



D-STAR COMMUNICATIONS

KU₁U – Cory Golob

What is D-Star??

- D-STAR stands for **D**igital **S**mart **T**echnologies for **A**mateur **R**adio
- This technology has been around since 2004
- It is a digital voice mode that also employs the use of Text and GPS data.
- D-Star is very narrow banded, using only 6.25 kHz of spectrum. You could fit 4 D-Star repeaters in the same bandwidth of a standard FM analog repeater!

Will D-Star Replace Analog??

■ NO!!!

- D-STAR is just another tool in the toolbox.
- D-STAR is not for everybody
- Analog is one of the last strong-holds that hams have at the ready (Public Safety is mandated to be narrow banded at 12.5 kHz. The 25 kHz FM repeaters widely used by hams are grandfathered and not affected by the federal mandate)

Is D-STAR expensive??

- Expensive is a relative term. When you compare D-STAR to the Chinese Baofeng radios that have flooded the amateur market then yes, D-STAR can be seen as expensive. It is the most expensive of the big 3 DV modes (D-Star, Fusion, DMR).
- D-STAR uses an AMBE vocoder chip, constituting an increased cost, to give the radio its digital quality. In this regard D-STAR is no different than the digital modes from Yaesu (System Fusion) and Motorola (DMR) also require the use of a vocoder.
- Recommend looking at older models such as ID-51 handheld or Icom 880H. 5100 is current mobile being offered which has GPS built in and takes advantage of the "DR" mode.

Is D-Star Proprietary to ICOM??

- No. The mode itself is not proprietary and is open source, but DVSI has put the codec on a chip for ease of development (their chip is proprietary)
- ICOM and now Kenwood are the only current manufacturers who have been willing to use the AMBE vocoder in their radios. Any manufacturer can have D-STAR, but they need to have a vocoder to make it work. Flex Radio allows D-Star by adding inserting the USB Dongle such as NW DV3000.
- Every company wants their own version of digital which is not compatible with other manufacturers.
- Connect Systems tried to create a handheld that will offer D-STAR, DMR, Fusion, P25 and other digital modes but it never went past being vaporware.

ICOM Handhelds



Icom IC-80AD
2m/70cm
1052 memories



Icom IC-91AD
IC-91A is D-STAR
upgradeable
2m/70cm
1304 memories



Icom IC-92AD
2m/70cm
1304 memories

Kenwood D-star



Kenwood D74A
2m/1.25m/70cm



Kenwood D75A
2m/1.25m/70cm

Kenwood D-star



Kenwood D750A
2m/1.25m/70cm

Estimated Release Late 2025



Icom ID-31A
70cm Only
Internal GPS



Icom ID-51A
2m/70cm
Internal GPS



Icom ID-51 Plus
2m/70cm
Internal GPS
Faster DV transfer
RS-MS1A Android
Application
DV/FM repeater search



Icom ID-51A 50th Anniversary Edition

Same features as the ID-51A Plus.
The 51A Plus and 50th Anniversary Edition fixed the muffled audio



Icom ID-50
2m/70cm
Internal GPS



Icom ID-52
2m/70cm
Internal GPS



Icom ID-52 Plus 60th
Anniversary
2m/70cm
Internal GPS

ICOM Mobiles



Icom ID-800H
55W2m/50W 70cm
500 memories



Icom ID-880H
50W 2m/50W 70cm
Identical companion to IC-80 HT



Icom ID-4100A
55W2m/50W 70cm
500 memories



ICOM IC-2820H 2m/70cm 50W mobile
Dual Monitor
522 memories
Cross-band repeat capable



ICOM ID-5100 2m/70cm 50W mobile
Touch Screen
Internal GPS
RS-MS1A Android Application compatible



ICOM ID-1

1.2 GHz Analog/D-STAR mobile

Transfer high-speed data at 128 kbps

Allows you to access the web, email and other internet applications
when connected to a PC

Data transfer works without a repeater

ICOM Base



Icom IC-9700
2m/70cm/23cm

HF ICOM D-STAR




IC-7100
160 – 10 meters
6 / 2 and 440
Popular as a mobile radio



IC-9100
160 – 10 meters
6 / 2 / 70cm & 23cm (with
module)



How Do I Access D-STAR??

- D-STAR can be accessible be Repeater, Hotspot, DVAP or DV Dongle
 - We will discuss each access point
- 

REPEATER




Icom G2 Factory Repeater



Icom G3 Factory Repeater



"Homebrew" Repeater Setup
Factory Repeater with MMDVM board

- 
- ICOM repeaters can be purchased or users can build their own repeaters.
 - ICOM offers a 2 meter, 70cm, 23cm voice and 23cm data module in addition to a repeater controller.
 - Front end receivers have been problematic with ICOM repeaters unless you have a quiet repeater location.
 - Most users opt to build their own repeater to enhance their knowledge, customize their features and reduce cost.

- Repeaters offer the best coverage for D-STAR
- Repeater call signs must be unique, they cannot be the same call sign as an individual accessing the system. Club call signs are usually assigned to a repeater or you can opt for a call sign of a ham who has no interest in getting on D-STAR but would like to offer their call sign for repeater use.
- Repeaters must be coordinated.
- Repeaters are used on 3 bands, referred to in D-STAR as MODULES.

HOTSPOT



SharkRF OpenSpot:

OpenSpot 1

OpenSpot 2

OpenSpot 3

OpenSpot 4

OpenSpot 4 Pro



Low Power, Simplex, Portable, User Friendly
GUI

HOTSPOT



ZumSpot



JumboSpot

Read Fine Print on if Raspberry Pi is included

Various styles of MMDVM Hotspots available

Band Module VS. Reflector Module

**MODULE A = 23 CM
or Hotspot User**

MODULE B = 70 CM

MODULE C = 2 M

Band Module

01200117 0000101 0101 D-STARusers.org 001100100 0110000
 01200117 0011010 0101010 Your Source for D-Star DIGITAL Information! 01100 10 011

Current Time is 01/21/2022 17:49:33 UTC [\[Click here to disable refresh\]](#)

Callsign	Time Heard	Reporting Node	501 Unique callsigns heard in the last hour
IK3DNV	01/22/22 20:22:30 UTC	IR3UEF C 2 Meters	Monselice (Padova) , Italy, Italy
E29HX	01/21/22 17:49:32 UTC	REF087 Dongle User DVD	Bangkok, Thailand
KG7XD	01/21/22 17:49:27 UTC	REF030 C 2 Meters DVD	Lawrenceville, GA, USA
N7BU	01/21/22 17:49:27 UTC	REF030 Dongle User DVD	Lawrenceville, GA, USA
W7SSK	01/21/22 17:49:27 UTC	REF029 Dongle User DVD	UT, USA
IV3PRS	01/21/22 17:49:27 UTC	REF090 B 440 MHz DVD	Troy, AL, USA
AD9Z	01/21/22 17:49:22 UTC	WB4HRO D Unknown DVD	Doraville (Atlanta), GA, USA
KT4ROY	01/21/22 17:49:22 UTC	REF090 B 440 MHz DVD	Troy, AL, USA
IW4DGS	01/21/22 17:49:22 UTC	REF068 B 440 MHz DVD	Milan, Lombardy, Italy
W4ZSZ	01/21/22 17:49:21 UTC	WX4EMA C 2 Meters	Macon, GA, USA
AJ4A	01/21/22 17:49:19 UTC	KE4YVD B 440 MHz	Richmond, KY, USA
KI5CZJ D	01/21/22 17:49:17 UTC	REF004 Dongle User DVD	US, USA
2E0EPB	01/21/22 17:49:17 UTC	REF001 Dongle User DVD	USA
KG9G	01/21/22 17:49:17 UTC	REF030 Dongle User DVD	Lawrenceville, GA, USA
KC0IEB	01/21/22 17:49:12 UTC	REF030 Dongle User DVD	Lawrenceville, GA, USA
EA1AXY	01/21/22 17:49:12 UTC	REF075 B 440 MHz DVD	Europe, Spain, Spain
M7ESZ	01/21/22 17:49:12 UTC	REF033 D Unknown DVD	Dallas, TX, USA
K1DWZ	01/21/22 17:49:06 UTC	REF030 C 2 Meters DVD	Lawrenceville, GA, USA
KA6NZU	01/21/22 17:49:06 UTC	REF030 Dongle User DVD	Lawrenceville, GA, USA
KM6HRW D	01/21/22 17:49:06 UTC	REF001 Dongle User DVD	USA
W3DAK	01/21/22 17:49:06 UTC	REF062 Dongle User DVD	Hunt Valley, MD, USA
KB4BKZ	01/21/22 17:49:03 UTC	KJ4YNR B 440 MHz	Dublin, GA, USA
N9GZK	01/21/22 17:49:01 UTC	WB4HRO D Unknown DVD	Doraville (Atlanta), GA, USA
W9LOL D	01/21/22 17:49:01 UTC	REF019 Dongle User DVD	WI, USA
EA7IYR	01/21/22 17:49:01 UTC	REF075 B 440 MHz DVD	Europe, Spain, Spain
W1WMM D	01/21/22 17:48:56 UTC	REF050 Dongle User DVD	Boston, MA, USA
F6HCX	01/21/22 17:48:56 UTC	REF084 B 440 MHz DVD	Unknown
M3HZW D	01/21/22 17:48:56 UTC	REF001 Dongle User DVD	USA
VE9LRS D	01/21/22 17:48:51 UTC	REF030 Dongle User DVD	Lawrenceville, GA, USA
LA4BSA	01/21/22 17:48:51 UTC	REF032 A 1.2GHz DVD	Radom, Poland
KC9UDA	01/21/22 17:48:46 UTC	REF030 Dongle User DVD	Lawrenceville, GA, USA
WD8BQS	01/21/22 17:48:41 UTC	REF030 C 2 Meters DVD	Lawrenceville, GA, USA

Reflector Module

DPLUS Dashboard | Reflector Status and Control

Registration

REF050 Reflector System

DREFD version 1.43

Linked Gateways

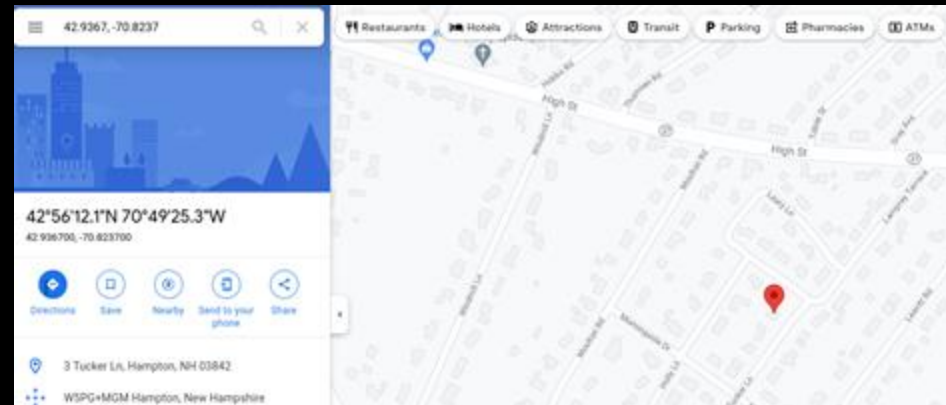
Module A	Module B	Module C	Module D	Module E
		K1HRO B		
		K1MRA C		
		W1DSR B		
		W1MRA B		

Remote Users

Callsign	User Message	Last TX on	Type
W1BZJ		listening	HotSpot
K1DTM		listening	HotSpot
KC1LEP D		listening	HotSpot
K1BEP		listening	HotSpot
KA1VDZ		listening	HotSpot
N1PCE		listening	HotSpot
W1CH	W1CH / Louie	C	HotSpot
K1DDJ		listening	HotSpot

Reflector Module

Last Heard			
Callsign	User Message	Last TX on	Time
W1WMM	MASS	B	2022/01/21 12:41:20
W1BFT B	REF001 C BER: 0.0%	B	2022/01/21 12:30:22
KN4ZDM	Manuel / Minneola	B	2022/01/21 12:26:43
G3IOI		B	2022/01/21 12:25:30
F3UZ	Jacques / Toulouse	B	2022/01/21 12:22:55
N4OZI	qrz.com/db/N4OZI	B	2022/01/21 12:21:29
VE9TJR	Tom Supplying the Na	B	2022/01/21 12:07:14
N4SVD	ICOM ID-5100A Deluxe	B	2022/01/21 12:06:52
KL3JH		B	2022/01/21 12:04:55
KE8PDO	Tim/Fowlerville, MI	B	2022/01/21 12:04:00
N9JZT		B	2022/01/21 12:03:43
W1BFT	Kevin, Wilmington,MA	B	2022/01/21 11:28:29
W1TG	Tom-Hampton, NH	C	2022/01/21 11:26:43
N1MPR	ED N1MPR FLORIDA	C	2022/01/21 11:25:53
W1CH	W1CH / Louie	C	2022/01/21 11:02:10



Orange Callsign indicates GPS location is available - Clicking on the callsign will open up a Google Map with the GPS position. GPS position back feeds over to the APRS-IS system.

- Repeater Building Checklist:

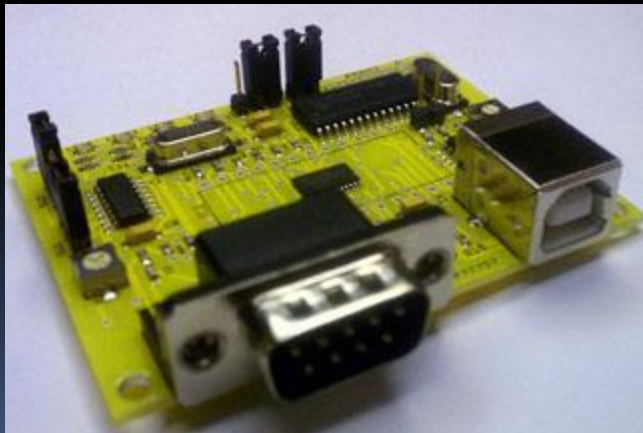
- Repeater that can accept 9600 Baud data



- ❑ GSMK Node Adapter to give the analog radio digital quality



DV-RPTR Board (from <http://www.dvrptr.net>)



Moencomm Star*Board
(NOT RECOMMENDED)



Satoshi GSMK Node Adapter

❑ Computer device to host software and control data from GSMK board



Raspberry Pi Linux Computer



ODROID-C1 Linux Quad Core Computer



Laptop Computer




❑ Software Image for D-STAR

KI4LKF offers a very stable image

G4KLX offers software that is widely used, has glitches, but is popular

VA3UV offers D-STAR software that is widely used on ALLSTAR systems

WinDV is a popular program from Windows users



- ❑ Software Options

Dude-Star is a software decoder that allows multiple Digital Voice (DV) formats, including D-Star

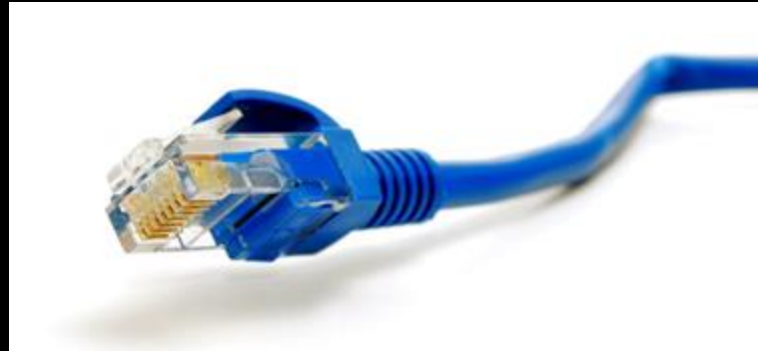
An AMBE hardware vocoder can be used to improve quality

<https://github.com/andrewpalumbo/dudestar>

Droid-Star operates similarly, but for the Android platform

<https://kapihan.net/connect/droidstar>

□ Means of connectivity



Internet connection is a popular method of linking with obvious downfalls

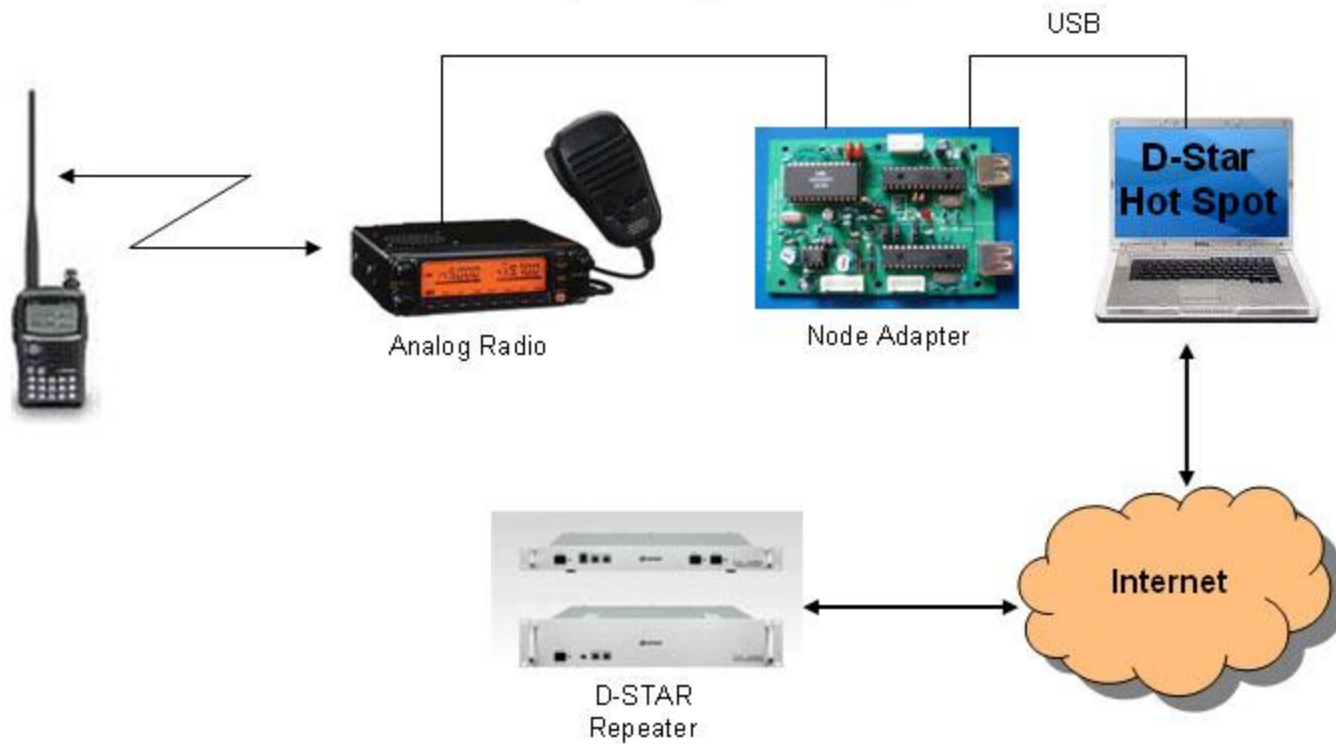


Microwave linking is the preferred method of linking D-STAR repeaters

HOTSPOTS

- Hotspots are simplex radios with a GMSK node adapter connected to the internet. This is a means of connecting you into the D-STAR network on a very localized level.
- Radios that have a TNC/g600 baud data jack are popular radios to use as hotspots. One must be mindful of the duty cycle rating. You can use the Kenwood D710A, Yaesu FT-8900, etc. Some clubs modify Motorola GM300 radios to use for hotspots.
- Hotspots DO NOT have to be coordinated since they operate on Simplex.

D-STAR Hot Spot - System Diagram

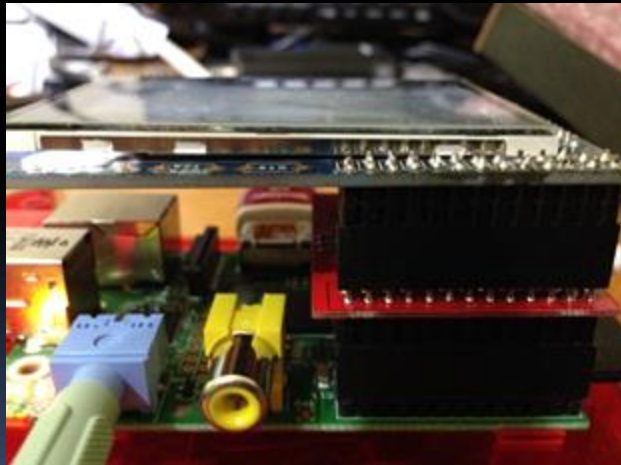


DVAPs

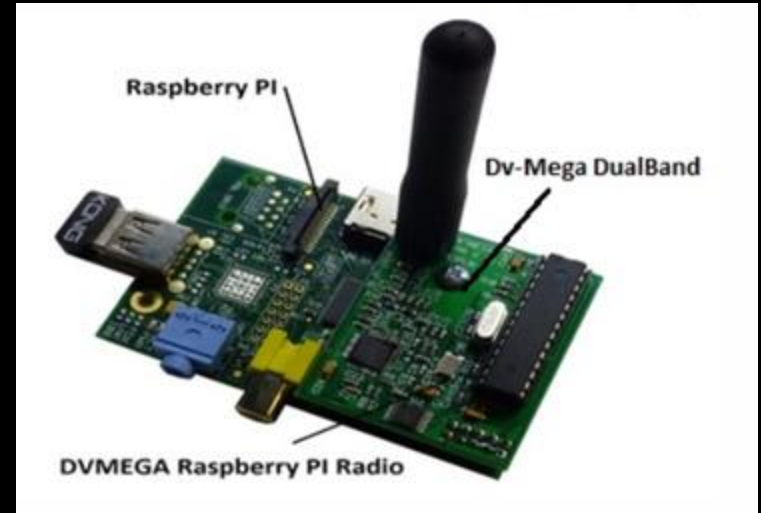
- A DVAP is a Digital Voice Access Point
- DVAPs are extremely localized, they have a maximum power output of 10 mW.
- DVAPs were originally introduced by Internet Labs as monoband. You can either buy the 2m version or 70cm version
- MEGA-DV has come out with a dual band DVAP.
- NWDIGITALRADIO offers a vocoder board for the raspberry pi and ODROID Linux computers.



Internet Labs DVAP



DV3000 add-on board
Stacked on a Raz Pi



DV-MEGA Dual Band DVAP

DV DONGLE

- Some people simply just use a DV Dongle adapter that plugs into the computer. The user would then use a headset connected to their computer linked to the internet.



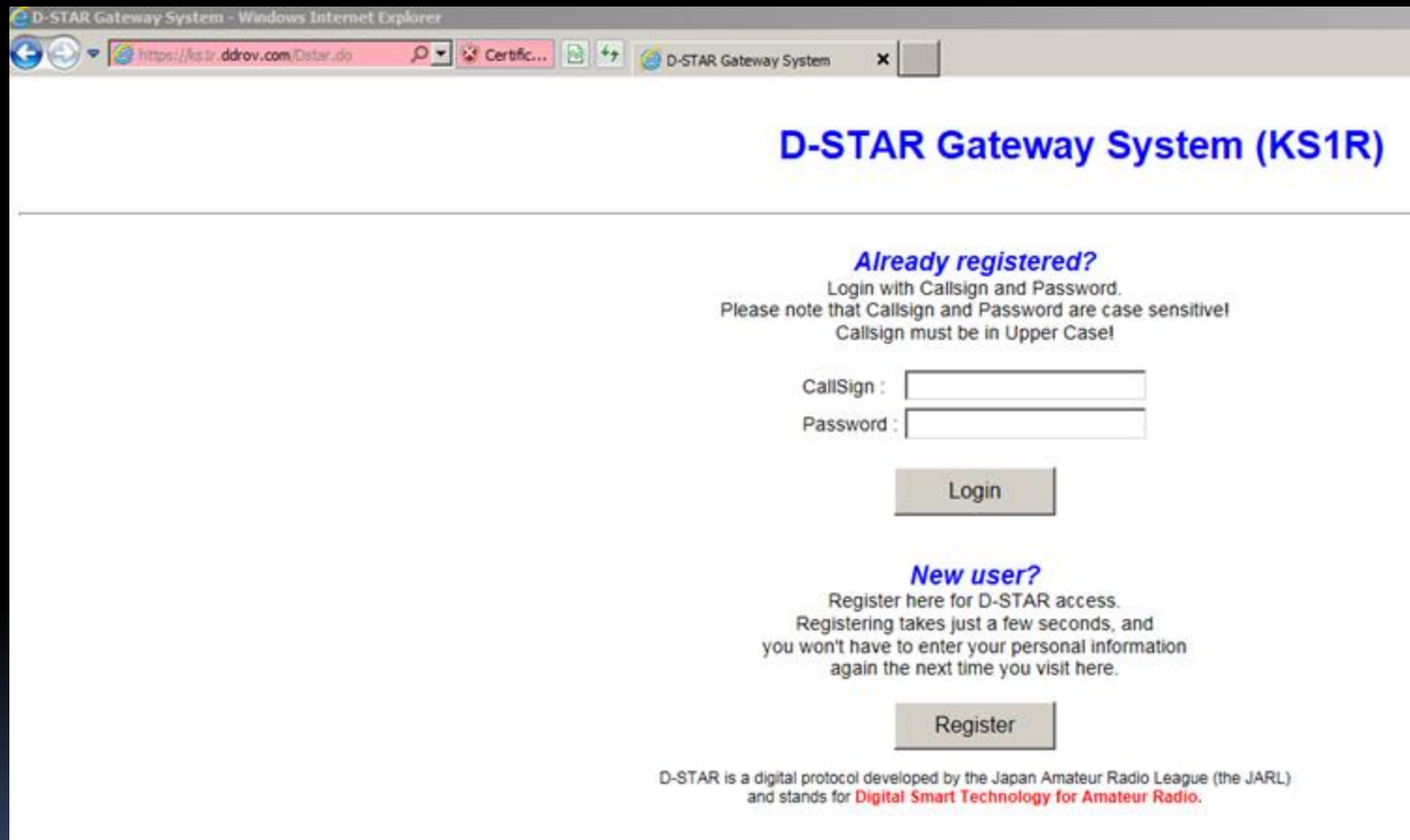


NW Digital Radio offers a USB version of the AMBE vocoder

I Have A Device.. What Next??

- In order to fully use what D-STAR has to offer you must register your call sign in the US Trust Server.
- Once your call is approved by an administrator, you must log back in and finish the registration process.
- It will take about 45 minutes for your registration to propagate through the system.

REGISTRATION



<https://regist.dstargateway.org/>
(Different Image, but same exact process)

D-STAR Gateway System (KS1R)

The agreement document

If you want to change agreement document, please change following file.
/opt/products/dstar/tomcat/webapps/D-STAR/WEB-INF/messages/agreement.txt

Do you agree?

YES: NO:

Enter your personal information!

CallSign : Equal to or less than 7 characters.

Name :

E-mail : Make sure you use a valid e-mail address.

Password : 8 to 16 characters.

Password confirm :

OK

Cancel

CLICK YES ON THE AGREE PORTION OF THE FORM.
ENTER YOU CALL SIGN, NAME, EMAIL ADDRESS AND PASSWORD
TWICE.
CLICK OK.

D-STAR Gateway System (KS1R)

Login : N1WJO

User Information

GW Information

Terminal Information

Personal Information

Please, edit after making a left check box on.

Name : Bob Gould
 E-mail : n1wjo@arrl.net
 Password :
 Password Confirm :

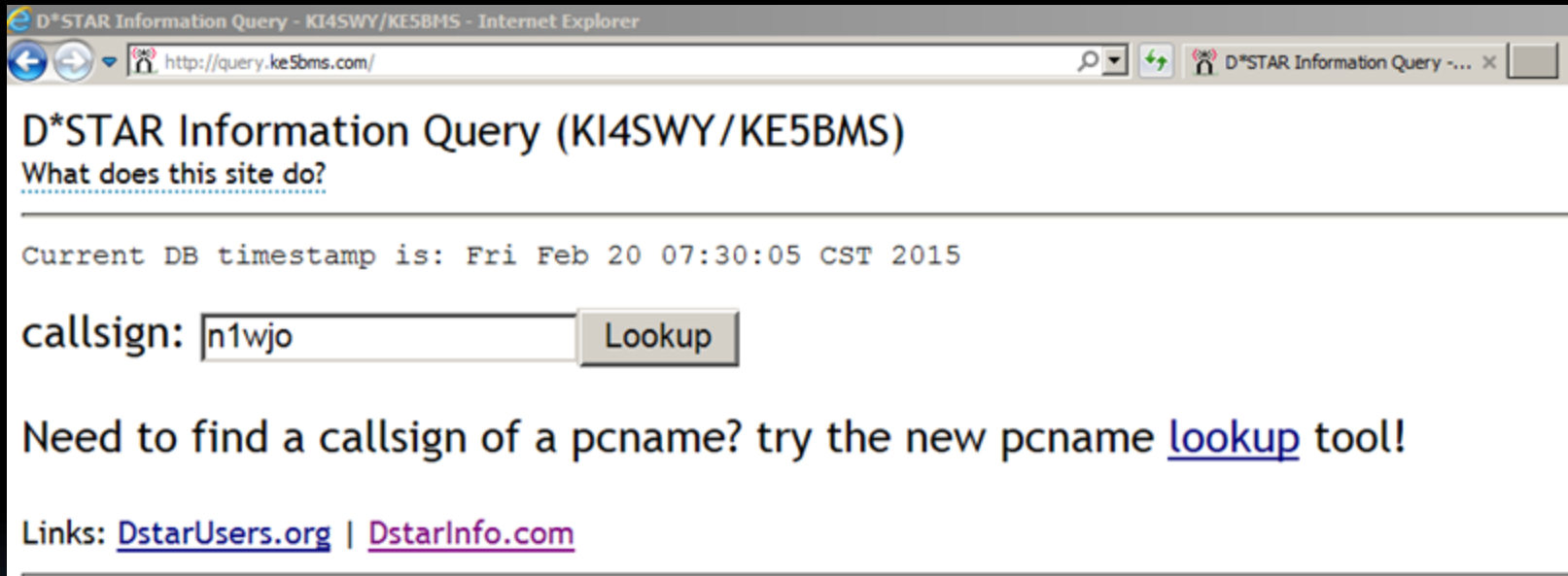
If the station has multiple radios, Target CS are distinguished by initial(last character) of a space or a capital english letter.
 Definition character as follows..... (G)is a gateway. (S)is a local server.
 Usually RPT(Repeater) isn't checked, initial AreaRPT CS is the port A of ZonerPT CS.
 If RPT is checked, AreaRPT CS is the same as Target CS.

	Initial	RPT	local IP	pcname	Del
<input type="checkbox"/> 1:	N1WJO	<input type="checkbox"/>	10.129.146.232	n1wjo	<input type="checkbox"/>
<input type="checkbox"/> 2:	N1WJO	<input type="checkbox"/>	10.129.146.233		
<input type="checkbox"/> 3:	N1WJO	<input type="checkbox"/>	10.129.146.234		
<input type="checkbox"/> 4:	N1WJO	<input type="checkbox"/>	10.129.146.235		
<input type="checkbox"/> 5:	N1WJO	<input type="checkbox"/>	10.129.146.236		
<input type="checkbox"/> 6:	N1WJO	<input type="checkbox"/>	10.129.146.237		
<input type="checkbox"/> 7:	N1WJO	<input type="checkbox"/>	10.129.146.238		
<input type="checkbox"/> 8:	N1WJO	<input type="checkbox"/>	10.129.146.239		

Check item and change a set value.
 Click the Update button.

CLICK ON THE **PERSONAL INFORMATION** TAB
 NEXT TO **NUMBER 1**, CLICK THE CHECK BOX.
 UNDER **INITIAL**, HIT THE SPACE BAR ONCE.
 UNDER **PC NAME** ENTER YOUR CALL SIGN IN ALL LOWER CASE.
 CLICK **UPDATE**
 WAIT FOR THE SYSTEM TO PROCESS YOUR CALL SIGN (Best to leave overnight)

CHECK TO MAKE SURE YOU ARE REGISTERED



Go to <http://query.ke5bms.com> or Google "D-STAR Query" and enter your call sign

D*STAR Information Query - KI4SWY/KE5BMS - Internet Explorer
 http://query.ke5bms.com/index.php

D*STAR Information Query (KI4SWY/KE5BMS)

What does this site do?

Current DB timestamp is: Fri Feb 20 07:30:05 CST 2015

The callsign you have entered is: **N1WJO**

Operator Information - (via callook.info)					
Status	Class	Expires	ULS	Name	Location
VALID	GENERAL	01/12/2016	Link	ROBERT L GOULD	CASCO, ME 04015

Registered Repeaters				
Repeater	Terminal Count	Registration Page	DstarUsers Page	DstarInfo Page
KS1R *	1		Link	Link

* = Possible Home Gateway
 (Where you would edit the below terminal information)

Terminals Information			
Terminal CS	Last RF RX	pcname	timestamp {utc}
N1WJO	KS1R	n1wjo	2015-01-12 13:46:35

If your registration did not process, **Terminal Count** will read as 0. You can register multiple terminals under personal preferences, each must have a unique pcname (say if you have multiple hotspots).

ROUTING

- Start by programming your radio just as you would an analog radio: Enter the frequency, shift and offset. D-STAR does not use PL tones.
- The biggest difference with D-STAR is programming the routing parameters.
- There are **FOUR** fields that must be programmed for D-STAR
- **UR** (Destination), **RPT₁**, **RPT₂** and **MY**.
- Routing Fields have 8 place marks.

UR FIELD

- Think of this field as your **command line** field
- By default, leave this field as **CQCQCQ**
- If the repeater is linked and you want to unlink it then you must enter the unlink command which is the letter U in the 8th position.

— — — — — U

- To link to a reflector you enter the Reflector Type (REF, XRF or DCS), 3 digit number (050) and module to link (A, B, C, D, E, etc.) and then L for Linking
- To link to D-Plus Reflector 50C (New England reflector) then in the UR field enter:

R E F 0 5 0 C L

- To link to the Florida Reflector on the DCS system you would enter into the UR field:

D C S 0 2 4 C L

- To link to one of the Canadian reflectors in the XRF system then you would enter in UR field

X R F 0 0 5 B L

- If you want to link directly to a repeater, this can also be done from the UR field.
- If you want to link to the KS1R Port B repeater in Brunswick, Maine you would enter the call sign of the repeater and with the Module in the 7th place and L in the 8th place.

K S 1 R _ _ B L

The longest call you can enter is a 2x3 call so that would occupy 6 places. If a call is shorter than 6 digits, you still need to keep its place with a space. KS1R is only 4 digits so you need to put 2 spaces after the call sign.

- Call sign Routing can be done through the UR field.
- If N₁URA wants to chat with W₁SK but does not know where he is, then he can use call sign routing to chat.
- N₁URA would program the destination call sign into the UR field: W₁SK
- When N₁URA talks, his transmission will dump onto whatever system W₁SK was last heard on.
- If W₁SK has CQCQCQ programmed into his UR field and answers N₁URA, then N₁URA will NOT hear him respond.
- W₁SK needs to put N₁URA into his UR field to be able to talk back with N₁WJO.

- Good etiquette is required for effective call sign routing.
- If N₁WJO were to call W₁IF via call sign routing, he should signal to him that he is doing so. The transmission should sound something like:

"W₁IF, N₁WJO VIA CALL SIGN ROUTING"

- This will give W₁IF a heads up that he needs to put N₁WJO into his UR field to answer the station calling.
- Call sign routing excludes a lot of people who may be on the same system. Not a completely effective system.

- Echo Testing can be done with the UR field.
- E is entered into the 8th place.
- Echo Testing is useful when you want to hear how you sound through a link, but nobody is around to answer.
- If you are on Reflector 50C and wanted to conduct an Echo Test, you would enter 50E

_ _ _ _ _ 5 0 E

- If you are on the W1NPP repeater and wanted to do a local Echo Test you would enter:

W 1 N P P _ _ E

DTMF Tones vs. Command Line

- Operators can change Reflector on HOTSPOTS using DTMF tones instead of changing the UR/Command Line field
- DOES NOT WORK ON REPEATERS (unless repeater is using a hotspot)
- To Change to Reflector 50 Charlie, use DTMF tones *50C
- XRF Reflectors use B ($B_{12A} = XRF_{012A}$)
- DCS Reflectors use D ($D_{26B} = DCS_{026B}$)

RPT1 FIELD

- RPT₁ is how you go into the system.
- If you are using the W₁NPP UHF Repeater on 443.300 MHz (+ 5 MHz offset), this is Port B, RPT₁ would be as follows:

W 1 N P P _ _ B

- 8 Placement fields still apply.
- Enter the Repeater Call Sign and use spaces until you reach the 8th placement field then enter the Band Module.
- RPT₁ is NOT used in Simplex operation

RPT2 FIELD

- RPT₂ is how you come out of the system.
- By default you should have the (internet) Gateway turned on.
- If you are using the same Auburn 443.300 Repeater, your RPT₂ field should be:

W 1 N P P _ _ G

- If you wanted to strictly have a local conversation on the repeater then enter:

W 1 N P P _ _ B

Just remember that you will hear anyone coming through the link, but will not be able to talk with them until you enable the Gateway setting on your radio.

- Some radios may have a GW setting for easier programming

MY FIELD

- MY is the field to program the user's personal call sign and name.
- The name field only has 4 place fields so if your name is longer than 4 letters, people typically put their radio model (880H, ID31, ID51, etc.).
- You can store multiple call signs in a radio so that it is easier to switch between different users.

GPS DATA

- 3600 bits per second are used for the digital voice stream leaving 1200 bits per second for GPS and other data.
- GPS data interfaces with the APRS-IS server.
- Older D-Star radios require an external GPS mic, some of the newer radios (like the ID-31 and ID-51) have an internal GPS.

TEXT DISPLAY

- The radio manuals refer to text messaging, however, I find the way that it is applied is a misnomer, I prefer to call it text display.
- Users can program in a short message that displays across the screen. You could have OXFORD ARES as a message that will display after your Call Sign and Name info.



TEXT MESSAGING

- Text Messaging can be done through the ID-5100 radio or other radios with other radios that use the data cable with D-RATS software.
- If you are a great multi-tasker you can send a text message while you are talking... the voice data and text data are separate streams.

QSO LOGGING

- Some radios include a Micro SD port on the radio.
- In the Menu, you can turn on the QSO Logging Function which will record the audio in MP3 format.
- Each transmission is a separate file.
- QSO Logging can provide a great means of critiquing After Action Reviews.
- Transmissions could also serve as a good means of documentation or evidence in certain situations.

CCS ROUTING

- There is another way to connect to a user if you do not know their location without using the call sign routing method.
- CCS numbers are a 4-digit ID which are free to obtain.
- You can pay for a vanity CCS number if you wish, the cost is 10 Euro.
- CCS numbers are not used in the UR field.
- To use a CCS number, you key it in with the DTMF keypad.

CCS DTMF LIST

DCS / CCS System - Windows Internet Explorer

http://dcs.xreflector.net/dtmf.php?s=dtmf

DSStar 101

x-reflector ccs - Ask.com Search


DCS / CCS System

CCS | DTMF Modul

CCS Admin System by HB9SDB

V 2.0

Callsign Search:



ECHOL [0000]	N1PA [1000]	HB9EZO [1001]	KC3BLF [1002]	KD0ZP [1005]	DL1SFA [1006]	W5ELM [1007]	DL1DBL [1008]	IK8TGH [1010]	SP8XXE [1011]	PU7TCA [1012]
WA8TZD [1013]	DL3GE [1014]	9Y4T [1015]	EA7IWX [1016]	DG3PT [1018]	M1SKI [1021]	M6DUO [1022]	LZ4DZ [1024]	MOVBD [1026]	EA7AHG [1028]	EA7OC [1029]
N1DOT [1030]	N3MAW [1031]	CT1FOP [1032]	G0WPB [1033]	PD5HJ [1034]	HB9MFY [1035]	DL1NAT [1036]	DK7JP [1037]	PE1FB [1038]	N1FZH [1039]	W4WWM [1040]
LA8UU [1041]	G4VRX [1042]	LA9NT [1044]	OE1PHS [1045]	OZ2JJ [1046]	OZ8UHF [1049]	KB2TR [1050]	DO2GSP [1051]	NU5D [1053]	F4DEI [1054]	DF4FV [1055]
DK3RC [1056]	W4IED [1057]	PD3ADN [1058]	SP6TPY [1059]	KI4KF [1060]	DG4UAK [1061]	IZ8QIG [1063]	VE3EFF [1064]	HA7PTY [1065]	F1ORJ [1066]	PD0LEX [1069]
DG3MKB [1070]	CT5KJE [1071]	SM6FRZ [1072]	DG1FFC [1073]	OE9PKV [1074]	DB6NM [1075]	DG0FIH [1076]	DO1HM [1078]	PE1NMM [1079]	N8JUC [1081]	HB9DTK [1082]
M0PYU [1084]	DF9CA [1086]	DL4DP [1087]	PD2EVT [1088]	PD0PIW [1089]	OH1SIC [1090]	DO9AJH [1092]	IZ0XBM [1093]	F1UBF [1095]	DO9HJ [1096]	IU0CX5 [1099]
F1GQM [1100]	OZ4DAN [1101]	W6SAT [1102]	KD2BDU [1103]	DL2ZEA [1104]	CT7ABO [1105]	N2PPN [1106]	2W0OGY [1107]	OK2MO [1108]	DF1EE [1109]	SA7AXT [1110]
DG1HT [1111]	M6XUP [1112]	DG1BGS [1113]	PU7RAO [1114]	M0JMM [1115]	DL7XM [1116]	PD0KOK [1118]	DO6BF [1119]	DG5MS [1120]	SQ3XZ [1121]	HB9DSE [1122]
IZ1DRY [1123]	DL5UR [1124]	MM0RKN [1125]	DL2LW [1127]	W4KLS [1128]	DK4TN [1129]	GI4MHD [1130]	VK5LY [1131]	PD2DM [1132]	SM7NUM [1133]	HS7WGQ [1134]
CT2HDQ [1136]	PA3PM [1137]	SM0RUX [1139]	PD8R [1140]	IT9KGH [1141]	DF8AY [1142]	DO8UK [1143]	K1PDY [1144]	DL2SDG [1145]	M0MID [1146]	DJ8PY [1147]
LA9JSA [1149]	DD1LS [1150]	2E0PSV [1151]	SM3LWP [1152]	AD4UU [1153]	OE5VCO [1154]	PP6PP [1155]	OZ3DST [1156]	OE7MMT [1157]	KI4IKM [1159]	DH6FAA [1161]
PD0GIP [1162]	S56LLB [1165]	WB5EKU [1166]	SQ5PTN [1167]	DL2AWT [1169]	CT1DTE [1171]	M0TTL [1173]	DC7GS [1174]	DO7RZ [1176]	N1RXE [1177]	PD0JX [1178]
OE7BJT [1179]	JJ0NNU [1180]	DG0OVP [1181]	DG9AW [1184]	DL2JL [1185]	SM5RVH [1186]	DL1DE [1188]	DG3PO [1189]	KM4BPI [1190]	OE1JTB [1191]	DB9HE [1192]
DC1TJH [1193]	WB1EZK [1194]	E20QVD [1195]	OE9FWY [1196]	7S7K [1197]	DG0CAW [1198]	PU7OJE [1199]	DB8TA [1200]	SQ7AYJ [1201]	M6EHF [1202]	PD0JB [1203]
KD4NFS [1204]	DG3KCE [1206]	NN1D [1207]	DO8GT [1209]	SM4POF [1210]	DG4BBR [1213]	KB3IIE [1214]	LZ3SP [1215]	G0UKP [1216]	AG6HG [1217]	DF3EC [1218]
W4LOV [1219]	IW0GWT [1221]	EA1DBB [1222]	DL9BBH [1223]	VA3UV [1225]	PY4LH [1226]	M3UYF [1227]	HS7XRH [1228]	EA6AMB [1229]	DK8ZV [1230]	SR6UVY [1233]
DG3FW [1234]	DF8TX [1235]	KK4OPJ [1236]	OE8WLK [1237]	KC3AAD [1239]	DL2MDC [1240]	PA3BAT [1241]	HB9KNN [1243]	DB0GSN [1245]	SQ6RMA [1246]	SP9AXN [1247]
DM6HB [1248]	M0VNK [1249]	DM3FB [1250]	K4QHR [1251]	EA8EE [1252]	DL1WM [1253]	DK3EM [1254]	ON4PN [1255]	DM1HE [1256]	EA1GIZ [1257]	OZ5LKJ [1259]
DL7VTS [1260]	IZ3ALU [1262]	DO0DEL [1263]	HB9FPF [1264]	EA1EZ [1266]	OZ2REC [1267]	SA5YLX [1268]	KB3KSB [1269]	DL1HRC [1270]	M16WOF [1271]	DL0NOT [1272]
DO8PT [1273]	DL3FCG [1274]	SP7QHR [1275]	KA9KDB [1276]	OE9PGV [1277]	G1HIG [1278]	HB9ERV [1280]	OE7AHJ [1281]	WB3EHB [1283]	PU7RKA [1284]	DK3WS [1285]
SM3JLU [1286]	DG3SMA [1287]	G7UFI [1288]	CT2JYO [1289]	KE6YJC [1290]	ND1L [1291]	DO1ZZ [1292]	SP3UUI [1293]	DM1HD [1294]	EA5GTX [1295]	SO3JAB [1296]
DC1CC [1297]	DO7EN [1299]	DK0ND [1301]	OZ1WC [1303]	LA5II [1304]	SA3BGC [1306]	PU2HIU [1307]	DJ9CN [1308]	GB1RR [1309]	SP1SHE [1311]	DL8MMA [1312]
M0TTF [1313]	SQ5KVZ [1314]	EA1CI [1317]	ON3TGV [1318]	2E0DMB [1319]	SP5XHC [1320]	I5NQG [1321]	G1BJY [1322]	W4DSL [1323]	E20TVU [1324]	VK4BQ [1325]
EB1HYS [1326]	IU1AWL [1327]	DC8KZ [1328]	K6UDM [1330]	DO3DSG [1331]	SV1GCK [1332]	OE3FPA [1333]	I5PVX [1335]	DL1FBK [1336]	M0WFK [1337]	DO1KDK [1338]
VK2KDX [1339]	DO5OC [1341]	K3IRA [1342]	CT5KEE [1344]	YO2LOJ [1345]	DO8DW [1346]	OK1IKO [1347]	VA2YRC [1348]	VE3JA [1349]	HL5KY [1350]	DO6FA [1351]
SM6VTT [1352]	W5LND [1353]	PA7D [1354]	OZ9ED [1356]	EA3ES [1357]	DG1GLG [1360]	DL0RT [1361]	DL0LEO [1362]	GM1TCN [1364]	KE5UYM [1365]	SM7AWE [1366]

Registering for a CCS Number



The screenshot shows a Windows Internet Explorer browser window. The address bar contains the URL <http://dcs.xreflector.net/>. The page title is "DCS System - Windows Internet Explorer". The browser's search bar contains "DStar101". There are two search engines listed: "x-reflector ccs - Ask.com Search" and "DCS System". The main content area has a dark blue background with a yellow horizontal bar. The text "x - NET DCS / CCS System" is displayed in yellow. Below the bar, the text "DCS / CCS System by HB9SDB / DG1HT" is shown in yellow. The main content area is dark blue and contains the following text in orange:

- User Register (for DTMF Call Sign Routing / CCS)
- Repeater Register (for DTMF Call Sign Routing / CCS)
- DTMF-Code change
- DTMF List

Gold Nummern:
Wir haben eine begrenzte Anzahl Gold Nummern, (4 gleiche Ziffern)
Diese versteigern wir an den höchstbietenden. Angebote an: dtmf@dstar.ch


[HTTP://DCS.XREFLECTOR.NET/](http://dcs.xreflector.net/)

Personal Call Sign-Up

software - Windows Internet Explorer
http://dcs.xreflector.net/userreg.html

x-NET Registrations Board | Registrations will only be approved for DCS / CCS System

DCS System by HB9SDB / DG1HT

 [German Version](#)

[List of ALL DTMF Codes](#)

The agreement document

I agree to abide by all rules and regulations of The DCS / CCS System. I understand that should I not comply, I may be removed from the DCS network without warning.

Do you agree?

YES: NO:

Enter your personal information!

CallSign	<input type="text"/>	Equal to or less than 7 characters.
Name	<input type="text"/>	
E-mail	<input type="text"/>	Make sure you use a valid e-mail address.
Password	<input type="text"/>	8 to 16 characters.
Password confirm	<input type="text"/>	
Repeater Sysop	YES: <input type="radio"/> NO: <input checked="" type="radio"/>	
Repeater Call	<input type="text"/>	Equal to or less than 7 characters.
Repeater Module	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> E <input type="checkbox"/>	A = 23cm / B = 70cm / C = 2 M / E = 10 M

OK Cancel

Repeater Call Sign-Up

software - Windows Internet Explorer

http://dcs.xreflector.net/repeaterreg.html

DStar101 x-reflector ccs - Ask.com Search software

x-NET Registrations Board

Registrations will only be approved for DCS / CCS System

DCS System by HB9SDB / DG1HT

The agreement document

I agree to abide by all rules and regulations of The DCS / CCS System. I understand that should I not comply, I may be removed from the DCS network without warning.

Do you agree?

YES: NO:

Enter your Repeater information!

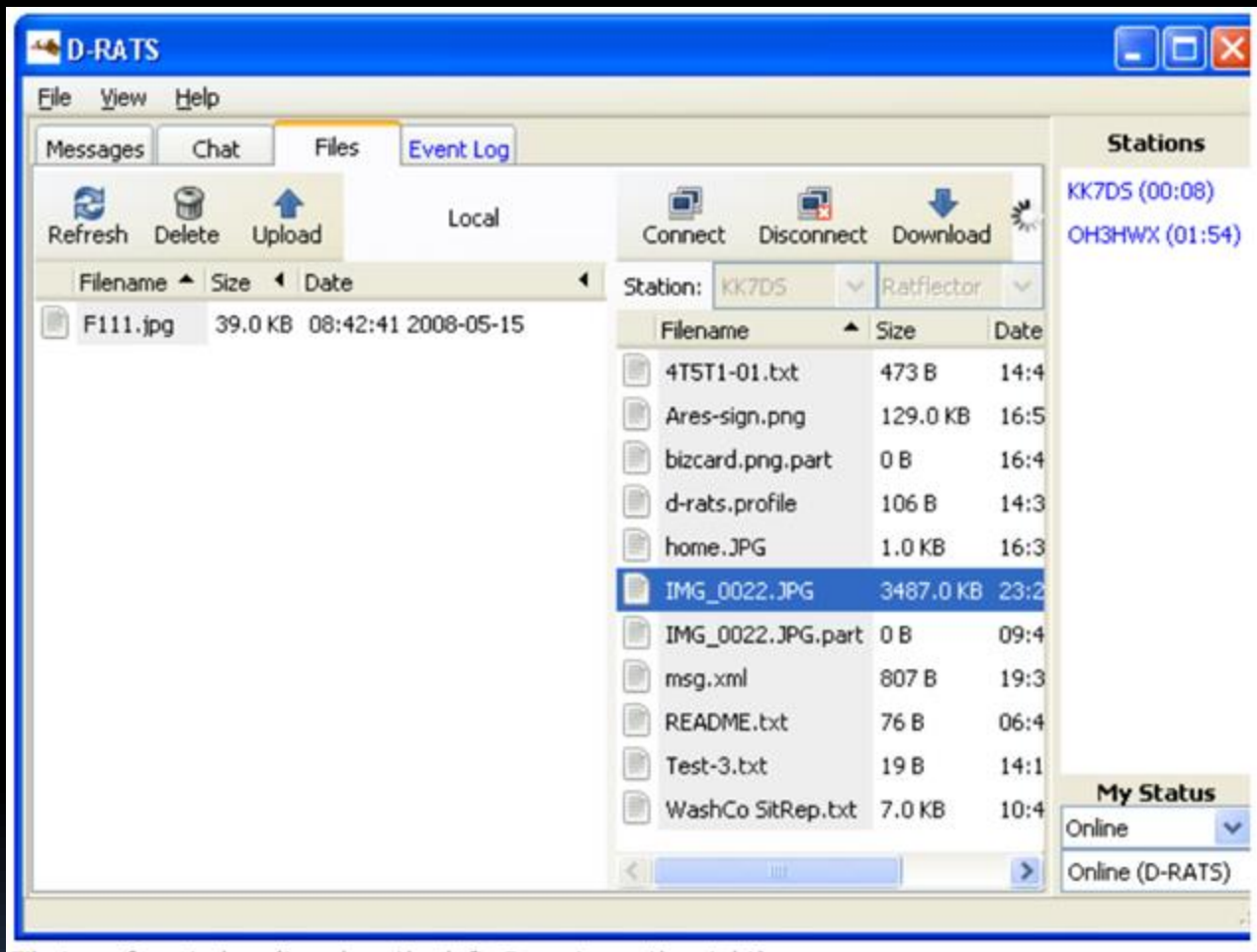
Repeater-CallSign	<input type="text"/>	Equal to or less than 7 characters.
E-mail	<input type="text"/>	Make sure you use a valid e-mail address.
Password	<input type="text"/>	8 to 16 characters.
Password confirm	<input type="text"/>	

OK Cancel

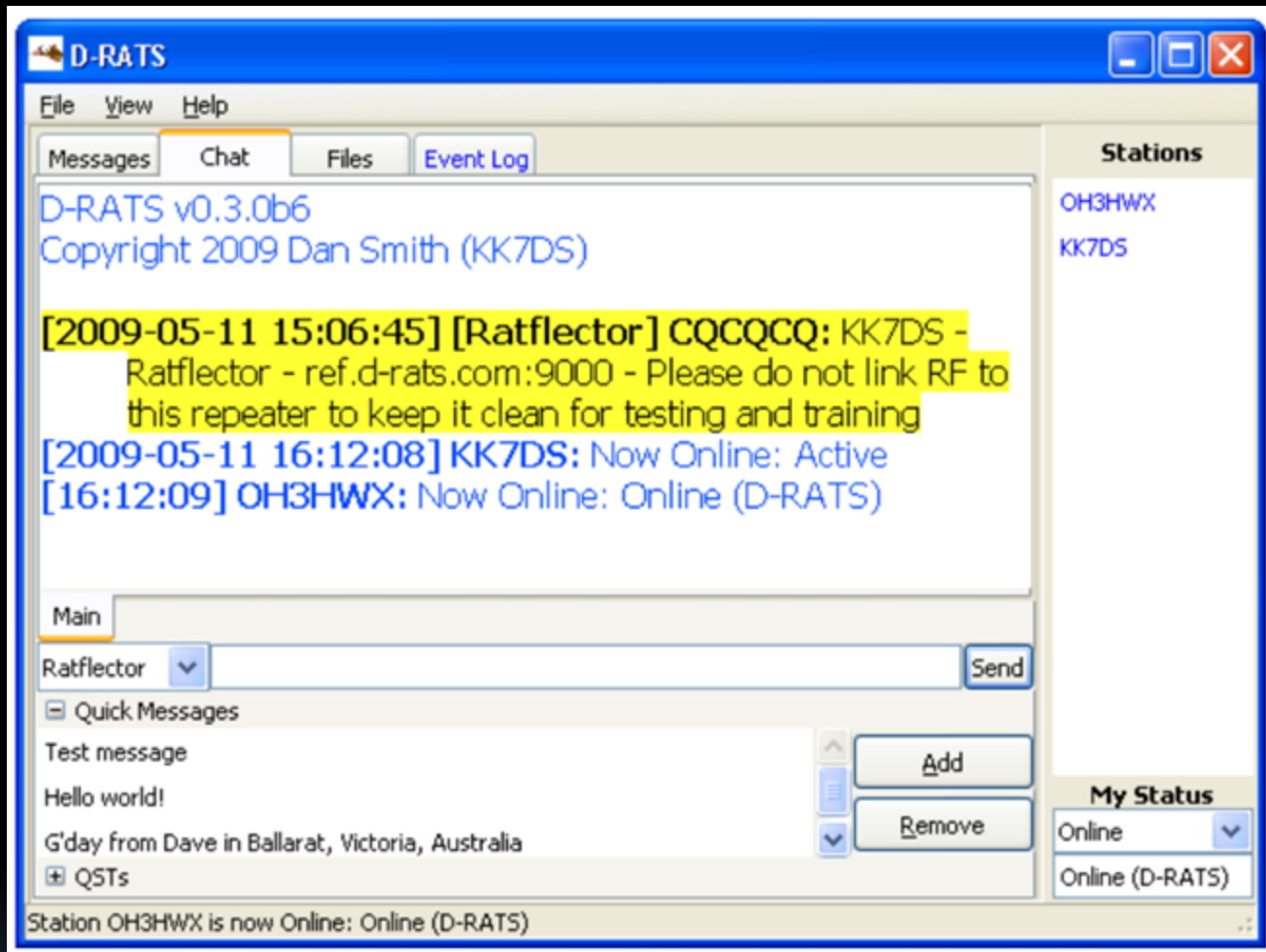
D-RATS



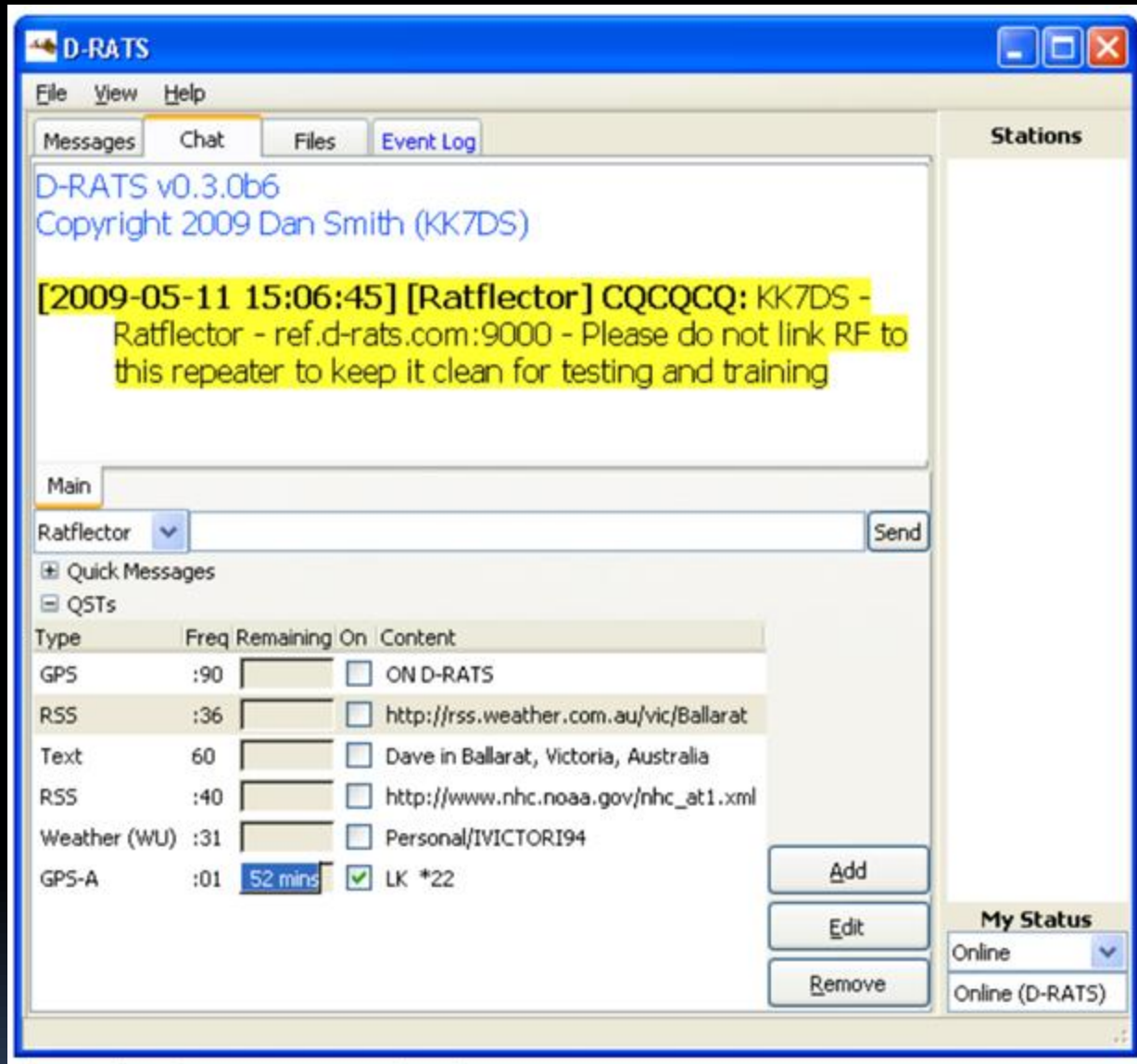
- D-RATS is free software that can be used via internet or over RF.
- RATS is simply STAR spelled backwards.
- Instead of a reflector, you can set up what is called a RATFLECTOR.
- Ratfelctors are RF links dedicated to passing D-RATS data.
- You can configure POP email, Winlink messages, Chat, send private messages or create private rooms within D-RATS.



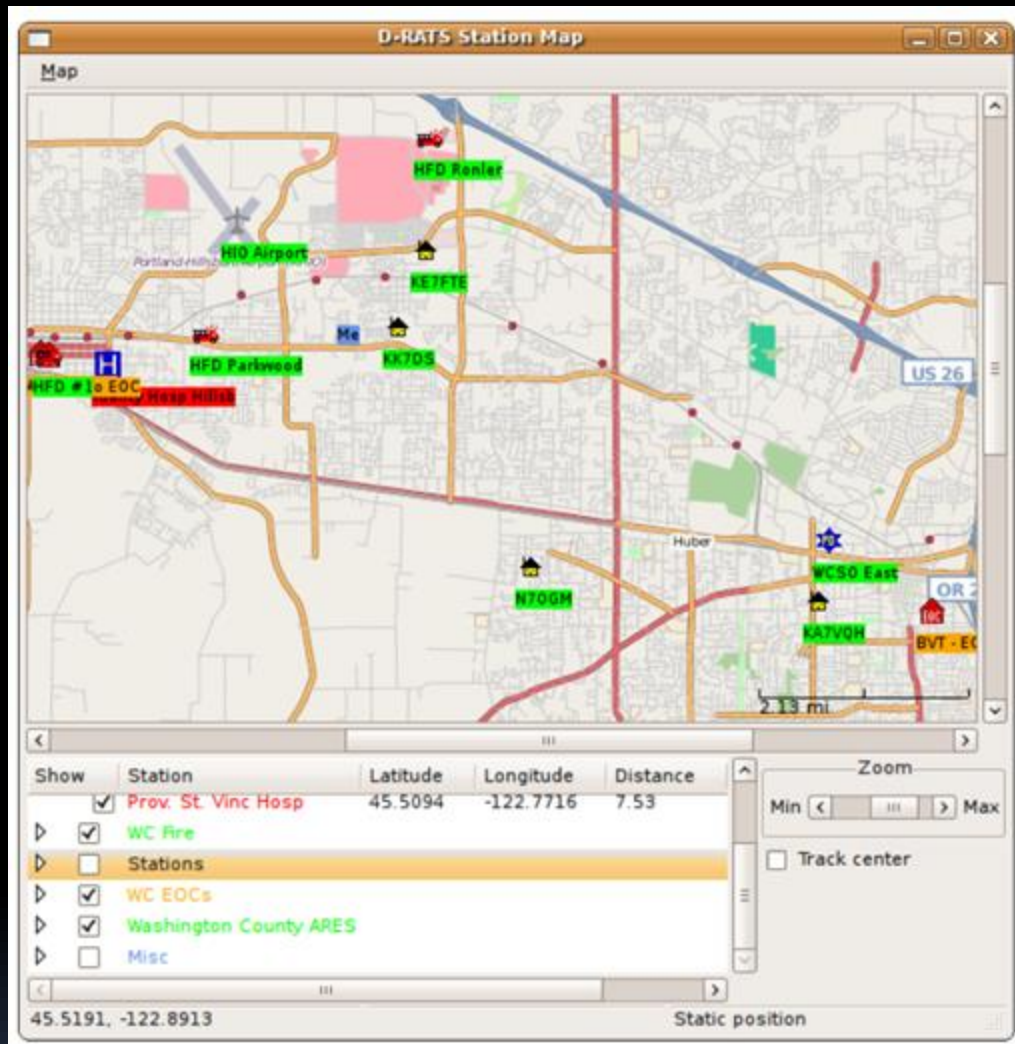
You can connect to remote computers and transfer files



You can chat with other hams in the main chat screen



You can set QST Announcement/Beacon messages at set intervals



D-RATS offers a station map. You can connect a GPS or manually enter coordinates.

DASHBOARDS

Think of a dashboard as a one-stop resource that displays pertinent information





Various Types of Dashboards

- There are dashboards for main reflector systems to see the bigger picture, Individual reflectors or specific repeaters.

[Home](#)

[Last Heard](#)

[JFindU D-Star Maps](#)

[Repeater Directory](#)

[D-Star Solutions](#)

[Watch D-Star Grow](#)

[Forums](#)

[Updated Site](#)

[Joining The Network
\(Now Automated\)
\(Updated 01/20/2013\)](#)

[Japan D-Star Repeaters](#)

[iPhone App](#)

[ARVN Programing
D-Star Radios Pt 1
\(ID-2820\)](#)

[ARVN Programing
D-Star Radios Pt 2
\(IC91/92 ID-800\)](#)

[Nifty E-Z Guide to
D-STAR Operation
The first published book
on D-Star!](#)



Callsign	Time Heard	Reporting Node	333 Unique callsigns heard in the last hour
M0AUG	02/20/15 16:37:19 UTC	REF001 Dongle User DVD	London, UK
N9NRA	02/20/15 16:37:19 UTC	REF001 Dongle User DVD	London, UK
KB4PNG	02/20/15 16:37:14 UTC	KK4VQG C 2 Meters DVD	Carryville, TN, USA
AJ4G	02/20/15 16:37:13 UTC	WA4YZY C 2 Meters	Middlesboro, Kentucky, USA
1NFO	02/20/15 16:37:09 UTC	GB7FK Dongle User DVD	Folkestone, Kent, UK
N1DOT	02/20/15 16:37:09 UTC	KB1VFA Dongle User DVD	Turner, ME, USA
VA2CPK	02/20/15 16:37:07 UTC	VE2RTO B 440 MHz	Mont-Orford, Quebec, Canada
2W0SKG	02/20/15 16:37:04 UTC	REF001 C 2 Meters DVD	London, UK
EA3URC	02/20/15 16:37:04 UTC	ED3YAK Dongle User DVD	BARCELONA, CATALUNYA, Spain
SV1EDZ	02/20/15 16:36:59 UTC	SW11 B 440 MHz	ATHENS, SZ1RSF REF045 C (Linked), Greece
VA3VAD	02/20/15 16:36:59 UTC	REF030 C 2 Meters DVD	Lawrenceville, Georgia, USA
2E0FBF	02/20/15 16:36:54 UTC	REF005 B 440 MHz DVD	London, UK
SV1EJJ	02/20/15 16:36:49 UTC	REF045 Dongle User DVD	Net-University, SZ1RSF REF045 (Server), Greece
G7LWT	02/20/15 16:36:46 UTC	GB7SF C 2 Meters	Sheffield, UK
UT2UU	02/20/15 16:36:39 UTC	REF030 Dongle User DVD	Lawrenceville, Georgia, USA
IV3FHS M	02/20/15 16:36:39 UTC	REF068 A 1.2GHz DVD	Milan, Lombardy, Italy
G0VAJ	02/20/15 16:36:39 UTC	REF001 C 2 Meters DVD	London, UK
G4WXN	02/20/15 16:36:34 UTC	REF002 C 2 Meters DVD	Nebraska, USA
KD5U	02/20/15 16:36:34 UTC	REF001 Dongle User DVD	London, UK
KD8DGH	02/20/15 16:36:31 UTC	W8RTL C 2 Meters	Dayton, Ohio, USA
SQ9IWS	02/20/15 16:36:29 UTC	REF032 A 1.2GHz DVD	Radom, Poland
K0STP	02/20/15 16:36:24 UTC	REF025 B 440 MHz DVD	Washington D.C., USA
HA5CD	02/20/15 16:36:19 UTC	REF030 C 2 Meters DVD	Lawrenceville, Georgia, USA
SP2JAR	02/20/15 16:36:09 UTC	REF032 C 2 Meters DVD	Radom, Poland
W4WWJ	02/20/15 16:36:04 UTC	REF007 B 440 MHz DVD	Gallarate, Varese, Italy
KB5PMY C	02/20/15 16:35:58 UTC	REF030 Dongle User DVD	Lawrenceville, Georgia, USA
HL5QQ	02/20/15 16:35:48 UTC	REF031 Dongle User DVD	Stockholm, Sweden
KE9PH	02/20/15 16:35:43 UTC	REF004 C 2 Meters DVD	USA
IK7YTQ	02/20/15 16:35:38 UTC	REF068 A 1.2GHz DVD	Milan, Lombardy, Italy
KA8C	02/20/15 16:35:38 UTC	REF001 Dongle User DVD	London, UK
KA6ELH	02/20/15 16:35:38 UTC	REF014 C 2 Meters DVD	Nevada, USA
NJ6N	02/20/15 16:35:26 UTC	K6SOA C 2 Meters	Laguna Beach, CA, USA
KE5KTU	02/20/15 16:35:08 UTC	REF010 C 2 Meters DVD	USA
VE2SE	02/20/15 16:35:07 UTC	VA2REX B 440 MHz	Covey Hill, Quebec, Canada

[Http://www.dstarusers.org](http://www.dstarusers.org) has the last heard list for the D-PLUS system

DPLUS Dashboard | Reflector Status and Control

Registration

REF050 Reflector System

DREFD version 1.29

Linked Gateways

Module A	Module B	Module C	Module D	Module E
		K1HRO B		
		K1MRA C		
		KB1ZEG C		
		W1DSR B		
		W1EMA C		
		W1MRA B		
		WB1GOF B		

Dashboard for Reflector 50 on the D-PLUS System.

Linked Gateways are Official ICOM repeaters linked to certain modules. Notice all of the repeaters in this instance are linked to Module C. This means that K1HRO B, K1MRA C, etc. are all linked to REF050C.

If a repeater was linked to Module A then it would be on REF050A.

Remote Users

Callsign	User Message	Last TX on	Type
W1BZJ	Mike in Naples FL	C	HotSpot
NN1D	Mike in Naples FL	C	HotSpot
W1NPP		listening	HotSpot
KB1WUW		listening	HotSpot
W1JT		listening	HotSpot
KB1WUW		C	HotSpot
K1HBR C		C	HotSpot
K3XT		listening	DV AP
W1JGR		listening	DV AP
N8QLT	Ev Windham,Ct.	listening	DV AP
N1MPR	ED MONIZ N1MPR FLA.	C	HotSpot
W1IF	Bob, N. Hampton, NH	C	DV AP
VY2DSR G	John Manchester NH	C	HotSpot
WA1OHR		listening	DV Dongle

Under the Reflector 50 Dashboard, Remote Users show who is connected to the reflector using a Hotspot, DVAP, DV Dongle or Non-ICOM (homebrew) Repeater.

Last TX shows what module they transmitted on. Listening means they are connected but have not actually transmitted with a CQCQCQ destination.

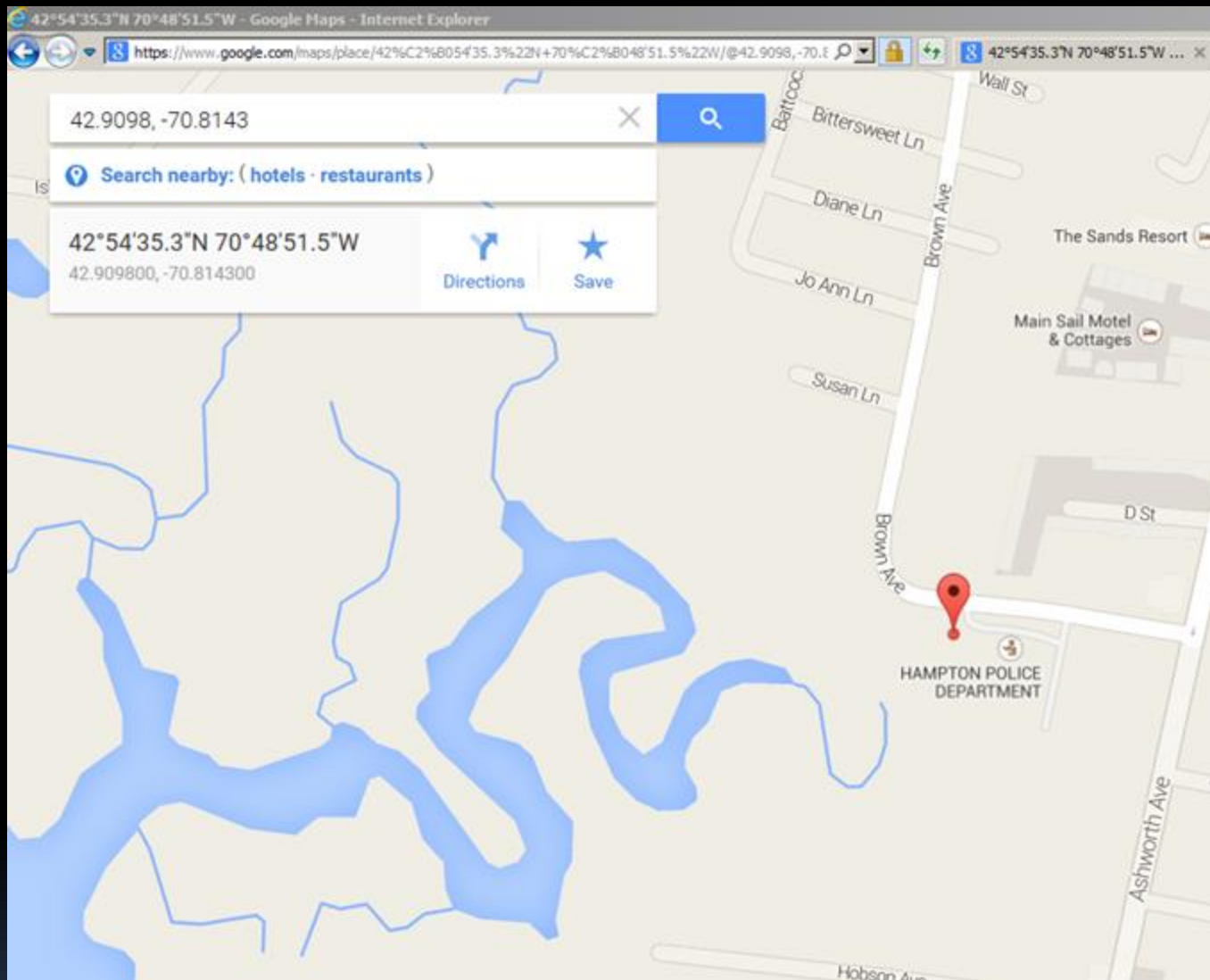
Last Heard

Callsign	User Message	Last TX on	Time
N1HSW	JOHN-FALL RIVER, MA.	C	2015/02/20 10:10:55
W1BZJ	Mike in Naples FL	C	2015/02/20 09:24:20
W1TG	Tom - Hampton, NH	C	2015/02/20 09:05:41
N1MPR	ED MONIZ N1MPR FLA.	C	2015/02/20 09:05:06
W2DAN	DAVE - TIVERTON, RI.	C	2015/02/20 07:23:42
KU1U	CORY - CCS 3239	C	2015/02/20 06:07:35
KD8JIA		C	2015/02/20 04:02:35
KB1VWT	Tony - Raynham, MA	C	2015/02/19 21:19:07
N1DOT		C	2015/02/19 18:57:31
WA1OHR	Ev Windham,Ct.	C	2015/02/19 18:51:12
KC1BZK		C	2015/02/19 18:15:32
N1KXJ	RAY / PORTABLE	C	2015/02/19 15:50:07
K1AHA		C	2015/02/19 15:34:11

The Last Heard list shows Call Sign, their Text Display Message, which module they were on and the Date/Time of the transmission.

Notice how some call signs are orange instead of black.

The orange means there is a GPS coordinate associated with the call sign (either using an Active GPS or manual coordinates).



If you click on W1TG's call sign, a google maps page will open up showing the location of that station.
This location will also transfer over to the APRS-IS system.



GPS Data is useful whether you are chatting on the repeater, reflector or Simplex . Any call sign received by your station with coordinate data will display.

MyCall: Gateway: Filter

dplus Last Heard

Date / Time	Gateway	MyCall	UrCall	Reflector	RPT1	RPT2
2025-03-23 12:32:39 UTC	KC1SBG	KC1SBG B	N6TZE		KC1SBG B	KC1SBG G
2025-03-22 21:34:15 UTC	KC1SBG	N1SNP	CQCQCQ		KC1SBG B	KC1SBG G
2025-03-13 16:27:05 UTC	KC1SBG	KB1YMM	CQCQCQ		KC1SBG B	KC1SBG G
2025-03-09 18:04:57 UTC	KC1SBG	W1SK	REF050CL		KC1SBG B	KC1SBG G
2025-03-05 23:18:30 UTC	KC1SBG	KB1QHR (PAUL)	CQCQCQ		KC1SBG B	KC1SBG G
2025-02-03 23:34:38 UTC	KC1SBG	NJ1O (BILL)	CQCQCQ		KC1SBG B	KC1SBG G
2025-01-07 12:27:49 UTC	KC1SBG	KC1TEY	CQCQCQ		KC1SBG B	KC1SBG G
2024-12-31 14:36:15 UTC	KC1SBG	W1JW (IAN)	CQCQCQ		KC1SBG B	KC1SBG G
2024-12-23 11:48:02 UTC	KC1SBG	KC1PHF (JOHN)	REF039CL		KC1SBG B	KC1SBG G
2024-11-14 22:22:00 UTC	KC1SBG	K1MV (BOB)	CQCQCQ		KC1SBG B	KC1SBG G
2024-09-20 15:36:42 UTC	KC1SBG	W4AJ	CQCQCQ		KC1SBG B	KC1SBG G
2024-07-23 19:19:48 UTC	KC1SBG	NT1N (BILL)	CQCQCQ		KC1SBG B	KC1SBG G
2024-05-22 20:30:51 UTC	KC1SBG	N1FR (BOB)	/KC1SBGB		KC1SBG B	KC1SBG G

Can search by Callsign or Gateway

NJ6N.COM/DPLUSMON/

DATA CABLE

- Data cables can be purchased or built.
- Cables are used to run D-RATS over RF.
- Other programs, such as D-Starlet and DStarTV, can be used with the data cable.





DStarTV is Slow Scan TV using D-Star.

POOR DECODING

There are instances where your radio may not decode the digital stream correctly.

D-Star users refer to this phenomenon as Being "R2D2" because that what the audio closely resembles.



BENEFITS OF D-STAR

- Narrow bandwidth allows for more stations to be on the band.
- Relative privacy. Analog scanners and P25 compliant radios cannot decode D-STAR.
- Simultaneous Text Display while users are in conversation. Great for people who forget call signs and names.
- Integration with APRS-IS system.
- Better coverage curve compared to analog.
- Can be in an electronically noisy environment and still hear digital audio.
- Offers many versatile options to allow users to connect to the D-STAR system.
- D-STAR not overrun with a free, downloadable app like Echolink.
- Once again hams are ahead of the curve, experimenting with the equivalent of APCO Phase II narrow banding.
- D-STAR is more for the experimental ham whereas DMR is more for the appliance user
- Great allocation of voice and data.

DISADVANTAGES OF D-STAR

- Cost appears high compared to analog equipment.
- High reliance of internet communication.
- Steep learning curve for some people.
- Not everyone cares for the quality of D-STAR audio.
- Lack of acceptance by other manufacturers.
- Too many competing digital modes. Users are faced with which digital mode they prefer to use.



GET ON THE AIR

LEARN SOMETHING NEW

BE A ROLE MODEL

INSPIRE EFFECTIVE

COMMUNICATION

THIS HOBBY IS WHAT YOU

MAKE OF IT!

