

# AREDN Setup

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6.5.2024

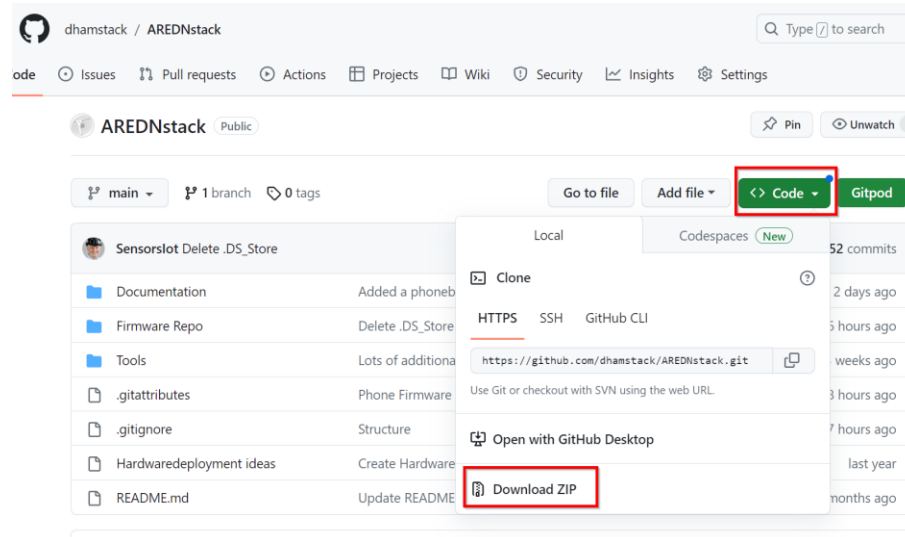
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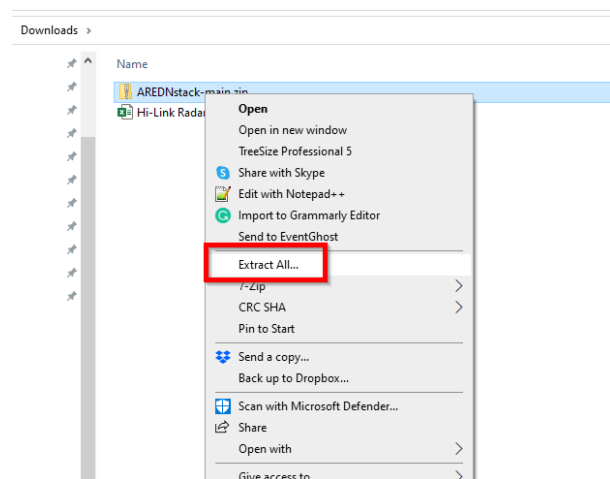
## Preparation

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

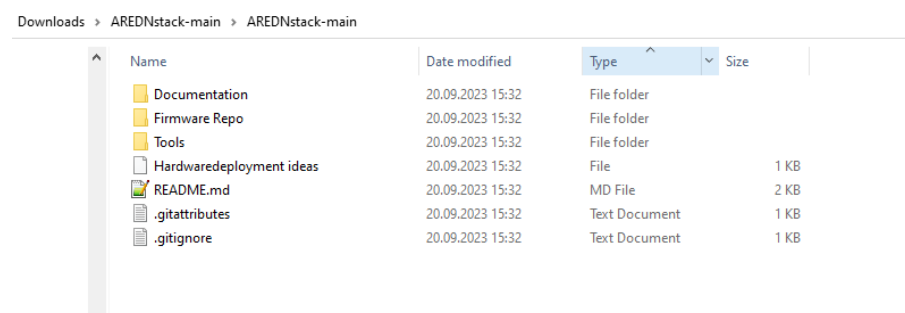
Press "code" and "Download ZIP". The file is quite big (>500M):





Extract the ZIP file:












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



In the Firmware Repo folder, you will find files for the current version of AREDN:

Name	Date modified	Date created	Type	Size
 3.23.8.0	06/11/2023 13:36	29/10/2023 09:08	File folder	
 Yealink phones Firmware	29/10/2023 09:08	29/10/2023 09:08	File folder	

You also 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

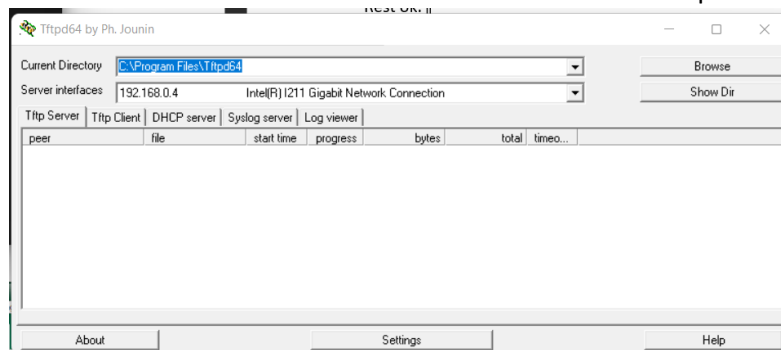
1. Download and unzip tftpd64.464.zip (the "run", not the setup version)  
(<https://bitbucket.org/phjounin/tftpd64/downloads/> )
2. Disconnect your computer from Wi-Fi and Ethernet and set a fixed IP address (e.g., 192.168.0.4)
3. Start tftpd64.exe
4. Click the browse button to locate the TFTP root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

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

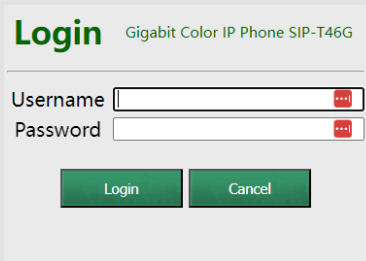
### This file is the exported MAC-all.cfg.

### 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. SOP means Swiss Official Phonebook, BTW.

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



**Login** Gigabit 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. At the top, there's a green header with the Yealink logo and 'T46G'. A warning message says 'Default password is in use. Please change!'. The language is set to 'English(English)'. Below the header is a navigation bar with tabs: Status, Account, Network, Dsskey, Features, Settings (selected), Directory, and Security. On the left is a sidebar menu with options: 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 'No selected file' and 'Browse...' buttons; 'Export CFG Configuration File' with a 'Static Settings' dropdown and an 'Export' button; 'Import CFG Configuration File' with 'No selected file', 'Browse...', 'Import', and 'Cancel' buttons; 'Pcap Type' with an 'Enhanced' dropdown; 'Pcap Feature' with 'Start' and 'Stop' buttons; 'Local Log' with 'Enable Local Log' (Enabled), 'Local Log Level' (3), 'Max Log File Size (256-2048KB)' (1024), and an 'Export Local Log' button; and 'Syslog' with 'Enable Syslog' (Disabled) and a 'Syslog Server' field with a 'Port' of 514. On the right, there's a 'NOTE' section titled 'Configuration' explaining that IP phones can provide feedback in various forms (log files, packets, status indicators) and listing links for 'Log Files', 'Capturing Packets', and 'Configuration File (\*.cfg/\*.bin)'. A link to 'Click here to get more product documents.' is also present.

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

After reboot, go to Directory → Remote Phone Book and check if the remote phone book screen looks like that:



Yealink | T48S

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

Status Account Network Dsskey Features Settings

Local Directory Remote Phone Book Phone Call Info Google Contacts LDAP Multicast IP Settings

Index	Remote URL	Display Name
1	<a href="http://localnode.local.mesh/arednstack/phonebook_generic_">http://localnode.local.mesh/arednstack/phonebook_generic_</a>	Direct
2	<a href="http://localnode.local.mesh/arednstack/phonebook_generic_">http://localnode.local.mesh/arednstack/phonebook_generic_</a>	PBX
3		
4		
5		

Incoming/Outgoing Call Lookup Enabled ?

Update Time Interval (Seconds) 3600 ?

Confirm Cancel

The two phonebooks for copy-paste:

[http://localnode.local.mesh/arednstack/phonebook\\_generic\\_direct.xml](http://localnode.local.mesh/arednstack/phonebook_generic_direct.xml)

[http://localnode.local.mesh/arednstack/phonebook\\_generic\\_pbx.xml](http://localnode.local.mesh/arednstack/phonebook_generic_pbx.xml)

Go to Directory → Setting and fill the fields like that:

Yealink | T46G

⚠ Default password is in use. Please change Log Out English(English)

Status Account Network Dsskey Features Settings Directory Security

Local Directory Remote Phone Book Phone Call Info LDAP Multicast IP Setting

Directory ?

Disabled: Local Directory, History, Blacklist

Enabled: Remote Phone Book

Search Source List In Dialing ?

Disabled: Local Directory

Enabled: Remote Phonebook History

Recent Call In Dialing Enabled ?

Confirm Cancel

**NOTE**

**Directory**  
It provides easy access to frequently used lists.

**Search Source in Dialing**  
It allows the IP phone to automatically search entries from the search source list based on the entered string, and display results on the pre-dialing screen.

**Recent Call In Dialing**  
It allows users to view the placed calls list when the phone is on the pre-dialing screen.

Click here to get more product documents.

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.

Check if you phone is enabled for IP telephony:

The screenshot shows the Yealink T48S web interface. The top navigation bar includes 'Status', 'Account', 'Network', 'Display', 'Features', 'Settings', 'Directory', and 'Security'. The 'Features' tab is selected. On the left sidebar, 'Forward & DND' is expanded, showing 'General Information', 'Audio', and 'Intercom'. The 'General Information' section is active, displaying a list of features with their current status and a help icon. The 'Allow IP Call' option is highlighted with a red box and is set to 'Enabled'. A red circle highlights the 'Accept SIP Trust Server Only' option, which is set to 'Disabled'. The 'Auto Redial' option is also set to 'Disabled'. The 'Call Waiting' option is set to 'Enabled'. The 'Send Pound Key' option is set to 'Disabled'. The 'Fwd International' option is set to 'Enabled'. The 'Diversion/History-Info' option is set to 'Enabled'. The 'BLF LED Mode' is set to '0'. The 'Auto Logout Time (1~1000min)' is set to '999'. The 'Call Number Filter' is empty. The 'IP Direct Auto Answer' option is set to 'Disabled'. The 'Call List Show Number' is set to 'Name'. The 'Voice Mail Tone' is set to 'Enabled'. The 'DHCP Hostname' is set to '441531'. The 'Reboot in Talking' option is set to 'Disabled'. The 'Hide Feature Access Codes' option is set to 'Disabled'. The 'Display Method on Dialing' is set to 'Username'. The 'Auto Linekeys' option is set to 'Disabled'. A 'NOTE' section on the right explains 'Call Waiting' and 'Auto Redial'. At the bottom, there are 'Confirm' and 'Cancel' buttons.

Feature	Status	Help
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	?
<b>Allow IP Call</b>	<b>Enabled</b>	<b>?</b>
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	?

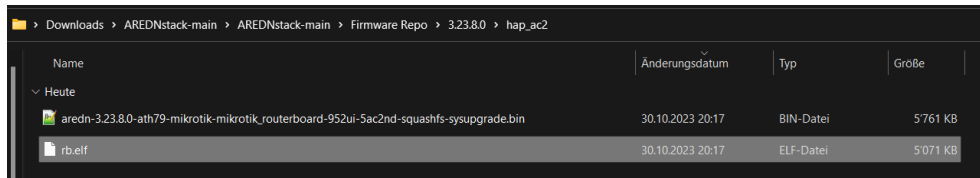
If your Mikrotik router already works with AREDN, you can skip the next step and install the phonebook and SIPserver. If not, continue with the next chapter.

## Flash Mikrotik devices

### Preparations

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

We assume you have downloaded the <https://github.com/dhamstack/AREDNstack> repository and unpackaged it to your download folder. It contains the two files of the newest release (we will need the rb.elf file in the next step:



Name	Änderungsdatum	Typ	Größe
aredn-3.23.8.0-ath79-mikrotik-mikrotik_routerboard-952ui-5ac2nd-squashfs-sysupgrade.bin	30.10.2023 20:17	BIN-Datei	5761 KB
rb.elf	30.10.2023 20:17	ELF-Datei	5071 KB

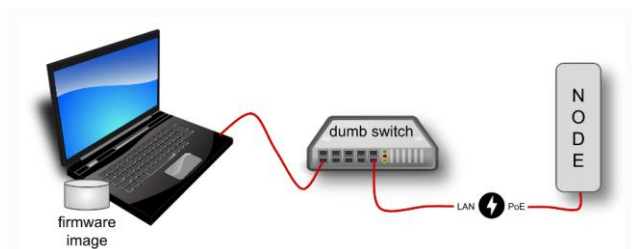
*Not needed:*

*Download the nightly build at your own risk if you wish*

*(<http://downloads.arednmesh.org/firmware/html/stable.html>) and copy the files to the respective directory of the AREDNstack repo. Rename the kernel file file to rb.elf.*

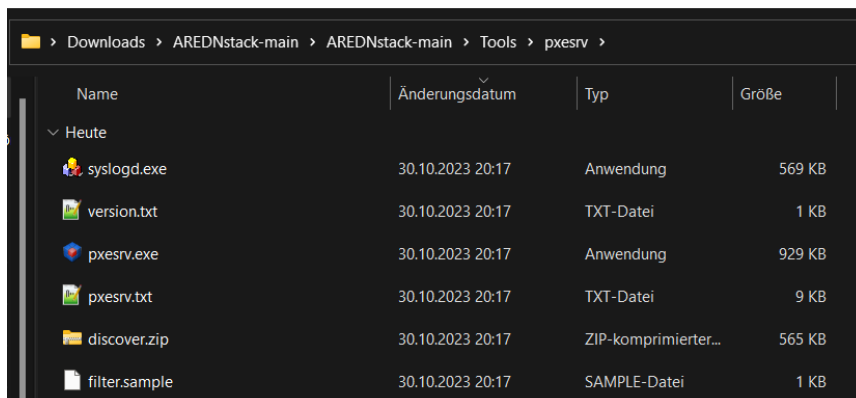
*For all other devices go to [Installing AREDN® Firmware — AREDN Documentation latest documentation \(arednmesh.org\)](#) to get instructions on how to find and rename the files.*

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.

Then go to the Tiny PXE Server directory:



Name	Änderungsdatum	Typ	Größe
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

Its source is <http://erwan.labalec.fr/tinypxeserver/pxesrv.zip>.

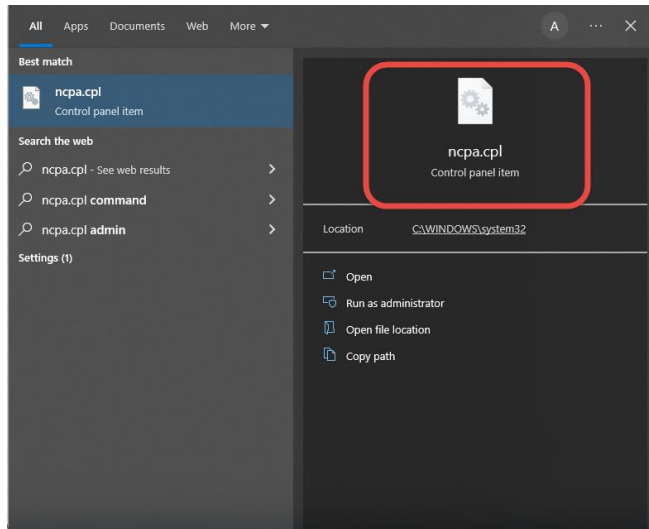
Copy the `rb.elf` file from before to the «Files» folder of the PXE server (overwrite if necessary). In our downloaded directory, this is already done.

## Change PC to a fixed IP address

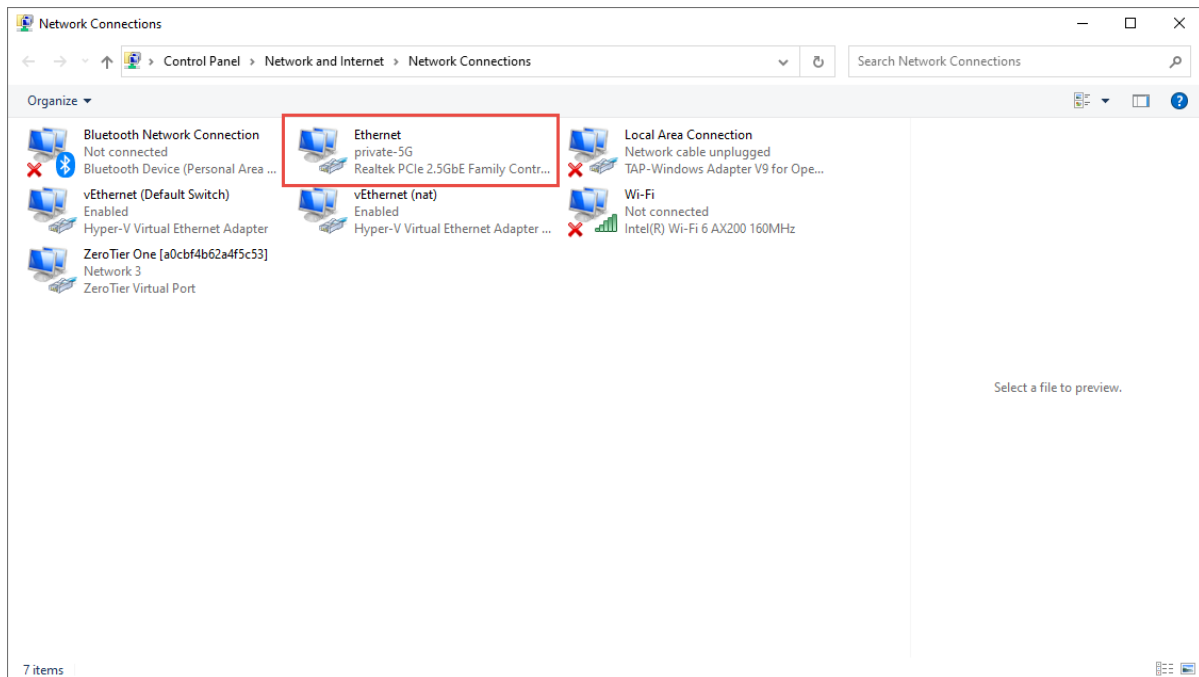
Type

`ncpa.cpl`

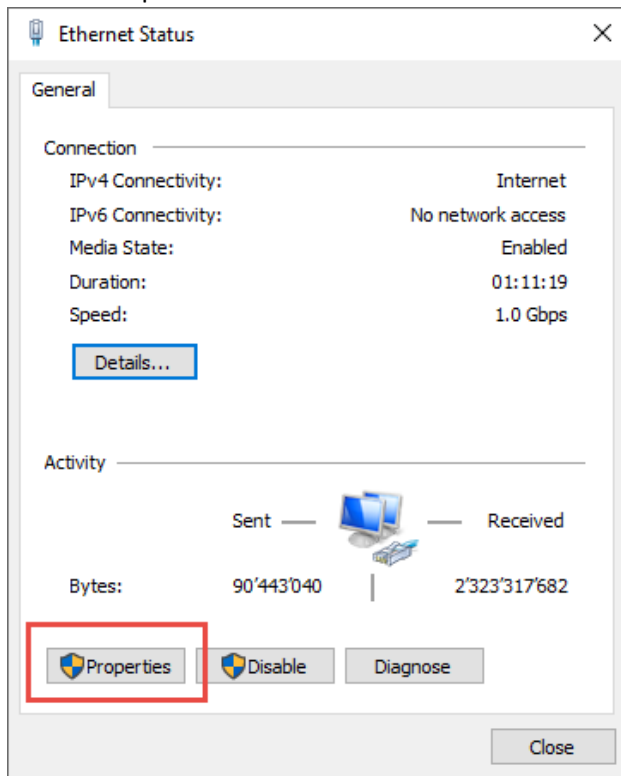
into Windows search



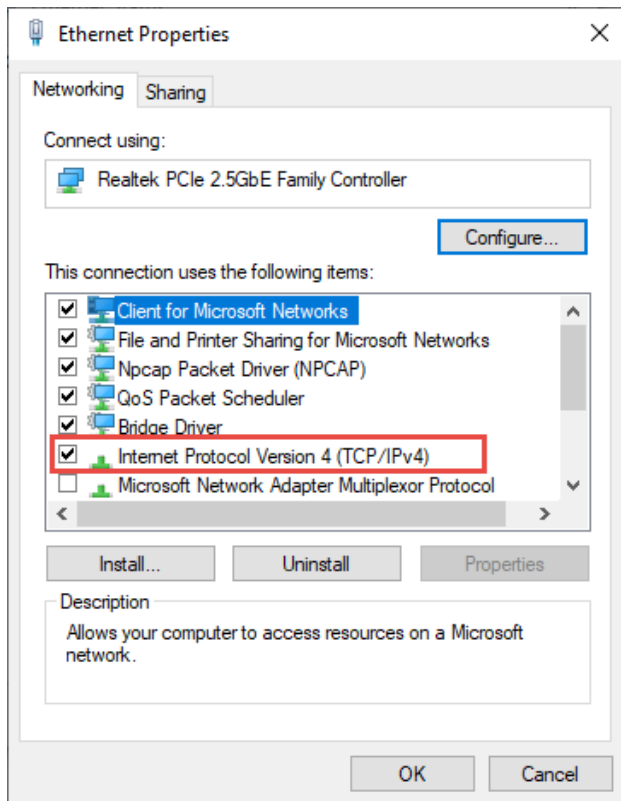
## Select "Ethernet"



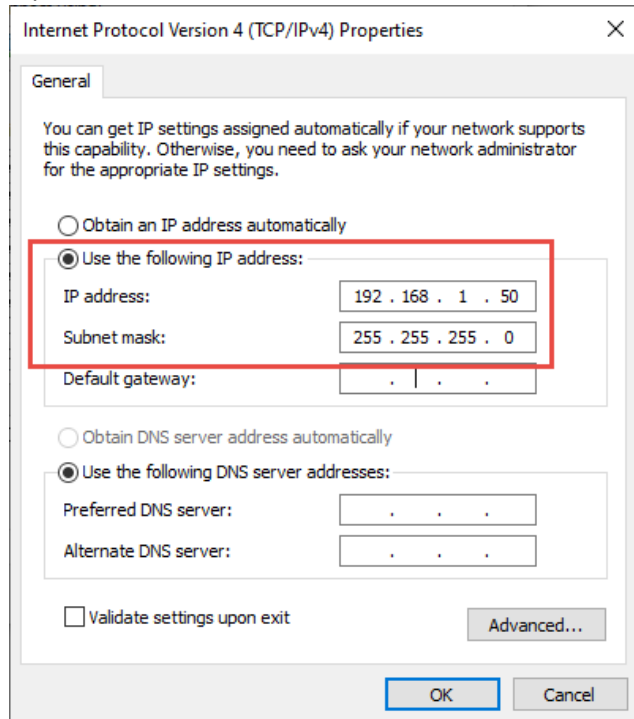
Select «Properties»:



Select IPV4:



Input IP address 192.168.1.50:



Internet Protocol Version 4 (TCP/IPv4) Properties

General

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

☐ Obtain an IP address automatically

☒ Use the following IP address:

IP address: 192 . 168 . 1 . 50

Subnet mask: 255 . 255 . 255 . 0

Default gateway: . . .

☐ Obtain DNS server address automatically

☒ Use the following DNS server addresses:

Preferred DNS server: . . .

Alternate DNS server: . . .

☐ Validate settings upon exit

Advanced...

OK Cancel

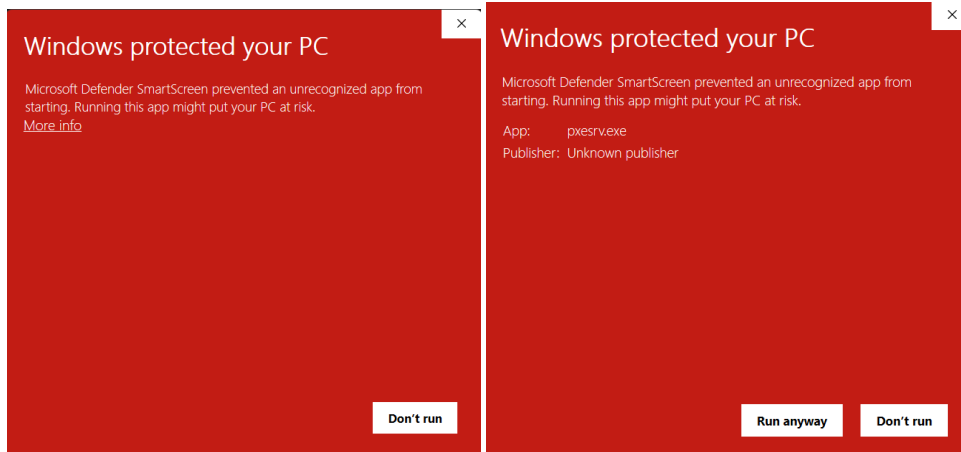
Press OK and Close

### Flash elf file to target device

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) 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 pxesrv.exe file in the «pxesrv» directory). You might get this warning:



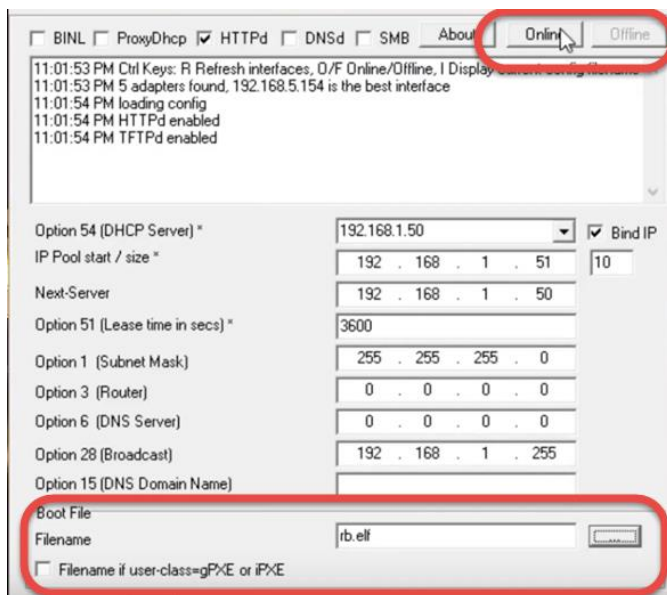
Press «More info» and let the program run.

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!

Switch the Ethernet adapter on the PC back to the "automatic IP address." Plug the Ethernet cable into **port 2** on your router. After about two minutes, the process should be finished.

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

Optional: Check with `ipconfig` whether our PC has received «local.mesh».

## Flash AREDN Firmware

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



If not, back to start

Now let's install the actual firmware on the target device. Click on setup and enter username/password:

User: root  
Password: hsmm

The following view appears:



Now uncheck "Keep Existing Configuration Settings" and select the firmware.

Names of the files as discussed above (file names similar to «aredn-3.23.8.0-ath79-mikrotik-mikrotik\_routerboard-952ui-5ac2nd-squashfs-sysupgrade.bin»):



Click «Upload.» The actual firmware is now loaded into the target device. The target device boots several times, and it takes about 10 minutes.

Once the software has been installed, Windows can again bring up a blue window on the right side of the screen.

### Configure AREDN

Open the browser and enter the following line `http://localnode.local.mesh:8080` (or `192.168.1.1`)

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 again.

The necessary settings can be made under «Basic Setup.»

User: root Password: hsmm
------------------------------

[Node Status](#)
[Basic Setup](#)
[Port Forwarding, DHCP, and Services](#)
[Tunnel Server](#)
[Tunnel Client](#)
[Administration](#)
[Advanced Configuration](#)

[Help](#)
[Save Changes](#)
[Reset Values](#)
[Default Values](#)
[Reboot](#)

Node Name: 
Password:

Node Description (optional): 
Verify Password:

Mesh RF (2GHz)	LAN	WAN
Enable: <input checked="" type="checkbox"/> IP Address: <input type="text" value="10.198.102.254"/> Netmask: <input type="text" value="255.0.0.0"/> SSID: <input type="text" value="AREDN"/> Channel: <input type="text" value="-2 (2397)"/> Channel Width: <input type="text" value="10 MHz"/> 	LAN Mode: <input type="text" value="5 host Direct"/> IP Address: <input type="text" value="10.51.55.241"/> Netmask: <input type="text" value="255.255.255.248"/> DHCP Server: <input checked="" type="checkbox"/> DHCP Start: <input type="text" value="242"/> DHCP End: <input type="text" value="246"/> 	Protocol: <input type="text" value="DHCP"/> DNS 1: <input type="text" value="8.8.8.8"/> DNS 2: <input type="text" value="8.8.4.4"/> 

**Power & Link Quality**  
Tx Power:   
Max Distance:  km  
Min SNR:  dB  
Min Quality:  %

**LAN Access Point**  
Enable: ☒  
AP band:   
SSID:   
Channel:   
Encryption:   
Password:

**Optional Settings**  
Latitude:  Find Me!     
Longitude:  Grid Square:   
Timezone:  NTP Server:  NTP Updates:

- A new password must be set before the first save. Otherwise, the changes will not be saved
- For the node name, please enter your call sign as shown above.

Only on the hap router:

- Also, enter your call sign for SSID, and set a password. Remember this SSID name and the password, you will need it later to connect the WLAN of the hap router. Tick «LAN Access Point»
- Fill in «Optional Settings»

Then reboot the target device.

Make your telephone visible to the network

Telephones have to be visible to others:

Node Status Basic Setup **Port Forwarding, DHCP, and Services** Tunnel Server Tunnel Client Administration Advanced Network Advanced Configuration

[Help](#) [Save Changes](#) [Reset Values](#) [Refresh](#)

### DHCP Address Reservations

Hostname	IP Address	MAC Address	Do Not Propagate	Del
441530	10.197.143.19	80:5e:c0:fa:cf:25	<input type="checkbox"/>	<a href="#">Del</a>
441531	10.197.143.22	90:de:80:ca:7e:c9	<input type="checkbox"/>	<a href="#">Del</a>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<a href="#">Add</a>

### Advertised Services

Name	Link	URL	Add
<input type="text"/>	<input type="checkbox"/>	z://HB9BLA-VM-1	<a href="#">Add</a>

### Current DHCP Leases

IP Address	MAC Address	Add
10.197.143.22	90:de:80:ca:7e:c9	<a href="#">Add</a>
10.197.143.19	80:5e:c0:fa:cf:25	<a href="#">Add</a>

### Port Forwarding

Interface	Type	Outside Port	LAN IP	LAN Port	Add
WAN	TCP	<input type="text"/>	- IP Address -	<input type="text"/>	<a href="#">Add</a>

### DNS Aliases

Alias Name	IP Address	Add
<input type="text"/>	- IP Address -	<a href="#">Add</a>

Part of the AREDN™ Project. For more details please [see here](#)

You get the telephone number from HB9JAT, HB9BND, oder HB9BLA. The MAC Adresse is on the telephone under «information».

After reboot, your telephones have to be visible in „mesh status“ near your station:

**HB9BLA-VM-1 mesh status**

Location Not Available

[Help](#) [Refresh](#) [Auto](#) [Cloud Mesh](#) [Quit](#)

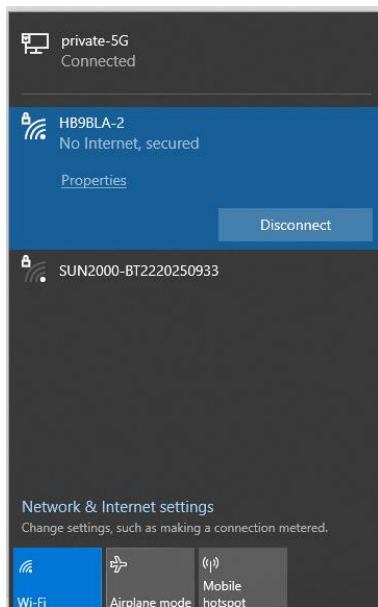
Node Name	LAN Hostname	Service Name
HB9BLA-VM-1	441530 441531	

Set up a tunnel to the AREDN network  
(only necessary if you connect via an Internet tunnel)

This chapter only applies to the hap router.

Connect port 1 (Internet) to the Internet.

From now on, you can access the router via Wi-Fi from your PC by looking for the right WLAN and connecting your PC to the router:



You should get the tunnel data from your tunnel server responsible:

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

Enabled?	Server	PwD	Network	Active	Action
<input checked="" type="checkbox"/>				Inactive	Del

Contact Info/Comment (Optional):

Tick «enable» and press «Save changes.»

Your tunnel should be active after a short time (blue cloud with an arrow).

You are now connected to the AREDN network. Go to «Node-Status» / «Mesh Status» and enjoy the success.



## HB9BLA-166-229-235 mesh status

Location:

[Help](#)

[Refresh](#)

[Auto](#)

[Quit](#)

Node Name	Lan Hostname	Service Name
HB9BLA-166-229-235	441530	

Current Neighbor	Lan Hostname	LQ	NLQ	TxMbps	Service Name
HB9 (dtd)		100%	100%		
HB9 G159-20M (tun)	freepbx	100%	100%		HP VOIP
HB9 -232 (tun,wan)		100%	100%		
HB9 -232 (tun,wan)	AREDN-WS-UP hb-aredn-srv01	100%	100%		Telefonbuch Yealink-Phonebook CHAT4ALL
HB9 (tun)		100%	100%		
Prev					
HB9	ors				
	15 minutes ago				

Ren	LAN Hostname	ETX	Service Name
HB9 G169-120		0.20	
PA30		0.20	
HB9 8 (tun*2)		0.20	
HB9 (tun*3)		0.20	
HB3 2)	arednports00	0.20	
HB9		0.20	
HB9 17-97 (tun*1)		0.20	
HB9		0.20	
HB9 (tun*1)		0.20	
HB9 un*1)	413330	0.20	CHAT4ALL
HB9 (tun*1)	178230	0.20	
HB9 G155-120 (tun*1)		0.20	CHAT4ALL
HB9 N-2G11-OMNI (tun*2)		0.20	
HB9 R-HB3XRV (tun*2)		0.20	
	W70B T42G		
HB9		0.30	
HB9 8 (tun*1)		0.30	
HB9 R-HB9FRR (tun*7)		0.30	
HB9 R-HB9FRR (tun*2)		0.30	

Note the LAN address:

## HB9HFM-HAP-1

Location:

[Help](#)

[Refresh](#)

[Mesh Status](#)

[Neighbor Status](#)

[WiFi Scan](#)

[Setup](#)

[Select a theme](#) ▼

mesh RF address: 10.198.102.254 / 8

mesh gateway: none

gateway node:

SSID: AREDN-10-v3

channel: -2

channel width: 10 MHz

LAN address: 10.51.55.241 / 29

LAN AP SSID: HB9BLA-2

WAN address: 192.168.0.36 / 24

default gateway: 192.168.0.1

signal|noise|SNR: -78 | -85 | 7 dB

[Charts](#)

firmware version: 3.22.12.0

model: MikroTik RouterBOARD RB952Ui-5ac2nD

system time: Sat Mar 18 2023 07:50:37 CET

uptime: 0:25

load average: 0.00, 0.01, 0.05

available space: flash = 10476 KB

memory = 28440 KB

host entries: 38 nodes / 89 total devices

Part of the AREDN™ Project. For more details please [see here](#)

## Phonebook

This project aims to create a common Swiss AREDN telephone directory and distribute it to all participating AREDN phones in Switzerland. By storing its latest version on each router, we can make sure 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.

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

[https://docs.google.com/spreadsheets/d/1g33BHSXMC8T4Cmfz\\_Zq-XxtPP17dtEBexF2i4KKe\\_Mc/edit?usp=sharing](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.

Currently, we support Yealink telephones, and Cisco phones are in the test.

The telephones used for AREDN offer local phonebooks that can be automatically loaded from a remote location. The file format used for that process is XML.

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.

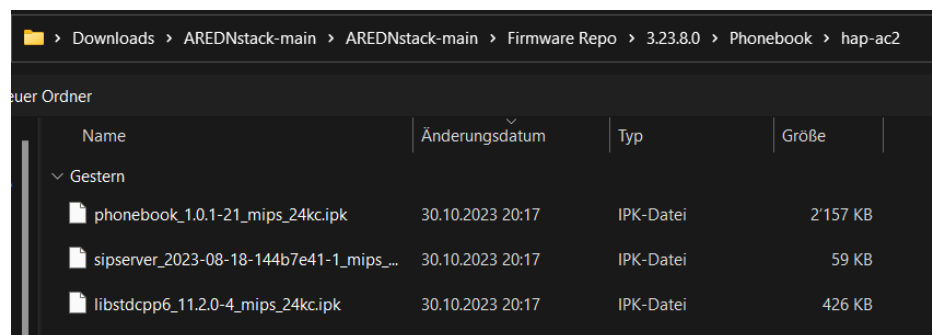
We use direct calling instead of a PBX to avoid a single point of failure for communication, reduce the latency time, and reduce the overload of single mesh segments. The address used for this case is an FQDN like [178230@178230.local.mesh](https://178230@178230.local.mesh). If you want or need to operate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

To support direct calling and PBX, our phones get two phone books ("Direct" and "PBX").

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 to a web server in the AREDN mesh. If Google is down, we could still edit this .csv file manually. This transfer is done every hour. An example job is in the repository.

## Installation

On our router, we must install three packages ( A library, SIPserver, and the phonebook itself).



This can be done in the "Setup→Administration Tab of the AREDN GUI:

The screenshot shows the AREDN GUI Administration tab. The top navigation bar includes links for Node Status, Basic Setup, Port Forwarding, DHCP, and Services, Tunnel Server, Tunnel Client, Administration (highlighted), and Advanced Configuration. Below the navigation bar, there are buttons for Help and Reboot. The main content area is divided into three sections: Firmware Update, Package Management, and Authorized SSH Keys. The Firmware Update section shows the current version as 3.23.4.0 and hardware type as (ipq40xx/mikrotik) mikrotik (hap-ac3). It includes options to upload, download, or load local firmware. The Package Management section shows a list of packages with columns for Name, Version, and Action. The Authorized SSH Keys section shows a list of keys with columns for Name, Key, and Action.

These packages are different for each AREDN release and each router (they have different chips inside). No nightly builds are supported (it still might run, but at your own risk).




**Important:** If you re-flash or upgrade your router, all three packages are erased and must be installed again.

**Important:** Check that your router is on the same firmware version as the packages you want to install

The screenshot shows the AREDN GUI Administration tab, specifically the Firmware Update section. The top navigation bar is the same as in the previous screenshot. The Firmware Update section shows the current version as 3.23.8.0 and hardware type as (x86/64) (qemu-standard-pc-i440fx-piix-1996). It includes options to upload, download, or load local firmware. A red arrow points from the 'Current Version: 3.23.8.0' field to the breadcrumb navigation at the bottom of the page, which reads: Downloads > AREDNstack-main.zip > AREDNstack-main > Firmware Repo > 3.23.8.0 > Phonebook > hap-ac2.

Start with the libstdcpp6 package and continue with the rest.

AREDNstack > Firmware Repo > 3.23.8.0 > Phonebook > hap-ac-lite

Name	Date modified	Date created	Type	Size
 libstdcpp6_11.2.0-4_mips_24kc.ipk	30/10/2023 19:09	29/10/2023 09:08	IPK File	426 KB
 phonebook_1.1.2-27_mips_24kc.ipk	05/11/2023 19:25	05/11/2023 20:55	IPK File	2'158 KB
 sipserver_1.0.0-3_mips_24kc.ipk	30/10/2023 19:09	30/10/2023 20:00	IPK File	59 KB

Your router will confirm that it installed the packages.

Now reboot the router, and the little phone on your Yealink connected to your router should become green. Success.

You also should find an AREDN directory in the directory tab. It most probably will be empty. After about one hour, it should be populated.

If you are in a hurry, you can issue this command:

<http://localnode.local.mesh/cgi-bin/phonebook.sh>

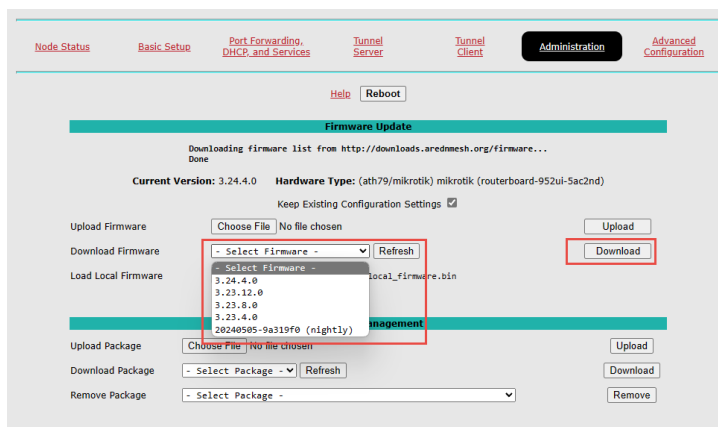
Now your phonebooks should be populated. The names with an Asterisk in front of the name are phones that are currently connected to the network. The ones without one are not connected. These asterisks are automatically downloaded to your phone every hour. You can press the "update" button to get a newer version (the check runs every 15 minutes).

The phonebooks are stored on your router, and your phone gets them also when it is powered off for a while (during power-up).

Now, reboot your router. Your small phone in the display should now turn green (your phone is registered), and you can call a fellow HAM for a test using the "direct" phonebook. You should see an "HD" sign in the display showing that your phones use the best available quality.

## Upgrade

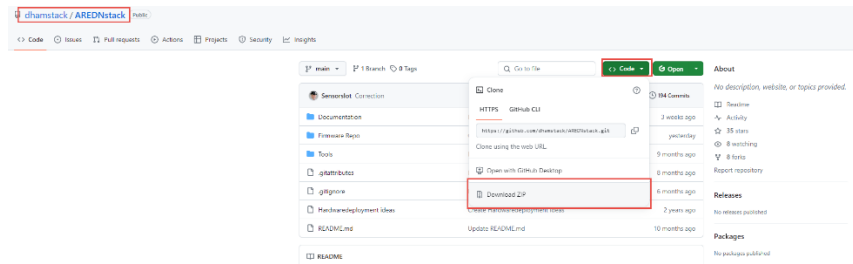
First upgrade your router software to the newest version. Connected to the internet, you can download the new version and install it (it takes a while till the versions are displayed):





Download the complete repo from

<https://github.com/dhamstack/AREDNstack/tree/main>



It is easiest to connect your router to your home network (use port 1). Go to “Administration” and compare the following file in “remove files”:



The screenshot shows the GitHub repository structure for AREDNstack-main. The path is AREDNstack-main > Firmware Repo > 3.24.4.0 > Phonebook > hap-ac3. The file list includes:

Name	Date modified	Date created	Type	Size
Today				
libstdcpp6_13.2.0-4_arm-cortex-a7_neon-vfpv4.ipk	06/05/2024 09:31	06/05/2024 00:29	IPK File	581 KB
phonebook_1.2.1-r1_arm-cortex-a7_neon-vfpv4.ipk	06/05/2024 09:31	06/05/2024 00:29	IPK File	2 307 KB
sipserver_1.0.1-r1_arm-cortex-a7_neon-vfpv4.ipk	06/05/2024 09:31	06/05/2024 00:29	IPK File	64 KB

The screenshot shows the Mikrotik WinBox Administration interface. At the top, there are navigation tabs: Node Status, Basic Setup, Port Forwarding, DHCP and Services, Tunnel Server, Tunnel Client, Administration (selected), and Advanced Configuration. Below the tabs are links for Help and Reboot. The main content area is divided into four sections:

- Firmware Update:** Shows the current version (3.23.8.0) and hardware type (ath79/mikrotik mikrotik (routerboard-952ui-5ac2nd)). It includes options to upload, download, or load local firmware, with a checkbox to keep existing configuration settings.
- Package Management:** Shows options to upload, download, or remove packages. A red box highlights the 'Choose File' button and the file name 'libstdcpp6\_13.2.0-r4\_mips\_24kc.ipk'.
- Authorized SSH Keys:** Shows options to upload or remove SSH keys.
- Support Data:** Includes a button to download support data.

Now you can continue to check the sipserver package the same way. If it does not want to “downgrade” and you are sure you are trying to install the newest version, remove the package first.

Do the same with the file “phonebook\_xxx”.

You can always check if the correct versions are installed.

Now, you can install your router into your AREDN network. After rebooting, the phone should connect to the sip server, and you should be able to download the phonebook

## Troubleshooting (Files to check):

### Config file

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

```
vi /etc/config/phonebook
```

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

#### Phonebook.csv

Check in /www/arednstack/ if phonebook.csv is downloaded. If not, wait for a few hours and check again.

#### 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.