User manual

Multimode IP radio for Ham Radio Amateurs

The Swiss army knife for Digital Voice

DVMEGA Cast

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General

Dear DVMEGA-Cast user,

Congratulations with your new device.

In this manual we will show you how to register, configure, and use your DVMEGA Cast.

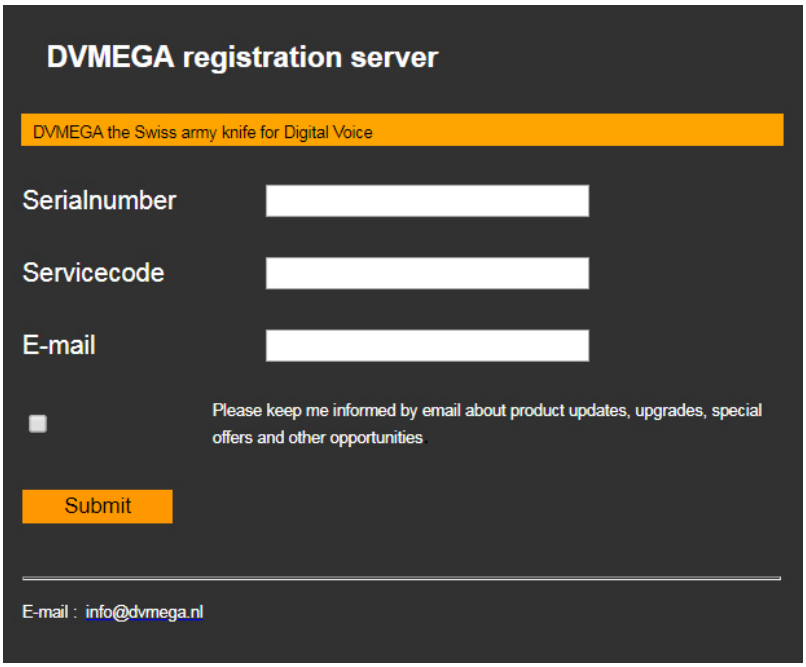
Read the user manual completely and carefully before use. The user manual is part of the product and contains important information for correct use.

Keep this user manual. The user manual must be available for uncertainties and passing the product.

Device registration

Registration is required to get your latest firmware for your device. In the past the firmware was online as download, but with this system you will receive the updates via email.

Please open http://registration.dvmega.nl/ and fill in the fields.



Serialnumber and servicecode can be found at the rear-panel, and on the registration-card you received together with this unit. Once registered you will receive a confirmation via email.

Introduction Digital Voice

Digital Voice is different to FM in that you need to first set up your radio with callsigns for yourself, other stations and reflectors, rooms or talkgroups.

If you are setting up your DVMEGA Cast for the first time then make sure you use your manual together with these notes. These notes are intended to be generic so there may be variations between different modes.

If you are new to Digital Voice i recommend to read the information on next websites and documents :

D-Star reference manual :
http://www.tmrahamradio.org/D-STAR_for_Dummies_v4.pdf

Linking to reflectors :
http://www.mdarc.org/activities/repeaters/dstar/linking

DMR reference manual :
http://www.dmrfordummies.com/

ID registration

Beside a Callsign you need a Radio ID. A Radio ID is a unique number assigned to you (and your callsign) like a telephone number or IP address, your Radio ID identifies you as a unique radio user on the various digital networks around the world.

If you do not have a Radio ID follow next link to get one :

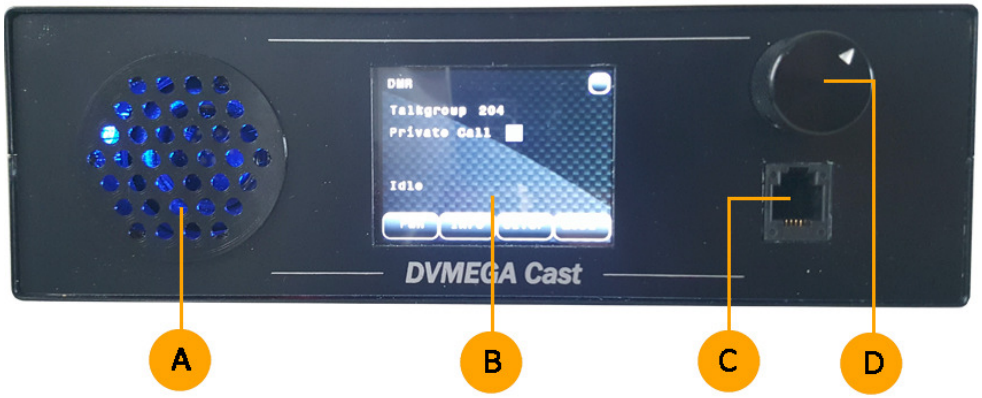
https://register.ham-digital.org/

If you have questions about ID registration you can contact one of the people on next list :

https://register.ham-digital.org/contacts.php

Preparations

Front :



A : Illuminated speaker.
B : 2.4" Touch screen.
C : Microphone connector
D : Rotary encoder with push button.

Back :

A : External speaker / headphone connection, 3.5 mm jack.
B : 12 V DC connector, 2.1 mm , central positive.
C : Type plate with serial number and service code.
D : RJ 45 LAN connection.
E : USB port with WIFI dongle installed.
F : Spare USB port.

Connect the device

Wired LAN Connection.

Before you can use the WIFI option of the device you have to set the WIFI credentials using the wired LAN connection. You need a network router or switch to connect the device to the internet. Use a router or a switch with high-speed broadband) connection to the internet. Plug your LAN cable in connection D on the back of the device.

Microphone.

To get the most out of your DVMEGA Cast a MH-48 compatible microphone is advised. A pin compatible microphone will also do. The microphone has to be connected to connection C at the front of the device.

Apply power.

Power the device by a 12 V DC PSU (2.1 mm central positive) Take care to use a good and clean powersupply, some powersupplies can generate interference/noise. Make sure to use a PSU that can handle 1 or more Amps. Power supply has to be connected to connection B at the back of the device.

Now you will get a screen that shows it is connecting, and then the first screen appears.

Important !

Before you can make a QSO or listen to other stations you have to configure the Radio and Host settings first.

Radio and Host settings are explained in a later chapters.

Get started

Before you enter the world of Digital Voice you need some basic knowlegde and be aware of some rules.

First you need a Callsign or a radio ID. A Radio ID is a unique number assigned to you (and your callsign) like a telephone number or IP address, your Radio ID identifies you as a unique radio user on the various digital networks and repeaters around the world.

On every available network you can connect to reflectors, rooms or talkgroups. A talkgroup, reflector or room is simply a way of grouping many Radio ID's into a single digital contact. Or put another way, a talkgroup, reflector or room is a method of organizing radio traffic specific to the users that all want to hear the same thing and not be bothered by other radio traffic on a network that they are not interested in hearing. D-Star uses reflectors, DMR talkgroups and Fusion rooms.

The way to connect to a network or talk via reflectors, talkgroups or rooms is different for each mode. This will be explained in a later chapter.

It is very important to know that world wide repeaters and hotspots are connected to the same network as the DVMEGA Cast is connected to. This means that your conversation will be heard and transmitted by all connected repeaters. So it is possible that when you press the MIC you switch maybe a hunderd repeaters to TX with in total a couple of Kilowatts RF. A licence or registered callsign is realy needed.

A voice stream is going through the internet to reflectors, talkgroups and rooms where the stream is distributed to connected devices. To solve network latency, the connected devices have a buffer. The delay from your voice to the endpoint speaker can be up to 1 sec. A rule of good practice is to keep a space of 3 seconds between each over in a QSO. This space give the devices the time to empty the buffers. It is also important to leave space for people to sign in the going QSO or change from reflector, talkgroup or room. Otherwise it is impossible for a listener to interrupt the voice stream of a talker. This behaviour is inherent to the networks.

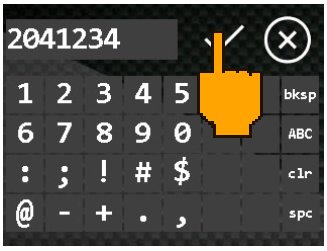
Radio configuration

Press MENU

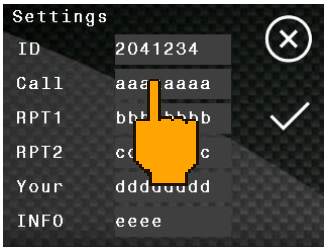
Press CALLS

Press on the ID text field

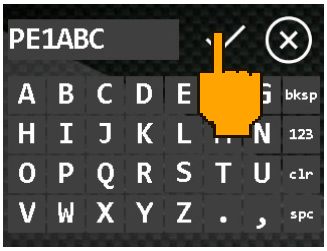
Enter your ID and press enter



Press on Call text field

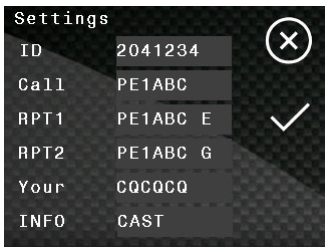


Enter your Call and press enter



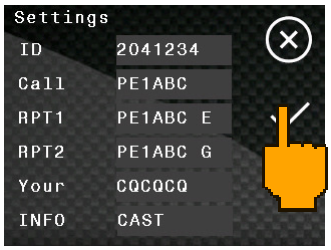
Replace PE1ABC with your own call

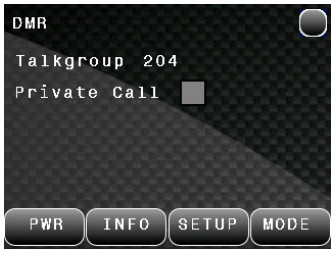
RPT1, RPT2 etc will be filled in automaticaly with default value.



You can change these fields individually if you like. The advise is to leave these fields by default values.

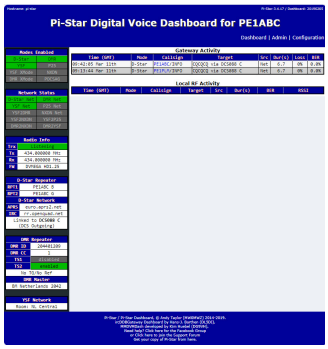
When all fields are filled in correctly then press enter.





Host configuration

The host configuration is easy accessible with a standard browser. Just enter "pi-star" in your URL bar.

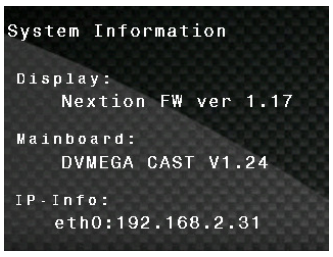


the next screen will be shown.

It is possible that the hostname can not be resolved in your network. Then you have to go via the IP address.

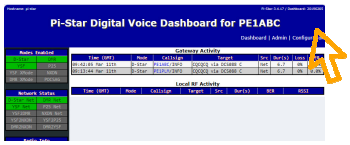
You can find the assigned IP address on the INFO screen on your DVMEGA Cast.

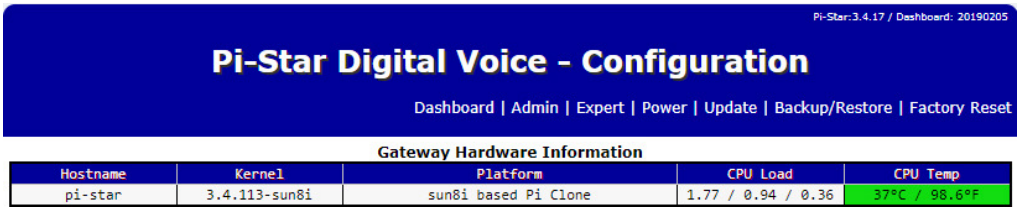
Press INFO to show IP Info.



Now enter the shown IP (192.168.2.31 as an example) in your URL bar.

Click Configuration to go to the Configuration page.





The Configuration page is devided in configuration blocks per function. Each function is explained in a seperate paragraph.

The header gives you some information about the PI-Star version, CPU load and CPU temperature.

On top you find some links. Not all links relate to the DVMEGA Cast. Only the related setting are described in this manual.

If you are an experienced user you can advice the detailed manual of PI-Star : https://amateurradionotes.com/images/1-Playing_with_Pi-Star.pdf

You need to know !

Some settings must be exactly as indicated. Others can be set as desired. Settings with a red dot means exactly set as indicated. A green dot means set as desired. It is recommended to apply the settings after every block change.

Control Software

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

MDVMHost Configuration

MMDVMHost Configuration

Setting	Value			
DMR Mode:	ON	RF Hangtime: 20	Net Hangtime: 20	
D-Star Mode:	ON	RF Hangtime: 20	Net Hangtime: 20	
YSF Mode:	ON	RF Hangtime: 20	Net Hangtime: 20	
P25 Mode:	OFF	RF Hangtime: 20	Net Hangtime: 20	
NXDN Mode:	OFF	RF Hangtime: 20	Net Hangtime: 20	
YSF2DMR:	OFF			
YSF2NXDN:	OFF			
YSF2P25:	OFF			
DMR2YSF:	OFF	Uses 7 prefix on DMRGateway		
DMR2NXDN:	OFF	Uses 7 prefix on DMRGateway		
POCSAG:	OFF	POCSAG Paging Features		
MMDVM Display Type:	CAST ▾	Port: /dev/ttyAMA0 ▾	Nextion Layout: G4KLX ▾	

Apply Changes

Modes can be enabled or disabled individiualy. If more than 1 mode is enabled the device will start to scan the enabled modes. When activity is detected, or via MIC PTT or network, scan stops and device will lock on this mode. When there is no activity via MIC PTT or network, after the hangtimers time delay, then the device restarts a scan. MMDVM Display Type has to be set to Cast.

General Configuration

General Configuration

Setting	Value		
Hostname:	pi-star	Do not add suffixes such as .local	
Node Callsign:	PE1ABC		
CCS7/DMR ID:	2044012		
Radio Frequency:	434.000.000	MHz	
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		
URL:	http://www.mw0mwz.co.uk/pi-star/		○ Auto ◉ Manual
Radio/Modem Type:	DV-Mega Cast Base Radio (Main Unit) ▾		
Node Type:	◉ Private ○ Public		
System Time Zone:	Europe/London ▾		
Dashboard Language:	english_uk ▾		

Apply Changes

Node Callsign : This is your own Callsign. Do not add any suffix like /P /M etc.

CCS7/DMR ID : This is your own DMR ID.

Radio Frequency : Radio Frequency is not used.

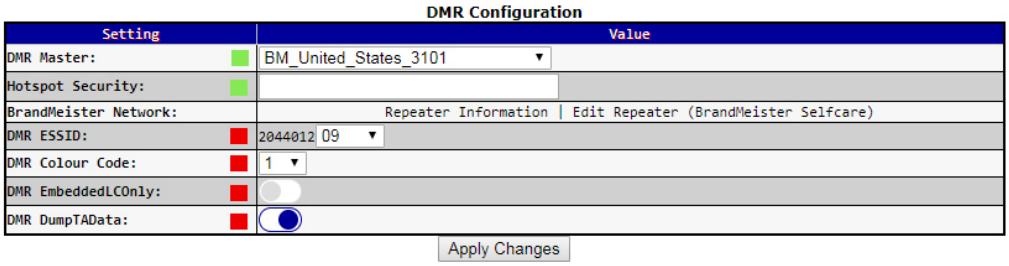
Latitude / Longtitude : This is your GPS possition.
Attention ! When you enter invalid data format, you are not able to log into Brandmeister.

Town / Country : Your Town and Country.

URL : If the switch is on manual then the text in the textbox is send. When the switch is on auto your QRZ address is send.

System Time Zone / Dashboard Language : Set at your preference.

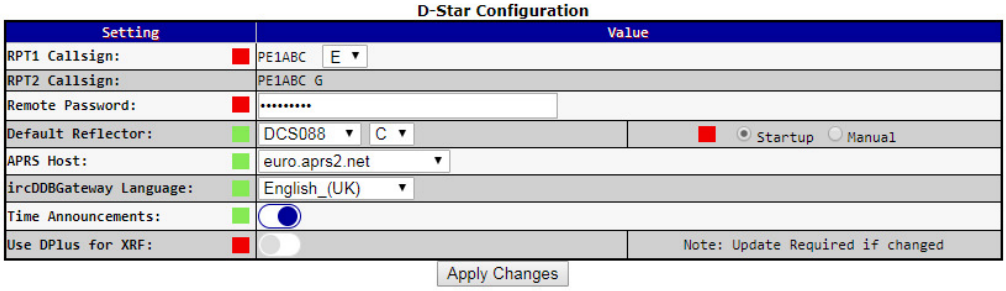
DMR Configuration



DMR Master : Select the master that is closest to your location.

Hotspot security : This field can be left blanc until 31-12-2019
For more info : http://wiki.pistar.uk/Pi-Star_Brandmeister_Hotspot_Security

D-Star Configuration



Default Reflector : Select the reflecor you like to be connected to at startup.

APRS Host : Select the APRS Host that is closest to your location.

ircDDBGateway Language : Set at your preference.

Time Announcements : Enable or disable time announcements.

Yaesu System Fusion Configuration

Yaesu System Fusion Configuration

Setting	Value
YSF Startup Host:	YSF96455 - NL Central - Centraal NL
APRS Host:	euro.aprs2.net
UPPERCASE Hostfiles:	Note: Update Required if changed
WiresX Passthrough:	

Apply Changes

YSF Startup Host : Select the YSF Host you like to be connected to at startup.

APRS Host : Select the APRS Host that is closest to your location.

Firewall Configuration

Firewall Configuration

Setting	Value
Dashboard Access:	Private Public
ircDDBGateway Remote:	Private Public
SSH Access:	Private Public
Auto AP:	On Off — Note: Reboot Required if changed
uPNP:	On Off

Apply Changes

Remote Access Configuration

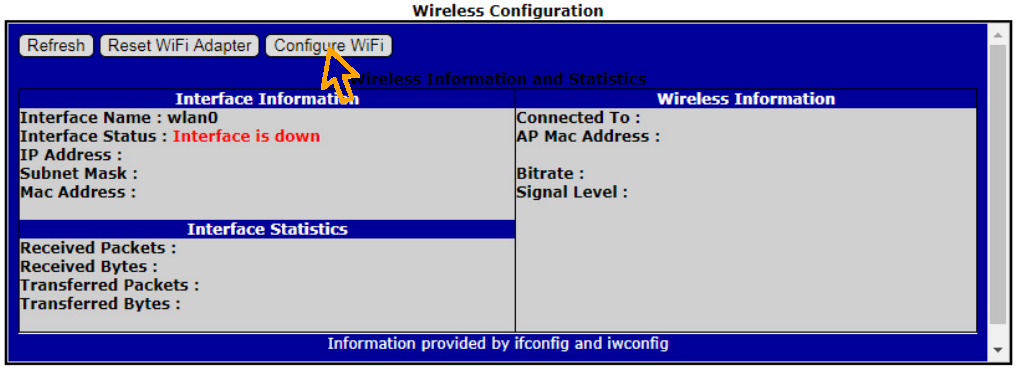
Remote Access Password

User Name	Password			
pi-star	Password:		Confirm Password:	Set Password

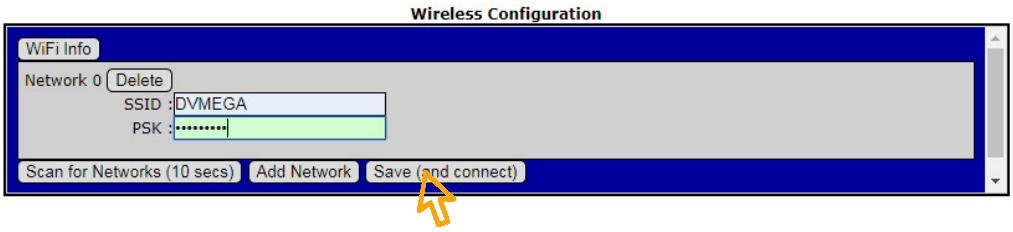
WARNING: This changes the password for this admin page
AND the "pi-star" SSH account

Wireless Configuration

Click Configure WiFi

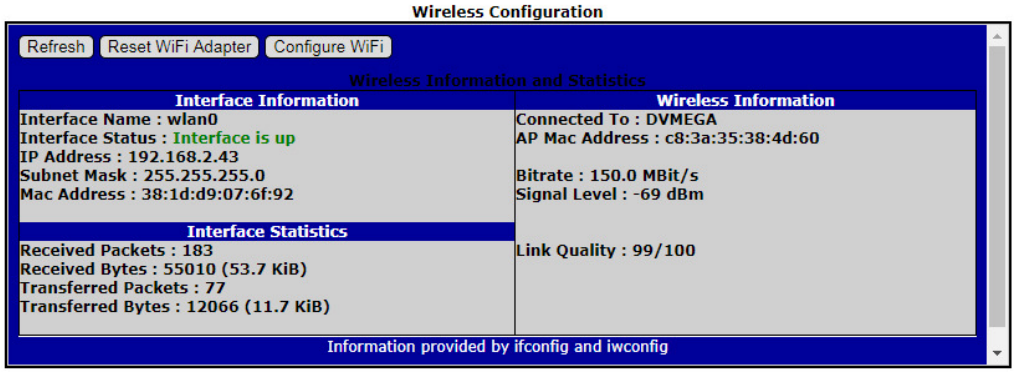


Enter your SSID and Password of the WiFi network you like to connect to. Then click Save (and connect)



Then power cycle the device.

Wireless Configuration screen will show the connected network.



Now you can unplug the LAN cable.

After a power cycle the DVMEGA Cast will connect via WiFi.

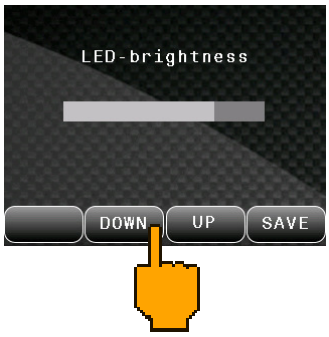
System settings

Press MENU

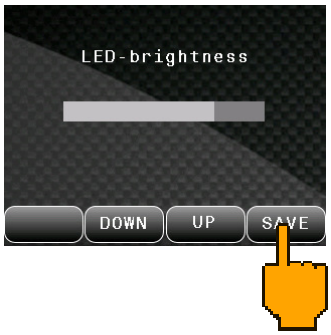
Press SYSTEM

Set led brightness

Press UP or DOWN to adjust led brightness.



Press SAVE to store setting.



Press EXIT to return to MAIN screen.

Operating instructions

Volume : Volume can be adjusted with rotary encoder D at the front of the device.

Mute : You can mute the audio by a short press on rotary encode D at the front of the device.

Set curent volume as default : Give a long press on the rotary encoder D at the front panel. The text MUTE will be shown in the display. Keep rotary encoder pressed until MUTE disappear. The current set volume is now stored and set as default.

Change Mode : Change mode is only possible when device is idle. The mode button is greyed out when device is not idle. Top left on the screen the curent set mode is shown.

Scanning : When more than 1 mode is enabled in the MMDVMHost Configuration the device will scan all enabled modes, when idle.
Device is idle when MODE button is white.
If you press PTT the mode shown on the top left of the display will be the active mode. Device is now no longer idle and MODE button is greyed out.
If the device is in scan mode the first stream coming from the network will lock the device in the relevant mode.

Power off : Press the PWR button to switch off the device.

Power on : Press rotary encode D at front of the device to power on the device.

INFO : A press on the INFO button will give you the firmware version numbers and the assigned IP address.

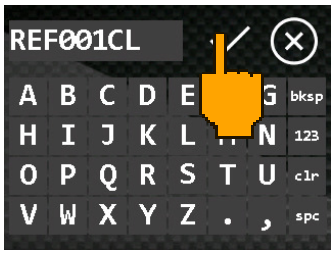
Speaker LED :	Blue	-	Waiting for RX / TX
	Red	-	TX
	Green	-	RX

D-Star linking

In D-Star the Your Call field is used to send the link and unlink commands. The Your Call field must contain the link command when linking and should contain CQCQCQ during a QSO. Linking is only possible when radio is idle.

Example : link to REF001C

Press the CQCQCQ text field.

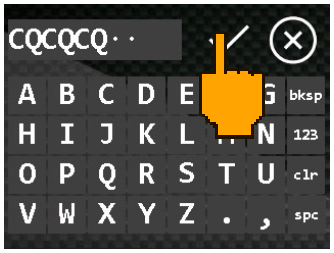


Enter the link command for REF001C. Remember the total characters of the link command must be 8. The L must be on the last (8th) possition. Then press enter.

You are now ready to send the link command. Press PTT to send the link command to the relfector.

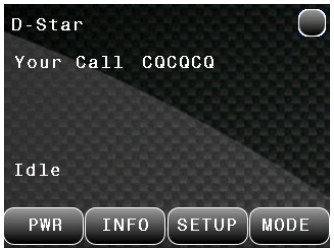
The voice server will anounce the linked status.

Before you can talk on the linked reflector you have to set Your Call to CQCQCQ. Press the text REF001CL.



Enter CQCQCQ . Remember the total characters must be 8. Add 2 spaces. CQCQCQ [space] [space]

Then press enter.



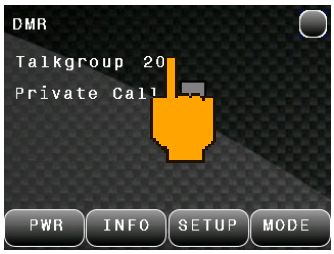
Now you are fully linked and ready to talk on REF001C.

DMR linking

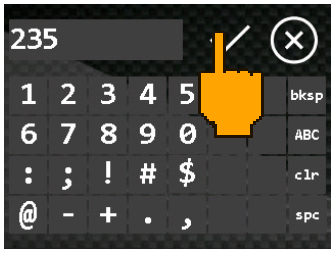
DMR linking is different from D-Star. The DMR talkgroup you want to talk to is embeded in the voice stream.

Example : Group call to TG235

Press the Talkgroup text field.

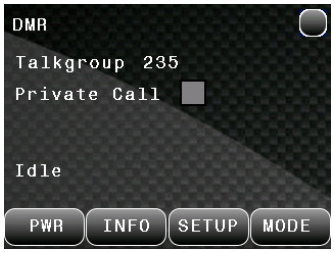


Then enter the desired Talkgroup and press enter.



Now press PTT once and you are linked to TG235.

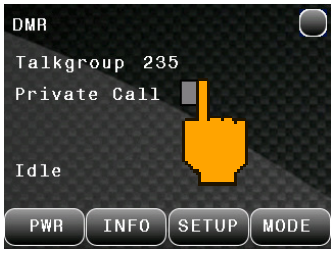
You are ready to talk.



Example : Private call to ID 2041234

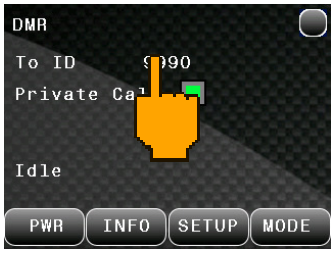
A private call is a 1 to 1 conversation in private to the entered ID.

Press Private Call check box.

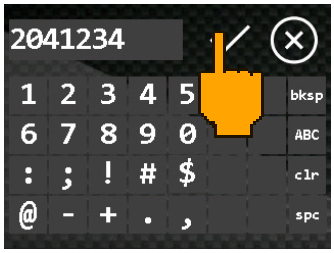


Private call will be enabled. The check box is green when checked.

Then press the To ID text field.

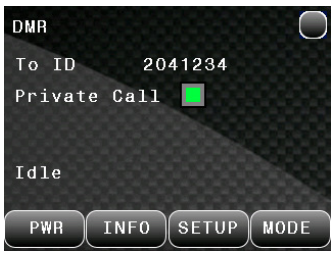


Then enter the desired ID you want to talk to and press enter.

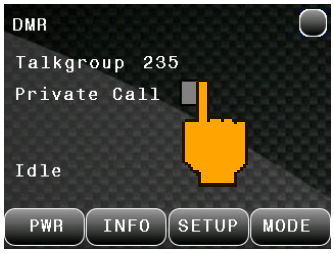


Now you can talk to ID 2041234 via a Private Call.

Note : Operator with ID 2041234 has to be available and connected to the Network.



To go back to the Group Call function you can simply uncheck the Private Call check box. You are set to the last used talkgroup. Press PTT to get connected before you are ready to talk.

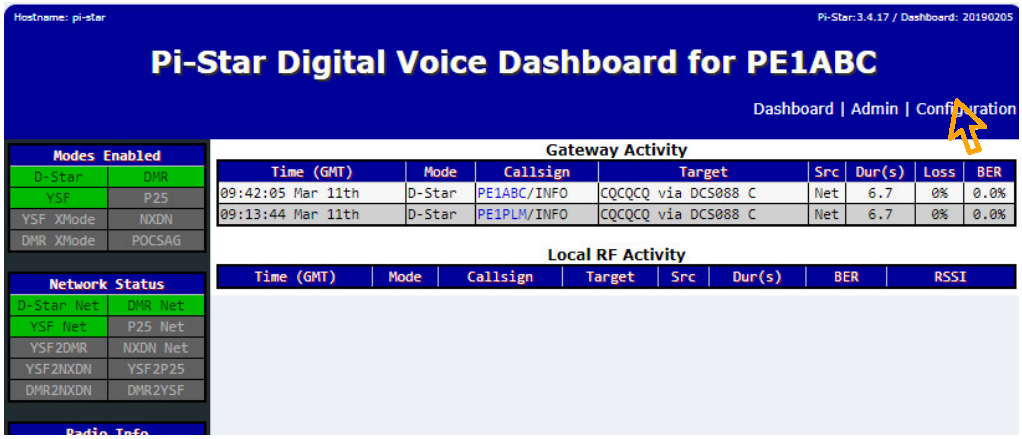


Fusion linking

Fusion linking is different from D-Star and DMR. You can choose a different room via the dashboard.

Enter the Dashboard as described under Host Configuration.

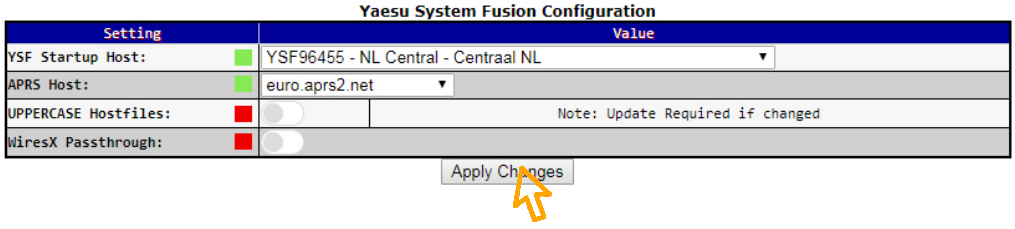
Click Configuration.



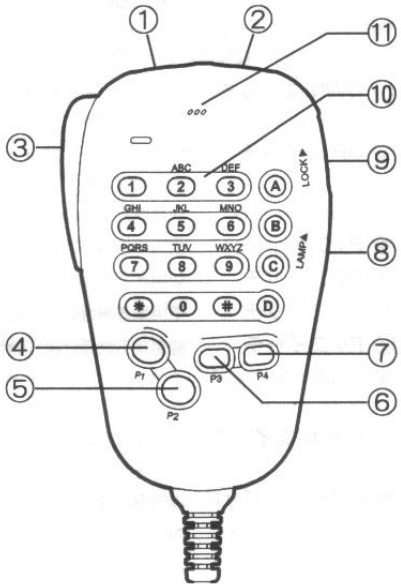
Scroll down to the Yeasu System Fusion Configuration.

With the drop down box YSF Startup Host you can select another room.

Click Apply Changes when ready, you will be automaticaly connected to selected room.



MIC buttons



General

Down (1)	Volume down
Up (2)	Volume up
P1 (4)	Toggle Mode
D	Mute / Unmute

D-Star

A	Preset CQCQCQ
C	Preset U
B	Set Edit Mode link command

Edit Mode link command D-Star

0 - 9	Numeric input
A	XRF -> REF -> DSC -> XRF -> etc.
B	AL -> BL -> CL -> ..... ZL -> AL -> etc.
*	Backspace
#	Enter (Okay)

DMR

A	Priv call / Grp call
B	Edit TG or ID

Edit Mode TG or ID DMR

0 - 9	Numeric input
*	Backspace
#	Enter (Okay)

Update instructions

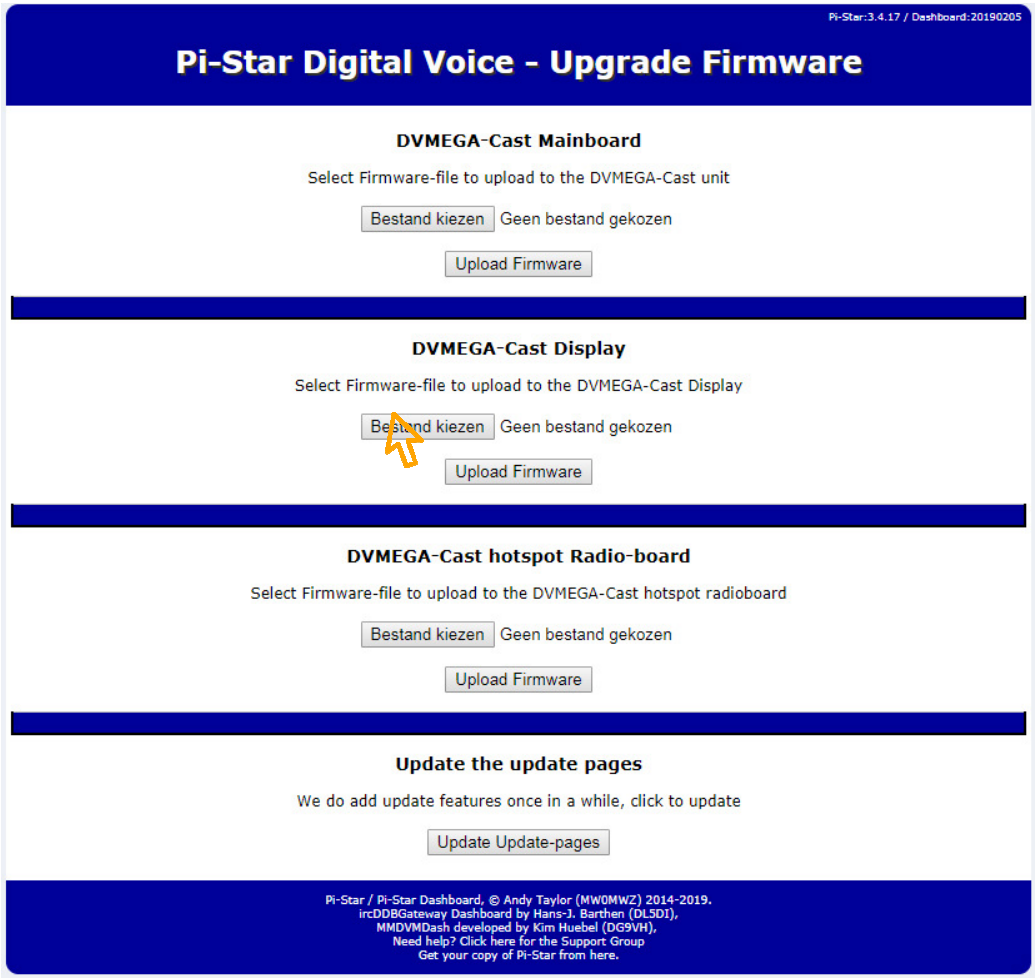
Important ! If you receive both updates for Display and Firmware, update always Display first.

DVMEGA Cast must be power on at any time while doing updates.

DVMEGA Cast Display update

Open the webpage http://pi-star/admin/fw and if requested enter the (default:pi-star / raspberry, or use the user/password you have set).

Then click Choose file in the Display section.

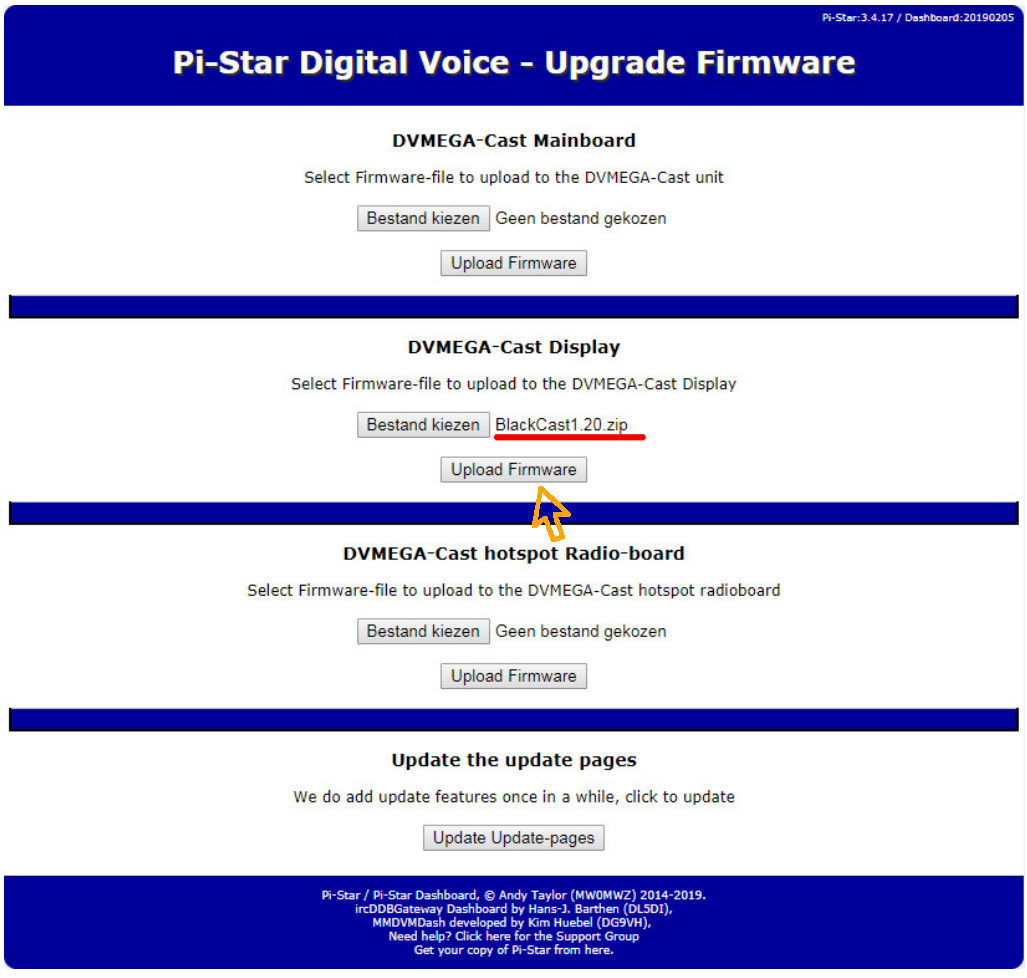


You receive the update files in .zip format. Do not extract the received zip files.

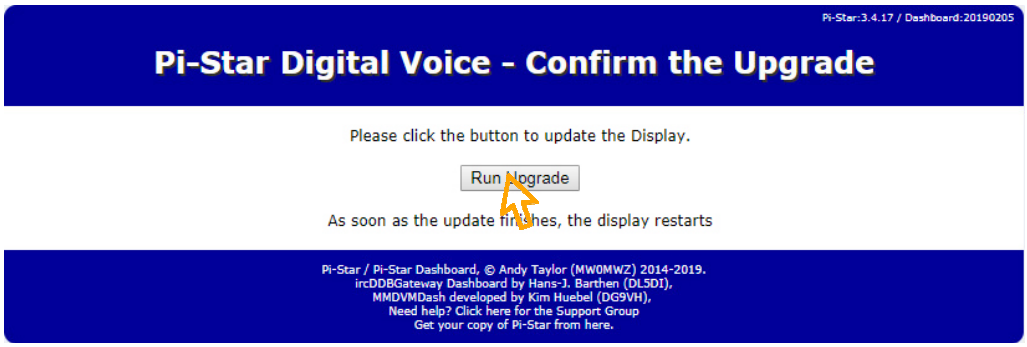
A browser window will open. Go to the location you have saved the received files.

Select the Display update file and confirm. You will be returned to the update screen. Check that the correct file is selected (red underlined)

Click Upload Firmware in the Display section now.

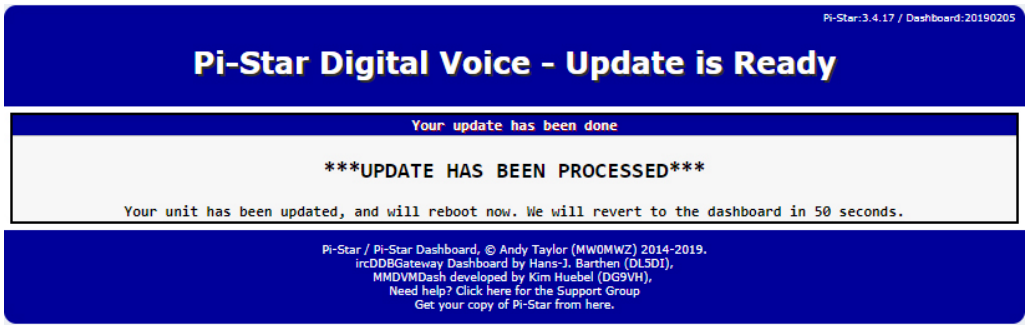


Then click Run Upgrade.



Notice that the display is going into update mode. You see the update progress on the display.

Follow the instructions in the web brouwser.

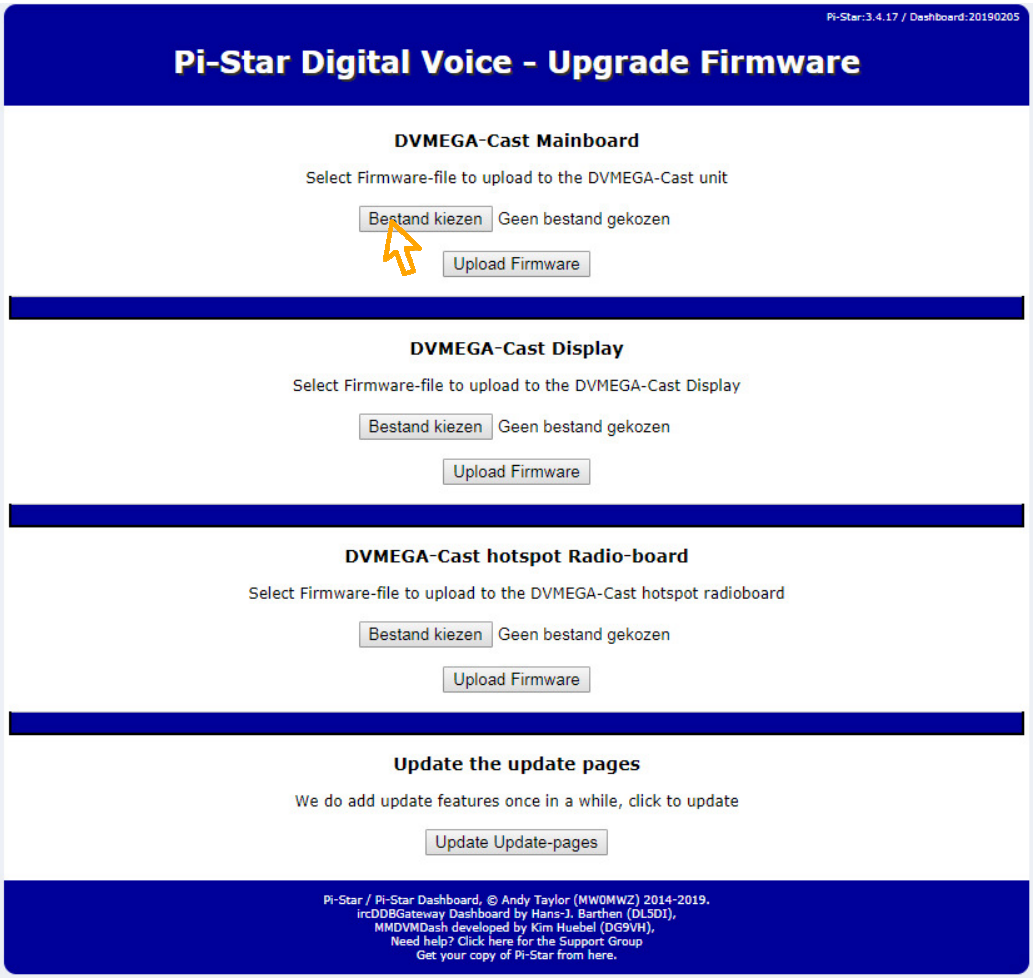


The system will restart, within 60 sec the Dashboard is back.

DVMEGA Cast Mainboard update

Open the webpage http://pi-star/admin/fw and if requested enter the (default:pi-star / raspberry, or use the user/password you have set).

Then click Choose file in the Mainboard section.

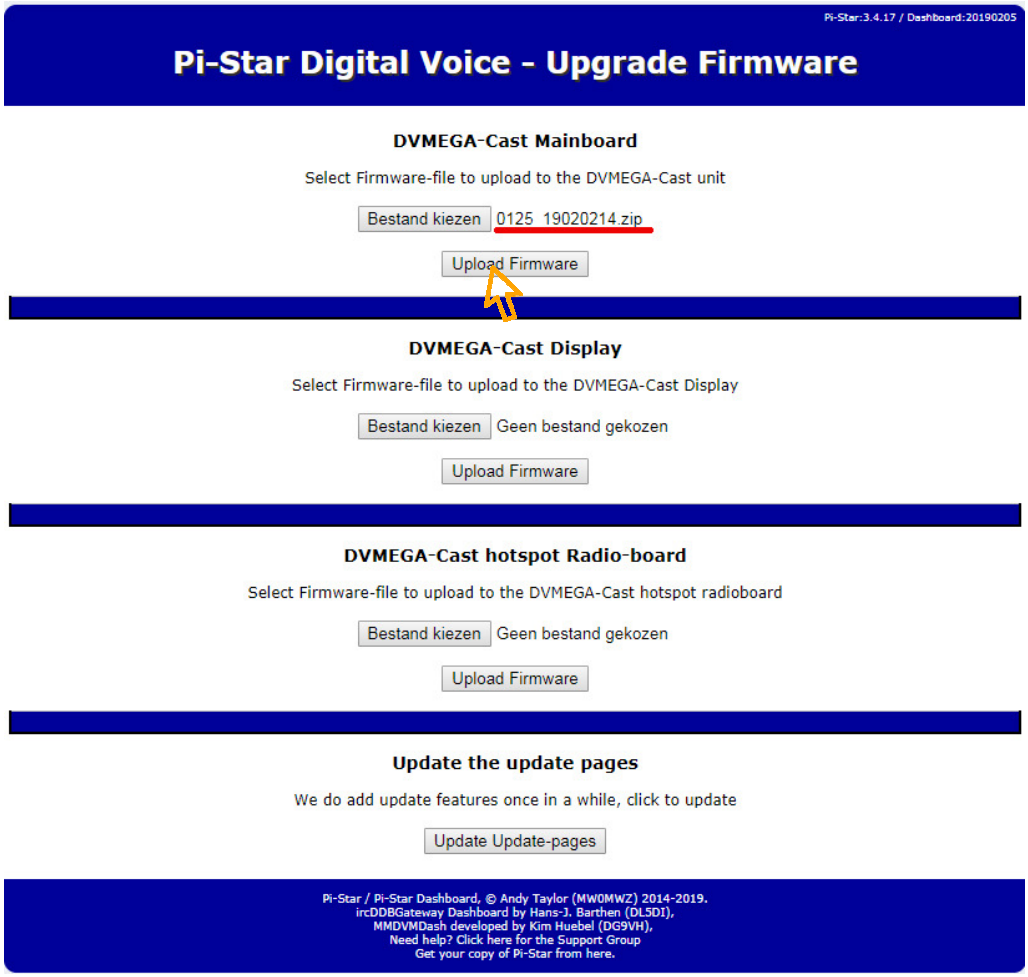


You receive the update files in .zip format. Do not extract the received zip files.

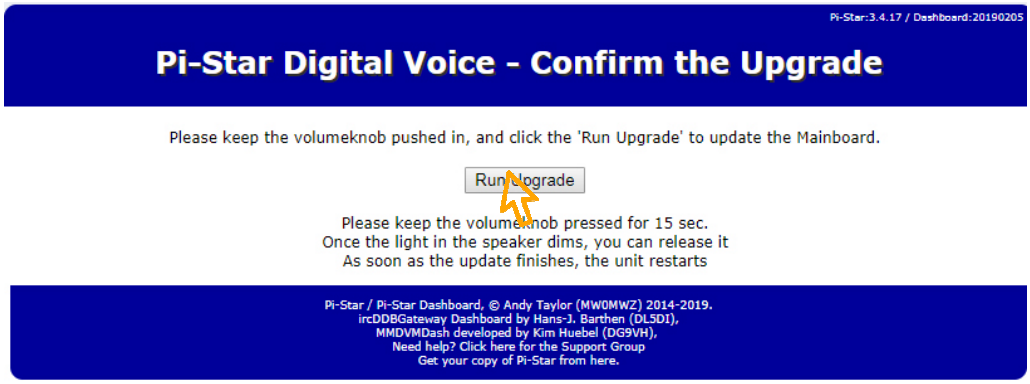
A browser window will open. Go to the location you have saved the received files.

Select the Mainboard update file and confirm. You will be returned to the update screen. Check that the file is selected (red underlined)

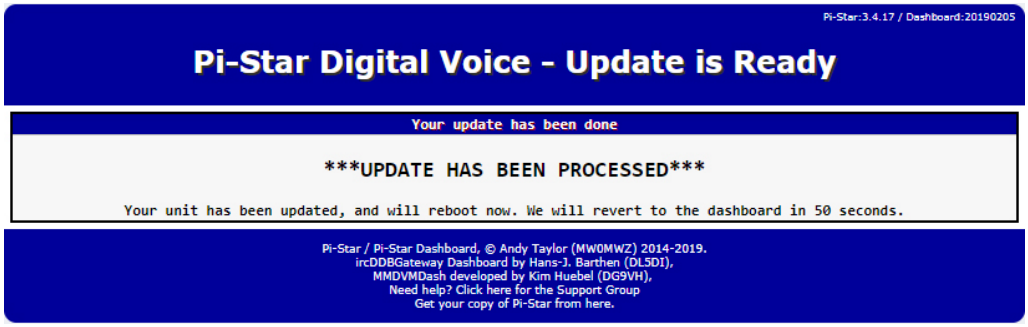
Click Upload Firmware in the Mainboard section now.



Then press rotary encode D on front of the device and keep pressed and click Run Upgrade. Release the rotary encoder D at front of device when LED in the speaker goes dark.



Wait until update is ready.



The system will restart, within 60 sec the Dashboard is back.

Power cycle the DVMEGA Cast now.

Specifications

- Cabled (RJ45) or Wifi to internet connected.
- No RF connection or repeater needed!
- Webinterface based configuration option.
- 2.4" touch screen for setup and control.
- Support Yaesu MH-48 with keypad for control.
- Rotary encoder for volume and multi-functionality.
- Embedded high-end CPU on dedicated mainboard.
- Support D-Star, DMR, and C4FM mode.
- Integrated Original DVSI AMBE3000.
- Easy to use web-based upgrade utility.
- Support a DVMEGA-pi radio for Hotspot functionallity.
- Supports an internal DVStick30 for AMBE-server.
- low powerconsumption 12VDC (2.1 mm Barrel Connector).
- Colorfull speaker indicator for status.
- 3.5mm external speaker connection.
- High performance 3 watt speaker
- Extra USB-connections availlable for future use.
- Solid full-metal powder coated housing
- Lifetime free Software updates.

Maintenance and Cleaning

- Clean only with a dry, soft cloth.
- Do not use cleaning agents and chemicals.
- Store cool and dry.
- Store the product a dry and dust-protected ambience when not in use.
- Keep and use the original packaging for transport.

Made in the Netherlands.

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