by "12v"



5. Connect the fan to the USB connection at the front of the unit. Note that there are four (4) places that the fan can be plugged in. It does not matter where the fan is plugged into. It may not be necessary to use the fan but it never hurts.



6. Power on the computer by momentarily pushing the power button on the front of the unit. The power light will turn green.



7. It will take several minutes to power up the computer.

Using the EOSS SDR System

After the computer has started the user can now connect to the computer to set up the system and to view the map. This is performed by wirelessly connecting to the web server on the EOSS SDR System computer and using a browser like any other web page.

Most common Internet Browsers that have been tested:

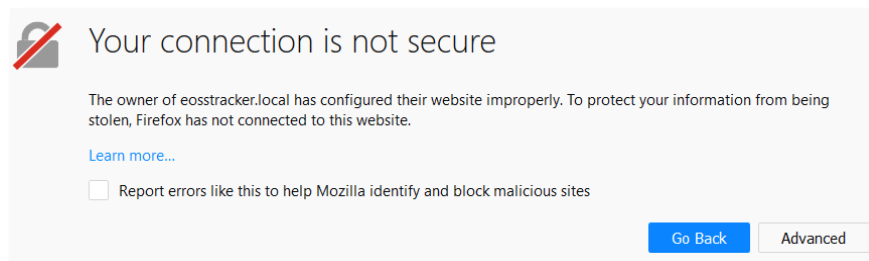
- Mozilla Firefox
- Apple Safari
- Microsoft Internet Explorer
- Microsoft Edge
- Google Chrome
- Opera

Other Internet Browsers can be used but have not been specifically tested. It is recommended to use the most recent version of the browser.

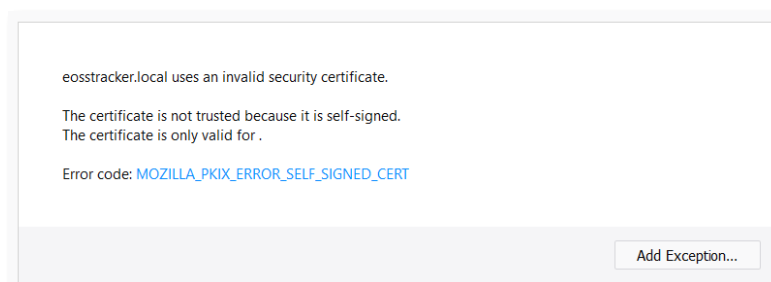


Note. Each time that there is an update to the browser, new features may be added that are not compatible with the EOSS SDR System. Before contacting EOSS support, try using a different browser to try to isolate the problem.

Using any Internet browser, navigate to <https://eosstracker.local>. Note that the browser may display an error related to the site not being secure. This is normal and should not be cause for alarm.



In most browsers there is a way to add the site to an exception list to prevent this message from appearing in the future. Locate a button similar to the “Advanced” button for Firefox shown above. Click the button and look for a similar message as below



By clicking the Add Exception button, the browser will no longer show this error.

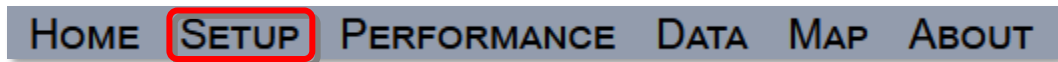


Note: There are many browsers available for use with the EOSS SDR System and each error cannot be shown here. Consult the Internet to learn how to set up your browser properly.

Flight Set Up

Anytime before the flight, the system must be set up. From the Setup screen, these functions can be set:


- Trackers
- Flights
- Prediction Data
- Launch Sites



Press the plus (+) sign beside each category to access the setup for this category.

Flights

- Flight Number – Enter the flight number as EOSS-xx where xx is the two-digit flight number (such as EOSS-01).
- Description – This can be any description and is case sensitive. An example would be “Qualification Flight”.
- Launch Site – Use the pull-down menu to select the proper launch site
- Tracking? – Check this box to track this flight.

Click the green plus sign  when finished.

Beacons




On any one flight there can be multiple devices on the flight string that can beacon their position using APRS. Each device is identified by a call sign and SSID. These are listed in this table.

1	CALL-XX	144.340MHz ▾		Description	
2	CALL-XX	144.340MHz ▾		Description	
3	CALL-XX	144.340MHz ▾		Description	
4	CALL-XX	144.340MHz ▾		Description	
5	CALL-XX	144.340MHz ▾		Description	

Enter the call sign and the SSID (AEOSS-07), the frequency the device is beaconing on and a description (such as “Shutdown Device”). Information is automatically saved after entering.

Existing flights

This table will show the flights being tracked and the devices on the flight string that are beaconing along with the frequency the device is beaconing on.

EOSS-999 (TRACKING)					
	EOSS-999	Blabla bla	Launch Site: Deer Trail ▾	Tracking: <input checked="" type="checkbox"/>	
	J3FF-1	145.535	Alskdjfasdf		
	J3FF-2	145.710	Safsadf		

Prediction Data

The EOSS SDR System can automatically display the predicted path when the proper data has been entered. The prediction data is a text file that is available on the EOSS web site beginning several days up to a week before the launch. The prediction data can be found at <https://www.eoss.org/predict>.

ACTION	FLIGHT ID	THE DATE	LAUNCH SITE	RAW FILE
	EOSS-289 ▾	mm / dd / yyyy	Crow Valley ▾	Browse... No file selected.

- Flight ID – Select the flight from the pull-down menu.
- The Date – This is the date of the prediction RAW file
- Launch Site – This is the launch site selected above

Navigate to <https://www.eoss.org/predict>. From this page, locate the launch site based on what was entered during the Flights set up.

EOSS 283

Sat February 23 2019 1500 UTC (primary date)

Launch Site	Source	Initialization	Files	Class B	I-25	Landing Site
Crow Valley	Climatology		GIF TXT RAW AA APRS ptm	pass	pass	114° @ 67.0 nmi (AKO081007)
Deer Trail	Climatology		GIF TXT RAW AA APRS ptm	pass	pass	114° @ 67.0 nmi (TXC146041)
Eaton	Climatology		GIF TXT RAW AA APRS ptm	pass	pass	115° @ 66.0 nmi (AKO240013)
Genoa	Climatology		GIF TXT RAW AA APRS ptm	pass	pass	114° @ 67.0 nmi (LAA032044)
Wiggins	Climatology		GIF TXT RAW AA APRS ptm	pass	pass	115° @ 67.0 nmi (TXC082021)
Limon	Climatology		GIF TXT RAW AA APRS ptm	pass	pass	114° @ 67.0 nmi (LAA022037)
Windsor	Climatology		GIF TXT RAW AA APRS ptm	FAIL	pass	115° @ 66.0 nmi (AKO246024)

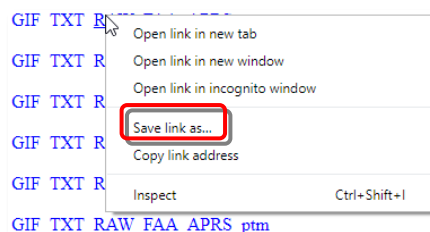
Depending on the browser being used. For the purposes of this manual, Chrome and Firefox are shown.



Caution: It is important to select the proper RAW file for the proper launch site

Chrome

- Navigate to <https://www.eoss.org/predict>
- Locate the RAW link for the proper launch site
- Right-click on the RAW link
- From the popup box, select "Save link as..."

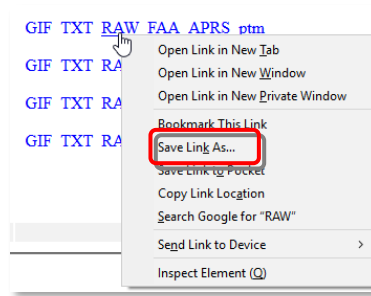


- Save the file to a location that it can be easily found (such as a folder on the desktop. Do not change the name of the file)

Firefox

- Navigate to <https://www.eoss.org/predict>
- Locate the RAW link for the proper launch site
- Right-click on the RAW link

- From the popup box, select “Save link as...”

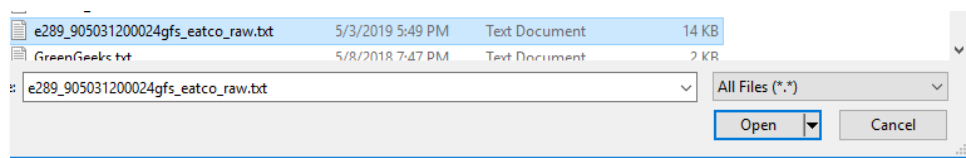


- Save the file to a location that it can be easily found (such as a folder on the desktop). Do not change the name of the file

From Add a Prediction click on the “Browse...” button located in the RAW File section

ACTION	FLIGHT ID	THE DATE	LAUNCH SITE	RAW FILE
	EOSS-289	05 / 01 / 2019	Crow Valley	Browse... No file selected.

Locate the text file that was saved in the previous step and click Open



Click the green plus sign to add the prediction file to the program. Note that it does not matter how many prediction files are added as the system will only use the latest prediction file.

ACTION	FLIGHT ID	THE DATE	LAUNCH SITE	RAW FILE
	EOSS-289	05 / 03 / 2019	Eaton	Browse... e289_905031200024gfs_eatco_raw.txt

The prediction file will now appear under Existing Predictions

Existing Predictions			
ACTION	FLIGHT ID	THE DATE	LAUNCH SITE
	EOSS-289	2019-05-03	Eaton

Launch Sites

EOSS uses a standard set of launch sites for all of the flights. However, as in the case of Great Plains Super Launch (GPLS), the launch site may not be in the list.

The Latitude, Longitude and altitude of the launch site is important for accuracy. Any web site such as Free Map Tools (<https://www.freemaptools.com/elevation-finder.htm>) can provide the elevation and the Latitude and Longitude plus elevation above sea level.



Note that the Latitude and Longitude **MUST** be decimal degrees and not degrees minutes. Altitude **MUST** be in feet and not meters.

Existing launch sites can be removed by clicking on the red “X”



Trackers

From this menu, the information for the trackers is set up. The team and flight assignments are preconfigured with the team that participated in the last flight before the software was released. Not all trackers are going to be initially on this screen. This is nothing personal.

TEAM AND FLIGHT ASSIGNMENT	CALLSIGN	NOTES	MOVE TO THIS TEAM
Alpha At Large ▾	KC0D	Mark	Alpha ▾
	N0LP	Nick	Alpha ▾
	WA0GEH	Marty	Alpha ▾

- Team and Flight Assignment – This is where the team is assigned to a flight
- Callsign – This is the team members. By clicking on the red “X”, the team member can be deleted. This is not case sensitive and will be converted to upper case automatically.
- Notes – This is usually the first name of the tracker. It can also include the position such as Tracking Coordinator (TC). This is case sensitive.
- Move to This Team – Instead of deleting a team member, the member can be moved to a different team. This is a pull down menu to select a team. Note that if the team does not have any members yet, a new team will be created

The assignments for the next flight can be found on the EOSS website (<https://www.eoss.org>). This is usually completed by the Tracking and Recovery Coordinator (Alpha) beginning several days before the flight but could be as much as a week or two before.

If a tracker is not listed, use the Add a New Tracker feature.

Add a New Tracker:

ACTION	CALLSIGN	NOTES	TEAM ASSIGNMENT
	CALL		Alpha ▾

- Call Sign – Enter the call sign of the tracker. Note that as of version 1.1, an SSID can be entered. This will allow the tracking of a specific station without having to worry about a situation were that station has a second APRS station (such as NØCALL-3 and NØCALL-9 where the SSID “-9” may be their weather station which is 50 miles away). Entering the callsign without the SSID will tell the system to track all stations with that call sign.
- Notes – Enter the first name of the tracker
- Team Assignment – Select the team from the pull down menu. Note that if the team exists, the Tracker will be added to the team. If the team does not exist, the Tracker will be added to a new team. There are 26 possible teams that can be utilized per flight.



EOSS teams are always identified by letters of the Alphabet (Alpha [Tracking Coordinator aka, Fearless Leader]), Bravo [backup Fearless Leader]), Charlie, etc.)

From the Tracking and Recovery list on the web, the Trackers section can be updated to include only current trackers. There are two options for each team

- Add to team
- Delete from team
- Move to another team

System Configuration

New to version 1.1 is the System Configuration. This Use this section to set configuration parameters for the EOSS Tracker system. These settings are system-wide and are not configurable on a per user basis.

Timezone

This is used to set the time zone for where the software is going to be used. Note that this is only for the software and does not change the time zone of the computer the software is running on.

CONFIGURATION ITEM	VALUE
Timezone used throughout the interface.	Timezone: <input type="text" value="America/Denver"/>

Call sign and SSID

CONFIGURATION ITEM	VALUE
Callsign and SSID. Enter your ham radio callsign and select an appropriate SSID.	Callsign: <input type="text" value="NOCALL"/> SSID: <input type="text" value="6"/>

Transmitting and iGating

In version 1.1, the ability to iGate was added for those who have an APRS-IS passcode and an Internet connection during the flight

IGATING TO THE INTERNET	
IGATING	Enable igating for received APRS packets. This assumes the system has Internet connectivity. Enable igating: <input checked="" type="checkbox"/>
	APRS-IS passcode for connections to APRS-IS systems. Passcode: <input type="text" value="1234"/>
	Beacon to APRS-IS at this this rate (i.e. every mins:secs), directly over an internet connection. Instead of relying solely on RF beaconing for getting APRS beacons to APRS-IS servers, this system can beacon directly to APRS-IS if enabled. Enable: <input checked="" type="checkbox"/> Mins:secs <input type="text" value="15:00"/>
Note: If RF beaconing is enabled below, APRS-IS direct beaconing will use those beaconing rates instead of the time value listed here.	


- Check the “Enable igating” checkbox. Once checked the remaining iGate parameters will be enabled
- Enter the Passcode. Note that the passcode is a variation of the user’s call sign.
 - There are many passcode generators on the web. An example is <http://n5dux.com/ham/aprs-passcode>



If using an SSID in the Call sign and SSID section, make sure that the callsign and SSID are used when generating an APRS passcode

Callsign: <input type="text" value="NOCALL-6"/>	<input type="button" value="Generate Passcode"/>
---	--

- Beacon to APRS-IS. Check this box if it is desired to beacon to the Internet. Select the number of minutes to beacon. Note that the default is every 15 minutes. It is not recommended to beacon too frequently.

APRS COMMENT AND STATION SYMBOL	
COMMENT AND SYMBOL	APRS comment. For each outgoing packet, this comment will be included (limited to 60 characters). <div>EOSS Tracker Alpha</div>
	APRS symbol. Chose the appropriate symbol to represent your station. <div>  <div>Overlay: <input type="checkbox"/></div> <div>SUV, ATV</div> </div>

Set the APRS comment that will be beacons to the Internet. It is recommended that the assigned tracker identifier also be included.

A new addition to version 1.1 is the ability for the EOSS SDR System to beacon over the air. This requires a radio and an interface to the radio.

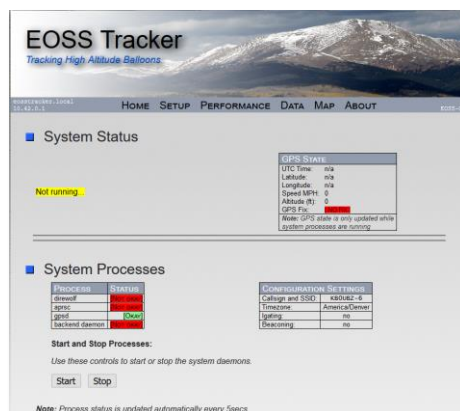
APRS RF SMART BEACONING		
BEACONING	Enable RF beaconing of position with APRS over RF. This requires an external radio set to an appropriate frequency. Include EOSS within your APRS path when tracking flights with EOSS. This system will always use WIDE1-1,WIDE2-1, but one optionally can append "EOSS" to that path. For example, WIDE1-1,WIDE2-1,EOSS.	Enable beaconing: <input checked="" type="checkbox"/> Include EOSS: <input checked="" type="checkbox"/>
	Fast speed threshold. For speeds above this value, beacon this frequently.	Mph <div>45</div> Mins:secs <div>01:00</div>
	Slow speed threshold. For speeds below this value, beacon this frequently.	Mph <div>5</div> Mins:secs <div>10:00</div>
	Frequency threshold. Never beacon more frequently than this.	Mins:secs <div>02:00</div>
	Fast speed direction change threshold. For speeds above the fast threshold, beacon when the direction travel changes by at least this many degrees.	Degrees <div>20</div>
	Slow speed direction change threshold. For speeds below the slow threshold, beacon when the direction travel changes by at least this many degrees.	Degrees <div>60</div>
	EXTERNAL RADIO CONNECTION	
System audio output device. Choose the audio device on this system that will be used to output audio to an external radio. Device 0 is usually the onboard headphone jack.	Device 1: HDA-Intel - HDA Intel PCH	
External radio PTT connection. Choose the serial device on this system that will be used to trigger the PTT on the external radio. Select "NONE" if using a third party device like Signalink or VOX on the radio. See the Dire Wolf User's Guide for details.	Port: <div>none</div> Line Ctrl: <div>RTS</div>	

EOSS cannot advise how to interface a radio to the EOSS SDR System as there are too many types of radios available. The user guide from Dire Wolf can be helpful in building the interface for transmitting and receiving.

Tabs

Main Screen (Home)

The first screen shown is the main screen.

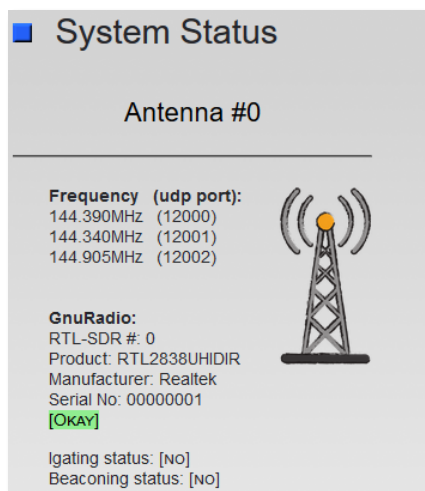


This screen shows the status of the system. Note that when first starting up, the system may show a status of “Not Okay”, “Not Running” or “NO FIX”. This normal as some of the system processes (or “daemons”) have not been started yet. Click on the Start button to start the processes.



Before turning off the power to the computer, the system processes must be stopped, and the status must show “Not Running”. Press the Stop button to stop all the daemons.

The remainder of the main screen is related to system messages. Although this may look like Greek, these messages may be important to the developer or support personnel if there is a problem with the system.



New to version 1.1 is the GPS State box. This will tell the status of the GPS and whether enough GPS satellites have been acquired to provide a good location. At least 3 satellites must be acquired to provide a good 3D fix which will include Latitude, Longitude, Altitude and Speed. In the example below, there is only a 2D fix so Latitude, Longitude, Altitude and Speed all show “nan”, which is geek speak for not able to display without a 3D fix. The biggest reason for not having a 3D fix is that the GPA cannot “see” at least 3 satellites. This is common when using GPS inside of a building.

GPS STATE	
UTC Time:	2019-05-21 01:06:53
Latitude:	nan
Longitude:	nan
Speed MPH:	nan
Altitude (ft):	nan
GPS Fix:	2D FIX
<i>Note: GPS state is only updated while system processes are running</i>	

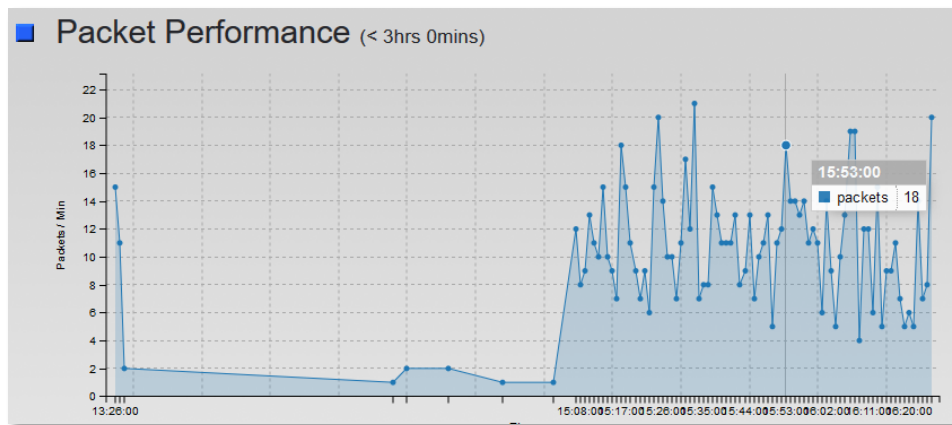
Once the GPS has obtained a 3D lock, the GPS State screen changes and displays more information:

GPS STATE					
UTC Time:	2019-05-21 02:39:55				
Latitude:	39.642111				
Longitude:	-104.807823				
Speed MPH:	0.0				
Altitude (ft):	5794.0				
GPS Fix:	[3D FIX]				
PRN:	Elev:	Azim:	SNR:	Used:	
5	27	51	10	Y	
13	38	91	25	Y	
15	45	141	32	Y	
20	27	241	27	Y	
21	45	302	21	Y	
29	71	165	36	Y	
2	8	97	8	N	
10	3	233	0	N	
16	11	321	22	N	
25	10	204	8	N	
26	20	294	0	N	

Note: GPS state is only updated while system processes are running

Performance

Users can monitor the performance of the EOSS SDR System by selecting “Performance”. Only the last three hours are displayed. This keeps the data easily viewable.



By moving the cursor to one of the dots on each peak, the number of packets displayed during that time can be seen in the example above.

Data

Data Downloads

There are several logs that can be downloaded that can provide additional information concerning the flight and troubleshooting. In order to download the log, the log type, beginning date/time and the ending date/time must be selected

ACTION	DATA SELECTION	BEGINNING DATE/TIME	ENDING DATE/TIME
Download	GPS Position Log	mm-dd-yyyy HH:MM:SS	mm-dd-yyyy HH:MM:SS
	GPS Position Log		
	Flight: EOSS-289		

GPS Position Log

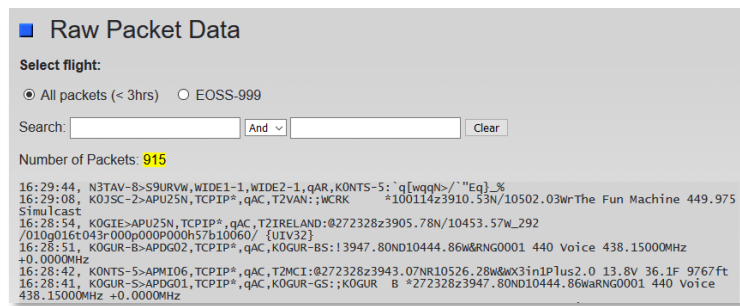
This will output all GPS positions for the given date/time range.

Flight

This will output all received packets for the given date/time range.

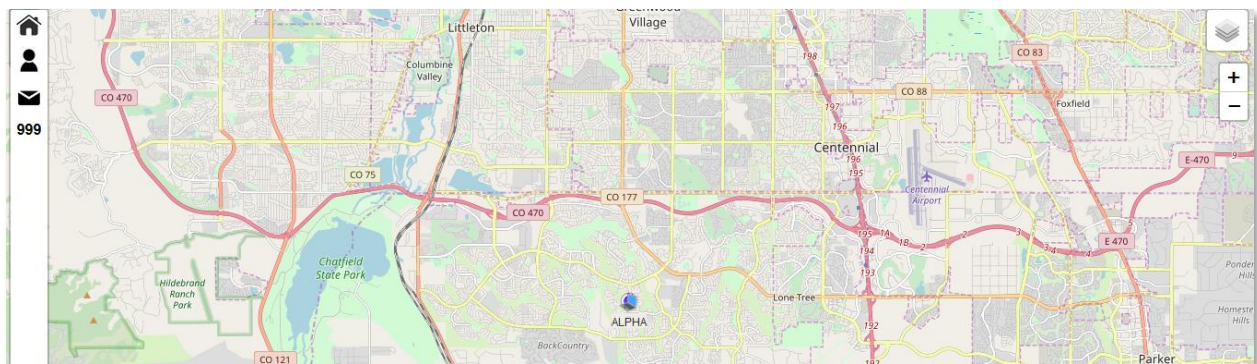
Live APRS Packets

This will show the user all the packets that have been received. The display can be shifted to the current flight or display all packets as displayed below





Maps

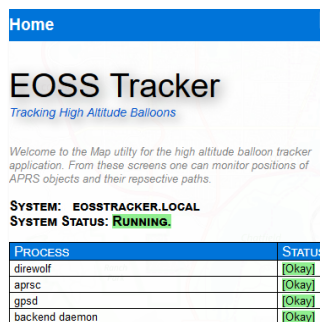
This is the heart of the EOSS SDR System. All tracking of the flights and the trackers is done from this menu option. By clicking on the Maps menu, a new web page will be opened.




There are icons on the left that provide additional functionality. This information is based on data entered into the setup screen for the flight and the devices that are attached to the flight string that beacon using APRS.

The icon on the right is for displaying information on the map (called map layers).


-  Displays system status from the Home screen. Use the  icon to close.



-  Displays the list of trackers. Note that the teams can be changed here or just viewed.

Trackers			
This tab shows the list of active trackers for the current mission.			
TRACKER LIST			
TEAM AND FLIGHT ASSIGNMENT	CALLSIGN	NOTES	MOVE TO TEAM
Alpha At Large	KC0D	Mark	Alpha
	N0LP	Nick	Alpha
	WA0GEH	Marty	Alpha
Bravo At Large	KB0YRZ	Chris	Bravo
	N0JPS	John	Bravo
	W9CN	Mike	Bravo
Charlie At Large	KC0RPS	Jim	Charlie
	W0NFW	George	Charlie
Delta At Large	K0SCC	Stephen	Delta
Echo At Large	KE0ORB	John and Nancy	Echo
Foxtrot At Large	K0LOB	Jim	Foxtrot
	N6BA	Jeff	Foxtrot

Use the  icon to close

-  This tab will display all APRS packets received on today's date for a given flight. Packets are displayed in reverse chronological order with the latest packets on top, oldest on bottom.

Live Packet Stream

LIVE PACKET STREAM: ON

This tab will display all APRS packets received on today's date for a given flight. Packets are displayed in reverse chronological order with the latest packets on top, oldest on bottom.

SELECT FLIGHT:

To start the packet stream, select a flight, then click start. Once running, the packet display will be automatically updated every 5 seconds.

☒ All packets (< 3hrs)
☐ EOSS-999

Start

Stop

SEARCH:

Enter search characters to filter the displayed packets. All searches are case insensitive, so "AAA" is equivalent to "aaa".

And

Clear

PACKETS: 1,119


16:49:04, K0RCW-AP0115,TCPIP*,qAS,N2NUO-9:027234923941.91N/10505.83W-MNDVM MNDVM HS H&T

Use the

Start

 button to begin displaying live packet data and use the

Stop

 to stop displaying live packet data. Use the  icon to close.

- 999

 is the flight being tracked. From this option, much information can be displayed.
- Instrument Panel** – This is a graphical view of Altitude, Vertical Rate of ascent/decent, balloon heading (in degrees) and speed.

(-) INSTRUMENT PANEL:



Relative Position – Show information about the balloon as it relates to the tracker current position.

(-) RELATIVE POSITION:



Most Recent Position Packets – This is a text display of the most recent positions of the balloon and devices that are attached to the flight string that beacon using APRS.

(-) MOST RECENT POSITION PACKETS:

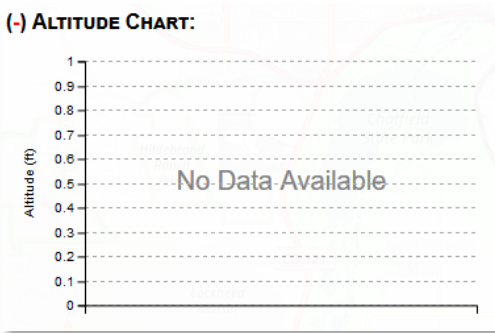
TIME	CALLSIGN	SPEED	V. RATE	ALTITUDE

Most Recent Status Packets – This is a text display of packets received by devices that are attached to the flight string that beacon using APRS.

(-) MOST RECENT STATUS PACKETS:

TIME	CALLSIGN	PACKET

Altitude Chart – This is a graphical chart of the altitude of the balloon. It scales automatically based on the altitude.



- This is to adjust display parameters. Use caution when changing these parameters. For example, changing the Lookback Period from 180 minutes to a higher number may cause too many points to be displayed and make the graph so cluttered that the data displayed will be difficult to read.

The icon size can be increased or decreased based on the resolution of the screen of the computer.

The EOSS SDR System software version is also displayed on this screen.

Settings

PREFERENCES:

Lookback Period: minutes
How far back in time the map will look, when plotting APRS objects and paths.

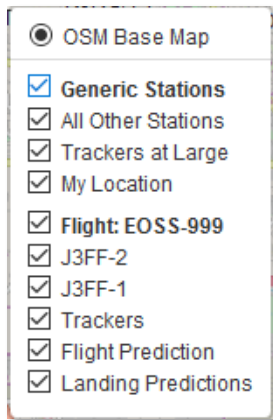
Icon Size: pixels
Changes how large the icons are for APRS objects on the map.

SYSTEM VERSION: 1.0
This is the version of the HAB Tracker application.

Map Layers



The Map Layers option controls what is displayed on the map. Each of these is toggled on and off. If the option is toggled off then back on, it may take another transmission from the device before the device is updated. Note that the more options are checked the more crowded the map will become. It is recommended that during an actual flight that the “All Other Stations” option be unchecked to reduce the stations that are not participating in the flight from being displayed on the map.



Generic Stations – These are stations that may or may not be related to the flight.

All other Stations – These are stations that may or may not be related to the flight.



Note: The EOSS SRD System only tracks signals heard by the SDR Dongle. The exception is if the computer is plugged into a network that has Internet connectivity using a physical network cable.

Trackers at Large – This option is based on the set-up screen. It will display the trackers that are listed as “At Large” and are not part of the flight.

My Location – This option displays the location of the user of the system.

Flight: EOSS-999 – This displays the payload at the bottom of the payload string. This is what most trackers use to track the balloon. Note that the example listed here is for a fictitious flight EOSS-999. All real flights are listed here.

J3FF-2 – This is usually the payload at the top of the string. The EOSS SDR System now has the capabilities of tracking this as well. Note that this is an example only and not a payload from Grenada.

J3FF-3 – This is another payload on the payload string of EOSS-999, the sample flight.

Trackers – This option will display the trackers on a flight. Note that with a lot of trackers, the screen will get quite crowded, especially around the landing zone.

Flight Prediction – If the RAW file from <https://www.eoss.org/predict> file has been imported, a series of dots will be displayed on the map to indicate the predicted path.

Landing Predictions – This will display the predicted landing. It will either be based on the RAW file or based on data received from the balloon payload while in flight.

About

The About tab provides the description of the system and licensing information. The version of the software can also be found here.

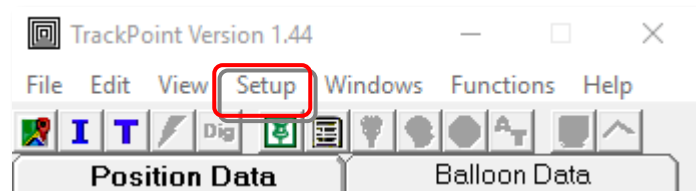
Appendix

Using the EOSS SDR System with TrackPoint

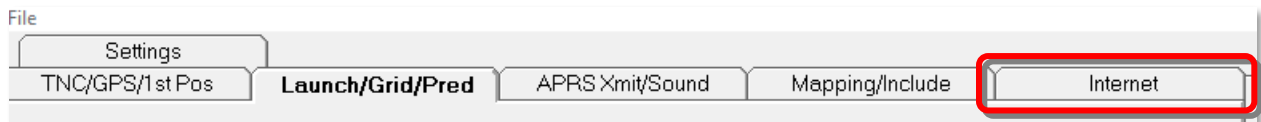
TrackPoint has been the gold standard for EOSS tracking for many years. For those who would like to continue to use TrackPoint, the data from the EOSS SDR System can be used.

Setting up TrackPoint

1. Open TrackPoint
2. Click on Setup on the menu bar



3. Select the Internet tab



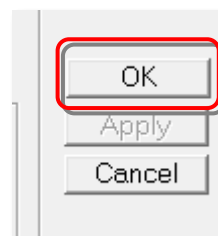
4. Click on the blue square next to APRS Server. This will open Notepad to allow the entering of the EOSS SDR System web server APRSWebServers.dat file.



5. Add eosstracker.local to the last line

```
sjc.aprs2.net
socal.aprs2.net
texas.aprs2.net
tus.aprs2.net
vancouver.aprs2.net
westtn.aprs2.net
eosstracker.local
```

Save this file and exit Notepad. Click Ok to close Settings



6. Exit TrackPoint
7. Restart TrackPoint. This will allow the new APRS Server (eosstracker.local) to now appear as one of the servers on the list.



Now all position reports will now appear just as if there is a connection to one of the standard APRS Servers.

Issue with SDR Hotspot

There is an issue with the Ubuntu software running on the SDR Kansung bricks where the Wi-Fi hotspot (ex. EOSS-04) will no longer be visible. When the brick is connected to a network connection allowing Internet connectivity, it will try to auto-update some (not all) of the Ubuntu Linux packages. One package, when updated, conflicts with the Wi-Fi hotspot running on the brick resulting in the EOSS-xx Wi-Fi network disappearing. The solution is to remove that offending software package as we don't need it - we mistakenly left it on the bricks when they were originally imaged.

There are two scenarios you might find yourself in:

- 1) Your EOSS-xx hotspot is still working.
- 2) Your EOSS-xx hotspot is not working/visible (presumably because you've recently had your brick connected to the Internet)

Scenario #1: Your hotspot is still working!!!

In this case, you're good...just don't connect the brick to the Internet. If desired, you can attempt to fix the issue by following the fixup steps below or wait until after this weekend's flights.

Scenario #2: Your hotspot is not working because you recently connected your brick to the Internet.

Not to worry, we have a procedure. Follow the fixup steps below.

Fixup Steps:

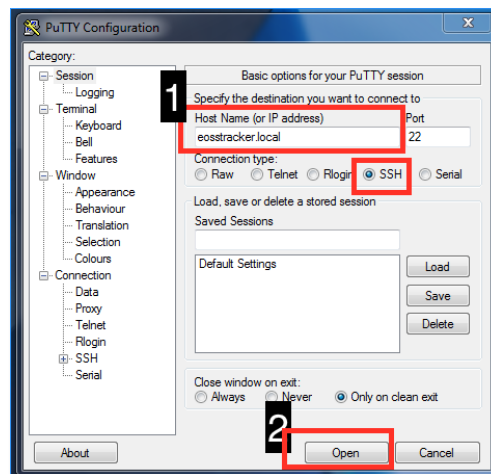
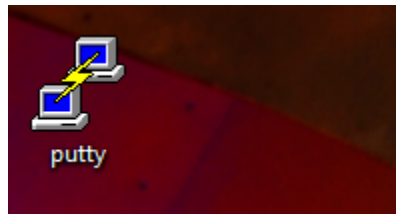
Job one is to get connected to your brick from your laptop/computer either by connecting to its EOSS-xx Wi-Fi hotspot (i.e. you're in Scenario #1 above) or by connecting it to your home network via a network cable. See the following picture for reference - it doesn't matter which network port on the back of the Kansung brick you pick.



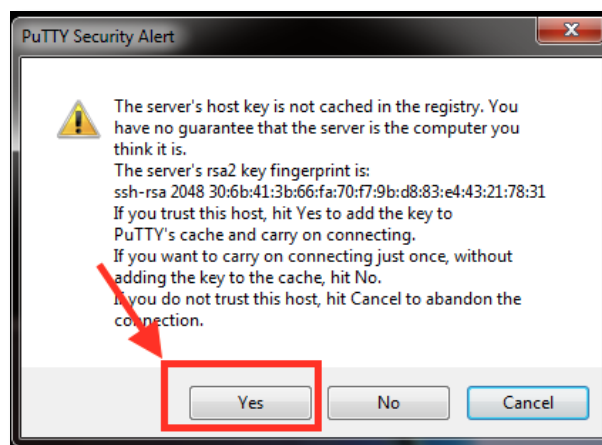
Instructions for Microsoft Windows:

You'll need to log into your system from a command line (i.e. you'll need to "ssh" to your brick). If you're on Windows, you'll need a piece of free software called "Putty" to do this. Download Putty from here: <https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html>. Once you've saved the Putty

program to your desktop, double-click it to start it. Then enter “eostracker.local” or if you know the IP address given to the brick from your home router you can use that. For example:



Then assuming you have connectivity to the brick, you’ll see the following dialog box (unless you’ve logged into your brick before using PuTTY). Just click “Yes”:



You should see a login prompt where you can enter the “eostracker” username and password. The Password is E0sstracker! (that is a zero). **Do not share this password with anyone!!!**

Instructions for Apple Mac:

Open the “Terminal” application on your Apple laptop/system.



Terminal

Next type in “ssh eostracker@eostracker.local” and press Enter. It will prompt you for the password, which is “E0sstracker!” (that is a zero).

For example:

```
macro:~ jeffdeaton$ ssh eostracker@eostracker.local
```

```
eostracker@eostracker.local's password:
```

Run through these commands (which are the same as the Windows instructions). Type in the following and press Enter. It will prompt you with, “Do you want to continue?”. Just answer “y” to that prompt.

```
sudo apt remove hostapd
```

For example:

```
eostracker@eostracker:~$ sudo apt remove hostapd
```

```
[sudo] password for eostracker:
```

```
Reading package lists... Done
```

```
Building dependency tree
```

```
Reading state information... Done
```

```
The following packages will be REMOVED:
```

```
hostapd
```

```
0 upgraded, 0 newly installed, 1 to remove and 0 not upgraded.
```

```
1 not fully installed or removed.
```

```
After this operation, 1,538 kB disk space will be freed.
```

```
Do you want to continue? [Y/n] y
```

```
(Reading database ... 177516 files and directories currently installed.)
```

```
Removing hostapd (2:2.6-15ubuntu2.2) ...
```

```
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
```

```
eostracker@eostracker:~$
```

Next, reboot the brick with the following command:

```
sudo reboot
```

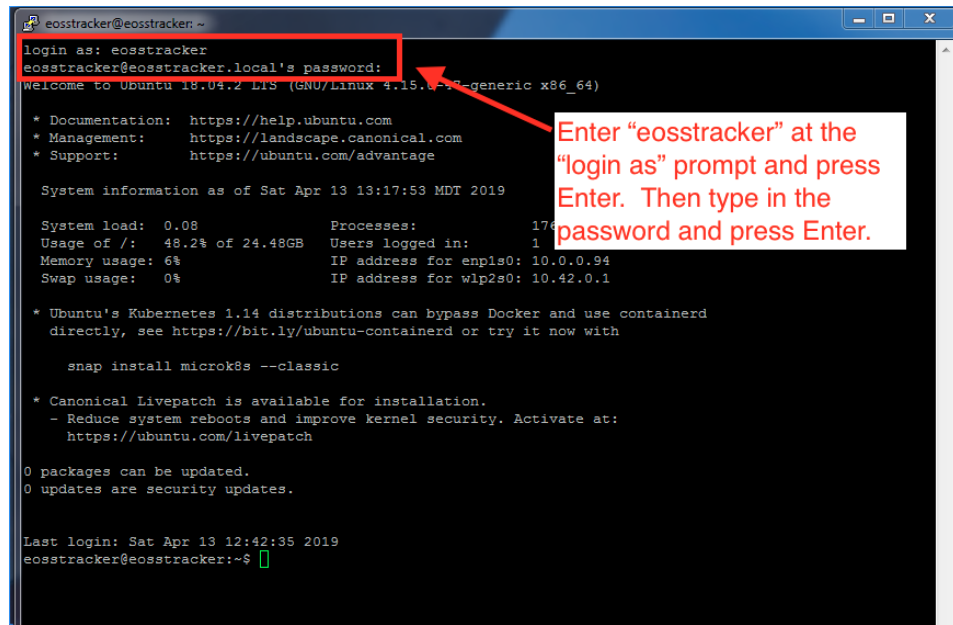
Example:

```
eostracker@eostracker:~$ sudo reboot
```

Connection to eosstracker.local closed by remote host.

Connection to eosstracker.local closed.

When the Kansung bricks comes back up, you should see your EOSS-xx Wi-Fi network again.



Congratulations, you're now logged into the brick via SSH. Now you need the following commands.

Type in:

```
sudo apt remove hostapd
```

and press Enter. It will prompt you for the password again so type that in and press enter. A bunch of messages will be spit out at you, not to worry, just type in "y" at the "Do you want to continue?" prompt and press Enter. For example:

```
eosstracker@eosstracker:~$ sudo apt remove hostapd
```

```
[sudo] password for eosstracker:
```

```
Reading package lists... Done
```

```
Building dependency tree
```

```
Reading state information... Done
```

```
The following packages will be REMOVED:
```

```
hostapd
```

```
0 upgraded, 0 newly installed, 1 to remove and 0 not upgraded.
```

```
1 not fully installed or removed.
```

```
After this operation, 1,538 kB disk space will be freed.
```

```
Do you want to continue? [Y/n] y
```

(Reading database ... 177516 files and directories currently installed.)

Removing hostapd (2:2.6-15ubuntu2.2) ...

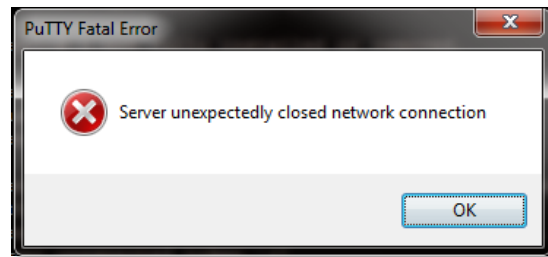
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...

eosstracker@eosstracker:~\$

Type in this command:

eosstracker@eosstracker:~\$ **sudo reboot**

and press Enter. If you've waited several minutes between running the prior command and this one, it might prompt you again for the password. This will log you out of your Putty session and reboot your brick. You'll likely see the following dialog box from Putty, just press "OK" and close out your Putty windows.



When your Kansung bricks comes back up, you should see your EOSS-xx Wi-Fi network again.

Updating the EOSS SDR System

Version 1.1 of the EOSS SDR tracker computer software (`eosstracker_1.1-1ppa2`) has been released and posted to both the master branch of GitHub and the EOSS Personal Package Archive (PPA).

There are many new features including beacons and I-Gating (with a valid amateur radio license) and several fixes under the hood including low-pass filter tuning and improved balloon landing prediction calculations. For a detailed list of all the upgrades and changes, check out <https://github.com/TheKoola/eosstracker/blob/master/CHANGES.md>.

How do you upgrade?

Assuming you have not been participating in the GitHub development activities (and if you don't know what that is, then you are likely not), then the upgrade is straightforward using Ubuntu's software package management tools. You will need to connect your tracker computer to the Internet to download and apply the update. You will also need to log into the computer via `ssh` with a terminal program, since the upgrade is performed using the command line. Both of these have been covered elsewhere in the SDR group, but here is a reminder in case you need one:

Connect to the Internet

To connect your tracker computer to the Internet via an Ethernet cable and your home LAN network, simply plug the cable into either one of the two Ethernet jacks on the computer. As long as your home LAN provides an IP address via DHCP, the tracker computer will recognize the connection and automatically connect to the Internet. If you don't have a wired Ethernet LAN, you can connect your computer to your home WiFi. Instructions are found here:

<https://github.com/TheKoola/eosstracker/blob/master/doc/EOSS-SDR-Tracker-WiFi.md>.

Connect to your tracker computer via a terminal program (like PuTTY) and log in with the `eosstracker` user and password.

Remove hostapd package (*one time only*)

As was discovered previously, the `hostapd` software that was installed on the original image of the tracker computer is no longer needed and can break with a recent upgrade. See the article here for the details: <https://eoss.groups.io/g/SDR/message/151>. Once logged into the command line, remove the `hostapd` package with the following command:

```
sudo apt remove hostapd
```

Add the EOSS PPA repository (*one time only*)

The `eosstracker` software is made available via a Launchpad PPA archive. You have to add the PPA to your list of approved software repositories in order to get the upgrade. Adding the PPA is only done once. Detailed instructions can be found here:

<https://github.com/TheKoola/eosstracker/blob/master/doc/EOSS-Install-PPA.md>.

```
sudo add-apt-repository ppa:eoss/ppa
```

Update the EOSSTracker software (*each time*)

You can upgrade the `eosstracker` software with two commands. There is no harm in doing this as often as you like, updates will only be pulled down if they have been posted to the PPA.

Before any upgrade, use your web browser to connect to the tracker computer home web page and make sure the system tracking processes are not running. Click on the “Stop” button under the “System Processes” section of the Home page.

Once the system processes are stopped, return to the command line and enter the following two commands, one at a time:

```
sudo apt-get update  
sudo apt-get upgrade eosstracker
```

All done! After that, you will be on Version 1.1 of the software. Refresh your web browser and you should see the changes immediately (no need to reboot computer). That’s it! Check out the new settings under the Setup tab or start up the processes by clicking on the “Start” button. There are documentation and application notes available at:

<https://github.com/TheKoola/eosstracker/tree/master/doc>.

Note: The savvier users will recognize that only the `eosstracker` software is being upgraded with that second command. It also switches you over to the package management for the software, since the original installation did not have the PPA up and running at the time. Once that is done, and to update all the Ubuntu software on the computer, you can enter the command without `eosstracker` listed:

```
sudo apt-get update  
sudo apt-get upgrade
```

Open Street Maps

The EOSS SDR System uses OpenStreetMap as they are updated every minute of every hour of every day. These updates are available in real-time. OpenStreetMap data is rich and detailed, containing huge amounts of data which is relevant to people on the ground - the people who collected it.

Features include:

- Roads, railways, waterways, etc...
- Restaurants, shops, stations, ATMs and more.
- Walking and cycling paths.
- Buildings, campuses, etc...

A separate instruction manual is being created for the generation of tiles for use with the EOSS SDR System.