

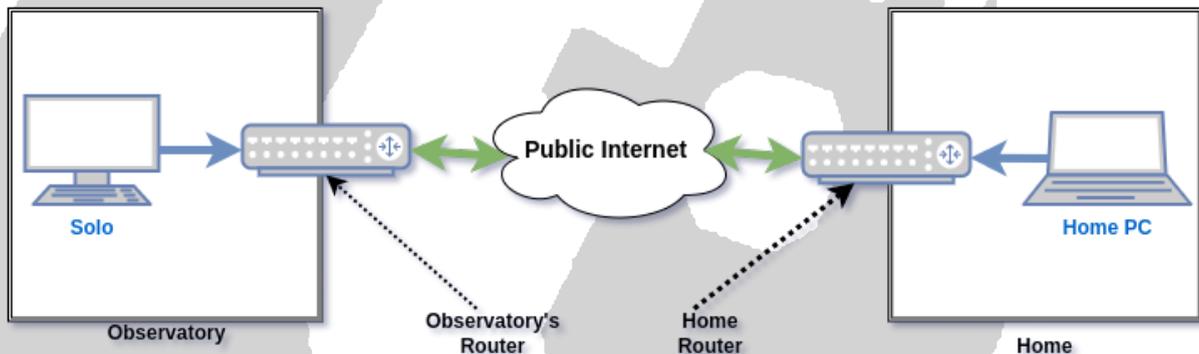
Remote Access to your SOLO

This article will guide you through the process of configuring your internet connection to provide access to the SOLO's web interface from any browser on any device, no matter whether you are at the observatory, at home, or anywhere else.

The problem

When you have your beautiful observatory away from your home, you will have an internet connection in the observatory itself and another internet connection at home. Each internet connection creates a private network where the devices connected to the router live.

As a result, your SOLO lives peacefully in the private network created by its internet connection and it is not reachable from home.



The arrows here are important to understand the problem:

- Green arrows (like the superhero) mean bidirectional communication. This means any device on the internet can reach the routers, and the routers can reach any device on the public internet.
- Blue arrows mean conversation can only be initiated from the device (SOLO or Home PC) to the router (which, in turn, communicates with the public internet). But unless we do something custom, there is no way “Home PC” can reach “SOLO” or the other way around.

The highway: remote viewers

There is a solution used by many users:

- Add a PC in the observatory (most already have one in which imaging software runs).

- Install a remote viewer solution such as TeamViewer, AnyDesk, Google Remote Desktop, etc.
- Access the remote session from home.

Ok! Done! Yes, kind of. But what if:

- The PC fails or restarts (power outages happen!).
- You want to access your SOLO from your phone or tablet. Yes, you still can, but managing a remote session from a mobile phone is far from comfortable.

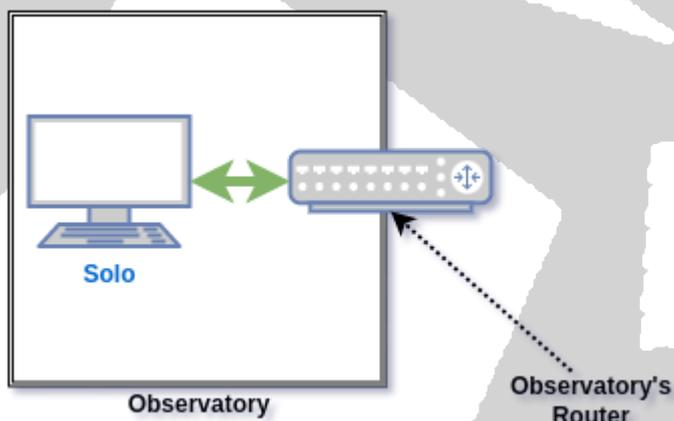
Ok, you are convinced. You want to access your SOLO's web interface from any browser on any device. Let's see the hard (but better) way.

The hard (better) way: publishing your SOLO

We do not need to change the internet connection at home. We only need to change the observatory's connection to:

- Publish the SOLO's web interface so that the blue line becomes a green line (bidirectional)
- Be able to reach it by name instead of IP address

Publishing the SOLO's web interface will turn the blue unidirectional arrow into a green bidirectional one:



...this means we will be able to access the SOLO's web interface from outside the observatory.

If you feel comfortable with networking terminology such as "IP Address", "Port", "Private IP Address" and "Public IP Address", please skip to [Publishing the SOLO's web interfaces](#) Otherwise, the next section will give a quick review of these terms.

Quick review of networking terminology

You can think of the internet as a postal mail service. Each address has a postal address you can use to find your way to that specific place. What the postal address is in the real world, an IP address is in the internet world. Every computer or device connected to the internet has an IP address.

The same way two different places cannot have the same postal address, two different devices cannot have the same IP address.

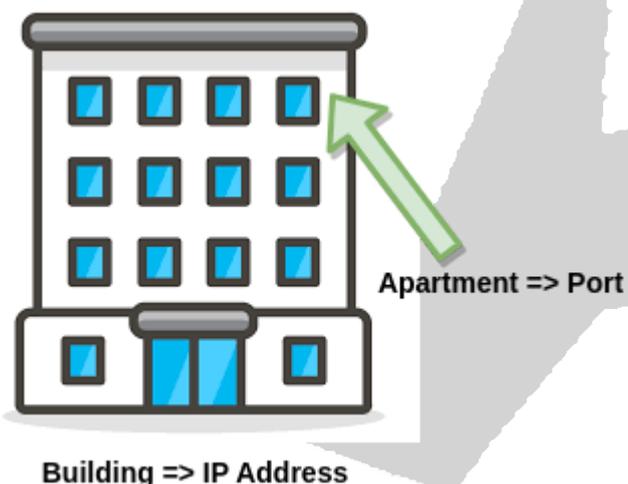
What does an IP address look like? It is just a series of four numbers, separated by a dot. For example: 80.3.122.1

Wow, but that is extremely difficult to remember! Don't worry. There is a thing called **DNS** that associates easier to remember names with their IP address. Do you remember when you type <http://aagsolo> in your browser to access your SOLO? Well, actually "aagsolo" is a name that corresponds to your SOLO's IP address. The **DNS** system takes care of converting that for you. You can think of the **DNS** system as your address book: you don't have to remember every person's address, just look for their name in your address book and you can find it there.

Is the postal address enough for my letter to reach its destination? Well, actually, many postal addresses are buildings in which many people live. So we need some extra information for our letter to be successfully delivered: where, inside the building, the addressee lives.

On the internet, something similar happens. Our computer has an IP address, but it may serve more than one service. It may serve as a backup system, and also as streaming service, and also as network file server and much more. So when I want to talk to the streaming service, an IP address will not be enough. I have to say which service within that IP address I want to talk to. **That is the port.**

So, in the internet world, in order to communicate with a service, I will need to know its IP address and its port.



The port is nothing more than a numerical value. For example, the SOLO's standard web is on port 80. So, when I type <http://aagsolo> in the browser, the browser is:

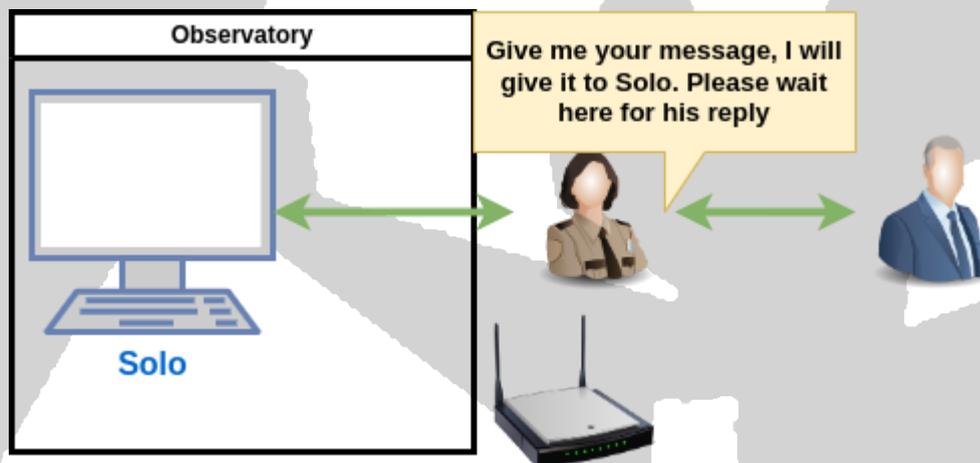
- Using the DNS to convert "aagsolo" to its IP address
- Connecting to that IP address and port 80 to display our beloved charts page 😊

Public internet and private networks

All we have seen applies to the public internet. But when we are at home with our smartphone connected to our router, we are not on the public internet. Why? Well, there are many reasons, but a strong one is that if we were, what would prevent any malicious person from reaching our smartphones?

Fortunately, when a device is connected to a home router, the device is not exposed on the public internet. The device resides in a private network guarded by the router itself, which is connected to both the public internet and our private network.

You can think of your router as the security guard of the building. Nobody can access the building without going through the Security Guard (the router). In fact, somebody trying to talk to "SOLO" will only speak to the Security Guard (the router).



This is nice because it is secure 😊 But it makes things complicated for our purpose of publishing the SOLO's webpage: somebody from outside our private network wanting to see the SOLO's webpage will never reach SOLO, he will just reach the Security Guard (the router).

How do we fix this? Well, just as in real life. We will have to give some rules to the Security Guard. Let's see how this is done.

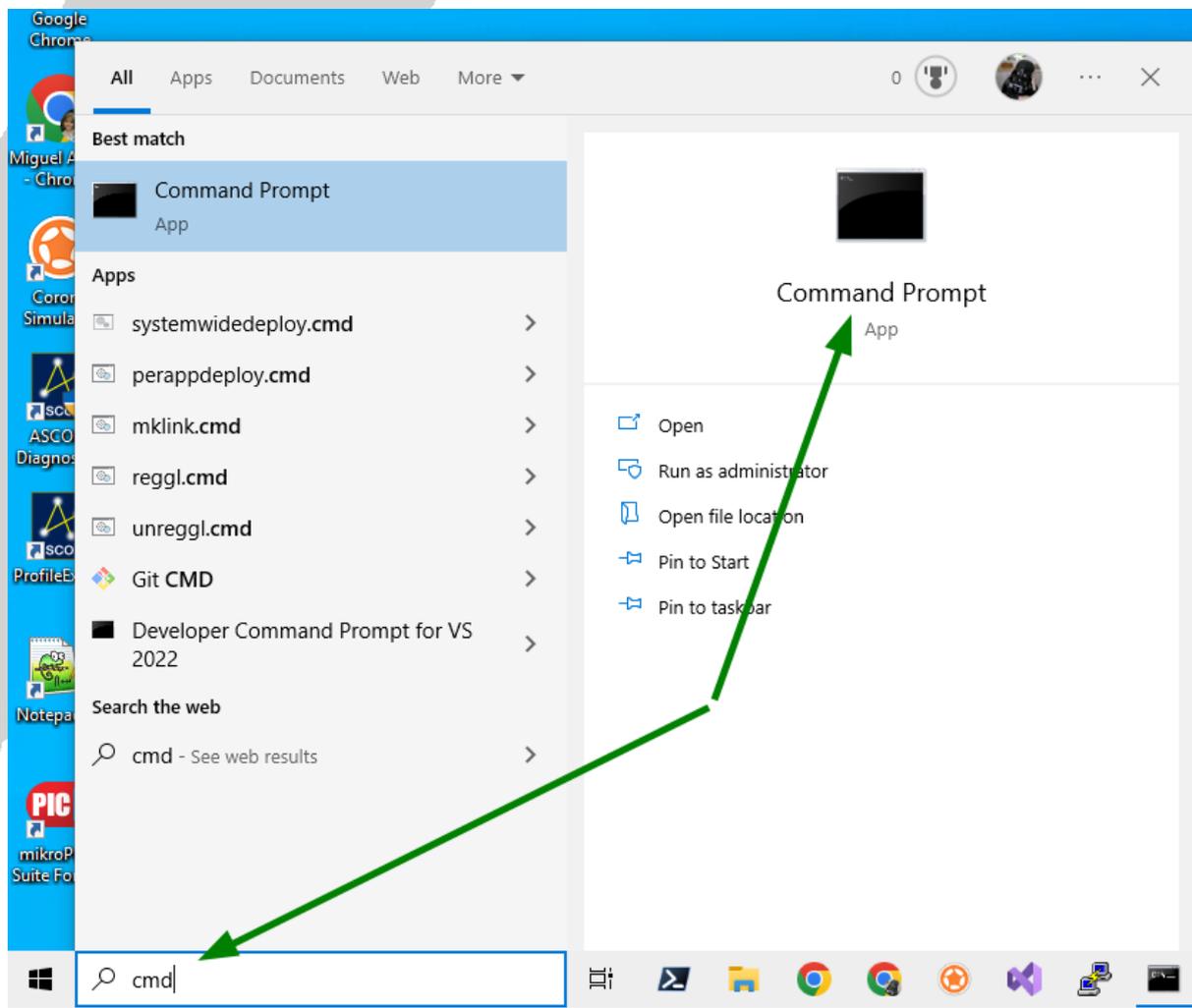
Publishing the SOLO's web interfaces

The SOLO has two web interfaces: one is reachable using <http://aagsolo> and displays the well-known weather information, safe status and charts; this is the SOLO's port **80**. The configuration (password protected) web is reachable using <https://aagsolo/config> (the former is "http" internet service, the later is "https" internet service; "s" stands for "secure"); this is the SOLO's port 443.

To publish the SOLO's web interface we will have to publish both services.

Obtaining the SOLO's IP address

We need to tell the router to redirect some traffic to the SOLO. In order to do so, we need to know the SOLO's IP address. You will need a PC in your observatory. Open a "CMD" on your PC connected to Observatory's network:



This will open Windows' default terminal application. Now type "ping aagsolo" and press the ENTER key.

```
CA Command Prompt
Microsoft Windows [Version 10.0.19045.2604]
(c) Microsoft Corporation. All rights reserved.

C:\Users\mikio>ping aagsolo

Pinging aagsolo.home [192.168.1.42] with 32 bytes of data:
Reply from 192.168.1.42: bytes=32 time=11ms TTL=127
Reply from 192.168.1.42: bytes=32 time=13ms TTL=127
Reply from 192.168.1.42: bytes=32 time=7ms TTL=127
Reply from 192.168.1.42: bytes=32 time=8ms TTL=127

Ping statistics for 192.168.1.42:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 7ms, Maximum = 13ms, Average = 9ms

C:\Users\mikio>_
```

- “aagsolo” is the name of your SOLO
- “ping” is a utility that serves two purposes
 - Determines the IP address of the name we give (“aagsolo” in our case)
 - Checks if such device is alive

In this example, the “ping” command is telling us that “aagsolo”’s IP address is “192.168.1.42”. **Yours will be different** as your router’s configuration will be different.

Adjusting the router configuration

In your router, redirecting traffic from one router’s port to a different device is called **NAT** (Network Address Translation).

Note: Please keep in mind that we will be changing the router’s configuration and each router brand will have its own interface to do this configuration. We will be showing one specific interface. Yours may differ.

Look for an option called **NAT** in your router’s configuration and enter information similar to this:

DHCP	NAT/PAT	DNS	UPnP	DynDNS	DMZ	NTP	ONT
------	---------	-----	------	--------	-----	-----	-----

NAT/PAT/CGNAT settings

These rules are needed to authorise a remote communication from Internet to reach a specific device of your LAN. You can also define the ports(s) that this communication will use.

In order to create NAT rule you must introduce the IPv4 assigned to your device. You can find it in the list of assigned IPs on "DHCP" Tab



Warning : Make sure you have not filtered these ports in the firewall.

Customize rules

status	application / service	internal port	external port	protocol	device IPv4	
	FTP Server	21	21	TCP		add
✓	Solo HTTP	80	8080	TCP	192.168.1.42	delete
✓	Solo HTTPS	443	8443	TCP	192.168.1.42	delete

What we are telling the router here is:

application / service	internal port	external port	protocol	device IPv4
Solo HTTP	80	8080	TCP	192.168.1.42

“when someone reaches the router on port 8080, redirect the conversation to 192.168.1.42 (SOLO’s IP address) on port 80 (http service)”

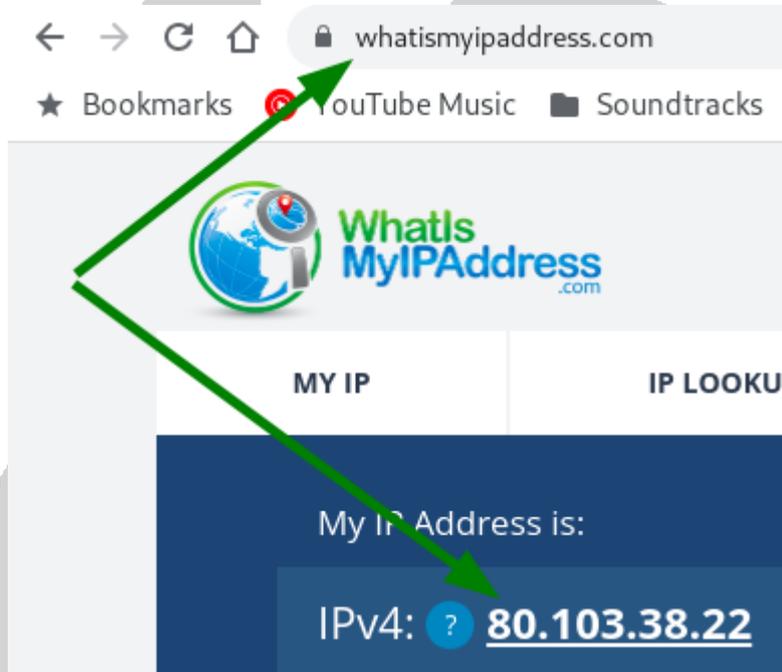
Something similar happens for the second rule.

“when someone reaches the router on port 8443, redirect the conversation to 192.168.1.42 (SOLO’s IP address) on port 443 (https service)”

Now, SOLO’s web interface will be reachable from **any** browser on **any** device using **http://<ip_of_your_observatory_router>:8080** and configuration interface in **https://<ip_of_your_observatory_router>:8443/config**

Determining router's IP Address

How do you know your router's IP address? The easiest way know it opening a browser from a PC **inside your observatory** and going to <https://whatismyipaddress.com/>



So, in my example, SOLO's web interface will be reachable using <http://80.103.38.22:8080>



Name instead of IP address: DynDNS

Remembering a name is easier than remembering four numbers. For example, it is easier to remember “aagsolo” instead of “192.168.1.42”. So let’s look for an easier way to remember router’s IP address.

There are several sites that allow you to assign a name to an IP address. [DynDNS](#) is one of the most popular. There are others, like [FreeDNS](#) which I will use for this tutorial since it is free, but they all work in a similar way.

After registering, you can go to the “Subdomains” section to register your router’s IP address:

← → ↻ 🏠 [freedns.afraid.org/subdomain/edit.php?data_id=21276760](#) ⌂

★ Bookmarks 📺 YouTube Music 📁 Soundtracks 🎮 GeForce NOW 📁 Voyage Privé,... 📄 Int

Editing n

For Members:

- [[Main Menu](#)]
- [[Domains](#)]
- [[Subdomains](#)]
- [[Web Forward](#)]
- [[Dynamic DNS](#)]
- [[IPv6 Reverse](#)]
- [[Backup DNS](#)]
- [[Preferences](#)]
- [[Registry](#)]
- [[Logout](#)]

For Everybody:

- [[Home](#)]
- [[About Us](#)]
- [[FAQ](#)]
- [[News](#)]
- [[DNS Stats](#)]
- [[AUP/TOS](#)]
- [[Contact](#)]
- [[Router Setup Guide](#)]

Editing mysolo.mooco.com

Type: [explanation](#)

Subdomain:

Domain:

Destination: [Forward to a URL](#)

TTL: seconds (optional)

Wildcard: Enabled for all subscribers ([more info](#))



[[Different Image](#)]

We will not go in detail on what “Type” and “Domain” mean (it is all part of **DNS** culture and it is quite long to explain), but let’s just say that when we hit “Save!”, the name “mysolo.mooco.com” will be resolved to my router’s IP address: 80.103.38.22, so I will be able to use <http://mysolo.mooco.com:8080> to reach my SOLO.



Now, this would be enough if your router had a fixed (static) IP address. But this is not usually the case. Most routers have a dynamic (changing) IP address.

So... all we did in **FreeDNS** will be useless when the router's IP address changes? Yes, but fortunately most routers have support for **DynDNS** or similar systems. For example:

The screenshot shows a router's configuration page with several tabs: DHCP, NAT/PAT, DNS, UPnP, DynDNS, DMZ, NTP, and ONT. The DynDNS tab is selected. Below the tabs, there is a descriptive text: "This page enables you to configure the DynDNS service. Use a DynDNS to map a static or dynamic IP address or long URL to an easy to remember subdomain such as mydomain.dyndns.org. Thus you will be able to access to your server on your LAN." Below this is an information icon and text: "Using DynDNS can be useful if you host a web site, ftp server or any type of server behind the Livebox Fibra. You can find it easily with a name like thisiscool.dyndns.org".

Below the text, there are two sections: "DynDNS settings" and "DynDNS/FreeDNS credentials". The "DynDNS settings" section has a dropdown menu set to "dyndns" and empty input fields for "full host name", "user name email", and "password", along with a "save" button. The "DynDNS/FreeDNS credentials" section is a table with a green border and a green triangle pointing to the "user name" and "password" columns. The table contains one entry:

service	full host name	user name email	password	last update	
FreeDNS	mysolo.moou.com	mikioma	*****	14/03/23 16:38:30	delete

If we register our DynDNS/FreeDNS credentials into the router, when its IP address changes, the router itself will notify **DynDNS/FreeDNS**. Keeping it synchronized, you will not have to worry about what IP address your router has.