

D-Star Routing Explained

D-Star routing can be confusing. There are many different options to set, and the Icom documentation may not be clear enough regarding how all the options work together. I'll try to explain what each of the routing entries means, and show how they fit together in common situations.

First, a note on how routing entries are shown here. In nearly all cases, there will be one or more spaces in a routing entry. Since fonts differ, and the number of spaces matters, they'll be shown here as an underscore (_). Be sure to replace the underscore with a space when you enter it into your radio.

Perhaps the hardest concept to understand is that the whole purpose of routing is not to get your signal directly to the other ham, it's to get the signal to the repeater that the other ham is using. He'll hear your signal when the repeater puts it out. He'll also hear every other signal the repeater puts out, so you don't have to specifically send it to him. As long as it gets to the repeater he's using, he'll hear it. The same goes in the other direction: he only needs to get the signal to the repeater you're using.

MYCALL is the easiest to understand. It's just that: the call sign of your amateur station. It doesn't figure into routing decisions, except that it tells a D-Star Internet gateway which repeater you're using. This happens every time you transmit through a repeater with an attached gateway, as long as you're registered as a gateway user anywhere on the system. When you change systems, a short transmission is all that's needed to tell every gateway in the entire network where you are.

RPT1 is the repeater you're talking to. If you're talking on simplex, set it to NOTUSE*, so other stations won't wait for a repeater to retransmit it. If you're using a repeater, set it to the repeater's call sign, plus the port identifier in the 8th position. For example, if you're using a repeater with the call sign WR5XXX on 2 meters, you'd set it to WR5XXX_C, since C is the port identifier for 2 meter repeaters. If you're using the K5TIT system in Dallas on 1.2 GHz, you'd set RPT1 to K5TIT__A (using two spaces to get the A in the 8th position). The general convention for port assignments that has been agreed on is: Port A 1.2Ghz (23cm), Port B UHF (70cm), Port C VHF (2m)

If you just set RPT1 to your local repeater, and RPT2 to NOTUSE*, your signal will go to your local repeater and be repeated, but it won't be sent any farther along than that. This is useful, but it's not where the real magic of D-Star lies. So far, all we've done so far is reinvent the local repeater. To really use the D-Star capability, we will use RPT2.

RPT2 tells your local repeater where else to send the signal besides its own transmitter. (It always does that.) If your local D-Star system has more than one band unit, you can cross-band repeat by setting RPT2 to the local repeater's call sign and port ID of the other band you want to use. For example: if you're on WR5XXX's 2 meter port and want to cross-band repeat to 440MHz, you'd set RPT1 to WR5XXX_C and RPT2 to WR5XXX_B (since B is the 440 port ID). Your transmissions will then come out on both bands. Someone on 440 who wanted to talk to you would do the reverse: set RPT1 to WR5XXX_B (since that's the repeater he's talking to) and RPT2 to WR5XXX_C.

So far, so good, but the real magic of D-Star is in gateways. A gateway isn't a repeater, itself. It has no RF hardware at all. What it does have is the intelligence to look up a call sign and automatically send your signal to wherever that call sign is on the network. You tell the gateway what to look up by setting URCALL. Up until now, the URCALL setting hasn't really mattered. The default is CQCQCQ, which is a general destination, not any specific ham. Unfortunately, the gateway has no idea what to do with CQCQCQ. You have to tell it what to look up.

There are two possible ways to get there. The first is the equivalent of CQCQCQ on a remote system. That's specified by putting a / in front of the repeater's call sign and port ID. The port ID, as always, is in position 8, so the CQ destination on WR5XXX's 2 meter port would be /WR5XXXC (note the lack of a space). A user on WR5XXX who wanted to talk to anyone at all on K5TIT's 1.2 port would set RPT1 to WR5XXX_C (as always), RPT2 to WR5XXX_G (G is the gateway's port ID), and URCALL to /K5TIT_A (with the space there to put the A in the 8th position). When the gateway sees / and a call sign and port ID in URCALL, it simply routes the signal there, with no further processing.

The second choice is if you want to talk to a particular ham, but you don't know which system he's on. You'd set URCALL to the call sign of the ham you want to talk to, RPT1 to your local repeater (as always), and RPT2 to the gateway. The WR5XXX 2 meter user who wanted to talk to N5MIJ would set RPT1 to WR5XXX_C, RPT2 to WR5XXX_G, and URCALL to N5MIJ. This will route the signal to WR5XXX's gateway, which will see that the destination is N5MIJ, look up where he was seen last, and then route the signal there. If N5MIJ is listening to that repeater, he'll hear your signal, and can respond to your call by reversing the process. (Some radios, such as the IC-91AD, can do this automatically.)

Since all signals are retransmitted by the repeater that receives them, either from its RF input or another repeater (locally or through a gateway), others can join in on the conversation. To do so, they'd use the same routing settings as one of the other local stations they're talking with, which will cause their signals to be routed the same way. The exception is URCALL: since it's only used by the gateway to look up the destination repeater, it can be anyone on the other repeater system, or that system's general destination (/call sign), if it's known.

D-Star routing isn't as complex as it appears in the documentation. Once you understand what each piece of the puzzle does, setting it up to do what you want is straightforward.