



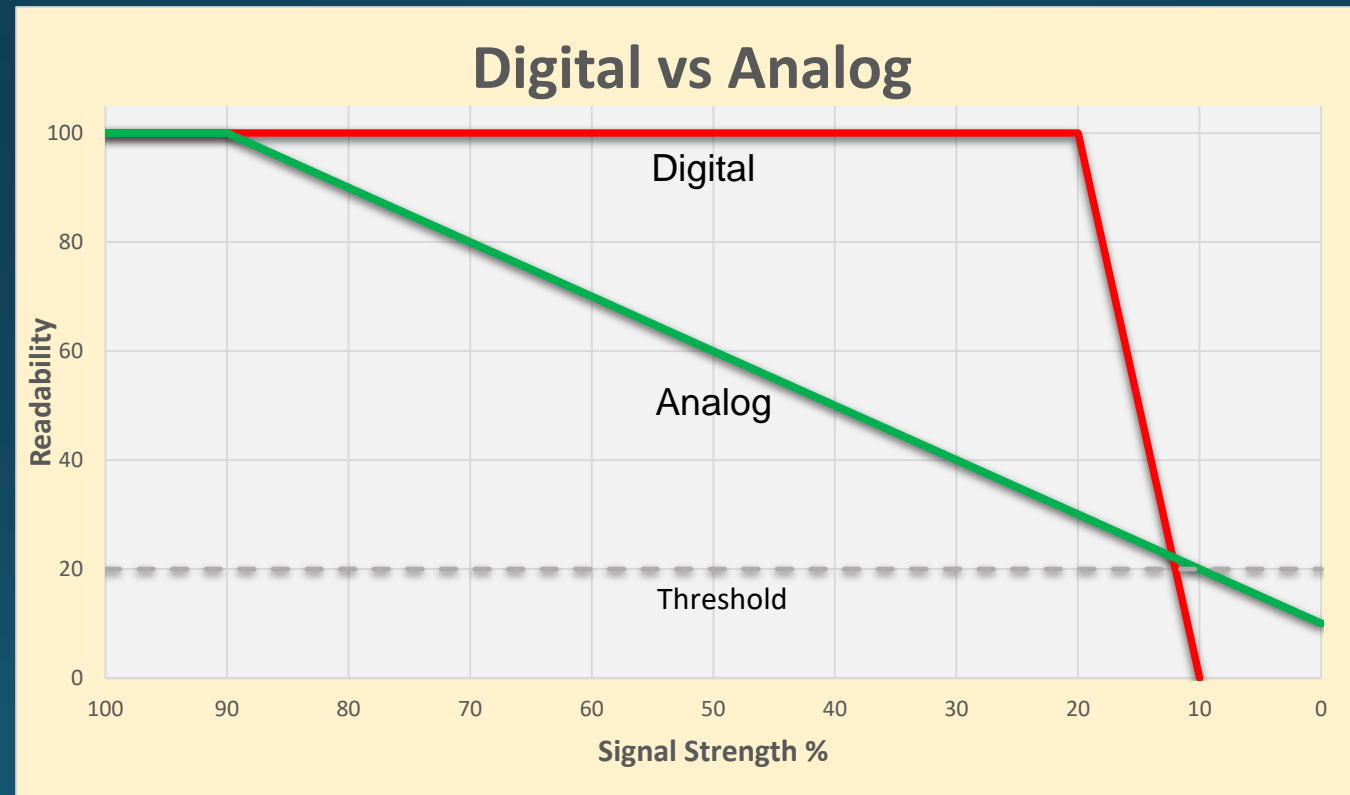
D-STAR Basics

John Davis WB4QDX

Digital Basics



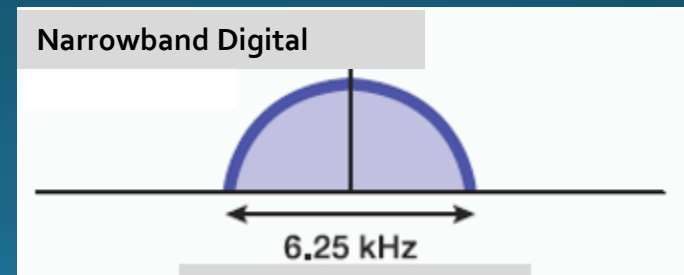
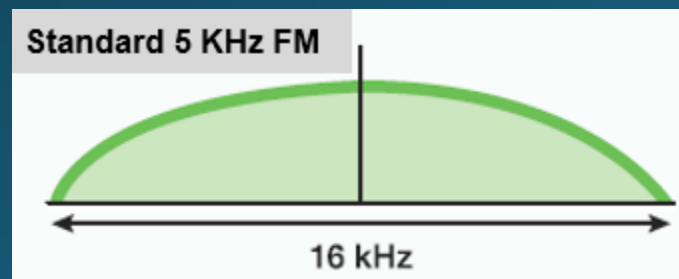
- Digital voice does not gradually degrade in quality as signal level decreases





Digital Basics

- Voice (analog) is converted to data
- Data may be added to voice to produce a single data stream containing voice and data
- Radio is modulated as a data carrier
- Occupied bandwidth is determined by bit rate and type of modulation
- Generally, digital voice and data occupies less spectrum than analog FM



What is D-STAR?



- D-STAR is an open standard for digital voice and data designed specifically for Amateur Radio
- D-STAR standard adopted by Icom and Kenwood
- One of several digital modes used in Amateur Radio, but remains the most popular
- Developed by Japan Amateur Radio League (JARL)
- Uses AMBE vocoder chip from DVSI to convert analog speech to data and vice versa
- D-STAR has lead the way encouraging experimentation and open development with a variety of third party products

How does D-STAR work?



- Voice is converted to digital and transmitted at 4800 bps using GMSK modulation
 - 2400 bits for voice
 - 1200 bits for Forward Error Correction on voice
 - 1200 bits for data (error correction usually in applications)
 - *Fast data mode allows 3600 bps data*
- True narrowband digital signal
 - Voice and data occupy one 6.25 KHz signal (versus wider bandwidth for FM voice, DMR, Fusion and P25)
- Can operate simplex, repeater or linked to other repeater(s) with voice and data features

What can D-STAR Do?



- Transmit or receive voice and 1200 baud data simultaneously on 2m, 440 and 1.2 GHz (no TNC required)
- 128 Kb data transmission on 1.2 GHz with Internet connectivity (Ethernet bridge to Internet with IP address)
- D-PRS (digital APRS) automatic position reporting simultaneous with voice with GPS
- Flexible repeater linking with Gateway and Internet connection
- Reflectors act as conference bridge for linking multiple repeaters (DPLUS, DCS and XRF Reflectors in operation worldwide)
- DV Dongle, DV Access Point (DVAP) / Hotspots and DV Node Adapters allow voice and data access to D-STAR via Internet connection (similar to EchoLink)

D-STAR Equipment



- D-STAR radios (mobiles, handhelds, repeaters) commercially produced by ICOM and Kenwood
- DV Dongle is non-radio device allowing access to repeaters and reflectors via Internet (similar to EchoLink)
- DV Access Point (DVAP) creates low power hotspot via Internet
- Hotspots create low power access points
- Node Adapters converts FM transceivers to D-STAR hotspots and repeaters

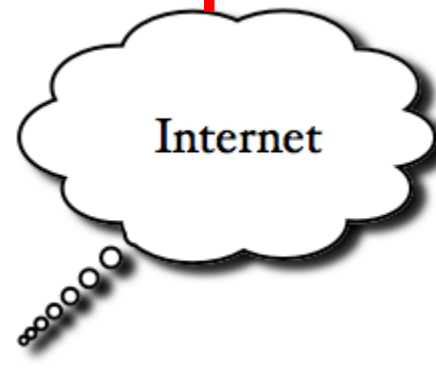
D-STAR Repeater Architecture



Linux Gateway PC
Running G2 Gateway
software



Runs third-party
apps, Dongle,
DVAP





The Registration Process

- Why register?
- Registering your callsign allows access to more functions on DPLUS repeaters (not required for ircDDB repeaters)
- Register on your local or the closest system, if possible
- Register on **one and only one** system (local registration syncs with all systems throughout world)
- Registration is a three-step process (*all three steps must be completed*)

Starting Registration

- Step 1 – Browse to desired system and register as new user (<https://callsign.dstargateway.org/Dstar.do>)

A screenshot of a web browser window showing the D-STAR Gateway System (WD4STR) registration page. The browser's address bar shows the URL 'https://wd4str.dstargateway.org/Dstar.do'. The page title is 'D-STAR Gateway System (WD4STR) Sponsored by Gwinnett D-STAR' and 'REVISION 1.0'. The page features a D-STAR logo on the left. The main content area has two sections: 'Already registered?' with a login form and 'New user?' with a register button. The login form includes fields for 'CallSign' and 'Password', and a 'Login' button. The register section includes a 'Register' button.

D-STAR **D-STAR Gateway System (WD4STR)** **Sponsored by Gwinnett D-STAR** REVISION 1.0

Already registered?
Login with Callsign and Password.
Please note that Callsign and Password are case sensitive!
Callsign must be in Upper Case!

CallSign:
Password:

Login

New user?
Register here for D-STAR access.
Registering takes just a few seconds, and
you won't have to enter your personal information
again the next time you visit here.

Register

Fill Out Your Info

- Fill out the info (callsign, name, email address and desired password)



The screenshot shows a web browser window with the URL <https://wd4str.dstargateway.org/TopMenu.do;jsessionid=>. The page title is "D-STAR Gateway System (WD4STR) Sponsored by Gwinnett D-STAR" and it is labeled "REVISION 1.0". The page contains a registration form with the following sections:

The agreement document

I certify that I hold a valid Amateur Radio license. I also agree to abide by all rules and regulations of Gwinnett D-STAR and Part 97 of the FCC Rules and Regulations. I understand that non-compliance may result in removal from the D-STAR gateway network without warning.

When filling in the form below, enter both your first and last name in the Name field. Upon submitting the form, please send an email info@dstarinfo.com to provide notification of your request and prompt approval. After approval, you will need to return and login to complete the registration process.

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 :

Buttons: OK, Cancel

- **Step 2** – System administrator must approve your initial registration. *You may need to send email to admin.*

Add a Terminal

- Step 3 – Add at least one terminal with a space in first row under Initial, then type a pc-name (lower case, e.g. wb4qdx-dstar)



The screenshot shows the "Terminal Information" section of the D-STAR Gateway System (WD4STR) web interface. The page title is "D-STAR Gateway System (WD4STR)" and the user is logged in as "WB4QDX". The interface includes a navigation menu with "User Information", "GW Information", "Terminal Information", and "Personal Information". Below the navigation menu, there are fields for "Name" (John Davis), "E-mail" (jdavis@gtworks.com), "Password", and "Password Confirm". A red arrow points to the "Terminal Information" section, which contains a table with columns for "Initial", "RPT", "Local IP", "pcname", and "Del". The table lists 8 terminals, with the first two having "wb4qdx" and "wb4qdx-node" as pcnames. Below the table, there is an "Update" button and a note: "Check item and change a set value. Click the Update button."

	Initial	RPT	Local IP	pcname	Del
<input type="checkbox"/>	1: WB4QDX		10.210.206.240	wb4qdx	<input type="checkbox"/>
<input type="checkbox"/>	2: WB4QDX N		10.210.206.241	wb4qdx-node	<input type="checkbox"/>
<input type="checkbox"/>	3: WB4QDX	<input type="checkbox"/>	10.210.206.242		
<input type="checkbox"/>	4: WB4QDX	<input type="checkbox"/>	10.210.206.243		
<input type="checkbox"/>	5: WB4QDX	<input type="checkbox"/>	10.210.206.244		
<input type="checkbox"/>	6: WB4QDX	<input type="checkbox"/>	10.210.206.245		
<input type="checkbox"/>	7: WB4QDX	<input type="checkbox"/>	10.210.206.246		
<input type="checkbox"/>	8: WB4QDX	<input type="checkbox"/>	10.210.206.247		

Note: You only need one terminal, a "space" for use. Adding more terminals can add confusion

Add Your Callsign to Radio



- For a radio, program your callsign (caps, no spaces) in MYCALL or MY field
 - Found in Menu under MY STATION in newer radios
- For a DVAP, DV Dongle or Hotspot, program call in callsign field exactly as entered in registration terminal
- Let's talk!