

D-STAR

Repeater Linking

User Guide

Australian Version

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0.1	14 May 2008	David Tilson	Modification of UK-IT <i>dplus</i> Reflector User Guide to suit Australian conditions
0.2	14 May 2008	David Tilson	Addition of Node and Gateway linking as per suggestion by Richard Hoskin
0.3	20 May 2008	David Tilson	Formatting changes
1.0	24 May 2008	David Tilson	Initial release version
1.1	23 September 2008	Richard Hoskin	Added and updated a number of new items including interconnect tables.

Please submit any updates for this document to webmaster@dstar.org.au

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Introduction:

This document assumes that your local D-STAR Node is:

1. Connected to the K5TIT trust server via the G2 Gateway network.
2. The D-STAR Node you are working through needs to be running *dplus* version 2.1d or later.
3. The local D-STAR Sysop has allowed user linking operations in the *dplus* configuration.

NB. At the time of writing all Australian Gateway connected D-STAR nodes meet the first two requirements.

There are 5 types of connections that can be performed across D-STAR, being:

1. CallSign Routing
2. Node Routing
3. Gateway Linking
4. Reflector Linking; and
5. Multicasting

This User Guide is designed to explain how each type of connection works and how to utilise them effectively.

In this User Guide the term YOUR and URCALL are interchangeable depending on your particular D-STAR radio.

CallSign Routing:

CallSign Routing allows a user, to 'dial up' a remote user by placing their callsign in the URCALL field. When the remote user's callsign is placed in the URCALL field the D-STAR network will route your signal to the repeater port that the remote user was last heard on. This is similar to dialling up a person using a mobile phone.

Eg: To call Alex, M0KVA no matter where he is in the world place M0KVA in the URCALL field, your local Repeater and Port in RPT1 and your local Repeater Gateway in RPT2.

So to call M0CVA C from VK3RWN B:

URCALL: M0KVA
RPT1: VK3RWN B
RPT2: VK3RWN G

So that M0KVA can answer your call and speak to you, you will need to announce the repeater and port you are calling from. Eg "M0KVA this is VK3JFK calling on VK3RWN port B"

NOTE: Once you have concluded your D-STAR contact you must 'Hang Up' by placing CQCQCQ in the YOUR: field of your radio, otherwise your local D-STAR transmissions will be heard at the remote repeater every time you transmit.

Node Routing:

Node Routing allows a user, or group of users, on one D-STAR Repeater Node to talk to another amateur, or group of amateurs, on another D-STAR Repeater Node. To achieve this both D-STAR Repeater Nodes must have a D-STAR Gateway installed and operational. To successfully communicate each user must have their RPT2 set to their local Gateway, eg: VK3RWN G.

Each user must also set their URCALL to match the destination they wish to talk to, prefixed by a "/" character. The 8th character in the URCALL field must always be the destination Port, eg: "/VK3RBAB" to connect to VK3RBA port B, or "/GB7IC A" to connect to GB7IC port A.

So that users on GB7IC can answer your call and speak to the group, you will need to announce the repeater and port you are calling from. Eg "VK3JFK calling on VK3RWN port B"

At the conclusion of the conversation each station must 'Hang Up' by changing their URCALL back to CQCQCQ, otherwise they will continue to be retransmitted across the remote D-STAR Repeater.

Figure 1 shows the results of stations that are correctly and incorrectly configured for Node Routing.

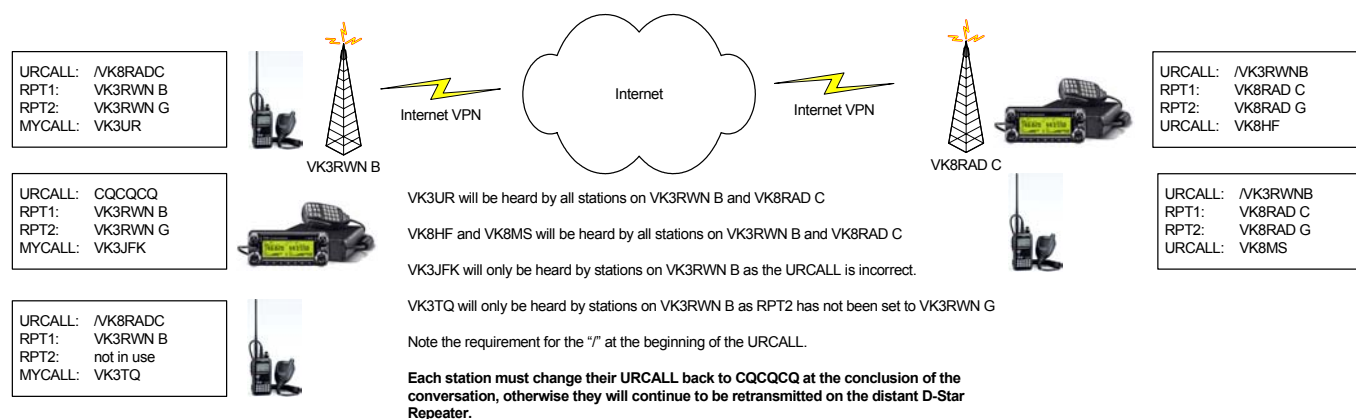


Figure 1: Example of Node Routing across D-STAR

Gateway Linking:

Note: Many Nodes (repeaters) do NOT allow user control of linking to the Gateways and Reflectors.

Gateway linking allows a user on one D-STAR repeater to link to another D-STAR Repeater without other users needing to program anything special in their URCALL field.

The person originating the Gateway link specifies the destination Repeater and Port followed by the letter "L" in the 8th character of the URCALL field. For example to link to VK2RDS port C the originator would enter VK2RDSCL in the URCALL field and press their PTT. This will then establish a link between the 2 D-STAR repeaters. When the Gateway link has been established the originating station is required to change their URCALL back to CQCQCQ.

Any station on either D-STAR Repeater that has their URCALL set to CQCQCQ as well as RPT1 set to their local D-STAR Repeater and RPT2 set to their local D-STAR Gateway will be heard across the 2 D-STAR Repeaters.

So to connect to VK2RDS C from VK3RWN B:

```
URCALL:    VK2RDSCL (L is in position 8, C is the destination port in position 7)
RPT1:      VK3RWN B
RPT2:      VK3RWN G
```

NOTE: Once you have connected to the D-STAR Reflector you should revert the YOUR: callsign field to CQCQCQ, otherwise the local D-STAR node will try to re-link every time you transmit.

Local users of a D-STAR Node should also note that where two D-STAR Nodes are linked. For example, in the case where VK2RDS C is linked to VK3RWN B, if you are on VK2RDS C and you try to Node Route to VK3RWN B with /VK3RWNB in the URCALL field, it won't work. So if you try to Route to a D-STAR Node, and its not working as expected, it's an indication that you may be Linked via a D-STAR Gateway or Reflector to the D-STAR Node you are targeting. So while you are Linked, all you need is to do is described above: RPT2 set to G, and URCALL set to CQCQCQ. If VK3RWN G is your local D-STAR Gateway then just try setting RPT2 to VK3RWN G, and it should work fine.

At the conclusion of a Linked session the user can set their URCALL to "*****U" (where the "*" character = space) and press their PTT to close the link. It is the responsibility of the user who established the Link to ensure it is closed.

Figure 2 shows the results of stations that have correctly and incorrectly configured for Gateway linking.

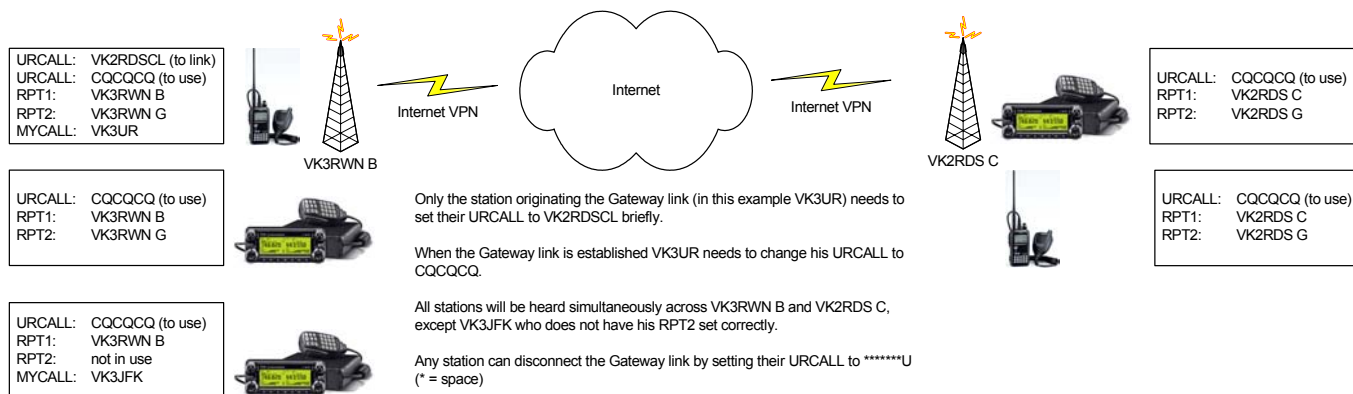


Figure 2: Example of Gateway Linking across D-STAR.

Reflector Linking:

Note: Many Nodes (repeaters) do NOT allow user control of linking to the Gateways and Reflectors.

A D-STAR Reflector acts as a central conference hub where multiple D-STAR Nodes / Dongle users can gather and all talk to each other.

There was a recent World Wide Net; the objective of the net was to see how many D-STAR Nodes and Dongle Users could connect to a D-STAR Reflector and to gauge what sort of capacity it could take. There were 28 D-STAR Nodes, and 18 Dongle users connected. The system performed perfectly, and no performance issues were noted.

If you've managed to program your D-STAR radio already you should be familiar with the format of programming the four key fields, MYCALL, URCALL, RPT1 and RPT2. Follow the instructions below to connect to a D-STAR Reflector.

There are a number of D-STAR Reflectors available for use throughout the world. In addition all of the D-STAR Reflectors have three Modules, A, B or C. So for example, the World Wide Net mentioned above, took place on REF001 C.

The Australian D-STAR Reflector is REF003, it supports operation through Reflector ports A, B and C.

A list of all known D-STAR Reflectors can be found on the Australian D-STAR Web Site at: <http://www.dstar.org.au/>

VK3RWN C is currently Linked to REF003 C.

Having D-STAR Nodes linked to each other, or being connected to a D-STAR Reflector, does not impact on other stations connecting up to your local D-STAR Node. If your D-STAR Node is connected to a D-STAR Reflector and there is a call via the D-STAR Gateway, the caller should be heard on all linked D-STAR Nodes / D-STAR Reflectors.

Dongle users can also connect to the D-STAR Reflectors directly. You should ask the Dongle users to connect directly to the D-STAR Reflector; this will enable all users that may be monitoring to hear both sides of the conversation. It's quite frustrating to listen to only one side of a conversation. Similarly, please make sure that all users on RF have set their RPT2 to set to their local Gateway, eg: VK3RWN G.

Talking across an already linked D-STAR Reflector:

The key thing that all users need to remember to make D-STAR Reflector access work, is to set your RPT2 field to include a G suffix in the 8th position.

For example in the case of users on VK3RWN B:

```
URCALL:    CQCQCQ
RPT1:      VK3RWN B
RPT2:      VK3RWN G
```

This way you will be heard by all stations connected to the D-STAR Reflector or by all stations connected to the linked D-STAR Nodes. This should be your standard setting for working your local D-STAR Node. One of the things you should remember is that you might turn on your radio and not realise that you are connected up to a D-STAR Reflector, so if you put a call out don't be surprised if you get a reply that you weren't expecting.

To Link to a D-STAR Reflector:

To connect to a D-STAR Reflector, (Eg. REF003 B from VK3RWN B) all you need to do is set your routing up as follows (your D-STAR radio does the rest).

To Link:

```
URCALL:    REF003BL (B is in position 7 & L is in position 8)
RPT1:      VK3RWN B
RPT2:      VK3RWN G
```

This links your D-STAR Node to D-STAR Reflector No. 3, Module B. Substitute the B with an A or C if you wish to connect to Module A or C, or change the 3 to 1, 2, 4, or 5 for one of those D-STAR Reflectors.

To Unlink from a D-STAR Reflector:

To Unlink:

```
URCALL:    *****U (U is in position 8 & the * represents spaces)
RPT1:      VK3RWN B
RPT2:      VK3RWN G
```

This Unlinks the D-STAR Node from any Reflector. NB. The * characters are spaces and this will Unlink any connected D-STAR Reflector. So you only need one memory in your radio to unlink any D-STAR Reflector that's connected.

If you are linked to a D-STAR Reflector / D-STAR Node and another station comes in via your Gateway, they will also be heard via whatever you are linked to.

If you plan to regularly use D-STAR Reflectors it is suggested that you input all the D-STAR Reflectors 1-12 and A-C into your radio's memories, so all you need to do is dial it up and link to the desired D-STAR Reflector. D-STAR is radio memory hungry. Once you've set them all up as memories in your radio, all you need to do is dial up whichever D-STAR Reflector / D-STAR Node you want to link to and press the PTT button for 2 seconds. You will hear a voice announcement saying "Remote System linked (or unlinked)" to indicate

you've been successful.

You are now linked to the D-STAR Reflector / D-STAR Node. Do not stay on this memory as it's only used to link/unlink the D-STAR Reflector / D-STAR Node. If you stay on this memory every time you press the PTT you will hear a message "Link Currently Established". To transmit via the Reflector, go to whichever memory you have for VK3RWN C (your local D-STAR Node) ensuring that RPT2 has VK3RWN G set, the URCALL field should be set to CQCQCQ.

Figure 3 shows the results of correctly and incorrectly configured radios for use with D-STAR Reflectors.

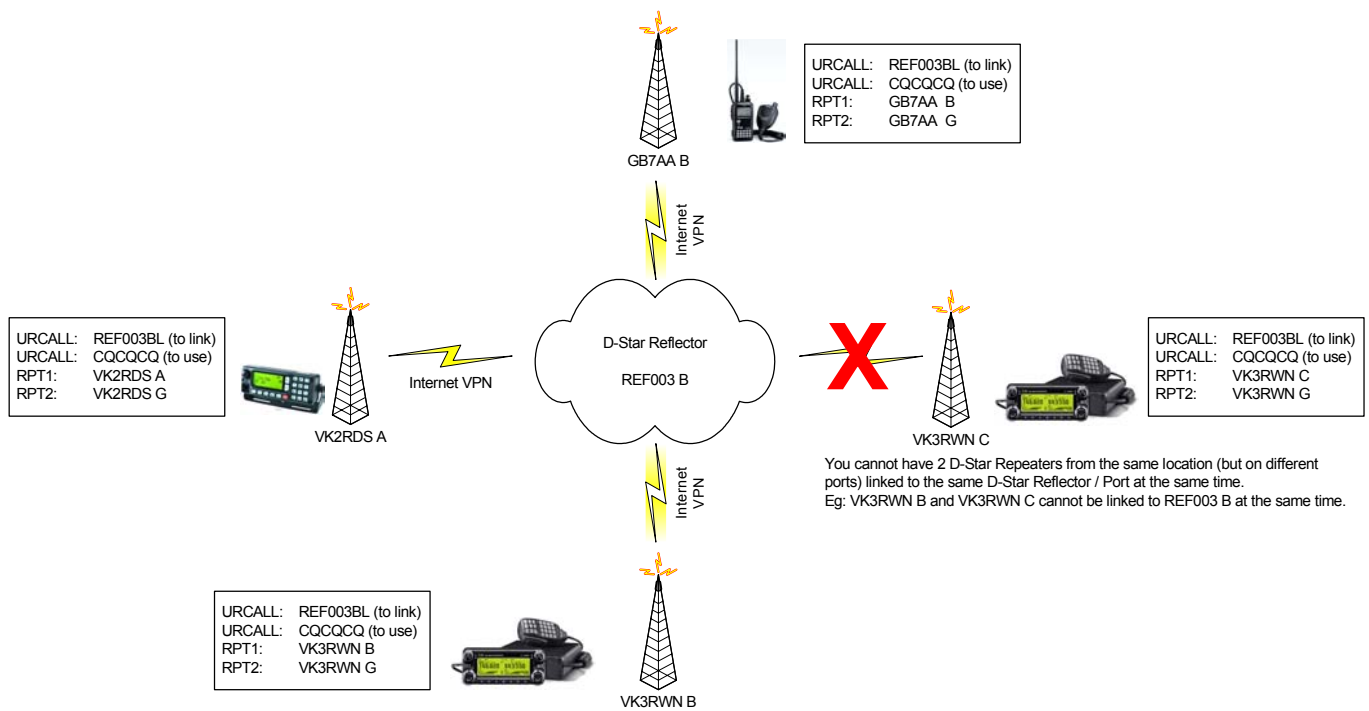


Figure 3: Example of Reflector Linking across D-STAR.

The important thing to note is that different Ports on the same D-STAR Repeater, eg: VK3RWN A, B or C CANNOT be connected to the same D-STAR Reflector and Port at the same time.

Multicasting:

Multicast allows the user to call on and talk to up to 10 D-STAR repeaters simultaneously. It is an extension to Node Routing and used when you wish to talk with more than one Node. The repeater system Administrator has to pre-configure the Multicast groups for the Gateway and users have to program a group name into the 'URCALL' call sign field. Then, their transmissions are routed to all the other repeaters in the Multicast group.

For Example;

VKC is a pre-defined Multicast group that is configured on all WIA D-STAR repeaters. It will allow you to simultaneously talk to all WIA repeaters on Port C

Configure your radio for Multicasting on VKC:

```
URCALL:      /VKC  
RPT1:       VK3RWN B  
RPT2:       VK3RWN G
```

So that users on the Remote repeaters can answer your call and speak to the group, it is important that you announce the repeater and port you are calling from. Eg "VK3JFK calling on VK3RWN port B using multicast call VKC"

At the conclusion of the conversation each station must 'Hang Up' by changing their URCALL back to CQCQCQ, otherwise they will continue to be retransmitted across the remote D-STAR Repeaters.

User Inter-Connection Success Summary Table:

It is possible to use a combination of Routing, Linking and Multicasting in some instances, though some combinations are not guaranteed to work together and you may experience drop outs and one way intermittent conversations.

The table below indicates which combinations of D-STAR Inter-Connection methods are reliable with the correct radio configuration and which combinations are unreliable.

		Remote RF Users				
		Callsign Routing	Node Routing	Multicasting	Gateway Linking	Reflector Linking
Local RF User	Callsign Routing	☺	☺	☺	☹	☹
	Node Routing	☺	☺	☺	☹	☹
	Multicasting	☺	☺	☺	☹	☹
	Gateway Linking	☹	☹	☹	☺	☺
	Reflector Linking	☹	☹	☹	☺	☺

Legend



Guaranteed to work with correct radio configuration.



Not Guaranteed to work even with correct radio configuration.

Notes:

- With Gateway Linking only the Local or the Remote user initiates the link.
- Inter-Connection types that are not guaranteed may work intermittently or in one direction of communications only.
- For Gateway Linking & Reflector Linking: - If the Local RF User and the Remote RF User are using Callsign Routing and both repeaters are Gateway or Reflector Linked the inter-connection is Not Guaranteed.

General Notes:

All Australian D-STAR Gateway Administrators have enabled user controlled Routing and Multicasting. Not all of the Australian and Overseas D-STAR Gateway Administrators have enabled user control of linking.

A couple of other things to bear in mind for local users are that there will be an announcement that you are linked to somewhere every 30 minutes, but no announcement of where you are linked to. Local users may not be aware that you are linked up to a D-STAR Reflector / D-STAR Node until they hear the announcement. We don't want to only hear half a conversation so please remember to state that you are on the Reflector so other users know to have RPT2 set to G.

If there is no activity on the D-STAR Repeater or D-STAR Reflector for a period of time, normally 25 minutes the link to the D-STAR Reflector / D-STAR Node will drop out.

Automatic GPS beacons that beacon every few minutes will be retransmitted on all connected D-STAR Reflectors, these can clash with other transmissions and prevent voice traffic from making it into the Reflector. Users who want to beacon GPS information are encouraged to set their radios to send their beacon on PTT rather than automatically.

Get into the habit of leaving *4 second* pauses between overs to allow others to get into the conversation if they wish to join. Due to the nature of the D-STAR Reflector, DV-Dongles and the capacity to have a lot of people connected, there is potential for a lot of activity on the D-STAR Reflector. Leaving at least a *4 second* pause between transmissions allows other stations to join the conversation.

If you get stuck, you can seek help via the Australian D-STAR Mailing List at:

<http://lists.wia.org.au/mailman/listinfo/dstar>.

Acknowledgements:

We wish to thank and acknowledge Declan McGlone – M0MTX, Darren Storer – G7LWT, and the UK Interconnect Team who produced the UK-IT *dplus* Reflector User Guide that the Australian Guide was originally based upon.

We also wish to thank Robin Cutshaw, AA4RC, for development of the *dplus* software which enables Gateway and Reflector linking across D-STAR Repeaters.