# ZEROTIER

ZeroTier is a simple method of connecting two or more computers across the world as if they were on the same network. If you are familiar with using a Virtual Private Network (VPN), then ZeroTier achieves the same result but using a different concept.

So why would we want to use ZeroTier?

ZeroTier has two main advantages. Firstly, it allows two computers on different networks to 'see' one another *without the need to configure the associated routers*. The second advantage is that the communication between computers takes place using IP addresses normally reserved for private networks. That means the actual address and port of the computer are not visible to the other user(s), thereby *greatly enhancing security*.

There any number of ways in which you might choose to use a ZeroTier connection with your Solo but we've chosen one typical situation as a case study for this tutorial.

Case Study - The International Astronomers Club.
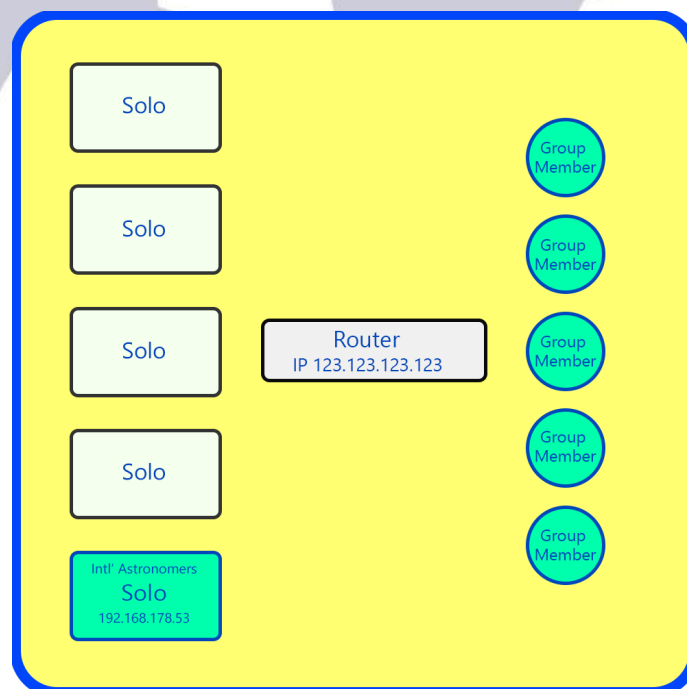
The International Astronomers Club have a telescope at a shared facility which they access with the IP address 123.123.123.123:12345.

The International Astronomers Club are a group of hobby astronomers, based in several countries, who have come together to purchase a telescope housed at a remote observatory in Spain.

They have just installed their CloudWatcher and Solo which is connected to the telescope's network with the IP address **192.168.178.53**.

The group access their telescope's network from their home countries via the single IP address of the telescope hosting facility which is **123.123.123.123**. and the Solo has been allocated to port number **12345**.

In order to view the output of the Solo, each of the members type **123.123.123.123:12345** into their web browser.

This works well, but several members of the group are concerned that revealing the IP address and port number of the Solo may attract the attention hackers and so, they decide to install ZeroTier on their Solo. The following pages describe the steps that they need to take.
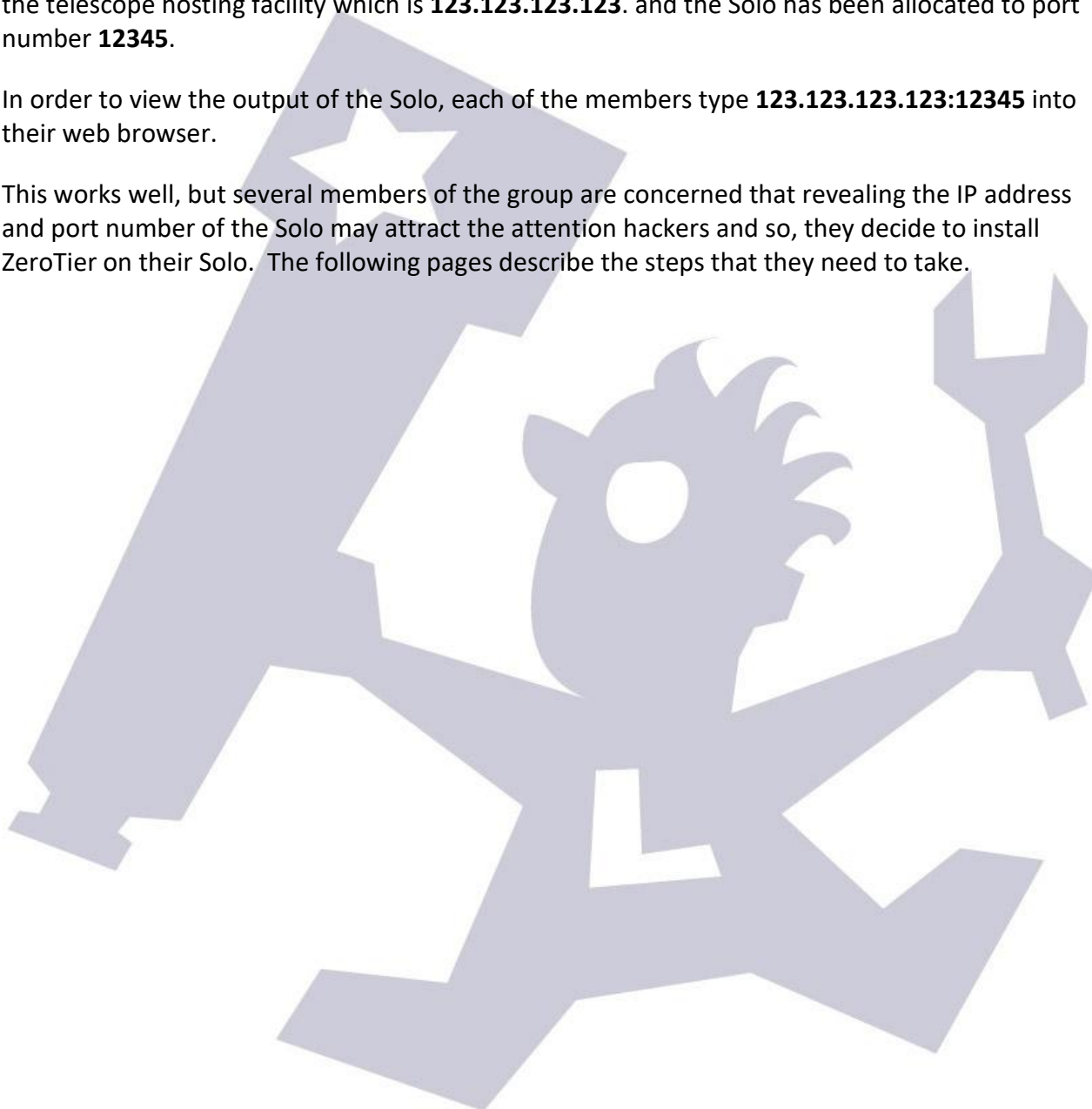
Registering a Network with ZeroTier

You may be a bit daunted at the prospect of creating a network with ZeroTier, but don't worry, the whole procedure should take less than five minutes. Just follow these steps:
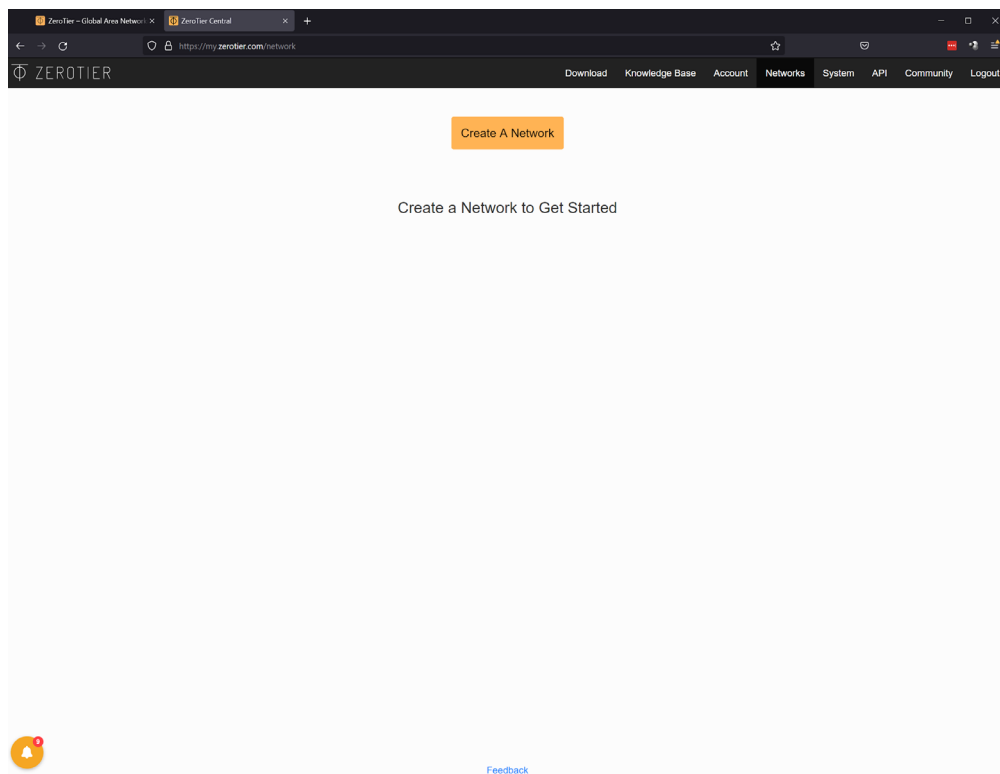
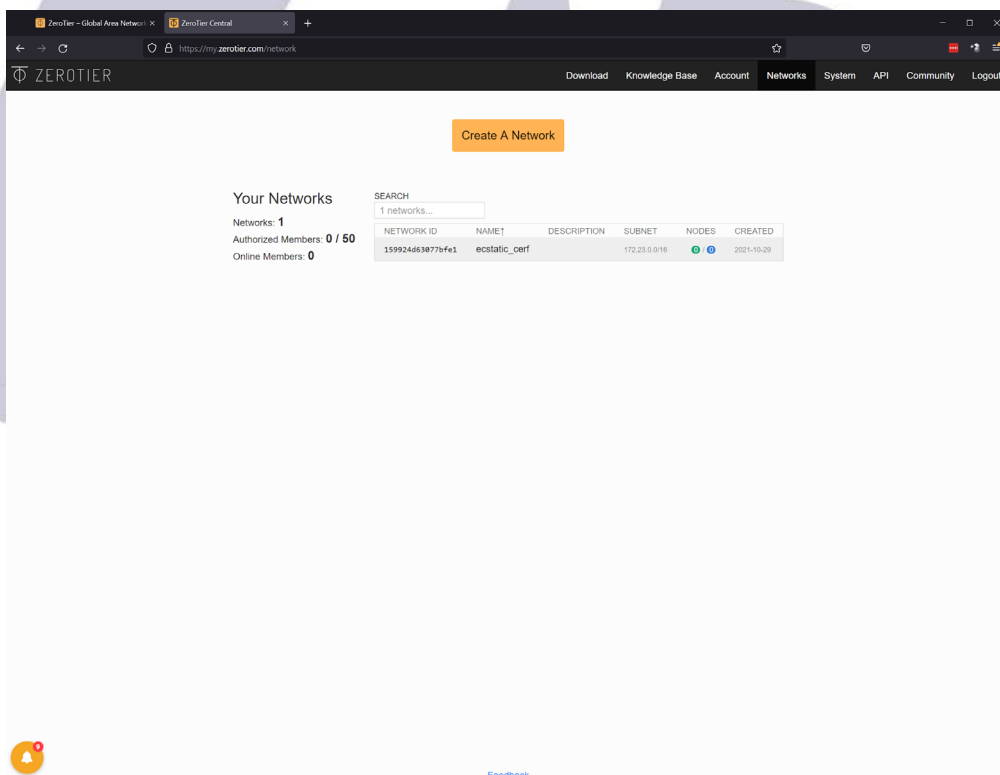a. To begin, go to the home page of ZeroTier at https://www.zerotier.com/.
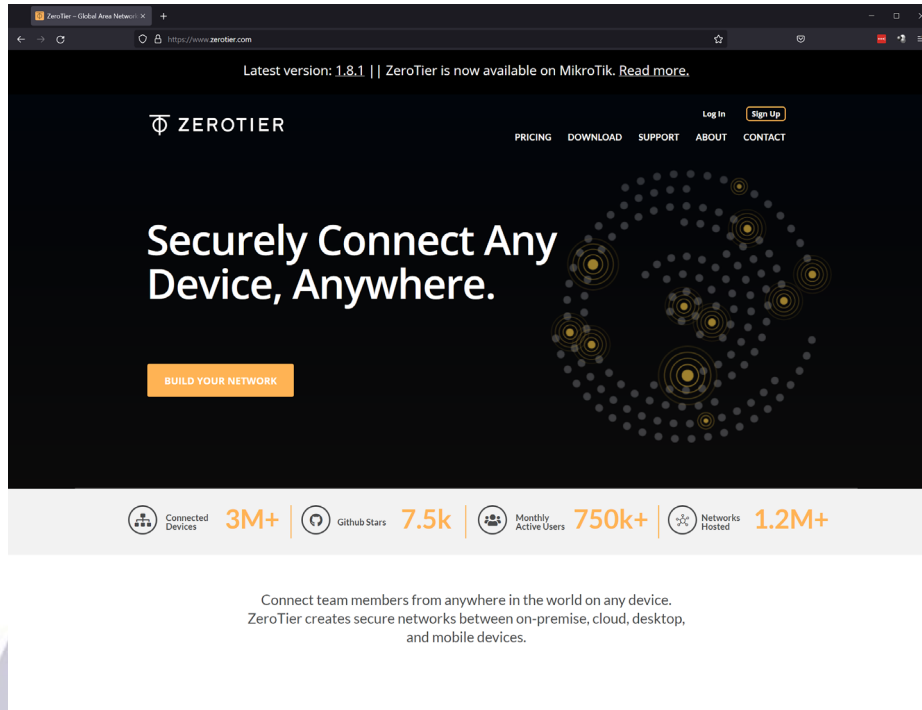
b. Click on **Sign Up** to reach the sign up screen.

c. Create an account, or log in using one of the options on the right. This will lead you to the Create Network page.

d. Click on **Create A Network**. The screen should now look like this:

e. Congratulations! You've created your first network. It was as easy as that. Before we go any further, take a moment to note that your network can have up to 50 members (more are available with a fee paying option). Also, note the **Network ID** and the Name. We'll come back to these in the next section. For now, click on the light grey area to reach the next screen.
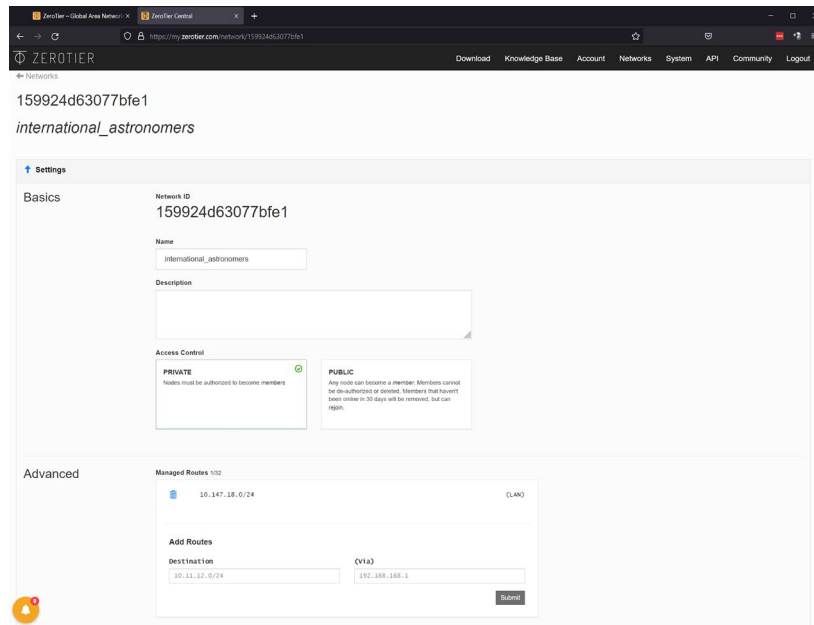
f. We're almost ready. There are just two more steps. At the top of the page, you can see the **Network ID** again in two places. This is the most important thing to note, so take a screenshot or photo, as you'll need this number to allow your devices to join the network. You should view the Network ID as a form of password. It defines the network but, unlike a password, it cannot be changed. **You should only give the Network ID to people you trust!**

When you create a network, ZeroTier allocates a random Name. In this example we've changed the name to reflect the name of the group in the case study. You can add a description in the box below if you wish.

You will probably want to leave the Access Control set to **Private,** although this can be set to Public if required.

Finally, scroll down to the Advanced section.
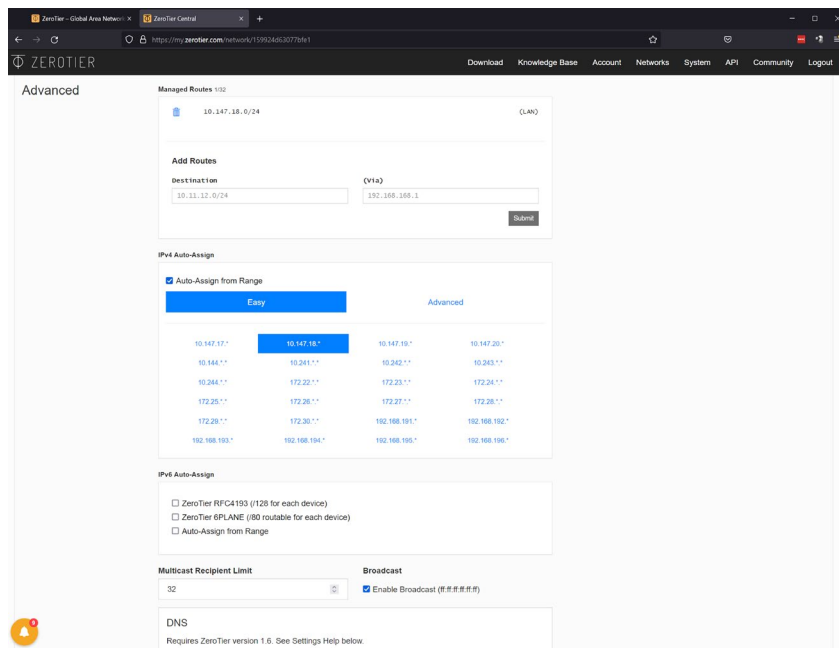
g. The default IP address range would work, but for simplicity we suggest you change it to one of the **10.xxx.xxx.*** ranges (the top row) as illustrated. This will be sufficient for all users of the free account, as it gives 256 possible addresses and the free account is limited to 50 users.

The IP address range will be the address that is visible when you use ZeroTier and we'll come back to it later on. For now, give yourself a pat on the back and have a cup of tea, but nothing stronger as we still have work to do!

When you're ready, move on to the next section.

Installing the ZeroTier Software on the Solo

Suitably refreshed, it's time to install the ZeroTier software on the Solo.

The following steps may seem a little complicated if you are not used to working with Unix style commands. The Solo is in fact an optimised Linux computer. If you are used to working with Linux, that's great, otherwise we suggest you simply type in the commands exactly as described. You can always google the meaning of the commands if you are unsure what you are doing and if you really get stuck just drop a line to support@lunaticoastro.com and we'll be there to help you.

So here goes.

a. To start, you'll need a terminal program. We'll use the Windows Power Shell command prompt, but any terminal program will do. Right click on the Windows icon and select Windows Power Shell.

b. Enter the command: **ssh solo@*IPaddress of your Solo*** as below:

c. Enter the password **cloudwatcher**.

d. The Solo ships with the disk **write protected**. **It is important to make the disk writeable with the command rootrw.**

e. Now enter the command: **curl https://install.zerotier.com | sudo bash**.

The command is taken from the download section of the ZeroTier website. If you go there, you'll see that the command looks a little different and begins with **curl -s**. The -s tells the Solo to install the package 'silently', (without text). This means that you won't see any error messages. The most likely error is that the drive is still write protected. If so, repeat step d. above.

At this point ZeroTier should be installed on your Solo. Now comes the moment of truth. We're going to connect to the ZeroTier network that we created earlier, using the **Network ID** – (You did note it down, didn't you? If not, no need to worry, you can simply log into your ZeroTier account you'll be directed to the page withe your network listed.

f. Type the command: **sudo zerotier-cli join** *Your-Network-ID*

If you've been successful, you should be rewarded with the screen below (and another cup of tea)!

## Activating the Solo with ZeroTier

So far, we've done three things:

- o Created a network with ZeroTier.
- o Installed the ZeroTier software on the Solo.
- o The Solo has joined the ZeroTier network.

You might be tempted to think we're finished, but there are a few more steps to go. When using ZeroTier it's not enough to join a network. Every user must also be authorised to use the network. To do this, we go back to the ZeroTier network and log in which should bring us back to this page:
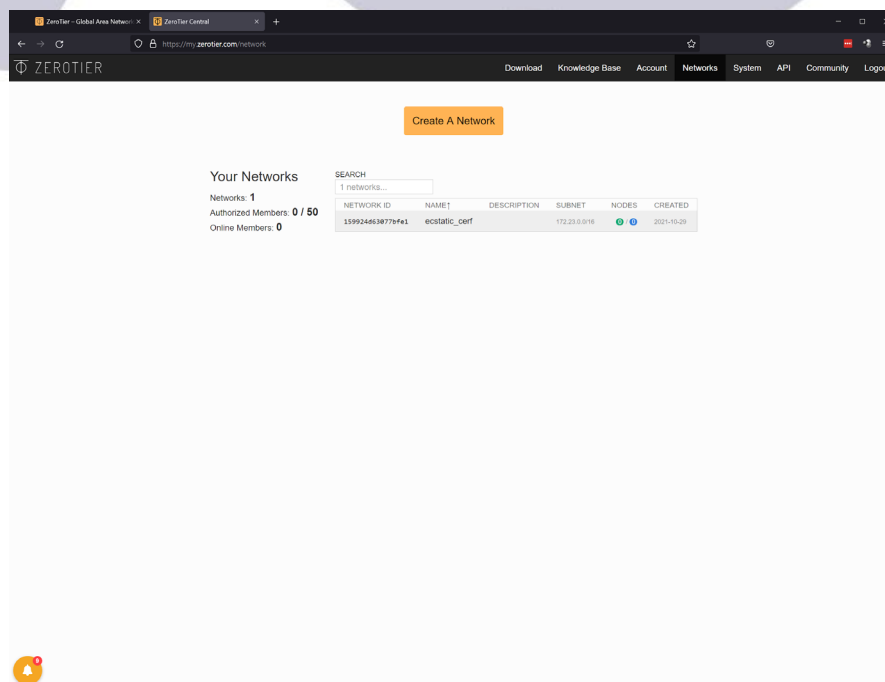
Click on the grey area to enter the **Admin** page and scroll down to the Members section. As you can see, our Solo has appeared and been allocated the Address **d28af2bfa1**. This isn't terribly useful, so take the time to complete the short name and description. Later all of the devices of the International Astronomers Club will appear here so it's very important to know which device is which. When you've done that click **Auth** to authorise the Solo.
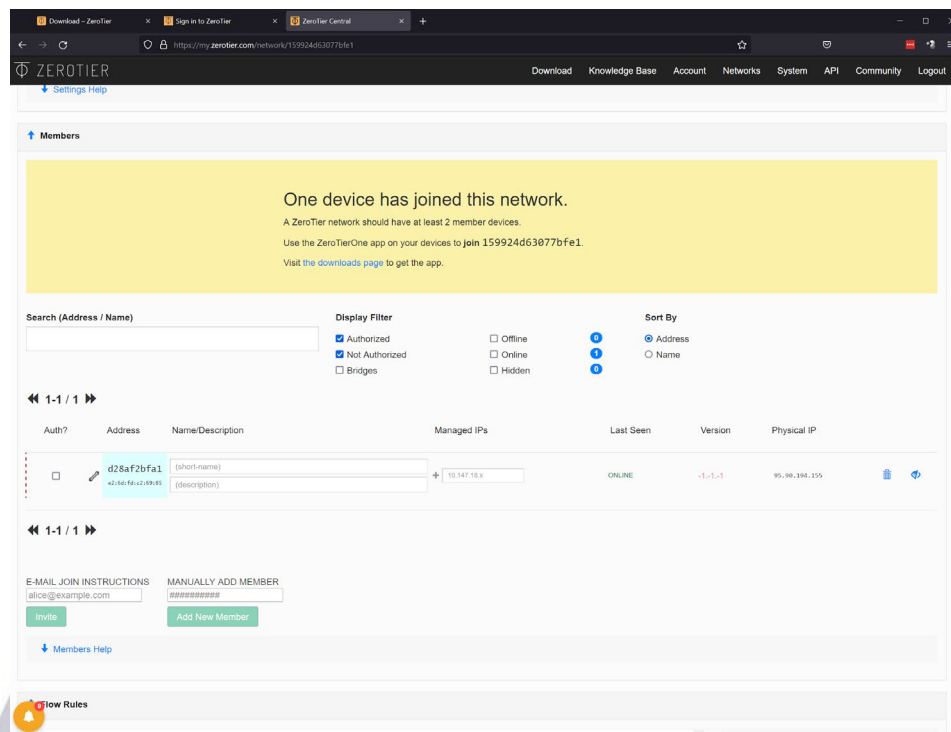
The screen should now look like this:
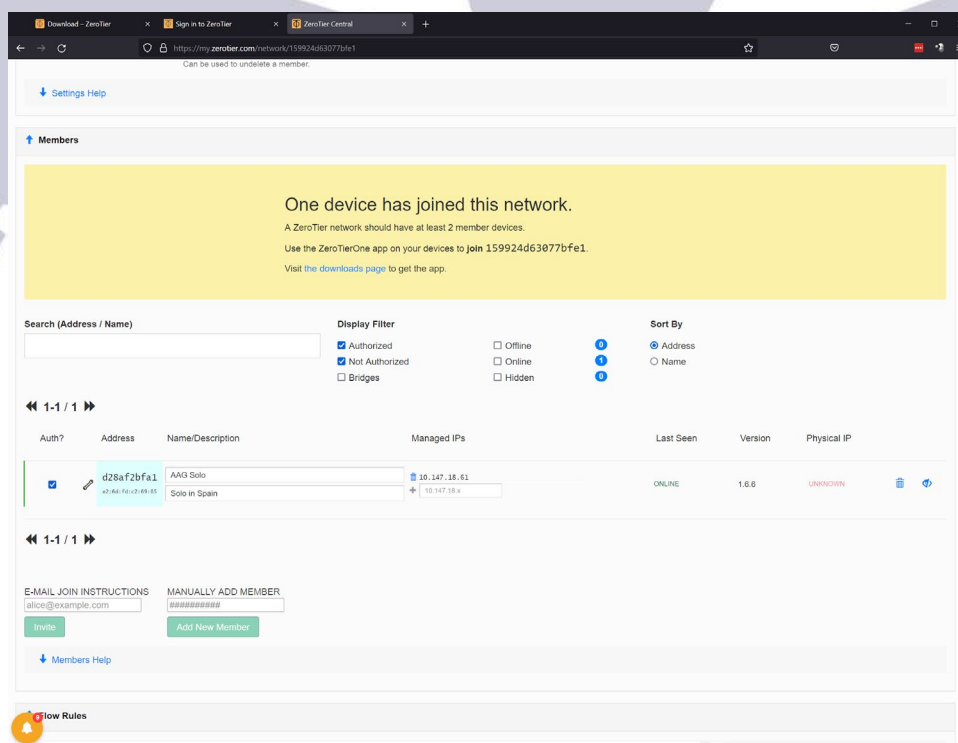
You can see that on the left there is a green line next to the device, indicating that it has been authorised. To the right is the address that ZeroTier has allocated to the Solo. This is now the IP address that you will use to reach the Solo on the ZeroTier network.
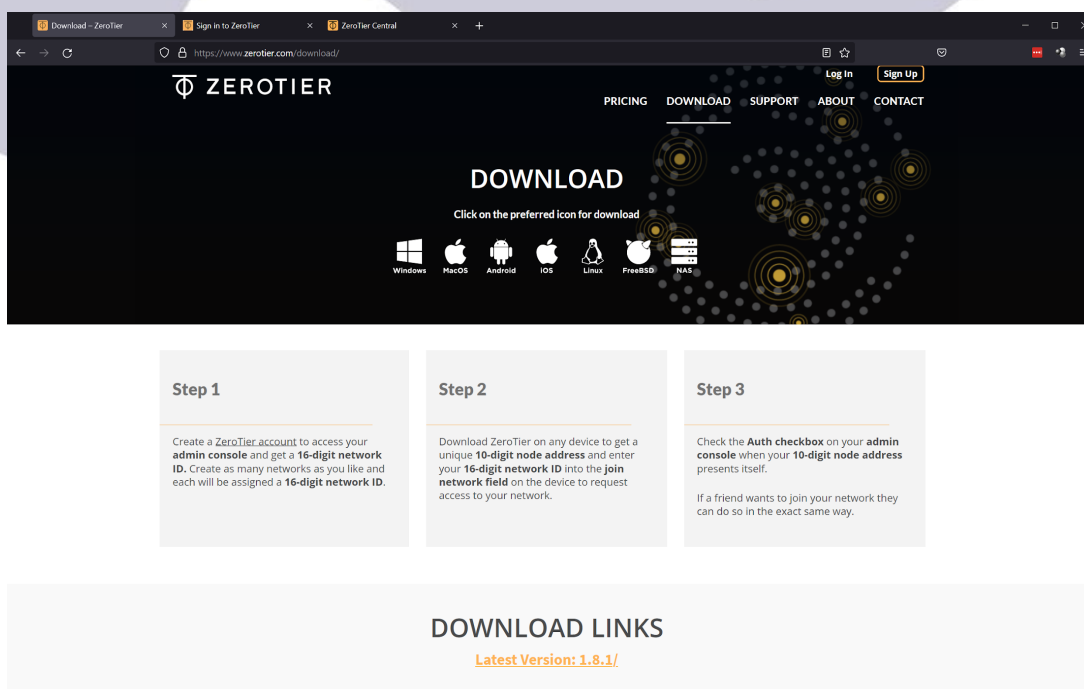
All that remains is to add at least one other device to the network. This is the subject of the next section.

Installing the ZeroTier Software on the Viewing Device

We left our Solo feeling rather lonely on the ZeroTier network. We need to add one or more devices so that it has someone to talk to! At the moment, the International Astronomers can all view the Solo web page using the IP address of the hosting facility and a port number: 123.123.123.123:12345. However, we want to use the number that we've created in the previous steps: **10.147.18.61**. If we type this into a web browser at this stage nothing will happen. That's because we only have one device on our network. Each of the International Astronomers Club members has to install the ZeroTier software on the device that they will use to view the Solo web page.

> **Each user has to install the ZeroTier software on the device that they will use to view the Solo web page.**

The **Download** section of the ZeroTier website has links to software for the majority of current devices from phones to desktop PCs, as well as of course Solos!

Due to the number of choices available, we won't go into the specifics of configuring your device here. Just remember that when you have installed the software, follow **Steps 2** and **3** in the screenshot above.

Here is an example of an iPhone user, viewing the Solo using ZeroTier.
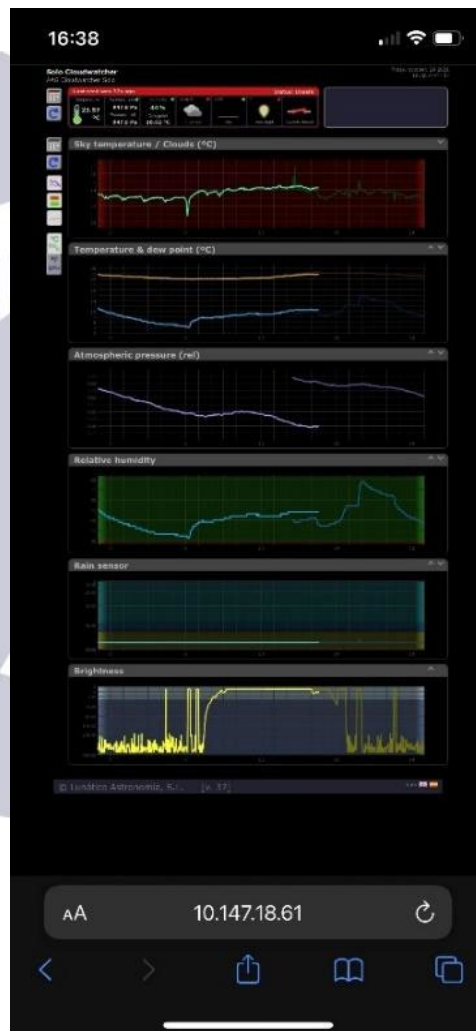
And that's it. Not too difficult, I hope you'll agree.
We hope you'll enjoy using your CloudWatcher and Solo with the added security and convenience of ZeroTier.

ZeroTier CLI commands

Here is a brief summary of the ZeroTier command line interface (CLI) commands which you can use with your Solo.

Please note, all commands should be preceded by the word **sudo**.
E.g. *sudo zerotier-cli status*

zerotier-cli status - Returns status of network.

zerotier-cli join Network ID - Join the network with the given Network ID.

zerotier-cli leave Network ID - Leave network with the given Network ID.

zerotier-cli listnetworks - List the current networks available on the Solo.