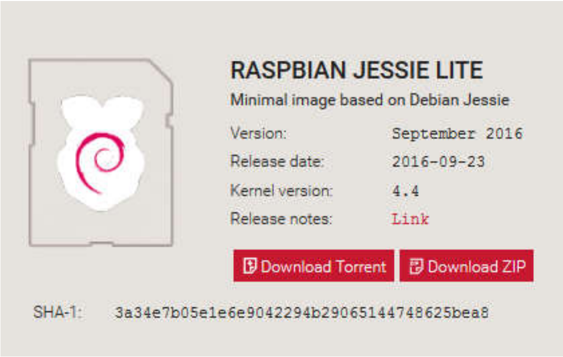
Setup a MMDVMHost Raspberry Pi DVMega Hotspot

Aangemaakt:	26/11/2016 10:41	**Bijgewerkt:**	12/12/2016 22:50
Auteur:	Filip Verhoeve		
Labels:	DMR, Dstar, Fusion, HAM, Linux		

1. Download Raspbian Jessie Lite **https://www.raspberrypi.org/downloads/raspbian/**



RASPBIAN JESSIE LITE

Minimal image based on Debian Jessie

Version: September 2016

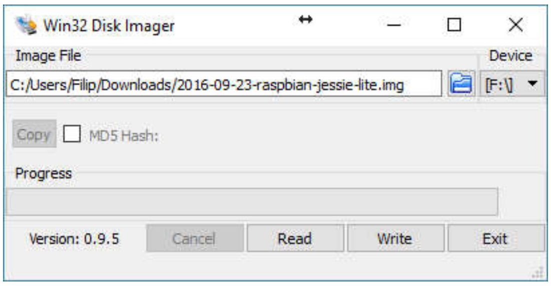
Release date: 2016-09-23

Kernel version: 4.4

Release notes: Link

SHA-1: 3a34e7b05e1e6e9042294b29065144748625bea8

2. Use Win32 Disk Imager to save the Raspbian Jessie Lite on a 16 GB MicroSDHC card **https://sourceforge.net/projects/win32diskimager/**



Win32 Disk Imager

Image File: C:/Users/Filip/Downloads/2016-09-23-raspbian-jessie-lite.img

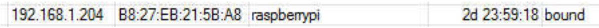
Device: [F:\]

□ MD5 Hash:

Progress

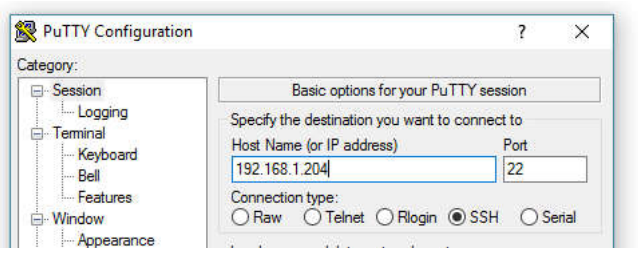
Version: 0.9.5

3. Boot the Raspberry Pi 3 with a network connection and check the IP address in your router



192.168.1.204	B8:27:EB:21:5B:A8	raspberrypi	2d 23:59:18	bound

4. Use Putty to make a SSH connection to your Raspberry Pi 3 **http://www.putty.org/**



PuTTY Configuration

Basic options for your PuTTY session

Specify the destination you want to connect to

Host Name (or IP address): 192.168.1.204

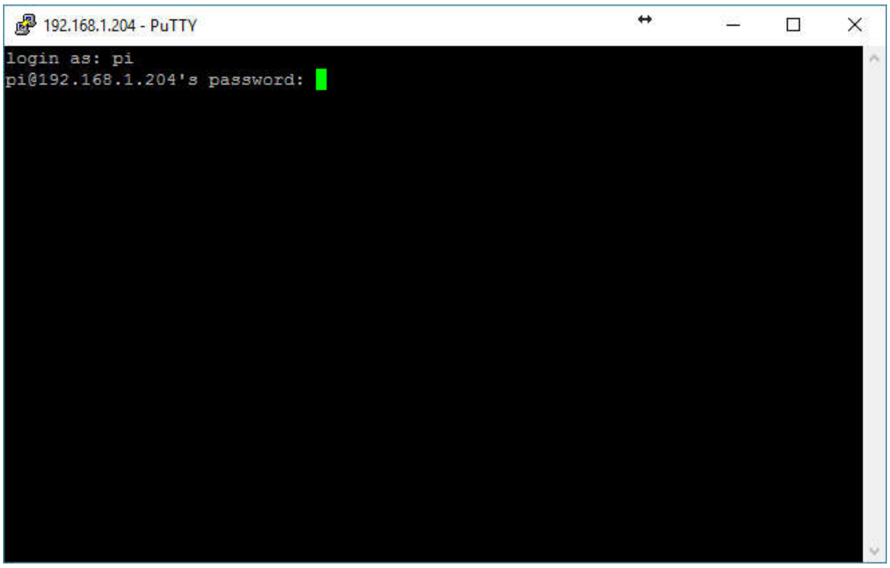
Port: 22

Connection type: ○ Raw ○ Telnet ○ Rlogin ● SSH ○ Serial

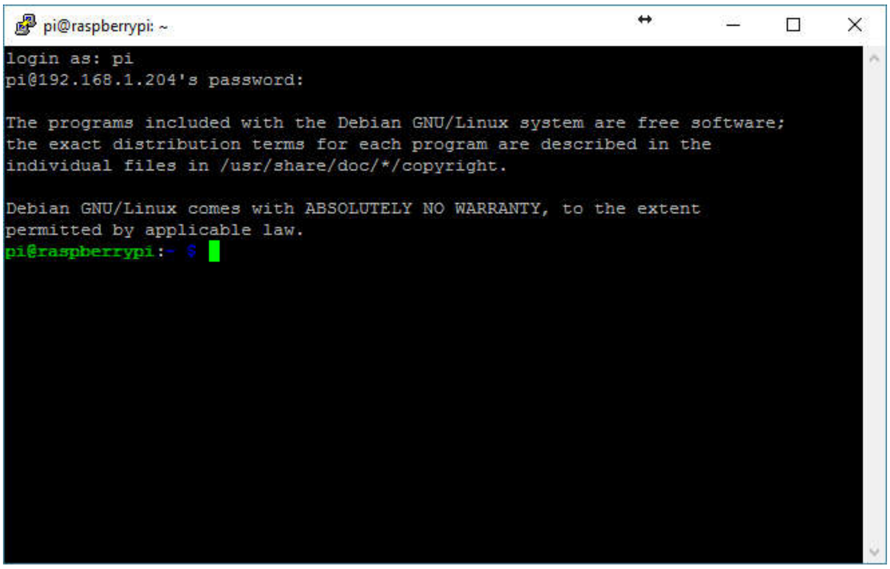
Accept the Putty Security Alert

5. Login into your Raspberry Pi 3

```
login as: pi
raspberry@192.168.1.204's password:  raspberry
```



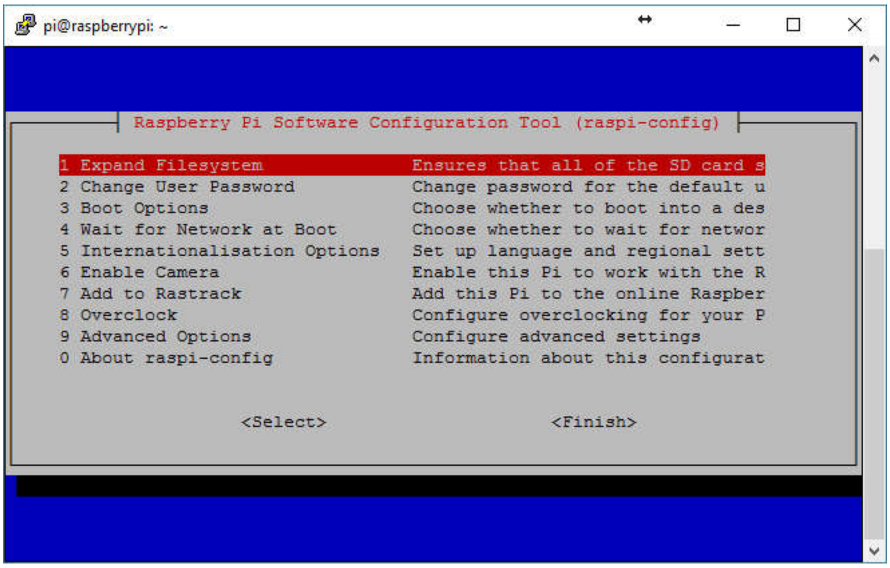
```
login as: pi
pi@192.168.1.204's password:
```



```
login as: pi
pi@192.168.1.204's password:

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.
pi@raspberrypi:~ $
```

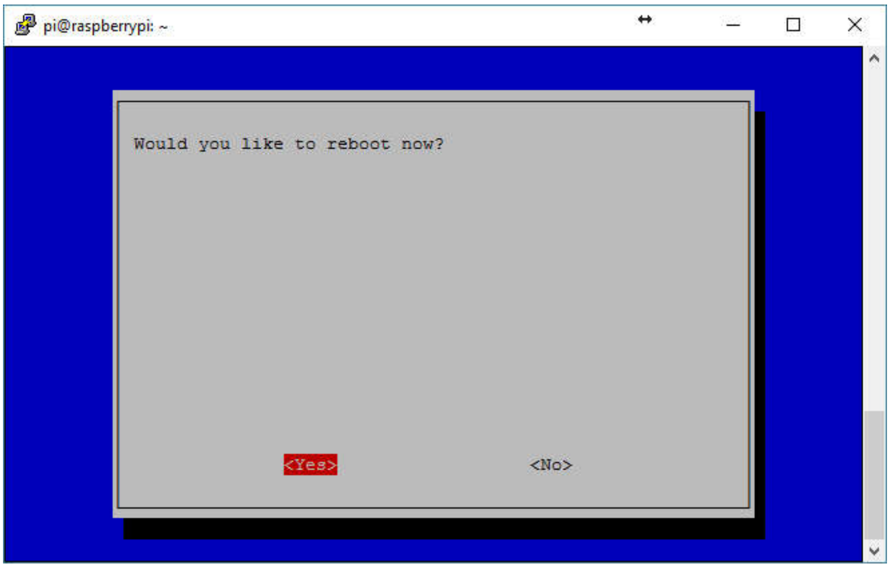
6. Expand your MicroSDHC filesystem to 16GB

```
# sudo raspi-config
```



```
Raspberry Pi Software Configuration Tool (raspi-config)

1 Expand Filesystem              Ensures that all of the SD card s
2 Change User Password           Change password for the default u
3 Boot Options                   Choose whether to boot into a des
4 Wait for Network at Boot       Choose whether to wait for networ
5 Internationalisation Options   Set up language and regional sett
6 Enable Camera                  Enable this Pi to work with the R
7 Add to Rastrack                Add this Pi to the online Raspber
8 Overclock                      Configure overclocking for your P
9 Advanced Options               Configure advanced settings
0 About raspi-config             Information about this configurat

             <Select>                     <Finish>
```

and reboot



```
Would you like to reboot now?

         <Yes>                  <No>
```

7. Update your Raspberry Pi 3 to the latest Raspbian Jessie Lite version

```
# sudo apt-get update && sudo apt-get upgrade
```

8. Setup Wireless networking

Check the available ESSID's

```
# sudo iwlist wlan0 scan
```

Edit wpa_supplicant.conf --> add your wireless network

```
# sudo nano /etc/wpa_supplicant/wpa_supplicant.conf

    country=BE
    ctrl_interface=DIR=/var/run/wpa_supplicant GROUP=netdev
    update_config=1

    network={
    ssid="Fill in your SSID"
    psk="Fill in your password"
    }
```

9. Improve color scheme / readability of the 'ls' command in Putty

```
# ls /home/
# dircolors --print-database > ~/.dircolors
# grep DIR .dircolors
```

Edit the .dircolors file

```
# nano .dircolors
```

Change DIR 01;34 # directory into DIR 01;33 # directory

```
# grep DIR .dircolors
# eval `dircolors ~/.dircolors`
```

10. Improve color scheme / readability of the command prompt

Edit the bashrc file

```
# nano .bashrc
```

Change following rows

```
     if [ "$color_prompt" = yes ]; then
         PS1='${debian_chroot:+($debian_chroot)}\[\033[01;32m\]\u@\h\[\033[00m\]:\[\033[01;34m\]\w
     \$\[\033[00m\] '
     else
         PS1='${debian_chroot:+($debian_chroot)}\u@\h:\w\$ '
     fi
```

into these rows

```
     if [ "$color_prompt" = yes ]; then
     #    PS1='${debian_chroot:+($debian_chroot)}\[\033[01;32m\]\u@\h\[\033[00m\]:\[\033[01;34m\]\w
     \$\[\033[00m\] '
          PS1='${debian_chroot:+($debian_chroot)}\! \[\033[01;32m\][\u@\h] \[\033[01;36m\]\w \$ \
     [\033[00m\]'
     else
         PS1='${debian_chroot:+($debian_chroot)}\u@\h:\w\$ '
     fi
```

Reload the bashrc file

```
# source ~/.bashrc
```

11. Install MMDVMHost

Install git software

```
# sudo apt-get install git screen
```

Download MMDVMHost & MMDVMCal

```
# cd /opt
# sudo git clone https://github.com/g4klx/MMDVMHost.git
# sudo git clone https://github.com/g4klx/MMDVMCal.git
```

Compile MMDVMHost & MMDVMCal

```
# cd /opt/MMDVMHost
# sudo make
# cd /opt/MMDVMCal
# sudo make
```

Create log directory for the MMDVMHost log files

```
# sudo mkdir /var/log/MMDVM
```

12. Configure MMDVMHost

```
# cd /opt/MMDVMHost
# sudo nano MMDVM.ini

     [General]
     Callsign=fill in your callsign
     Timeout=180
     Duplex=0
     # ModeHang=10
     # RFModeHang=10
     RFModeHang=30   #(minimum 30sec required for Fusion)
     NetModeHang=3
     Display=Nextion #(in case Nextion display is used)
     #Display=None
     Daemon=0

     [Info]
     RXFrequency=433650000
```

```
TXFrequency=433650000
Power=1
Latitude=xx.xxxxxx
longitude=x.xxxxxx
Height=xx
Location=Describe your location
Description=Multi-Mode Repeater
URL=fill in your website (f.i. https://www.qrz.com/db/callsign)

[Log]
# Logging levels, 0=No logging
DisplayLevel=2
FileLevel=2
FilePath=/var/log/MMDVM
FileRoot=MMDVM

[CW Id]
Enable=1
Time=10

[DMR Id Lookup]
File=DMRIds.dat
Time=24

[Modem]
Port=/dev/ttyAMA0
# Port=/dev/ttyACM0
# Port=\\.\COM3
TXInvert=1
RXInvert=0
PTTInvert=0
TXDelay=100
DMRDelay=0
RXLevel=50
TXLevel=50
# CWIdTXLevel=50
# D-StarTXLevel=50
# DMRTXLevel=50
# YSFTXLevel=50
# P25TXLevel=50
OscOffset=0
RSSIMultiplier=1
RSSIOffset=10
Debug=0

[UMP]
Enable=0
# Port=\\.\COM4
Port=/dev/ttyACM1

[D-Star]
Enable=1
Module=B
SelfOnly=0

[DMR]
Enable=1
Beacons=1
Id=fill in your DMR ID XXXXXX
ColorCode=1
SelfOnly=0
# Prefixes=234,235
CallHang=3
TXHang=4
#Blacklist=
#DstIdBlackListSlot1RF=
#DstIdBlackListSlot2RF=
#DstIdWhiteListSlot1RF=
#DstIdWhiteListSlot2RF=
#DstIdBlackListSlot1NET=
#DstIdBlackListSlot2NET=
#DstIdWhiteListSlot1NET=
#DstIdWhiteListSlot2NET=
TGRewriteSlot1=0
TGRewriteSlot2=0
BMAutoRewrite=0
BMRewriteReflectorVoicePrompts=0
DirectDial=0
TargetTG=9
#RewriteMapSlot1=
#RewritemapSlot2=
[System Fusion]
Enable=1
RemoteGateway=0

[P25]
Enable=0
NAC=293

[D-Star Network]
Enable=1
GatewayAddress=127.0.0.1
GatewayPort=20010
LocalPort=20011
Debug=0

[DMR Network]
Enable=1
Address=81.95.127.156  #(DMR Master Belgium)
Port=62031
Jitter=300
# Local=3350
Password=password
# Cptions=
RSSI=0
Slot1=0
Slot2=1
Debug=0

[System Fusion Network]
Enable=1
LocalAddress=127.0.0.1
LocalPort=3200
GwyAddress=127.0.0.1
GwyPort=4200
Debug=0

[P25 Network]
Enable=0
GatewayAddress=127.0.0.1
GatewayPort=42020
LocalPort=32010
Debug=0

[TFT Serial]
# Port=modem
Port=/dev/ttyAMA0
Brightness=50

[HD44780]
Rows=2
Columns=16

# For basic HD44780 displays (4-bit connection)
# rs, strb, d0, d1, d2, d3
Pins=11,10,0,1,2,3

# Device address for I2C
I2CAddress=0x20

# PWM backlight
PWM=0
PWMPin=21
PWMBright=100
PWMDim=16

DisplayClock=1
UTC=0

[Nextion]
# Port=modem
# Port=/dev/ttyAMA0
Port=/dev/ttyUSB0
Brightness=50
DisplayClock=1
UTC=0
IdleBrightness=5

[OLED]
Type=3
Brightness=0
Invert=0

[LCDproc]
Address=localhost
Port=13666
```

```
#LocalPort=13667
DimOnIdle=0
DisplayClock=1
UTC=0
```

13. Configure serial communication with DVMega

```
# sudo nano /boot/cmdline.txt
```

Delete «ttyAMA0 » if present
Delete «console=serial0,115200»
You will get something like
«dwc_otg.lpm_enable=0 console=tty1 root=/dev/mmcblk0p2 rootfstype=ext4 elevator=deadline fsck.repair=yesrootwait»

```
# sudo nano /boot/config.txt
```

Disable Bluetooth --> add at the end of the file

```
# Additionaloverlays and parametersare documented/boot/overlays/README
# Enableaudio (loadssnd_bcm2835)
dtparam=audio=on
# Modification Bluetooth
dtoverlay=pi3-disable-bt
```

14. Creating the needed services

Create service mmdvmhost.service

```
# sudo nano /lib/systemd/system/mmdvmhost.service
```

Add below in the new file

```
[Unit]
Description=MMDVM Host Service
After=syslog.targetnetwork.target
[Service]
User=root
WorkingDirectory=/opt/MMDVMHost
ExecStart=/usr/bin/screen -S MMDVMHost -D -m /opt/MMDVMHost/MMDVMHost /opt/MMDVMHost/MMDVM.ini
ExecStop=/usr/bin/screen -S MMDVMHost -X quit
[Install]
WantedBy=multi-user.target
```

CTRL+X and Y

Make your file executable

```
# sudo chmod 755 /lib/systemd/system/mmdvmhost.service
# sudo ln -s /lib/systemd/system/mmdvmhost.service /etc/systemd/system/mmdvmhost.service
```

Create a 60 sec timer mdvmhost.time

```
# sudo nano /lib/systemd/system/mmdvmhost.timer
```

Add following in the new file

```
[Timer]
OnStartupSec=60
[Install]
WantedBy=multi-user.target
```

CTRL+X and Y

Make your file executable

```
# sudo chmod 755 /lib/systemd/system/mmdvmhost.timer
# sudo ln -s /lib/systemd/system/mmdvmhost.timer /etc/systemd/system/mmdvmhost.timer

# sudo systemctl daemon-reload
# sudo systemctl enable mmdvmhost.timer
```

15. Reboot the Raspberry Pi 3 and wait 60 seconds till MMDVMHost starts

16. Install ircDDBGatewway

```
# sudo curl http://repo1.ham-digital.net/raspbian/opendv.list -o /etc/apt/sources.list.d/opendv.list
# cd /tmp
# wget http://repo1.ham-digital.net/debian/dl5di.pk
# sudo apt-key add dl5di.pk
# sudo apt-get update
# sudo apt-get install ircddbgateway
```

After the installation your /home/opendv/ircddbgateway/ircddbgateway file should like similar to below file

```
language=10
gatewayCallsign=fill in your callsign
latitude=xx.xxxxxx
longitude=x.xxxxxx
description1=Describe your location
url=fill in your website (f.i. http://status.ircddb.net/qam.php?call=your callsign)
hbAddress=127.0.0.1
hbPort=20010
repeaterCall1=fill in your callsign
repeaterBand1=B
repeaterType1=0
repeaterAddress1=127.0.0.1
repeaterPort1=20011
frequency1=433.650000
offset1=0.0000
rangeKms1=1
agl1=15
reflector1=DCS011 B
atStartup1=1
reconnect1=0
latitude1=xx.xxxxxx
longitude1=x.xxxxxx
ircddbEnabled=1
ircddbHostname=group1-irc.ircddb.net
ircddbUsername=fill in your callsign
ircddbPassword=
aprsEnabled=1
aprsHostname=euro.aprs2.net
aprsPort=14580
ccsEnabled=1
ccsHost=CCS711
dextraEnabled=1
dextraMaxDongles=3
dplusEnabled=1
dplusMaxDongles=3
dplusLogin=fill in your callsign
dcsEnabled=1
remoteEnabled=0
infoEnabled=1
echoEnabled=1
logEnabled=1
dratsEnabled=0
dtmfEnabled=1
```

Reboot the Raspberry Pi 3 and wait 60 seconds till MMDVMHost starts

17. Install YSFGateway

Download YSF Gateway

```
# cd /opt
# sudo git clone https://github.com/g4klx/YSFClients.git
```

Compile YSF Gateway

```
# cd /opt/YSFClients/YSFGateway
# sudo make
# sudo cp YSFGateway /usr/local/bin
```

Configure YSF Gateway

```
# sudo mkdir /etc/YSFGateway
# sudo nano /etc/YSFGateway/YSFGateway.ini
```

```
[General]
Callsign=fill in your callsign
Suffix=RPT
# Suffix=ND
RptAddress=127.0.0.1
RptPort=3200
LocalAddress=127.0.0.1
LocalPort=4200
Daemon=1

[Info]
RXFrequency=433650000
TXFrequency=433650000
Power=1
Latitude=xx.xxxxxx
```

```
Longitude=x.xxxxxx
Height=15
Name=Describe your location
Description=Multi-Mode Repeater

[Log]
# Logging levels, 0=No logging
DisplayLevel=2
FileLevel=2
FilePath=/var/log/YSFGateway
FileRoot=YSFGateway

[aprs.fi]
Enable=1
# Server=noam.aprs2.net
Server=euro.aprs2.net
Port=14580
Password=xxxx #(password can be checked with via http://apps.magicbug.co.uk/passcode/index.php)

[Network]
Enable=1
Port=42000
Hosts=/etc/YSFGateway/YSFHosts.txt
ReloadTime=60
ParrotAddress=127.0.0.1
ParrotPort=42000
# Startup=
Debug=0
```

Create log directory for the YSF Gateway log files

```
# sudo mkdir /var/log/YSFGateway
```

Move the Fusion Host file to the correct location

```
# sudo cp YSFHosts.txt /etc/YSFGateway
```

Download the most recent host file from the web

```
# sudo wget -O /etc/YSFGateway/YSFHosts.txt http://register.ysfreflector.de/export_csv.php
```

Define the correct file access rights

```
# sudo groupadd mmdvm
# sudo useradd mmdvm -g mmdvm -s /sbin/nologin
# sudo chgrp mmdvm /var/log/YSFGateway
# sudo chmod g+w /var/log/YSFGateway
```

Create a starting script for automatic start during boot

```
# sudo nano /etc/init.d/YSFGateway.sh
```

```
#!/bin/bash
### BEGIN INIT INFO
#
# Provides:               YSFGateway
# Required-Start:         $all
# Required-Stop:
# Default-Start:          2 3 4 5
# Default-Stop:           0 1 6
# Short-Description:      Example startscript YSFGateway

#
### END INIT INFO
## Fill in name of program here.
PROG="YSFGateway"
PROG_PATH="/usr/local/bin/"
PROG_ARGS="/etc/YSFGateway/YSFGateway.ini"
PIDFILE="/var/run/YSFGateway.pid"
USER="root"

start() {
      if [ -e $PIDFILE ]; then
          ## Program is running, exit with error.
          echo "Error! $PROG is currently running!" 1>&2
          exit 1
      else
          ## Change from /dev/null to something like /var/log/$PROG if you want to save output.
      sleep 20
          cd $PROG_PATH
          ./$PROG $PROG_ARGS
          echo "$PROG started"
          touch $PIDFILE
      fi
}

stop() {
      if [ -e $PIDFILE ]; then
```

```
          ## Program is running, so stop it
         echo "$PROG is running"
         rm -f $PIDFILE
         killall $PROG
         echo "$PROG stopped"
      else
          ## Program is not running, exit with error.
          echo "Error! $PROG not started!" 1>&2
          exit 1
      fi
}

## Check to see if we are running as root first.
## Found at http://www.cyberciti.biz/tips/shell-root-user-check-script.html
if [ "$(id -u)" != "0" ]; then
      echo "This script must be run as root" 1>&2
      exit 1
fi

case "$1" in
      start)
          start
          exit 0
      ;;
      stop)
          stop
          exit 0
      ;;
      reload|restart|force-reload)
          stop
          sleep 5
          start
          exit 0
      ;;
      **)
          echo "Usage: $0 {start|stop|reload}" 1>&2
          exit 1
      ;;
esac
exit 0
### END
```

Make the starting script executable

```
# sudo chmod +x /etc/init.d/YSFGateway.sh
```

Activate script to run during boot

```
# sudo apt-get install chkconfig
# sudo chkconfig YSFGateway.sh on
```

Start the Fusion Gateway

```
# sudo /etc/init.d/YSFGateway.sh start
```

Update the Fusion Host file each 10 minutes

```
# sudo crontab -e
```

```
*/10 * * * * wget -O /etc/YSFGateway/YSFHosts.txt
http://register.ysfreflector.de/export_csv.php
```

Reboot the Raspberry Pi 3 and wait 60 seconds till MMDVMHost starts

18. Install MMDVMHost Dashboard

Install a lightweight webserver

```
# sudo apt-get install lighttpd
```

Create the correct group and user access rights

```
# sudo groupadd www-data
# sudo usermod -G www-data -a pi
# sudo chown -R www-data:www-data /var/www/html
# sudo chmod -R 775 /var/www/html
```

Install PHP5

```
# sudo apt-get install php5-common php5-cgi php5
# sudo lighty-enable-mod fastcgi
# sudo lighty-enable-mod fastcgi-php
# sudo service lighttpd force-reload
```

Install the MMDVMHost Dashboard

```
# cd /opt
# sudo git clone https://github.com/dg9vh/MMDVMHost-Dashboard.git
# sudo cp -r /cpt/MMDVMHost-Dashboard/. /var/www/html/
# cd /var/www/html
# sudo rm index.lighttpd.html
```

Allow reboot, restart and halt commands within PHP

```
# sudo nano /etc/sudoers

     %www-data ALL=NOPASSWD:  /sbin/halt, /sbin/reboot, /bin/systemctl
```

your dashboard can now be accessed via http://ip-of-your-mmdvm/

move /var/www/html/config/config.php outside your web file system !!!

19. Install and connect your Nextion 2.4" LCD display using a USB to TTL UART converter type CP2102

Connect the Nextion display to the CP2102 converter

```
     Black  --> GND
     Yellow --> RXD
     Blue   --> TXD
     Red    --> 5V
```

Plugin the USB-TTL converter into the USB port

Install Python & Python-Serial

```
# sudo apt-get install python-serial python
```

Stop the MMDMVHost if running

```
# sudo systemctl stop mmdvmhost.service
```

Download the Nextion Firmware into the display using the Raspberry Pi 3

```
# cd /opt/MMDVMHost/Nextion
# python nextion.py NX3224T024.tft /dev/ttyUSB0 #(use the .tft file conform the productcode
mentioned on the back
```

The MMDVM logo should appear after a succesfull download

Make sure the use of your Nextion display is activated in your MMDVM.ini file and the communication port and brightness are correctly set

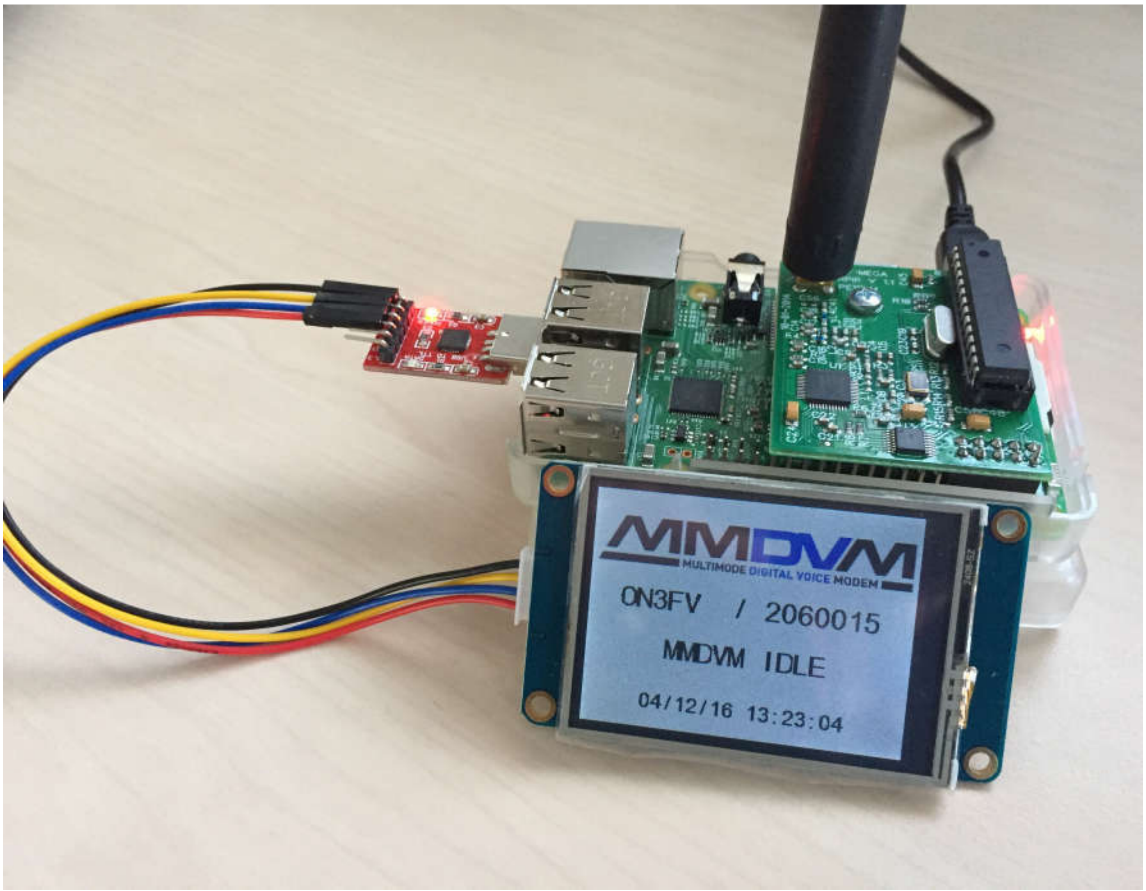
```
     [General]
     Display=Nextion
     #Display=None

     [Nextion]
     # Port=modem
     # Port=/dev/ttyAMA0
     Port=/dev/ttyUSB0
     Brightness=50
     DisplayClock=1
     UTC=0
     IdleBrightness=5 #(level at your own preference)
```

Restart the MMDVMHost service

```
# sudo systemctl start mmdvmhost.service
```

20. **Enjoy your MMDVM Host in DMR, Dstar and Fusion mode !**

73,
Filip - ON3FV



MMDVM
MULTIMODE DIGITAL VOICE MODEM
ON3FV / 2060015
MMDVM IDLE
04/12/16 13:23:04