

DMRplus DSTAR-DMR-Gateway

Package installation

Copyright:

This software is for Amateur Radio usage only.

The DSTAR-DMR-Gateway is Copyright of Hans-J. Barthen DL5DI and Torsten Schultze.

It is provided in form of executable binaries for Linux and Windows and installation Packages for

- Debian 7 (Wheezy) 32 and 64bit
- CentOS5 32bit
- CentOS6 64bit
- Raspbian

The software is closed source.

It does not need any copyright protected libraries or tools.

It was developed to be used in the open, non-professional Amateur Radio DMR network.

Any kind of commercial use of the DSTAR-DMR-Gateway is prohibited!

Overview:

The software allows connecting a Hytera-DMR-Repeater to a DSTAR DCS-Reflector.

The software is closed source.

It does not need any copyright protected libraries or tools.

Requirements:

- D-Star-Repeater with Hytera API-Interface (all Hytera repeaters)
- Firmware version 7.x / API protocol version 2.14 or newer
- Outgoing IP traffic to the configured DCS-reflector (port 30051)
- Outgoing IP traffic to download lists with actual DMR-IDs from webserver
- The DMR-Master which gets connected should run version 7.x or higher
- The installation of the gateway on VMWare is not supported, there are known issues with other standard network software as well.
- Computer in the same subnet running Windows or Linux
- AMBE-Modem.

We support 2 modems:

- o the known "blue DV dongle" for the USB port with AMBE2020 chip
- o the AMBE3000 from NWDigital (ThumbDV)

If you buy it new the ThumbDV is the better choice.

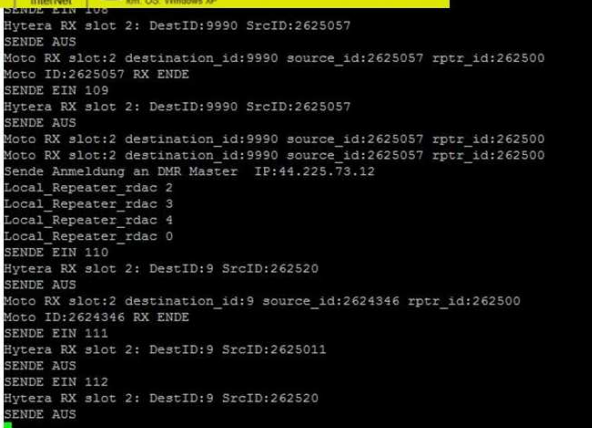
NWDigital provides 2 versions, one for the USB port, which may be used at any PC and one for the GPIO ports of a RaspberryPi.

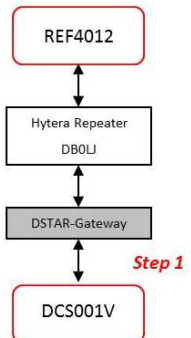
The USB modem is more flexible, the GPIO port from our experience runs more stable.



HAM DMR – D-Star









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We have 2 different software versions available, which require a different hardware setup:

Version 1:

- blue D-Star USB-DV-Dongle (<http://www.dvdongle.com>)
(a VM most likely won't work with the DV-dongle)
- Linux 32bit, libcurl, openssl-1.0.0 installed
(tested on Debian7/Wheezy, CentOS6.5)
- Installation is from tar-file archives.

Version2:

- AMBE3000 modem (NWDigital ThumbDV DV3000GPIO or DV3000USB)
<http://nwdigitalradio.com>
- AMBEServer software installed and running (provided by NWDigital)
Linux 32bit/64bit, libcurl, openssl-1.0.0 installed (older version not supported!)
(tested on Debian7/Wheezy, Raspbian, CentOS5 32bit and CentOS6 64bit)

The DSTAR-DMR-Gateway uses RFC3550 based protocol to communicate to the API control port and ulaw audio format to transfer linear digital audio to the repeater.
The audio signal is un-coded and un-compressed.

Repeater and gateway need to run in the same subnet – not via a router - to make sure that this traffic works stable and reliable.

All AMBE/AMBE++ coding and decoding is done by the DV-Dongle and in the repeater.

- Linux packages are available for Debian7, CentOS and Raspbian.
Installation and update can easily be done by the standard package managers in the usual way and together with other software.

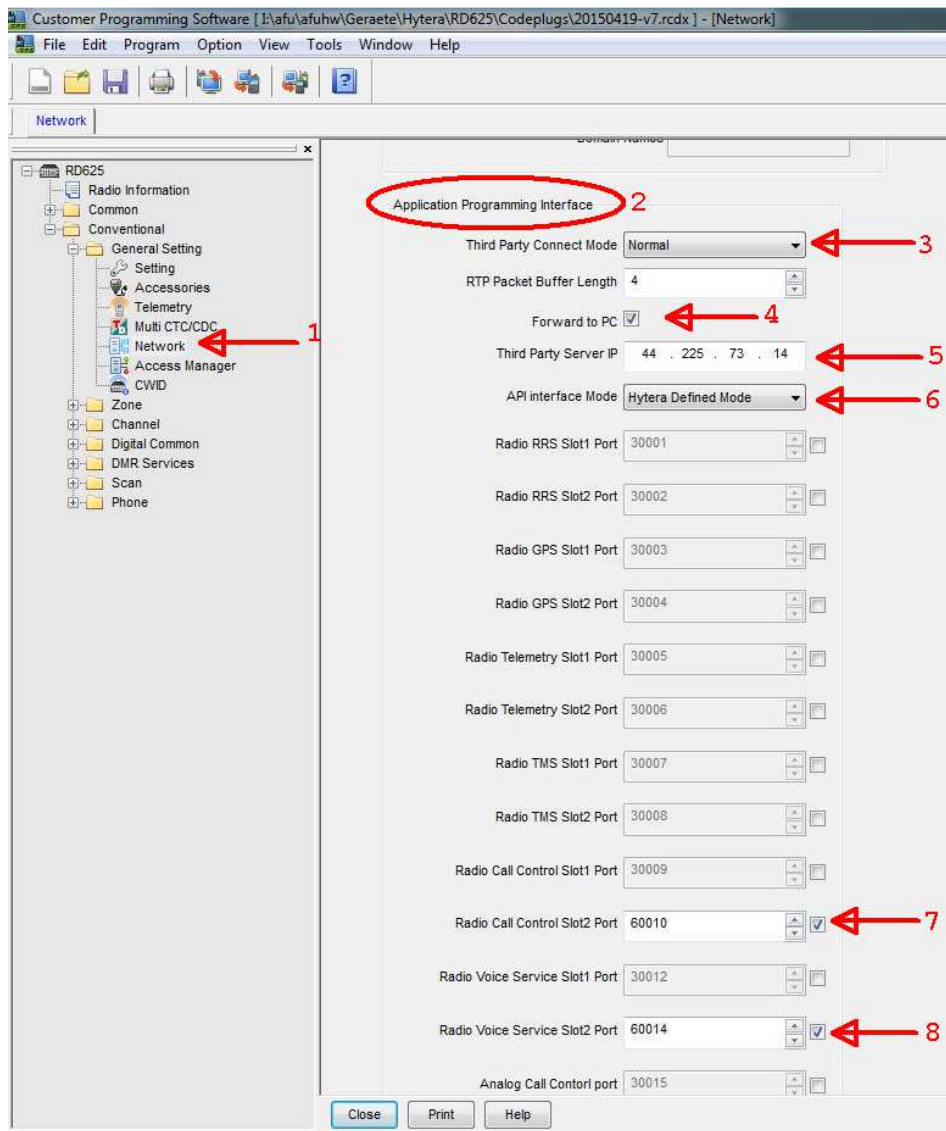
Preparation of the repeater:

Configure the repeater by using the CPS.

Recommended is Hytera firmware release 7.x with API protocol 2.14 or newer.

The gateway won't work with older protocol versions.

1. Enter CPS menu *Conventional* -> *General Settings* -> *Network*
2. Scroll down to "Application Programming Interface"



3. "Third Party connect mode" defines if your DSTAR traffic will only be send out on your local repeater (Selective) or also through other connected repeaters (Normal).

!! Make sure that only one Gateway runs at your reflector when you use "Normal" !!

4. Activate "forward to PC"

5. Enter the IP address of your DStar-DMR-Gateway to "Third Party Server IP"

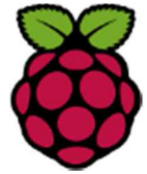
6. Check if "API Interface Mode" is set to "Hytera Defined Mode"

Leave all ports unchecked and values untouched other than for this 2 ports:

7. Activate "Radio Call Control Slot2 Port" and enter port number 60010

8. Activate "Radio Voice Server Slot2 Port" and enter port number 60014

Installation on Raspberry Pi in a short overview:



Download and install the latest Raspbian-Wheezy version from <http://www.raspberrypi.org/downloads/> to your favorite Windows-/Linux- or Mac-system

1. Follow the installation instructions for your system from the “image installation guides”.
You will find a link at the top of the download page.
2. Install the image to an SD-card like described in the installation guide.
3. After you finished the installation, booted the system and resized the image to the full size of the SD-card login as user “pi” like described in the instructions.
4. Change to user root with command “sudo -s”

We have installation packages for the DMR+MBridge available which allow easy installation and upgrade.
PLEASE NOTE that the repositories for Debian and Raspbian are different!!

When you get a “segmentation fault” at program start you took the wrong one !!

Add the DMRplus-Repository on Raspbian Linux:

```
# apt-get install curl
# cd /tmp
# wget http://repo1.ham-digital.net/dmr-plus/raspbian/dl5di.pk
# sudo apt-key add dl5di.pk
# sudo curl http://repo1.ham-digital.net/dmr-plus/raspbian/dmrplus.list -o /etc/apt/sources.list.d/dmsplus.list
```

Take care that you copy and execute the complete line on your system!

This command copies a configuration file with information about the DMRplus repository servers to your yum repos directory.

You will not need to execute this command again later for any update.

Installation of DSTAR-DMR-Gateway:

Update the lists of available packages from the repository servers:

```
# sudo apt-get update
# sudo apt-get install dstartmrgw
```



Installation on a Debian7 system in a short overview:

Add the DMRplus-Repository on Debian Linux:

```
# apt-get install curl
# cd /tmp
# wget http://repo1.ham-digital.net/dmr-plus/debian/dl5di.pk
# sudo apt-key add dl5di.pk
# sudo curl http://repo1.ham-digital.net/dmr-plus/debian/dmrplus.list -o /etc/apt/sources.list.d/dmsplus.list
```

Take care that you copy and execute the complete line on your system!

This command copies a configuration file with information about the DMRplus repository servers to your yum repos directory.

You will not need to execute this command again later for any update.

Installation of DSTAR-DMR-Gateway:

Update the lists of available packages from the repository servers:

```
# sudo apt-get update
# sudo apt-get install dstardmrgw
```

The following part is for Raspbian and Debian Linux the same:



Update/downgrade

```
# sudo apt-get update
# sudo apt-get upgrade dmrplusmb                # sudo apt-get downgrade dmrplusmb
```

Remove the software

```
# sudo apt-get remove dmrplusmb
```

Activate startscript (autostart)

```
# update-rc.d dmrplusmb defaults
```

De-Activate startscript

```
# update-rc.d -f dmrplusmb remove
```

Start / Stop the software as a daemon in background:

```
# /etc/init.d/dmrplusmb start                # /etc/init.d/dmrplusmb stop
```

CentOS:**Step 1: Adding the DMRplus repository server**

At first you have to run the following command on your repeater system once:

```
curl http://repo1.ham-digital.net/dmr-plus/centos5/dmrplus.repo -o /etc/yum.repos.d/dmrplus.repo
```

Take care that you copy and execute the complete line on your system!

This is the same path for CentOS5 (32bit only) and CentOS6 (64bit only).

This command copies a configuration file with information about the dmrplus repository servers to your yum repos directory.

You will not need to execute this command again later for any update.

Step2: Clean your expire-cache

```
# sudo yum clean expire-cache
```

Step 3: Install the repeater package

```
# sudo yum install dstardmrwgw
```

Say "yes" to install the software.

Dependencies should be resolved, all necessary libraries be downloaded and installed.

Updating the software on CentOS systems:

```
# sudo yum clean expire-cache  
# sudo yum update dstardmrwgw
```

Start / Stop the software as a daemon in background:

```
# /sbin/service dstardmrwgw start
```

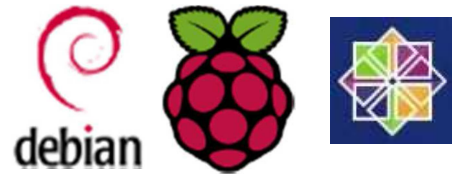
```
# /sbin/service dstardmrwgw stop
```

Activate startscript (autostart)

```
# /sbin/chkconfig --add dstardmrwgw
```

De-Activate startscript

```
# /sbin/chkconfig --del dstardmrwgw
```

Running the software:

All software packages are provided with standard start/stop scripts in `/etc/init.d/` and may be started and stopped in the usual way, depending on the Linux distribution.

The activation and usage of the auto-start mechanism depends on the Linux distribution and is shown before in the installation procedure.

Note that these scripts create a crontab entry which works as a watchdog and makes sure that the software is restarted whenever it should break for any reason.

When started by start-script you **MUST** stop it by the stop-script to de-activate the watchdog, otherwise it will always come up in the background again.

When started by the standard start script the software runs invisible as daemon in the background.

For tests you may also use the “run.sh” script in the installation directory to start the software and keep it alive. This will show useful console output.

When you access your system from remote you need to run it in a “screen”, otherwise it will end when you close the session!

The scripts have some delay implemented which is necessary to close the sockets and clear the existing connections before the software may be started again.

Start / Stop the software in foreground (all Linux distributions):

Open a shell screen

Change to the installation directory

```
# cd /opt/dstardmrgw
```

```
# ./run.sh
```

Configuration of the DSTAR-DMR-Gateway:

The installation will be done in the directory /opt/dstardmrgw

- Edit the configuration file "dstar-dmr-gateway.conf" like shown below
- Start the DMR+MBridge with "./run.sh"
- In case of any issues ask your next friend with Linux experiences for help

The package installs also scripts /etc/init.d/dmrplusmb for start and stop in demon mode and autostart at boot-time.

The configuration file /opt/dstar-dmr-gateway.conf looks like this:

```
# Configuration file for DMR-DStar-Gateway
# (C) DL5DI/DG1HT 2014-2015
#
# My own config data:
MY_IP=0.0.0.0
MY_PORT=60014
#
# AMBE-dongle data
AMBE_IP=127.0.0.1
AMBE_PORT=2460
#
# Reflector login data
GW_LOGIN_CALL=DB0TST D
GW_PORT=30051
#
# Repeater data (Hytera API-ports)
REPEATER_IP=99.99.99.99
REPEATER_AUDIO_PORT=60014
REPEATER_COMMAND_PORT=60010
#
# default DMR-ID which the repeater should use if a DStar user has no own DMR-ID
# (this should be registered to something meaningful!)
DEFDMRID=999999
#
# Set audio type PCMU (ulaw) or PCMA (alaw)
AUDIOTYPE=PCMU
#
# keep untouched:
SFX=GATE
MAXQ=150
LISTEN_TO_ALL=Y
HANGUP_TIME=1
TIMEOUT_STEP=3
DETAIL=Y
SERVER_IS_LOCAL=N
#
```

The configuration file /opt/dstar-dmr-gateway.conn looks like this:

```
DCS001 dcs001.xreflector.net V
```

It shows 3 fields, the name of the reflector, the hostname or IP of the reflector and the module which should be connected.

PLEASE NOTE: only 1 gateway is allowed on a repeater module otherwise the repeater will be blocked automatically!

Known bugs:

1.) The gateway may show some issues when started during a running QSO.
The different threads need to be better coordinated.
For the moment do not start traffic before both ports show their regular heartbeats like this:

```
SEND HB 60014
SEND HB 60014
SEND HB 60010
SEND HB 60014
SEND HB 60014
SEND HB 60014
SEND HB 60010
```

If not defined different in your repeater setup 60010 is the control port, 60014 is the voice port.

2.) In version 1 (blue USB DV-dongle) the control software "ascpseriald" may die and cannot be synchronized properly.
The start-up script will kill all processes and try to start it new.
This not always works properly.
Long term we plan to replace "ascpseriald" from the USB-DV-Dongle by an own part of software.

3.) Make sure that you read about the requirements!

- repeater and dstar-dmr-gateway must run in the same network!
- repeater firmware must be 7.x or higher
- the repeater will connect to the gateway, if this won't work check the repeater settings!

Error Reporting:

In the unlikely case that you may find an error:

- If you are using an OS other than Debian7, Raspbian or CentOS5/6 ask Google please or place the request to the Yahoo-Group "ham-dmr"!!
- If you are using one of the supported OS mentioned above report any issues please to dl5di@gmx.de

Provide as many details as possible:

- Operating system
- Package name
- Revision and release of the installation package (like 20150719-1)
- Former revision if the errors appears during an update
- Exact error message, best is a screenshot
- DMR-ID / Callsign / location of your system / where is it connected

Most important for us are errors based on missing libraries and other dependencies.

No details → no answer!

In case of any general Linux related questions please

1. Use the powerful help system of Linux (man pages etc.)
2. Ask my friend Google, he really knows a lot more than we
3. Ask the mass of Linux users in the different internet groups worldwide
4. Ask in the Yahoo-Group <http://ham-dmr.de>

Please ask us only if the problem is really DMR+ related and provide sufficient details!