

DSTAR

Digital Smart Technologies for Amateur Radio

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Digital Voice/Data = DSTAR

Digital Smart Technology for Amateur Radio

- Joint venture between Japanese government and Japanese Amateur Radio League (JARL)
- Open specification
- Icom is the only current vendor although Kenwood announced products coming
- Radio products all offer analog mode for backward compatibility

DSTAR Modes

Digital Voice (DV) - 2m, 70cm, 23cm

- 4800 baud data rate (6.25kHz bandwidth GMSK)
 - 2400 baud AMBE encoded voice, 1200 baud FEC

Low-speed Digital Data (DV)

- 1200 baud available simultaneously on digital voice (DV) channel
- 3-wire "com port" interface via submini jack

High-speed Digital Data (DD) - 23cm only

- 128K baud data rate (100kHz bandwidth)
- Available through RJ-45 Ethernet jack

Why use Digital Voice?

Spectral efficiency

- Same reason as cellular service providers
- Digital voice has a 6.25 kHz bandwidth
- FM voice is 15-20 kHz bandwidth
- TWICE as many repeaters in the same spectrum!

Shares spectrum with data

- Callsigns, DPRS position data and messages can transmit WITH voice signal, unlike APRS

Voice QSOs are "routable"

- Voice can be directed to another radio, repeater or gateway

User Routing (Fun Stuff)

- Goal
 - To talk to as many D-STAR users as possible.

User Callsigns

N5MIJ: Dallas, TX
KJ4VO: Atlanta, GA
W4OZK: Huntsville, AL
K6BIV: Mt. Diablo, CA
N9JA: Bellevue, WA
VK8HF: Darwin, Australia

Callsign Programming

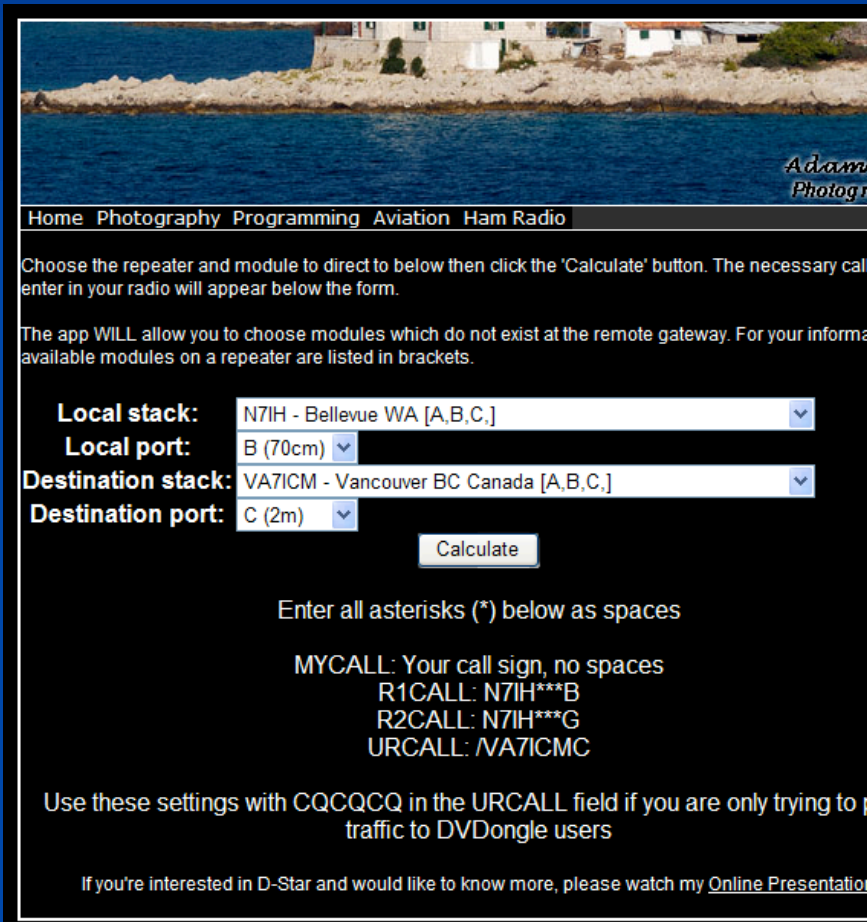
MYCALL = N9JA
RPT 1 = N7IH---B
RPT 2 = N7IH---G
URCALL = N5MIJ
Then
URCALL = KJ4VO
Then
URCALL = W4OZK
Then
URCALL = K6BIV
Then
URCALL = VH8HF

- Result
 - Both Voice and Data Communications routed to the appropriate recipient!

DSTAR Calculators

<http://www.dstarinfo.com/Calculator/DSTAR%20Web%20Calculator.aspx>

<http://www.adamfast.com/hamradio/callsign-calculator/>



Home Photography Programming Aviation Ham Radio

Choose the repeater and module to direct to below then click the 'Calculate' button. The necessary call enter in your radio will appear below the form.

The app WILL allow you to choose modules which do not exist at the remote gateway. For your information available modules on a repeater are listed in brackets.

Local stack: N7IH - Bellevue WA [A,B,C.]

Local port: B (70cm)

Destination stack: VA7ICM - Vancouver BC Canada [A,B,C.]

Destination port: C (2m)

Enter all asterisks (*) below as spaces

MYCALL: Your call sign, no spaces
 R1CALL: N7IH***B
 R2CALL: N7IH***G
 URCALL: VA7ICMC

Use these settings with CQCQCQ in the URCALL field if you are only trying to get traffic to DVDongle users

If you're interested in D-Star and would like to know more, please watch my [Online Presentation](#)

D-STAR Web Calculator V1.3.1.0

Georgia D-STAR

Source Repeater

- 145.29000 -0.600 Mhz
- 443.57500 +5.000 Mhz
- 1294.00000 -20.000 Mhz (ID-1 only)
- 1248.15000 Mhz (DD - High Speed Data / ID-1 only)

WA Bellevue N7IH
 Use Gateway? (Recommended to allow DVDongle Users to Hear You)

Destination Repeater

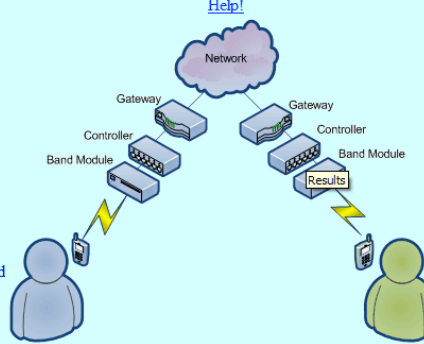
- 147.38000 +0.600 Mhz
- Not Available
- Not Available
- Echo Test

AK Ketchikan KL7FF

Programming for N7IH Port B to KL7FF Port C

YOUR: /KL7FF•C
 RPT1: N7IH•••B
 RPT2: N7IH•••G
 Set Radio To: 443.57500 +5.000 Mhz

"•" represents a space after the callsign
[Help!](#)



I'm near Bellevue WA. I'm talking on the N7IH repeater and my radio is set to 443.57500 +5.000 Mhz

I'm near Ketchikan AK and I'm listening to the KL7FF repeater and my radio is set to 147.38000 +0.600 Mhz

www.dstarusers.org



Your Source for D-Star DIGITAL Information!

497 Unique callsigns heard in the last 24 hours

[Click here to disable refresh]

Current Time is 03/14/2008 16:50:31 UTC

Callsign	Time Heard	Reporting Node
KC4YOZ	03/14/08 16:50:26 UTC	KI4WXS B 440 MHz Charlotte NC
W6DXX	03/14/08 16:50:22 UTC	K6IFR B 440 MHz Palm Springs CA
G3OJZ	03/14/08 16:49:51 UTC	GB7FK B 440 MHz Folkestone Kent, UK
K4WAM	03/14/08 16:49:45 UTC	KI4WXS B 440 MHz Charlotte NC
KE5DLM M	03/14/08 16:49:40 UTC	W5SHV B 440 MHz Shreveport LA
DL1ZAV	03/14/08 16:49:26 UTC	DB0HRF B 440 MHz Gr.Feldberg/Frankfurt Germany
W6MAT	03/14/08 16:49:08 UTC	K6IFR B 440 MHz Palm Springs CA
W6KAP	03/14/08 16:49:06 UTC	W6DHS C 2 Meters Volcano CA
N8JSN	03/14/08 16:49:00 UTC	WX8GRR C 2 Meters Grand Rapids MI
K6CZA	03/14/08 16:48:40 UTC	W6HRO C 2 Meters Anaheim CA/USA
IW2DLL	03/14/08 16:47:58 UTC	K2DIG B 440 MHz New York NY
N6APC	03/14/08 16:47:58 UTC	K6MDD A 1.2GHz Mt. Diablo CA
N5JMZ	03/14/08 16:47:55 UTC	W5SHV C 2 Meters Shreveport LA
KH6MEI	03/14/08 16:47:53 UTC	WH6DHT B 440 MHz Pearl Harbor HI
VK3EUL	03/14/08 16:47:36 UTC	VK3RWN C 2 Meters Melbourne Victoria, Australia
OE3MSU	03/14/08 16:47:02 UTC	OE1XDS B 440 MHz Vienna Austria
KB6JST	03/14/08 16:46:56 UTC	W6DHS C 2 Meters Volcano CA
AD6NH	03/14/08 16:46:19 UTC	W6HRO A 1.2GHz Anaheim CA/USA
IZ3NCQ 9	03/14/08 16:46:08 UTC	IR3UEF B 440 MHz Monselice/Padua Italy
WA6DNR	03/14/08 16:45:14 UTC	K6MDD B 440 MHz Mt. Diablo CA
W9NDU	03/14/08 16:45:10 UTC	N59RC B 440 MHz Chicago IL
DL8NCE	03/14/08 16:45:06 UTC	DB0WZ B 440 MHz Würzburg Germany
IZ3ATU	03/14/08 16:43:46 UTC	IR3UQ B 440 MHz Verona Italy
G8FF7	03/14/08 16:43:46 UTC	GB7IC B 440 MHz Herne Bay Kent, UK

[Home](#)

[Last Heard](#)

[News](#)

[JFindU D-Star Maps](#)

[Repeater Directory](#)

[D-Star Solutions](#)

[Joining The Network](#)



Ads by Google

[Home/Condo Mgmt San Diego](#)

We manage, sell, and maintain coastal San Diego, CA property
www.timcassidy.com

Why not IRLP/Echolink?

- No “callsign squelch”
- Cannot call individual user – only links repeaters
- Call routing is not automatic
- Node names are numeric rather than callsigns
- Requires activation via DTMF code sequence
 - DSTAR call information can be stored in memory
- Cannot send callsign/messages/position or other data to remote users
- DSTAR offers some level of secure transmission

Why Digital Data?

- DPRS position reports and messages like APRS
- Transfer any type of data (text, photos, email, spreadsheets, etc)
- Interface as COM port (low speed) or Ethernet port (high speed)
- Routable to other radio anywhere in the system or gateway to Internet
- 128K baud at 1.2GHz!
- Plug and play – no extra TNC or radio cabling

Why not packet or Winlink?

- Packet is a routing nightmare
 - Roaming IP is available for packet but not used
- Packet protocols are unique to ham radio
 - DSTAR is either a COM port (low speed) or TCP/IP network (high speed)
- Winlink is only Email (with small attachments)
- Winlink is supported over DSTAR
- Off the shelf, single-box solutions for 1200 baud, 4800 baud and 128K baud!

What do I need?

Full line of products currently available with more coming from Icom and Kenwood

- 2m HT – V82 with UT-118
- 70cm HT – U82 with UT-118
- Dual band HT with Dual VFOs – IC-91A/D, IC-92
- 2m Mobile – IC-2200 with UT-118
- Dual band mobile – ID-800 and IC-2820
- 1.2Ghz mobile – ID-1 (supports high speed data)
- VHF, UHF and microwave repeaters and controllers

Bands Covered

2m

DV Mode

70cm

DV Mode

23cm

DV Mode

DD Mode

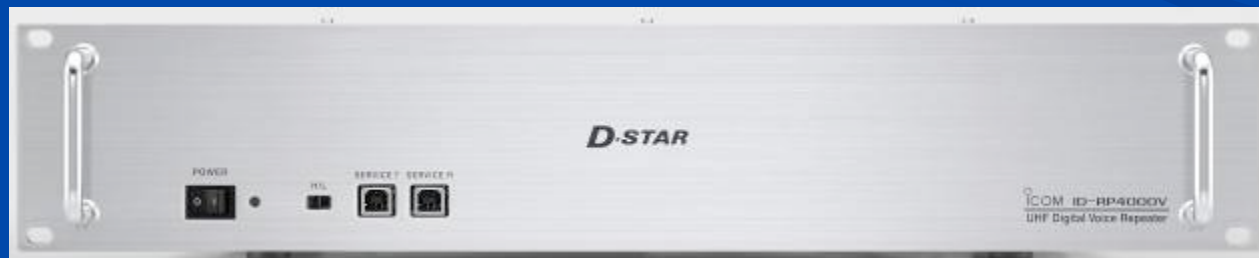


Infrastructure

RF modules

- 2m ID-RP2000V DV
- 70cm ID-RP4000V DV
- 23cm ID-RP2V DV
- 23cm ID-RP2D DD

Modes

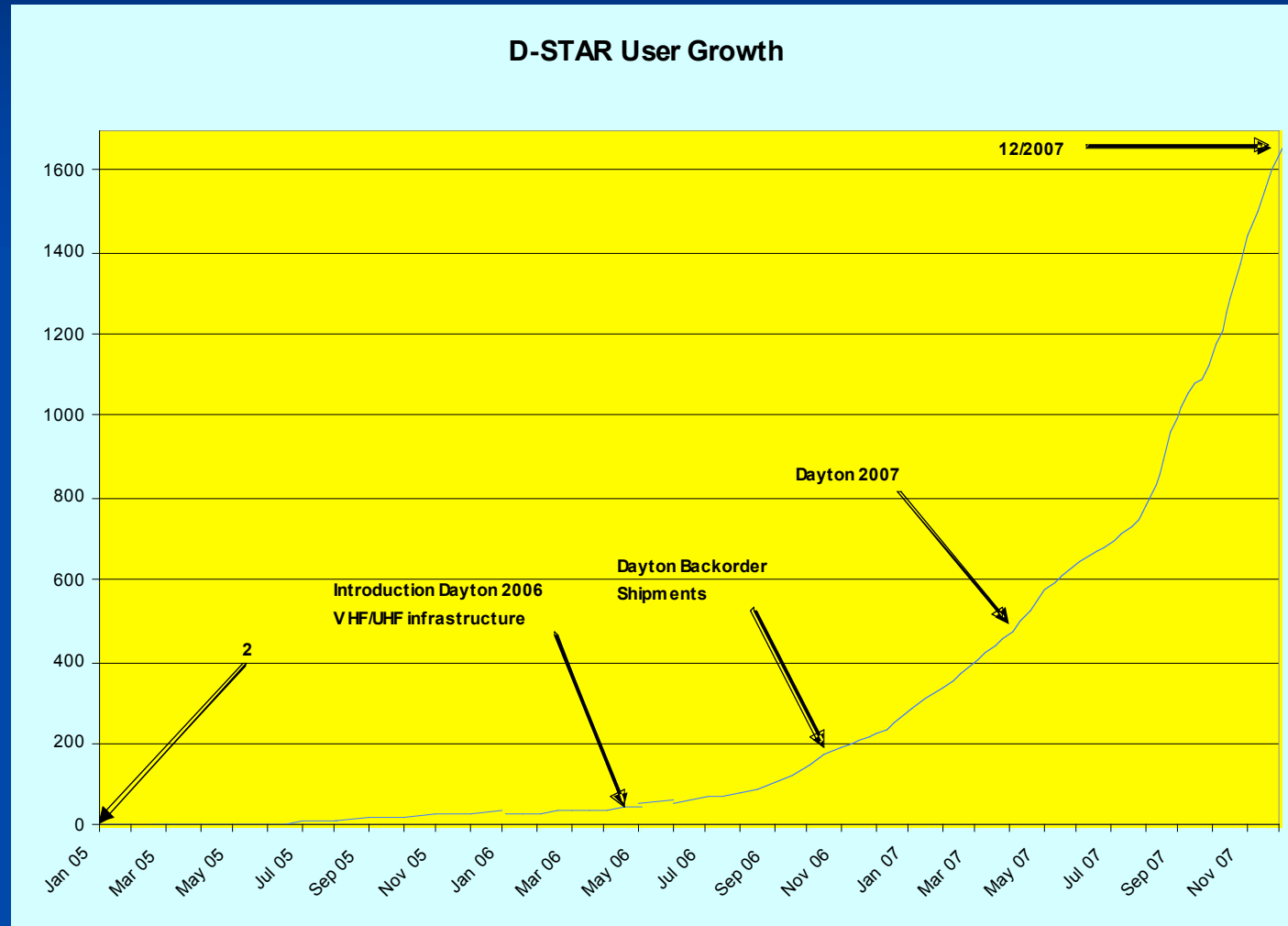


How much does it cost?

- IC-V82 / IC-U82, IC-2200 accepts UT-118 Digital Voice Module at \$199.95 (HRO Price)
 - Compare Kantronics KPC-3+ at \$189.95 (HRO Price)
- IC-91A - \$299.95, IC-91AD - \$399.95
- ID-800H - \$579.99
- ID-1 - \$999.99 (128K baud Data!)
 - Compare to 56Kbaud GRAPES data modem
 - GRAPES IF modem + 10m radio + transverter + HSP card \approx \$1000 + soldering and assembly

D-STAR Growth

Sep 06	108
Oct 06	150
Nov 06	198
Dec 06	226
Jan 07	286
Feb 07	338
Mar 07	413
Apr 07	474
May 07	580
Jun 07	645
Jul 07	703
Aug 07	784
Sep 07	115 ²
Oct 07	144 ²
Nov 07	165 ⁷
Dec 07	6



D-STAR Future

D-STAR is still young

- Repeaters have only been readily available since November 2006
- Version 2.0 of the gateway software addresses many issues and is shipping now

Early applications

- D*Chat
 - http://nj6n.com/dstar/dstar_chat.html
- DPRS Gateway – D-STAR to APRS-IS gateway
 - <http://www.aprs-is.net/dstartnc2.htm>
- D-STAR Monitor – Monitors gateway communications
 - Feeds <http://www.dstarusers.org>

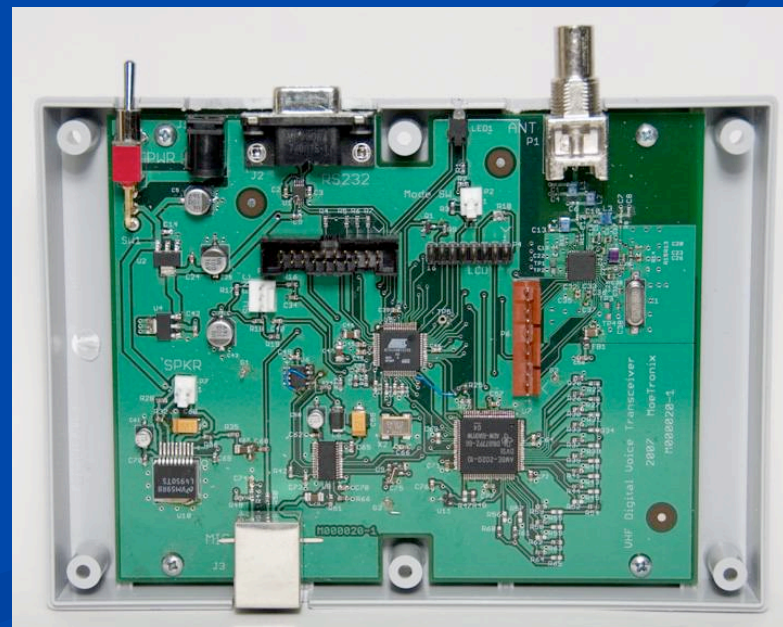
Open D-STAR Project

- New controller/gateway functionality and tools
- DPLUS - gateway add-on daemon
 - Echo test
 - Voicemail
 - Simulcast to all nodes
 - Link/Unlink modules across the gateway
 - Playback from saved file
 - More...
- DPLAY - plays DVTool file to remote gateway/repeater
- DSHARK – D-STAR protocol sniffer
- <http://www.opendstar.org/>

DVX Project

Digital Voice Transceiver Project

- Homebrew low power D-STAR 2m voice/data radio
- Allowed experimenting with different AMBE options
- <http://www.moetronix.com/dstar/>



DV Dongle

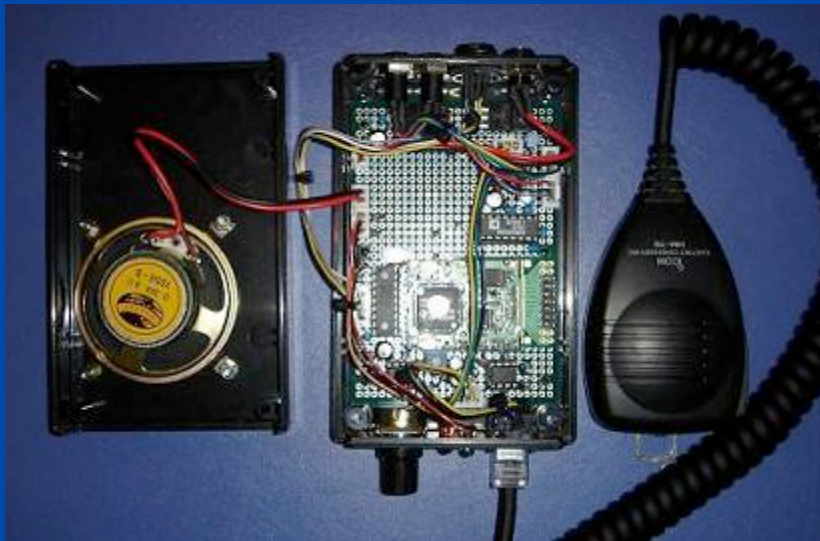
- Connect to the international network and receive/transmit just like a D-Star radio user
- Uses AMBE2020 voice compression chip from DVSI
- Works with DVTool software for Windows/Mac/Linux
 - API available for other implementations



DV adapter using UT-118

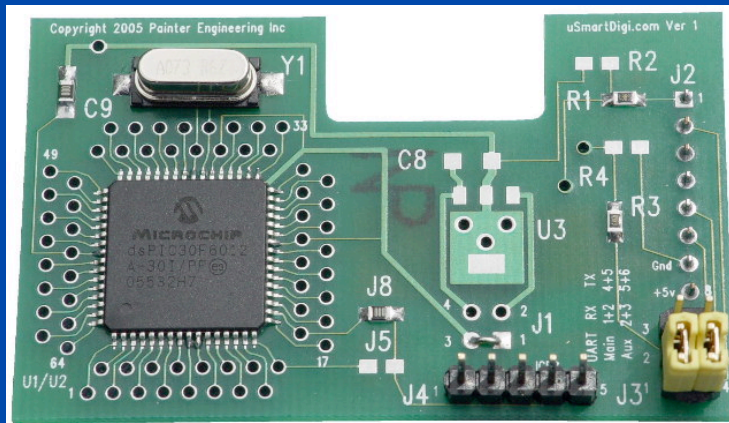
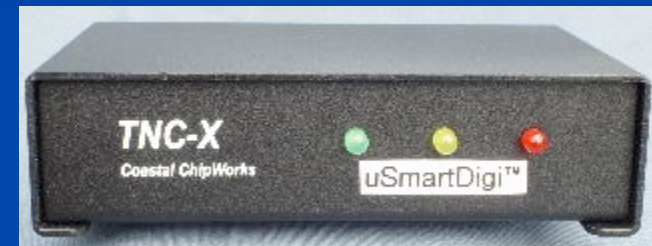
Created by Satoshi Yasuda 7M3TJZ/AD6GZ

- Allows DSTAR use with any 9600 baud ready rig
- Board available through
 - Japanese CQ Magazine
 - German Funk Amateur
- http://d-star.dyndns.org/DV_Adapter.html.en



μSmartDigi™ D-Gate™ D-STAR Gateway

- Standalone gateway between D-STAR digital network and a conventional analog APRS network
- Uses a D-STAR and an analog radio
- Mounts inside a TNC-X
- <http://www.usmartdigi.com/>
- <http://tnc-x.com/>



Dean Gibson, AE7Q

DSTARCom

- Allows loading of "frequency memories" from CSV with
 - IC-91A & IC-91AD radios and RS-91 software
 - IC-2820H radio and CS-2820 software
 - ID-800H radio and CS-D800 software (at least version 2.0 firmware & software)
 - ID-1 radio and accompanying software
- Command-line utility under Windows and Linux
- <http://www.d-starcom.com/>

DSTARLet

- Multiuser messaging via D-STAR (to replace FNPack)
 - <http://www.dstarlet.com/>

More Applications

DSTAR Comms

- Advanced text chat, private messages with auto reply and inbox, email gateway (to internet) and more
- Development is active with new features often
- <http://www.m0dqw.co.uk/>

DSTARSWITCH

- An open source (Linux) project geared towards allowing multiple applications to communicate through a single D-STAR radio at the same time
- <http://dstarswitch.com>

D-RATS

- Instant-messaging style chat
- Automatic QSTs at varying schedules, containing:
 - Simple messages , file contents, command output
- File transfers with adjustable-sized packets
 - Transparent block compression
- Forms transmission with multiple XML-based form templates, graphical editor, and HTML exporting
- Searching/logging ability
- Online/offline status notifications
- Multi-platform Linux/UNIX, Windows, MacOSX
- <http://d-rats.danplanet.com/wiki/>

D-STAR – It's not just "digital voice"

Without any infrastructure

- Voice, callsigns, GPS positions, low speed data to multiple users simultaneously
- Callsign squelch, emergency mode
- High speed data (DD) point-to-point

Adding repeaters adds

- Voice, callsigns, GPS positions, low speed data to multiple users simultaneously over longer range
- Cross band on same repeater stack allow more users
- Automatic routing of calls by callsign
- High speed data (DD) with multiple users

Gateway version 2.0

Provides worldwide linking of all features plus

- Automatic callsign routing worldwide
- DPRS \Rightarrow APRS gateway
- Up to 10 linked voice channels in a conference
- Controlled access to gateway

Version 2.0 addresses major issues

- Now supports DHCP, static IP no longer required
- Web-based gateway registration request system
- Multiple redundant trust servers
- New relational database format on trust server
 - Proper housekeeping (no more scripts)

Build it and they will come

Chicken and egg

- Repeaters and gateways drive users
- Why buy a VHF/UHF radio that only works simplex?
- Why install a whole new repeater for 5 users?

Many repeaters available – fewer gateways

- D-Star repeaters are very simple and clean
- Gateway version 1.0 required passing a course/test
- Gateway 2.0 eliminates the course and resolves many installation issues (static IP, fixed IP to callsign map)
- Many owners (me) waiting for version 2
- Hold on for the next explosion in user growth!

References

Icom America

- <http://www.icomamerica.com/amateur/dstar/>

DSTAR_Digital Yahoo Group

- http://groups.yahoo.com/group/dstar_digital/

DSTAR User/Repeater Registry

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

Texas Interconnect Team – K5TIT

- <http://www.k5tit.org/forum/>

Wikipedia

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