



MESHCOM MCAPP INSTALLATION

SCREEN SHOTS – RESPONSIVE UI WITH DARK MODE

Messages

Ziel: all

- No Filter (658)
 - 20 (113)
 - 222 (18)
 - 22251 (27)
 - * (426)
 - DK5EN-99 (20)
 - OE5HWN-12 (24)
 - OE9ROE-92 (2)
 - DL2JA-11 (3)
 - DL2JA-3 (2)
 - DO1MH-12 (1)

IW1QAF-11 udp Il nuovo Nodo iw1qaf-11 è aperto a tutto il traffico mesh.. Vede Piemonte, parte della Lombardia e Liguria.

92F550FC 20.04.2025, 09:37:04

DL9CL-10 udp Happy Easter from Stuttgart SW-Germany A5E5B041 20.04.2025, 09:42:24

DK5EN-12 node buona pasqua IW1QAF-11 EFF85245 20.04.2025, 09:46:00

DK5EN-12 node Happy Easter to Skofja Loka, the city related to Freising! EFFF85246 20.04.2025, 09:46:31

DL9CL-10 udp mheard do9do-10 A5E5B044 999 20.04.2025, 09:49:05

Neueste unten 140

cFSdump

```
{"src_type": "udp", "type": "msg", "src": "DL9CL-7", "dst": "*"}, {"msg": "schoene gruesse auch von mir der hunderunde!", "msg_id": "09FE082B", "firmware": "30", "tv_sub": "n", "timestamp": "1745138272228}
```

Schreib etwas ..

to the ☺

Positions

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cFSdump

all

all DK5EN-99 | WsProxy:rpizero.local-2981 | remaining:149

Schreib etwas ..

to the ☺

Internet

MeshCom

Settings

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DK5EN-12 lora - / - House 48.423N / 11.7865E / 499m / Firmware: 34x

E9F1137F Batteriekapazität: 100 % 20.04.2025, 10:24:50

DK5EN-99 lora - / G Grid square, 3 by 3 48.4071N / 11.7388E / 480m / Firmware: 34x

EA0EB0F9 Batteriekapazität: 100 % 20.04.2025, 10:27:22

DG7RJ-11 lora - DG7RJ-12 / # Digipeater 48.302N / 11.6276E / 509m / Firmware: 34v

EA3E31D Batteriekapazität: 78 % 20.04.2025, 10:28:40

DG7RJ-12 lora - / - House 48.3021N / 11.6276E / 465m / Firmware: 34w

EF2ED19 Batteriekapazität: 83 % 20.04.2025, 10:33:51

Neueste unten 20

Internet

MeshCom

Settings

Messages

X 15 (1) X X 20 (115) ✓ X 222 (19) ✓ X 888 (3) X

X 999 (10) X X 7007 (2) ✓ X 8092 (1) X X 22251 (27) ✓

X 26275 (1) X X 26277 (11) ✓ X 26298 (59) ✓ X 26362 (1) ✓ X DK5EN-99 (20) ✓

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X OE5HWN-12 (24) ✓ X OE9ROE-92 (2) ✓ X DL2JA-11 (3) ✓ X TEST (2) ✓

X DO1MH-12 (1) ✓ X TEST (2) ✓ X Time (10) ✓

Callsign	DK5EN	SID	99	Scrollbar	140
WebSocket IP	rpizero.local	WebSocket Port	2981	LoRa IP	not used
LoRa Port	not used	Country	EU8	TX Power	10
Latitude	48 . 123	Longitude	12 . 073	Altitude	468
APRS Name	not used	APRS Group	/	APRS Symbol	#

Positions

X 15 (1) X X 20 (115) ✓ X 222 (19) ✓ X 888 (3) X

X 999 (10) X X 7007 (2) ✓ X 8092 (1) X X 22251 (27) ✓

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VORWORT

- Die Kommunikation zwischen Webbrowser am PC und Server Komponente am Raspi Zero kann nur TLS-verschlüsselt erfolgen, weil modernen Browser dies erzwingen. Dies ist kein unnötiger Luxus, sondern wird vom Webbrowser (Chrome, Safari, ..) für Websockets gefordert
- Offizielle Zertifikate von Let's Crypt werden nur für offizielle Domains ausgestellt. Wenn man mit mDNS „.local“ (auf MacOS oder Windows mit iTunes installiert) oder Fritz!Box .fritz.box arbeitet, dann gibt es keine SSL-Zertifikate, die gegen ein getrustetes Root-Zertifikat laufen, die im Browser und Betriebssystem vorinstalliert sind
- Jedoch ist die für den geübten Admin kein Problem, denn Caddy bringt eine PKI mit Zertifikatsrotation mit sich. x.509 Zertifikate sind trotzdem komplex
- Daher muss das self-signed Root Zertifikat der Caddy PKI importiert werden

- SSL-Zertifikate enthalten immer den Hostname, der mit der URL übereinstimmen muss. Es ist nicht möglich mit IP-Adressen zwischen Webbrowser und Raspi im lokalen Netz zu arbeiten. Es muss alles zwingend über DNS-Namen laufen, die auch dem cn= Eintrag im Zertifikat entsprechen
- Die Serverkomponente ist ein Python Script, das die Messages per UDP mit dem MeshCom Node austauscht und alles über einen WebSocket weiterleitet. Der WebSocket wird TLS verschlüsselt durch Caddy, den Reverse Proxy
- Der lighttpd Webserver wird ebenso durch Caddy TLS verschlüsselt. Die Webseite selbst ist statisch, es wird kein PHP benötigt, es ist eine Single Page App
- Zum Abschluss nicht vergessen auf dem MeshCom Knoten `--extudp on` zu konfigurieren und einzuschalten.
- Stabilere Kommunikation mit viel mehr Daten läuft über Bluetooth

INSTALL PROCEDURE

- Flash SD card, insert, boot up, wait for FS expansion (takes 2 minutes)
- Login via ssh and your user, execute statements one after another

```
■ curl -fsSL https://raw.githubusercontent.com/DK5EN/McAdvChat/main/install_caddy.sh | bash  
■ curl -fsSL https://raw.githubusercontent.com/DK5EN/McAdvChat/main/mc-install.sh | sudo bash  
■ curl -fsSL https://raw.githubusercontent.com/DK5EN/McAdvChat/main/install_mcproxy.sh | bash  
■ sudo vi /etc/mcadvchat/config.json  
■ curl -fsSL https://raw.githubusercontent.com/DK5EN/McAdvChat/main/install_mcproxy.sh | bash
```

- Got to web browser,
 - On a Mac Computer with mDNS responder: import root certificate <https://mcapp.local/root.crt>
 - On a Windows PC, but with a Fritz!Box as DSL Router: <https://mcapp.fritz.box/root.crt>
- Go to web browser,
 - On a Mac: <https://mcapp.local/webapp>
 - On a PC with Fritz!Box: <https://mcapp.fritz.box/root.crt>
- Click connect MC
- Enjoy

TROUBLE SHOOTING GUIDE

- After you have setup everything, make sure that you can open the McApp WebPage
- If the Websocket connection then fails, this means: Caddy + LightHTTPd is running, but something with the mcproxy service isn't right.

Check that all services are up and running

```
martinwerner@MacBook-Pro-von-Martin ~ % ssh mcapp.local
martin@McApp:~ $ systemctl status caddy
● caddy.service - Caddy
  Loaded: loaded (/lib/systemd/system/caddy.service; enabled; preset: enable
  Active: active (running) since Fri 2025-06-13 20:55:23 CEST; 1 week 3 days
    Docs: https://caddyserver.com/docs/
  Main PID: 504 (caddy)
    Tasks: 11 (limit: 178)
      CPU: 5min 3.308s
     CGroup: /system.slice/caddy.service
             └─504 /usr/bin/caddy run --environ --config /etc/caddy/Caddyfile

martin@McApp:~ $ systemctl status lighttpd
● lighttpd.service - Lighttpd Daemon
  Loaded: loaded (/lib/systemd/system/lighttpd.service; enabled; preset: ena
  Active: active (running) since Thu 2025-06-19 10:26:25 CEST; 4 days ago
  Process: 15531 ExecStartPre=/usr/sbin/lighttpd -tt -f /etc/lighttpd/lighttp
  Main PID: 15536 (lighttpd)
    Tasks: 1 (limit: 178)
      CPU: 20.959s
     CGroup: /system.slice/lighttpd.service
             └─15536 /usr/sbin/lighttpd -D -f /etc/lighttpd/lighttpd.conf

martin@McApp:~ $ systemctl status mcproxy
● mcproxy.service - McAdvances MeshCom Proxy Service
  Loaded: loaded (/etc/systemd/system/mcproxy.service; enabled; preset: enab
  Active: active (running) since Thu 2025-06-19 11:27:08 CEST; 4 days ago
  Main PID: 16118 (python3)
    Tasks: 5 (limit: 178)
      CPU: 5min 55.350s
     CGroup: /system.slice/mcproxy.service
             └─16118 python3 /usr/local/bin/C2-mc-ws.py
```

▪ Check your config file

```
martin@McApp:~ $ cat /etc/mcadvchat/config.json
```

```
{
  "UDP_PORT_list": 1799,
  "UDP_PORT_send": 1799,
  "UDP_TARGET": "192.168.68.69",
  "WS_HOST": "127.0.0.1",
  "WS_PORT": 2980,
  "PRUNE_HOURS": 168,
  "MAX_STORAGE_SIZE_MB": 50,
  "STORE_FILE_NAME": "/home/martin/mcdump.json",
  "VERSION": "v0.0.0",
  "CALL_SIGN": "DK5EN-99",
  "LAT": 48.4031,
  "LONG": 11.7497,
  "STAT_NAME": "Freising",
  "USER_INFO_TEXT": "DK5EN-99 Node | Location: Freising, Germany | Operator: Martin | QRV: 70cm/2m/HF | QRZ.COM DK5EN"
}
```

No comments in json files, make sure to have a comma at the end!

Don't change UDP_PORT*, WS_HOST, WS_PORT.

CALL_SIGN is used for the command interface. If you don't like commands, don't fill it.

STAT_NAME and USER_INFO_TEXT is used for „!WX“ command

UPDATING TO THE LATEST VERSION

- At a later time, update everything, just use the script
- mc-install.sh is to keep all installed files up to date
- install_mcproxy.sh does maintain config files

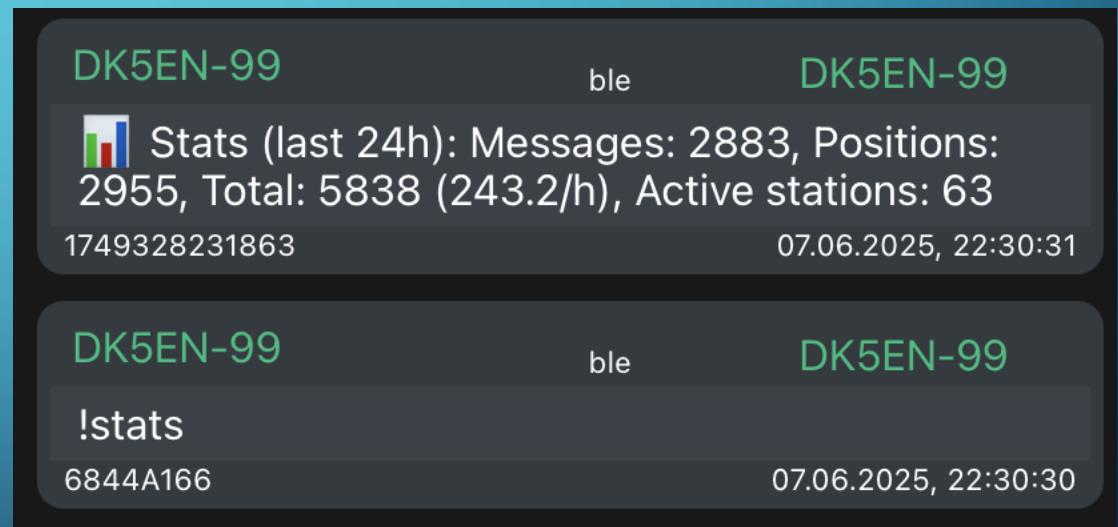
```
martin@McApp:~ $ curl -fsSL https://raw.githubusercontent.com/DK5EN/McAdvChat/main/mc-install.sh | sudo bash

[INFO] Skript läuft unter Benutzer: martin
[INFO] Lokale WebApp-Version: v0.1.0
[INFO] Lokale Python-Skript-Version: v0.2.0
[INFO] Lokale Shell-Skript-Version: v0.2.0
[INFO] Install-Skript-Version: v0.1.0
[INFO] Remote WebApp-Version: v0.1.0
[INFO] Remote Python-Skript-Version: v0.2.0
[INFO] Remote Shell-Skript-Version: v0.2.0
[INFO] Reloade Webserver ...
[INFO] Prüfe WebApp unter https://rpizero.local/webapp/version.txt
[INFO] WebApp erfolgreich aktualisiert auf Version v0.1.0
[INFO] Installations-Skript erfolgreich abgeschlossen.

martin@McApp:~ $ curl -fsSL https://raw.githubusercontent.com/DK5EN/McAdvChat/main/install_mcproxy.sh | bash
```

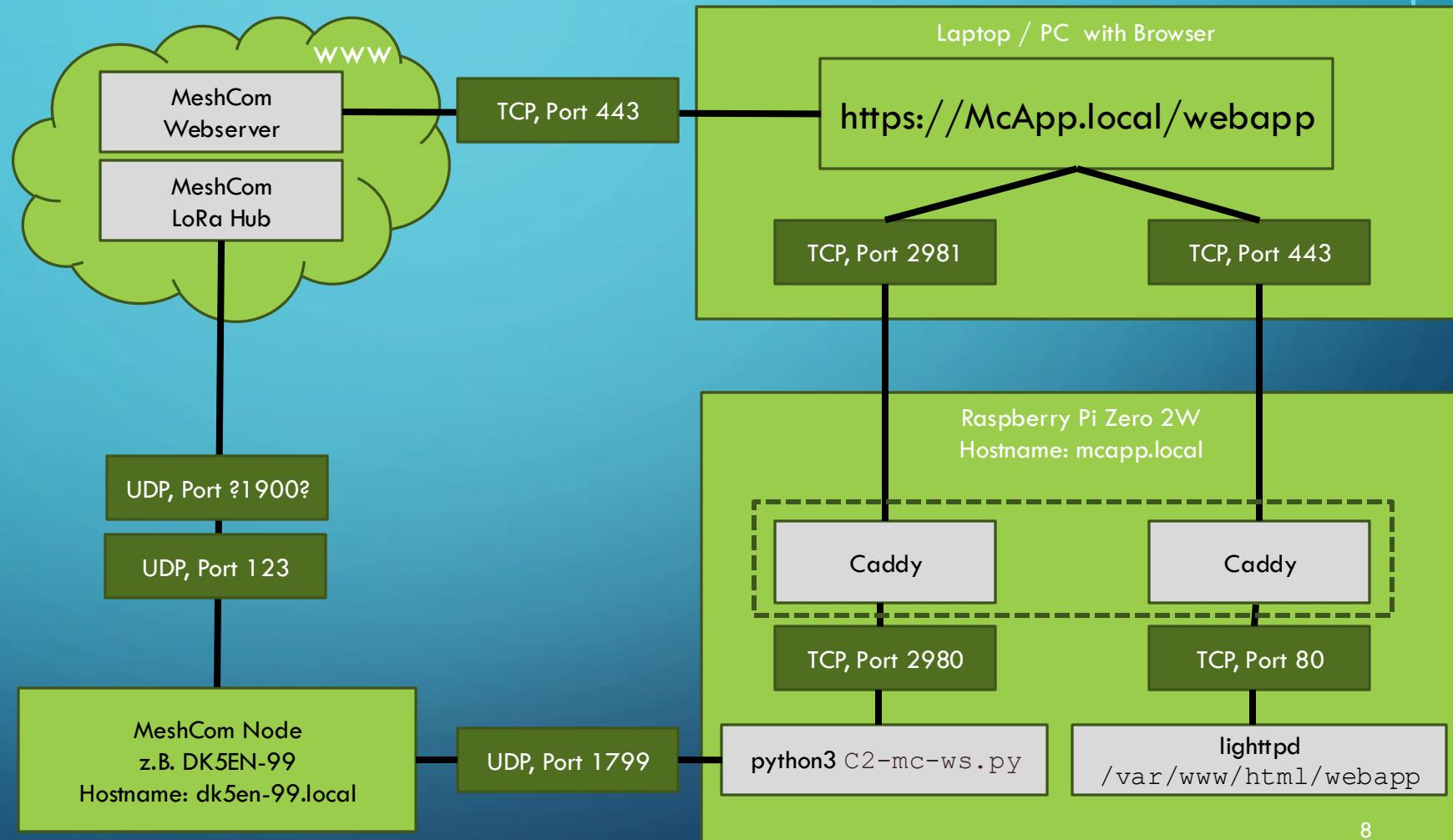
MCAPP COMMANDS

- If you configure your Callsign with SID in the config file, you can send commands to the server process
- !help
- !stats
- !stats 96
- !search db0ed
- !search dl2ja-1
- !mheard or !mh
- !mheard type:pos
- !mheard tye:msg
- !pos db0ed
- !wx



HIGH LEVEL ARCHITECTURE

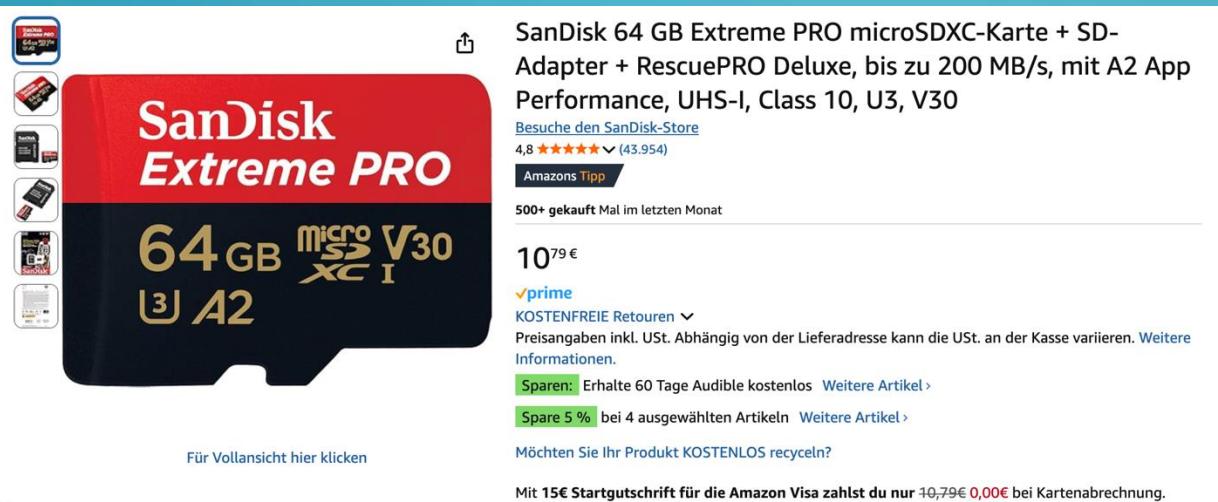
- High level overview of how everything is tied together



Some screenshots on how to install

SD CARD & RPI ZERO

- Insert your at least 32GB SD Card into your card reader
- Please only use SD Cards with 100MBit/s like SanDisk
- Have your Raspberry Pi Zero 2W at Hand

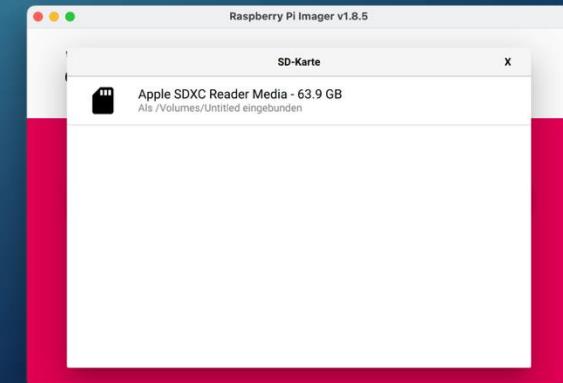
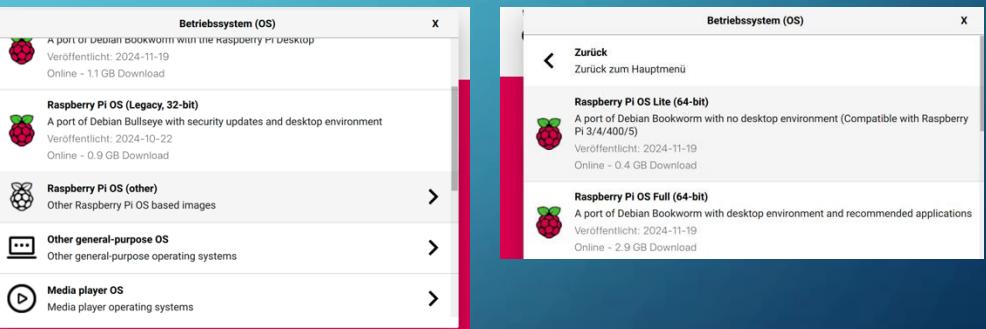
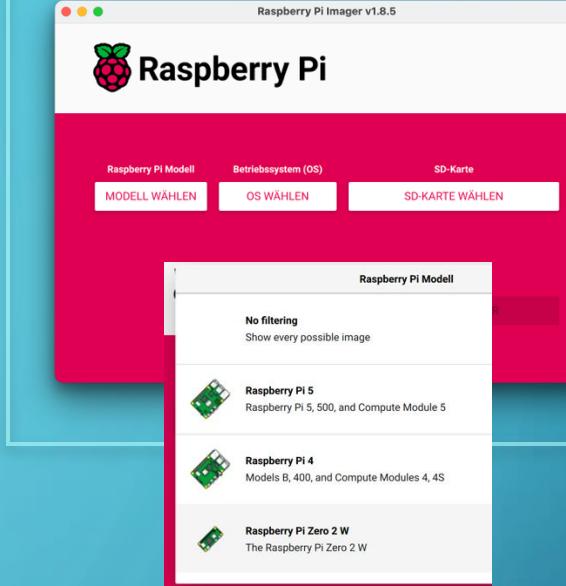


CUSTOM OS INSTALLATION

We want to install a headless, 64Bit Debian Bookwork

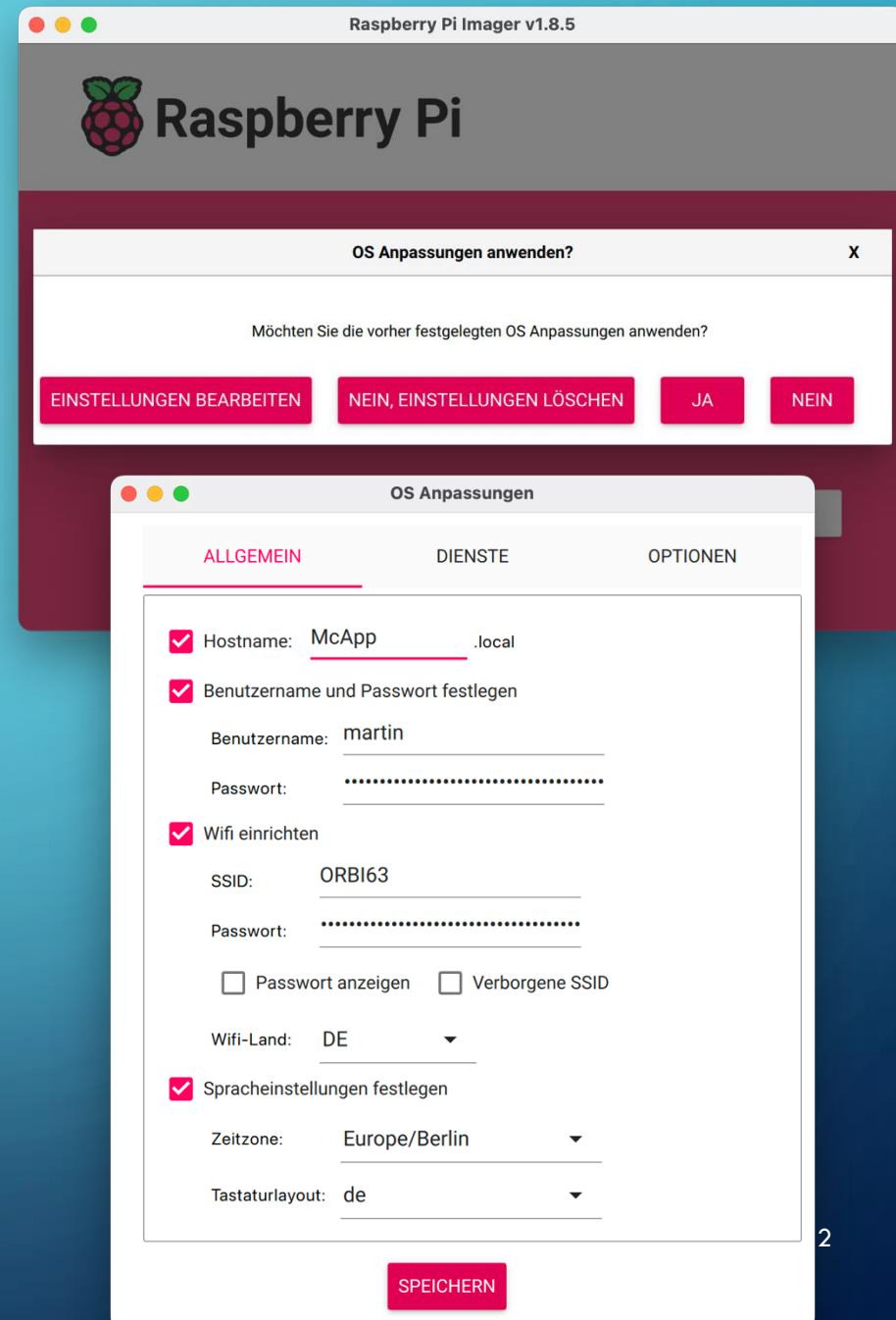
- I do recommend Raspberry PI Imager, which can be found here
<https://www.raspberrypi.org/downloads/>
- Select your Model: Raspberry Pi Zero 2 W
- For OS, select “other“ – „Raspberry Pi OS Lite (64-bit), with no desktop, approx. 0,4GB
- Select your SD Card

.. And click next



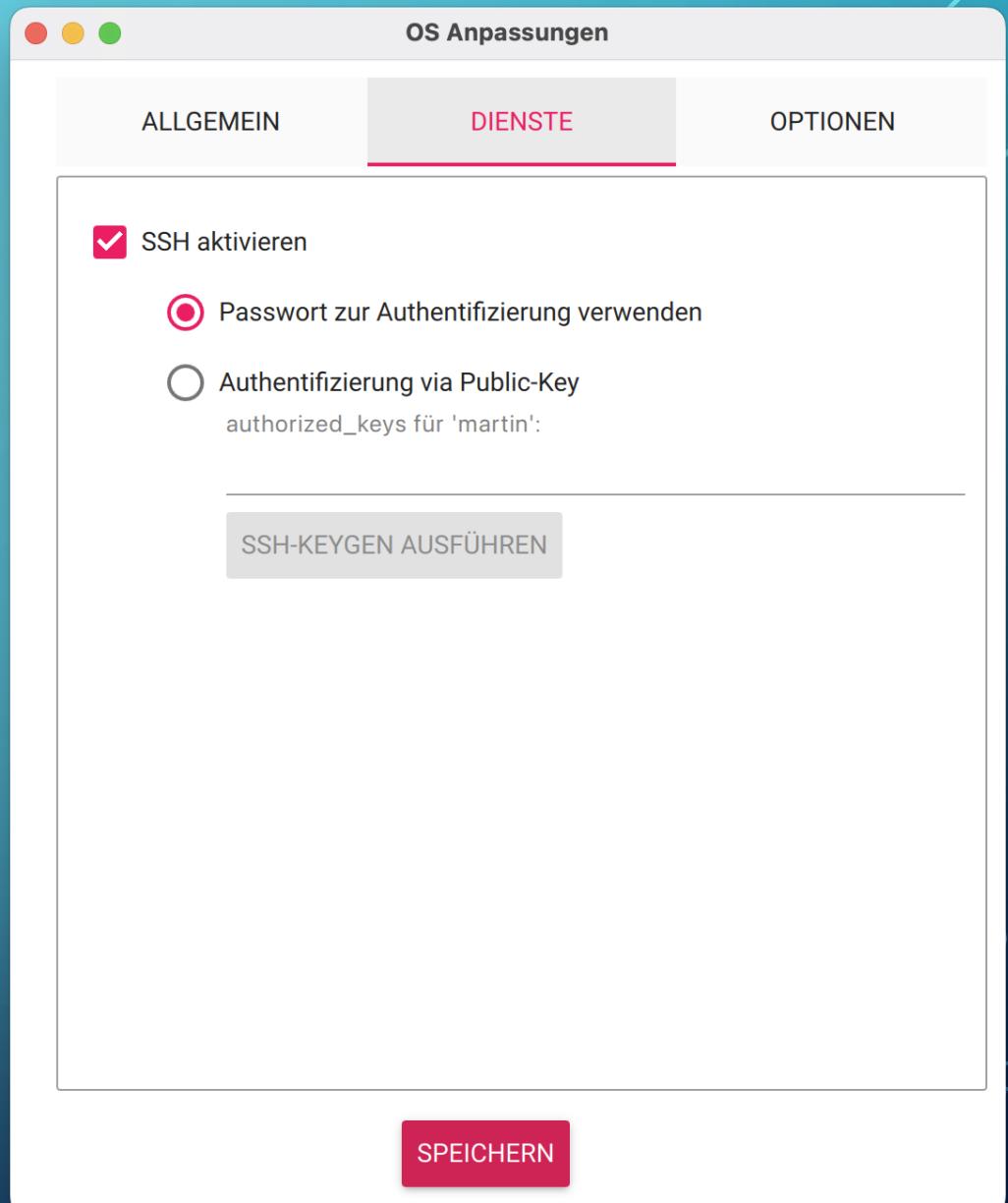
IMPORTANT CUSTOMIZATIONS

- Choose your hostname: McApp in our example
- Choose what ever username, you want. I do not recommend to setup a standard „pi“ user, as this is a security risk
- Choose your login password, which should later be changed to a pre-shared ssh key
- Make sure you have your WiFi Settings correct, because otherwise you will not be able to access your headless system



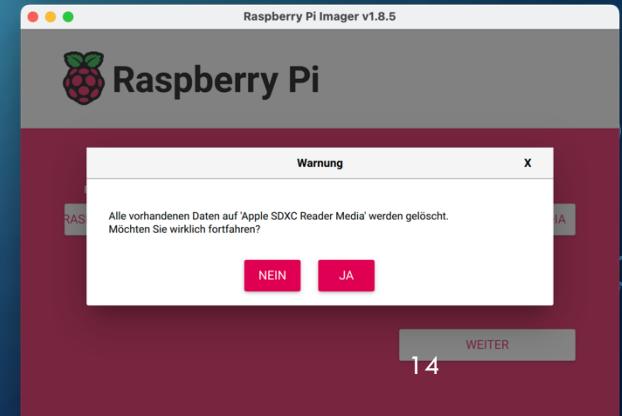
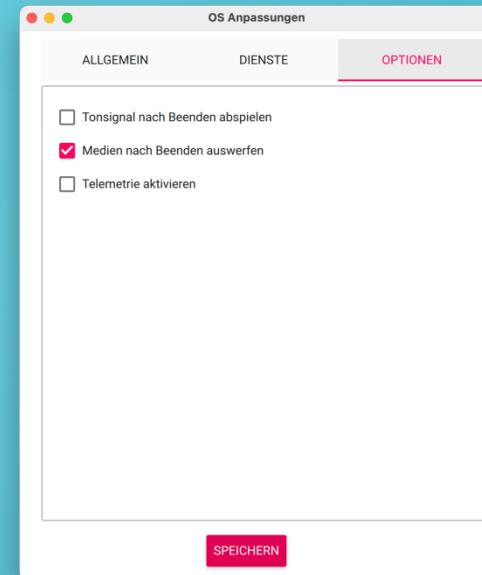
ACTIVATE SSH

- Make sure that ssh is activated.
- For the initial setup, we start with password Authentication.
- If you are experienced, you can also set a pre-shared key.



OPTIONS

- Nothing to change here, everything standard.
- Now click save
- Then click yes to apply custom settings
- Now agree to erase everything on the SD card.



FLASHING THE SD CARD

- Now wait for the flashing to be finished
- On MacOS you get asked about your Admin password, as this is a low level write, that needs more privileges

- After a short while you should see the success message
- Close Raspberry Pi Imager, eject your SD card

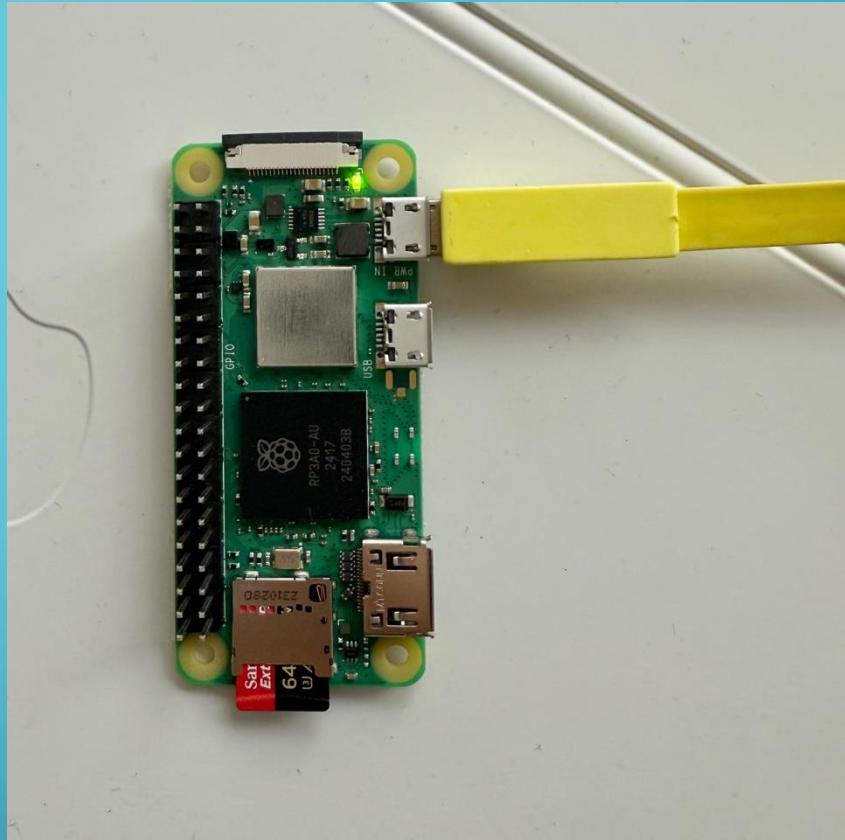


FIRST TIME BOOT UP

- Insert your SD card into Raspberry Pi 2 Zero
- Attach 5V via Mini USB Jack
- The greenlight starts flashing

Raspberry Pi is booting up and expanding the filesystem. Depending on your SD card, this takes at least 2 Minutes. Grab yourself a coffee and wait

- If you have mDNS, then you can try to ping your Raspberry Pi
- Otherwise check your WiFi Router for the IP of the new device



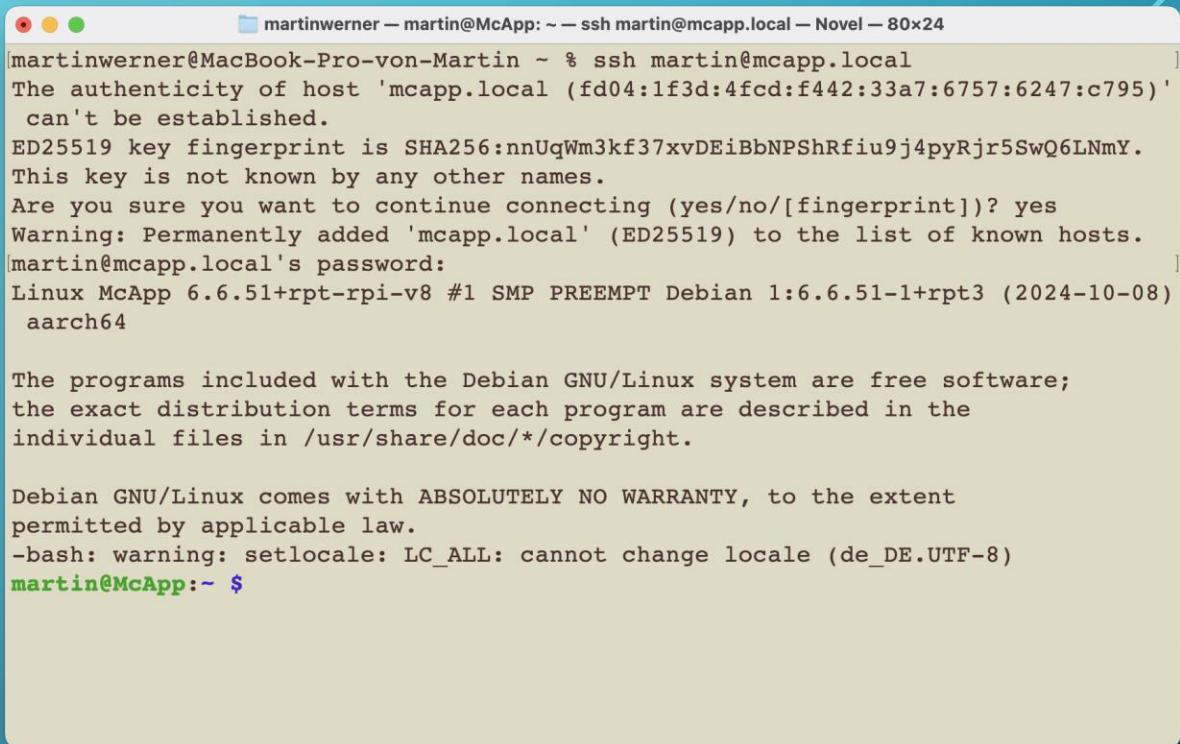
```
[martinwerner@MacBook-Pro-von-Martin .ssh % ping mcapp.local
ping: cannot resolve mcapp.local: Unknown host
[martinwerner@MacBook-Pro-von-Martin .ssh % ping mcapp.local
PING mcapp.local (192.168.68.70): 56 data bytes
64 bytes from 192.168.68.70: icmp_seq=0 ttl=64 time=121.193 ms
64 bytes from 192.168.68.70: icmp_seq=1 ttl=64 time=11.150 ms
64 bytes from 192.168.68.70: icmp_seq=2 ttl=64 time=8.156 ms
64 bytes from 192.168.68.70: icmp_seq=3 ttl=64 time=3.976 ms
64 bytes from 192.168.68.70: icmp_seq=4 ttl=64 time=8.038 ms
64 bytes from 192.168.68.70: icmp_seq=5 ttl=64 time=15.590 ms
```

TIME TO ACCESS YOUR RASPI

Use putty on Windows or term on MacOS

- Make sure to use the correct username for your Pi Zero
- Accept the new ssh fingerprint
- Enter your password
- You should now have ssh access to your Raspi

- Now run the 4 commands shown on Page 4- “New install procedure”



The screenshot shows a terminal window titled "martinwerner — martin@McApp: ~ — ssh martin@mcapp.local — Novel — 80x24". The window displays the following text:

```
martinwerner@MacBook-Pro-von-Martin ~ % ssh martin@mcapp.local
The authenticity of host 'mcapp.local (fd04:1f3d:4fc0:f442:33a7:6757:6247:c795)' can't be established.
ED25519 key fingerprint is SHA256:nnUqWm3kf37xvDEiBbNPShRfiu9j4pyRjr5SwQ6LNmY.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'mcapp.local' (ED25519) to the list of known hosts.
martin@mcapp.local's password:
Linux McApp 6.6.51+rpi-v8 #1 SMP PREEMPT Debian 1:6.6.51-1+rpi3 (2024-10-08) aarch64

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/*copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
-bash: warning: setlocale: LC_ALL: cannot change locale (de_DE.UTF-8)
martin@McApp:~ $
```

CERTIFICATE HANDLING

CHECK THE WEB SERVER DOWNLOAD SSL CERTIFICATE

- First we access our lighttpd via http – the unencrypted version.

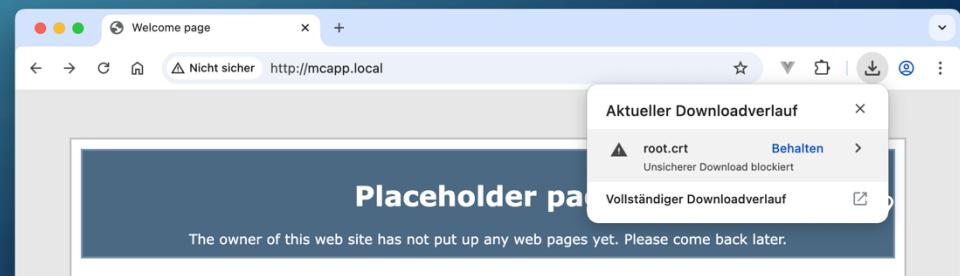
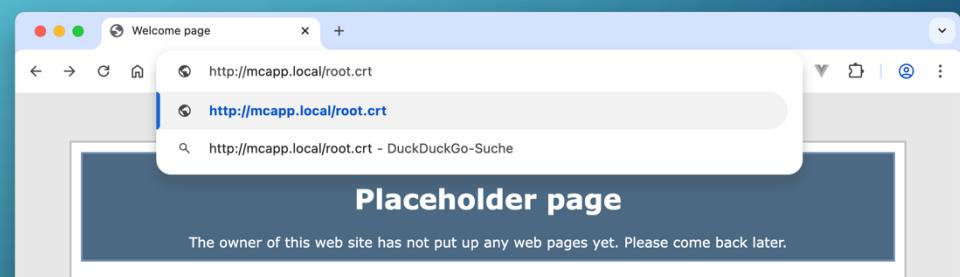
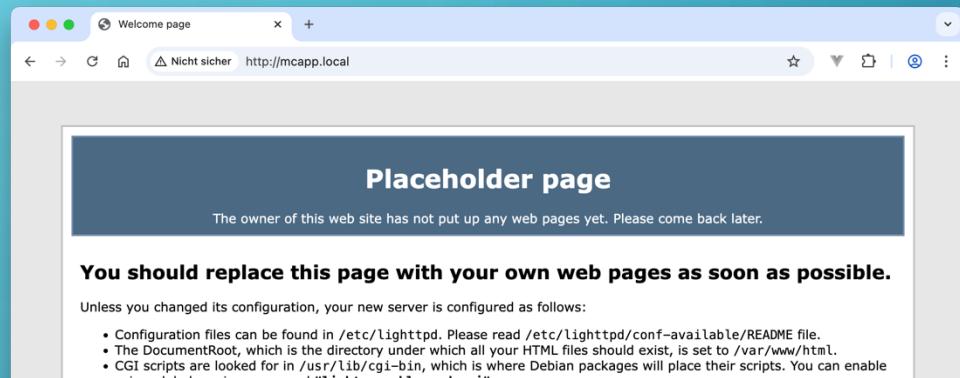
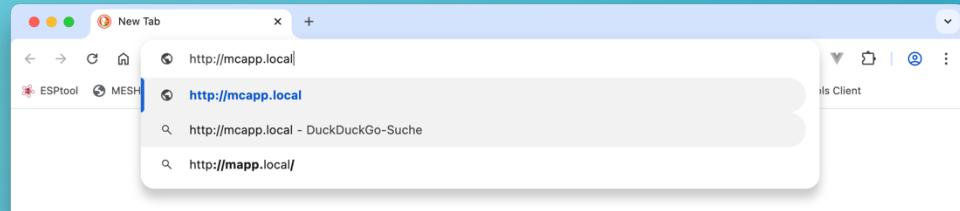
<http://mcapp.local>

- You should see the placeholder page

- Now we download the self-signed root certificate

<http://mcapp.local/root.crt>

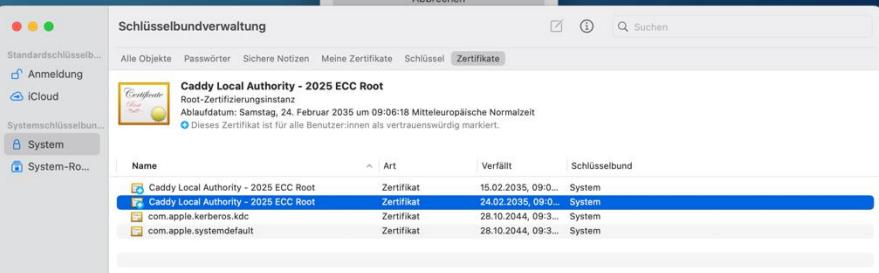
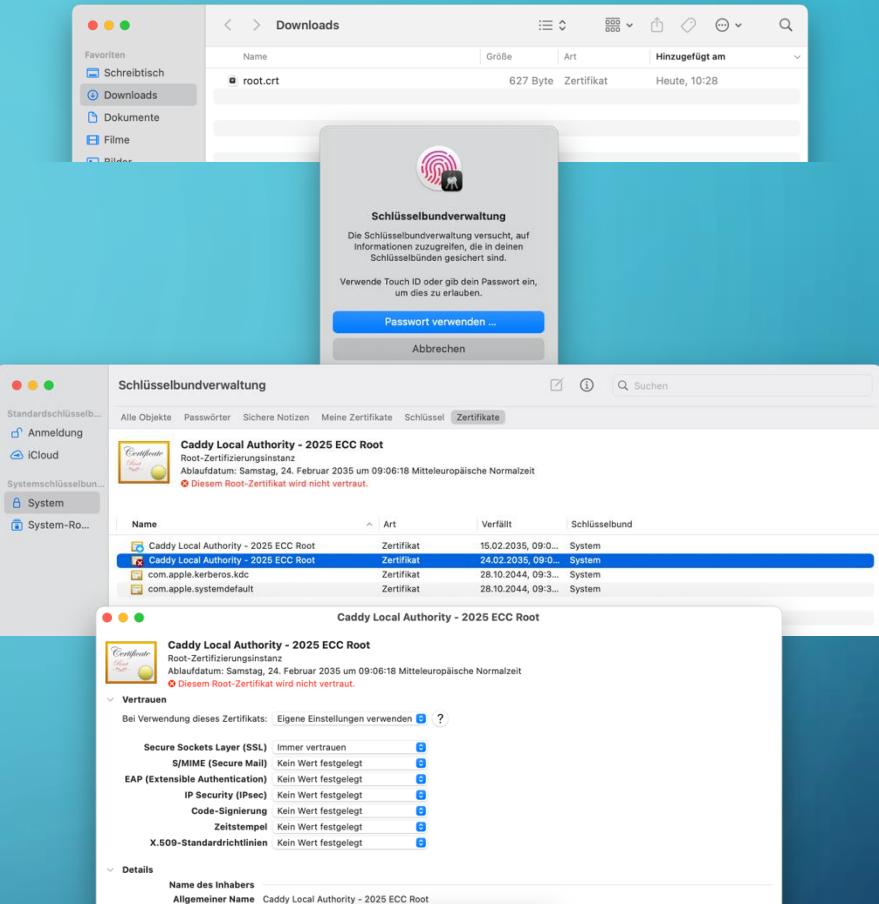
- Make sure to accept the blocked download



INSTALL THE SSL CERTIFICATE

- Locate your root.crt in your download folder
- Double click root.crt
- Enter your Admin password
- Now locate the newly installed certificate
- Trust the certificate for TLS encryption

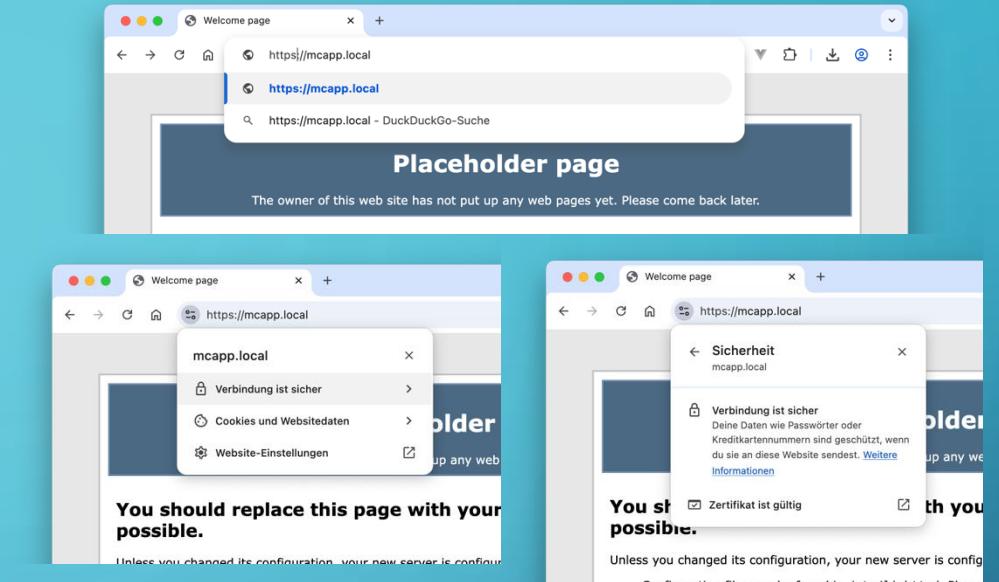
- Same is true for the iPhone. After import, you have to accept it in General – Profiles AND then you need to trust it, which is hidden in the settings menu



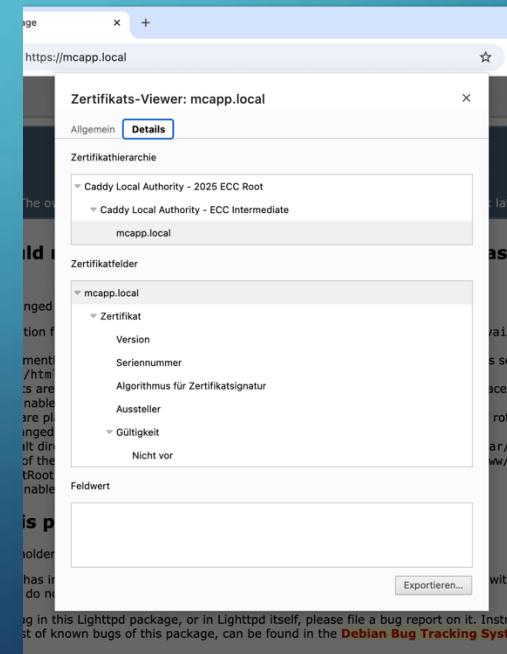
TESTING SSL ACCESS

- Go to your web browser, now we access https

<https://mcapp.local>



- If everything worked out, as expected, you should see a fully trusted root chain.



CHECKS AND CONFIGURATION

Advanced Troubleshooting

OPEN WEBBROWSER

- Click option command J for Debug Output
- Go to url: <https://mcapp.local/webapp/>
- Click on Settings
- Enter your Callsign
- Your SID
- 20 for scroll back buffer
- mcapp.local for your UDP Proxy server
- 2981 for the secure socket of the UDP Proxy that runs in python
- Click Connect MeshCom

Callsign	DK5EN	SID	99
Scrollbar	20	WebSocket IP	mcapp.local
WebSocket Port	2981	LoRa IP	not used
LoRa Port	not used	Country	EU8
TX Power	10	Latitude	48.123
Longitude	12.073	Altitude	468
APRS Name	not used	APRS Group	/
APRS Symbol	#	Max V	3.500
LoRa Group 1	9	LoRa Group 2	20
LoRa Group 3	232	LoRa Group 4	262
LoRa Group 5	222	LoRa Group 6	0
BLE PIN	000000	Node UTC	-2

```
connecting .. null index-CN2EVPl.js:26
SyntaxError: Failed to construct 'WebSocket': The URL 'ws://undefined:undefined' is invalid.
at Object.r [as connect] (index-CN2EVPl.js:26:8359)
at l (index-CN2EVPl.js:26:8838)
at a (index-CN2EVPl.js:14:38)
at t (index-CN2EVPl.js:14:108)
at HTMLButtonElement.t (index-CN2EVPl.js:18:4802)
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Command: message dump index-CN2EVPl.js:26
message dump, need to unpack array
sorting array, nachdem wir alle Nachrichten vom Node bekommen haben index-CN2EVPl.js:26
```

TIME TO TEST EVERYTHING

- Go to <https://meshcom.oevsv.at/#>
- Click on Test
- Now enter a test Message
- Check on MeshCom Test page

The screenshot shows a web application window titled "WebApp" with the URL <https://mcapp.local/webapp/messages/all>. The interface includes tabs for "Messages", "Positions", "Internet", "MeshCom" (which is selected), and "Bluetooth". A "Settings" button is also present. The main area displays a list of messages from various users:

- 0.0 mm Wind: 17 Km/h Pressure MSL: 1003.9 hPa
- DK9MS-12
- Guten Mittag aus Fulda, Osthessen, 9 Grad, bedeckt, es hat geregnet, 73 Markus
- DA70E2F8
- OE5HWN-6
- Mittagspause in der Kalten Kuchl
- 8C59DCA4
- D05DHA-12
- guten Hunger Helmut
- 3DCDBFAA
- DK8GO-12
- hier liegt schnee
- 75D311E4
- DB0SEP-12
- DBOSEP BBS online <https://qrz.com/db/db0sep>
- A2659230
- Neueste unten 20

Below the message list, there is a text input field containing "Eine kleine Testnachricht" and a "cFDump" button. To the right of the input field, there are buttons for "TEST" and "cMsgRead". The status bar at the bottom indicates "all DK5EN-99 | WsProxy:mcapp.local:2981 | remaining:124". The browser's developer tools show several JavaScript errors related to WebSocket connections.

The screenshot shows a web browser window with the URL meshcom.oevsv.at/#. The page displays a log of messages in a table format:

	Date	Node	Source	Destination	Count	Time	Message	Details	
34	2025-04-17 12:22:45	A2659224	DB0SEP-12	DB0SEP-12	DK9MS-12	4	0	0	Ping received, BBS online
35	2025-04-17 12:24:55	DA70E2F6	DK9MS-12	DK9MS-12	DB0SEP-12	4	0	0	db0sep h
36	2025-04-17 12:24:58	A2659226	DB0SEP-12	DB0SEP-12	DK9MS-12	4	0	0	Commands-> db0sep br,bs,mh,r,l,e,s,u,h,p,t https://www.qrz.com/db/db0sep - done..
37	2025-04-17 12:26:37	DA70E2F9	DK9MS-12	DK9MS-12	DB0SEP-12	4	0	0	db0sep p
38	2025-04-17 12:26:42	A2659228	DB0SEP-12	DB0SEP-12	DK9MS-12	4	0	0	Ping received, BBS online
39	2025-04-17 12:56:05	DA70E2FE	DK9MS-12	DK9MS-12	DB0SEP-12	4	0	0	db0sep r 1
40	2025-04-17 12:56:08	A265922D	DB0SEP-12	DB0SEP-12	DK9MS-12	4	0	0	mal sehen ob das bei dir auch ankommt. 73 de Helmut - done..
41	2025-04-17 12:56:44	DA70E300	DK9MS-12	DK9MS-12	DB0SEP-12	4	0	0	db0sep e 1
42	2025-04-17 12:56:50	A265922F	DB0SEP-12	DB0SEP-12	DK9MS-12	4	0	0	Delete ok - done..
43	2025-04-17 13:00:01	A2659230	DB0SEP-12	DB0SEP-12	*	*	*	*	DB0SEP BBS online https://qrz.com/db/db0sep
44	2025-04-17 13:00:39	EA0EB280	DK5EN-99	DK5EN-99	TEST	4	0	0	Eine kleine Testnachricht, ob was raus geht

The message from node 44 is highlighted with a red border. The status bar at the bottom indicates "Starttime: 2025-04-15 20:50:37" and "ID: 338658".

UPDATE LOCALES AND KEEP SYSTEM UPDATE

```
martin@McApp:~ $ sudo raspi-config
```

- 5 Localization -> L1 locale -> select de.UTF-8 -> OK -> C.UTF-8 -> OK
- Finish

```
martin@McApp:~ $ sudo apt-get update
```

```
martin@McApp:~ $ sudo apt-get dist-upgrade
```

```
martin@McApp:~ $ sudo reboot
```