

AREDN Setup

V2.2

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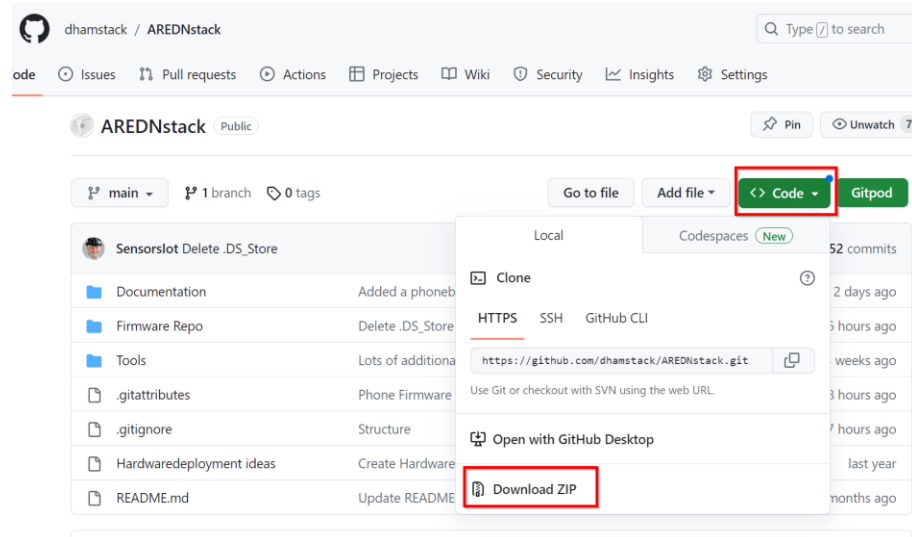
Content

| | |
|--------------------------------------------------------------------|----|
| Preparation | 3 |
| Yealink Phones | 5 |
| Flash the Phone..... | 5 |
| Phone Setup..... | 6 |
| Standard phone book..... | 10 |
| Backup phonebook (with full mesh address)..... | 10 |
| Flash Mikrotik devices..... | 12 |
| Preparations..... | 12 |
| Change PC to a fixed IP address..... | 12 |
| Flash rb.elf to target device | 14 |
| Flash AREDN Firmware | 16 |
| Configure AREDN | 17 |
| My recommended settings for the hap routers (for the moment) | 18 |
| Make your telephone visible to the network | 19 |
| Set up a tunnel to the AREDN network..... | 20 |
| Install the Phonebook | 23 |
| Principle of operation | 23 |
| Installation | 24 |
| Troubleshooting:..... | 25 |
| Is the phonebook downloaded? | 25 |
| Config file (only for experts) | 25 |
| Using a PBX in parallel..... | 26 |
| Attachments..... | 32 |
| Google Sheets replication | 32 |

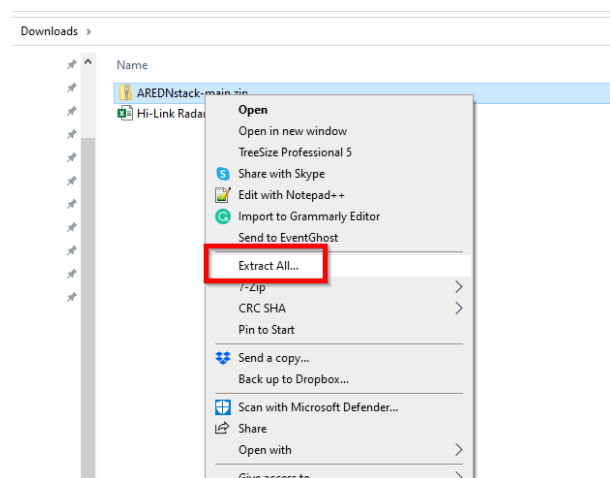
Preparation

You can find all relevant files on GitHub (<https://github.com/dhamstack/AREDNstack>)

Press "code" and "Download ZIP". The file is quite big (>500M):



Extract the ZIP file:



Now you should have all needed files in your Downloads/AREDNstack-main/ folder:

Downloads > AREDNstack-main > AREDNstack-main

| Name | Date modified | Type | Size |
|--------------------------|------------------|---------------|------|
| Documentation | 20.09.2023 15:32 | File folder | |
| Firmware Repo | 20.09.2023 15:32 | File folder | |
| Tools | 20.09.2023 15:32 | File folder | |
| Hardwaredeployment ideas | 20.09.2023 15:32 | File | 1 KB |
| README.md | 20.09.2023 15:32 | MD File | 2 KB |
| .gitattributes | 20.09.2023 15:32 | Text Document | 1 KB |
| .gitignore | 20.09.2023 15:32 | Text Document | 1 KB |

Here you find firmware for our typical phones to flash with "free" firmware (not connected to a provider).

| Name | Date modified | Type |
|-----------------------------|------------------|-------------|
| ConfigManager 2.0.0.17(V86) | 20.09.2023 15:32 | File folder |
| T41P | 20.09.2023 15:32 | File folder |
| T41S | 20.09.2023 15:32 | File folder |
| T42 | 20.09.2023 15:32 | File folder |
| T46G | 20.09.2023 15:32 | File folder |
| T46S | 20.09.2023 15:32 | File folder |
| T48G | 20.09.2023 15:32 | File folder |
| T48S | 20.09.2023 15:32 | File folder |
| T58A | 20.09.2023 15:32 | File folder |

Yealink Phones

Flash the Phone

This is not always needed. Try first without this step and return if needed. Continue with “Phone Setup”.

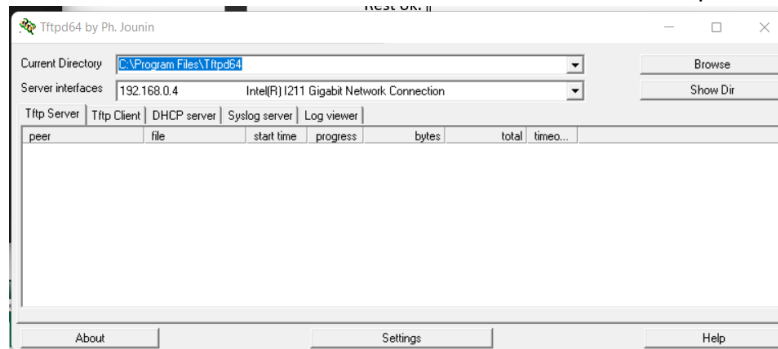
1. Download and unzip tftpd64.464.zip (the "run", not the setup version)
(<https://bitbucket.org/phjounin/tftpd64/downloads/>)
2. Disconnect your computer from Wi-Fi and Ethernet and set a fixed IP address (e.g., 192.168.0.4)
3. Start tftpd64.exe
4. Click the browse button to locate the TFTP root directory

AREDNstack-main > AREDNstack-main > Firmware Repo > Yealink phones Firmware > T46G

| Name | Date modified | Type | Size |
|----------|------------------|----------|-----------|
| T46.bin | 20.09.2023 15:32 | BIN File | 1'710 KB |
| T46.rfs | 20.09.2023 15:32 | RFS File | 8'192 KB |
| T46.rom | 20.09.2023 15:32 | ROM File | 23'065 KB |
| T46G.cfg | 20.09.2023 15:32 | CFG File | 2 KB |

You should be able to see the files your phone will request during flashing.

5. Select the local IP address from the "Server Interface" drop-down menu.



If you do not find your fixed IP, something is wrong, and you must start over.

6. Connect the SIP phone to the PC with an Ethernet cable. Use the “Internet” socket on the telephone. Use the “Internet” socket on the telephone
7. Power the Yealink with the speaker button pressed until you see a selection(TFTP or USB) or the below screen. Press 1 for TFTP if presented.
8. Fill in the fields as shown. Make sure you use a free IP address for the telephone (e.g., 192.168.0.230):

| |
|--------------------------------------------------------------------------------------------------|
| IP Addr: 192.168.0.230 Netmask: 255.255.255.0 Gateway: 192.168.0.1 TFTP IP: 192.168.0.4 |
|--------------------------------------------------------------------------------------------------|

9. Hit enter (OK) and wait. The display on the phone shows “Start Updating...”. You should see in the tftpd64 window on the PC that the phone fetches files from your computer.

10. As soon as all files have been read from the PC, the phone will automatically restart. However, this can take a few minutes. As soon as the phone displays a display again (e.g. "Obtaining IP address...") carry out the following step
11. Hold down the OK button until the message "Reset to factory setting?" appears. Confirm this message with the »OK« key. The message "Resetting to factory setting, please wait" appears, and then the welcome screen appears.
12. Remove power from the phone
13. The flashing of the SIP phone is now finished, and the phone is now ready for settings for the AREDN mesh.
14. Connect the phone to your hap router (port 2-4) and to power. After booting, go to the "About" menu on your phone to find the IP address.





Now, you are ready for the next step.

Phone Setup

Attention: Does not work with T42 phones. The entries must be made manually (see Checks)

With the firmware for your phone, you also find a file with the extension .cfg.

AREDNstack-main > AREDNstack-main > Firmware Repo > Yealink phones Firmware > T46G

| Name | Date modified | Type | Size |
|----------------------------------------------------------------------------------------------|------------------|----------|-----------|
|  T46.bin | 20.09.2023 15:32 | BIN File | 1'710 KB |
|  T46.rfs | 20.09.2023 15:32 | RFS File | 8'192 KB |
|  T46.rom | 20.09.2023 15:32 | ROM File | 23'065 KB |
|  T46G.cfg | 20.09.2023 15:32 | CFG File | 2 KB |

Edit this file and replace XXXXXX with the phone number you want for your phone. You can change the language by placing the # in the right place.

```

#!version:1.0.0.1

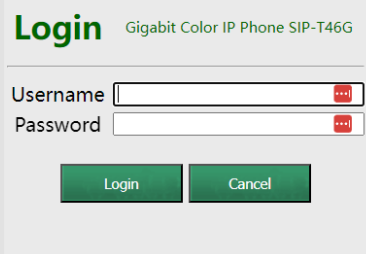
### This file is the exported MAC-all.cfg.

### For security, the following parameters with password haven't been display in this file.
account.1.password = admin
account.1.enable = 1
account.1.label = SOP
account.1.display name = Test
account.1.user_name = XXXXXX
account.1.auth_name = XXXXXX
account.1.sip_server.1.address = localnode.local.mesh
features.remote_phonebook.flash_time = 3600
features.remote_phonebook.enable = 1
features.relog_offtime = 999
lang.gui = German
#lang.gui = French
#lang.gui = English
account.1.codec.pcmu.priority = 3
account.1.codec.pcma.priority = 4
account.1.codec.g729.priority = 1
account.1.codec.g722.priority = 2
local_time.time_zone = +1
local_time.time_zone_name = Germany(Berlin)
local_time.ntp_server1 = ch.pool.ntp.org
local_time.dhcp_time = 1
local_time.date_format = 1
local_time.manual_ntp_srv_prior = 1
### Static Configuration ###
static.auto_provision.power_on = 0
static.auto_provision.pnp_enable = 0
static.auto_provision.dhcp_option_enable = 0
static.network.dhcp_host_name = XXXXXX
remote_phonebook.data.1.url = http://localnode.local.mesh/arednstack/phonebook\_generic\_direct.xml
remote_phonebook.display_name = AREDN
remote_phonebook.data.1.name = Direct
remote_phonebook.data.2.url = http://localnode.local.mesh/arednstack/phonebook\_generic\_pbx.xml
remote_phonebook.data.2.name = PBX
features.remote_phonebook.enable = 1
features.direct_ip_call_enable = 1
#directory_setting.url = http://localnode.local.mesh/arednstack/favorite\_setting.xml
#super_search.url = http://localnode.local.mesh/arednstack/super\_search.xml
#super_search.recent_call = 1
#security.var_enable = 1
#web_item_level.url = http://localnode.local.mesh/AREDNstack/WebItemsLevel.cfg

```

Replace the display.name if you want. Save it.

Go to a browser, type the IP address of your phone into the address, and login using admin/admin.



Login Gigaset Color IP Phone SIP-T46G

Username

Password

Change your password if you want.

Now go to Settings → Configuration.

The screenshot shows the Yealink T46G web interface. The top navigation bar includes 'Status', 'Account', 'Network', 'Dsskey', 'Features', 'Settings' (selected), 'Directory', and 'Security'. A warning message states: 'Default password is in use. Please change!'. The left sidebar lists various settings categories: Preference, Time&Date, Call Display, Upgrade, Auto Provision, Configuration (selected), Dial Plan, Voice, Ring, Tones, Softkey Layout, TR069, Voice Monitoring, SIP, and Power Saving. The main content area is titled 'Configuration' and contains several sections: 'Export or Import Configuration' with 'Import' and 'Export' buttons; 'Export CFG Configuration File' with a dropdown set to 'Static Settings' and an 'Export' button; 'Import CFG Configuration File' (highlighted in yellow) with a 'No selected file' dropdown, a 'Browse...' button, and 'Import' and 'Cancel' buttons; 'Pcap Type' set to 'Enhanced'; 'Pcap Feature' with 'Start' and 'Stop' buttons; 'Local Log' section with 'Enable Local Log' set to 'Enabled', 'Local Log Level' set to '3', 'Max Log File Size (256-2048KB)' set to '1024', and an 'Export Local Log' button; and 'Syslog' section with 'Enable Syslog' set to 'Disabled' and a 'Syslog Server' field. A 'NOTE' box on the right explains that IP phones can provide feedback in various forms (log files, packets, status indicators) to help administrators find and fix system problems. It also lists 'Log Files', 'Capturing Packets', and 'Configuration File (*.cfg/*.bin)' and provides a link to get more product documents.

Go to "Import CFG configuration file and browse to the Txx.cfg file you edited before. Hit "Import" and wait till the phone rebooted.

Checks

Has to be entered manually for T42

SIP Server and your phone numbers have to be correct

Yealink T48S

Log Out English (English)

These users (admin,user) are using the default password, please change the password!

Account

Register

Basic

Codec

Advanced

Account1

Register status: Registered

Line Active: Enabled

Label: SOP

Display Name: Portable

Register Name: 441531

Username: 441531

Password: *****

SIP Server 1

Server Host: localnode.local.mesh Port: 5060

Transport: UDP

Server Expires: 3600

Server Retry Counts: 3

SIP Server 2

Server Host: Port: 5060

Transport: UDP

Server Expires: 3600

Server Retry Counts: 3

Enable Outbound Proxy Server: Disabled

Outbound Proxy Server 1: Port: 5060

Outbound Proxy Server 2: Port: 5060

Proxy Fallback Interval: 3600

NAT: Disabled

Confirm Cancel

NOTE

Account Registration
Register account (s) for the IP phone.

Server Redundancy
It is often required in VoIP development to ensure service continuity, for events where the server needs to be taken offline for maintenance, or for events when the connection between the IP phone and the server fails.

NAT Traversal
A computer networking technique of establishing and maintaining Internet protocol connections across gateways that implement NAT.

You can configure NAT traversal for this account.

Click here to get more product documents.

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Check if your phone is enabled for IP telephony:

Yealink T48S

Log Out English (English)

These users (admin,user) are using the default password, please change the password!

Features

Forward & DND

General Information

Audio

Intercom

General Information

Call Waiting: Enabled

Call Waiting On Code:

Call Waiting Off Code:

Auto Redial: Disabled

Send Pound Key: Disabled

Fwd International: Enabled

Diversion/History-Info: Enabled

BLF LED Mode: 0

Auto Logout Time (1-1000min): 999

Call Number Filter:

Accept SIP Trust Server Only: Disabled

Allow IP Call: Enabled

IP Direct Auto Answer: Disabled

Call List Show Number: Name

Voice Mail Tone: Enabled

DHCP Hostname: 441531

Reboot in Talking: Disabled

Hide Feature Access Codes: Disabled

Display Method on Dialing: Username

Auto Linekeys: Disabled

Confirm Cancel

NOTE

Call Waiting
It allows IP phones to receive a new incoming call when there is already an active call.

Auto Redial
It allows IP phones to automatically redial in the event of a failed call.

Go to Directory → Remote Phone Book and check if the remote phone book screen looks like that:

The two phonebooks for copy-paste (**only if they are not here**):

Standard phone book:

<http://localnode.local.mesh:8081/phonebook?format=PBX&target=generic&ia=true>

This file only stores the telephone number. The PBX knows this number anyway, and the SIP server in the phonebook program automatically creates the mesh address for direct calling.

Backup phonebook (with full mesh address):

If you want to store the full mesh address as a backup on your phone, you can add the second line. It is not needed.

<http://localnode.local.mesh:8081/phonebook?format=direct&target=generic&ia=true>

Go to Directory → Check or adjust fields. They should look like that:

Press “Confirm”

Now, you should see a small phone in your phone's display that shows it is ready for the AREDN network. You should also see a "direct" and "PBX" folder if you press the "Directory" button on your phone.

If your Mikrotik router already works with AREDN, you can skip the next step and install the phonebook.
If not, continue with the next chapter.

Flash Mikrotik devices

Preparations

The small Mikrotik hap ac-lite/ac3 box or square Access PointSXTsq (AP) will hereafter be referred to as "target devices." **Green are the notes for the AP.**

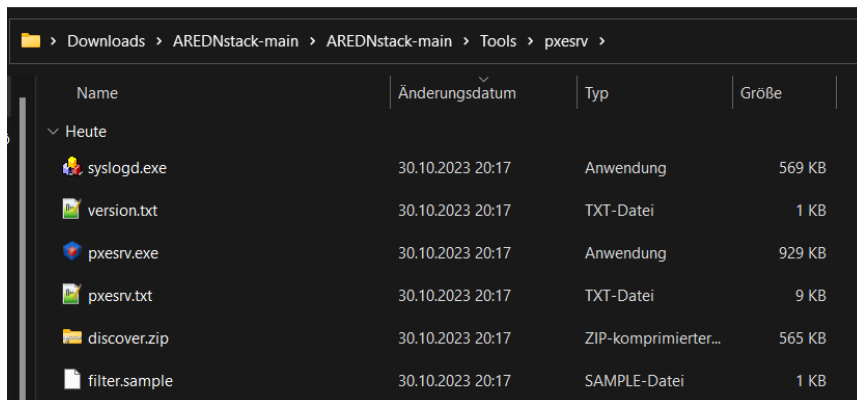
Download the "kernel" and "sysupdate" files for your device. **Every letter in the name counts!**

<https://downloads.arednmesh.org/afs/www/>

Rename the kernel bin file file to rb.elf.

Download the Tiny PXE Server (<http://erwan.labalec.fr/tinypxeserver/pxesrv.zip>) and unpack it to a convenient directory.

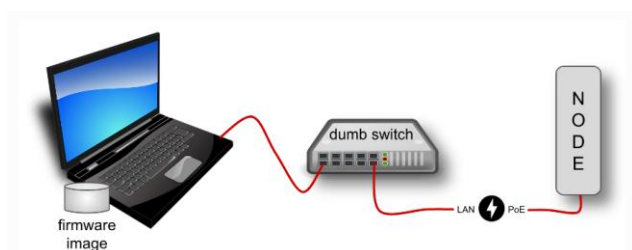
Go to the Tiny PXE Server directory:



| Name | Änderungsdatum | Typ | Größe |
|---------------|------------------|----------------------|--------|
| Heute | | | |
| syslogd.exe | 30.10.2023 20:17 | Anwendung | 569 KB |
| version.txt | 30.10.2023 20:17 | TXT-Datei | 1 KB |
| pxesrv.exe | 30.10.2023 20:17 | Anwendung | 929 KB |
| pxesrv.txt | 30.10.2023 20:17 | TXT-Datei | 9 KB |
| discover.zip | 30.10.2023 20:17 | ZIP-komprimierter... | 565 KB |
| filter.sample | 30.10.2023 20:17 | SAMPLE-Datei | 1 KB |

And copy the rb.elf file from before to the «Files» folder of the PXE server (overwrite if necessary).

Connect your target device to a switch as shown below (connect the LAN cable to the "internet" port of the hap router):



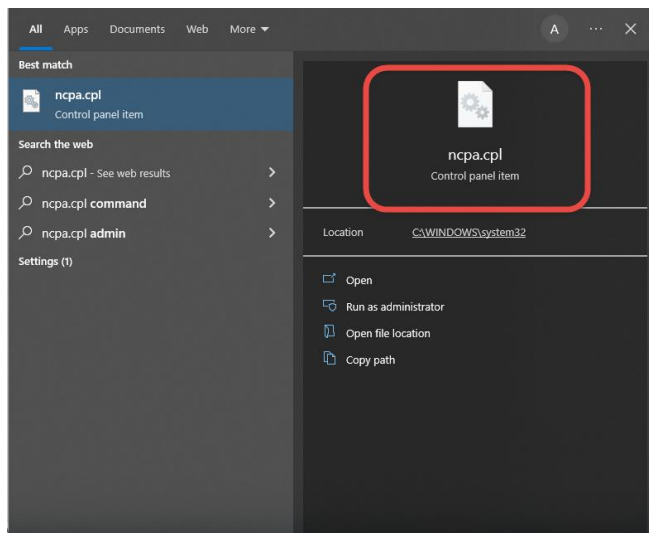
Deactivate Wi-Fi on the PC and supply power to the dumb switch.

Change PC to a fixed IP address

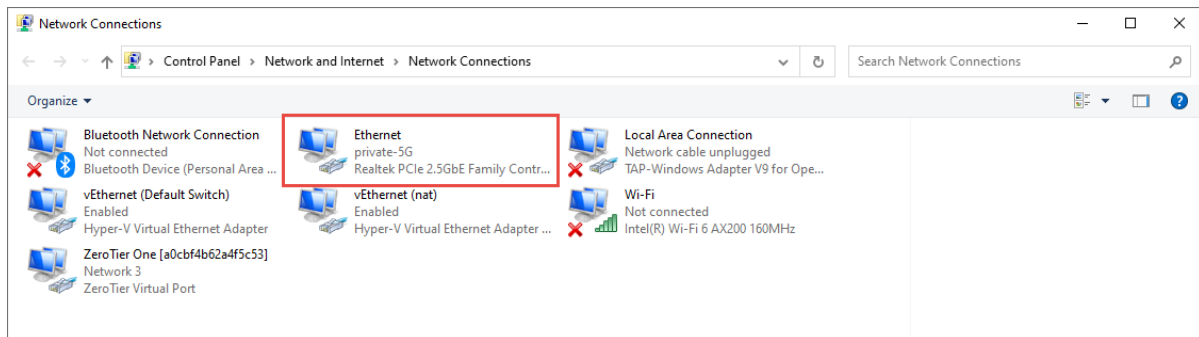
Type

ncpa.cpl

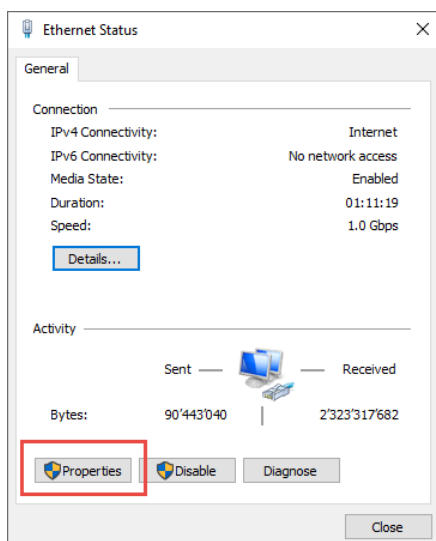
into Windows search



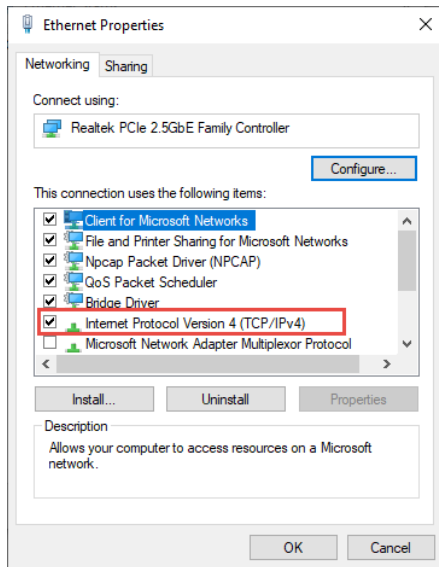
Select "Ethernet"



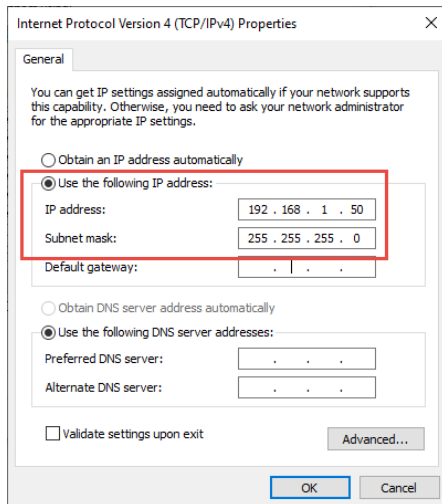
Select «Properties»:



Select IPV4:



Input IP address 192.168.1.50:



Press OK and Close

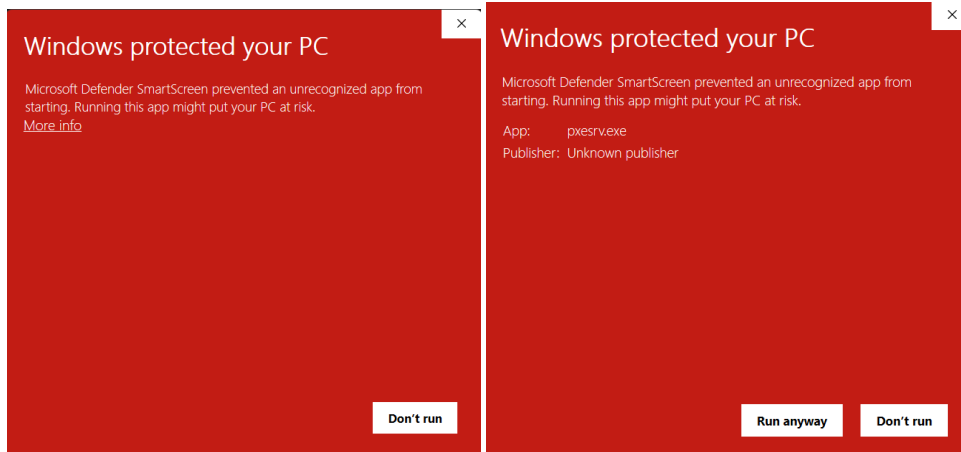
Flash `rb.elf` to target device

Power the hap devices with a power supply, not with PoE.

Check if the ethernet cable is connected to **port 1** of the hap router (labeled with Internet), supply the router with power and wait until the top red LED is off and the green LED above with the number 1 flickers. Possibly Windows detects a new network. Then a larger blue window will appear on the right side of the screen, mentioning the new network. Confirm with OK. The whole thing takes about 3 minutes.

Do the same with the AP. Use the PoE injector (Y-cable) or a **passive** PoE switch for the power supply. The power supply unit of the router also works here (both are 24V).

Start Tiny PXE Server (double click on the `pksesrv.exe` file in the «`pksesrv`» directory). You might get this warning:



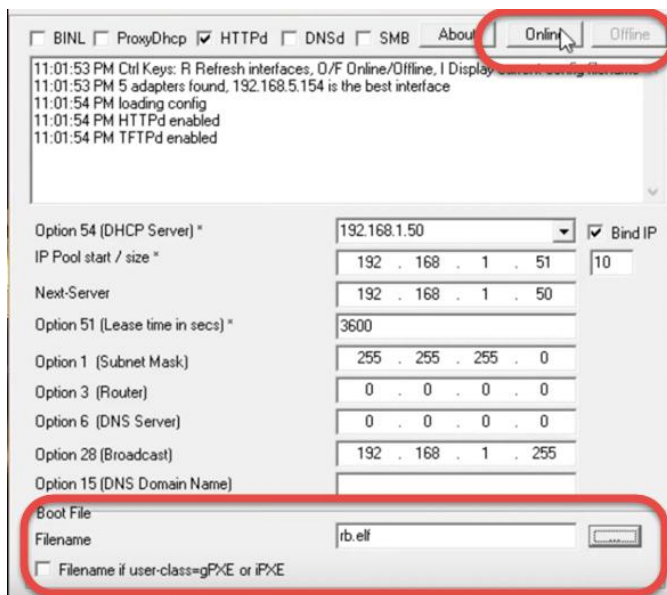
Press «More info» and let the program run.

Now pull the power of the target device.

In the Tiny PXE Server window, select the IP address entered on the Ethernet adapter from the drop-down box (192.168.1.50). If this IP address cannot be selected, close the Tiny PXE Server and start it again. If it still doesn't work, check the IP4 adapter settings and start again.

Find and select rb.elf in the «Boot File» section. This file can be found in the «...\pxesrv\files» folder.

Uncheck «Filename if user class...». No additional settings are necessary.



Now switch the Tiny PXE Server to «Online» in the upper right corner.

Then press the reset button in the target device with a pointed object (e.g., paper clip or toothpick) and then plug in the power cable to the target device. The USB LED will be on, flashing, and off (5 seconds each). Check the log window. Immediately after the bottom line says "Do ReadFile:rb.elf" release the reset button and switch the Tiny PXE Server to "Offline." This procedure takes about 20 seconds. The target device now boots with the AREDN firmware.

Don't keep the reset button pressed for too long, or you'll have to start over!

Keep the device powered. Otherwise, you have to start over!

If new messages (new requests) keep appearing in the window, you must use a different PC. Preferably one with little software installed.

After a few minutes, the process should be finished.

Plug the Ethernet cable into **port 2** on your router

With the AP, the Ethernet cable remains in the only socket. The rest is the same

Flash AREDN Firmware

Now open a browser and enter 192.168.1.1. The picture should look something like this.



Welcome

Congratulations on booting AREDN®

AREDN® is currently running in RAM. The next step is to install AREDN® into Flash.

Download the **sysupgrade.bin** file for this device (it should be at the same place you found this **kernel.bin** file) and upload it using the file selector below

Select Firmware File

aredn-3.24.10.0-tpq40xx-mikro...-ac3-squashfs-sysupgrade.bin

If not, back to start.

Now you can select the sysupgrade file for your router and hit "Upload". Wait till you get an answer on <http://192.168.1.1>



Welcome

Congratulations on installing AREDN®
There's a few pieces of basic information we need to start setting up your node.

Node Name

This is the unique name given to your node. It must start with your callsign which must be capitalized. For example, **K6AH-home**

New Password

Retype Password

Enter a password, twice, to assign to your node for access to configuration information later

Save & Reboot

Enter the node name **beginning with your call sign.**

Configure AREDN

Change your PC to DHCP. Open the browser and enter the following line

<http://localnode.local.mesh>

If there is no answer, the process is not yet complete. Try again and again. If you still can't connect after 15 minutes, go back and start over.

The new screen should show up where you can login to administer the node.

HB9BLA-HAP3-1 status

None
description

10:28 pm
time

0:07
uptime

0.02 0.14 0.09
load average

94.608 MB 178.648 MB
free flash free ram

3.24.10.0
firmware version issues release notes

NETWORK
10.242.159.161 / 8
mesh address
10.148.253.9 / 29
lan address

LOCAL SERVICES
None

LOCAL DEVICES
None

LOCAL NODES
None


NEIGHBORHOOD NODES
None

RADIO
MikroTik hAP ac3
model

MESH
-2 2392 - 2402 MHz 10 MHz
channel frequencies bandwidth
19 dBm 80 km 15
tx power maximum distance minimum snr

ANTENNA
3 dBi Omni
antenna
- - -
azimuth height elevation

MESH
1 1
nodes devices

Old UI  Login

You see if you are in administration node when the UI looks like that:

HB9BLA-HAP3-1 admin

Old UI

None

description

-

notes

10:35 pm

time

0:14

uptime

0.00 0.03 0.05

load average

94.608 MB

free flash

179.128 MB

free ram

3.24.10.0

firmware version

issues

release notes

0

installed packages

NETWORK

10.242.159.161 / 8

mesh address

10.148.253.9 / 29

lan address

To Do

Set the latitude and longitude

INTERNAL SERVICES

active

 Cloud Mesh

disabled

 Watchdog

active

 IPerf3 Server

active

 WAN ssh

active

 WAN web

inactive

 Metrics

disabled

 Remote Logging

disabled

 Supernode

active

 WAN telnet

disabled

 PoE out

LOCAL SERVICES

None

LOCAL DEVICES

None

LOCAL NODES

lq nlq snr n snr errors mbps km

None

NEIGHBORHOOD NODES

None

RADIO

MikroTik hAP ac3

model

MESH

-2

channel

2392 - 2402 MHz

10 MHz

bandwidth

19 dBm

tx power

80 km

maximum distance

15

minimum snr

ANTENNA

3 dBi Omni

antenna

-

azimuth

-

height

-

elevation

MESH

1

nodes

1

devices

LAN DHCP

Active

status

10.148.253.9 / 29

10.148.253.10 - 10.148.253.14

Changes are made everywhere on the screen when you see a grey shadow.

After changes, you have to commit them, and sometimes you are asked to reboot. There is no «reboot» button anymore.

My recommended settings for the hap routers (for the moment)

Radios & Antennas

Help

Radio 2.4GHz

Radio purpose

WAN Client

SSID

private-2G

WAN client

Password

Client password

Antenna

3 dBi Omni

Antenna

Height

Antenna height in meters

Elevation

Antenna elevation in degrees

Radio 5GHz

Radio purpose

Mesh

Channel

149 (5745)

Channel and frequency of this connection

Channel Width

10 MHz

Channel bandwidth

Cancel

Done

I connect my hap routers to Wi-Fi and create a mesh on 5GHz to test with other AREDN nodes. If you connect the hap via cable to the internet, you can switch the 2.4GHz radio to “off”.

Make your telephone visible to the network

Telephones have to be visible to others. This is why we have to reserve the address. This is done in the “LAN DHCP” area on the right. If you click it you get to this screen:

The screenshot shows the 'LAN DHCP' configuration page. Under the 'Address Reservations' section, there is a table with the following data:

| hostname | ip address | mac address | do not propagate |
|----------|---------------|-------------------|-------------------------------------|
| SIP-T48S | 10.148.253.10 | 80:5e:c0:76:d3:55 | <input checked="" type="checkbox"/> |

The 'do not propagate' checkbox for the first entry is checked. Below this table is an 'Active Leases' section showing the same entry. At the bottom are 'Cancel' and 'Done' buttons.

If you connect your Yealink phone, it should already be visible, and you just have to press the “+” button. Change its name to one of your unique phone numbers. You get the telephone numbers from HB9JAT, HB9BND, or HB9BLA. MAC address is found on the telephone under «information» (if needed).

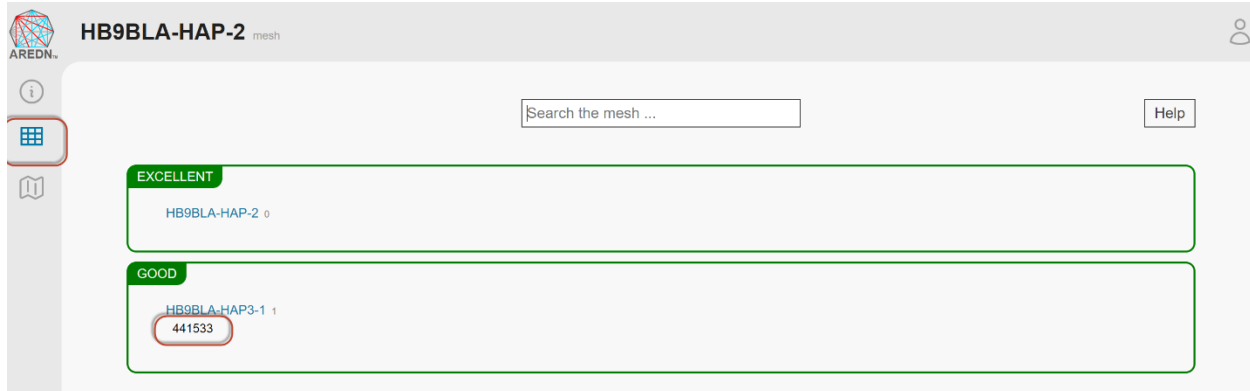
Remove the tick at “do not propagate” to make it visible in the net.

This screenshot is similar to the first one, but the 'do not propagate' checkbox for the first reservation entry is now unchecked. The table data is:

| hostname | ip address | mac address | do not propagate |
|----------|---------------|-------------------|--------------------------|
| 441533 | 10.148.253.10 | 80:5e:c0:76:d3:55 | <input type="checkbox"/> |

The 'do not propagate' checkbox is now empty. The rest of the interface remains the same.

Now it is time to go to the network overview:



The phone should be visible under your router name.

Set up a tunnel to the AREDN network

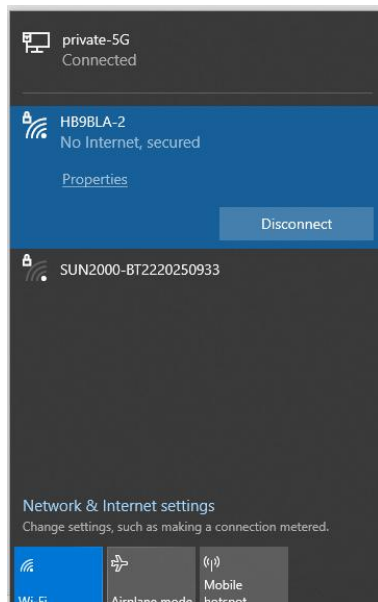
(only necessary if you connect via an Internet tunnel)

This chapter only applies to the hap routers.

Connect port 1 (Internet) to the Internet or connect via the network as shown before in my recommended settings.

From now on, you can access the router either if you connect a cable from your PC to ports 2-4 or via Wi-Fi.

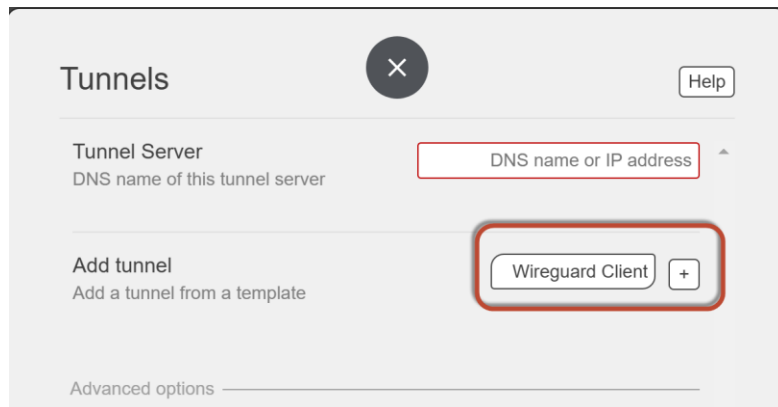
The router should provide a network.



There are two different tunnels available. The owner of the tunnel server decides which one you have to use. Wireguard tunnels are the future.

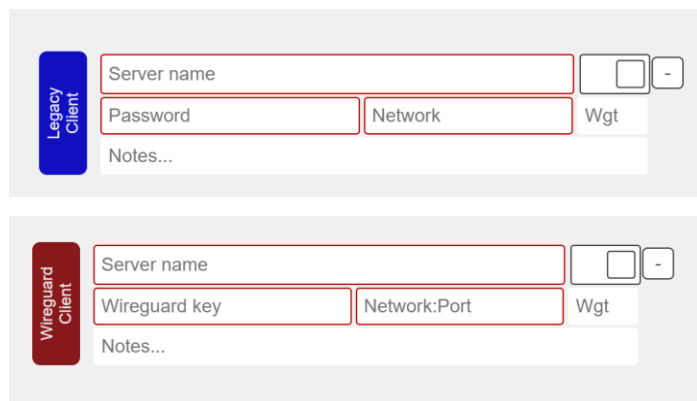
The tunnel owner will send you a file with the needed info. For legacy tunnels, make sure your node name matches the one given to you by the owner. Otherwise it will not work.

Server: his server address
PwD: The password he assigned to your tunnel
Network: The address of your tunnel



The screenshot shows a window titled 'Tunnels' with a close button (X) and a 'Help' button. Below the title bar, there's a section for 'Tunnel Server' with a text input field labeled 'DNS name or IP address'. Underneath, the 'Add tunnel' section has a sub-label 'Add a tunnel from a template'. A red box highlights the 'Wireguard Client' button with a plus sign. At the bottom, there's an 'Advanced options' section with a horizontal line.

The field “Tunnel server” is left blank for clients. Chose Wireguard or Legacy client, press the plus sign, and fill in the information you got from the tunnel owner.



The first screenshot shows the 'Legacy Client' configuration form. It has a blue header with 'Legacy Client' text. The form includes fields for 'Server name', 'Password', and 'Network', each with a red border. There are also checkboxes and a minus sign button. A 'Notes...' field is at the bottom. The second screenshot shows the 'Wireguard Client' configuration form. It has a red header with 'Wireguard Client' text. The form includes fields for 'Server name', 'Wireguard key', and 'Network:Port', each with a red border. There are also checkboxes and a minus sign button. A 'Notes...' field is at the bottom.

After you commit the changes, you should be connected (green) and your network should start to populate. You are now connected to the AREDN network. Go to «Node-Status» / «Mesh Status» and enjoy the success.

HB9BLA-HAP-2 mesh

[Help](#)

EXCELLENT

HB9BLA-HAP-2 0

FAIR

HB9BLA-VM-TUNNELSERVER 2.4
SwissDigitalNetPBX

filerepo
SwissDigitalNetPBX

HB9BLA-VM-1 2.5
441531
441530

HB9BLA-BASEL-SUPERNODE 2.5
lan.HB9BLA-BASEL-
SUPERNODE.local.mesh

SLOW

HB9BLA-HAP3-1 3.2
441533

HB9SP-HAP-TUNNELSERVER 3.4

DO5JWA-HAP-1 3.4
16792

HB9LU-HAP-TUNNELSERVER 3.4

HB9ZCY-HAP-1 3.4
804830

HB9HFM-HAP-1 3.4
178230

HB9EDI-VM-GW 3.4
mrtg
422530

filerepo
mesh-traffic-ch

HB9GNO-HAP-TUNNELSERVER 3.4
720830

HB9REY-HAP-1 3.4
813430

HB9GVM-VM-1 3.4

HB9HHH-HAP-1 3.4
141831

HB9HOO-HAP-1 3.4
443430

HB9AG-TUNNELSERVER-1 3.4
533330

HB9JBP-hap-1 3.4
860030

Install the Phonebook

This project aims to create a common Global AREDN telephone network. Local telephone books are distributed to all participating AREDN phones connected to the SwissDigitalNetwork or, via Supernodes, worldwide. By storing the latest version on each router, we can ensure that, during an emergency, we have no single point of failure. Each phone can call all reachable phones without a (central) PBX.

Principle of operation

You can skip this chapter and go to "Installation" if you are not interested in how the telephone book works.

AREDN is a mesh network, and we do not want to create a single point of failure. This is why the telephones get their phonebook files from the hap router they are connected to. So, a phone gets its phonebook as long as its router works.

We use direct calling instead of a PBX to avoid a single point of failure for communication, reduce the latency time, and reduce the overload of single mesh segments. The address used for this case is an FQDN like 178230@178230.local.mesh. If you want or need to operate a PBX, the address is just a phone number like 178230. In Switzerland, we use the city's zip code of the HAM plus a two-digit number in the range of 30-70. Lower numbers are reserved for official use.

The "Official" Swiss AREDN phonebook (SOP) is on Google:

https://docs.google.com/spreadsheets/d/1g33BHSXMC8T4Cmfz_Zq-XxtPP17dtEBexF2i4KKe_Mc/edit?usp=sharing. You can create a comment to add or change something or notify one of the administrators to do it for you.

Other countries will have their own telephone book (one per international area code). The maximum length of a local phone number is 7.

xxx-yyyyyyy

xxx: 3-digit area code

yyyyyyy: 7-digit local number (in Switzerland, currently only 6 are used)

Examples:

A global number in Switzerland starts with 041 (e.g. 041441530). For your comfort, you only have to dial the short number (in Switzerland, 441530). The SIP server in the phonebook program automatically adds 041 (it is defined in the config file).

Other nations use their international area code. It must have three digits. So, the US has 001 and Lichtenstein 423.

Currently, we support Yealink telephones. Cisco phones should also work.

At power-up and every hour, the telephones used for AREDN automatically load phonebooks from the connected router. The file format used for that process is XML.

How is the information transferred from the Google Sheets to your hap router? The first step is to copy the .csv version of the sheet from Google to two web servers (one acts as a backup) in the AREDN mesh.

If Google is down, we could still edit this .csv file manually. This transfer is done every hour. You find more info in attachment.

Installation

Go to the releases page and open “Assets”:

<https://github.com/arednch/packages/releases>

Releases Tags

12 hours ago
finfinack
v1.9.1
aa84944

Compare

v1.9.1 Pre-release

Alpha release with new changes/fixes:

- memory profiling and reduction
 - removing the pretty interface (CSS) to reduce memory use
 - some structure optimizations removing unneeded fields
- move CSS to node base webserver instead

IMPORTANT: Remove the `sipserver` and `libstdc++` packages from the node before installing this version of phonebook as this includes a (really really basic and incapable) SIP server of its own listening on the same port.

Only update this if you know what your doing - all at your own risk as this is an experimental feature for the time being.

▼ Assets 5

| | | |
|-------------------------------------------------|---------|--------------|
| phonebook_1.9.1-r1_arm_cortex-a7_neon-vfpv4.ipk | 2.1 MB | 12 hours ago |
| phonebook_1.9.1-r1_mips_24kc.ipk | 2.02 MB | 12 hours ago |
| phonebook_1.9.1-r1_x86_64.ipk | 2.5 MB | 12 hours ago |
| Source code (zip) | | 12 hours ago |
| Source code (tar.gz) | | 12 hours ago |

Download the respective ipk file (mips-24kc for the small hap lite and arm-cortex for the hap3). The ipk file includes the phonebook, the SIP server, and all libraries.

Go to “installed packages” on the left:

Packages Help

Download Package
Download package from an AREDN server.

Upload Package
Upload a package file from your computer.

Remove Package
Uninstall package from node.

Advanced options




Chose the correct “phonebook” file and “upload it. This starts its installation.

Downloads

Search Downloads

Sort

View

| Name | Date modified | Date created | Type |
|-----------------------------------------------------------------------------------------------------------------------------------|------------------|------------------|----------|
| Today | | | |
|  phonebook_1.9.1-r1_arm_cortex-a7_neon-vfpv4.ipk | 09/07/2024 08:46 | 09/07/2024 08:46 | IPK File |
|  phonebook_1.9.1-r1_mips_24kc.ipk | 09/07/2024 08:46 | 09/07/2024 08:46 | IPK File |
|  phonebook_1.9.1-r1_x86_64.ipk | 09/07/2024 08:46 | 09/07/2024 08:46 | IPK File |

Now, you can connect your router to your AREDN network. After rebooting, the attached phone should connect to the SIP server, and you should be able to download the phonebook with all numbers.

Troubleshooting:

Is the phonebook downloaded?

localnode.local.mesh:8081/phonebook?format=direct&target=generic&ia=true

should show you the actual phonebook

This XML file does not appear to have any style information associated with it. The document tree is shown below.

```
<IPPhoneDirectory>
  <DirectoryEntry>
    <Name>HB9CF SEC 1</Name>
    <Telephone>644040@644040.local.mesh</Telephone>
  </DirectoryEntry>
  <DirectoryEntry>
    <Name>HB9CF SEC 2</Name>
    <Telephone>644041@644041.local.mesh</Telephone>
  </DirectoryEntry>
  <DirectoryEntry>
    <Name>HB9ZG SEC 1</Name>
    <Telephone>630040@630040.local.mesh</Telephone>
  </DirectoryEntry>
  <DirectoryEntry>
    <Name>HB9ZG SEC 2</Name>
    <Telephone>630041@630041.local.mesh</Telephone>
  </DirectoryEntry>
  <DirectoryEntry>
    <Name>DL8TW @DK0NFK (DL8TW-1)</Name>
    <Telephone>9118931@9118931.local.mesh</Telephone>
  </DirectoryEntry>
</IPPhoneDirectory>
```

if not, type:

localnode.local.mesh:8081/reload

should load the actual telephone book from the AREDN server

Phonebook: Reload

Version: 1.11-5
Commit hash: "a6db137d8da43807f55d19bdc79209d6848ffa08"

Last phonebook update: 2024-11-13T16:17:19Z

Phonebook reloaded from http://hb9bla-vm-tunnelsrvr.local.mesh/filerepo/Phonebook/AREDN_PhonebookV2.csv

Config file (only for experts)

You can influence the behaviour of your phonebook software by changing parameters with the command

`vi /etc/phonebook.conf`

Important are these two parts:

formats: Comma separated list of formats to export.

Default:

```
"formats": [  
    "direct",  
    "pbx"  
],
```

- Supported: "pbx,direct,combined"

targets: Comma-separated list of targets to export.

Default:

```
"targets": [  
    "generic"  
],
```

- Supported: generic,yealink,cisco,snom

[Using a PBX in parallel](#)

If you want to use a PBX, you must add a second account with the respective information given to you by the PBX operator.

Install phonebook on a Raspberry Pi (needed after 3.25.0)

Hardware

With each release, the memory of the HAP Lite routers is more used. From AREDN 3.25.0 onwards, the phonebook no longer has sufficient space. Therefore, we need a solution.

Martin created a version of the phonebook for the Raspberry Pi. So we can use any Raspberry to host it. My preferred solution is a Pi Zero because it is quite small. But because it has no Ethernet connector, we either have to connect it via Wi-Fi to the HAP lite, or we use one of these small USB-RJ45 cables:



Or you use an old Pi3.

Software installation

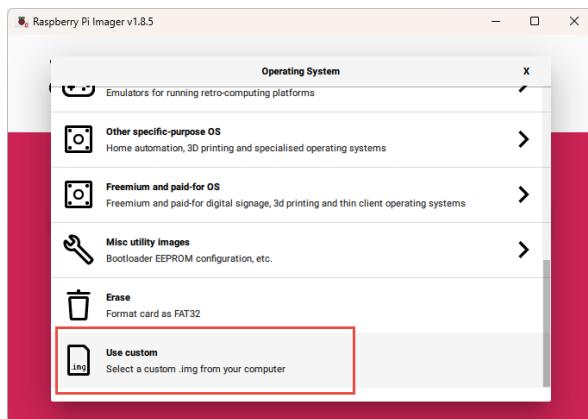
Next, we need to create an SD card using Pi Imager. I prepared a version with everything installed.

You can download it from here:

<https://drive.google.com/file/d/13LI0mwhcDH-T6AzRpbhtvQxxWXn5o51F/view?usp=sharing>

The username is Pi, and the password is "raspberry". It is a 32bit Raspberry OS and should run on all Pis


Select the file in the Pi imager (Use custom)




When finished, insert the ready-made SD card into the Pi, power it up, and connect it to ports 2 or 3 of the HAT Lite. Then, power up the Pi.

To proceed, we go to the home screen of your HAP router:

<http://localnode.local.mesh>

 [Login](#)



HB9BLA-HAP-2

admin

None

description

- notes

23.14

time (ntp)

1.23

uptime

0.00 0.01 0.00

load average

8.392 MB

free flash

9.98 MB

free ram

3.25.2.0

firmware version

Up to date

issues

release notes

0

installed packages

INTERNAL SERVICES

active

Cloud Mesh

disabled

Hardware Watchdog

active

IPerF3 Server

active

WAN ssh

active

WAN web

disabled

PoE out

LOCAL SERVICES

None

LOCAL DEVICES

PhoneBookServer

inactive

Metrics

disabled

Remote Logging

disabled

Supernode

active

WAN telnet

active

Wireless Watchdog

active

USB power out

LOCAL NODES

| | lq | nlq | snr | n snr | errors | mbps | miles |
|------------------------|------|------|-----|-------|--------|------|-------|
| hb9bla-basel-supernode | 100% | 100% | | | 0% | | |
| hb9bla-vm-1 | 100% | 100% | | | 0% | | |
| hb9bla-vm-tunnelsrver | - | - | | | 4% | | |

| | | | |
|-------------------|-------------------|-----------------------------|-------------------|
| LAN DHCP | | | |
| Active | | | |
| clients | | | |
| 10 51 55 233 / 29 | | 10 51 55 234 - 10 51 55 238 | |
| gateway | | range | |
| 1 | | 1 | |
| reserved leases | | active leases | |
| 0 | | 0 | |
| tags | | options | |
| | | | |
| TUNNELS | | | |
| Winguard | | | |
| 0 | | 0 | |
| active clients | 0 | active servers | 0 |
| legacy | | | |
| 0 | | 0 | |
| active clients | 0 | active servers | 0 |
| | allocated clients | | allocated servers |

LAN DHCP

Help

DHCP Server

Provide addresses to devices on the LAN network

Address Reservations

Hostnames with fixed addresses

+

Active Leases

Addresses currently in use

| hostname | ip address | mac address | |
|-----------------|--------------|-------------------|---|
| PhoneBookServer | 10.51.55.236 | 00:e0:4c:53:44:58 | + |

Advanced options

LAN DHCP

Help

DHCP Server ☒ Provide addresses to devices on the LAN network

Address Reservations
Hostnames with fixed addresses

| hostname | ip address | mac address | do not propagate |
|-----------------|--------------|-------------------|-------------------------------------|
| PhoneBookServer | 10.51.55.236 | 00:e0:4c:53:44:58 | <input checked="" type="checkbox"/> |

Active Leases
Addresses currently in use

| hostname | ip address | mac address |
|-----------------|--------------|-------------------|
| PhoneBookServer | 10.51.55.236 | 00:e0:4c:53:44:58 |

Advanced options

And tick the “do not propagate”. Like that, nobody will see your phone server outside of your HAP router.

If your PC is directly connected to your HAP router, you can type the following address in a different window on your browser

<http://phonebookserver:8081/reload>

Otherwise, use this line (IP address in our case is 10.51.55.236):

<http://<node IP address>:8081/reload>

Now you can check if your Pi downloaded the phonebook:

<http://phonebookserver:8081/phonebook?format=direct&target=generic&ia=true>
or
<http://phonebookserver.local.mesh:8081/phonebook?format=direct&target=generic&ia=true>

This XML file does not appear to have any style information associated with it. The document tree is shown below:

```
<?xml version="1.0"?>
<IPPhoneDirectory>
  <DirectoryEntry>
    <Name>HB9CF SEC 1</Name>
    <Telephone>644040@644040.local.mesh</Telephone>
  </DirectoryEntry>
  <DirectoryEntry>
    <Name>HB9CF SEC 2</Name>
    <Telephone>644041@644041.local.mesh</Telephone>
  </DirectoryEntry>
  <DirectoryEntry>
    <Name>HB92G SEC 1</Name>
    <Telephone>630040@630040.local.mesh</Telephone>
  </DirectoryEntry>
  <DirectoryEntry>
    <Name>HB92G SEC 2</Name>
    <Telephone>630041@630041.local.mesh</Telephone>
  </DirectoryEntry>
  <DirectoryEntry>
    <Name>DL8TW @OKOMFK (DL8TW-1)</Name>
    <Telephone>9118931@9118931.local.mesh</Telephone>
  </DirectoryEntry>
  <DirectoryEntry>
    <Name>DL8TW @OKOMFK (DL8TW-2)</Name>
    <Telephone>9118932@9118932.local.mesh</Telephone>
  </DirectoryEntry>
  <DirectoryEntry>
    <Name>Daniel (HB9GD-1)</Name>
    <Telephone>895330@895330.local.mesh</Telephone>
  </DirectoryEntry>
</IPPhoneDirectory>
```

Adjustments on the phone

The only thing you have to adjust is to replace “localhost” with “phonebookserver” in these two places:

← ↻ Not secure | <https://10.197.143.19/#/account-register?acc=1>

YouTube YouTube Studio Treffpunkt DARC YouTube Octopi Balloons Portainer Home Assistant CWops Huawei Monitor AREDN

Yealink | T58

- Status
- Account
- Register**
- Basic
- Codec
- Advanced
- Network
- Dsskey
- Features
- Settings
- Directory
- Security

These users (admin,var) are using the default password, please change the password!

| Account | Account 1 (SIP - Registered) | ? |
|---------------------|-------------------------------------|-------------|
| Register status | Registered | ? |
| Line Active | <input checked="" type="checkbox"/> | ? |
| Label | SIP | ? |
| Display Name | HB9BLA-QTH | ? |
| Register Name | 441530 | ? |
| Username | 441530 | ? |
| Password | ***** | ? |
| SIP Server 1 | | |
| Server Host | phonebookserver.local.mesh | Port 5060 ? |
| Transport | UDP | ? |
| Server Expires | 3600 | ? |
| Server Retry Counts | 3 | ? |

And:

Yealink | T58

- Status
- Account
- Network
- Dsskey
- Features
- Settings
- Directory
- Local Directory
- Remote Phone Book**

These users (admin,var) are using the default password, please change the password!

| # | Remote URL |
|---|---------------------------------------------------------------------------------------|
| 1 | http://phonebookserver.local.mesh:8081/phonebook?format=PBX&target=generic&ia=true |
| 2 | http://phonebookserver.local.mesh:8081/phonebook?format=direct&target=generic&ia=true |
| 3 | |
| 4 | |
| 5 | |

Incoming/Outgoing Call Lookup ☒ ?

Update Time Interval (Seconds) 3600 ?

Now you can test if your phone registers and if you can refresh the phonebook. If so, you are done.

Installation of the package (for “professionals”)

Get the package from:

XXX???

For the Raspberry Pi 1 and Pi Zero, or if you want to use a 32-bit Raspberry OS, you have to use:

phonebook_armv6.deb

otherwise, this one:

phonebook_arm64.deb

You can install it with:

```
sudo dpkg -i phonebook_armv6.deb  
or  
sudo dpkg -i phonebook_arm64.deb
```

Uninstall for both:

```
dpkg -r phonebook
```

Now the phonebook should start at boot.

This is the end of the manual. The rest is for Administrators

Attachments

These steps are executed on the server with the file repo.

Google Sheets replication

Create a file on the “phonebook repo” server (in my case the tunnel server):

```
vi /etc/cron.hourly/load_phonebook_from_google
```

and insert:

```
#!/bin/sh
curl -L "https://docs.google.com/spreadsheets/d/e/2PACX-1vTZw1cw1V6pdFETvC-
JnI0gPwKRwR0rBUc2XqX9V3LV1NfrB0zvhhWkmrYVS1eippbs911MLfkeXj6-
/pub?gid=0&single=true&output=csv" -o
/www/filerepo/Phonebook/AREDN_PhonebookV2.csv
curl -L "https://docs.google.com/spreadsheets/d/e/2PACX-1vTZw1cw1V6pdFETvC-
JnI0gPwKRwR0rBUc2XqX9V3LV1NfrB0zvhhWkmrYVS1eippbs911MLfkeXj6-
/pub?gid=0&single=true&output=csv" -o /www/filerepo/Phonebook/AREDN_Phonebook.csv
curl -L "https://docs.google.com/spreadsheets/d/e/2PACX-1vTZw1cw1V6pdFETvC-
JnI0gPwKRwR0rBUc2XqX9V3LV1NfrB0zvhhWkmrYVS1eippbs911MLfkeXj6-
/pub?gid=208565882&single=true&output=csv"
```

```
#!/bin/sh
curl -L "https://docs.google.com/spreadsheets/d/e/2PACX-1vTZw1cw1V6pdFETvC-
JnI0gPwKRwR0rBUc2XqX9V3LV1NfrB0zvhhWkmrYVS1eippbs911MLfkeXj6-
/pub?gid=0&single=true&output=csv" -o /www/filerepo/Phonebook/AREDN_PhonebookV2.csv
curl -L "https://docs.google.com/spreadsheets/d/e/2PACX-1vTZw1cw1V6pdFETvC-
JnI0gPwKRwR0rBUc2XqX9V3LV1NfrB0zvhhWkmrYVS1eippbs911MLfkeXj6-
/pub?gid=0&single=true&output=csv" -o /www/filerepo/Phonebook/AREDN_Phonebook.csv
```

Include the route to this phonebook repo (and eventually a backup server) to this file on all routers with the appropriate phonebook software:

```
vi /etc/phonebook.conf
```

```
"sources": [
  "http://hb9hla-vm-tunnelserver.local.mesh/filerepo/Phonebook/AREDN_Phonebook.csv",
  "http://hb9edi-vm-gw.local.mesh/filerepo/Phonebook/AREDN_Phonebook.csv"
],
"olsr_file": "/tmp/run/hosts_olsr",
"sysinfo_url": "http://localnode.local.mesh/cgi-bin/sysinfo.json?hosts=1",
"ldap_server": true,
"sip_server": true,
"debug": false,
"allow_runtime_config_changes": false,
"allow_permanent_config_changes": false,
"path": "/www/arednstack",
"formats": [
  "combined",
  "direct",
  "pbx"
],
"targets": [
  "generic"
],
"resolve": false,
"indicate_active": true,
"filter_inactive": false,
"active_pfx": "*",
"include_routable": true,
"port": 8081,
"reload_seconds": 3600,
"web_user": "aredn",
"web_pwd": "arednsecret",
"ldap_port": 3890,
"ldap_user": "aredn",
"ldap_pwd": "aredn",
"sip_port": 5060
```

The second path is for backup.