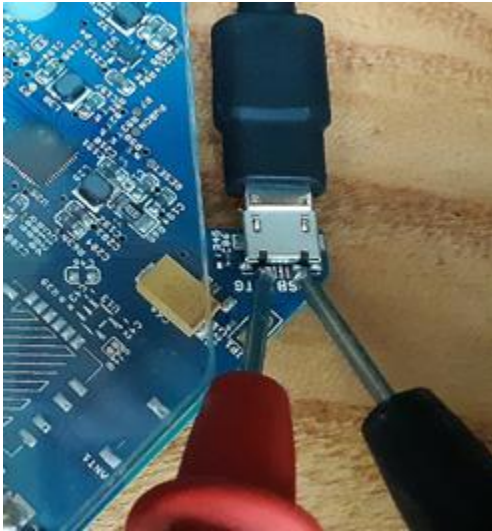


## ANNEX A

### More on Power Cubes and Cables

#### POWER CUBES

Forum Members' experience varies with some USB power cubes. Once the power required by the Dreamcatcher exceeds 1 amp dc, the voltage delivered to the Dreamcatcher Board by **some** USB power cubes rated at 2.4 amp dc decreases below 5 vdc to a level not sufficient to provide the 13 - 14 vdc Bias-T the LNB requires, or run the Dreamcatcher. Most home USB power cubes won't work correctly. f



A reliable power option is to use a **Regulated** Raspberry Pi power supply which has a larger tolerance for low voltage from the usb cable (it just throttles itself) which means a constant output voltage not dependent on load. They come in various sizes, however I prefer to use a Regulated 5.25 vdc 2.4 amp Raspberry Pi charger. Dreamcatcher browns out when there's low voltage - and the main cause of Dreamcatchers not working normally is bad power. Make sure the power cube has a micro USB plug at one end. Newer power cubes come with C-type connectors which are not compatible with the Dreamcatcher.

The Dreamcatcher is an energy hungry device drawing 1.1 amps at 5 vdc, so don't be surprised if your gear doesn't work with undersized power supplies.

To make sure you are supplying sufficient voltage, measure the input at the micro USB connection to the board with a VTVM. The plus and minus are at either end of the plug.

#### BUCK CONVERT

Another viable solution to powering the Dreamcatcher is to use a *buck converter*. Simply put, a buck converter is a DC-to-DC power converter which steps down voltage (while stepping up current) from its input (supply) to its output (load). Specifically, the one I have used steps voltages from 6 to 26 vdc on the input (supply) side **down to 5.25 vdc** at a maximum of **3 amps** on the output (load) side. This current is plenty to run the Dreamcatcher, and the 5.25 vdc is well within the Dreamcatcher's operational range that goes up to 5.5 vdc.



What makes it most useful is you can use any dc voltage power cube to run the Dreamcatcher - - you don't have to use a USB power cube which may be hard to find with the required voltage and current capability.

My Dreamcatcher runs off a 12 vdc power cube drawing 0.3 amps on the input (supply) side. The output (load) going into the Dreamcatcher is 5.35 vdc (a bit higher than it's spec) drawing 1.1 amps.

An example from <http://Newegg.com> costs \$3 complete with a standard USB plug to connect to the Dreamcatcher.

## **CABLES**

When selecting a USB to micro USB cable, select one less than 4 feet long that is relatively thick. These cables usually use larger gauge wire - - AGW 22 or 24. Price is also a method of choosing the best cable. Generally the more costly the cable - - the better it will be. Often cables marked as "quick charging" do a fine job running the Dreamcatcher. Many Forum Members have good performance from IHome, DeWalt and FuseBox cables.

## ANNEX B

### Trouble Shooting

This Annex is written to help find the cause of problems occurring after **you previously successfully set up** your Dreamcatcher. *Most times when the Dreamcatcher v3.05 fails, a simple reboot by shutting down the Dreamcatcher by powering it off then on (referred to as a **Power Cycle**) will work, but if it **does not restore** Skylark 5.8, follow these guidelines.*

#### **Problems Operating in the AP Mode**

*No display of 10.0.0.1 in browser*

- Make sure Othernet AP Hotspot is **still broadcasting** - - if not, go to **LAST RESORT** and select **Function 1 with the PB1 Button** to return the Dreamcatcher to the AP Mode, then, redo Section II Step 4 making sure your computer is **still connected** to the Othernet HotSpot - - if not, reconnect it and continue with Section II Step 5.

- If problem persists, go to **LAST RESORT** and select **Function 3 with the PB1 Button** to do a **Factory Reset** and start over again.

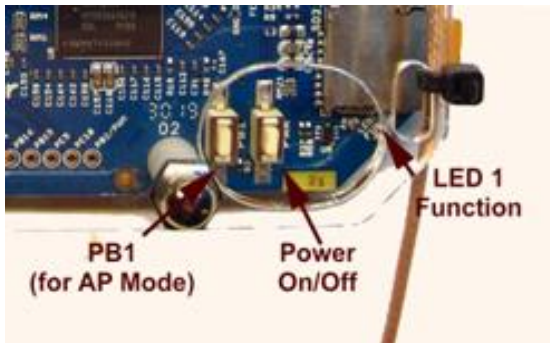
*Display available in browser, but no signal is being downloaded (Tuner App Status Screen Blank)*

- Check presence of Bias T voltage as in Fig. 17. If Bias T voltage is deficient, check LNB selection to make sure it is still set up as in Section II Step 8 to the **correct satellite**, and to the **correct LNB** either the Single LO: or Dual LO: LNB. Correct as necessary. Also make sure your wire connection between the Dreamcatcher Board and the LNB hasn't broken under the black wire wrap (do a continuity check).

- Redo the Fine Tuning of the Operating Frequency routine with more diligence.

- If problem persists, go to **LAST RESORT** and select **Function 3 with the PB1 Button** to do a **Factory Reset** and start over again.

#### **Problems Operating as a Network Client**



*No display of Skylark on assigned local IP address in browser*

- Make sure Dreamcatcher **did not revert** to the AP mode by seeing if AP Hotspot Othernet came back on line. If it reverted, redo Section IV to connect the Dreamcatcher to your network.

- If your computer is **still connected to the same Network** you set Skylark to operate on as in Section IV Step 3, and your Network WiFi **password did not get changed** to that of your router, go to **LAST RESORT** and select **Function 3 with the PB1 Button** to do a

**Factory Reset** and start over again.

*Display of Skylark in browser, but no signal is being downloaded (Tuner Status Screen Blank)*

- Check presence of Bias T voltage as in Fig. 17. If Bias T voltage is deficient, check LNB selection to make sure it is still set up as in Section II Step 8 to the **correct satellite**, and to the **correct LNB** either the Single LO: or Dual LO: LNB. Correct as necessary. Also make sure your wire connection between the Dreamcatcher Board and the LNB hasn't broken under the black wire wrap (do a continuity check).

- If problem persists, go to **LAST RESORT** and select **Function 3 with the PB1 Button** to do a **Factory Reset** and start over again.

*My.othernet.is does not find your Dreamcatcher's IP address*

- It is possible you **are not connected to the Internet** or you are on a different Client Network. Verify you have an Internet connection on your router, and that you connected to the correct Client Network.

### ***Last Resort***

This process uses the **PB1 Button** on the Dreamcatcher v3.05 to reset files.

### ***Problems Reconnecting to a Client Network After a Power Failure***

An AC power failure to the Router and Dreamcatcher create a unique problem for the Dreamcatcher to reconnect to the Router. The reason is most Routers take longer to boot up than the Dreamcatcher. As a result, the Dreamcatcher is trying to reconnect to the Router before the Router is ready to accept a connection and assign a Client IP address. The Dreamcatcher **must be the last device** to power up after a power failure.

## ANNEX C

### LNB Enhancements

by Will Brown @wbrown

#### Scope

The document provides a consolidated reference of techniques to enhance signal reception performance of your Dreamcatcher (as of this writing, v3.03, running on Ku band satellite SES-2 for North America ). This document does not include information about where Othernet service is available, how to setup or otherwise use your equipment.

#### Background

The Dreamcatcher operates using a bare LNB (Low Noise Block Downconverter) to receive signals transmitted from a satellite (SES-2 for North America as of this writing). The signal being transmitted is notionally strong enough across the United States (contiguous 48 states) to be received using only a bare LNB (eg no dish antenna) and correct aiming/alignment. Due to weather patterns (heavy clouds, rain), geographical influences and nearby RF pollution sources, the Dreamcatchers signal reception performance may be increased using a “horn” or “cone” over the LNB. Alternately, an appropriately chosen dish antenna (“satellite dish”) may be employed.

#### How Much is Good Enough?

If you're reading this with the intent of improving your reception, or generally “make it better”, be aware that “making it better” beyond what's “good enough” doesn't provide any benefit. A SNR of -about -13dB is required for lock and signal reception and decoding. The SNR value tends to fade during bad weather (rain fade). If, during times of bad weather, your Dreamcatcher has a good SNR ( $> -13\text{dB}$ ), and retains lock, then there is nothing to do -your setup already has enough margin.

*There is a minimum SNR required for demodulation. After accounting for margin due to weather, there is no additional benefit to having better SNR.* – Syed, May 2018

#### Sources and Attributions

Information taken from the following threads:



- <https://forums.othernet.is/t/increasing-gain-with-15-degree-cone/5258/>
- <https://forums.othernet.is/t/free-supplies-for-cone-extension-experiment/5373/>
- <https://forums.othernet.is/t/dreamcatcher-v3-02-feedback-thread/4997/>

Each design is denoted with the creators Othernet Forum Username in the “Construction” column. All information provided per-row is created and owned by the username listed.





#### LNB Cones / Horns


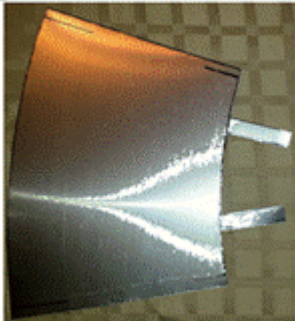



This section collects the various designs created and tested by Othernet Forum Members. In most if not all cases, the received signal strength (RSSI) is not changed with the addition of the horn or cone. It is only the Signal to Noise Ratio (SNR) that is improved. Therefore, RSSI performance is not listed, rather only SNR improvements. SNR Improvements listed are the values reported by the Forum Members during their own tests. The following table serves as a rough guide to assist in the

creation of such a device. The exact performance depends on several factors (construction technique, alignment with LNB, precision of aiming at the desired satellite) and therefore the values listed below serve only as a reference.


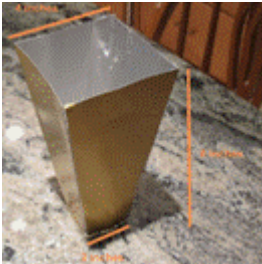

Construction	Finished Product	SNR Improvement
<p>Collapsed metal rings, approx 2" diameter</p> <p>@kenbarbi</p>		+2dB
<p>7.7cm diameter x 11 cm tall tin-can. We had to cut approximately 0.2 cm from the bottom to remove the floor of the can. We slotted the sides 1.8 cm wide by 8 cm deep to accommodate the LNB mounting hardware</p> <p>@maxboysdad</p>		+2dB








Construction	Finished Product	SNR Improvement
<p>1-gallon paint can</p>  <p>@maxboysdad</p>		<p>+2dB - +3dB</p>
<p>16 oz Styrofoam cup covered in aluminum duct-tape</p>  <p>@thomslik</p>		<p>+2.5dB</p>

Construction	Finished Product	SNR Improvement
<p>Pringles potato chip can</p> <p>@kenbarbi</p>		<p>+3dB</p>
<p>2.5" at the narrow end and 3.5" at the wide end, pattern expanded from the 12-oz soft-drink cup. The shield is cut from 0.019" aluminum sheet</p>  <p>@maxboysdad</p>		<p>+3dB to +3.5dB</p>
 <p>@Konrad_Roeder</p>		<p>+3.5dB</p>



Construction	Finished Product	SNR Improvement
<p>7" funnel from an auto-parts store, lined inside-and-out with aluminum duct tape</p> <p>@maxboysdad</p>		<p>+4dB</p>
<p>4" x 2" x 8" Aluminum Flashing (held together with duct-tape)</p>  <p>@kenbarbi</p>		<p>+4.5dB</p>

Construction	Finished Product	SNR Improvement
<p>1/4" grid "hardware cloth". The opening at the LNB is 2.5", the opening toward the sky is 5" in diameter and the cone is 8" from LNB to the outer opening.</p>  <p>@maxboysdad</p>		<p>+5dB</p>
<p>4" x 2" x 8" Used heavy corrugated cardboard, covered each section with heavy duty aluminum foil and used thin metallic duct tape to join the 4 sections. Towards the smaller end, I left a couple of inches unattached all around allowing enough flexibility to slip over the LNB.</p> <p>@dschre</p>		<p>+5dB</p>

Construction	Finished Product	SNR Improvement
5" x 2.25" x 9" cardboard covered with aluminum foil          @AL01		+5.25dB
5" x 2.25" x 9" Wire mesh          @thomslik		+7dB

## Dish Antennas

Though the intent of using the Dreamcatcher is to simply aim a bare LNB at the transmitting satellite, some Forum Members have successfully implemented dish antennas:

*This YouTube video shows you how to adapt a linear LNB (like the one for Outernet) onto a dish previously used for DishNetwork or DirecTV. These use circular-polarized LNBs. The LNB needs to be swapped out. This video shows you how: How to convert and install a old trashed DTV satellite dish to a FTA Dish*  
 - Konrad\_Roeder  
 May 2018

Construction	Finished Product	SNR Improvement
--------------	------------------	-----------------

An example from Forum Member Barefoot\_Mike (March 2016) looks like this.



(not listed)

@Barefoot\_Mike

18" DirecTV dish with Maverick Mk1 LNB. A new LNB bracket was purchased, which had the same angle as the LNB that came with the DirecTV dish. The dish was mounted indoors.



@wbrown



Indoor dish setup as compared to a bare Maverick Mk1 LNB mounted outdoors:

**Dish w/Maverick Mk1**  
SNR improved 10-13dB  
RSSI improved 6-7dBm

**Dish w/LNB 18 (circular)**  
SNR improved 7-10dB  
RSSI improved -2dBm  
(RSSI is worse)

*Outdoor dish performance is roughly +6dB better than mounted indoors.*

A more detailed writeup of the indoor dish shown above is [here](#).

## Circular Polarized LNBs

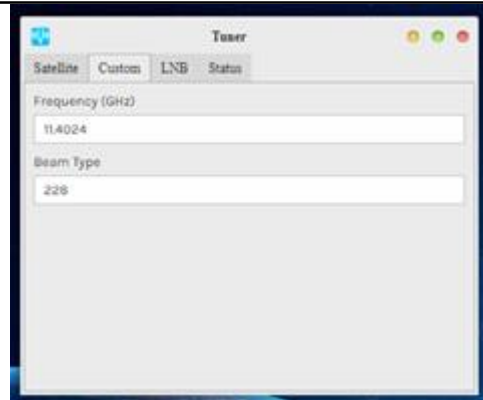
Circular polarized LNBs may be used with some reduced sensitivity. The LO (local oscillator) frequency of the LNB must be noted, and an appropriate adjustment made in the Dreamcatcher for it to work.

Here is a table showing a DirectTV LNB 18 vs the Maverick Mk1 supplied (as of 2019) with the DC 3.03:

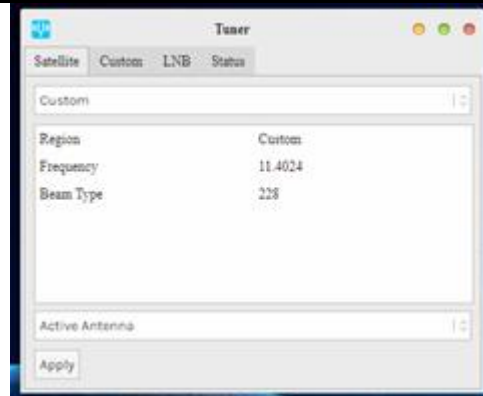
LNB Type	LO	DreamCatcher “Freq”	DreamCatcher “Beam”
Maverick Mk1	10.750	11.9024	228
LNB 18	11.250	11.4024	228

To make this change, logon to the Dreamcatcher as user “othernet” (default password “othernet”). Open the Tuner app.

Go to the “Custom” TAB and enter the Frequency and Beam Type.



No go to the “Satellite” TAB. The first line is a drop-down selection (it says “Custom” in the image to the right). The entries available are “Americas ” and “Custom”. Select “Custom”. Then click the “Apply” button.



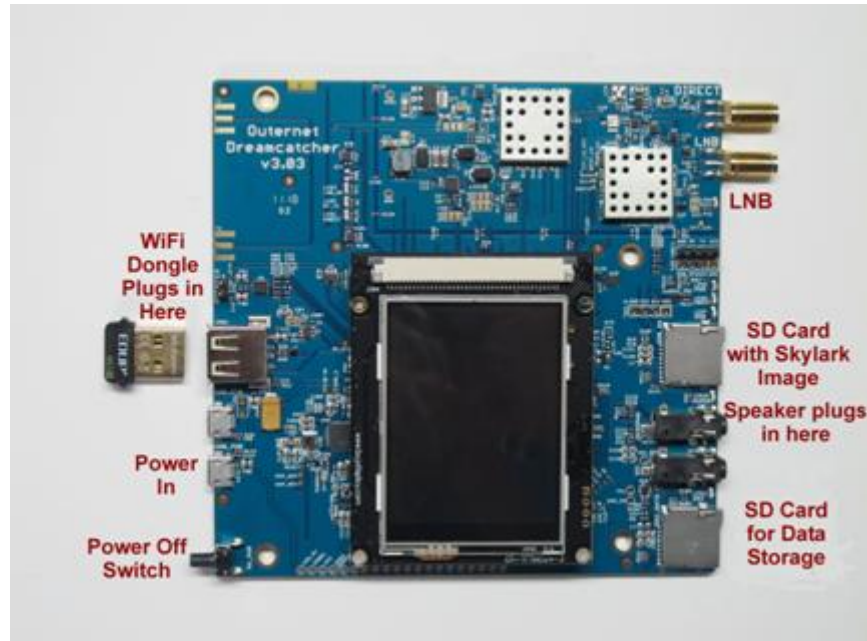
After making the above changes, reboot the Dreamcatcher either with a power-cycle or by using the “Reboot” selection on the utility menu on the touch-screen.



## ANNEX D

### Dreamcatcher v3.03 Unique Features

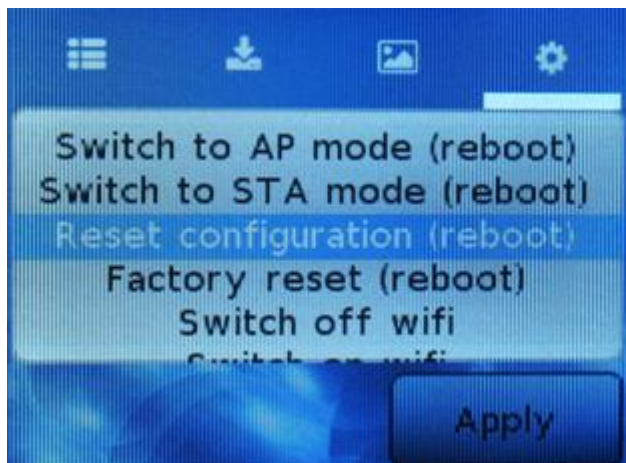
***Look at Annex D for v3.03 differences #1***



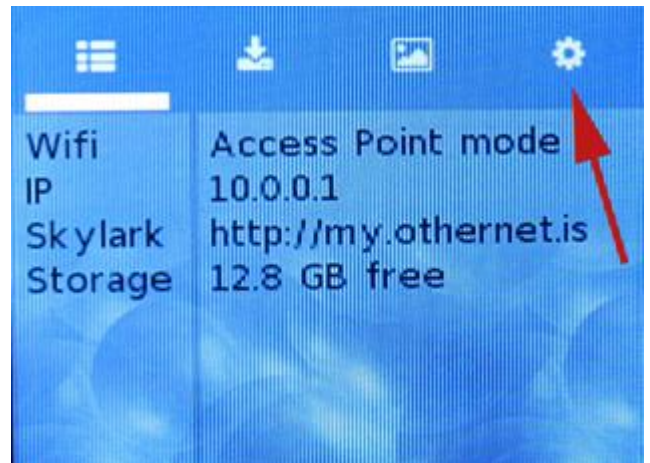
Dreamcatcher v3.03 Board

***Look at Annex D for v3.03 differences #2***

Step 5. **Wait another 5 minutes before you open your Web Browser** for the Skylark Program to finish initialization housekeeping functions. Then type (in the URL tab) [10.0.0.1](http://10.0.0.1) and you will see the Skylark Guest Logon Screen (Fig. 11). You will also see the Touch Screen Summary showing an Access Point mode connection to IP address 10.0.0.1.



Touch Screen Summary Page



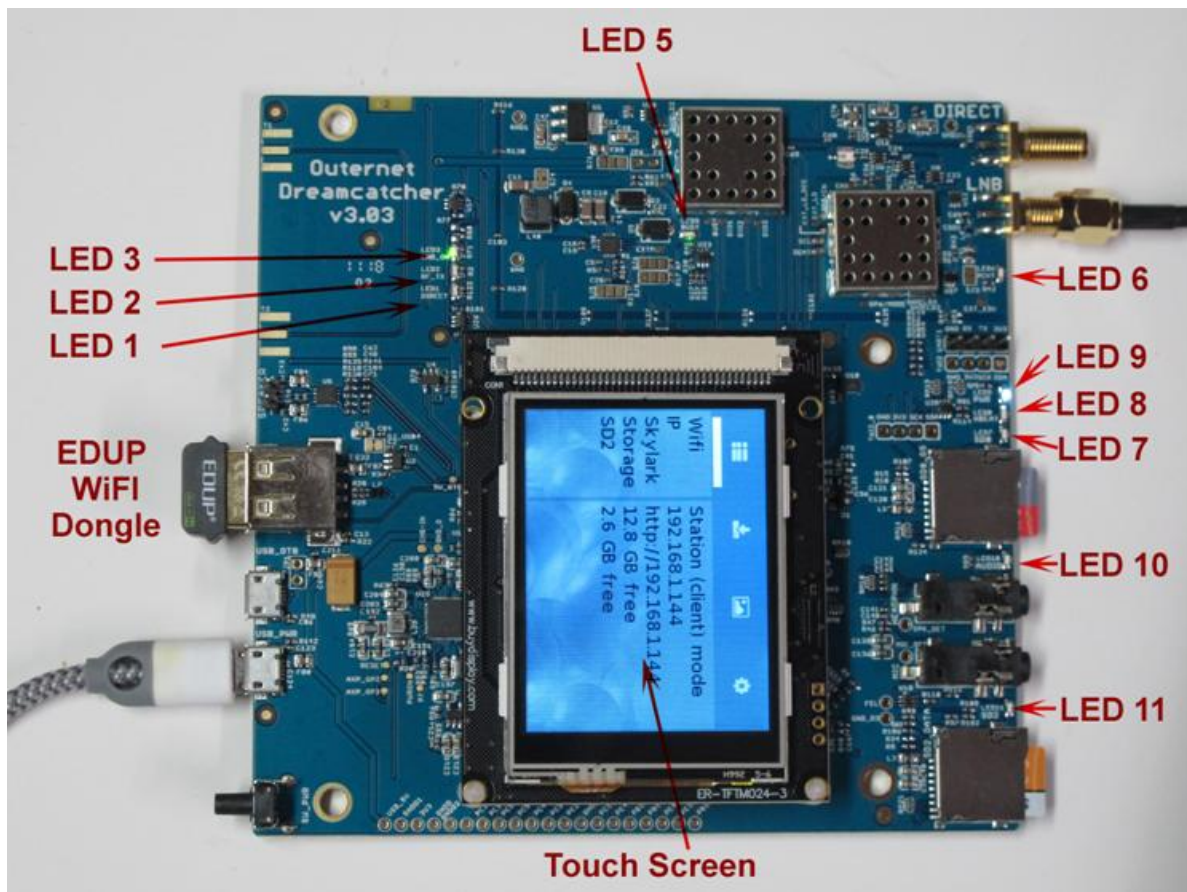
Touch Screen to *Reset configuration (reboot)*



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### Look at Annex D for v3.03 differences #4

Properly connected and operating, the Dreamcatcher v3.03 with an external micro SD card installed, will display the following LEDs

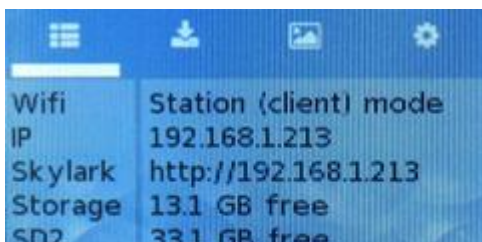


Design	Color	Name	Function	Normal Operation	Receiving Packets
LED 1	Green	Function	PB1 Presses	Off	
LED 6	Green	PCKT	Receiving packets	On fast blinking dim green	
LED 7	Green	SDO	Shows read/write activity on either SD Card	On blinking green	
LED 8	Green	HBeat	Reports status to Chicago	On blinking green	
LED 9	Blue	Power	OFF/ON indicator	On solid blue	
LED 10	Green	Audio	Blinks if audio is present	On blinking green	
LED 11	Green	SD2	Blinks if SD card is active	On blinking green	
EDUP	Green	WiFi	Green if WiFi is on	On blinking green	

LED Table

---

### Look at Annex D for v3.03 differences #5



Step 4. You will be connected to Dreamcatcher's Skylark Program through your local WiFi from your router. You can go to any computer on your router's network, and use any Web Browser to access Skylark through its newly assigned IP address, or by typing [my.othernet.is](http://my.othernet.is) (which requires an internet connection to work). **If you cannot find the**

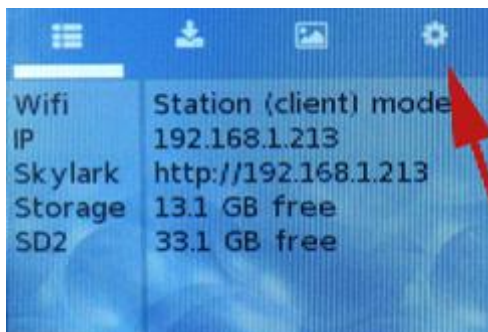


Dreamcatcher's IP address using your router or [my.othernet.is](http://my.othernet.is), suggest you use a shareware program such as Angry IP Scanner (<https://angryip.org>) (Fig. 27a) for Windows, MAC, and Linux; or Advanced IP Scanner (<https://advanced-ip-scanner.com>). You can also look at the Touch Screen to find the assigned IP address.

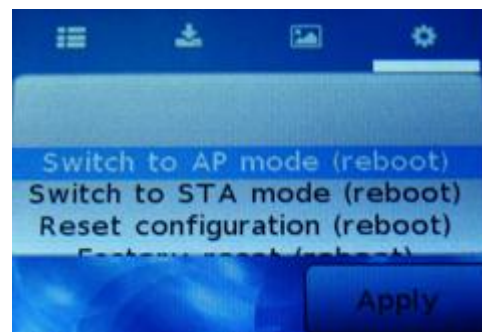
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### Look at Annex D for v3.03 differences #6

Step 6. Skylark has an **option using the Touch Screen** to return to the Hotspot mode after you leave a network. Illustrated here on the *Touch Screen Summary Page* is the old WiFi network information. If you click on the far right wheel icon, you will be able to go back to the Othernet Hotspot mode by selecting **Switch to AP mode (reboot)**. You will not be able to re enter a new WiFi network name or password from the Touch Screen. To do that, you have to use the browser with Skylark and repeat Step 3 above. Your satellite and LNB selection will remain unchanged.



Touch Screen Summary Page



Touch Screen Return to Hotspot

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### Look at Annex D for v3.03 differences #7

Step 3. **Increasing the Volume of the Othernet Satellite Radio** can be accomplished “on the fly” with a software modification to Skylark that *only remains in effect as long as you do not reboot the Dreamcatcher*. This change will have **no effect** on the Native audio/sound mentioned in Method 1.

**There are 2 ways make this adjustment.** The **first method** is by using the Dreamcatcher Touch Screen to Increase/Decrease the volume at the audio output plug or Mute it. (Fig. 37).



Fig. 37 Touch Screen for Adjusting Audio Levels

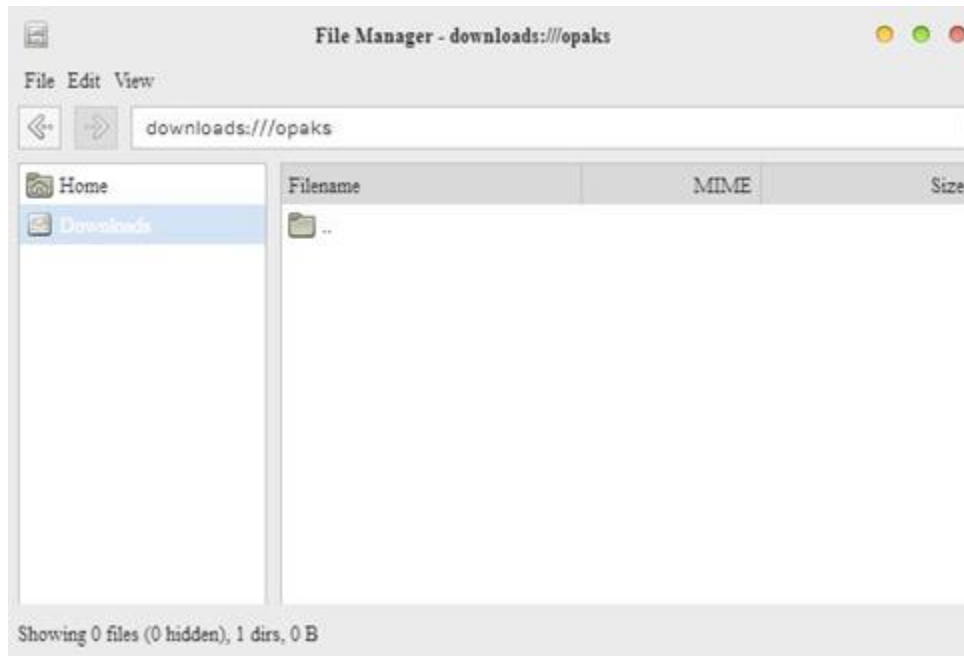
## ANNEX E

### Preliminary Test for OTA

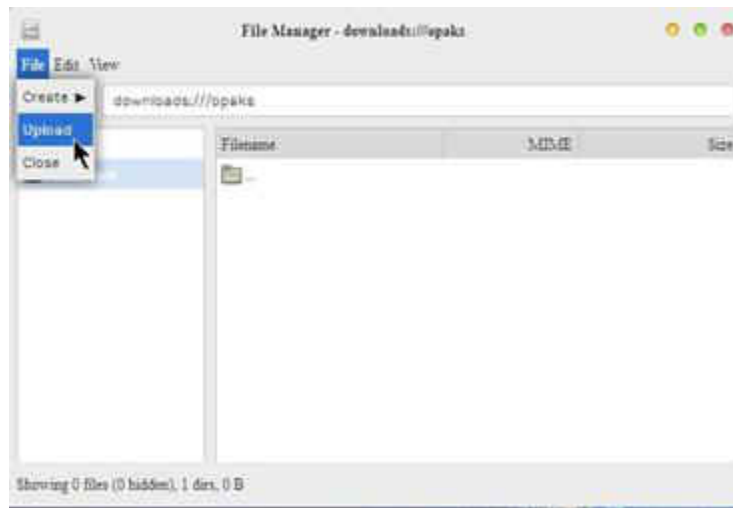
You can use an Over the Air (OTA) file to update your via the Web User Interface (webUI) – there is no need to remove the micro SD card from the Dreamcatcher. **At this time, there are NO OTA files for Skylark 5.8.**

To use this method:

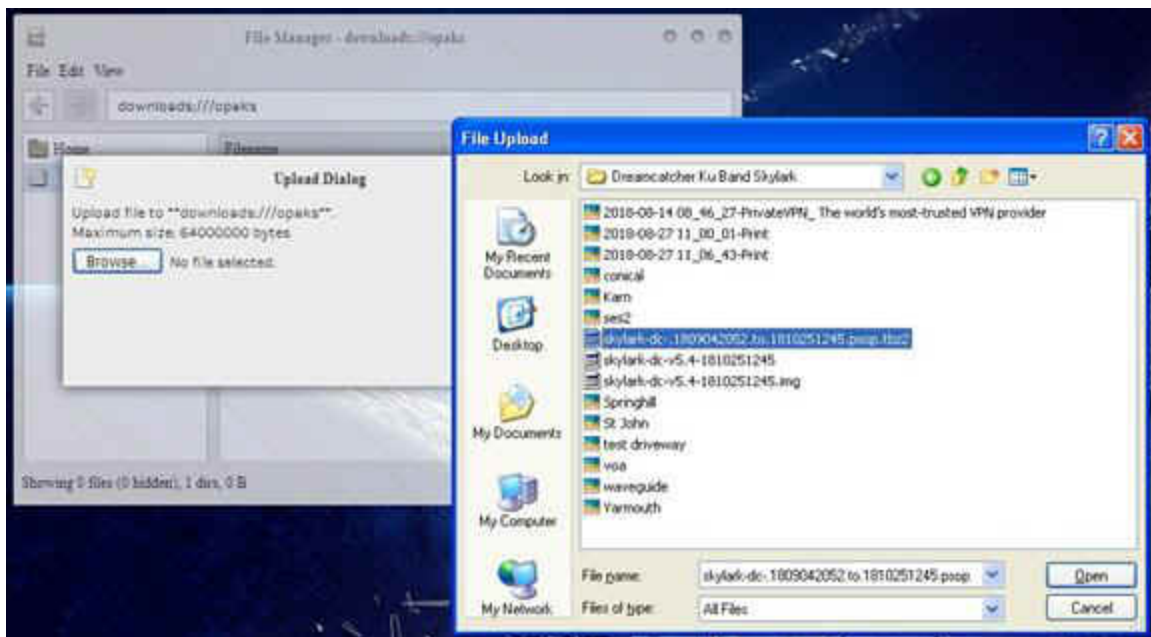
- a. Download the update file that looked like this for the Skylark 5.3 to 5.4 upgrade [skylark-dc-1809042052.to.1810251245.psop.tbz2](#) from Othernet's Achieves to your computer. DO NOT extract it or process it in any way.
- b. Logon to Skylark as the “othernet” user (logon as “guest” WILL NOT WORK).
- c. Open File Manager App.
- d. In File Manager, in the left-most pane, select “Downloads” and then in the right-side pane, double-click the “opaks” folder to enter it.



- e. In the File Manager app menu bar, select “File” -> “Upload”. This will open up the file upload dialog, and your normal OS file selection dialog; select the update file you downloaded to your computer in step “a”. Click Ok/Open etc (as per your OS) to begin the upload.



Then select the .tbz2 file to upload, and just click **Open** - - nothing else needs to be clicked.



f. The update file will be uploaded to the “opaks” folder, and from there, Skylark OS will automatically start processing the update.

g. **Be patient.** The update process will take 15 - 20 minutes to complete! **Do NOT reboot** your Dreamcatcher during this process **or change any other settings**. During this process, it will appear as though nothing is happening, but don't despair - - **it is working**.

h. After the update process is complete, the Dreamcatcher will automatically reboot into the new version of Skylark. You will need to refresh your WEB browser to see the new Skylark version.

i. If the process fails, just use the normal micro SD card burning process **Section I Step 4** as before to fix things.



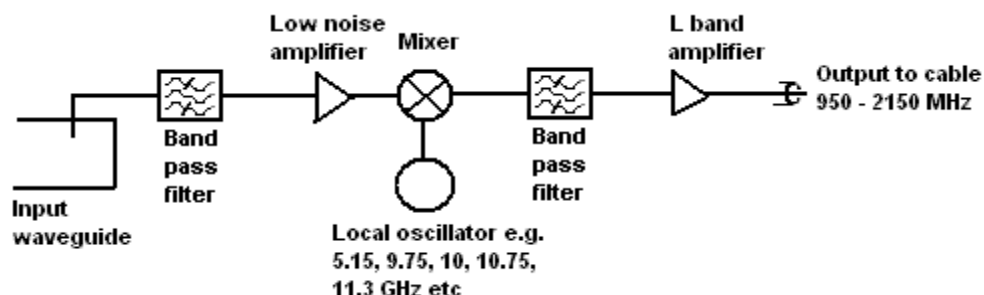
## ANNEX F

### Low Noise Block (LNB) Devices

An LNB has two important functions: it's a low-noise amplifier, meaning that it takes the extremely weak satellite signal and amplifies it. It's also a block down converter, meaning it takes the signals on the super-high satellite frequencies and converts them to lower frequencies. Both functions are important in order to deliver a satellite signal. Ku Band satellites broadcast between 10.7 - 12.75 GHz.

Because Othernet is now using a narrower bandwidth (reduced from 800kHz to 200 kHz), it is more difficult to tune to the correct operating frequency for each LNB since they all respond a little differently. Some LNBs do not have sufficient local oscillator (LO) stability.

Keep in mind that (even on paper) the data packets won't appear with an offset greater than 25% (50 kHz) in Othernet. So far we've noticed that 25 kHz of offset is a pretty reliable window. It is said the Maverick will work - - **but some Forum Members have been unable to achieve lock with it.** The offset is probably just much farther out. Please keep in mind that most commercially available DTH LNBs are specified to a 1,000,000 Hz offset (aka +/- 1000 kHz).



**The Maverick Single LO LNB** - The Maverick was shipped with the Dreamcatcher v3.02Q, the first unit being used on the KU band system. It has a LO frequency stability of +/- 1 MHz. If you use the Maverick LNB for Othernet, you must select: Single LO: 10750 MHz. If you use it as your FTA LNB, your FTA must be tuned to 9750 -10750 MHz.



**The Universal Dual LO LNB** - This LNB was shipped with the Dreamcatcher v3.05 and has a LO frequency stability of +/- 200 kHz. If you use it for Othernet, you must select: Dual LO: 9750 - 10600 MHz. If you use it as your FTA LNB, your FTA must be tuned to 9750 - 10600 MHz.



**The Bullseye Dual LO LNB** - This LNB (soon to be shipped with a New Dreamcatcher and currently available in the Othernet Store), has a LO frequency stability of +/- 10 kHz, Noise factor of 0.5 dB. It is very stable with temperature variations. In Skylark, it will operate as a Dual LO: 9750-10600 MHz. Connect to your Dreamcatcher from



the green F connector. The second red output connector provide a 25 MHz reference signal for other uses not related to Othernet. If you use it as your FTA LNB, your FTA must be tuned to 9750 - 10600 MHz.