



Setup and use of meshtastic nodes and mesh.



Meshtastic website:
<https://meshtastic.org/>

Disclaimer

- I am not a representative from meshtastic. (in spite of my 😎 T-shirt!)
- I started using it April 2023 after being introduced to it by Peter
- I am not a network expert
- But I will show you how it works and do some live demonstrations.
- The information here is from the Meshtastic website and my experience.

App



What is meshtastic?

- Open source network, long range- 254km.
- Runs on a low power esp32 microcontroller. Several options are possible in various form factors
- Does not require internet, but can be set up to use access points.
- Inexpensive : <https://a.co/d/0Frvgfr>
- Apps run on android
Android , IOS, Mac, Web browser



Mesh overview

- **Demo: From meshtastic** <https://youtu.be/7v6UbC5bIJU?si=Gkzg3QajdkaFQbi7>

Play YouTube link

Another good overview video- for reference

- <https://youtu.be/EAQI2ZSmxPU?si=aUhqosx7oRunzTpA>



My personal example

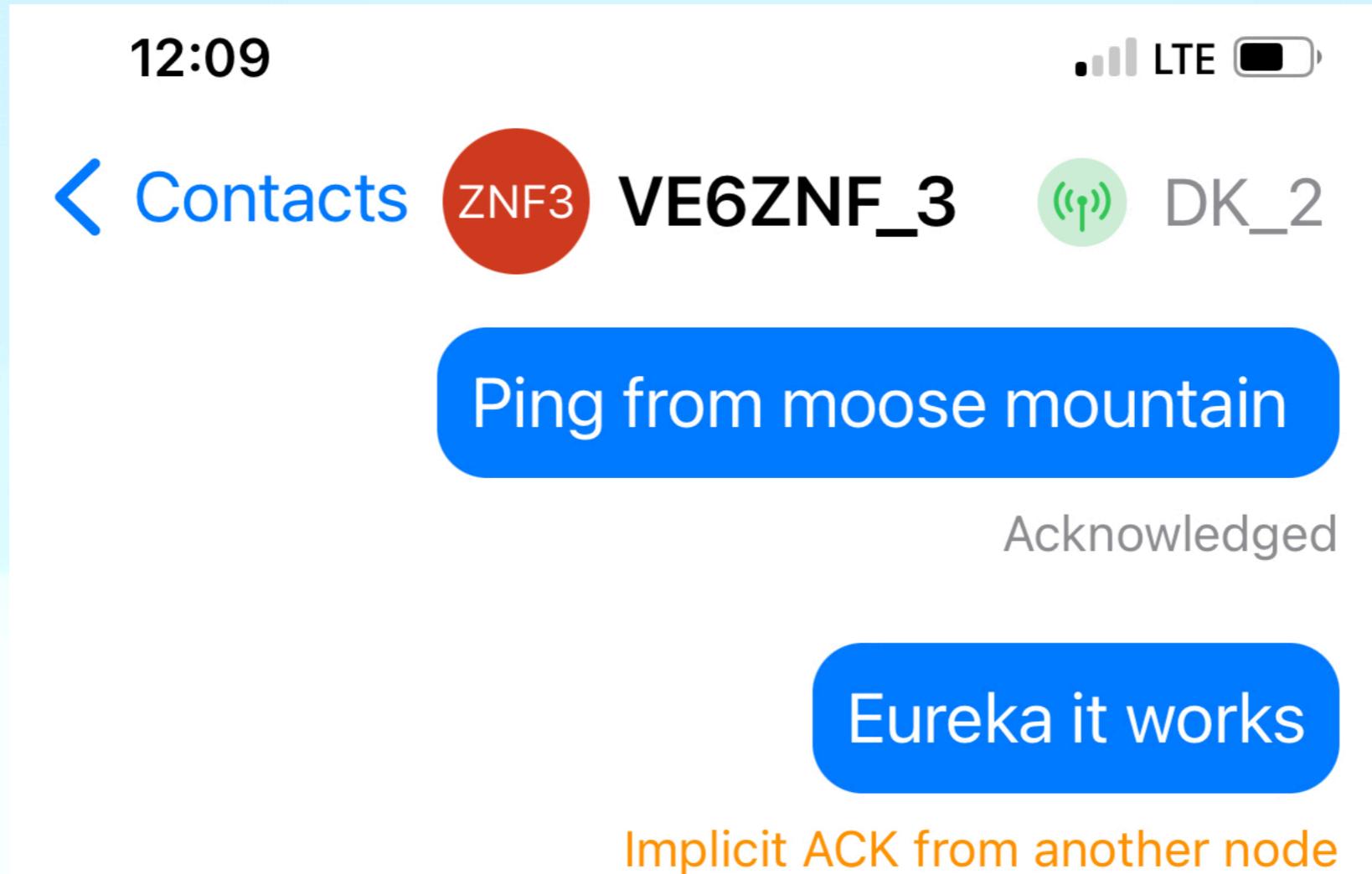
- Moose Mountain range test.
- Biked up Moose Mountain and could text Peter (located in fish creek park) without using internet or cell towers.
- First connected node in mesh was 58km away



My personal range test.



My personal example



Ping



Devices that can be used

ESP32 - use ESP32 Serial Drivers (max, linux, and win instructions are nicely documented on website.)

- LILYGO® TTGO T-Beam (>V1.1 recommended)
- LILYGO® TTGO Lora (>V2.1 recommended)
- Nano G1
- Station G1
- **Heltec V3** and Wireless Stick Lite V3
- RAK11200 Core module for RAK WisBlock modular boards

nRF52- less power (only use Bluetooth) and program using UF2 bootloader(appear as a flash drive)

- RAK4631 Core module for RAK WisBlock modular boards
- LILYGO® TTGO T-Echo

RP2040

- Raspberry Pi Pico + Waveshare LoRa Module (Note: **Bluetooth and Wi-Fi on the Pico W is not yet supported by Meshtastic**)
- RAK11310 Core module for RAK WisBlock modular boards



Programming a heltec radio

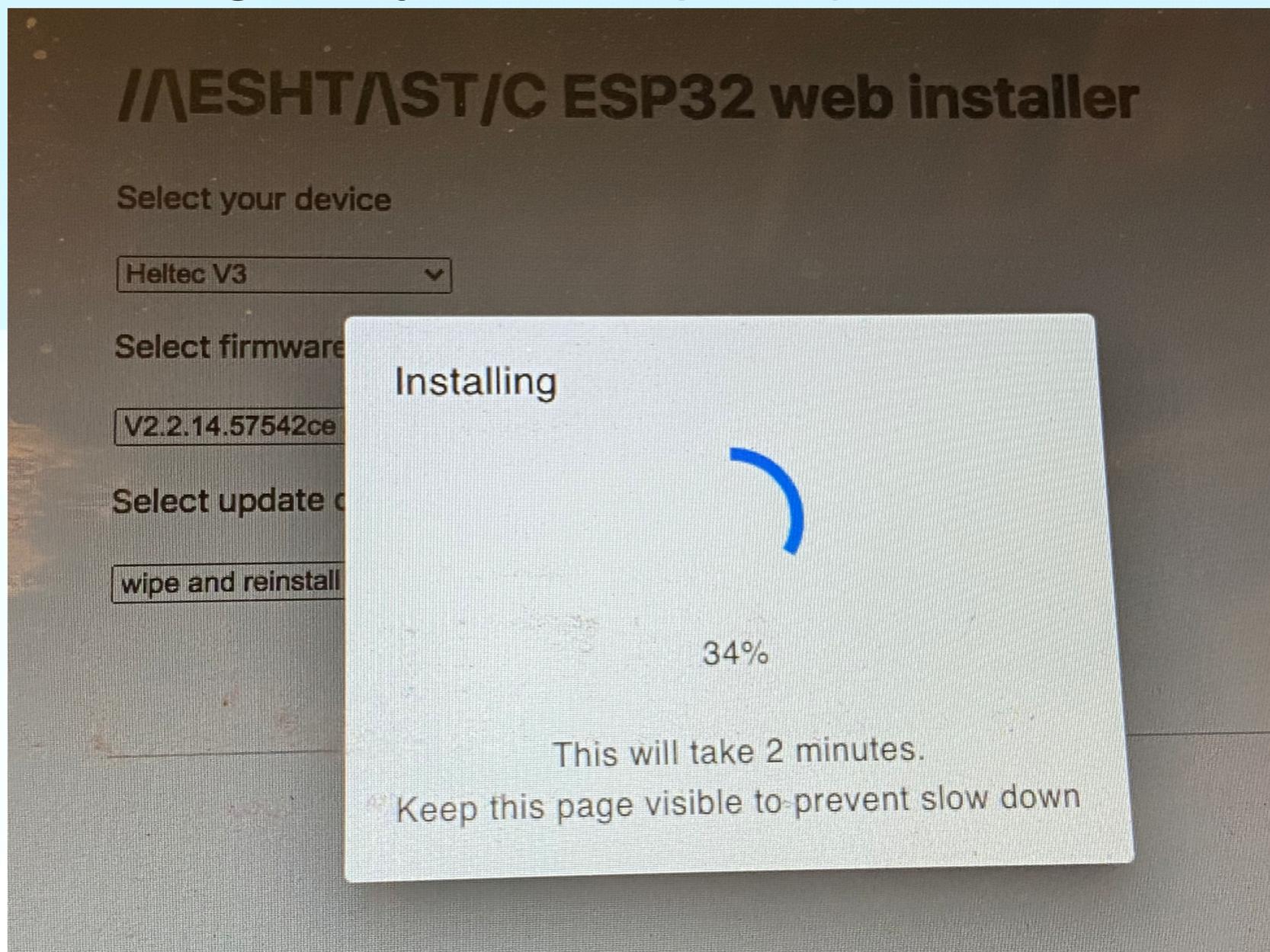
- It is not that difficult and really is quite quick.
- Flashing the firmware. - use chrome or edge browser for web based installer
- After firmware install then use phone app or Python command line interface. (CLI)
- Demo: switch to Mac - at the end of presentation



Flashing the firmware.

- use chrome or edge browser

- Remember to push the program button on the device as you are connecting it to your USB port. (This enables the install.)



- Wait 2min
- Close installer page.
(releases usb for Python programming)



Python command line interface. (CLI)

- Python command line interface. Usage and setup .

```
pip3 install --upgrade pytap2  
pip3 install --upgrade meshtastic
```

- (again most of these radio setup steps can be also done on the Bluetooth connected phone App)
- The CLI instruction set is documented correctly under software. (other places there are some errors.)
- CLI help codes are useful - if typing in the wrong code.



Python command line interface. (CLI)



- Setting region: **meshtastic --set Lora.region US**
have to do this due to EU and N.A. frequency availability differences.
- Bluetooth setting - if your display is not working:
meshtastic --set bluetooth.mode NO_PIN
- Setting channel (use one line in command line):
**meshtastic --ch-set name "cfa_test1" --ch-set psk random
--ch-set uplink_enabled false --ch-index 2**
- Enable monitoring of remote hardware (ie read/write gpio pins.)
meshtastic --set --set remote_hardware.enabled true
- Reading remote hardware pin 4: set LoRa settings to shortfast when testing !!!
meshtastic --gpio-rd 0x10 --dest '!75ce6314'
Node is in hex and do not use double quotes on Mac and Linux , pin uses a Mesh to select the pin - mesh (**explain**)

Python command line interface. (CLI continued)

- Reading a pin using the mesh mask

```
GPIO:1 mask:0x2  
GPIO:2 mask:0x4  
GPIO:3 mask:0x8  
GPIO:4 mask:0x10  
GPIO:5 mask:0x20  
GPIO:6 mask:0x40  
GPIO:7 mask:0x80  
GPIO:8 mask:0x100  
GPIO:9 mask:0x200  
GPIO:10 mask:0x400  
GPIO:11 mask:0x800  
GPIO:12 mask:0x1000
```

```
GPIO:13 mask:0x2000  
GPIO:14 mask:0x4000  
GPIO:15 mask:0x8000  
GPIO:16 mask:0x10000  
GPIO:17 mask:0x20000  
GPIO:18 mask:0x40000  
GPIO:19 mask:0x80000  
GPIO:20 mask:0x100000  
GPIO:21 mask:0x200000  
GPIO:22 mask:0x400000  
GPIO:23 mask:0x800000  
GPIO:24 mask:0x1000000  
GPIO:25 mask:0x2000000  
GPIO:26 mask:0x4000000  
GPIO:27 mask:0x8000000
```

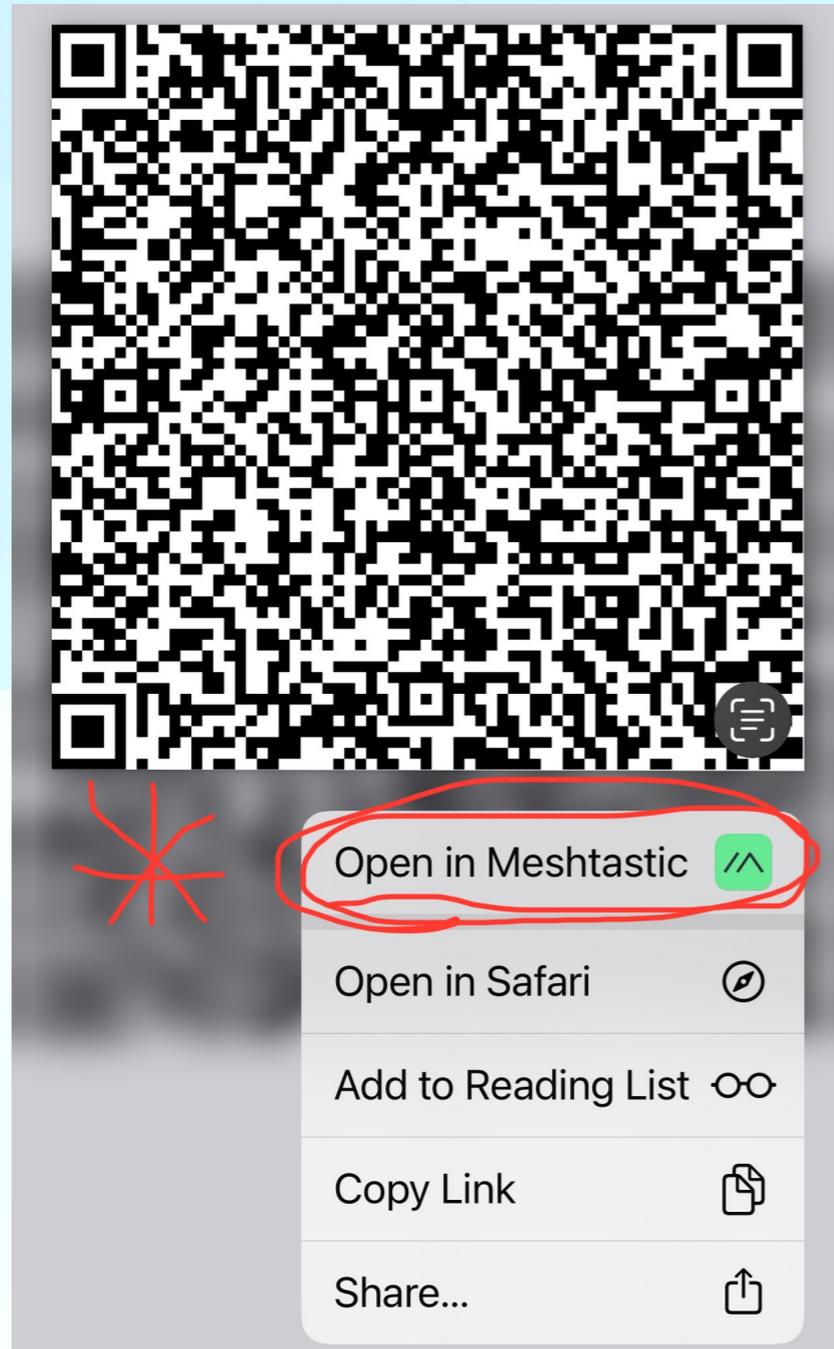


Python command line interface. (Continued)

- Remote gpio (reading and writing to pins needs a **gpio** channel set up)
- To remotely control a node you need an **admin** channel set up.
- With this you can set and read parameters off a remote node. (using `—get` and the `—set` commands) - ie node name changes, remote resets...)
- Once everything is set up you can use a QR code to transfer settings



Useful points



- My channel settings.

- Use QR code in app to transfer settings.



Useful points - cont.

- Do not plug in power before connecting the antenna. - can damage esp32
- A text to channel zero, goes to everyone on the network. (and so does motion sensor data!!!!)
- - https://www.laub-home.de/wiki/RTTTL_Songs.



Useful points - cont.

- Buzzer needs to be set in BOTH the device AND in the external notification settings...!!!
- Using PWM for buzzer **and** setting external notification pin high or low at the same time causes device shutdown(use one or the other)

Website, Laptop, CLI, hardware and app demonstrations.



Summary

- Cheap
- Very versatile
- Open source
- Can encrypt your channels
- Can use as a stand alone pair or have a Python USB monitoring program as demonstrated



Summary

- Show of radio units
- Final Demo
- Questions?????



My Python code to talk to CLI

```
# program reads pin 4 on remote node and prints out the result
import subprocess
command = "/Library/Frameworks/Python.framework/
Versions/3.12/bin/meshtastic --gpio-rd 0x10 --dest '!
75ce6314' "
output,error = subprocess.Popen(
    command, universal_newlines=True, shell=True,
    stdout=subprocess.PIPE,
    stderr=subprocess.PIPE).communicate()
print (output,error)
```



- If you get an error after installing: Python meshtastic CLI like below(I did!)

ModuleNotFoundError: No module named 'pkg_resources'

fix:

```
pip3 install --upgrade setuptools
```

Then everything worked.

(don't ask me why)

