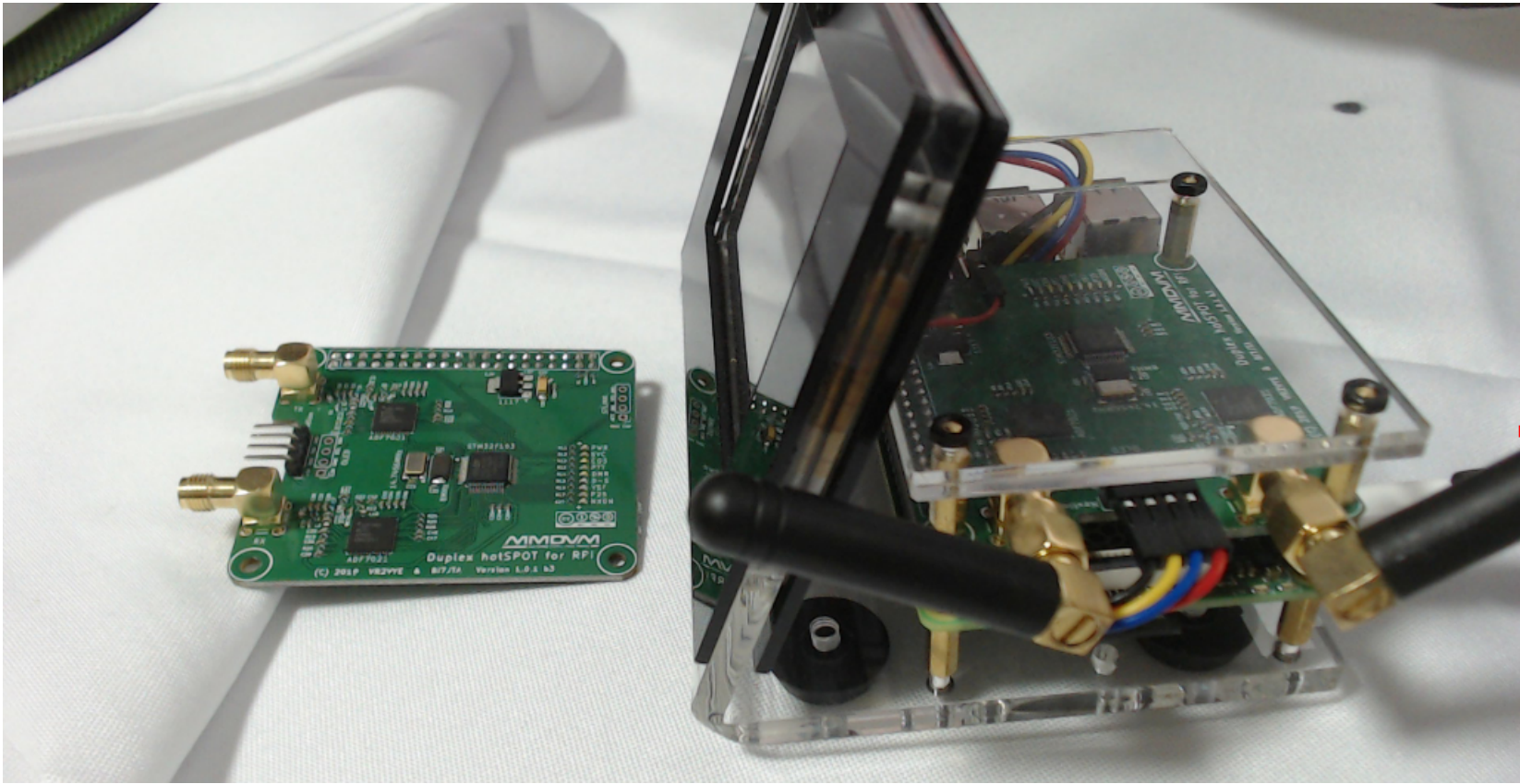# Duplex hotspot User's Manual _v2020_12_23 #MMDVM

This guide just for the Products made by BI7JTA, Synchronous update www.youtube.com/winters_huang , www.bi7jta.org

目录

Overview

Prepare:

NOTE:
 I have configuration your hotspot with default settings, if your purchase is from BI7JTA provider, you do not need to flash SD card .

Hardware

MMDVM Duplex Hat with Antennas,
Raspberry Pi 3B, 4B, ZeroW,
SD Card/ TF card 8G/16G,
Nextion Display, OLED (Option)
Power supply 5V2A

Software

Pi-Star OS (Raspbian integration MMDVMHost, Serial of DMR/YSF/P25/D-STAR/NXDN/POCSAG gateway serivces , Pi-Star Dashboard),

LAN IP devices address scan tools:

Fing , for iOS, Android, www.fing.com
IP Scan tools, for MAC OSX https://apps.apple.com/cn/app/lanscan/id472226235?mt=12
Advanced_IP_Scanner , for Microsoft Windows http://www.advanced-ip-scanner.com/
SDFormatter v4, for format your SD Card, just for install a new OS,
win32diskimager, just for install a new OS,
Web browser, Mobile default browser, Chrome, Firefox for Windows, Safari, Not support Microsoft IE

Step 1 Hardware connection

Use 5V2A Power supply, any MicroUSB Android power supply wire, but must stable , otherwise the power will affect your TX spectrum, cause high BER% .
Wire LAN recommend, the first time you use MMDVM hotspot.

Figure: hardware wiring diagram
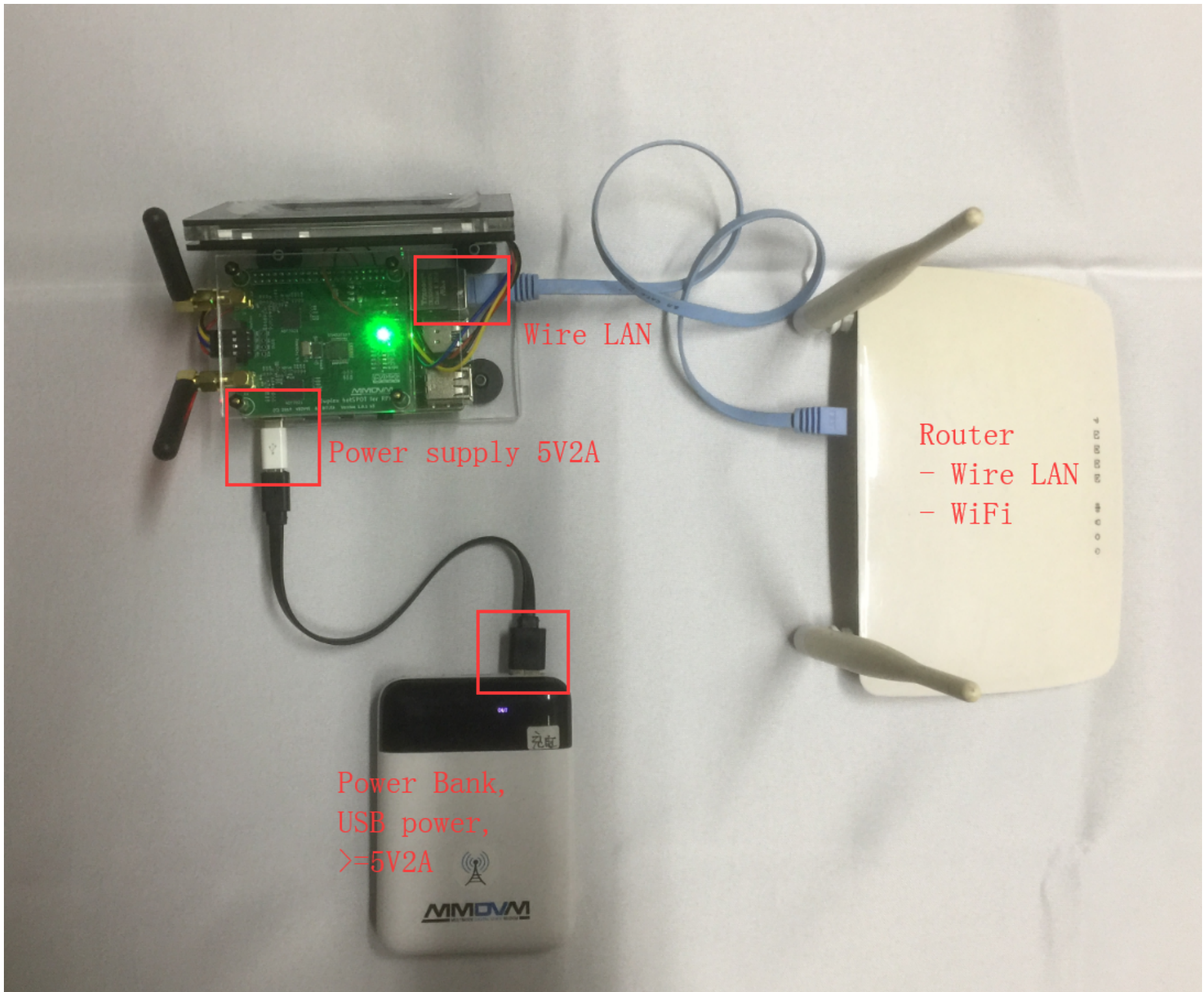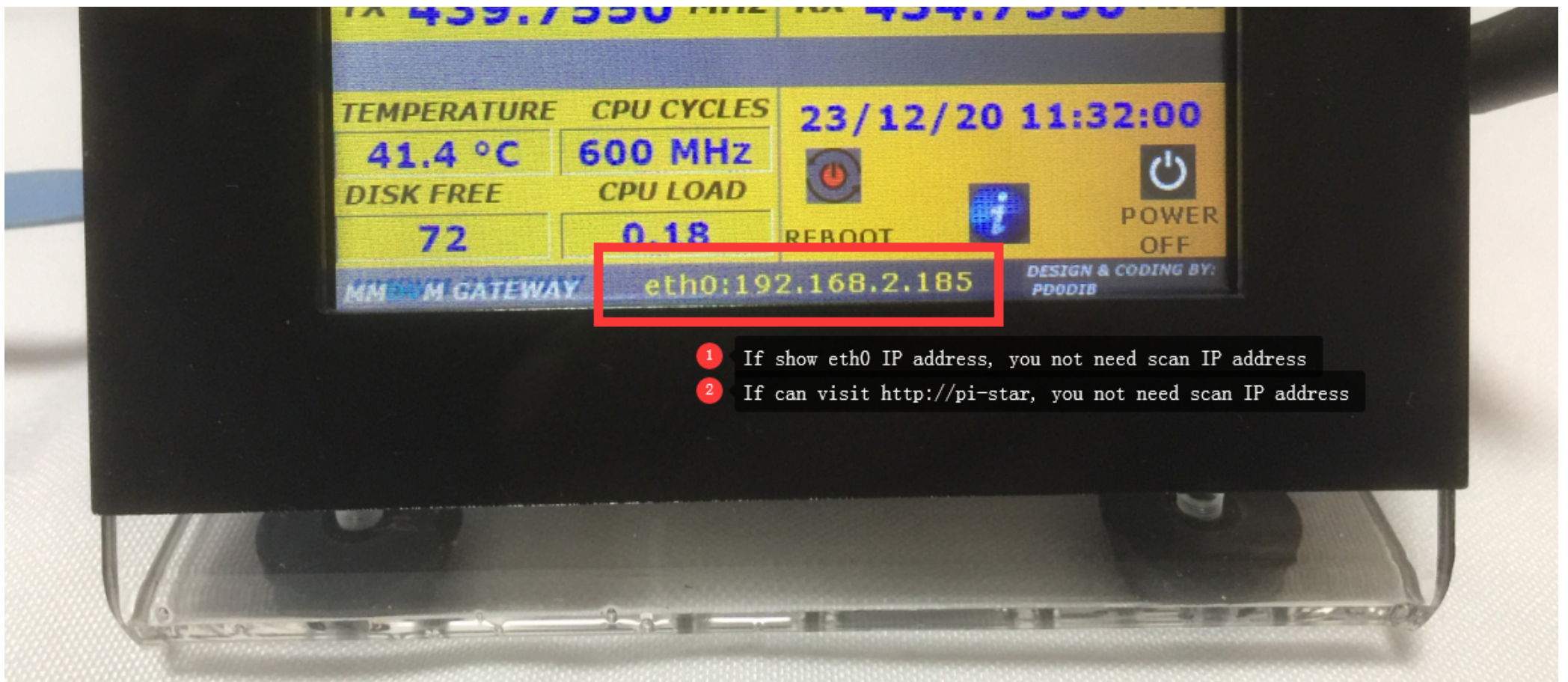
Step 2 Network Configuration

There are 3 methods to make MMDVM hotspot connect to internet

1, Wire LAN (Simple and Recommend)

NOTE:
1, This method cannot use in your Raspberry Pi ZW, not have LAN interface, Unless you buy a USB-LAN adapter.
2, If your hotspot with Raspberry Pi 3B/4B purchase from BI7JTA, one your plug-in Wire LAN ,the display will show the true IP address.

TEMPERATURE 41.4 °C CPU CYCLES 600 MHz 23/12/20 11:32:00

DISK FREE 72 CPU LOAD 0.18 REBOOT POWER OFF

MMDVM GATEWAY eth0:192.168.2.185 DESIGN & CODING BY: PD0DIB

1 If show eth0 IP address, you not need scan IP address
2 If can visit http://pi-star, you not need scan IP address

Steps one by one:
– Connect the Wire LAN between Raspberry Pi 3B/4B and Router,

Figure: iOS/Android find HS IP Address

– The router assign IP address through DHCP ,

– Scan your MMDVM hotspot IP address,
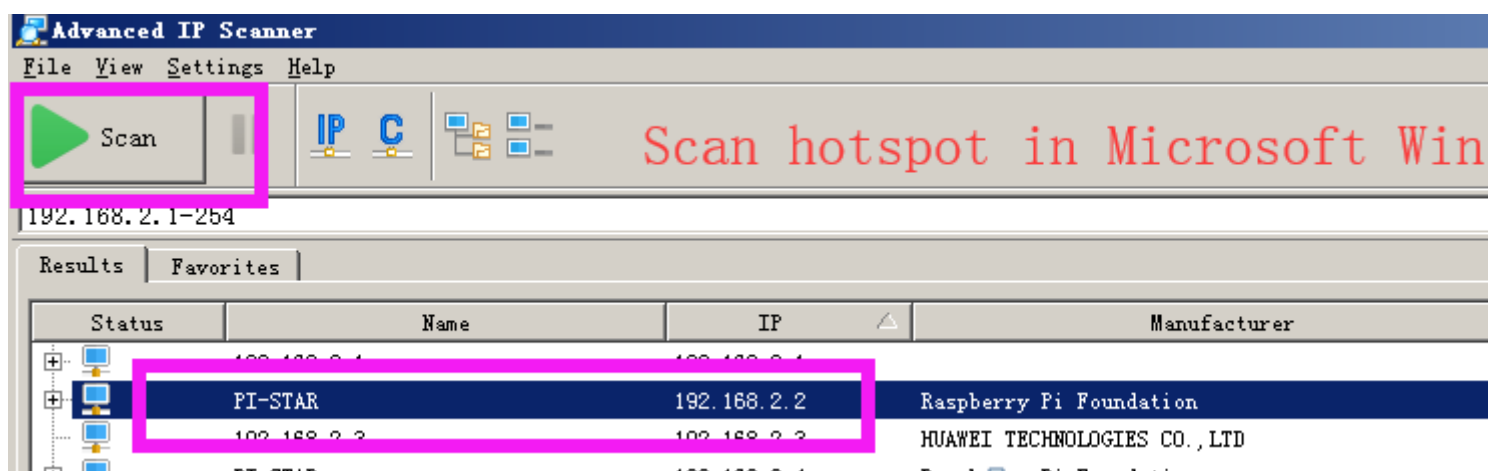 See Figure: Windows OS find HS IP Address

Figure: Windows OS find HS IP Address

– Open your the default web browser , visit the URL ,as follow

http://pi-star (If your LAN have more than 1 hotspot , this possible not link to the hotspot you need)
http://192.168.x.x (the IP address you have scan from IP scan tools).
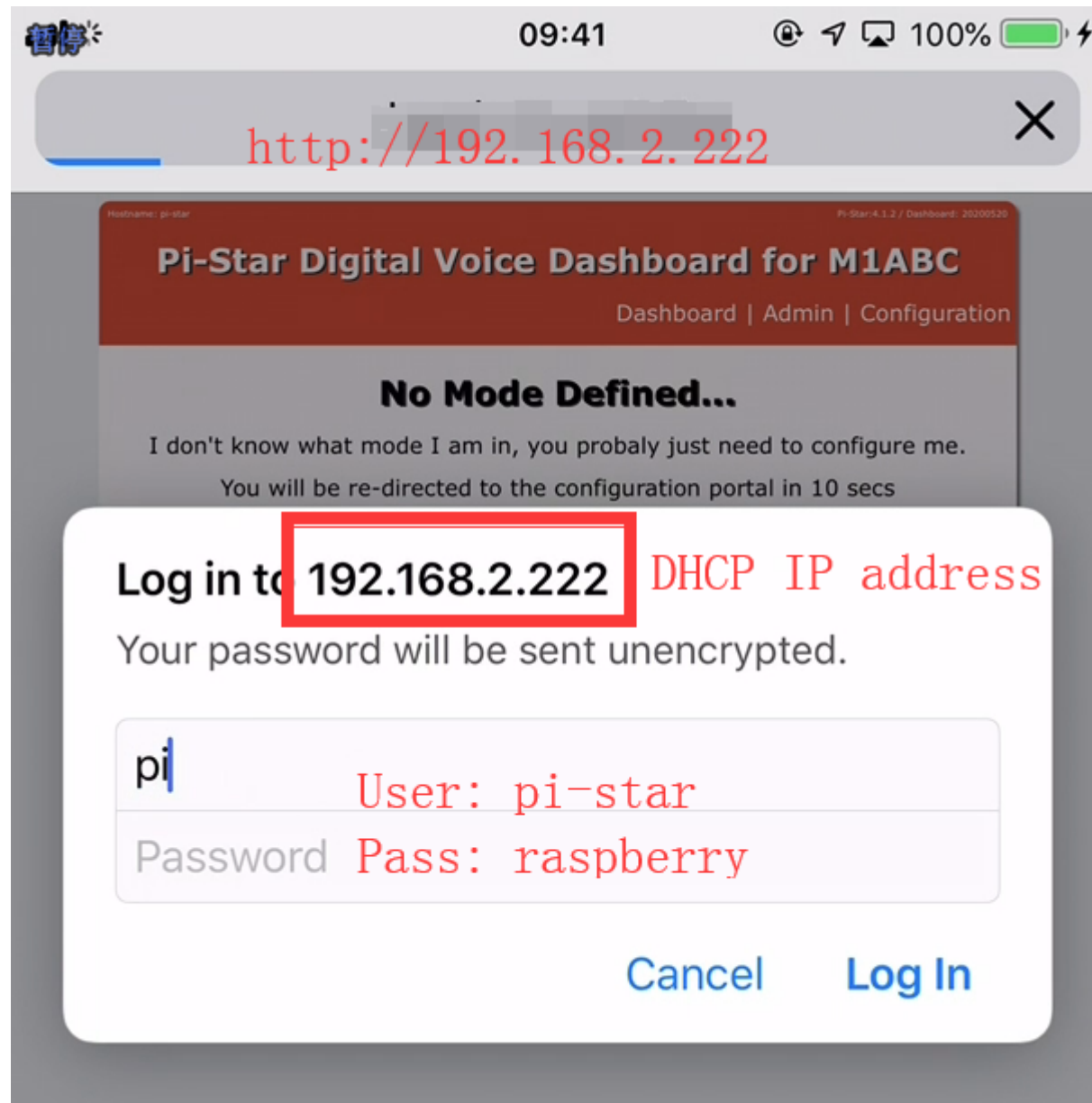See Figure: Visit MMDVM Dashboard

Figure: Visit MMDVM Dashboard

— Add your home WiFi SSID/PSK, then reboot
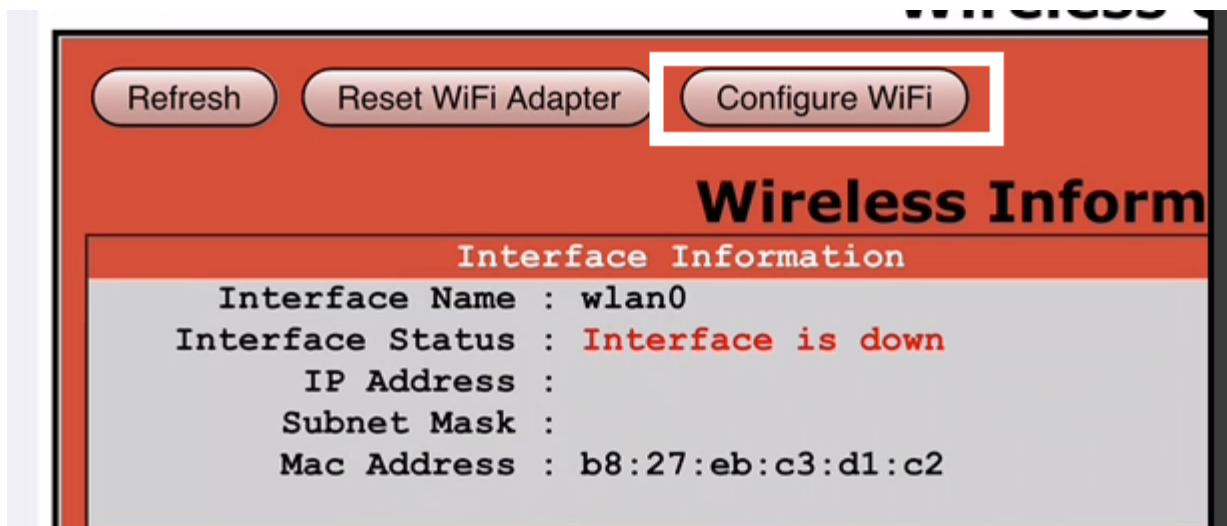
— Finally you can use WiFi connection, instead of Wire LAN.

* The IP address here just a demo value , please use your true scan result value.

2, WiFi self AP (Complicated)

View Appendix --> Configuration WiFi --> WiFi Self AP

3, WiFi config file (Need SD Card adpater)

View Appendix --> Configuration WiFi --> WiFi Config file

Step 3 Pi-Star Configuration

Base settings

Pi-Star:4.1.2 / Dashboard: 20200520

Pi-Star Digital Voice - Configuration

Dashboard | Admin | Expert | Power | Update | Backup/Restore | Factory Reset

Gateway Hardware Information

Hostname	Kernel	Platform	CPU Load	CPU Temp
pi-star	4.19.97-v7l+	Unknown ARM based System	0.63 / 0.26 / 0.13	37° C / 98.6° F

Control Software

Setting	Value
Controller Software:	○ DStarRepeater ● MMDVMHost (DV-Mega Minimum Firmware 3.07 Required)
Controller Mode:	○ Simplex Node ● Duplex Repeater (or Half-Duplex on Hotspots)

Apply Changes

General Configuration

Setting	Value	
Hostname:	pi-star	Do not add suffixes such as .local
Node Callsign:	BI7JTA	
CCS7/DMR ID:	4600724	DMR ID register www.radioid.net
Radio Frequency RX:	434.755.000 MHz	RX <-->Digital radio TX
Radio Frequency TX:	439.755.000 MHz	TX <-->Digital radio RX
Latitude:	50.00	degrees (positive value for North, negative for South)
Longitude:	-3.00	degrees (positive value for East, negative for West)
Town:	Town, L0C4T0R	
Country:	Country	for Duplex hotspot
URL:	http://www.qrz.com/db/BI7JTA	● Auto ○ Manual
Radio/Modem Type:	MMDVM_HS_Hat_Dual Hat (VR2VYE) for Pi (GPIO)	
Node Type:	○ Private ● Public	
APRS Host:	euro.aprs2.net	
System Time Zone:	Europe/London	
Dashboard Language:	english_uk	

Frequency range: 144MHz-148MHz, 420MHz-475MHz, 842MHz-950MHz

avoid the following ranges: **145.8-146.000 MHz and 435-438.000** MHz, otherwise firmware will not start.

See also https://github.com/juribeparada/MMDVM_HS/releases/tag/v1.4.12

Display Type:

DMR2NXDN:		Uses 7 prefix on DMRGateway
POCSAG:		POCSAG Paging Features

Must select the correct Display Type

| MMDVM Display Type: | Nextion ▾ | Port: /dev/ttyNextionDriver ▾ | Nextion Layout: ON7LDS L3 HS ▾ |

None
OLED Type 3 ② OLED 0.96"
OLED Type 6 ① OLED 1.3"
Nextion ① Nextion/USART Display ③
HD44780
TFT Serial
LCDproc

Setting	Value
Hostname:	Do not add suffixes such as .local
Node Callsign:	
CCS7/DMR ID:	4600724
Radio Frequency RX:	434.755.000 MHz

POCSAG:		POCSAG Paging Features
MMDVM Display Type:	Nextion ▾	Port: /dev/ttyNextionDriver ▾ Nextion Layout: ON7LDS L3 HS ▾

None
Modem ② The board 4Pins Header
/dev/ttyAMA0
③ USBtoTTL adapter → /dev/ttyUSB0
/dev/ttyNextionDriver ① Install NextionDriver

Setting	Value
Hostname:	pi-star	Do not ...

1 4 Pins header
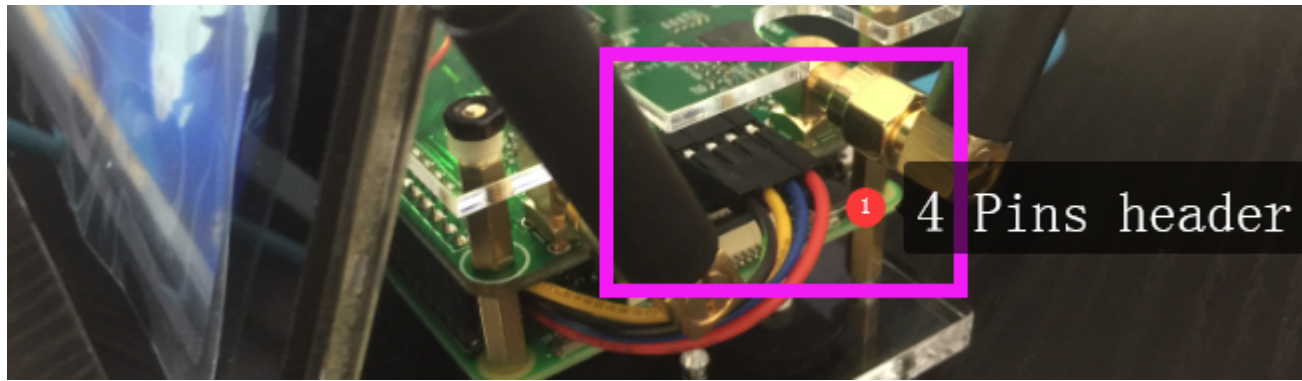
POCSAG Paging Features

: /dev/ttyNextionDriver ⌄ Nextion Layout: ON7LDS L3 HS ⌄

Apply Changes

G4KLX	
ON7LDS L2	2 for Modem or ttyUSBx
ON7LDS L3	
ON7LDS L3 HS	1 For installed NextionDriver

eneral Configuration

Value

not add suffixes such as .local

DMR Mode:

MMDVMHost Configuration

Setting		Value			
DMR Mode:	🔴	RF Hangtime:	20	Net Hangtime:	20

DMR Configuration

Setting	Value	
DMR Master:	BM_China_4601 ⌄	Select your local BM Server
Hotspot Security:		Password keep blank or passw0rd
BrandMeister Network:	Repeater Information Edit Repeater (BrandMeister Selfcare)	
DMR ESSID:	4600724 83 ⌄	
DMR Colour Code:	1 ⌄	Duplex mode need set Static Talkgroup for your
DMR EmbeddedLCOnly:	⚪	
DMR DumpTAData:	🔴	Keep default

Apply Changes

YSF Mode:

MMDVMHost Configuration

Setting		Value			
DMR Mode:	⚪	RF Hangtime:	20	Net Hangtime:	20
D-Star Mode:	1 C4FM, Yaesu	RF Hangtime:	20	Net Hangtime:	20
YSF Mode:	🔴	RF Hangtime:	20	Net Hangtime:	20
P25 Mode:		RF Hangtime:	20	Net Hangtime:	20
NXDN Mode:	⚪	RF Hangtime:	20	Net Hangtime:	20

General Configuration

Setting	Value
Hostname:	pi-star — Do not add suffixes such as .local
Node Callsign:	BI7JTA ②
CCS7/DMR ID:	4600724
Radio Frequency RX:	434.755.000 MHz
Radio Frequency TX:	439.755.000 MHz
Latitude:	50.00 ①
Longitude:	-3.00
Town:	Town, L0C4T0R
Country:	Country
URL:	http://www.qrz.com/db/BI7JTA — ●Auto ○Manual
Radio/Modem Type:	MMDVM_HS_Hat_Dual Hat (VR2VYE) for Pi (GPIO) ③
Node Type:	○Private ●Public
APRS Host:	euro.aprs2.net
System Time Zone:	Europe/London
Dashboard Language:	english_uk

Apply Changes

YSF ,DMR ID not necessary, just when you cross to DMR/P25, with ID will show your Callsign

Will show in http://aprs.fi map, you can get your GPS value in aprs.fi map

for the HAT "BI7JTA &VR2VYE"

Apply Changes

Yaesu System Fusion Configuration

Setting	Value
YSF Startup Host:	YSF80337 - CN CHINA 1 - W24166/TG46001
UPPERCASE Hostfiles:	
WiresX Passthrough:	

- YSF53710 - CA MARITIMES - CAN MARITIMES
- YSF48095 - CAMOAST - YSF REFLECTOR
- YSF19952 - CA NANIKANA - NANIKANA
- YSF36010 - CA ON-PROCOM - ON PROV COMMS
- YSF79602 - CAROLINA LINK - 79602
- YSF13339 - CA WEST CAN - WESTERN CANADA
- YSF63347 - CH 228 SWISS2 - HB-CONNECT
- YSF30998 - CH 228 SWISS - SWISS-CONNECT
- YSF15280 - CH HB9VD - RADIOAMATEURS
- YSF66049 - CHINALINK - CHINA YSF REFL
- YSF37664 - CH IT-SWISS - C4FM OM
- YSF52796 - CH JOTA - JOTA CH
- YSF72350 - CL CHILE - YSF TO TG730
- YSF34287 - CL CL CHILE - YSF HOTSPOT'S
- YSF19525 - CL EMCOMM - TG 730911
- YSF09627 - CL YSF - CHILE YSF ROOM
- YSF69058 - CNARN - CNARN
- YSF07333 - CN B4-C4FM - WELCOME TEST!
- YSF18829 - CN CC1 - TG 460501
- YSF80337 - CN CHINA 1 - W24166/TG46001

① Select your YSF reflector (Room/Server)

Setting	
MobileGPS Enable:	
GPS Port:	
GPS Port Speed:	

Setting	
Dashboard Access:	
ircDDBGateway Remote:	
SSH Access:	
Auto AP:	changed
uPNP:	●On ○Off

Apply Changes

Step 4 Radio Programming

DMR Mode:

AnyTone 878UV,

Also apply to other model DMR radios, such TYT, Baofeng, Motorola, GD77
The key items:
1, DMRID,
2, Talkgroup,
3, Receive Group CallList,
4, Color Code, Slot,

Motorola P8668i, XPR4550

YSF

YSF the BER around 1% is ok, you can also adjust by set RXOffset, TXOffset in Pi-Star expert mode.

Step 5 QSO & Testing

Troubleshooting

Believe me , your board I have tested full, please do not doubt the board issue, need patience to make it work.

BER too high

Most Motorola radio, Hytera, Baofeng DMR radio ,will has big offset more than −300Hz

① Expert mode
Configuration -> Expert -> MMDVMHost

② Motorola, Hytera, Baofeng always have -300 to -500Hz offset

DisplayLevel	0
FileLevel	2
FilePath	/var/log/pi-star

Apply Changes — CW Id

Enable	0
Time	10

Apply Changes — Modem

Port	/dev/ttyAMA0
TXInvert	1
RXInvert	0
PTTInvert	0
TXDelay	100
RXOffset	0
TXOffset	0
DMRDelay	0
RXLevel	50
TXLevel	50
RXDCOffset	0
TXDCOffset	0
CWIdTXLevel	50
D-StarTXLevel	50
DMRTXLevel	50
YSFTXLevel	50
P25TXLevel	50

Hz

RXOffset = TXOffset
try:
-300,-200,-100
100,200,300 ...

RXoffset = ?
TXoffset = ?

RXoffset=0
TXoffset=0

MMDVM
DMR TS1 TS2
YSF/C4FM
D-ST...

Local RF Activity

Time (HKT)	Mode	Callsign	Target	Src	Dur(s)	BER	RSSI
22:55:41 Mar 6th	DMR Slot 2	BI7JTA	TG 6	RF	2.9	0.1%	S9+46dB

DMR: <=0.5% YSF: <1.5%

Apply Changes — UMP

Enable	0
Port	/dev/ttyACM1

Cannot open repeater

Possible,
1) RX, TX not invert with Hat and radio;
2, BER too high,
3, Other, such as frequency be interferences, Power supply not stable,

Cannot continue listen network TG, in DMR mode
— Duplex mode(Simplex Hat not support duplex mode)
Register BM account and setup your static Talkgroup for TS1,TS2
https://www.bi7jta.org/wiki/index.php?title=Main_Page#Set_Static_Talkgroups

— Simplex mode
Simplex mode default use Dynamic talkgroup, will continue listen the last TG you have press PTT, on your DMR radio.
YOu can also set more than one static Talkgroup for TS2

Cannot connect to Modem

Possible reason:
1) satellite
Frequency restrictions to avoid satellite interference. Please avoid the following ranges: 145.8-146.0 MHz and 435-438 MHz, otherwise firmware will not start.

tail -100f /var/log/pi-star/MMDVM-2018-11-21.log
Error message Received a NAK to the SET_FREQ command from the modem

Modes Enabled

D-Star	DMR	
YSF		
YSF XMode	NXDN	
DMR XMode	POCSAG	

① Disconnected Modem

Time (GMT)	Mode

Time (GMT)	Mode

Network Status

D-Star Net	DMR Net
YSF Net	P25 Net

2) Factory Reset cause NextionDriver not normal

Ask me for help

Before ask me for help, please analysis Pi-Star running logs first,
http://pi-star/admin/download_modem_log.php
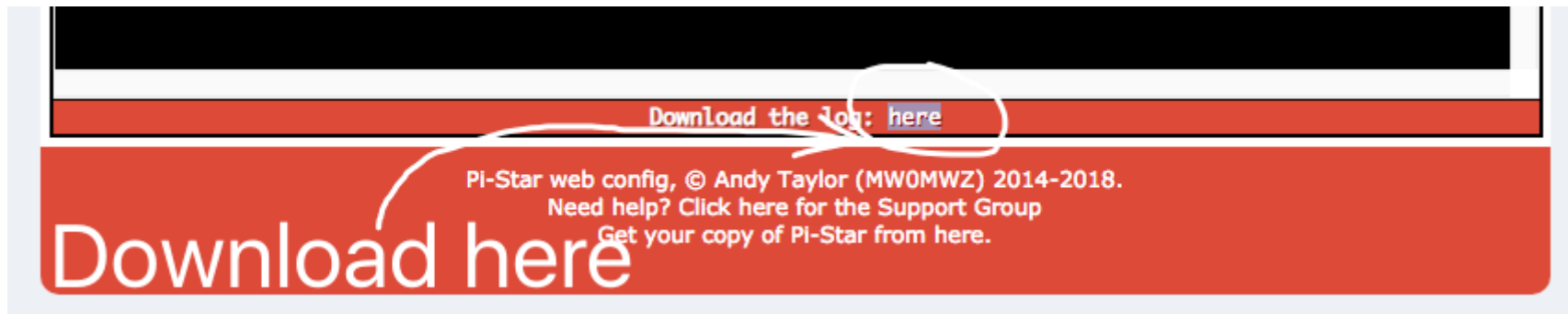
1) Download Pi-Star full logs
2) your radio channel settings detail screenshots
3) Send to email bi7jta@gmail.com ,

Too large size video please upload to Youtube.com, then send me a link.
Remote Desktop: Microsoft Teams, Teamviewer

Demo video

https://www.youtube.com/winters_huang

Reference

BI7JTA Wiki https://www.bi7jta.org
Pi-Star http://pistar.uk
MMDVM Project https://github.com/g4klx/MMDVM

Appendix

Frequency range:

144MHz-148MHz, 420MHz-475MHz,842MHz-950MHz
avoid the following ranges: **145.8-146.000 MHz and 435-438.000** MHz, otherwise firmware will not start.
See also https://github.com/juribeparada/MMDVM_HS/releases/tag/v1.4.12

Other method for Configuration WiFi

— WiFi self AP,

NOTE: This method cannot use in your NanoPi NEO, Raspberry Pi 2B not have inner WiFi model.
Steps one by one:

— Power on your hotspot , after 2 or 3 minutes , if MMDVM hotspot cannot join any WiFi netwok, Pi-Star OS will generate a WiFi AP(access point/router),
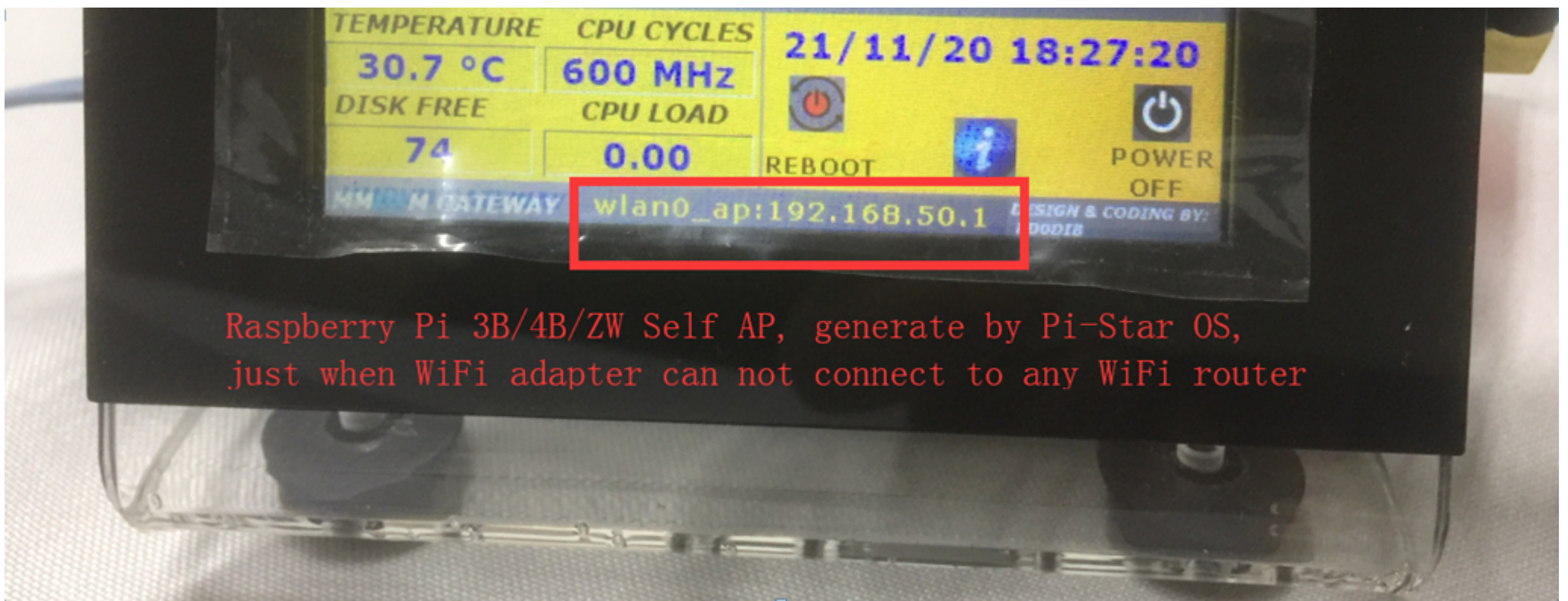
Raspberry Pi 3B/4B/ZW Self AP, generate by Pi-Star OS,
just when WiFi adapter can not connect to any WiFi router

Figure: MMDVM Self AP

— Open your iOS or Android , PC with WiFi adapter, join the Pi—Star WiFi AP,

iOS, Android --> Settings -->WiFi
Join WiFi network: Pi-Star_xxx
Password: raspberry

Figure: Join WiFi Self AP

— Open your the default web browser , visit the URL ,as follow (**Must join this WiFi AP**)
   http://pi-star or
   http://192.168.50.1 (the IP address is fix, if your display show this 50.1 address, means hotspot WiFi have not connect to internet).
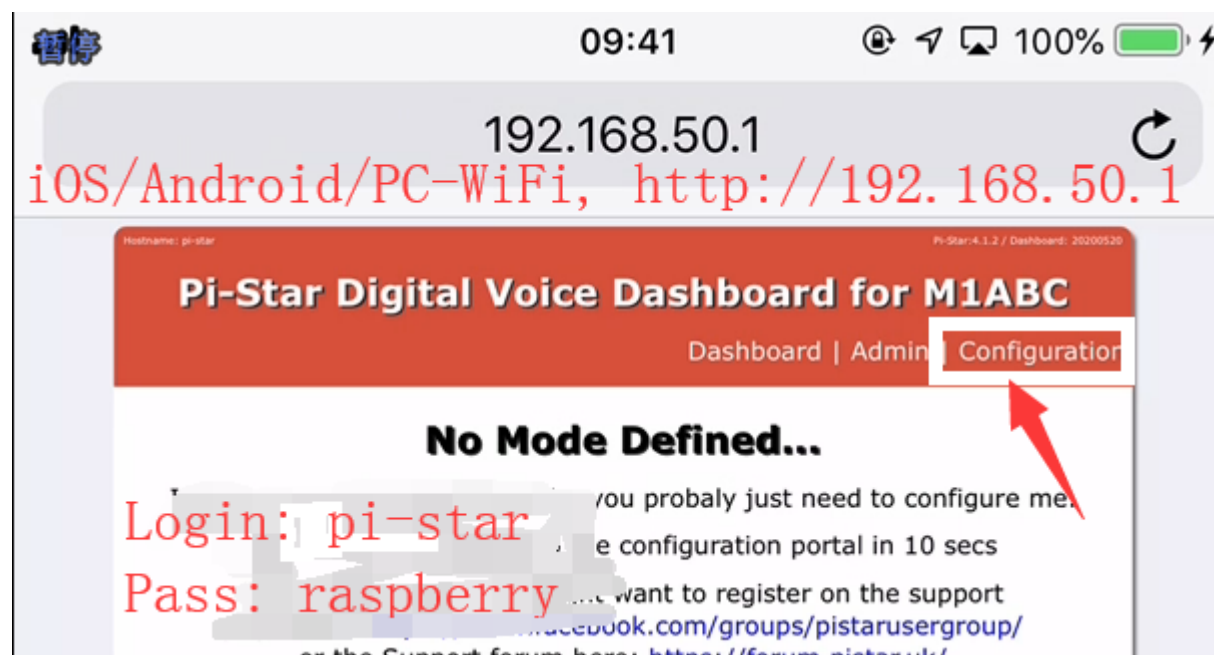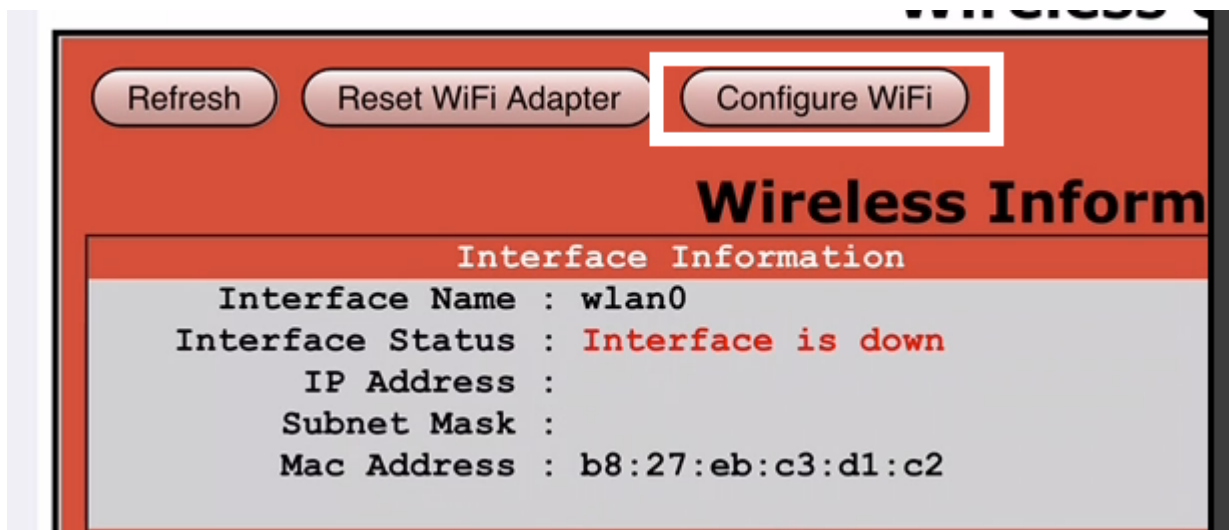   Figure: Visit management page

iOS/Android/PC-WiFi, http://192.168.50.1

Login: pi-star
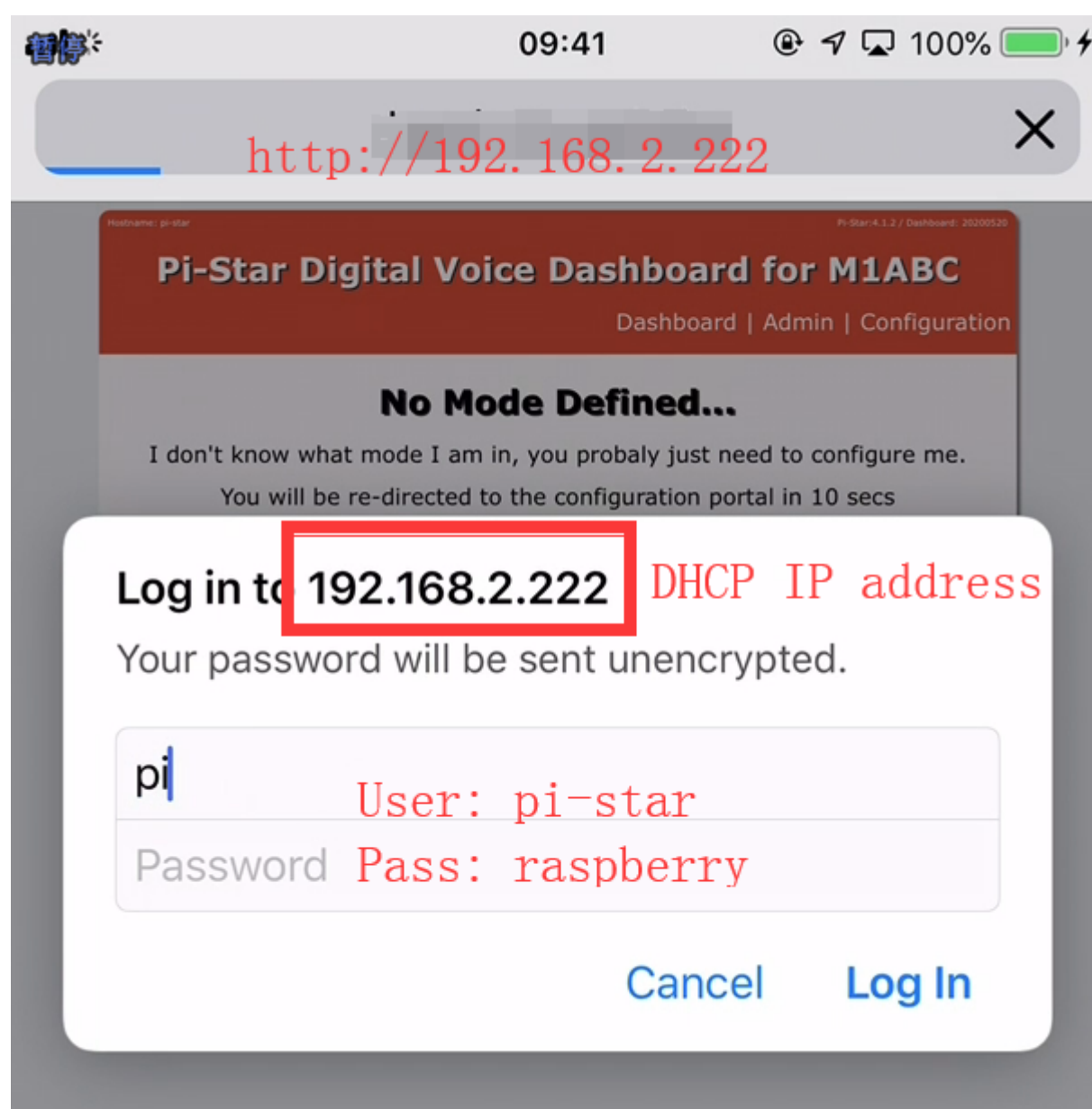Pass: raspberry

Figure: Visit management page

— Add your home WiFi SSID/PSK, then reboot

— Use Fing APP or IP scan tools in Windows/OSX, find the Pi-Star hostname and DHCP IP

— Finally you have made the MMDVM hotspot connect to your router, do the next step

— WiFi config file

https://www.pistar.uk/wifi_builder.php
— Input your home WiFi SSID/PSK
— Submit to download, the file wpa_supplicant.conf
— Copy this file to the root of Pi-Star SD card
— Power on again ,if all correct , your MMDVM hotspot will connect to your WiFi router

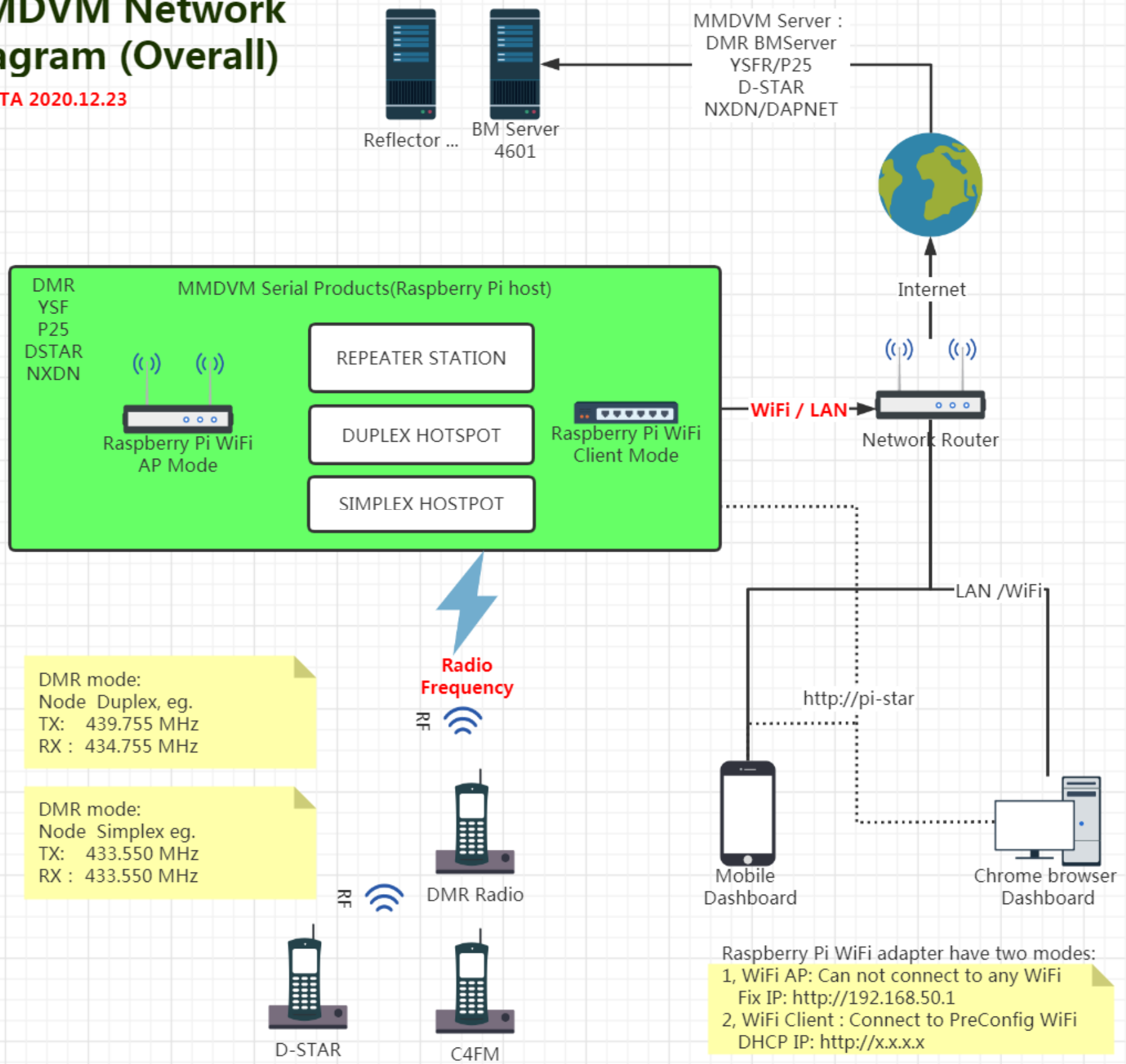|			
	WiFi Country Code: GB ▼		
	SSID:		
Your WiFi	PSK:		
	提交查询		

(Continue and not the end)

Figure: MMDVM Network diagram(Overall)