Committee for Space Programme Development
R e p u b l i c o f S e r b i a
2 1 0 0 0 N o v i S a d
I D N: 2 8 1 0 4 2 9 4

I n t e r c o n t i n e n t a l A e r o s p a c e C o m m a n d
Member country: S e r b i a
HQ: 21000 N o v i S a d
I D N: 2 8 1 0 4 2 9 4

WELCOME

Dear Sir/Madam,

Due to the growing need for global coverage of reliable antenna networks for communication with satellites Serbian, Indian, Italian, Russian*, Hungarian*, Canadian, Peruvian, Argentinean* and Australian* partners agreed to establish an **Intercontinental Aerospace Command** (hereinafter: **Command**).
The program holder is **Committee for Space Programme Development** (hereinafter: **CSPD**) (a formal headquarters is in Novi Sad) and the existence of the **Command** has the following reasons:

- reliable global coverage (real-time communication, regardless of the position of the satellite);
- support and strengthening of SATNOGS network;
- raising radio amateurism to a higher level;
- gaining importance of the operators/owners/participating countries;
- global benefit;
- a global player;
- cooperation (unity) and assistance (help);
- motivation of young people for this area, etc.

The goal of the **Command** is that certain number of antennas become of greater global importance, and that their functionality be constantly reliable (as well as strengthening of SATNOGS network).
In short, no changes in the ownership of the antennas will be made, just the owners/operators/countries will become part of the **Command**, and therefore will be added a motive more for the continuation of work, then possibility to closely monitor the work of other members, exchange experience and knowledge, information, upgrading antennas etc., as well as in the case of owning or planning of its own satellite, the possession of reliable global communication.

The **Command** has the goal of becoming a global player and at one point becoming a UNOOSA partner. The **Command** will use the SATNOGS network as the basis, and for the needs of certain satellites it also will be created an internal database for filtering data for the needs of the users (these costs will be covered by the **CSPD**). Also, the **Command** will be able to allow satellites from member countries and/or satellites that are of greater significance to give priority over others within the SATNOGS network. Our intention is to raise the significance of each operator/owner/member country, strengthen the SATNOGS network and enable coverage of the larger surface of the Planet.

We think that we are together stronger and that we can do together and well organized more, not only for ourselves, but for the entire Planet.

Access to the **Command**, as well as membership is free, the only condition is that the antenna that is added to the network is constantly functional (all costs for the construction and operation of the antenna must be covered by the owners/operators/countries). Every member can leave the **Command** at any time, but it has to be announced at least 2 months earlier so that we can find an adequate replacement in that region.

Anyone who becomes part of the **Command** will connect its own antenna to the SATNOGS network. Each member needs to test its own antenna hardware and software segment and get used to working as one large family. Also, the **Command** represents the SATNOGS network backup (in case that something happens to SATNOGS network the **Command** must provide continuity in the operation). For any type of assistance the **CSPD** and SATNOGS support are available.

The annual meetings of all members of the **Command** are also scheduled to be held every year on the second place.

In addition to the feeling of belonging to something big and significant, the **Command** offers people around the Planet something concrete that is reliability in functioning.

In essence, we also want to contribute to strengthening and expanding the SATNOGS network, as well as increasing its reliability for the benefit of all. We believe that SATNOGS is an idea of noble, wide and that must be supported and that everything necessary for SATNOGS survival must be done.

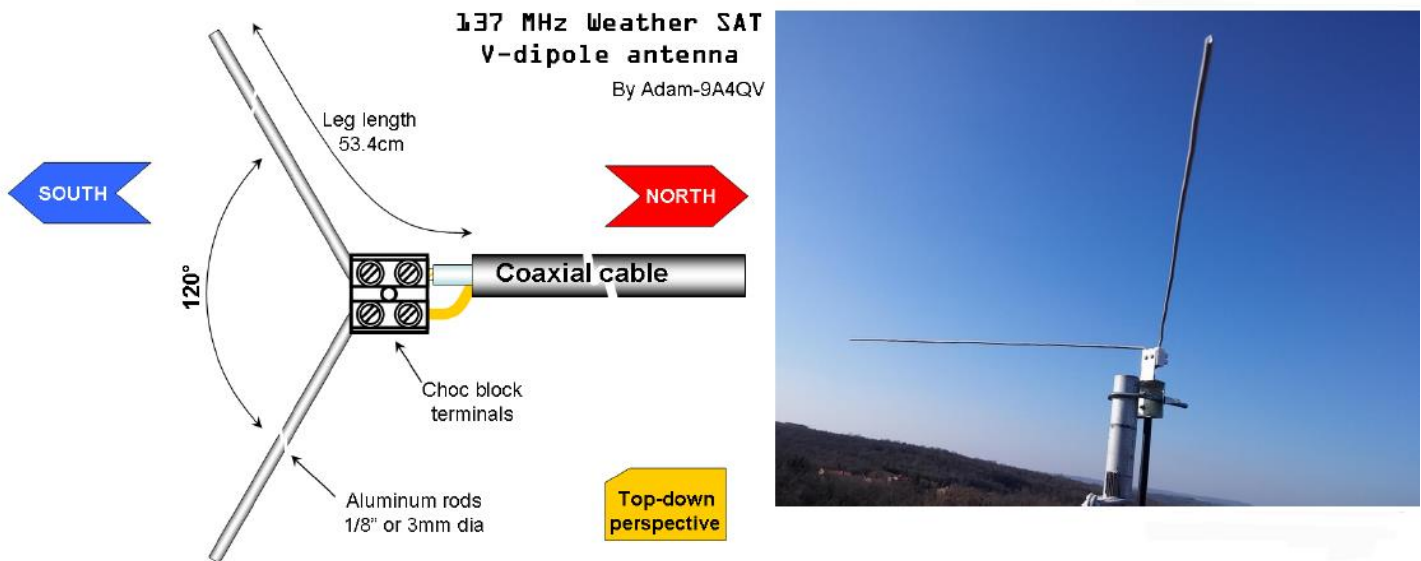**Antenna minimum technical requirements:** V-Dipole

INSTRUCTIONS
for V-Dipole Antenna installation

1. **Equipment requirements:**
- V-Dipole Antenna
- SDR
- LNA (**preferable**)
- Raspberry Pi 3+
- MicroSD 16 GB

2. **How to make a V-Dipole Antenna for 137 MHz and 435 MHz:**
- **DIY 137MHz** V-dipole antenna by Adam-9A4QV
https://www.dropbox.com/s/6fpfn2p9filc9ol/DIY%20137MHz%20WX-sat%20V-dipole%20antenna.pdf?dl=0

- **DIY 435 MHz**

DIY 435 MHZ with reflectors

Example from Twitter https://twitter.com/marco_langbroek/status/1095070332640202754

Dr Marco Langbroek @Marco_Langbroek · Feb 11, 2019
I built a V-dipole antenna for ~435 MHz last Sunday, the frequency of many cubesats.
Today I tested it, and found it works. This spectrogram shows the signal of @SpireGlobal 's LEMUR 2 YONGLIN (2017-071J), a 3U CubeSat, at ~403.72 MHz, with a nice Doppler s-curve
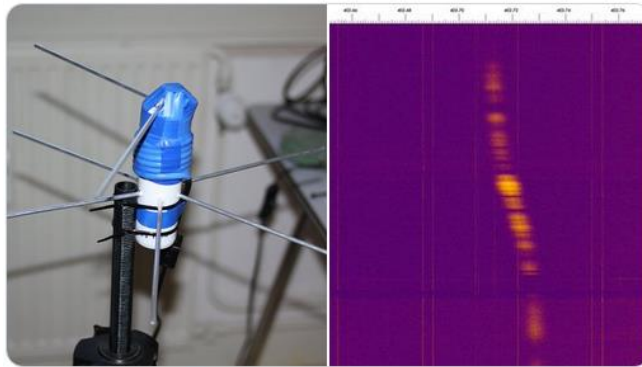
Example of V dipole made from rabbit ear TV antenna/aluminum elements with reflectors
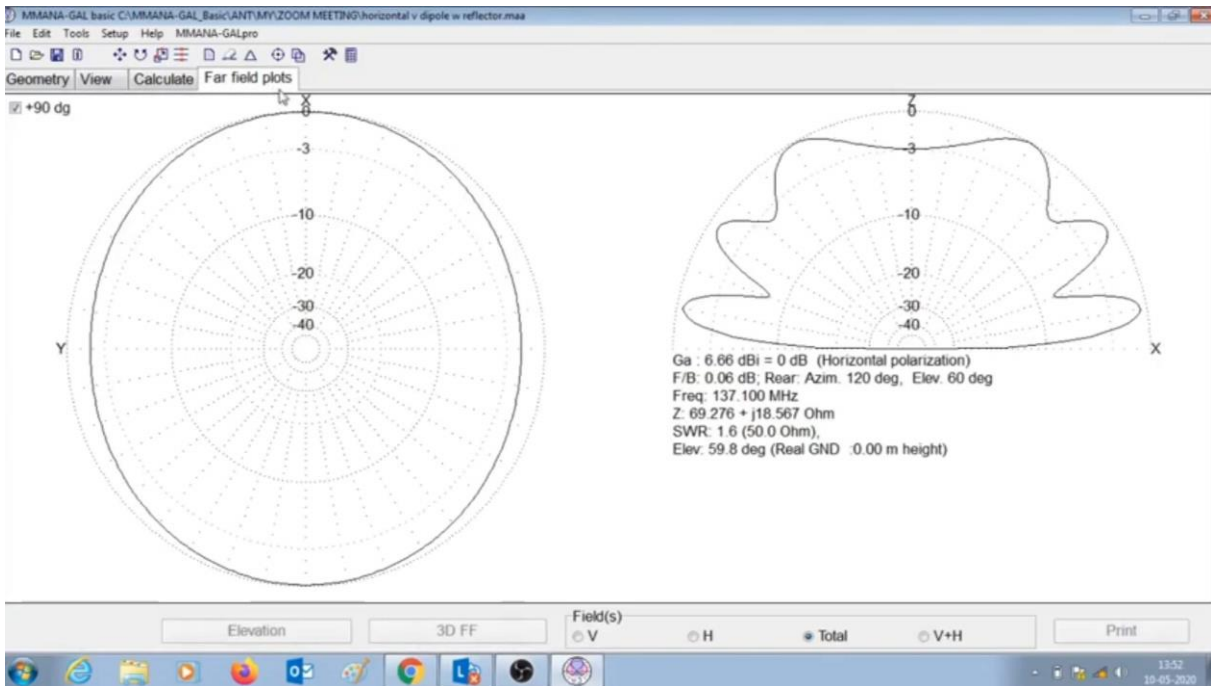
Another option is to request us for the 3D file of this antenna holders.

3. Software installation (SATNOGS Software):

1.) Install the last distribution of artifacts.zip from this link:
https://gitlab.com/librespacefoundation/satnogs/satnogs-pi-gen/-
/jobs/artifacts/2020030400/download?job=release,
2.) Then by the instructions from: https://wiki.satnogs.org/Raspberry_Pi
and page for installation of SATNOGS client: https://wiki.satnogs.org/SatNOGS_Client_Setup , withdrawn and
that software.
3.) Then start with the configuration as per SATNOGS instructions

Note:
Strictly follow the instructions for creating a boot-able SD card and Linux for the 64-bit version.
The steps for upgrading the software in steps as stated in the instructions are also important.

### 4. Opening an account on https://satnogs.org/ and connecting the GS to the SATNOGS network

Scheduling your first test observation

Prerequisites

- You've set up your SatNOGS client successfully
- You've created an account on the Network, created a ground station, and it's showing up as "online"

If you've run into any problems with those steps, check out the Troubleshooting page

SatNOGS network:
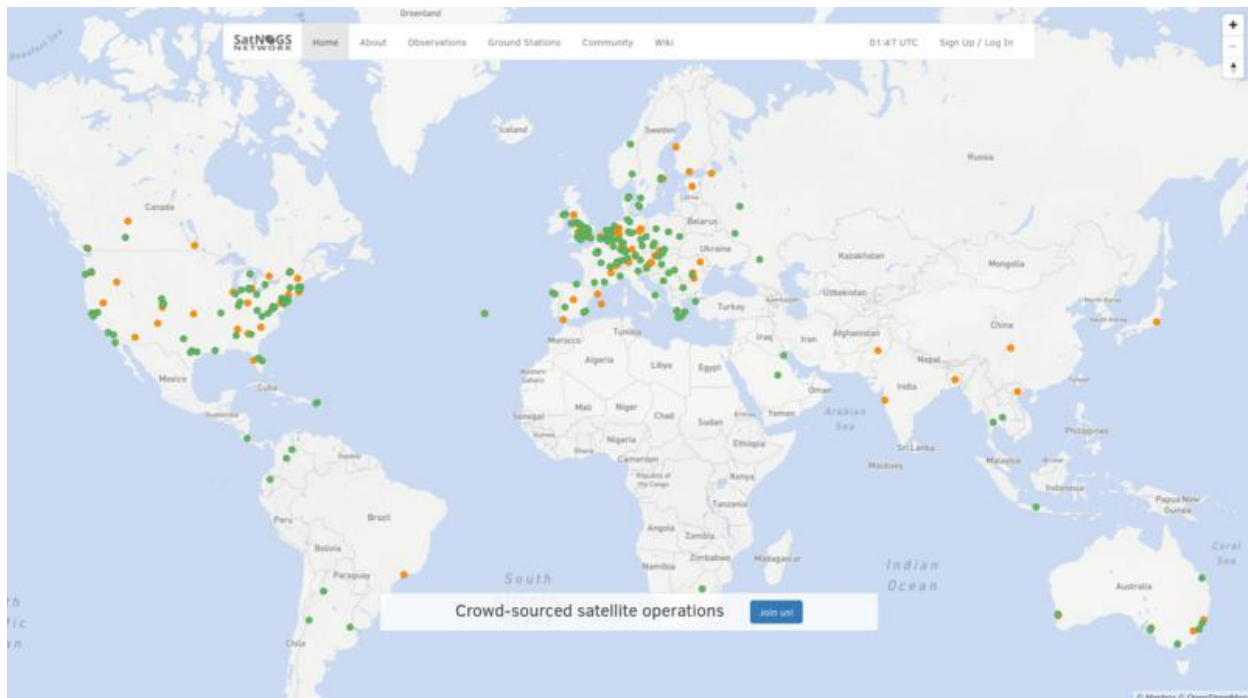
Steps:

- Navigate your ground station page in the [Network Environment](#) (user name -> "My Profile" -> click on the name of your ground station).
- Select the "Upcoming passes" tab.
- Look for a pass with a "schedule" button that isn't greyed out, and click it. Ensure it is a good (high) pass of an operational satellite (check the color bar on the satellite)
- In the "New Observation" page that comes up, click the "Calculate" button, then click "Schedule".
- You should now see a page for that observation; in the "Waterfall" tab, you should see "Waiting for waterfall".
- You can also schedule multiple observations at once for a single satellite via the ["Observation new page"](#).

Ground Station

Now SSH to your ground station computer and run these steps:

- Follow the SatNOGS-client logs. Depending on your setup, this might be done with `journalctl -f -u satnogs-client.service`, or `tail -F /var/log/supervisor/satnogs.log`
- Before the observation is scheduled to start, you should see your client wake up once per minute to check for new jobs:
- At the scheduled time for the observation, you should see the client kick off the observation:

```
• Oct 02 00:18:00 raspberrypi satnogs-client[10124]: 2017-10-02 00:18:00,774 - satnogsclient - DEBUG -
  Opening TCP socket: 127.0.0.1:5011

• Oct 02 00:18:00 raspberrypi satnogs-client[10124]: 2017-10-02 00:18:00,776 - satnogsclient - DEBUG -
  Sending message: [{"origin": "network", "transmitter": "uXJ8NQNcH8b9osRc

• Oct 02 00:18:00 raspberrypi satnogs-client[10124]: 2017-10-02 00:18:00,781 -
  apscheduler.executors.default - INFO - Job "get_jobs (trigger: interval[0:01:00], next run at: 2

• Oct 02 00:18:22 raspberrypi satnogs-client[10124]: 2017-10-02 00:18:22,022 -
  apscheduler.executors.default - INFO - Running job "spawn_observer (trigger: date[2017-10-02 00:

• Oct 02 00:18:22 raspberrypi satnogs-client[10124]: 2017-10-02 00:18:22,082 - satnogsclient - DEBUG -
  Opening TCP socket: 127.0.0.1:4533

• Oct 02 00:18:22 raspberrypi satnogs-client[10124]: 2017-10-02 00:18:22,109 - satnogsclient - DEBUG -
  Sending message: p

• Oct 02 00:18:22 raspberrypi satnogs-client[10124]: 2017-10-02 00:18:22,110 - satnogsclient - DEBUG -
  Received message: 0.000000
```

- After the observation is over, you should see the client submit the data to the SatNOGS network

In the SatNOGS Stage Environment, refresh the Observation page. You should now see a waterfall plot for your data.

If that all worked -- congratulations! You've just successfully completed your first SatNOGS observation.

If it didn't work, don't feel bad -- it can take a few attempts before you get it right. Have a look at the [Troubleshooting](#) page for tips, and don't forget to contact the community if you need help.

INSTRUCTIONS
for Turnstile Antenna installation

1. Equipment requirements:

1.) Turnstile antenna 435MHz with Type-N Female connector

2.) RTL-SDR

3.) Micro USB Active POE Splitter Power for Raspberry pi 3 Board (48V to 5V 2.4A) +POE-48-24W-BULK POE Adapter 48V, 0.5A, 24W

4.) SMA Male to SMA Male Connector Pigtail Cable

*(Pigtail cable RG316 diameter 2.5mm (if not available, a thicker cable is also OK))

5.) LNA with FM-Notch (**preferable**)

6.) Type-N Female chassis connector

7.) Raspberry Pi 3 Case + SD Card, Class 10, 32GB, Kingston, SanDisk + Case

8.) LMR-200 cable (2x N male connector), 2.2m

*(LMR200 5mm or LMR400 10mm or RG6 7mm)

9.) Ethernet LAN RJ45 Outdoor Waterproof Connector

10.) cable, Male USB Micro to Male USB A, L=25cm

11.) cable, Female USB A to Male USB A, L=25cm

12.) Ring Core Ferrite Bead for USB cables

13.) Ethernet cable, outdoor, CAT5, *L=? m

*(20 - 30 meters)

14.) Outdoor Weatherproof Enclosure, 200x187x65mm, 1 antenna N + 1 x Ethernet.

*(It is only important that the following components fit inside: Raspberry Pi, POE, LNA, cables etc., that it is waterproof and that it is as close as possible to the antenna. Please see images bellow)

Adapter converter N female jack nut bulkhead to SMA female jack pin RF COAXIAL For WIFI:

M25 Ethernet LAN RJ45 Waterproof Connector with 25cm Cable high quality IP67 Protection:

N Female Bulkhead to SMA Male Plug RG316 Pigtail Cable RF Coaxial Cables Jumper:

PG Compression Glands Water Resistant Stuffing Cable Connector Glands:

Raspberry Pi 3B+ 3B Plus PoE Kit (Splitter + Injector) Micro USB 5V:

800px-Liverpool_no_rotator_1:

Turnstile Antenna:

2. **How to make a Turnstile Antenna:**
- We advise you to buy it on the market

3. **Software installation (SATNOGS Software):**

1.) Install the last distribution of artifacts.zip from this link:
https://gitlab.com/librespacefoundation/satnogs/satnogs-pi-gen/-/jobs/artifacts/2020030400/download?job=release,
2.) Then by the instructions from: https://wiki.satnogs.org/Raspberry_Pi
and page for installation of SATNOGS client: https://wiki.satnogs.org/SatNOGS_Client_Setup , withdrawn and that software.
3.) Then start with the configuration as per SATNOGS instructions

Note:
Strictly follow the instructions for creating a boot-able SD card and Linux for the 64-bit version.
The steps for upgrading the software in steps as stated in the instructions are also important.

4. **Opening an account on https://satnogs.org/ and connecting the GS to the SATNOGS network**

Follow the instructions as of page 4-5.