

Toledo Mobile Radio Association (TMRA)

D-Star – Information Handout

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#1: What is D-Star?

From Wikipedia:

***D-STAR (Digital Smart Technologies for Amateur Radio)** is a digital voice and data protocol specification developed as the result of research by the [Japan Amateur Radio League](#) to investigate digital technologies for [amateur radio](#). While there are other digital on-air technologies being used by amateurs that have come from other services, D-Star is one of the first on-air and [packet](#)-based standards to be widely deployed and sold by a major radio manufacturer that is designed specifically for amateur service use.*

Other non-digital voice modes such as [amplitude modulation](#), [frequency modulation](#), and [single sideband](#) have been widely used since the first half of the 20th century. By comparison, digital D-STAR signals offer clearer signals and use less [bandwidth](#) than their non-digital counterparts. [1] As long as the [signal strength](#) is above a minimum threshold, and no [multi-path](#) is occurring, the quality of the data received is better than an analog signal at the same strength.

D-Star compatible radios are available on [VHF](#), [UHF](#), and microwave amateur radio bands. In addition to the over-the-air protocol, D-Star also provides specifications for network connectivity, enabling D-Star radios to be connected to the Internet or other networks and provisions for routing data streams of voice or packet data via amateur radio callsigns.

Source: <http://en.wikipedia.org/wiki/D-STAR>

From Icom:

D-STAR is a new ham radio system which offers digital voice and data communication. It connects repeater sites over microwave links and the Internet and forms a wide area ham radio network. The DSTAR system provides a new capability and functionality to the ham radio world and increases the efficiency of emergency communications.

Source: <http://www.icomamerica.com/en/products/amateur/dstar/id1/default.aspx>

#2: The Proposition

During a short period in May 2011 Icom offered a promotion where amateur radio clubs could purchase an Icom D-Star repeater setup for \$3,000.00. This is a large discount over the regular price of around \$5,000.00. In addition, Icom offered a *bonus*, where, if certain conditions are met, Icom would reimburse the \$3,000.00 purchase price.

The TMRA applied for the offer and was accepted. The TMRA Executive Committee met, as well as the club trustees, and voted to approve a proposition to present this to the club membership for approval. While Icom will reimburse the \$3,000.00 assuming we met their conditions, the club still needs to foot the bill initially.

This means the general club membership needs to vote to approve this plan.

What is the plan?

To put a 440Mhz D-Star repeater on the PNC bank building downtown, the former site of the TMRA repeaters. The rationale behind choosing this location and band are explained in the next section.

Aside the initial \$3,000.00, there will need to be a work party formed to do the installation. There may be additional expenses as well, but the TMRA tech committee has put some thought into reducing these additional expenses by making use of existing resources.

What are Icom's requirements for reimbursement?

Directly from the Icom rebate form:

If your club meets the following requirements, within 90-days from the delivery date, Icom will send a check for the original purchase price (US\$3000).

- *Install in permanent location identified at the time of purchase*
- *Fully operational on the USROOT trust server with Icom G2 Gateway Software and within the requirements outlined by the USROOT Administration team.*
 - **HUH?** This simply means that we need to have the system hooked up the Internet and the global D-Star network. Remember, the rationale behind Icom reimbursing us for the repeater is that if there is a repeater available, more people are likely to buy Icom radios with D-Star.
- *Minimum of 10 users registered on the "Gateway"*
 - **Again, huh?** This goes hand-in-hand with the above comment. Icom wants to know that people are using the repeater. If no one is using it, they gave us a free system with no return for them.
 - **IMPORTANT NOTE:** Icom is looking for ten **NEW** D-Star users. Some of you may already have D-Star equipment and may have already used it on other D-Star repeaters and/or the D-Star global network. This means you may have **ALREADY registered** on another system. If you have already registered, that doesn't count towards ten **NEW** D-Star registrations. **SO – if you want to support the club and purchase a new D-Star radio, please wait until we get the system up and running (assuming this is all approved – please show up and vote!), and THEN register with the TMRA D-Star gateway.** Instructions for how to do this will be forth-coming if/when the new repeater system is put on the air!!!
- *Guarantee system on air for minimum of 1 year from date of installation*

Under no circumstances can product be returned for a refund.

What's the catch?

Firstly, this offer was only available to amateur radio clubs which were not in a location that already had access to a D-Star repeater. Second, we have to get the repeater installed, up and running, hooked up to the Internet, and have **10 new D-Star users** registered on the gateway **within 90 days** from delivery date of the equipment. Lastly, there is always a chance that something unexpected will happen and we won't get the \$3,000.00 reimbursed. In this situation, however, we'd still have the equipment... which normally sells for around \$5,000.00.

#3: Repeater Location & Band

Why the PNC bank building?

The TMRA has two major locations. The PNC bank building, downtown, and Parks Tower, at the University of Toledo. The 2m and 440 repeaters were previously at the PNC bank building. However, due to interference on 2m, these were moved to Parks Tower. Therefore, we have a vacancy at the PNC bank building. We also have Internet access readily available, which is required for hooking up the D-Star repeater to the world-wide D-Star network. While Internet access is in the works for Parks Tower, we currently do not have it there.

Why 440 and not 2m?

- While there was interference on the 2m band, there were no major issues with 440 on the PNC bank building... in fact, it worked quite well.
- 440 is more optimized for mobile and/or HT use... better building penetration and smaller antennas.
- More 440 repeater frequency pairs are available than 2m pairs.
- Most of the current Icom radios are dual band (2m/440).

Can we upgrade and/or add items to the repeater later?

Absolutely. Included in the equipment purchase is a repeater controller unit which allows for multiple repeaters to be hooked into it, just like our other repeaters. Therefore, we could add a 2m repeater, or even 1.2Ghz in the future. There is a possibility that, in the future, we could link the D-Star repeater to the other TMRA club repeaters!

Additionally, since D-Star has APRS-like features (GPS position reporting and/or text messaging), there is the possibility of adding an APRS to D-Star gateway ("*D-PRS*"). This would allow APRS users to exchange GPS position reports with D-Star users and vice-versa, and possibly APRS text messaging between APRS and D-Star users.

There are a number of exciting possibilities. There also exists a growing home-brew community out there for D-Star equipment/hardware/software.

#4: D-Star Compatible Equipment

ICOM D-Star Radios:

Model	Price w/D-Star	Band	D-Star Status
- Base/Mobile			
IC-2200H	\$390.00 (\$170 + \$220)	2m	Upgradeable (\$220)
ID-880H	\$500.00	2m/440Mhz	D-Star Ready
IC-2820H	\$880.00 (\$600 + \$280)	2m/440Mhz	Upgradeable (\$280)
ID-1	\$970.00	1.2Ghz	D-Star Ready
ID-800H	<i>DISCONTINUED</i>	2m/440Mhz	Upgradeable (\$220)
IC-9100	\$3820.00 (\$3600+\$220)	HF/6m/2m/440Mhz	Upgradeable (\$220)
- HT			
IC-V82	\$370.00 (\$150+\$220)	2m	Upgradeable (\$220)
IC-U82	\$370.00 (\$150+\$220)	440Mhz	Upgradeable (\$220)
IC-80AD	\$440.00	2m/440Mhz	D-Star Ready
IC-92AD	\$560.00	2m/440Mhz	D-Star Ready
IC-91AD	<i>DISCONTINUED</i>	2m/440Mhz	Upgradeable (\$220)

Others:

D-Star "Dongles" (for hookup to a computer & used with the Internet):

Inet Labs DV-Dongle: ~\$200.00

Inet Labs DV-AP: ~\$250.00

What are "dongles"???

These devices can be hooked up to a computer and use your Internet connection to communicate with the global D-Star network. This means that you talk using your computer, not radio, and you can connect to repeaters and/or other D-Star users on the Internet. If you connect to a D-Star repeater via the Internet, your voice will then go out via RF from that repeater to other D-Star radios using RF.

Additionally, the "DV-AP" can provide "hot spot" like access. If you have Wi-Fi on your Internet connection at home, this is basically the same concept. You can use the DV-AP as an "access point", in addition to the standard features listed above of the regular DV-Dongle. If a person does not have D-Star access from their home QTH, but do have a radio with D-Star capability, this can be used to allow them to use their D-Star capable radio to talk to other D-Star users by going through the Internet. They can talk on their D-Star radio using RF at home, which then goes to this DV-AP which intercepts the RF, converts it to go over the Internet, then that goes to another D-Star repeater or other D-Star users on the Internet. The DV-AP only has a 10mw 2m transceiver built-in, so it's not likely that it can be used to directly talk to a repeater via RF. The intention of this device is as stated above, to provide a home user with D-Star access if they can't directly access a D-Star repeater, or if coverage is an issue at their home QTH. Please see the Internet links in the next section for more information on the *Inet Labs Dongles*.

#5: Where can I get more information?

Icom D-Star Information:

<http://www.icomamerica.com/en/products/amateur/dstar/dstar/default.aspx>

Inet Labs Dongles:

DV-Dongle: http://www.dvdongle.com/DV_Dongle/Home.html

DV-AP: http://dvapdongle.com/DV_Access_Point_Dongle/Home.html

Wikipedia:

<http://en.wikipedia.org/wiki/D-STAR>

D-Star Users Group:

<http://www.dstarusers.org/>

D-RATS:

<http://www.d-rats.com>

D-Star Info, FAQs, & More:

<http://www.dstarinfo.com/home.aspx>

Dayton 2011 D-Star Forum Presentation – John Davis, WB4QDX:

<http://www.dstarinfo.com/Data/Sites/1/SharedFiles/presentations/dayton2011/dayton2011forumpres.pdf>