

Basic Networking for Bitcoin & Lightning Node Workshop

BITCOIN THAILAND
CONFERENCE 2023



Topics



Node Software Installation



Basic Networking (IP, Tor, VPN)



Wallet App Connection to
Node



P2P Network for Node



Workshop #1 : Software Installation

Node Software

- Operating System – Ubuntu, Debian
- Bitcoin Software – Bitcoin Core, Bitcoin Knot
- Lightning Software – LND, Core Lightning, Éclair, LDK
- Tool/Utility Software – RTL, Thunderhub, Lightning Terminal, Electrs, LNDg, Mempool, Tor, Tailscale, BTC Pay Server, LNbits, BalanceOfSatoshi, Nginx etc.

Node Software Bundle/Helper



Citadel



Umbrel



Dojo



Install umbrelOS anywhere.

Raspberry Pi, homelab, VM, RockPro, NUC — you name it.

Install on a Raspberry Pi 4

Run umbrelOS on a Raspberry Pi 4 in just a few clicks. No technical skills required.

- ✓ **Raspberry Pi 4**
- ✓ **Storage drive**
- ✓ **Drive enclosure**
- ✓ **16GB+ microSD**
- ✓ **Power supply**
- ✓ **Ethernet cable**
- ✓ **Case**

How to install →



Install on anything that runs Linux

Run umbrelOS on Ubuntu or Debian on any hardware (or a VM on Mac or Windows) by running:

```
curl -L https://umbrel.sh | bash
```

Minimum requirements

Dual Core CPU

2GB RAM

1GB free space

Debian or Ubuntu OS

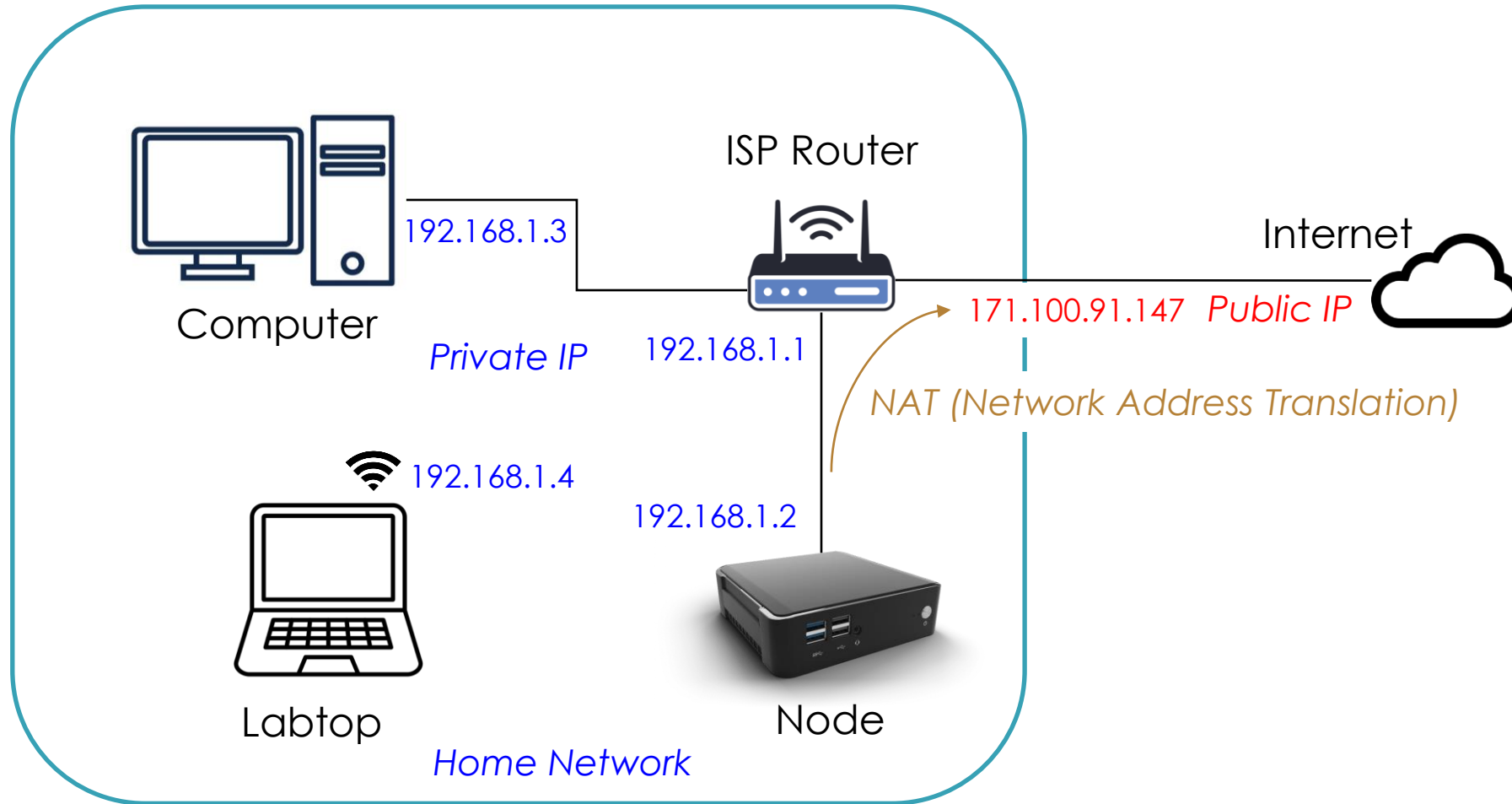


Workshop #2 : Basic Network LAN, Tor, Tailscale

Basic Home Networking

- What configuration that computer need to connect to internet?
 - IP Address e.g., 192.168.1.2
 - Netmask e.g., 255.255.255.0
 - Gateway e.g., 192.168.1.1
 - DNS e.g., 192.168.1.1
- All configuration automatically setting by DHCP Server

Home Network Example

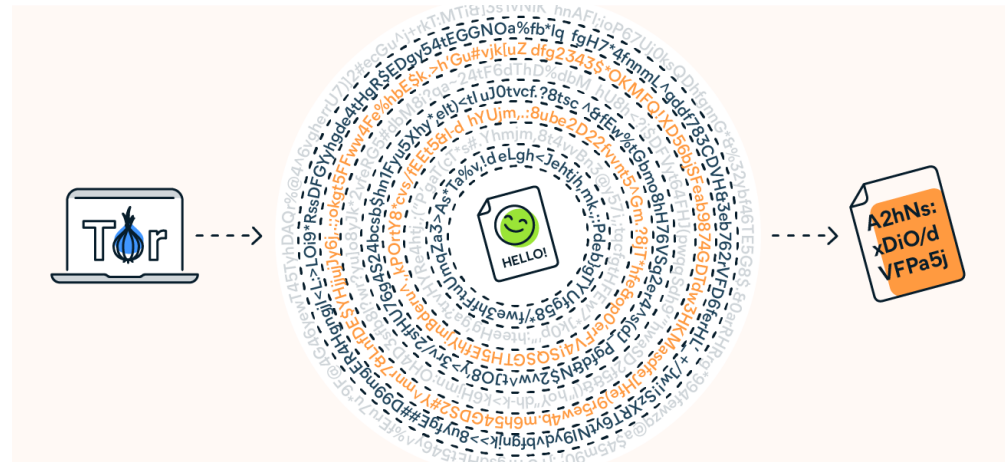


Private IP vs Public IP

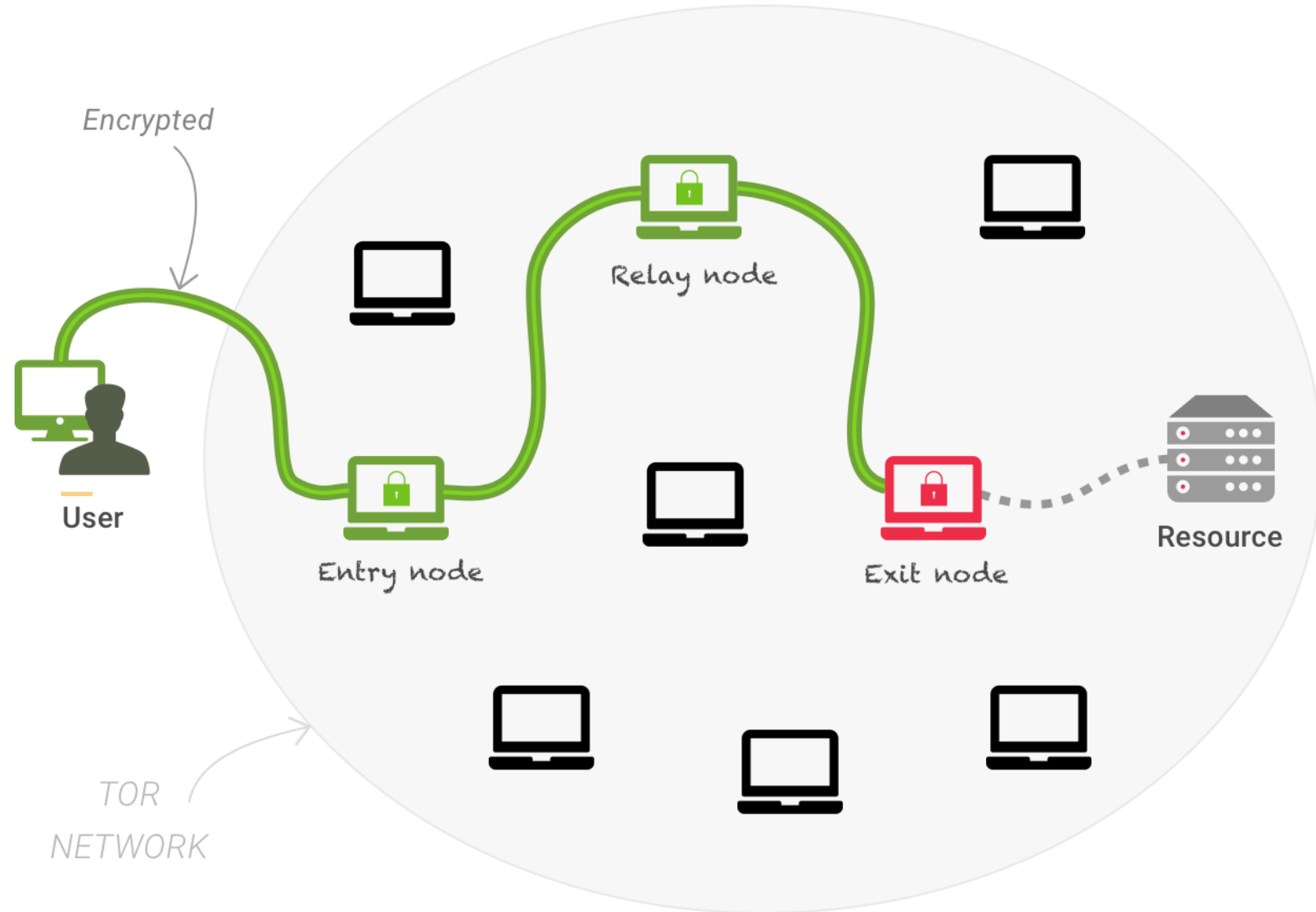
- Private IP : Non-internet facing IP addresses used in an internal network.
 - 192.168.0.0 to 192.168.255.255
 - 172.16.0.0 to 172.31.255.255
 - 10.0.0.0 to 10.255.255.255
- Public IP : an IP address that is reachable from the internet.
 - E.g., 171.100.91.147
 - Look up my public IP at <https://whatismyipaddress.com/>
 - Look up my public IP location at <https://www.iplocation.net/ip-lookup>
- No privacy for public IP

What is Tor Network?

- Tor (**T**he **O**nion **R**outer) is a network that anonymizes web traffic to provide truly private web browsing.
- Hides your IP address and browsing activity by redirecting web traffic through a series of different routers known as nodes.



How Tor Browser Work

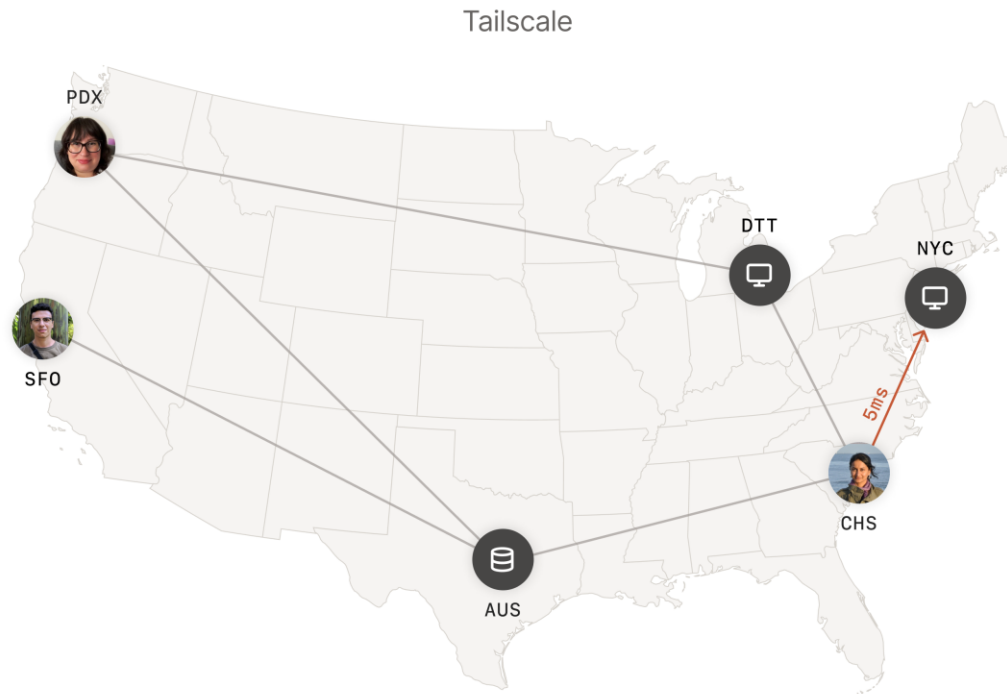


Onion Services

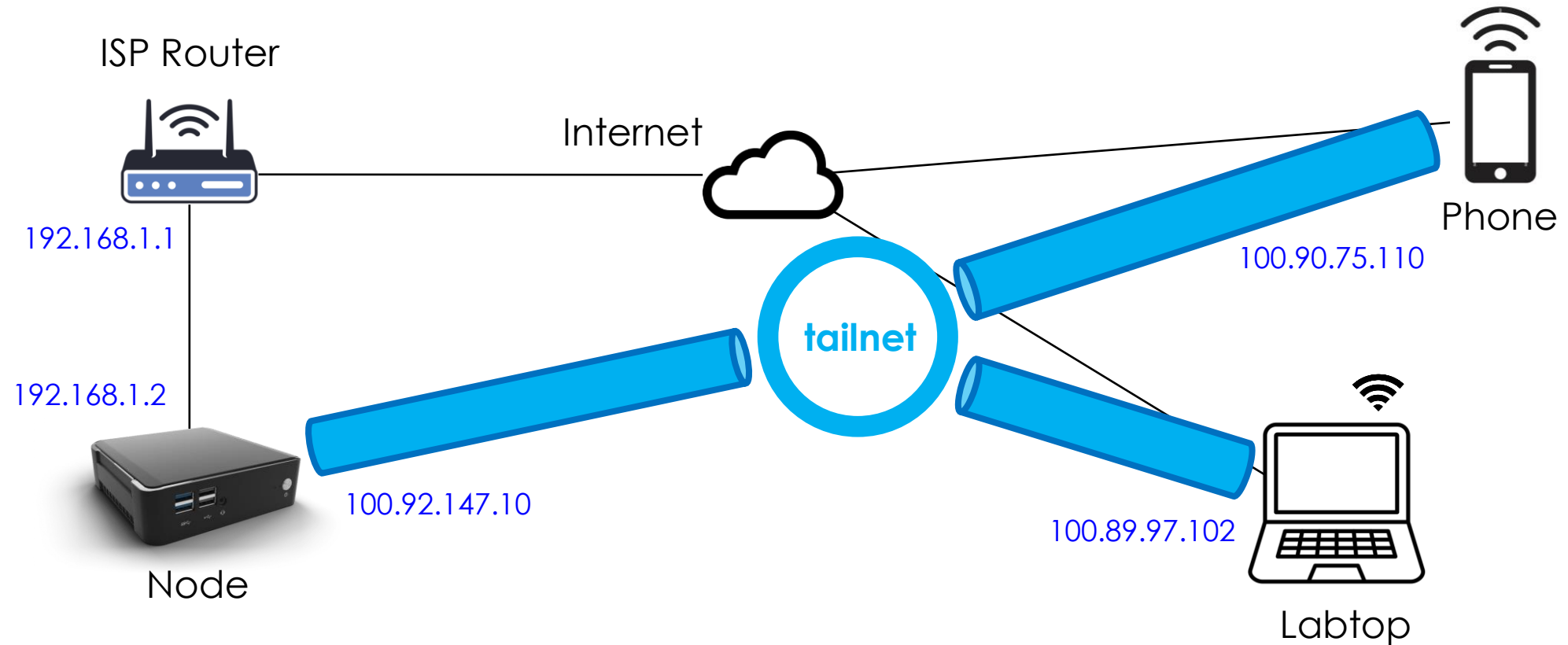
- Onion services (formerly known as "hidden services") are services (like websites) that are only accessible through the Tor network.
- Onion services' location and IP address are hidden
- All traffic between Tor users and onion services is end-to-end encrypted
- An onion address is a string of 56 letters and numbers, followed by ".onion".
 - E.g., <http://explorerzydxu5ecjrkwceayqybizmpjjznk5izmitf2modhcsuqlid.onion>
 - Onion address of <https://blockstream.info/>

VPN Solution : Tailscale

- VPN service that makes the devices and applications you own accessible anywhere in the world, securely and effortlessly.



Tailscale Network (Tailnet)



Setup Tailscale

- Step 1: Install tailscale - <https://tailscale.com/download/>
- Step 2: Login




Workshop #3 : Wallet Connection

Wallet Connection via Tailscale

- Connect to Bitcoin Core
 - Sparrow Wallet
- Connect to Electrs
 - Sparrow Wallet
 - Electrum Wallet
 - Nunchuk
 - Blue Wallet
- Connect to Lightning (LND)
 - Zeus Wallet

Wallet Connection to Bitcoin Core



● Running

Bitcoin Node

Bitcoin Core 25.0.0


+ CONNECT


...


Blockchain

Synchronized

Latest Blocks

Block 796,696
2,095 transactions

Block 796,695
6,028 transactions

Block 796,694
2,778 transactions

19 minutes ago

Blockchain Size

559 GB

Connect to Bitcoin Node

Connect any wallet that supports Bitcoin Core's RPC or P2P connection to your node using these details.



Select mode and network

RPC (Local Network)

Bitcoin Core RPC Username

umbrel

Bitcoin Core RPC Password

82Ps7Ry2GvRNCZQlp3G

Bitcoin Core RPC Address (Host)

nuc11.local

Bitcoin Core RPC Port

8332

Looking for step-by-step instructions to connect your wallet to your Bitcoin node? [Click here.](#)

Wallet Connection to Electrs



• Running

Electrs

0.9.10

100% Synchronized

Use the following details to connect your wallet or application to Electrs.



Local Network

Tor

ADDRESS

nuc11.local

PORT

50001

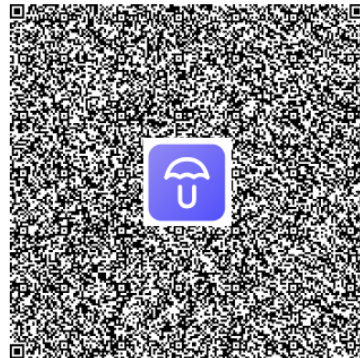
SSL

Disabled

Looking for step-by-step instructions to connect your wallet to Electrs? [Click here.](#)

Wallet Connection to Lightning

Connect a wallet to your node



Choose mode and network

REST (Local Network)

Host

nuc11.local

Port

8080

Macaroon

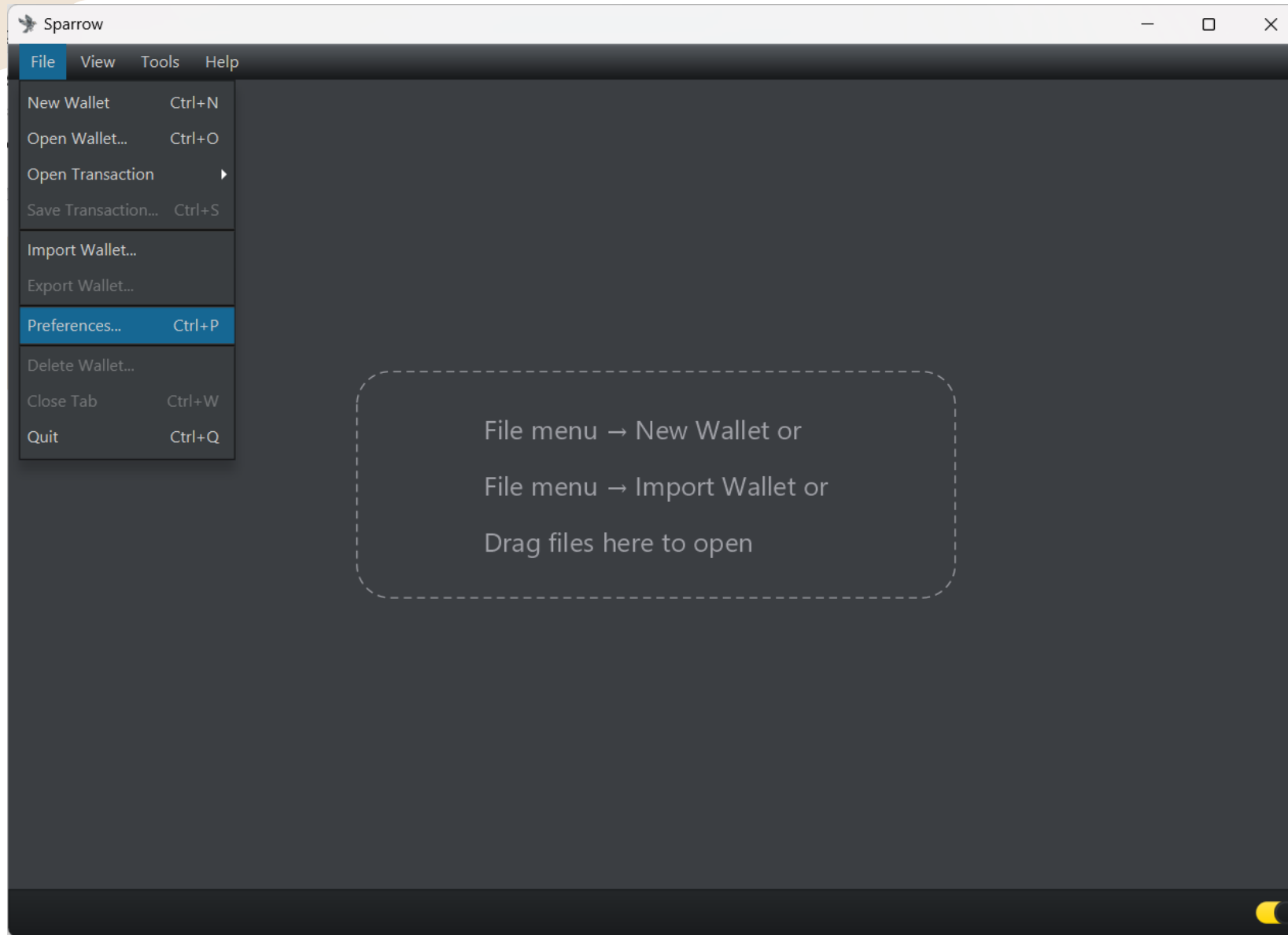
0201036c6e6402f80103

Indconnect URL

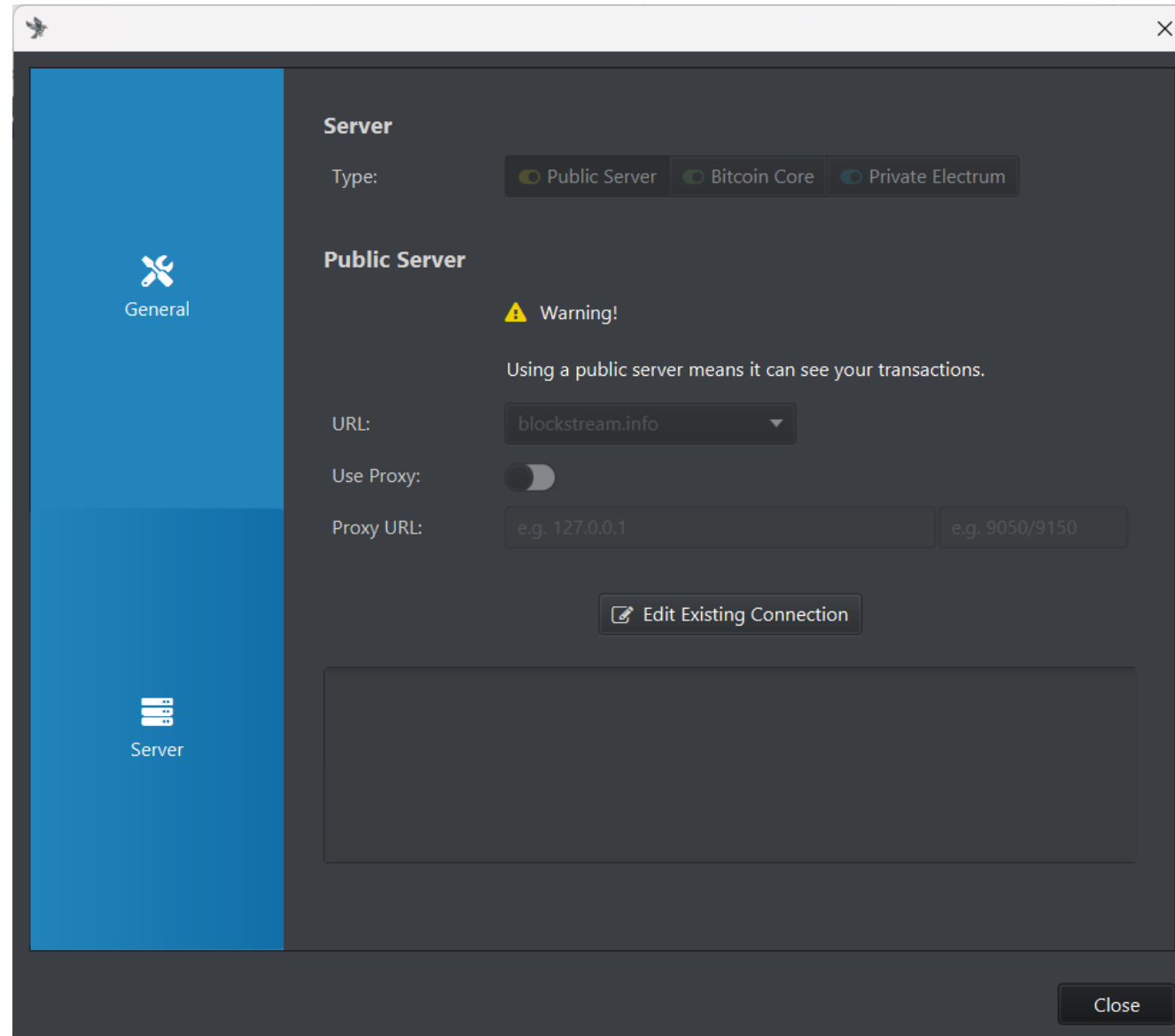
Indconnect://nuc11.local:

Looking for step-by-step instructions to connect your Lightning wallet to your node? [Click here](#)

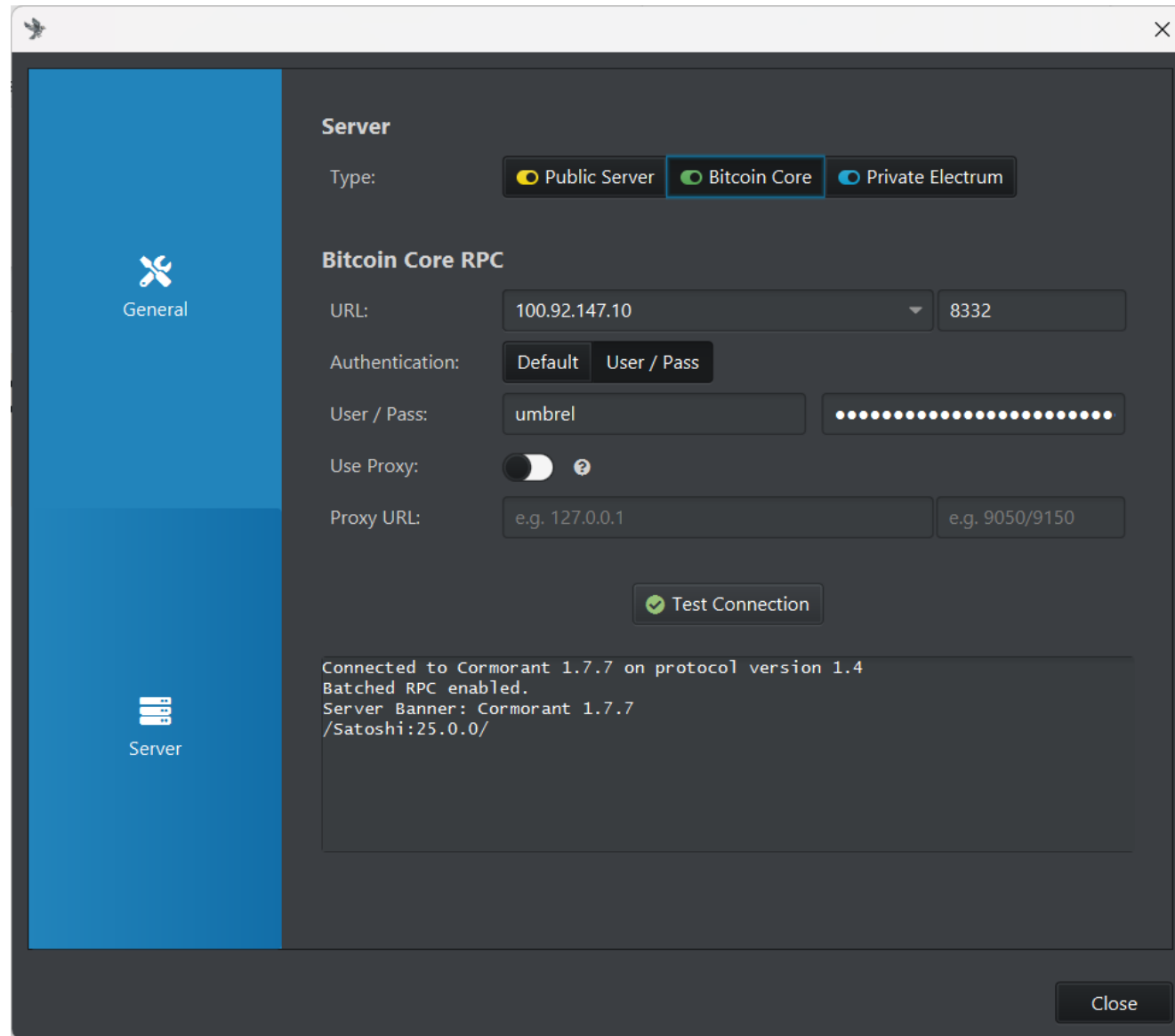
Sparrow Wallet – File → Preferences



Sparrow Wallet – Server → Edit Existing Connection



Sparrow Wallet – Connect to Bitcoin Core

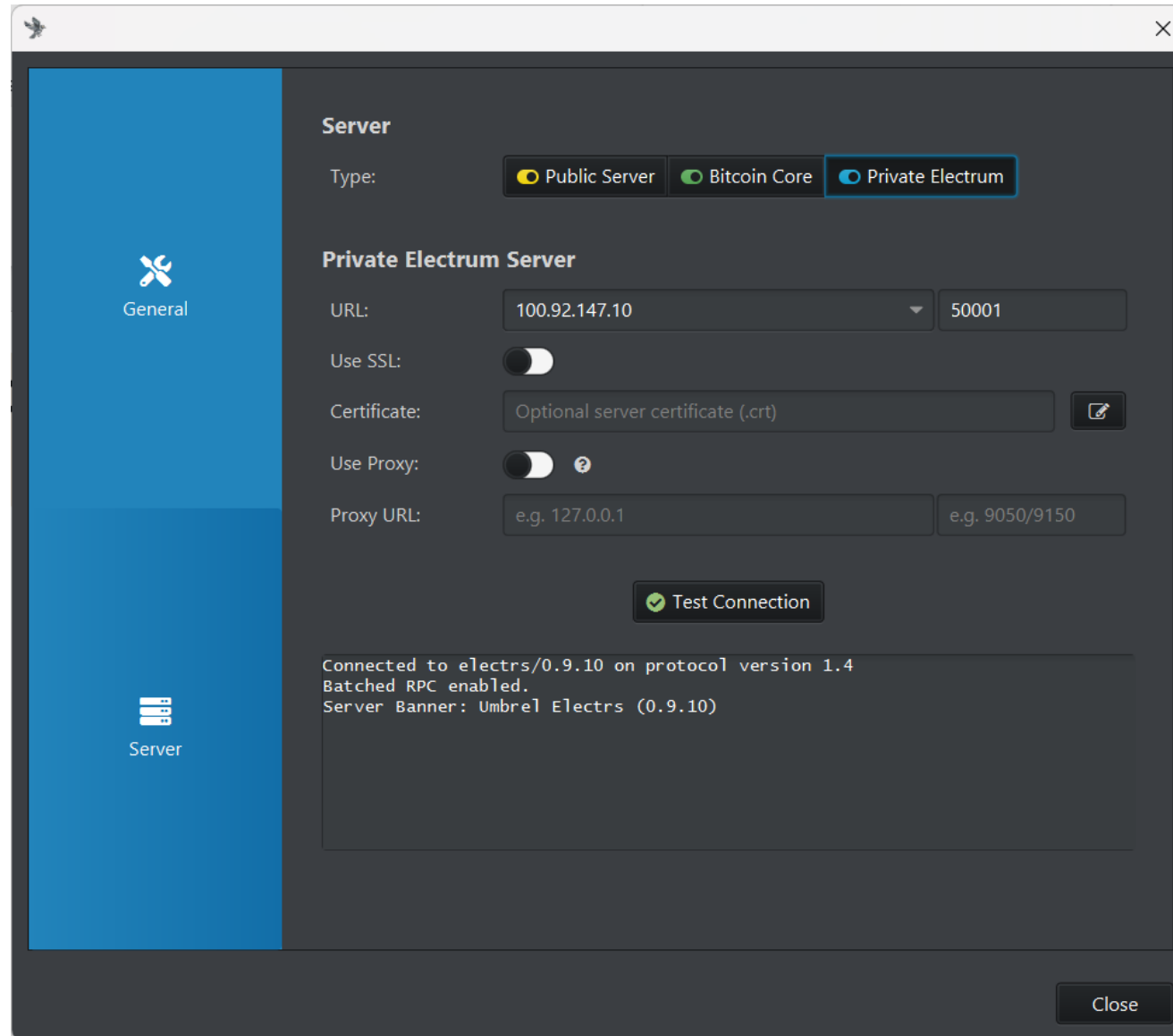


The image shows the Sparrow Wallet interface for configuring a Bitcoin Core RPC connection. The window has a dark grey background with a blue sidebar on the left. The sidebar contains two icons: a wrench and screwdriver labeled 'General' and a server rack labeled 'Server'. The main area is titled 'Server' and contains the following settings:

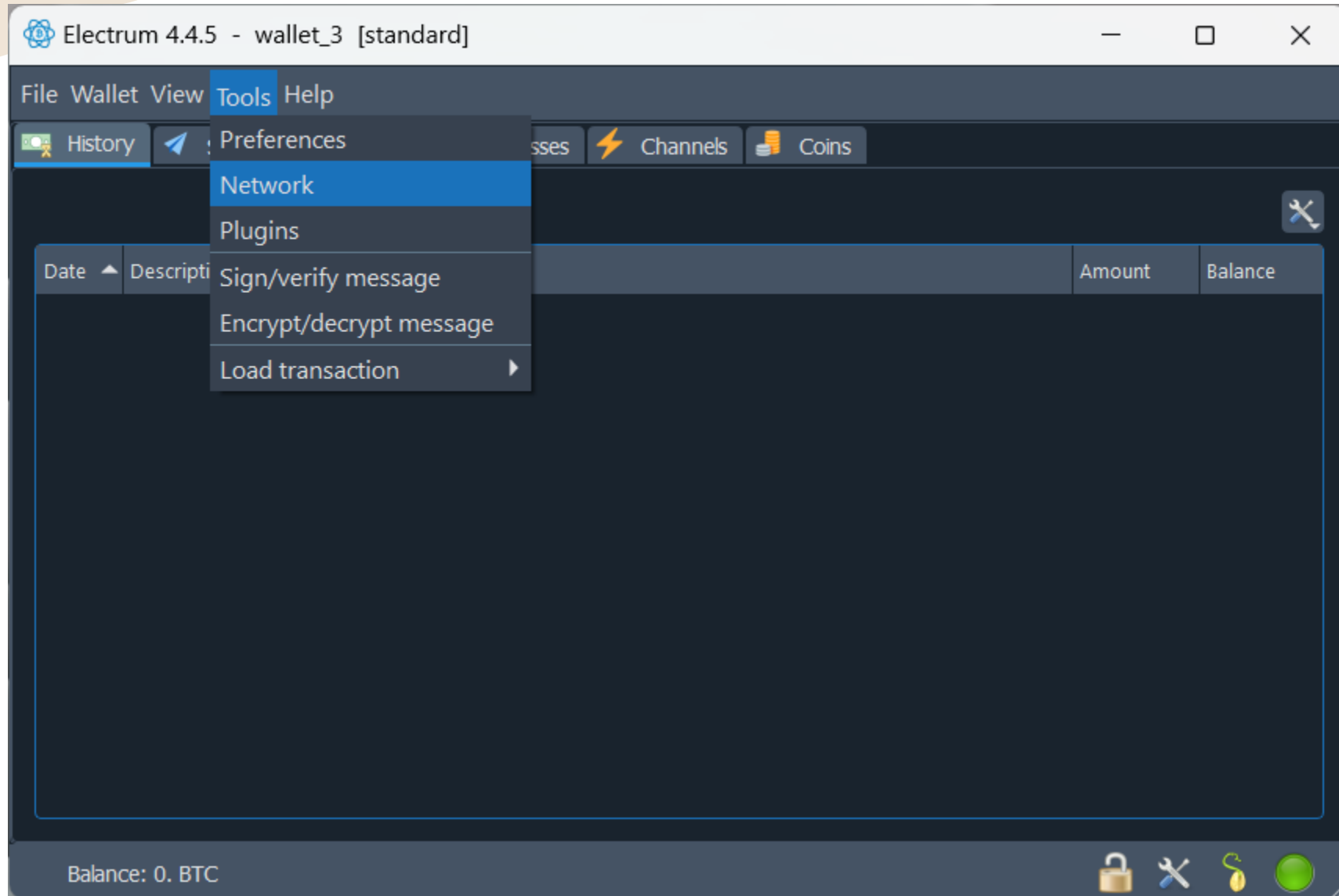
- Server Type:** Three radio buttons are present: 'Public Server' (unselected), 'Bitcoin Core' (selected and highlighted with a blue border), and 'Private Electrum' (unselected).
- Bitcoin Core RPC:**
 - URL:** A dropdown menu showing '100.92.147.10' and a text input field containing '8332'.
 - Authentication:** Two buttons: 'Default' (selected) and 'User / Pass'.
 - User / Pass:** A text input field containing 'umbrel' and a password field with 12 dots.
 - Use Proxy:** A toggle switch that is currently turned off, with a help icon (?) to its right.
 - Proxy URL:** Two text input fields. The first contains 'e.g. 127.0.0.1' and the second contains 'e.g. 9050/9150'.
- Test Connection:** A button with a green checkmark icon and the text 'Test Connection'.
- Status Log:** A text area displaying the following message:

```
Connected to Cormorant 1.7.7 on protocol version 1.4
Batched RPC enabled.
Server Banner: Cormorant 1.7.7
/Satoshi:25.0.0/
```
- Close:** A button in the bottom right corner.

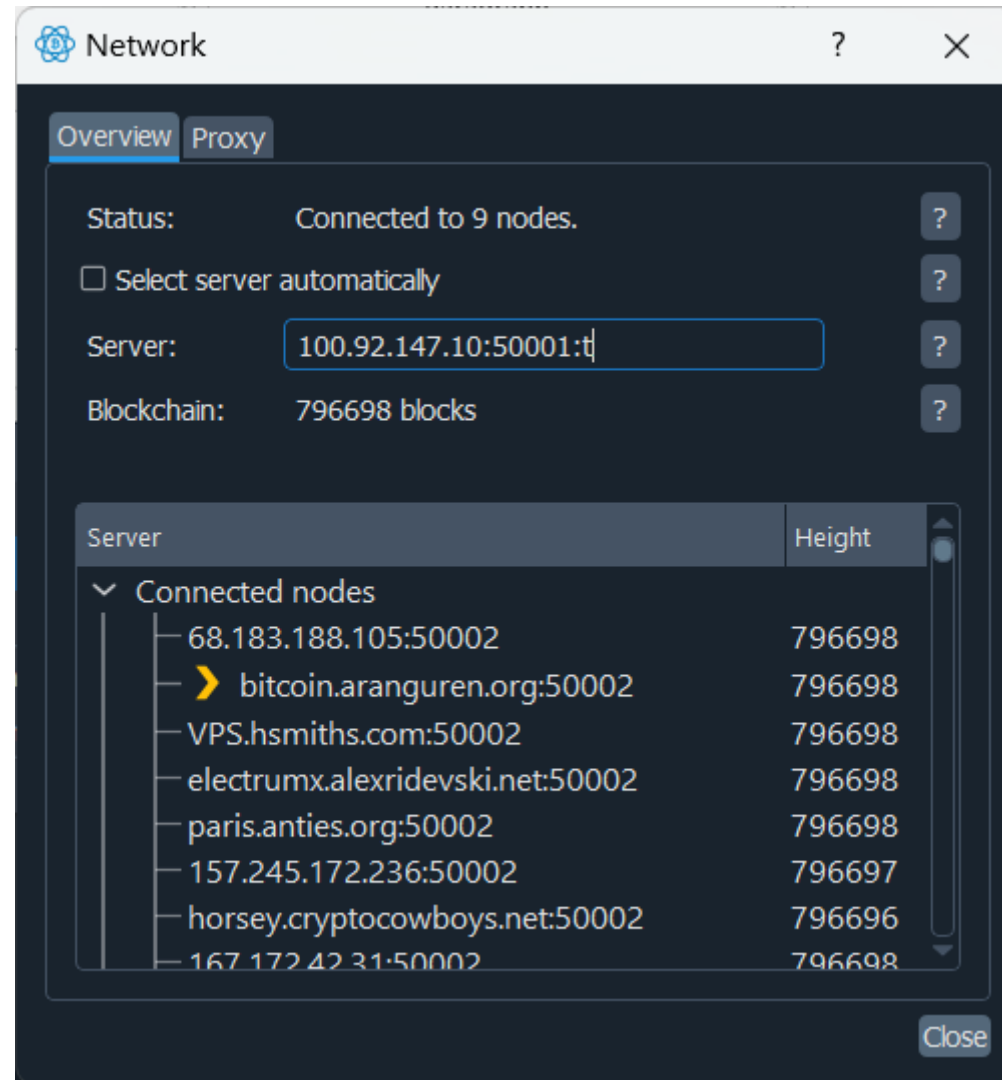
Sparrow Wallet – Connect to Electrum



Electrum Wallet – Tools → Network



Electrum Wallet – Change Server



Nunchuk – Change Server

← Network Setting

Connect to Electrum server ☒

Mainnet server

100.92.147.10:50001:t

☒

Reset

Testnet server

testnet.nunchuk.io:50001

☐

Signet server

signet.nunchuk.io:50002

☐

Save network settings

Reset to default network settings

Blue Wallet – Change Server

←

Electrum Server

Offline Mode

When enabled, your Bitcoin wallets will not attempt to fetch balances or transactions.

Status

Connected

mainnet.foundationdevices.com:50002

100.92.147.10

50001

Use SSL

Leave blank to use the default.

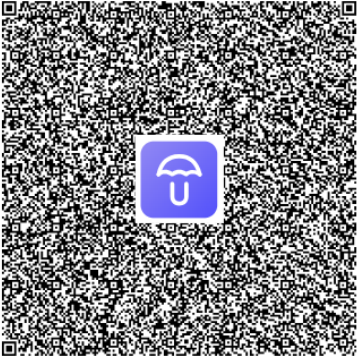
Reset to default

Save

Scan or import a file

Zeus Wallet – Scan QR

Connect a wallet to your node



Choose mode and network

REST (Local Network)

Host	Port
nuc11.local	8080
Macaroon	Indconnect URL
0201036c6e6402f80103	Indconnect://nuc11.local:

Looking for step-by-step instructions to connect your Lightning wallet to your node? [Click here](#)

Node Configuration

Nickname (optional)

Lightning

Node interface

LND (REST)

Host

https://100.92.147.10

Macaroon (Hex format)

0201036C6E6402F801030A10659E

REST Port

8080

Use Tor

Certificate Verification

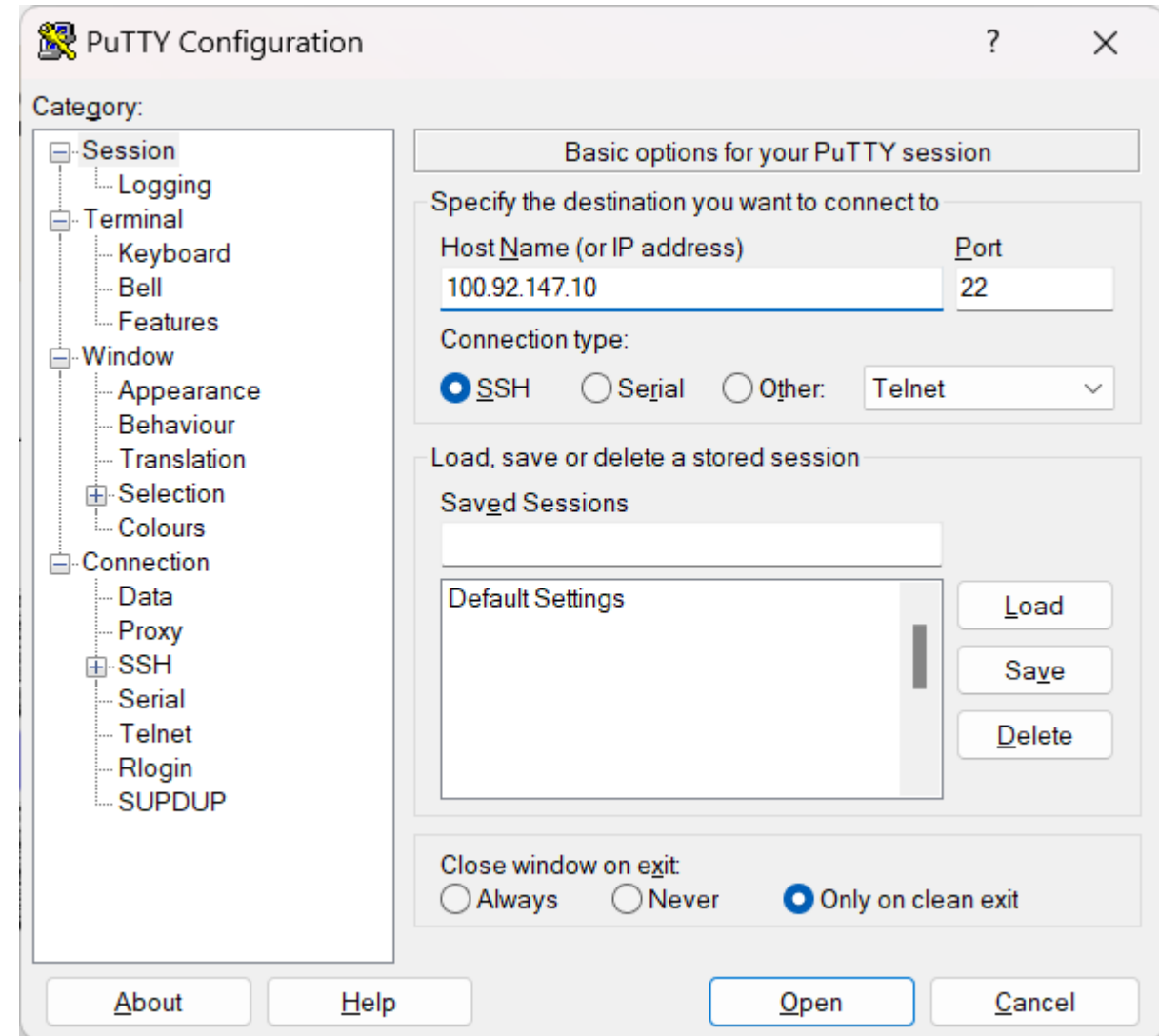
SAVE NODE CONFIG



Workshop #4 : P2P Network

Secure Shell (SSH) for Command Line

- Download putty from <https://www.putty.org/>
- Fill IP Address and enter
- Default Password for Umbrel: moneyprintergerbrrr



Basic Command for Bitcoin Core

- **bitcoin-cli** → `sudo ~/umbrel/scripts/app compose bitcoin exec bitcoind bitcoin-cli`
- **Show Bitcoin Core Basic Information**
 - `sudo ~/umbrel/scripts/app compose bitcoin exec bitcoind bitcoin-cli -getinfo`
- **Show Bitcoin Core Network Information**
 - `sudo ~/umbrel/scripts/app compose bitcoin exec bitcoind bitcoin-cli getnetworkinfo`
- **Show Bitcoin Core Blockchain Information**
 - `sudo ~/umbrel/scripts/app compose bitcoin exec bitcoind bitcoin-cli getblockchaininfo`
- **Configuration File Location**
 - `~/umbrel/app-data/bitcoin/data/bitcoin/bitcoin.conf`
- **Log File Location**
 - `~/umbrel/app-data/bitcoin/data/bitcoin/debug.log`

Basic Command for Lightning (LND)



- Incl → `sudo ~/umbrel/scripts/app compose lightning exec lnd Incl`
- Show LND Basic Information
 - `sudo ~/umbrel/scripts/app compose lightning exec lnd Incl getinfo`
- Show LND Peer Connection
 - `sudo ~/umbrel/scripts/app compose lightning exec lnd Incl listpeers`
- Show LND Channel Information
 - `sudo ~/umbrel/scripts/app compose lightning exec lnd Incl listchannels`
- Configuration File Location
 - `~/umbrel/app-data/lightning/data/lnd/lnd.conf`
- Log File Location
 - `~/umbrel/app-data/lightning/data/lnd/logs/bitcoin/mainnet/lnd.log`

Basic Command for Core Lightning (CLN)



- **lightning-cli** → `sudo ~/umbrel/scripts/app compose core-lightning exec lightningd lightning-cli`
- Show CLN Basic Information
 - `sudo ~/umbrel/scripts/app compose core-lightning exec lightningd lightning-cli getinfo`
- Show CLN Peer Connection
 - `sudo ~/umbrel/scripts/app compose core-lightning exec lightningd lightning-cli listpeers`
- Show CLN Channel Information
 - `sudo ~/umbrel/scripts/app compose core-lightning exec lightningd lightning-cli listchannels`
- Configuration File Location
 - `~/umbrel/app-data/core-lightning/data/lightningd/????`
- Log File Location
 - `~/umbrel/app-data/core-lightning/data/lightningd/????`

P2P Connection

- Bitcoin Core (Tor)

- Address: y5vggov7rsvb42vr3fa4q6ai2r43yinaljs47qi23js7jgg2vbwemhqd.onion
- Port: 8333
- Check at <https://bitnodes.io/>

- LND (Tor)

- ID (pubkey) :
022d83fe426975bf52b0ada5345cbd4fad6d0c59d50addf95bddc068e2529ac249
- Address: 4dcvf3fzxj2cuv4jeg2ek4uhjdehcxp7kw4wcwwj45rzciedwhfbqlid.onion
- Port: 9735
- [ID] @ [Address] : [Port]
- 022d83fe426975bf52b0ada5345cbd4fad6d0c59d50addf95bddc068e2529ac249@4dcvf3fzxj2cuv4jeg2ek4uhjdehcxp7kw4wcwwj45rzciedwhfbqlid.onion:9735
- Check at <https://1ml.com/> , <https://amboss.space/>

Clearn (Advanced)





Thank You