

WaveTunnel Configuration Guide

GA release

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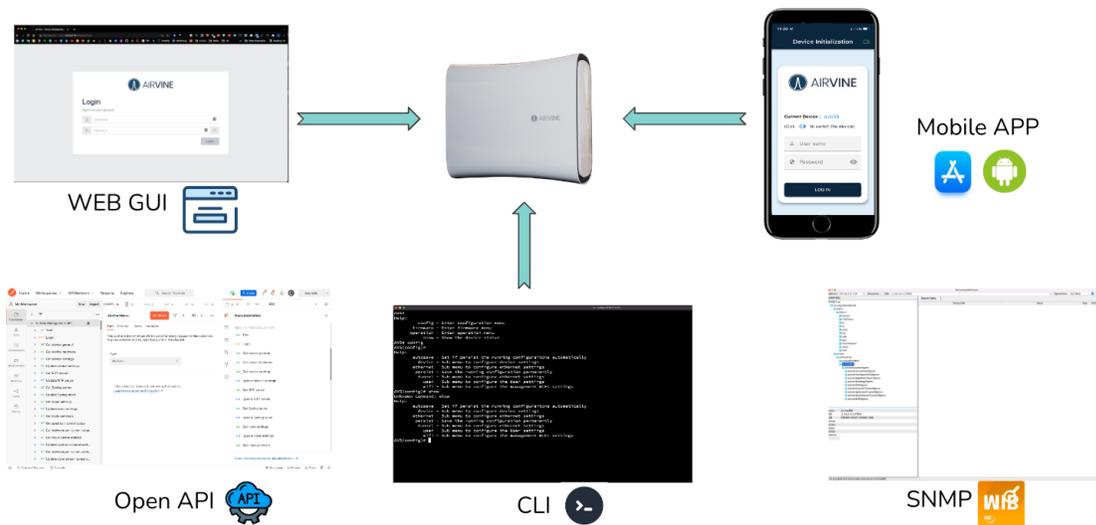
This document provides the instructions on how to configure and monitor your WaveTunnel network. You can follow the instructions described in each section to set up the WaveTunnel connections, change the configurations, monitor and troubleshoot your network.

Management Interfaces of WaveTunnel device

There are several management interfaces supported by the WaveTunnel device which you can use to manage the network. It includes:

- WEB GUI
- Mobile App
- Command-Line interface
- Open API
- SNMP interface

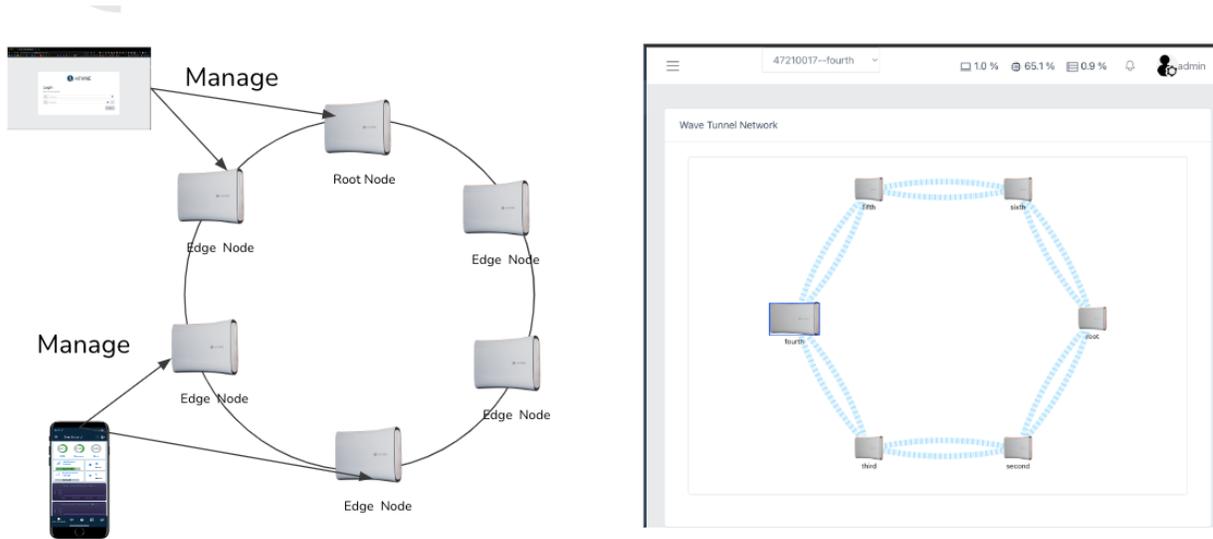
You can select the interfaces in your environment which are most appropriate to configure and monitor your network.



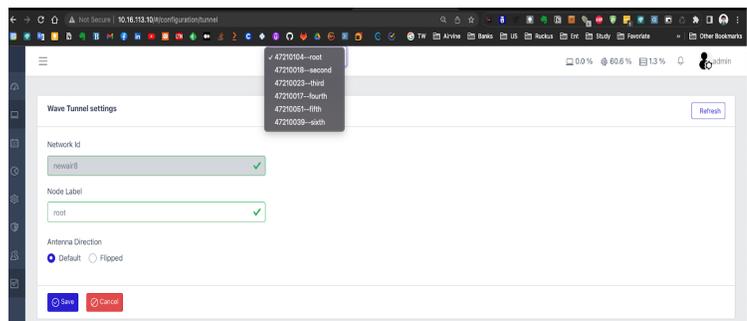
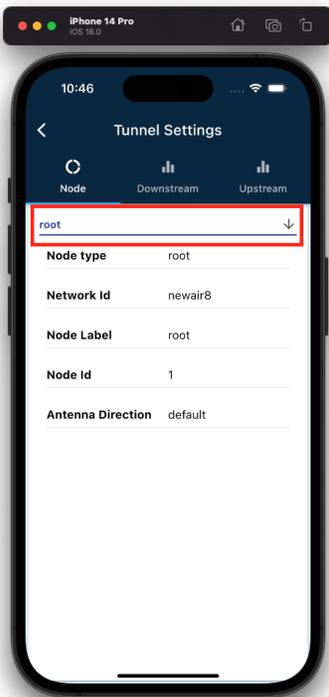
For Open API, please refer to the online document below.

<https://documenter.getpostman.com/view/4668474/VUjQm4Bx>

The architecture of the WaveTunnel network is designed as the “controller-less” system. It means there is no central controller in the network to manage the WaveTunnel devices. You can just connect to any WaveTunnel device in the network to manage others via the WEB GUI or Mobile App. Please refer to the diagrams below.



You can select any node from the dropdown list on the WEB GUI or Mobile App to manage the selected WaveTunnel device.



Prerequisites of using the management interfaces

Hardware Installation Package

A complete installation hardware package includes the items listed below:

- WaveTunnel device
- Mounting bracket
- Power supply

Note: In accordance with FCC Part 15.21, Changes or modifications not expressly approved by Airvine Scientific Inc. could void the user's authority to operate the equipment.

Note: In accordance with FCC Part 15.105, This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

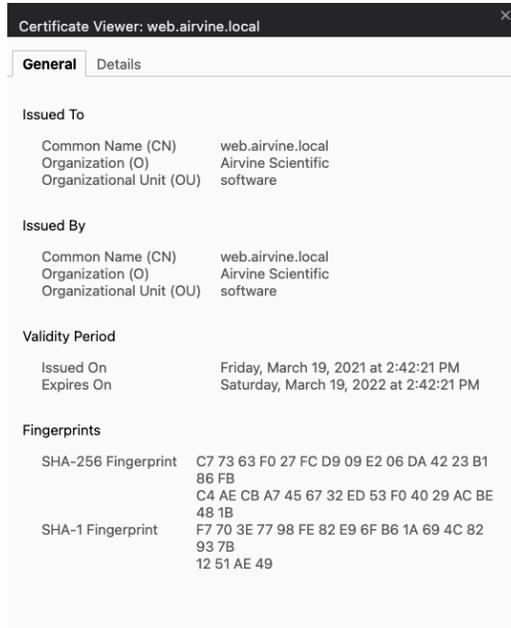
Web GUI Prerequisites

For being able to connect to the WEB GUI of the WaveTunnel device, you need a computer installed with one of the following web browsers:

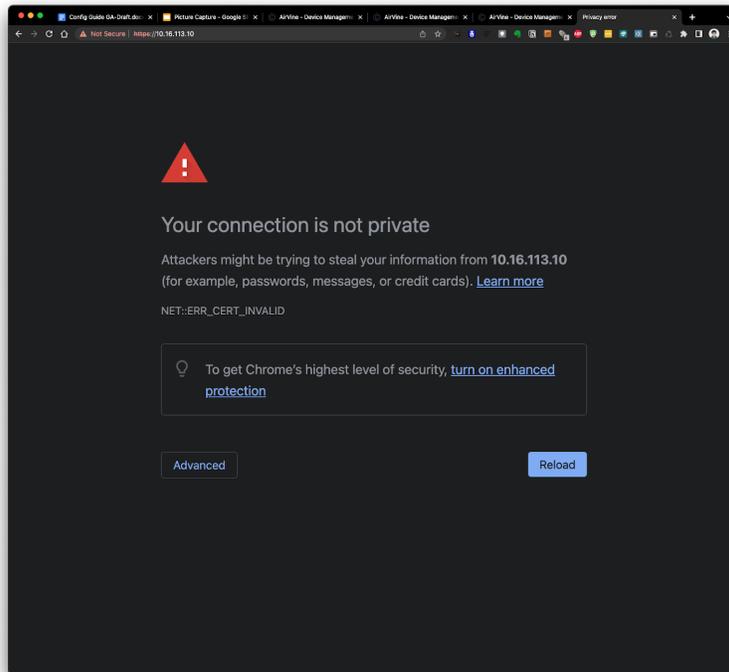
- Google Chrome
- Microsoft Edge
- Safari
- Firefox

The WEB GUI supports both **http** and **https** connections. For https connections, the web server of the WaveTunnel device uses the self-signed certificate. Thus, you need to ignore the security warnings on the browser to bypass the validation.

The information of the Airvine self-signed certificate.



For Google Chrome, there is no link on the warning page to ignore the certificate and move forward. You can type **“thisisunsafe”** to proceed.



The default login credential of the WEB GUI are

User name: **admin**

Password: **admin**

Mobile App Prerequisites

Download the “wtmanager” App to your mobile device

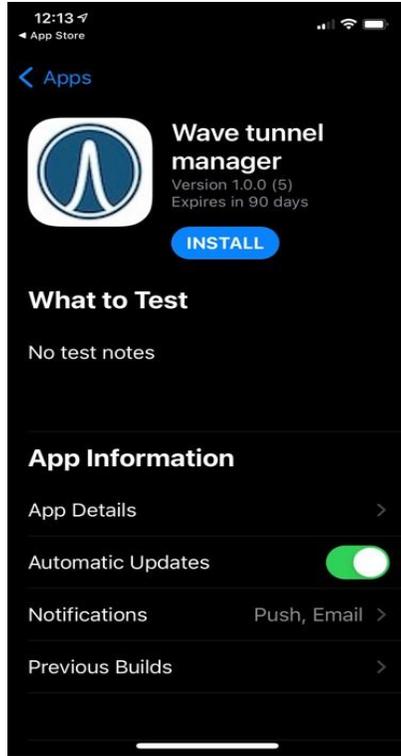
(To be changed when the App is officially released. There is no need for getting approval from Airvine support.)

The “wtmanager” App for configuring a WaveTunnel device can be downloaded from the Apple App Store or Google Play to enable a wave tunnel network. The following steps will aid in the download process. For Apple IOS devices:

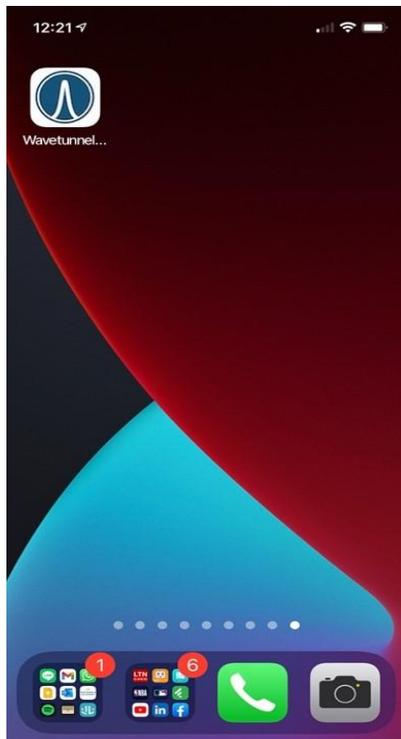
- Provide your Apple ID account email to Airvine support. We will then add you to the pilot testing group.
- Email: support@airvine.com
- You will receive an invitation email to download the “wtmanager” App. This does require that you first install the “TestFlight” App.
- The “TestFlight” application was developed by Apple to allow vendors to test their application before it goes through the formal approval process. Once we have that approval, this step will no longer be required.



Open the “TestFlight” App and you will see the “wtmanager” App.

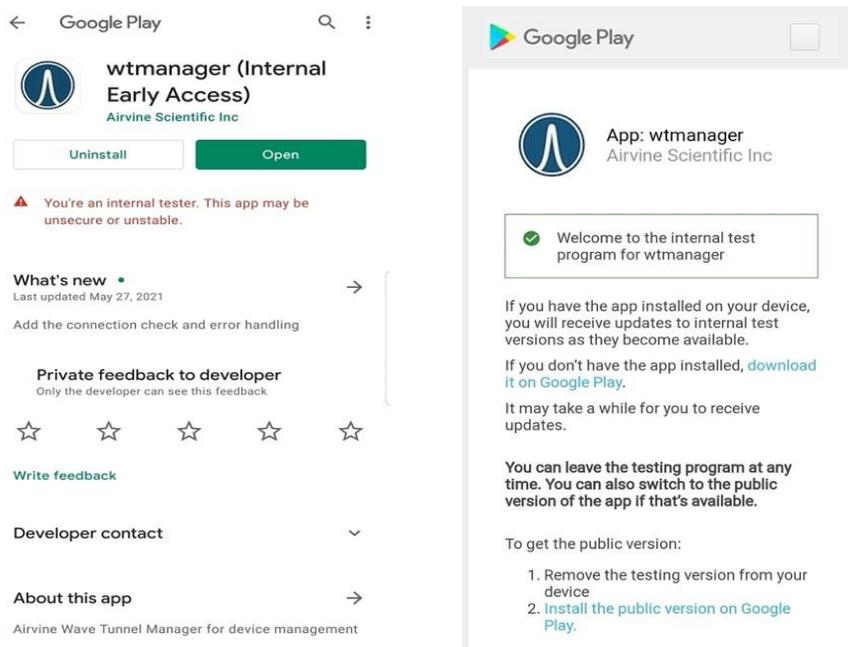


Install the WaveTunnel manager from “TestFlight”. After the installation, you will see the “wtmanager” App on your IOS device.



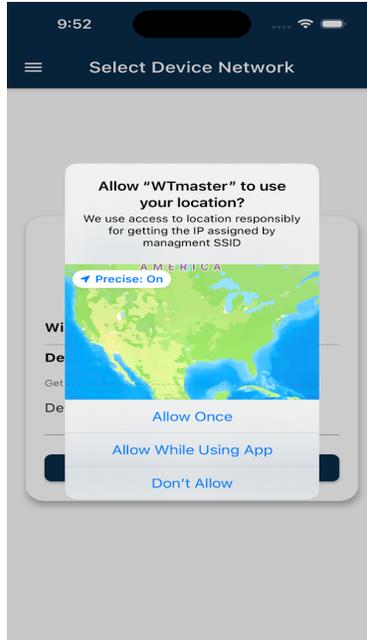
For Android devices:

- Provide your Google Play account email to Airvine support. We will then add you to the pilot testing group.
- You will receive an email that provides the download link (e.g. https://play.google.com/apps/in_ternaltest/4699881988975691697)
- Click the link from your Android device and you will see the page from which you can download the mobile App from Google Play.
- Install the Mobile App from Google Play.



After the installation, you can see “wtmanager” on your Android device.

When first opening the Mobile App, please grant the permission to the Mobile App to use your location. This is for the App to get the information of wifi connection from your mobile device.



The default login credential of the mobile App are

User name: **admin**

Password: **admin**

Command-Line Interface Prerequisites

There are two methods you can use to get into the command-line interface of the WaveTunnel device. You can either use the serial cable or connect through the network.

The default login credential of the command-line interface are

User name: admin

Password: admin

Enable Password: blank, just hit enter key

[CLI command keys]

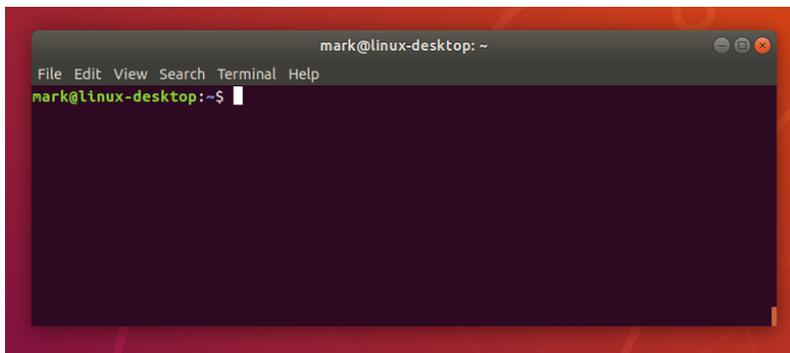
Key	Action
Enter	Show the sub categories or command list
Tab	Auto complete

↑ ↓	View the command history
..	Go up to the parent category
Exit or Ctrl+D	Exit the CLI

[SSH Client]

To connect through the network, you need to have the SSH(Secure Shell protocol) client. It can be the Linux terminal console or SSH client on other operating systems. For example, Putty, Kitty, MobaXterm.....etc.

Linux Terminal



SSH Clients



With these ssh clients, you can type “ssh admin@[IP of WaveTune]” to connect to the device.

For example, ssh admin@192.168.3.1 if you are connecting through the management WLAN.

```
allen@allen-unc: ~$ ssh admin@192.168.1.100
admin@192.168.1.100's password:
Last login: Mon Sep 19 02:38:16 2022 from 192.168.1.200
AVS>

Help:
deviceinfo - Show the device general information
enable - Enter 'enable' for enable mode;'enable password' to change the password
ping - Ping destination ip. Ex: ping 8.8.8.8
traceroute - Trace route to destination ip. Ex: traceroute 8.8.8.8
.. - Navigate up one category
exit - Exit Command line interface

AVS> █
```

[Serial USB cable]

Micro-USB cable is required to connect to the WaveTunnel device if you want to use the console.

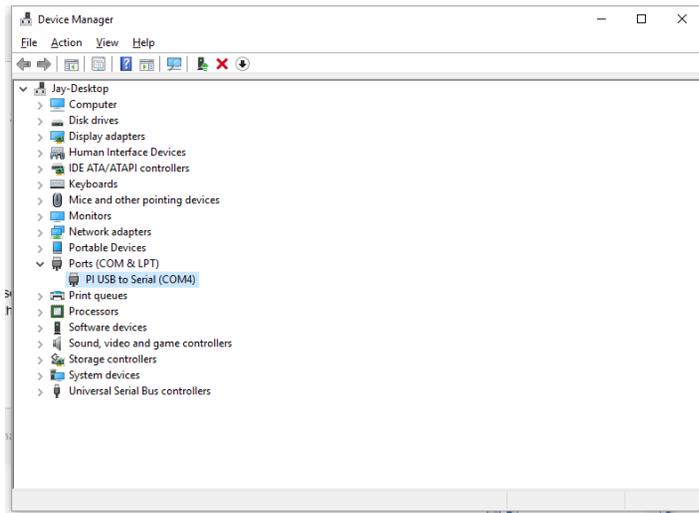


To use the serial cable connecting to the WaveTunnel device, you need to know the name of the serial port.

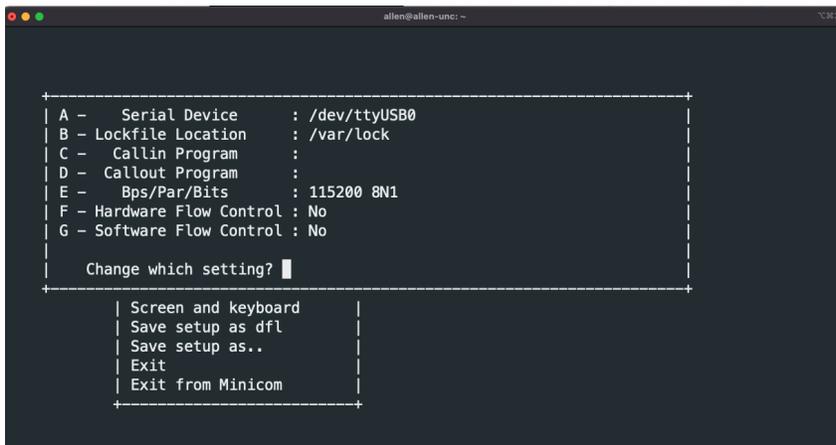
Below is an example of Linux or MacOS.

```
allen@allen-unc: ~$ ls -al /dev/ttyUSB*
crw-rw---- 1 root dialout 188, 0 Sep 22 21:09 /dev/ttyUSB0
crw-rw---- 1 root dialout 188, 1 Sep 22 21:09 /dev/ttyUSB1
allen@allen-unc: ~$ █
```

For Windows OS, please check the COM



Once you know the name of the serial port, you need to configure the settings in minicom or Putty as follows.



You can see the screen if you can connect to the device.

```
Welcome to minicom 2.7.1

OPTIONS: i18n
Compiled on Aug 13 2017, 15:25:34.
Port /dev/ttyUSB1, 21:17:37

Press CTRL-A Z for help on special keys

drew02 login: █

CTRL-A Z for help | 115200 8N1 | NOR | Minicom 2.7.1 | VT102 | Offline | ttyUSB1
```

The console output after successfully login.

```
allen@allen-unc:~$ ssh admin@192.168.1.100
admin@192.168.1.100's password:
AVS> █
```

```
allen@allen-unc:~$ ssh admin@192.168.1.100
admin@192.168.1.100's password:
AVS> enable
Password:
AVS#

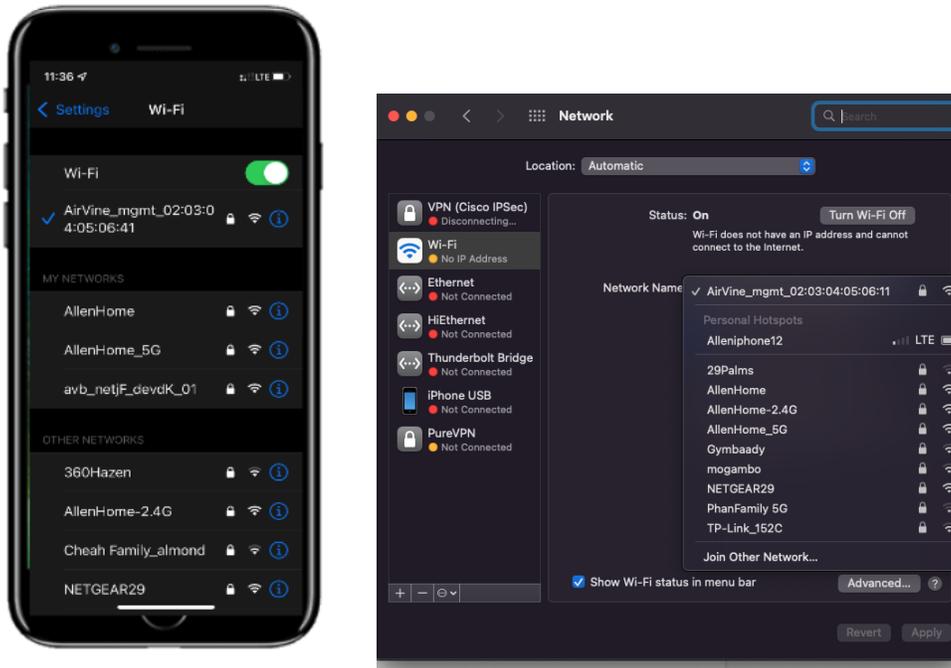
Help:
  show - Show the device status
  config - Enter configuration menu
  firmware - Enter firmware menu
  operation - Enter operation menu
  .. - Navigate up one category
  exit - Exit Command line interface

AVS# █
```

How to connect to the new WaveTunnel device

1. Management WLAN

The default management SSID is “**Airvine_mgmt_[MAC_ADDRESS]**”. You can check the MAC address from the label of your WaveTunnel device.



You can connect to this SSID with your mobile device or laptop. The default passphrase is “**airvine!**”.

For the laptop, type “<http://192.168.3.1>” on your browser to access the WEB GUI.

2. Ethernet cable

You can plug in the ethernet cable to any of the ports of the WaveTunnel device directly. The default IP address of the WaveTunnel device is “**192.168.0.253**”. Set the IP address of your laptop to the same subnet(e.g. 192.168.0.100) for being able to connect to the WaveTunnel device.

3. Serial console cable

Please refer to the “Command-Line Interface Prerequisites” above.

Initialize the WaveTunnel device

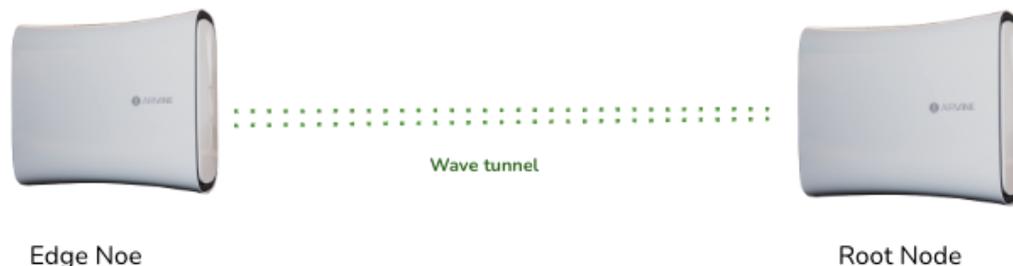
Before You Begin you will need the following:

- MAC address, which is printed on each WaveTunnel (WT) node.
- Mounting location for each node
- Root node Ethernet cabling
- Each of the nodes to be installed must be in the factory default state
- The network topology of your deployment. Please refer to the following example for the pilot phase.

Mounting Instructions

Select mounting locations for each node in the network. Nodes should be mounted using the appropriate bracket and hardware, and then powered-up before beginning the configuration process. When multiple Ethernet cables are used ensure they are bundled together.

Important: These pre-production Nodes need to be mounted facing the same direction so the radios can communicate properly (see below WaveTunnel example, the Airvine logo is on the same side).



For more detailed mounting instructions, please see the “WaveTunnel Installation Guide”.

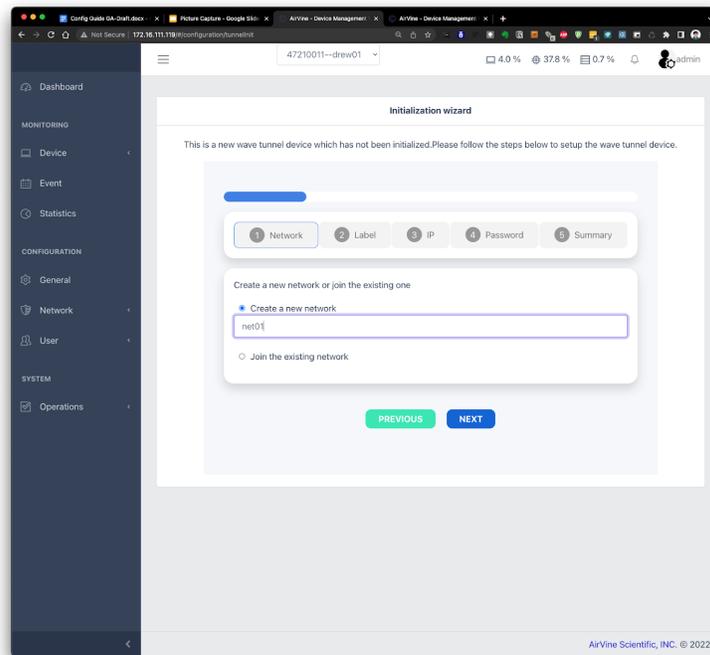
Take the example below to set up the wave tunnel connection between the first(root) and the second(edge) nodes.

[WEB GUI]

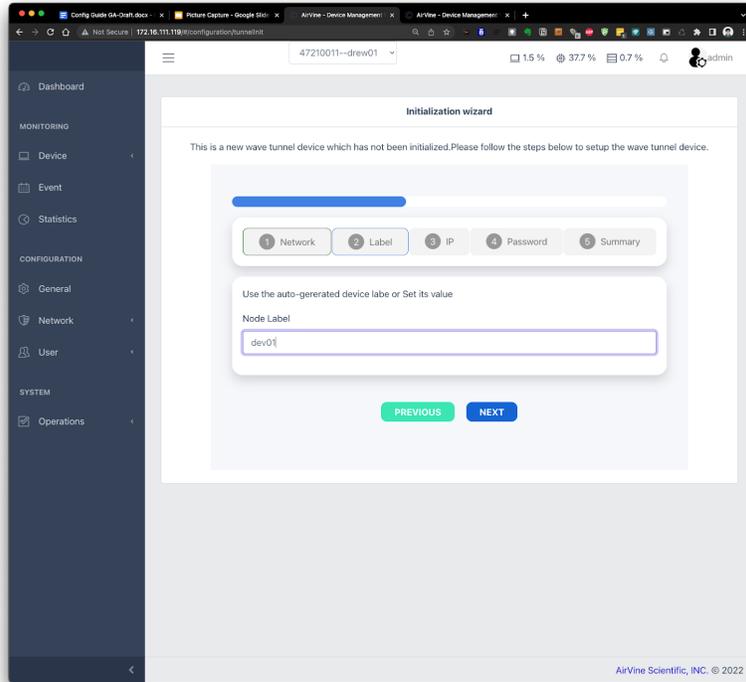
Connect the WEB GUI through the default management SSID or ethernet cable.

- Set up the Root Node

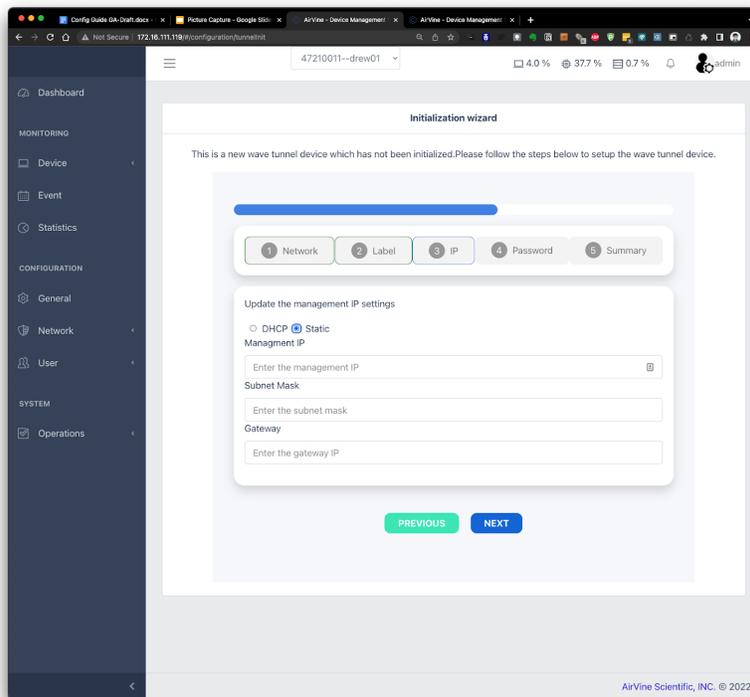
After logon to the WEB GUI, the initialization wizard is shown on the landing page. Following the Initialization wizard to set up the wave tunnel connection. The first step is selecting “Create a new network” and giving the name of this network.



Input the label of this root node to recognize it later.



Configure the management IP of this WaveTunnel device, it can be DHCP or Static IP.



For security considerations, you can change the default admin password in this step.