



# MESHCOM MCAPP INSTALLATION

# SCREEN SHOTS – RESPONSIVE UI WITH DARK MODE

**Messages**

Ziel: all

No Filter (658)

20 (113) 4B4C3287 20.04.2025, 09:27:25  
IW1QAF-11 udp Il nuovo Nodo iw1qaf-11 è aperto a tutto il traffico mesh. Vede Piemonte, parte della Lombardia e Liguria.

222 (18) 92F550FC 20.04.2025, 09:37:04  
DL9CL-10 udp Happy Easter from Stuttgart SW-Germany A5E5B041

22251 (27) 92F550FC 20.04.2025, 09:37:04  
DKSEN-99 (20)  
OE5HWN-12 (24)  
OE9ROE-92 (2)  
DL2JA-11 (3)  
DL2JA-3 (2)  
DO1MH-12 (1)

cFSdump

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DL2JA-3 (2)  
DO1MH-12 (1)

cFSdump

all

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

(\*src\_type\*: "udp", \*type\*: "msg", \*src\*: "DL9CL-7", \*dst\*: "", \*msg\*: "Schönste grüße auch von mir von der hundurunde", \*mss\_id\*: "09FE0928", \*firmware\*: 30, \*fe\_sub\*: "n", \*timestamp\*: 1746138272228)

Schreib etwas ..

Schreib etwas ..

**Messages**

Ziel: all

No Filter (658)

20 (113) 4B4C3287 20.04.2025, 09:27:25  
IW1QAF-11

6935B11A Batteriekapazität: 62 % 20.04.2025, 10:21:25  
DL2JA-1 lora - / - House 48.423N / 11.7865E / 499m / Firmware: 34x

E9F1137F Batteriekapazität: 100 % 20.04.2025, 10:24:50  
DKSEN-99 lora - / G Grid square, 3 by 3 48.4071N / 11.7388E / 480m / Firmware: 34x

EAE0B09 Batteriekapazität: 100 % 20.04.2025, 10:27:22  
DG7RJ-11 lora - D07RJ-12 / # Digipeater 48.302N / 11.6276E / 509m / Firmware: 34v

EA3E31D3 Batteriekapazität: 78 % 20.04.2025, 10:28:40  
DG7RJ-12 lora - / - House 48.3021N / 11.6276E / 465m / Firmware: 34w

EF2ED191 Batteriekapazität: 83 % 20.04.2025, 10:33:51  
Neueste unten 20

Switch to Satellite

DKSEN  
DKSEN-12  
DKSEN-99

Map showing node locations across a geographic area.

**Messages**

X 15 (1) X

X 999 (10) X

X 26275 (1) X

X 26379 (1) X

X OE5HWN-12 (24)

X DO1MH-12 (1)

X 20 (115) ✓

X 7007 (2) ✓

X 26277 (11) ✓

X 26386 (1) X

X OE9ROE-92 (2) ✓

X TEST (2) ✓

X 222 (19) ✓

X 8092 (1) X

X 26298 (59) ✓

X \* (426) ✓

X DL2JA-11 (3) ✓

X Time (10) ✓

X 888 (3) X

X 22251 (27) ✓

X 26362 (1) ✓

X DKSEN-99 (20) ✓

X DL2JA-3 (2) ✓

Callsign DKSEN SID 99 Scrollback 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 #

**Messages**

X 15 (1) X

X 999 (10) X

X 26275 (1) X

X 26379 (1) X

X OE5HWN-12 (24)

X DO1MH-12 (1)

X 20 (115) ✓

X 7007 (2) ✓

X 26277 (11) ✓

X 26386 (1) X

X OE9ROE-92 (2) ✓

X TEST (2) ✓

X 222 (19) ✓

X 8092 (1) X

X 26298 (59) ✓

X \* (426) ✓

X DL2JA-11 (3) ✓

X Time (10) ✓

X 888 (3) X

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Callsign DKSEN SID 99 Scrollback 140

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# VORWORT

- Die Kommunikation zwischen Webbrower am PC und Server Komponente am Raspi Zero kann nur TLS-verschlüsselt erfolgen, weil die modernen Browser dies erzwingen. Dies ist kein unnötiger Luxus, sondern notwendig
- Offizielle Zertifikate werden von Let's Crypt 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 getrustete 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 müssen das self-signed Root Zertifikat der Caddy PKI importieren
- Da bei SSL-Zertifikaten immer der Hostname übereinstimmen muss, ist es nicht möglich mit IP-Adressen zwischen Webbrower und Raspi im lokalen Netz zu arbeiten. Es muss alles zwingend über DNS-Namen laufen, die auch dem cn= Eintrag im Zertifikat entsprechen müssen
- 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, unseren Reverse Proxy
- Der lighttpd Webserver wird ebenso durch Caddy TLS verschlüsselt. Die Webseite selbst ist statisch, es wird kein PHP benötigt
- Wer seinen MeshCom Knoten nur über IP-Adresse erreicht, kann dies im `c2-mc-ws.py` Skript entsprechend anpassen.
- Zum Abschluss nicht vergessen auf dem MeshCom Knoten `--extudp on` zu konfigurieren und einzuschalten

Happy Meshing in MeshCom de DK5EN

# 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

# 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

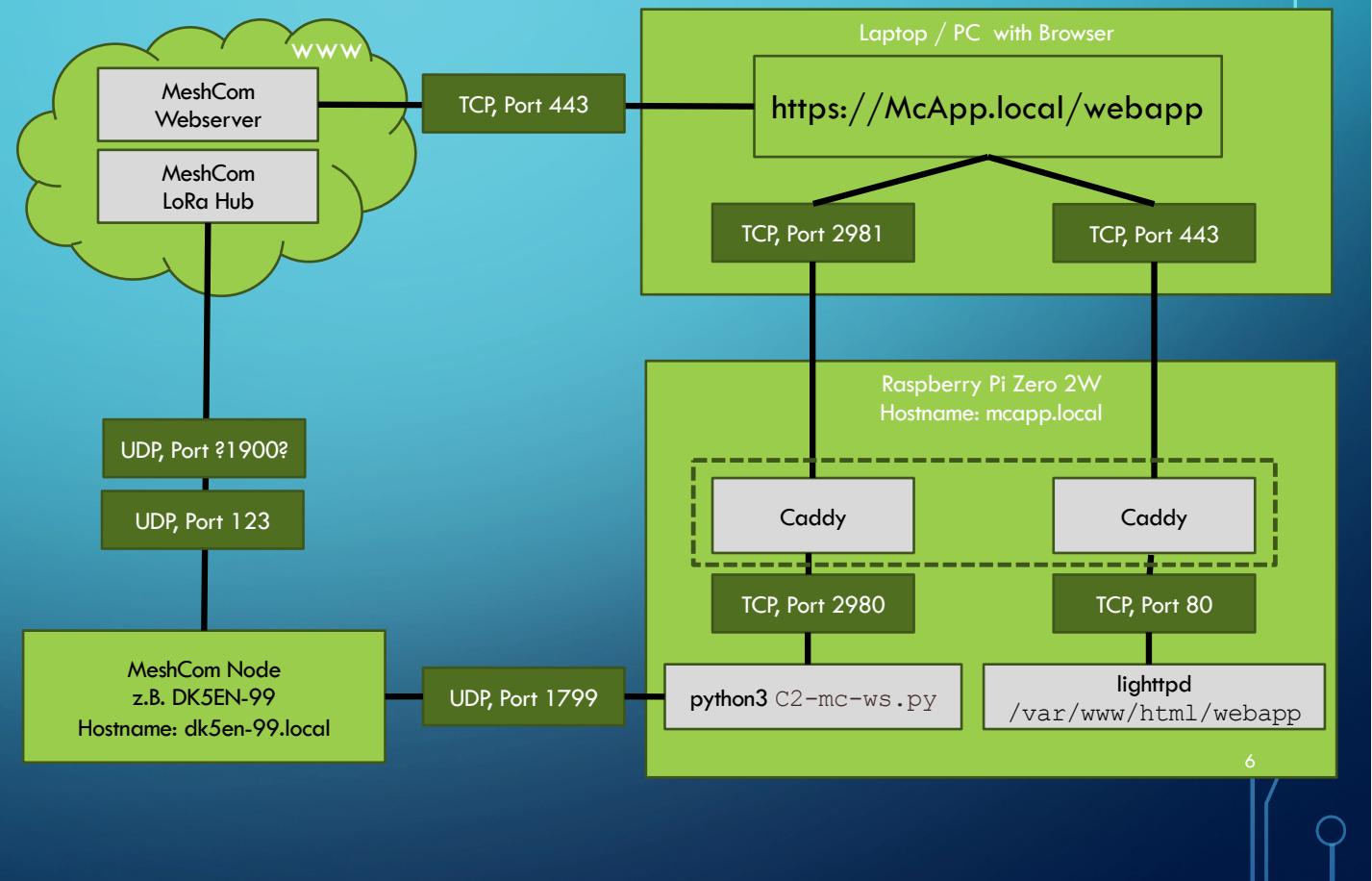
```
martin@McApp:~ $ curl -fsSL https://raw.githubusercontent.com/DK5EN/McAdvChat/main/mc-install.sh | sudo bash

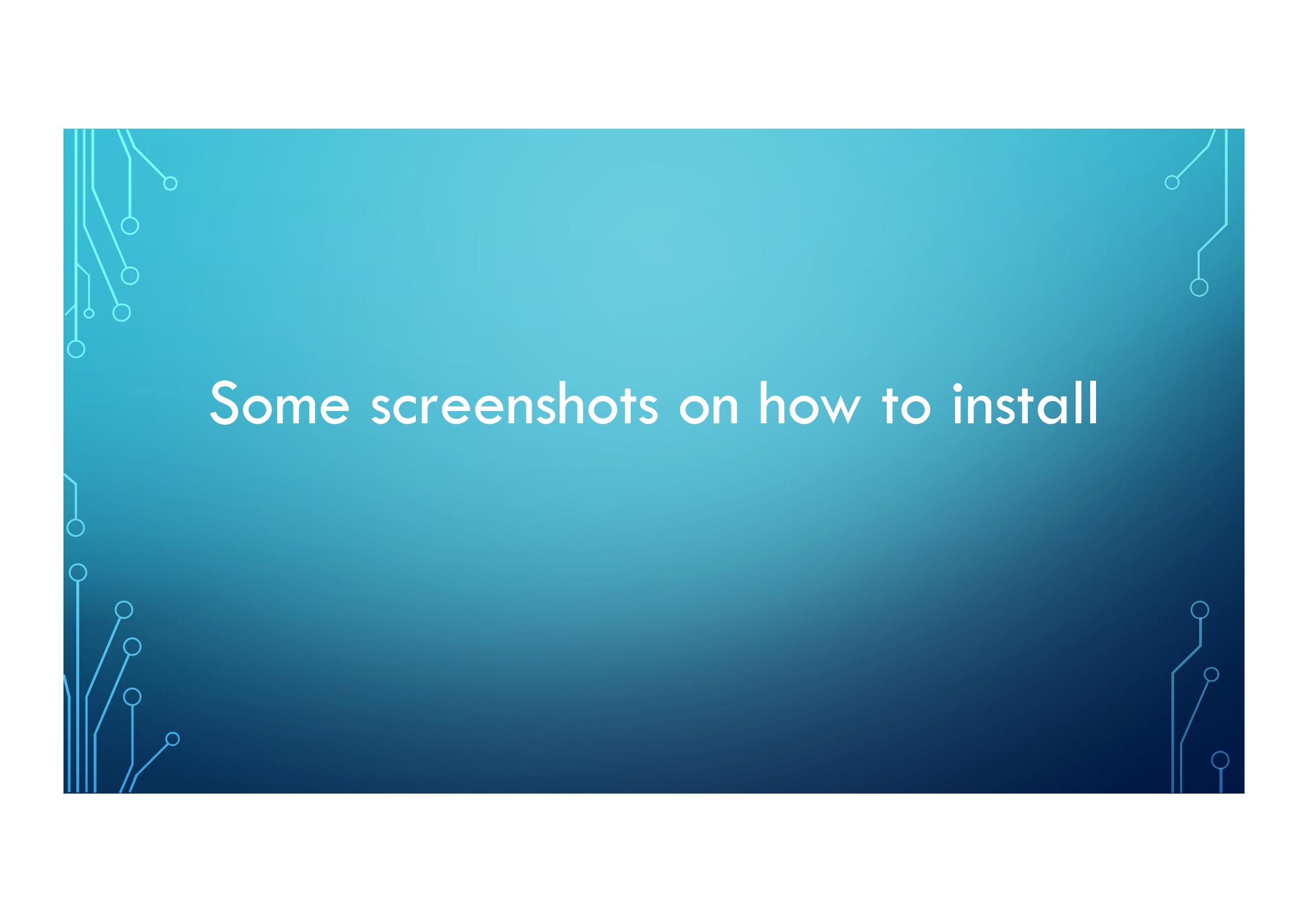
[INFO] Skript läuft unter Benutzer: martin
[INFO] Lokale WebApp-Version: v0.1.0
[INFO] Lokale Python-Skript-Version: v0.2.0
[INFO] Lokale Shell-Skript-Version: v0.2.0
[INFO] Install-Skript-Version: v0.1.0
[INFO] Remote WebApp-Version: v0.1.0
[INFO] Remote Python-Skript-Version: v0.2.0
[INFO] Remote Shell-Skript-Version: 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
```

# 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

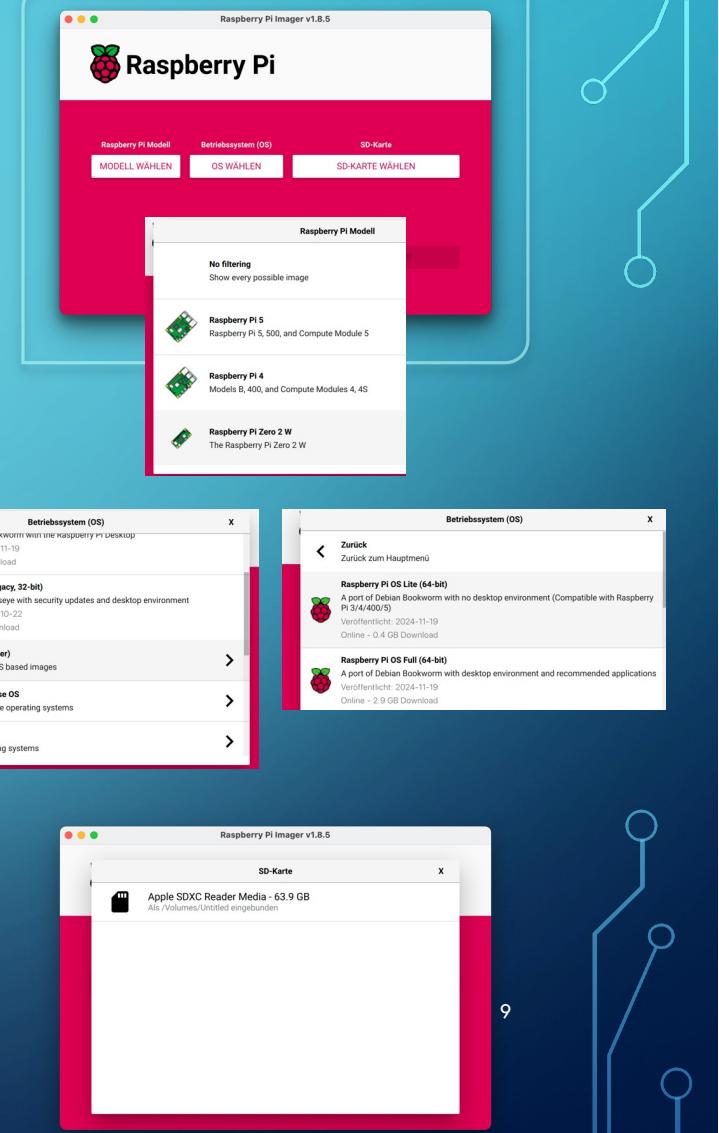


# CUSTOM OS INSTALLATION

We want to install a headless, 64Bit Debian Bookwork

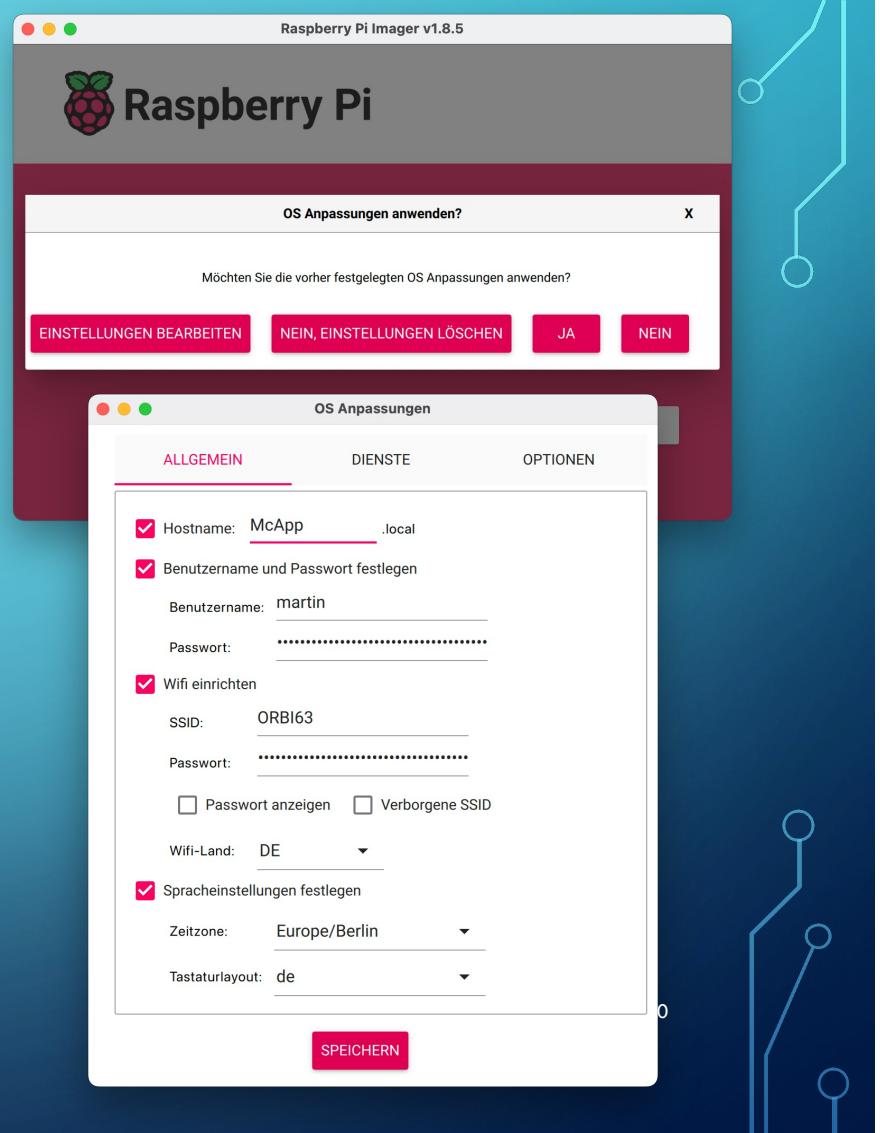
- I do recommend Raspberry PI Imager, which can be found here  
<https://www.raspberrypi.org/downloads/>
- Select your Model: Raspberry Pi Zero 2 W
- For OS, select “other“ – „Raspberry Pi OS Lite (64-bit), with no desktop, approx. 0,4GB
- Select your SD Card

.. And click next



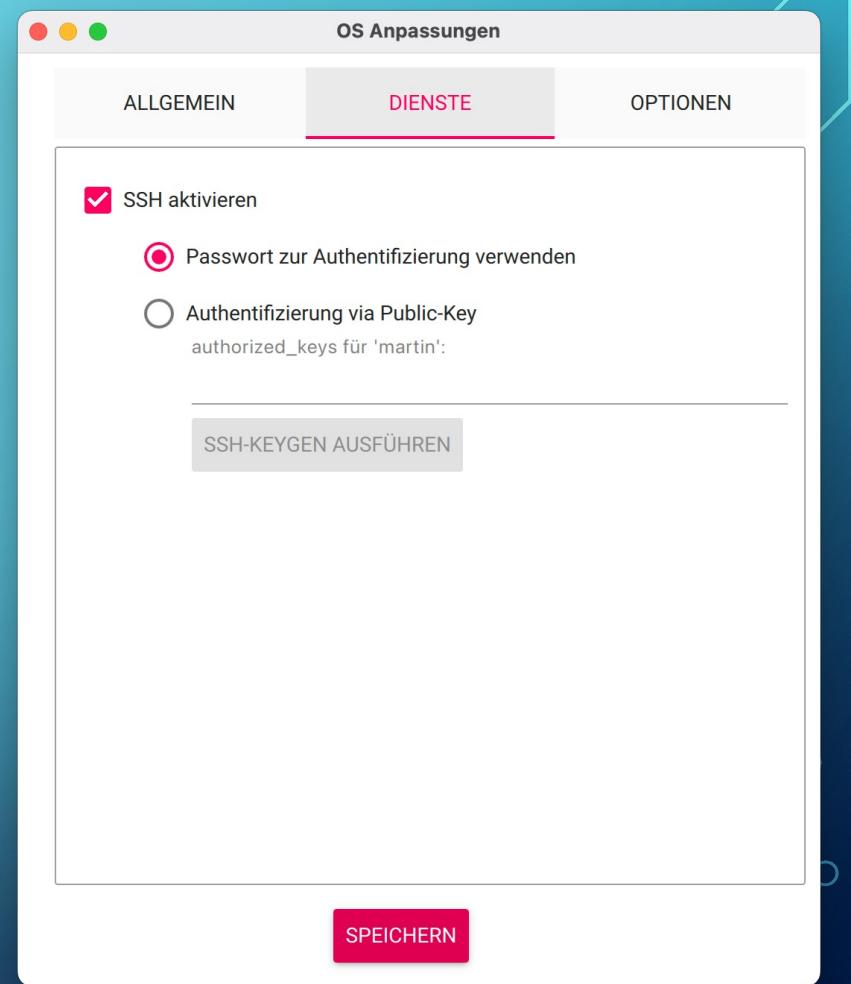
## IMPORTANT CUSTOMIZATIONS

- 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



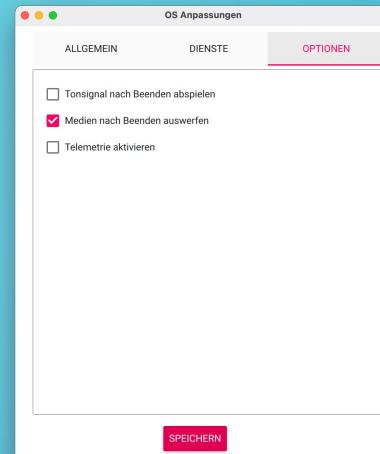
## ACTIVATE SSH

- 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

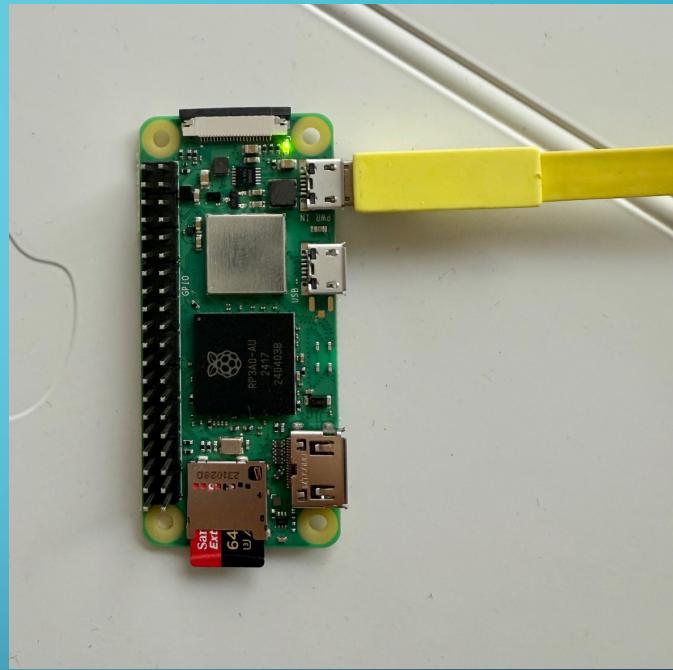


## FIRST TIME BOOT UP

- 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

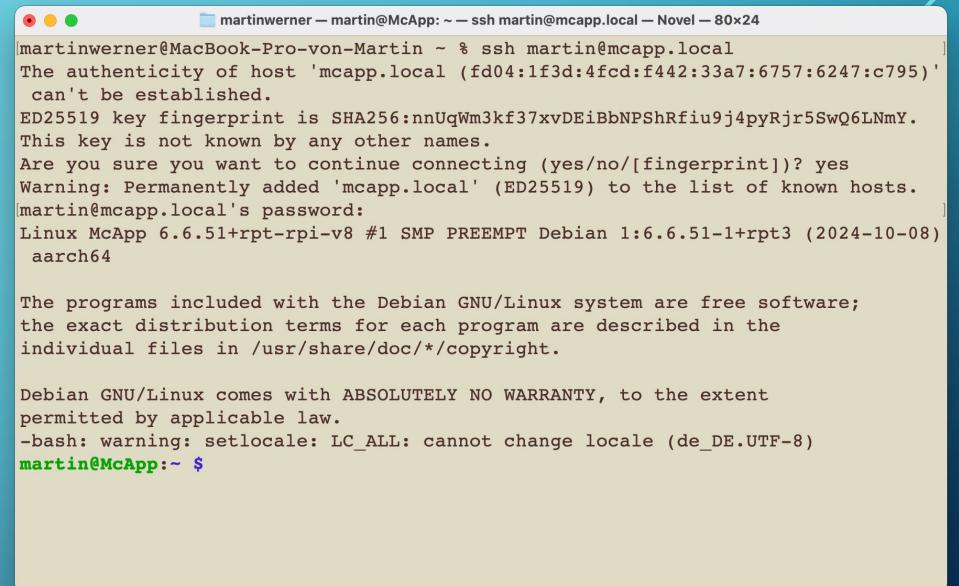


```
martinwerner@MacBook-Pro-von-Martin .ssh % ping mcapp.local
ping: cannot resolve mcapp.local: Unknown host
martinwerner@MacBook-Pro-von-Martin .ssh % ping mcapp.local
PING mcapp.local (192.168.68.70): 56 data bytes
64 bytes from 192.168.68.70: icmp_seq=0 ttl=64 time=121.193 ms
64 bytes from 192.168.68.70: 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”



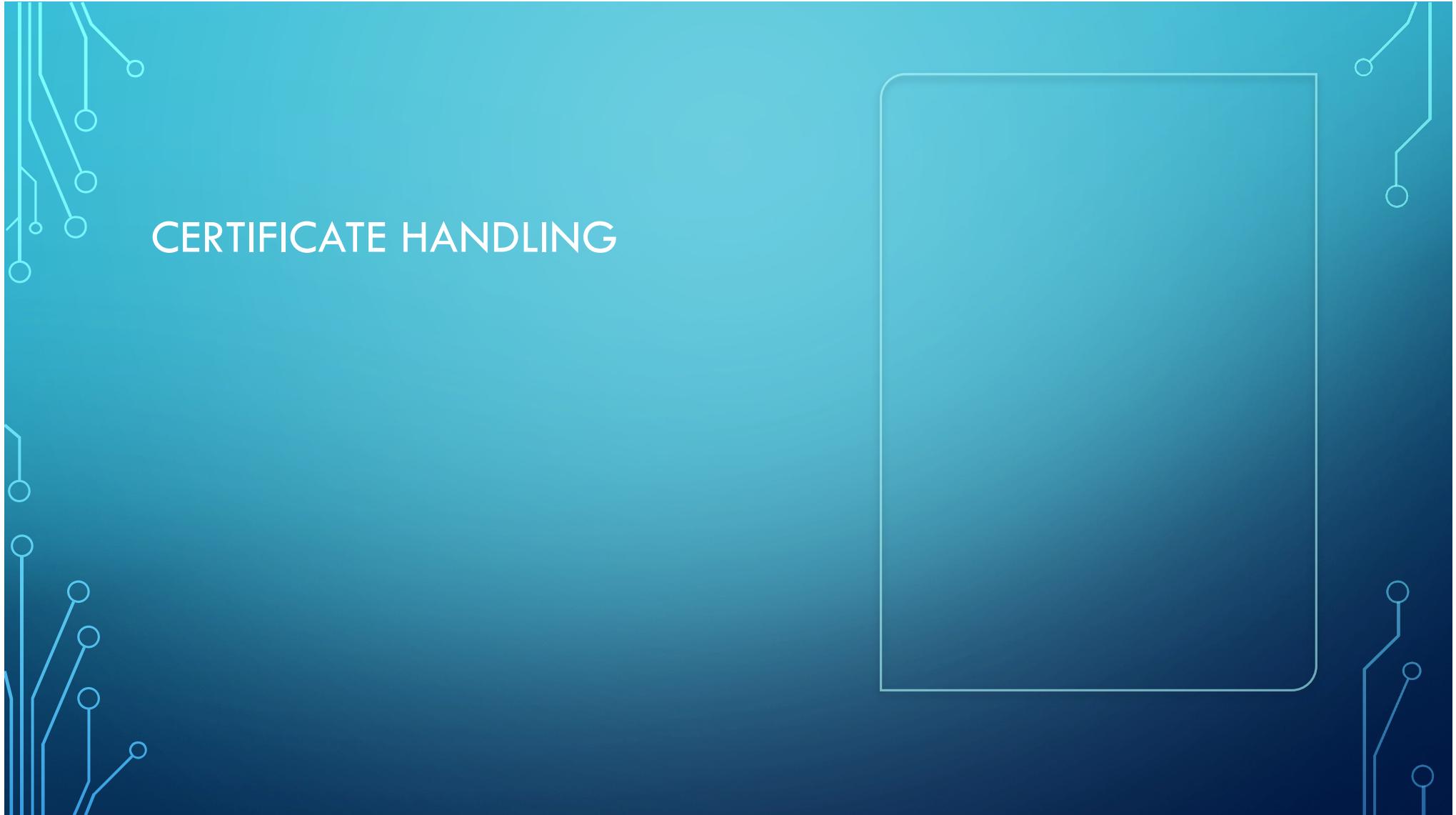
The screenshot shows a terminal window titled "martinwerner — martin@McApp: ~ — ssh martin@mcapp.local — Novel — 80x24". The window displays the following text:

```
martinwerner@MacBook-Pro-von-Martin ~ % ssh martin@mcapp.local
The authenticity of host 'mcapp.local (fd04:1f3d:4fcfd: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+rpt-rpi-v8 #1 SMP PREEMPT Debian 1:6.6.51-1+rpt3 (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.

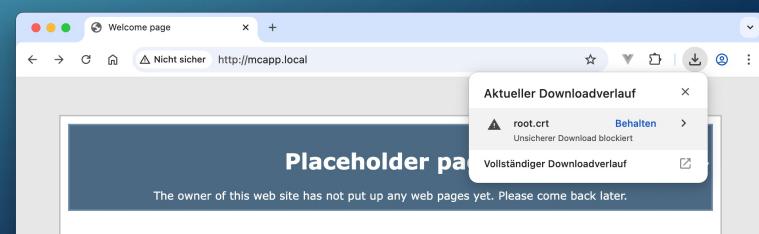
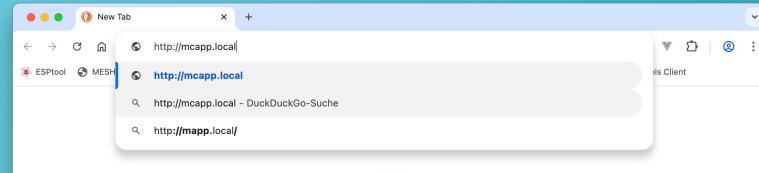
<http://mcapp.local>

- You should see the placeholder page

- Now we download the self-signed root certificate

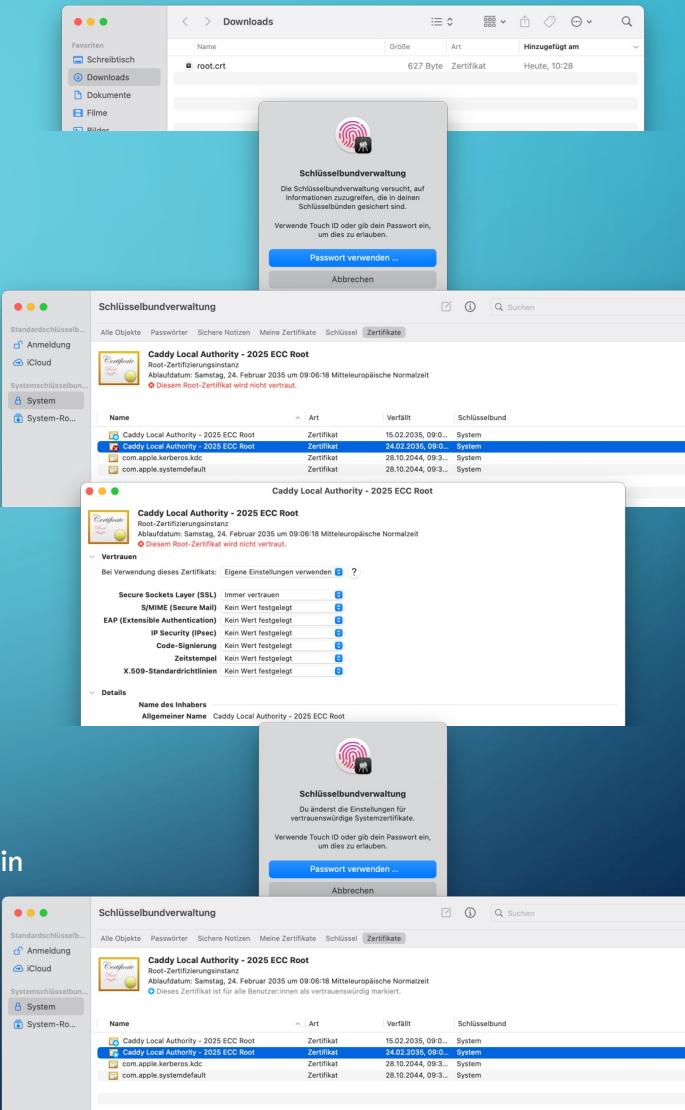
<http://mcapp.local/root.crt>

- 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

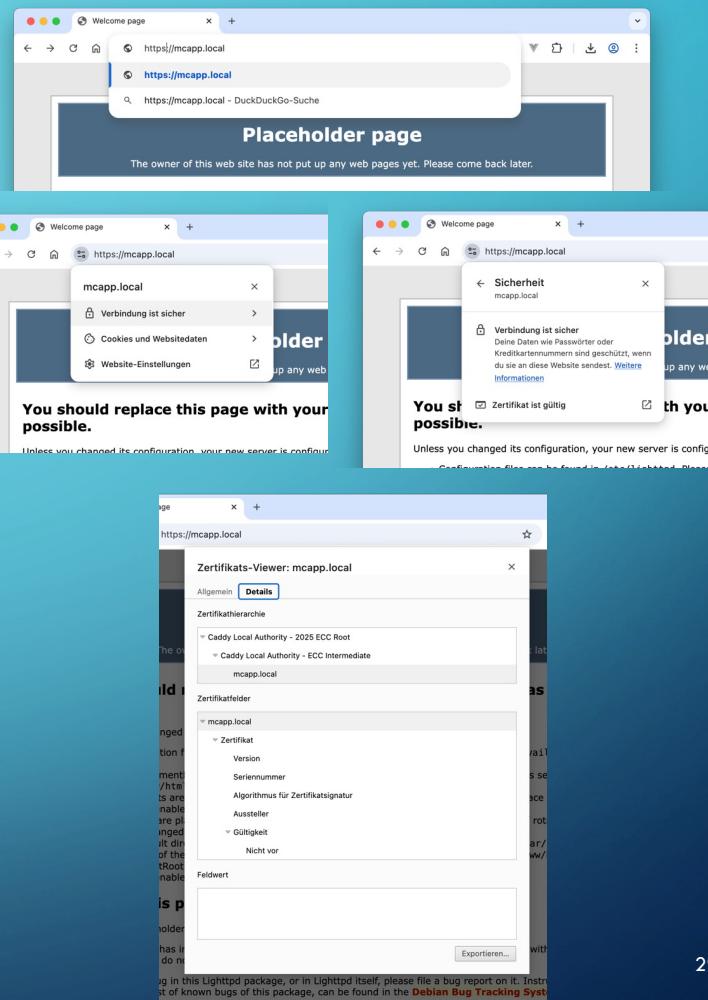


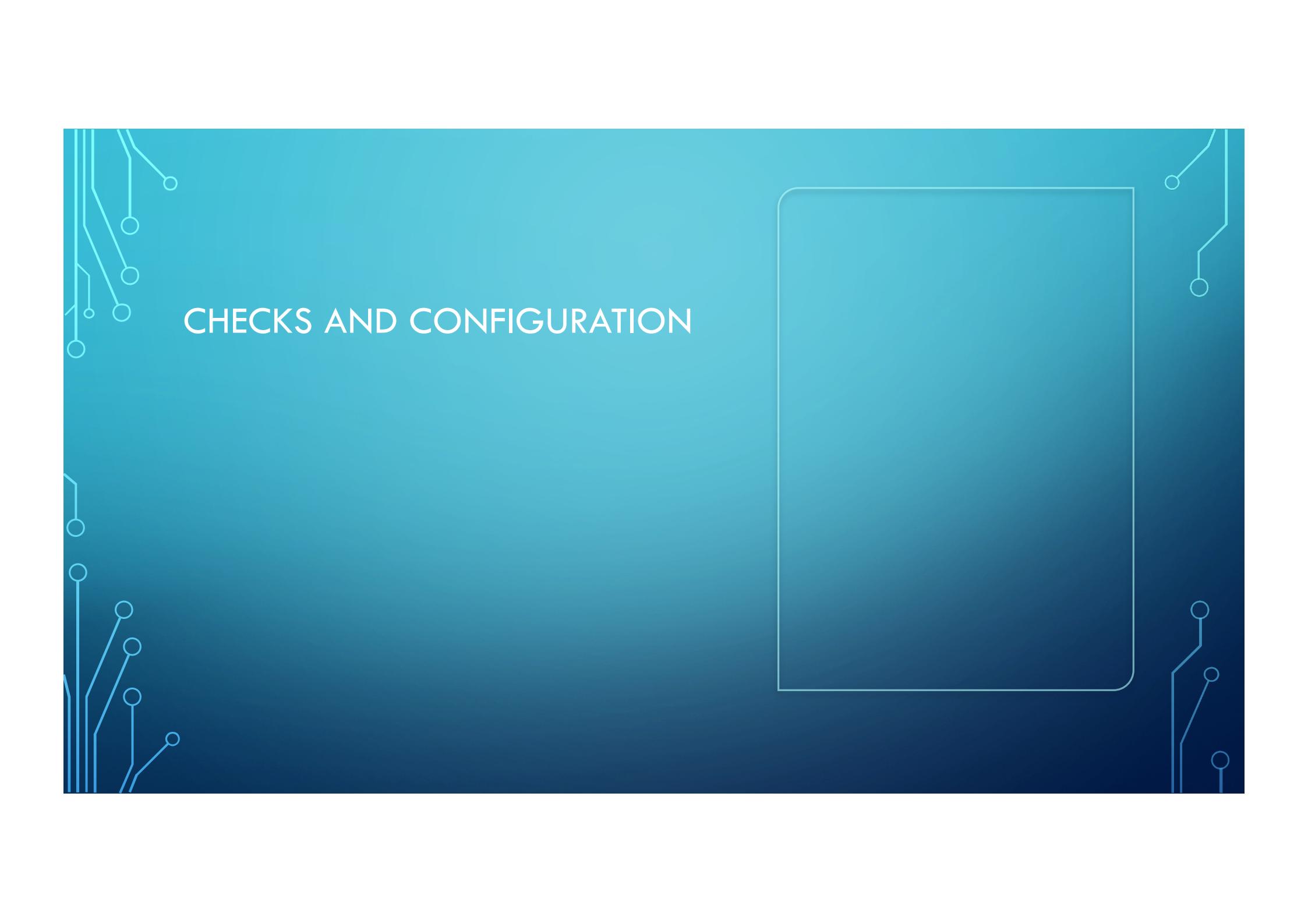
# TESTING SSL ACCESS

- 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

# 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  
WebSocket Port: 2981  
LoRa Port: not used  
TX Power: 10  
Longitude: 12.073  
APRS Name: not used  
APRS Symbol: #  
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

```
connecting .. null  
SyntaxError: Failed to construct 'WebSocket': The URL ws://mcapp.local:2981/underlinedundefined is invalid.  
at Object.<anonymous> (index-CN2EVPl.1:126:88491)  
connecting .. null  
SyntaxError: Failed to construct 'WebSocket': The URL ws://mcapp.local:2981/underlinedundefined is invalid.  
at Object.<anonymous> (index-CN2EVPl.1:126:78339)  
at t (index-CN2EVPl.1:126:8832)  
at tt (index-CN2EVPl.1:126:8833)  
at tt (index-CN2EVPl.1:126:108)  
at t (index-CN2EVPl.1:126:108)  
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at tt (index-CN2EVPl.1:126:108)  
at t (index-CN2EVPl.1:126:108)  
connecting .. null  
Kommand: message dump  
message dump, need to unpack  
array  
sorting array, nachdem wir  
alle Nachrichten von Node bekommen haben  
Index-CN2EVPl.1:126
```

# TIME TO TEST EVERYTHING

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

Messages | Positions | Internet | MeshCom | Bluetooth | Settings

Ziel: all

Node	Message	Time
20 (6)	0.0 mm Wind: 17 Km/h Pressure MSL: 1003.9 hPa	22251 17.04.2025, 12:01:20
D9KMS-12	Guten Mittag aus Fulda, Osthessen, 9 Grad, bedeckt, es hat geregnet, 73 Markus	276CE0C1 17.04.2025, 12:28:19
OE5HWN-6	Mittagspause in der Kalten Kucht	www BOT GATE 17.04.2025, 12:30:22
999 (1)		8C590CA4 *
1211 (1)	guten Hunger Helmut	www D05DHA-12 17.04.2025, 12:30:55
8092 (8)		3DCB0FAA *
DK8GO-12	hier liegt schnee	www DK8GO-12 17.04.2025, 12:32:10
8421 (1)		75D311E4 *
20857 (3)		www DB0SEP-12 17.04.2025, 13:00:01
22201 (2)	DB0SEP BBS online https://qrz.com/db/db0sep	A2659230 *
22251 (12)	Neueste unten: 20	

cFDump

Gesendet: Eine kleine Testnachricht, ob was raus geht

TEST

all DK5EN-99 | WsProxy:mcapp.local:2981 | remaining:124

Eine kleine Testnachricht

cMsgRead

Console Errors:

- construct 'WebSocket': The URL 'ws://undefined' is invalid.
- at Object.r [as connect] ('index-C3N2EVPl.js:126')
- at l ('index-C3N2EVPl.js:126:78359')
- at a1 ('index-C3N2EVPl.js:14:38')
- at a1 ('index-C3N2EVPl.js:14:108')
- at HTMLButtonElement.t ('index-C3N2EVPl.js:18:4882')
- connecting .. null ('index-C3N2EVPl.js:126')
- construct 'WebSocket': The URL 'ws://undefined' is invalid.
- at Object.r [as connect] ('index-C3N2EVPl.js:126:8832')
- at l ('index-C3N2EVPl.js:126:9832')
- at a1 ('index-C3N2EVPl.js:14:38')
- at a1 ('index-C3N2EVPl.js:14:108')
- at HTMLButtonElement.t ('index-C3N2EVPl.js:18:4882')
- connecting .. null ('index-C3N2EVPl.js:126')
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- at l ('index-C3N2EVPl.js:126:9832')
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- connecting .. null ('index-C3N2EVPl.js:126')
- Kommand: message dump ('index-C3N2EVPl.js:126')
- message dump, need to unpack ('index-C3N2EVPl.js:126')
- array
- sorting array, nachdem wir ('index-C3N2EVPl.js:126')
- alle Nachrichten vom Node bekommen haben ('index-C3N2EVPl.js:126')
- WB Connect ausgelöst ('index-C3N2EVPl.js:126')
- sorting array, nachdem wir ('index-C3N2EVPl.js:126')
- alle Nachrichten aus dem internet bekommen haben ('index-C3N2EVPl.js:126')

Privat

meshcom.oevsv.at/#

Index	Date	From	To	Type	Content	Time	Location	MAC			
34	12:22:45	A2659224	DB0SEP-12	DB0SEP-12	DK9MS-12	4	0	0	Ping received, BBS online	EU8	SF11CR46BW250
35	2025-04-17 12:24:55	DA70E2F6	DK9MS-12	DK9MS-12	DB0SEP-12	4	0	0	db0sep h	EU	SF11CR46BW250
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..	EU8	SF11CR46BW250
37	2025-04-17 12:26:37	DA70E2F9	DK9MS-12	DK9MS-12	DB0SEP-12	4	0	0	db0sep p	EU	SF11CR46BW250
38	2025-04-17 12:26:42	A2659228	DB0SEP-12	DB0SEP-12	DK9MS-12	4	0	0	Ping received, BBS online	EU8	SF11CR46BW250
39	2025-04-17 12:56:05	DA70E2FE	DK9MS-12	DK9MS-12	DB0SEP-12	4	0	0	db0sep r 1	EU	SF11CR46BW250
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..	EU8	SF11CR46BW250
41	2025-04-17 12:56:44	DA70E300	DK9MS-12	DK9MS-12	DB0SEP-12	4	0	0	db0sep e 1	EU	SF11CR46BW250
42	2025-04-17 12:56:50	A265922F	DB0SEP-12	DB0SEP-12	DK9MS-12	4	0	0	Delete ok - done..	EU8	SF11CR46BW250
43	2025-04-17 13:00:01										
44	2025-04-17 13:00:39	EA0EB280	DK5EN-99	DK5EN-99	TEST	4	0	0	Eine kleine Testnachricht, ob was raus geht	EU8	SF11CR46BW250

Starttime:2025-04-15 20:50:37

ID:338658

MAC:ff9f9fb

## UPDATE LOCALES AND KEEP SYSTEM UPDATE

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

- 5 Localization -> L1 locale -> select de\_AT.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
```