

DMRplus MBridge

Overview:

This software is for Amateur Radio usage only.

It is an add-on to the DMR+Master (DG1HT) and allows to connect timeslot 2 of a Motorola repeater to the DMRplus Amateur Radio system.

(The DMRplus Master software is provided to Amateur Radio license holders only and not available here)

MBridge behaves like a peer on the Amateur Radio IPSC network.

Timeslot 2 needs to be isolated at the bridge from any other traffic.

The software is designed to work as the only peer on TS2 and won't serve other peer connections.

TS1 is not used and may be configured at the repeater independently.

MBridge behaves like a repeater on the DMR+network.

It connects to a DMR+Master and supports DTMF controlled reflector and link features from stations on the Motorola repeater TS2, like known from the DMRplus network and very similar to the worldwide CCS/DCS D-Star network.

Also GPS messages on TS2 are forwarded transparent to the DMR+Master and provided to the APRS network (only tested with Hytera mobile devices).

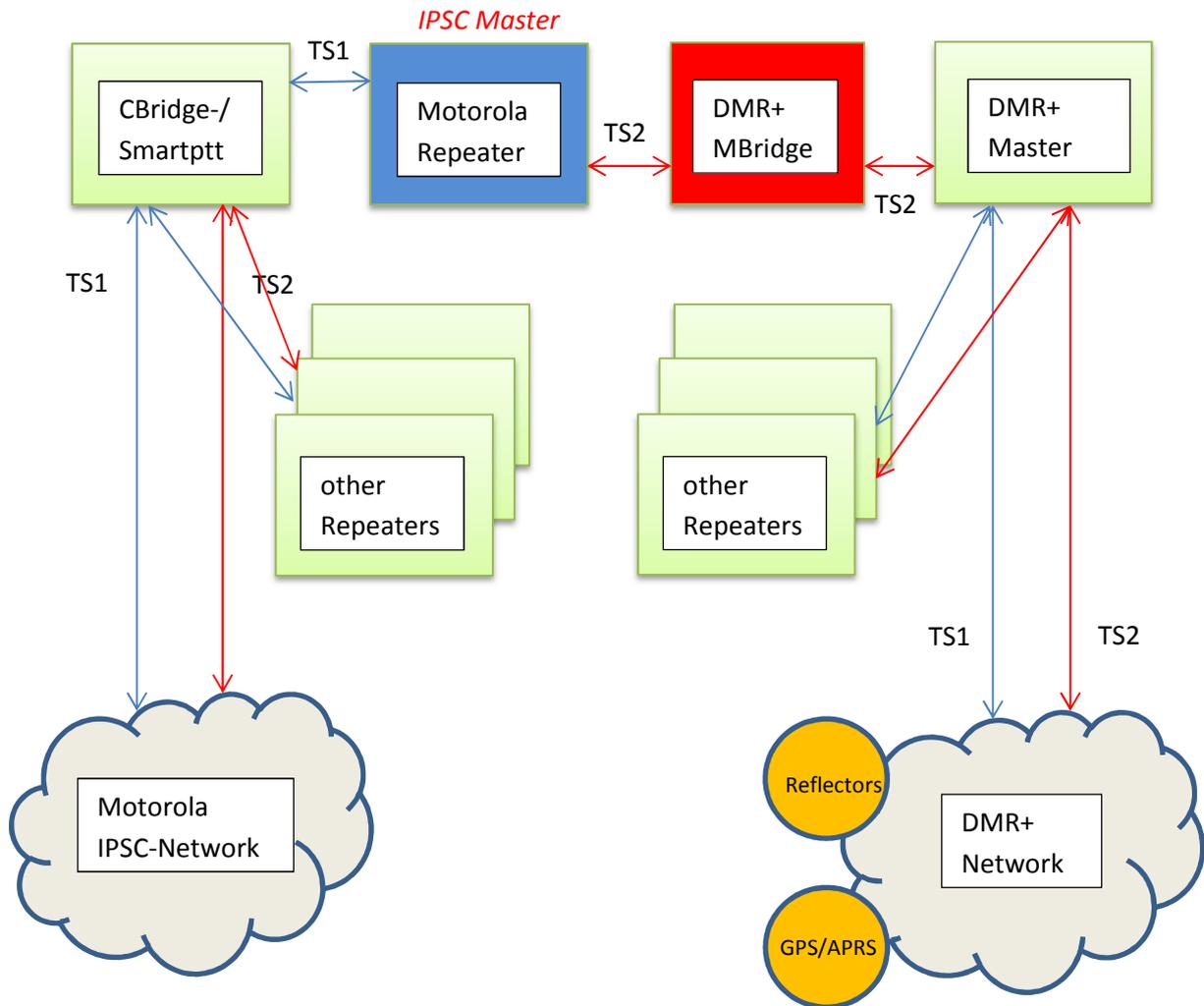
Timeslot 1 remains untouched.

MBridge supports all DMR+ features like reflector linking and GPS beacons on TS2 of the Motorola repeater.

- MBridge is Copyright of Hans-J. Barthen DL5DI and Torsten Schultze.
- MBridge is provided in form of executable binaries for Linux.
Versions are available for Linux x86 32 and 64bit (compiled on Debian7) and for Raspbian-Wheezy on Raspberry Pi. It requires openssh-1.0.0 which is not available in form of a package for Debian6 and other older Linux distributions.
- The software is closed source.
It does not need any copyright protected libraries or tools.
It was developed to be used in the open, nonprofessional Amateur Radio DMR network.
Any kind of commercial use of DMR+MBridge is prohibited!

- **Requirements:**
 - There are no special requirements on the DMR+ side.
MBridge connects to the DMR+Master exactly like a Hytera repeater.
 - There are some special requirements on Motorola IPSC side which are based on the fact that we split the 2 timeslots of the IPSC network:
 - Slot 1 connects to the Motorola IPSC network like usual, with all settings and features.
MBridge does not touch anything, you will never see any frame to TS1.
 - Slot 2 connects to the DMR+ IPSC network.
MBridge expects not to see any other traffic there.
 - As of today this is a fix configuration, it cannot be changed by the user.
 - MBridge acts as an additional peer on the Motorola IPSC network and may either connect to a repeater or a bridge which acts as a master.
It works as single peer on TS2, which requires that TS2 is strictly isolated from any other traffic on Motorola side.
This is a MUST, we do not want to interfere with any traffic on the Moto-DMR networks!
 - There should be no more peers in the network than 1 repeater and 1 bridge.
 - There are security features implemented:
 - MBridge won't answer any other peer request than from the IPSC master.
With a wrong setup of the bridge or repeater it won't work properly, it will get collisions of incoming traffic on TS2 of the local trunk.
 - If the peer list from the IPSC master shows more than 2 entries the software will stop with an error message.

- 2 different setups have been tested successful:
 - At DB0MYK the DR3000 repeater is the master, MBridge is one peer, the bridge (in this case Smartptt) is another peer.
 TS2 is set to be "not networked" on the bridge, no traffic to be send on TS2!



- In Austria Kurt OE1KBC is testing a setup where the MBridge is connected direct to a bridge (Smartptt) with no other peer in that trunk.
MBridge acts as a peer, Smartptt as a master.
Kurt has configured several Motorola repeaters on other trunks to communicate on TS2 to MBridge.
- Both setups have some advantages and disadvantages:
 - TS2 of a connected Motorola repeater provides all features of the DMR+ system, like reflector linking, GPS position reporting etc.
If you have several repeaters connected to MBridge via the bridge, control commands are accepted from each of it.
All repeaters will always use the same linking.
 - With one dedicated MBridge for each Motorola repeater it works exactly like users know it from the DMR+ network, you can link each repeater individually.
- Linux beginners should prefer the Raspberry Pi solution.
With that the MBridge can be installed next to the Motorola repeater and offers a standalone interface system for less than 30 Euro.
On other systems you might find issues with different hardware platforms, Linux versions, shared ports and addresses, firewall settings and all the nice things that will cost you time.
Please understand that we cannot provide Linux lessons.
- However, if there is no other way you can get a Linux version for your PC.
- There is also a Cygwin based Windows version available.

Installation on Raspberry Pi in a short overview:

1. Download and install the latest Raspbian-Wheezy version from <http://www.raspberrypi.org/downloads/> to your favorite Windows- /Linux- or Mac-system
2. Follow the installation instructions for your system from the “image installation guides”.
You will find a link at the top of the download page.
3. Install the image to an SD-card like described in the installation guide.
4. 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.
5. Change to user root with command “sudo -s”
6. Create a new directory with “mkdir /opt/mbridge”
7. Change to the new directory “cd /opt/mbridge”
8. Download the tgz file from our download server to the directory on the Raspberry Pi with this command
`wget http://download.prgm.org/dl5di-soft/mbridge/dmrplusmb4raspberrypi.tgz`
9. Unpack the file with
`tar -zxvRf http://download.prgm.org/dl5di-soft/mbridge/dmrplusmb4raspberrypi.tgz`
10. Edit the configuration file “dmrplusmb.cfg”
11. Start the DMR+MBridge with “./run.sh”
12. In case of any issues ask your next friend with Linux experiences for help



Installation on Linux PCs:

Follow step 5-12 from the description above.

Modify the filename in step 8 and 9 to the correct version for your system:

http://download.prgm.org/dl5di-soft/dmrplusmb/dmrplusmb4linux-x86_32.tgz

http://download.prgm.org/dl5di-soft/dmrplusmb/dmrplusmb4linux-x86_64.tgz



The configuration file of MotoMaster looks like this:

```
#
# Configuration file of "DMR+MBridge"
# (C) 2013-2015 DL5DI Hans-J. Barthen, DG1HT Thorsten Schulze
#
# Own bridge ID (usually repeater ID with leading "1")
# This ID should be unique in the network, has not to be registered, will not appear on air
MyBridgeID=1262999
#
# Parameters of Motorola Repeater/IPSC Master:
#
# call of the Motorola repeater (max 7 chars)
RptrCall=DB0TEST
# repeater ID (usually 6 digit, max 7 for test repeaters)
RptrID=262999
# transmit frequency in Hertz
RptrQRGtx=438300000
# receive frequency in Hertz
RptrQRGrx=430700000
# IP address of the repeater
RptrIP=192.168.0.2
# UDP Port number of the repeater
RptrPort=50000
# Network key (max 40 digits numeric)
NetworkKey=0123456789
#
# Parameters of the DMRplus Master
#
# IP address of the dmr+master
MasterIP=192.168.0.1
```

The software was tested on Raspbian version 2014-12-24-wheezy-raspbian from <http://www.raspberrypi.org/downloads/> running
Linux raspberrypi 3.12.35+ #730 PREEMPT Fri Dec 19 18:31:24 GMT 2014 armv6l GNU/Linux

The average cpu load created by 4 threads is shown in htop like this:

PID	USER	PRI	NI	VIRT	RES	SHR	S	CPU%	MEM%	TIME+	Command
7251	root	20	0	36268	1312	1112	S	7.0	0.3	15:19.90	./dmrplusmb
7267	root	20	0	36268	1312	1112	S	3.0	0.3	8:02.19	./dmrplusmb
7268	root	20	0	36268	1312	1112	S	1.0	0.3	4:19.39	./dmrplusmb
7266	root	20	0	36268	1312	1112	S	1.0	0.3	2:48.05	./dmrplusmb

Support by email (dl5di@gmx.de) or better in the Yahoo Group "dmrplus".