



DSTAR Basics for RCARC

Presented by: Paul Beeman, W2PB
D-Star user since 2008

Rev3A **42/78**

Tonight's Goals:

- Be able to spell and understand the acronym: D-STAR,
 - **Digital Smart Technologies for Amateur Radio**
- Understand the high level capabilities of D-STAR,
 - Understand: Simplex, local repeater, gateway operation, call programming requirements. **D-Star radios use up to four (4) call signs for call routing.**
 - **URCall** **RPT1** **RPT2** **MYCall** *We will talk about this alot tonight.*
 - **Simplex QSO:** **URCall** normally CQCQCQ and **MyCall** (W2PB)
 - Two (2) call signs to be programmed.
 - **Local Repeater QSO:** **URCall**, (CQCQCQ) **RPT1** (WD2NY C), **MYCall:** (W2PB)
 - Three (3) call signs to be programmed.
 - **Gateway Repeater QSO:** **URCall** (CQCQCQ), **RPT1** (WD2NY C), **RPT2** (WD2NY G), **MYCall** (W2PB) - Four (4) call signs to be programmed.
 - **Call Sign Programming for repeaters:** "Module" must be specified in RPT1 and RPT2. Think as **RPT1** being the input repeater and **RPT2** being the output repeater.
 - A: 23cm B: 70cm C: 2m

Majority of
use

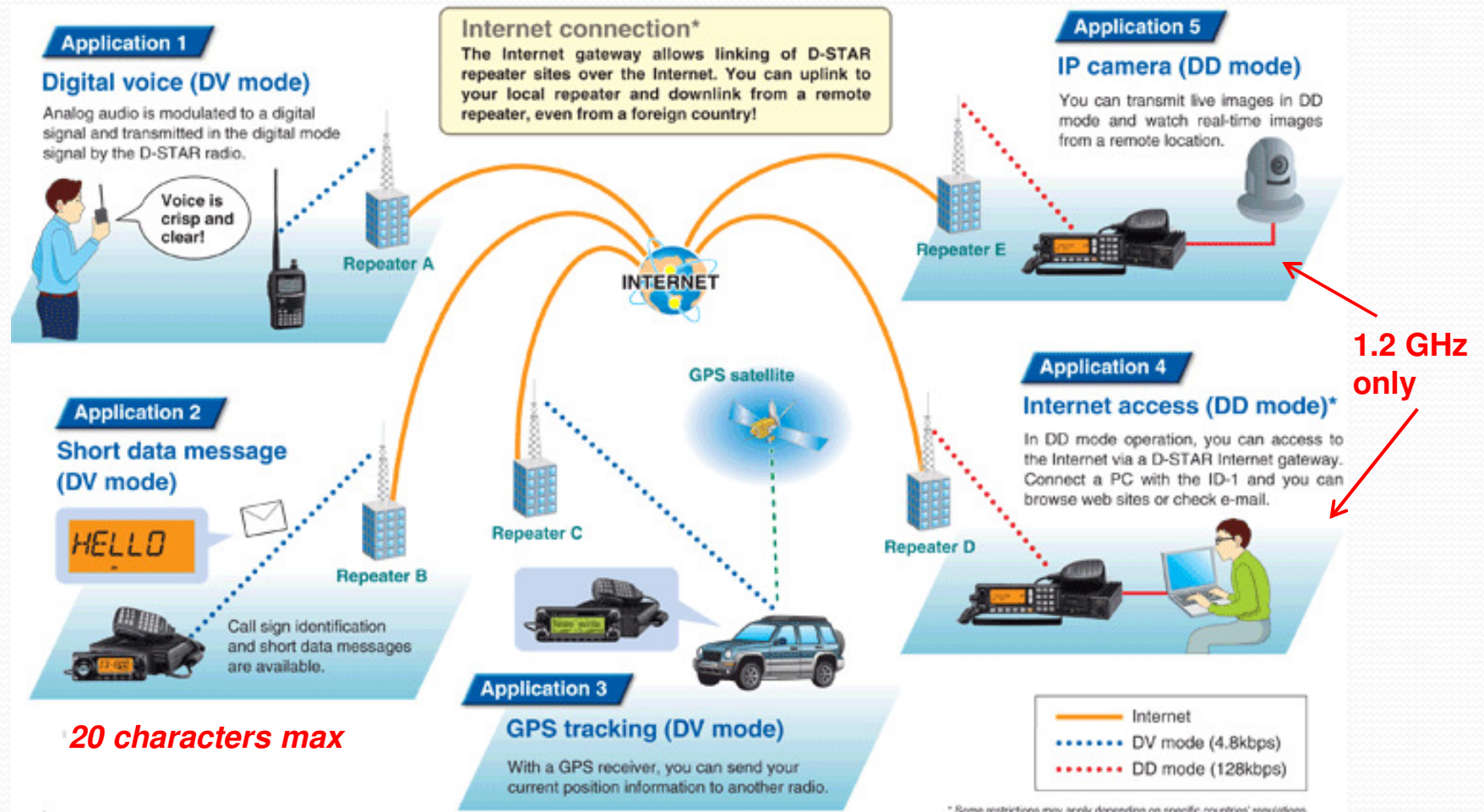
Tonight's Goals:

- Understand principles of repeaters and reflector linking,
- Introduce you to “Echo” test for testing signal quality into a D-Star repeater
 - URCall: - - - - - E (7 spaces then E)
- *Time permitting, understand what the following can do for you:*
 - DV Dongle,
 - Digital Voice Access Point (DVAP),
 - Hotspot
 - Using a laptop/desktop
 - Using a Raspberry Pi

D-Star: “What is it?”

- Digital voice transmissions that provides a slightly greater range, $\approx 23\%$, than analog.
- No static or hissing in weak signals.
- Audio is either there or “R2-D2” (droid sound), or totally absent
 - http://www.youtube.com/watch?v=WWY_abrtM9E
- Allows for simultaneous slow speed (900 bps) data transmission,
- Automatic call sign transmission, and GPS coordinates (if GPS connected and on) each time you transmit.
 - **If GPS is being transmitted by each station, distance and direction to transmitting station is shown on display.**
- Call Sign/ Name and short message transmitted each time you key the PTT.
 - **i.e. W2PB / Paul ID-51A RPi+DVAP [20 character maximum – spaces count]**
- *Call sign routing allowing the person who is calling you to “potentially” find you via the last D-Star repeater you accessed.*
- Local peer to peer communication via simplex or local D-Star repeater and worldwide communication through a D-Star gateway.

D-STAR: “What is it?”



D-Star: “Why do I want it?”

- Do you live in an antenna restricted community?
- Do you live in a condo or apartment building where outside antennas are prohibited?
- ***Do you want the capability to speak to other amateurs around the world?***
- Using a D-Star HT and items called: DVAP, DVDongle or “Hotspot” you can access local D-Star repeaters or D-Star repeaters anywhere in the world that has a D-Star gateway.

You can even have worldwide and local D-Star connectivity without using a radio via a DV-Dongle! (USB)



More about this later.

LOCAL D-STAR Repeaters:

- **LONG ISLAND:**

- WG2MSK – B: UHF – Brooklyn, NY [REF020A – NJ/NY/PA]
- NC2EC – B : UHF - Hicksville, NY [REF020A – NJ/NY/PA]
- NC2EC – C: VHF: - Hicksville, NY [User selectable]
- W2TOB –B: UHF - Babylon, NY [REF020A – NJ/NY/PA]
- WD2NY –B: UHF – Hauppauge, NY [REF020A-NJ/NY/PA]
- WD2NY –C: VHF – Hauppauge, NY [REF010C – New England]

- **NEW YORK CITY:**

- K2DIG – B: UHF – Empire State Bldg [REF020A – NJ/NY/PA]

Linked
&
Many more

Reflector 020A

Linked Gateways

Module A	Module B	Module C	Module D	Module E
AA3E A	K2EOC B			
AA3E B	KC2TXB B			
K2DIG B	KC2TXX B			
K3PDR C	NJ2CM B			
K9RRD B				
KD2EQY B				
NC2EC B				
NJ2DG B				
NJ2MC B				
NJ2MC C				
W2DGL C				
W2TOB B				
W3OI B				
W3OI C				
WD2NY B				
WG2MSK B				

Area View of D-Star Repeaters

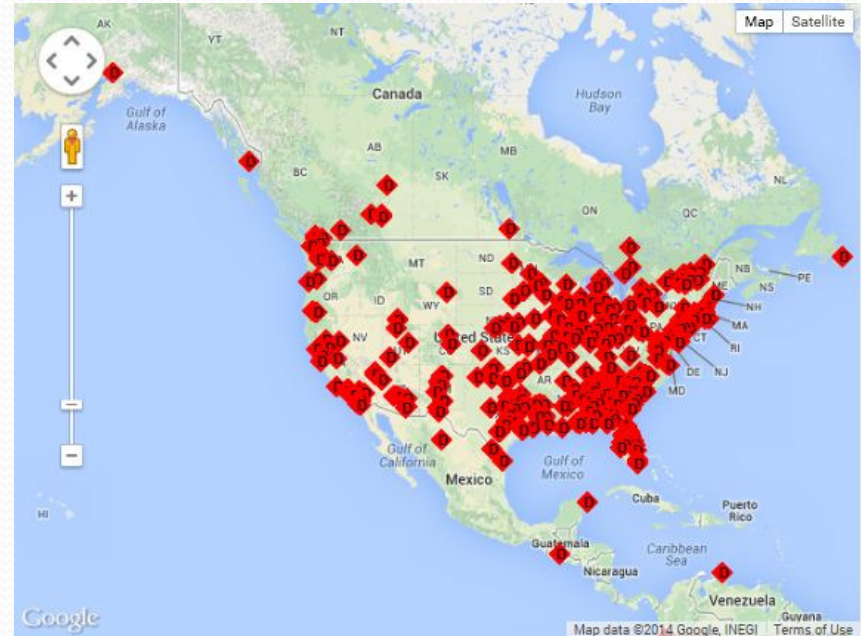


D-STAR Repeaters:

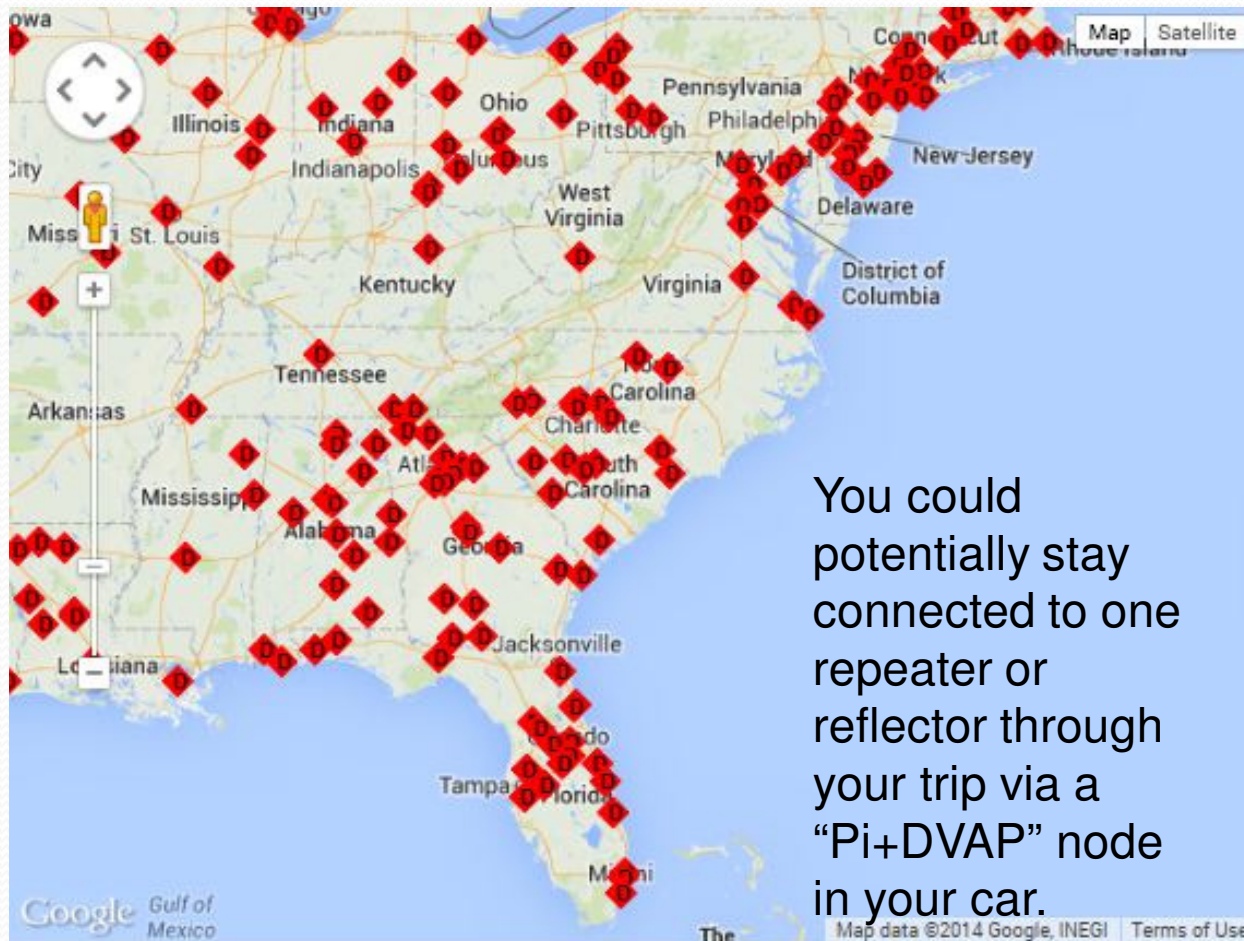
World-Wide



North America



Driving to Florida: No Problem!



You could potentially stay connected to one repeater or reflector through your trip via a “Pi+DVAP” node in your car.

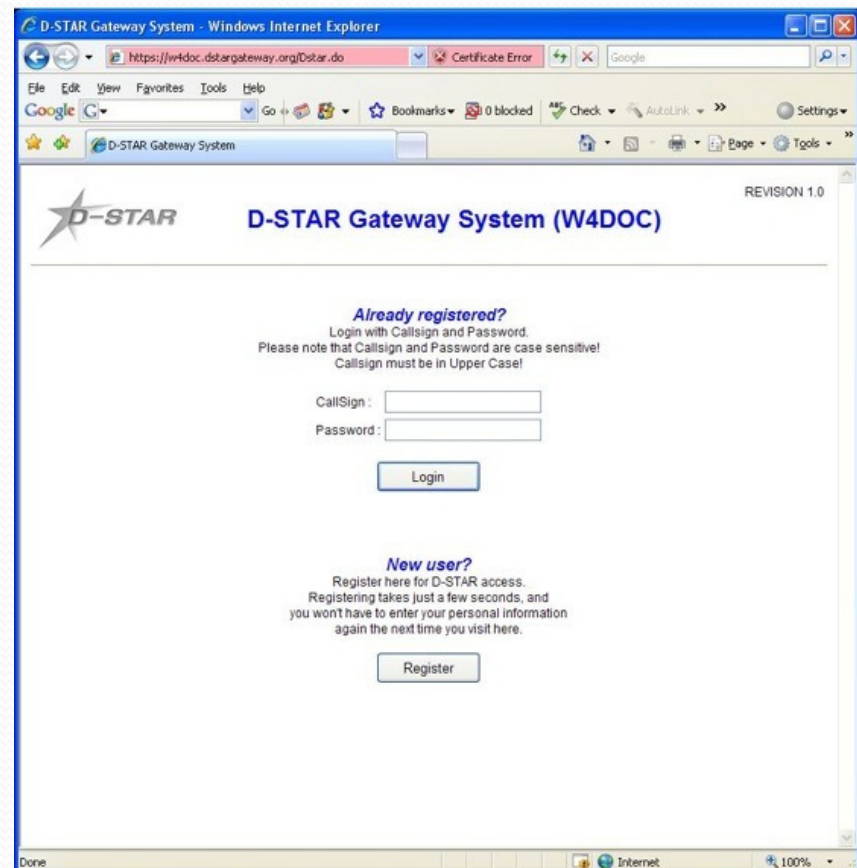
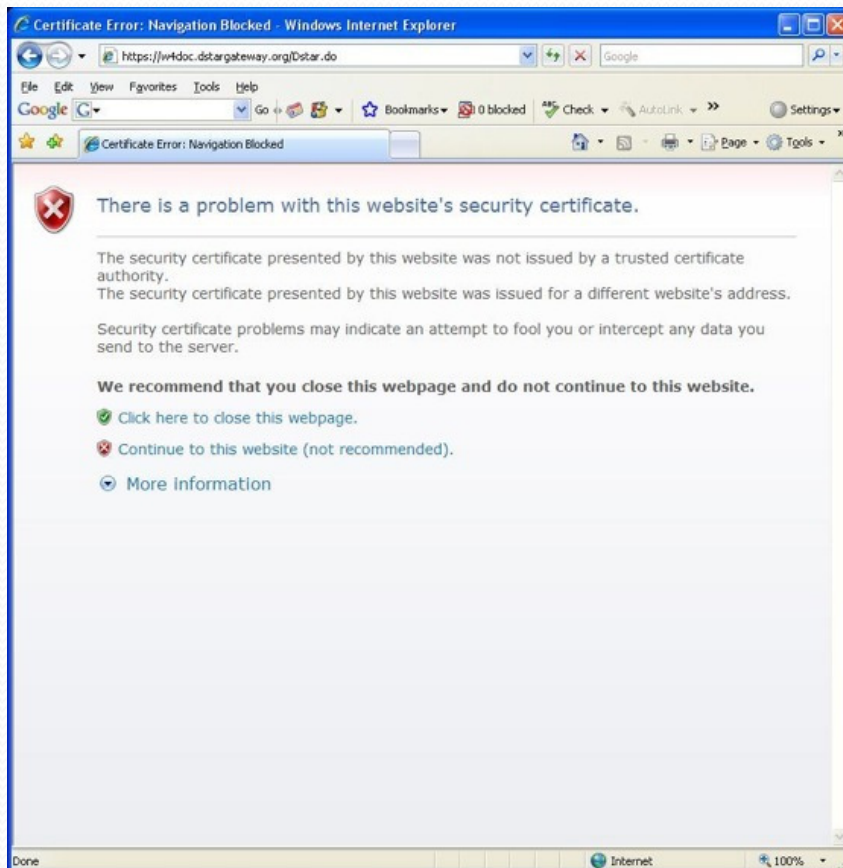
<More about this later.

[RPI DVAP](#)

You Must Be Registered to Use D-Star Gateways!

- Registering URL:
 - http://www.dstargateway.org/D-Star_Registration.html
- Open a web browser and enter <http://www.dstarusers.org/repeaters.php> and find the D-Star repeater system closest to you. Click on the link after “Registration URL:” for your repeater. For example, if you live in Georgia, scroll down to W4DOC and click on <https://w4doc.dstargateway.org/Dstar.do>.
- If a “Registration URL:” is not listed for your closest repeater, contact the administrator of the repeater for instructions. Notice that you are using https and not http for the prefix and that the letter “D” is capitalized in the word “Dstar.do”. You will receive a warning similar to the one below. Select “Continue to this website” if using Internet Explorer, or “Accept this certificate temporarily for this session” if using Firefox, or “Continue” if using Apple Safari.
- **You do not have to be registered to use simplex on D-Star (145.67MHz).**
- **DO NOT REGISTER ON MORE THAN ONE D-STAR REPEATER!**

Registering for D-Star:



Registering for D-Star:

D-STAR Gateway System - Windows Internet Explorer

https://w4doc.dstargateway.org/TopMenu.do;jsessionid=... Certificate Error

D-STAR Gateway System

REVISION 1.0

D-STAR Gateway System (W4DOC)

The agreement document

I agree to abide by all rules and regulations of The Atlanta Radio Club and FCC Part 97. I understand that should I not comply, I may be removed from the D-Star network without warning.

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

D-STAR Gateway System - Windows Internet Explorer

https://w4doc.dstargateway.org/TopMenu.do Certificate Error

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Do you agree?

YES: ☒ NO: ☐

Enter your personal information!

CallSign: W5BJV Equal to or less than 7 characters.

Name: Marcel Pitzini

E-mail: w5bjv@arrl.net Make sure you use a valid e-mail address.

Password: 8 to 16 characters.

Password confirm:

OK Cancel

Registering for D-Star:

D-STAR Gateway System - Windows Internet Explorer

https://w4doc.dstargateway.org/Register.do

Certificate Error

Google

File Edit View Favorites Tools Help

Go

Bookmarks 0 blocked

Check AutoLink

Settings

D-STAR Gateway System

REVISION 1.0

D-STAR Gateway System (W4DOC)

Registration is submitted.

CallSign : W5BJV
Name : Marcel Pitzini
E-mail : w5bjv@arrl.net

Authorization for your registration will be reviewed by the system administrator.
You will be notified by email when it is approved.

OK

Done

Internet

100%

D-STAR Gateway System - Windows Internet Explorer

https://w4doc.dstargateway.org/PersonalInfoEdit.do

Certificate Error

Google

File Edit View Favorites Tools Help

Go

Bookmarks 0 blocked

Check AutoLink

Settings

D-STAR Gateway System

REVISION 1.0

D-STAR Gateway System (W4DOC)

Login : W5BJV Logout

User Information GWV Information Terminal Information Personal Information

Please, edit after making a left check box on.

☐ Name : Marcel Pitzini
☐ E-mail : w5bjv@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	pname	Del
<input type="checkbox"/> 1: W5BJV	<input type="checkbox"/>	<input type="checkbox"/>	10.220.101.184		
<input type="checkbox"/> 2: W5BJV	<input type="checkbox"/>	<input type="checkbox"/>	10.220.101.185		
<input type="checkbox"/> 3: W5BJV	<input type="checkbox"/>	<input type="checkbox"/>	10.220.101.186		
<input type="checkbox"/> 4: W5BJV	<input type="checkbox"/>	<input type="checkbox"/>	10.220.101.187		
<input type="checkbox"/> 5: W5BJV	<input type="checkbox"/>	<input type="checkbox"/>	10.220.101.188		
<input type="checkbox"/> 6: W5BJV	<input type="checkbox"/>	<input type="checkbox"/>	10.220.101.189		
<input type="checkbox"/> 7: W5BJV	<input type="checkbox"/>	<input type="checkbox"/>	10.220.101.190		
<input type="checkbox"/> 8: W5BJV	<input type="checkbox"/>	<input type="checkbox"/>	10.220.101.191		

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

Update

Done

Internet

100%

D-Star: - A brief history

- D-Star is a digital voice and data protocol specification developed as the result of research by the Japan Amateur Radio League (JARL) to investigate digital technologies for amateur radio.
- In 1999 an investigation was put into finding a new way of bringing digital technology to amateur radio. The process was funded by the Japanese government and administered by the Japan Amateur Radio League (JARL).
- In 2001, D-STAR was published as the result of the research and Icom entered the construction of the new digital technology by offering the hardware necessary to create this technology. D-Star is an open standard and well published and documented.
- JARL released significant changes to the existing D-STAR standard in late 2004. Icom, aware that the changes were coming, had placed the release of their hardware on hold for a period of as much as a year while they awaited the changes. As soon as the changes were out, Icom announced they would be able to finish up and release equipment.
- **First radios produced by Icom in 2004. IC-V82 (VHF), IC-U82 required optional D-Star board. Single band, 7 watt FM/D-Star HT with 200 memories. *Still commands big\$ in used market on eBay.***



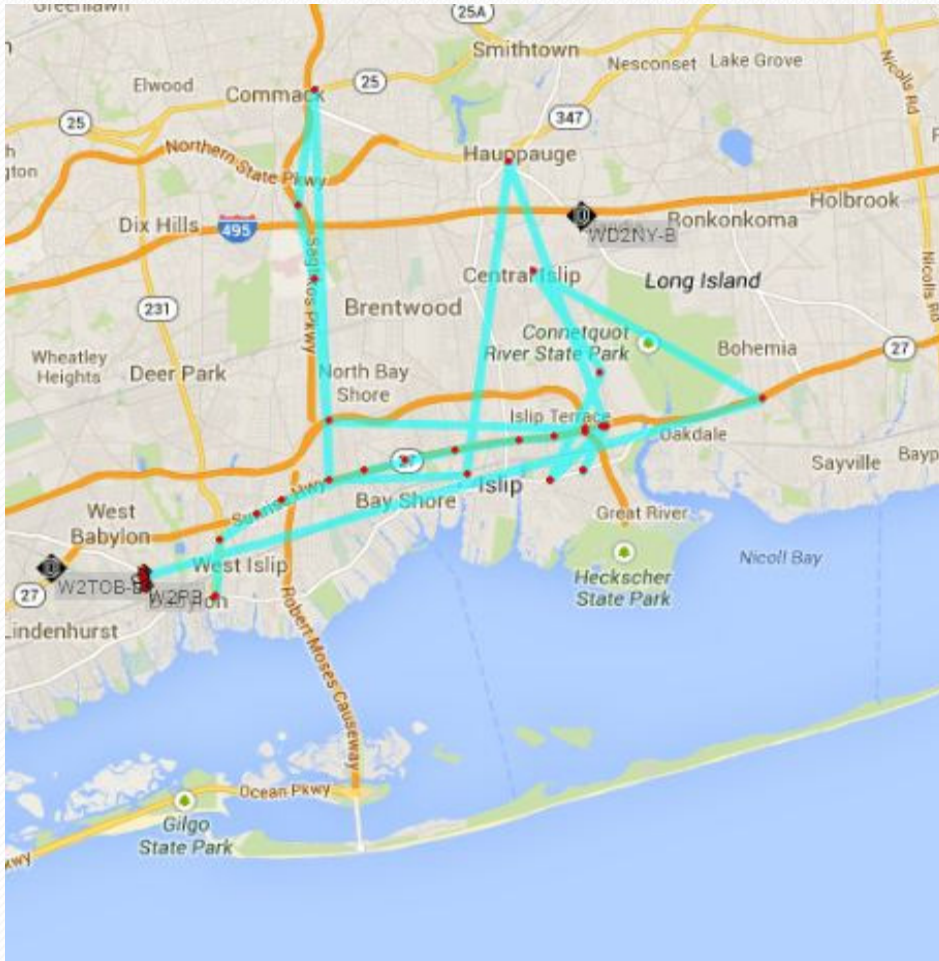
D-Star: - A brief history

- Original pricing for D-Star/FM transceivers v. standard FM transceivers were more than double.
- Current pricing is closing the gap, but the dual mode (D-Star & FM) transceivers still costs >40% more than standard FM transceivers.
- Technology coupled with software continue to offer more cost effective ways of implementing D-Star.
- Currently, other than Icom, no other amateur radio equipment manufacturer has chosen to include D-STAR technology in their radios. The technology requires the use of a proprietary AMBE Codec that is owned by Digital Voice Systems, Inc (\$).

D-Star:

- D-Star *is not* a replacement for:
 - Analog FM
 - SSB,
 - Packet
 - APRS
 - ***Even CW!***
- D-Star *is*:
 - ***Another communication tool in a radio amateur tool-box.***
 - Able to communicate ~23% further than analog FM for same S/N
 - Able to send slow speed data without additional hardware other than a cable and free software
 - Able to send APRS type data w/GPS through D-Star repeaters
 - Shows up on www.aprs.fi

D-APRS via www.aprs.fi



Unlike “packet radio”, if you do not press your PTT, your position is not transmitted.

<http://www.aprs.fi>

D-STAR

- **Advantages:**

- Its digital and therefore has less noise (when path is above QEF), but it does not mean that it is “better” audio.
- Can carry voice and data simultaneously
- Via D-APRS send APRS Icon and position data every time mic is keyed
- Call sign, name and text statement sent each time mic is keyed
- Works on VHF/UHF and now on HF
- Works as FM transceiver too
- Call sign is transmitted each time mic is keyed. No voice ID is legally required, but commonly sent like in FM transmissions.
- ***Imagine calling another station on the local repeater and regardless where they might be, your call will be routed to their last known repeater used location.***

D-Star

- **Disadvantages:**

- A D-star/FM radio costs more than just an FM (i.e. mobile) radio. But you are getting two radios in one.
- Requires AMBE encoder/decoder for transmission and reception.
 - Advanced Multi-Band Excitation (AMBE) is a very powerful proprietary speech coding standard developed by Digital Voice Systems, Inc.
- Because it is relatively new, it is sometimes misunderstood.
- Requires correct programming of up to four call signs in the radio to operate through a local repeater and wide area gateway.
 - **If you can hear only one half of a QSO it is likely that the station you are not hearing does not have RPT2 configured properly. (i.e. WD2NY-- G)**
- Unlike analog FM as it degrades, there is no indicator before you lose a D-Star link. You go from perfect copy to what is called “R2D2” very quickly. [Ennes’s Law]
- http://www.youtube.com/watch?v=WWY_abrtM9E

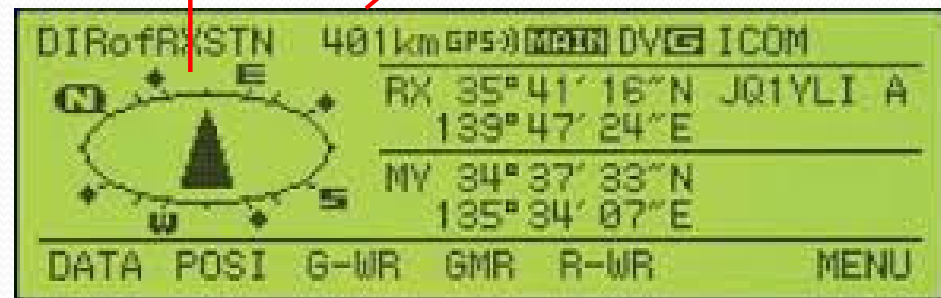
How D-Star is different

- D-Star radios convert your voice to digital before transmission.
- Additional information is included in the “digital stream” that is transmitted (and displayed on the receiving radio):
 - Your call sign (“MyCall”) is included – you never have to verbally “identify” again! *(On D-Star!)*
 - Other call signs are included when using the D-Star network.
 - You can set a short (4 character) “call sign tag” (your name or radio type), & a short (20 character) “identification string” that is included.
 - i.e. **W2PB /Paul IC-2820H Mobile-FN30 [Spaces count]**
 - **Simplex requires only two call signs, repeaters up to four call signs required.**
- **(Advanced) You can also include low-speed digital data or GPS positioning information.**
- D-Star signal as monitored on FM receiver.
<http://www.w2sjw.com/sounds/D-STAR.mp3>

ID-51A and IC-2820H Mobile GPS Displays:

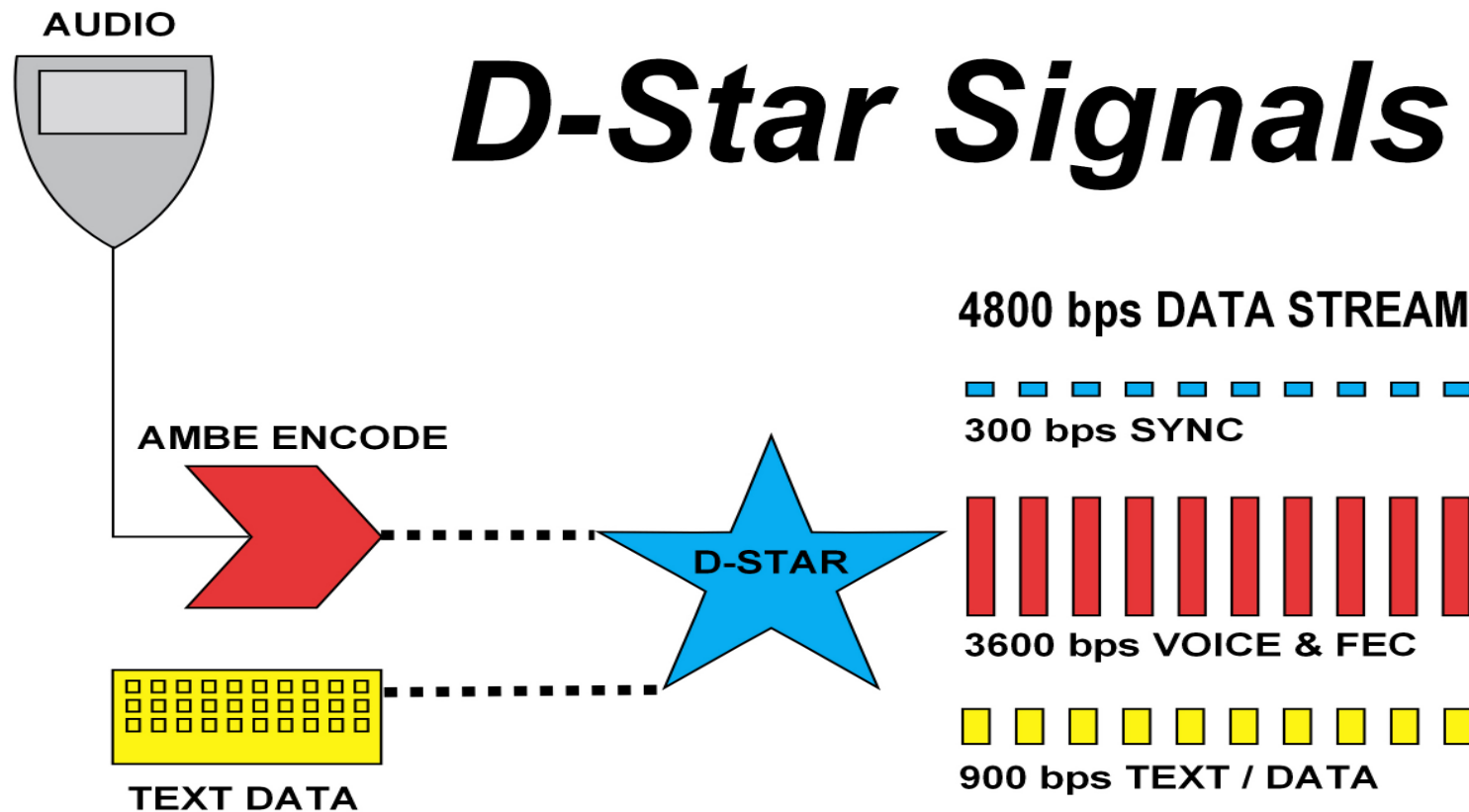
Direction

Distance



D-Star Bit Stream:

D-Star Signals



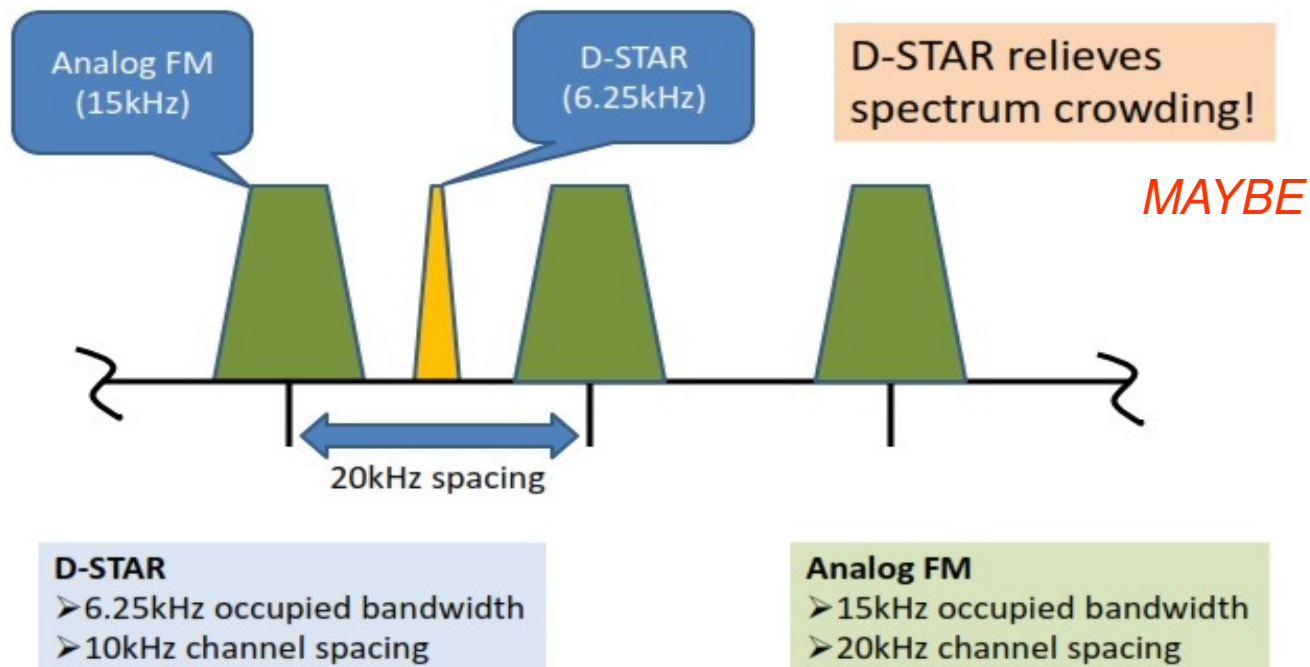


D-Star Bit Stream:

- In Digital Voice (DV) mode, a D-Star transceiver employs circuitry that converts voice audio, using proprietary AMBE encoding, to data packets.
- The packets are transmitted at a rate of 4800 bps, with *3600 bps used for voice and error correction*.
- The remaining 1200 bps are used for synchronization and general use, of which *900 bps are available for transmitting slow-speed text*.
- In addition to DV mode, a high-speed Digital Data (DD) mode can be sent at 128 kbps only on the 23cm band.

Bandwidth:

D-STAR Repeater Allocations





Repeaters Versus Reflector:

- Like analog FM repeaters, a local D-Star receive/transmit site is known as a repeater and serves the local area.
- A Gateway is a computer connected to the repeater which is also connect to the Internet.
 - Signals received and repeated are also sent over the Internet.
 - Gateways are inserted into “RPT2” field in radios and end with a “G” in the 8th character position. i.e. WD2NY--G
- A Reflector, is a network of individual repeaters tying many repeaters around the country or world together.
 - I.E. Refl020A connects D-Star repeaters in PA, NJ and NY.
 - Transmitting through one repeater means your signal is being transmitted by all the repeaters on the reflector.

D-Star call sign terminology

- The terminology is from the viewpoint of the communication link!
 - “**MyCall**” is really **YOUR** call sign; that is, you, the guy or gal holding the radio or microphone.
 - “**YourCall**” (also called “**UrCall**”) is really the call sign of the **OTHER** person, that is, the person you want to talk to. Normally set to “CQCQCQ”.
 - “**Rpt1Call**” and “**Rpt2Call**” (also called “**R1Call**” & “**R2Call**”) are also used. Think of them as “input” and “output” paths.
- Screen Sequence:
 - URCALL: CQCQCQ
 - RPT1: WD2NY<><>B
 - RPT2: WD2NY<><>G
 - MyCall: W2PB / Paul

<> = space

```
CALL SIGN
►UR: CQCQCQ
R1: RPT1AA
R2: NOT USE*
MY: MYCALL
/IC91
```

For simplex only “URCall” and “MyCall” have to be programmed.

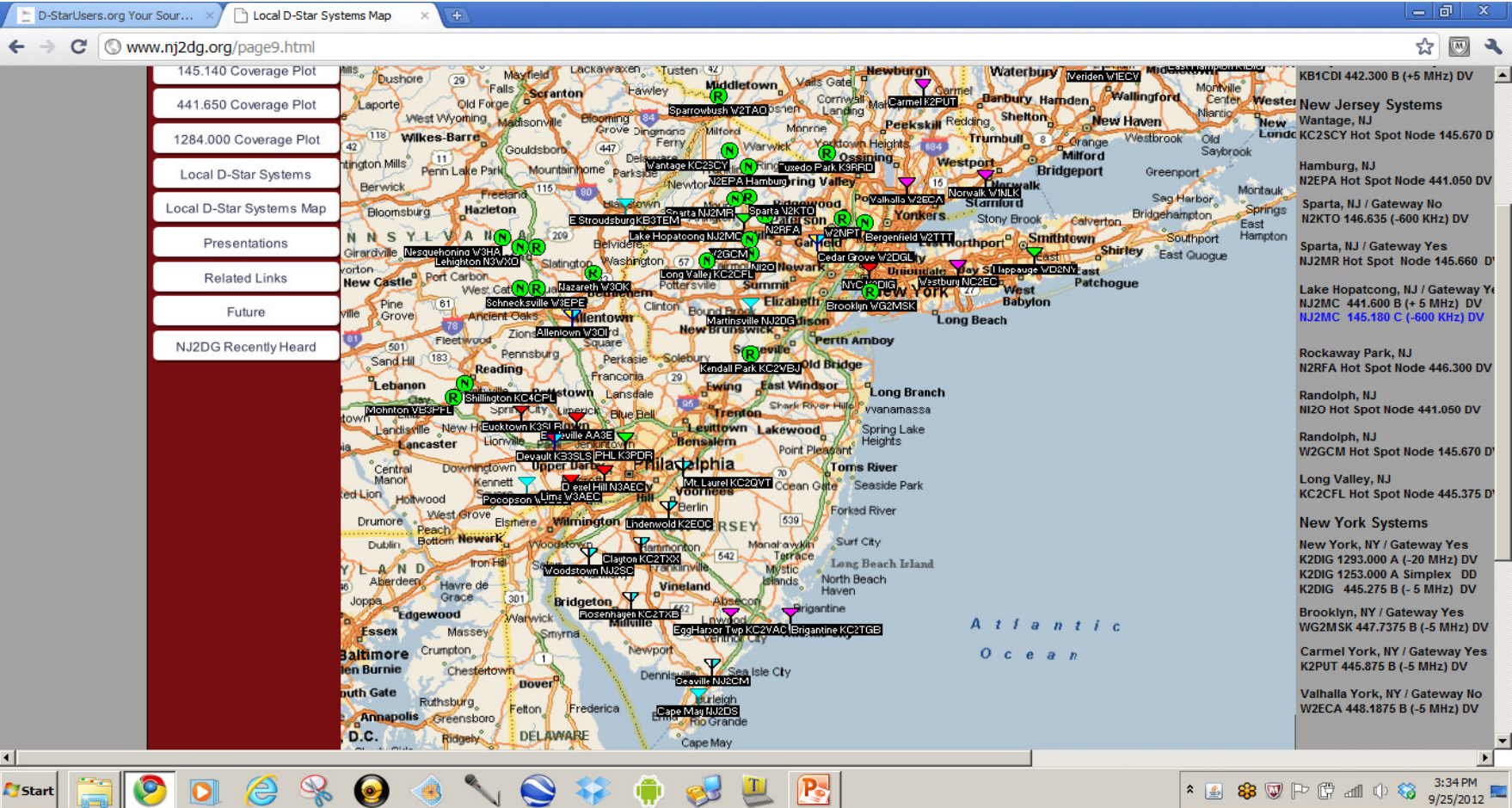
D-Star radio setup

- D-Star radios have two transmitting modes:
- Analog (FM –Frequency Modulation)
 - You just set the frequency/PL tone and talk.
- Digital (DV – Digital Voice)
 - You also set the frequency.
 - You must also (one time) enter your call sign.
 - **With D-STAR there is no “kerchunking” without a call sign through a repeater’s gateway to the Internet.**
 - Your call sign must go into the “MyCall” field and you must register your call sign with the D-Star system through ONE repeater.
 - Registration then allows you to use repeaters worldwide.
 - Without registration, you can only use simplex. Repeater will not recognize your call sign.



Using the local D-Star repeater

- The repeater module (“A”, “B”, or “C”) is inserted in the 8th character position of the repeater call, i.e. WD2NY--B
- Most D-Star repeater installations have more than one repeater. Each repeater is on a different amateur radio band. By convention:
 - The “C” module is on the “2m” band (144-148 MHz).
 - The “B” module is on the “70cm” band (440-450 MHz).
 - The “A” module is on the “23cm” band (1.2 GHz)
 - 128Kbps data speed for Internet access.



Recap:

Local D-Star repeater setup

- To set up your radio:
 - You **must** set (one time) your call sign into the “MyCall” field. (Fourth call sign field in your radio)
 - You should set the “YourCall” field to “CQCQCQ” or “/” (these are specially recognized values). (First call sign field)
 - You **must** set the repeater call sign & module into the “Rpt1Call” field. The module (“A”, “B”, or “C”) **must** be set in the 8th character position of the “Rpt1Call” field. (Third calls sign field)
 - *You can leave the “Rpt2Call” field blank for local usage.*

REVIEW: Call Sign Programming:

- URCALL : CQCQCQ
- RPT1 : WD2NY__ C (C [2Mtr] Module of repeater)
- RPT2 : WD2NY__ G (Gateway of repeater to Internet)
- MYCALL : W2PB /PAUL
- **Note:** Without a repeater or gateway programmed into “RPT2”, your signal remains on the local repeater only.

Getting on D-Star: Radios:



My field use HTs



Icom
IC-91AD



IC-92AD w/ GPS Mic



ID-31A w/ GPS



ID-1 (1.2 GHZ, 10W)



ID-880H

Dual
band,
single
band at
a time.

IC-2820H
Dual Band w/
cross band



My
current
mobile

New D-STAR HT: ICOM IC-51

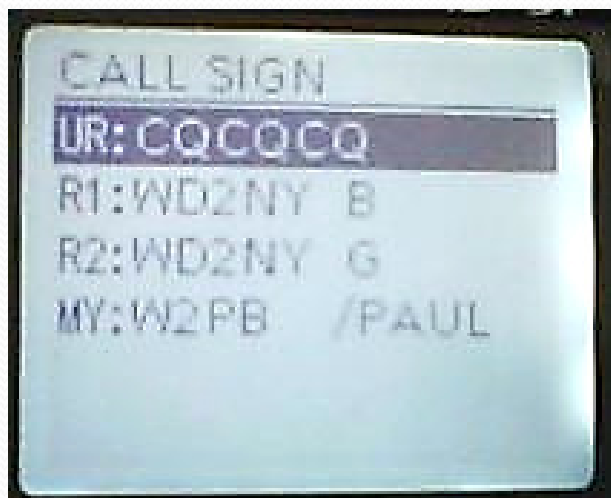
- Dual band HT, 2M/70cm (V/U, U/U, V/V), FM/D-STAR
- 5W, 2.5W, 1W 0.5W, 0.1W
- Built in GPS (top of radio)
- Able to provide GPS (NEMA) output
- Speech function (announcing function/ call signs)
- microSD slot for storing settings/memories
- 1304 memories including
 - Nearest Repeaters function

~\$600 US



www.icomamerica.com

ID-51 Menu Pictures



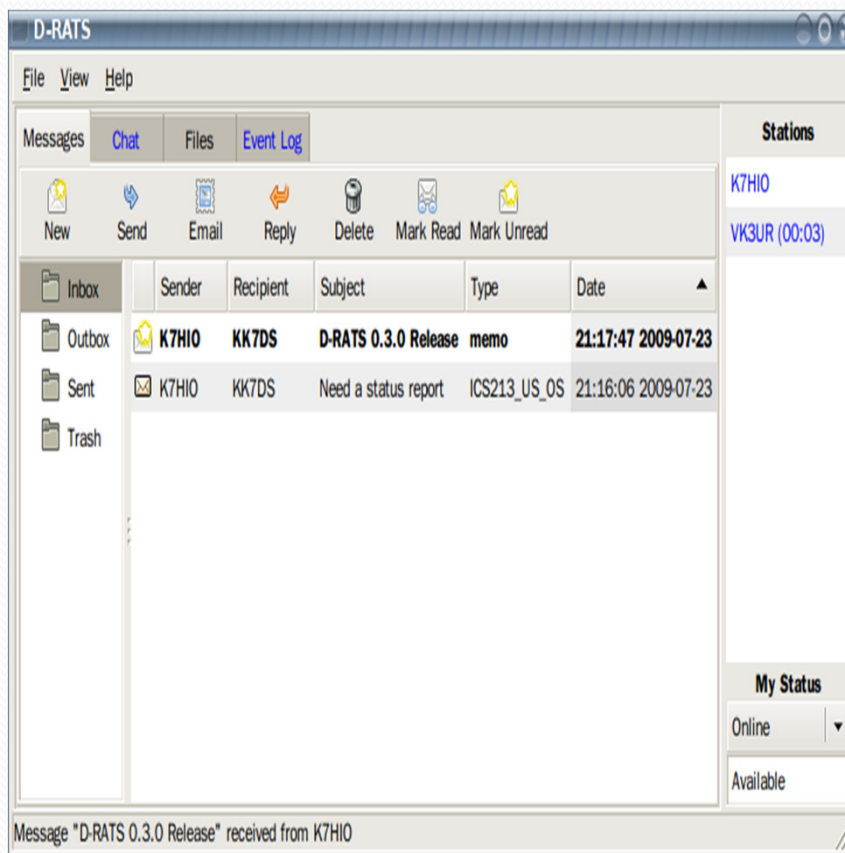


Low Speed Data:

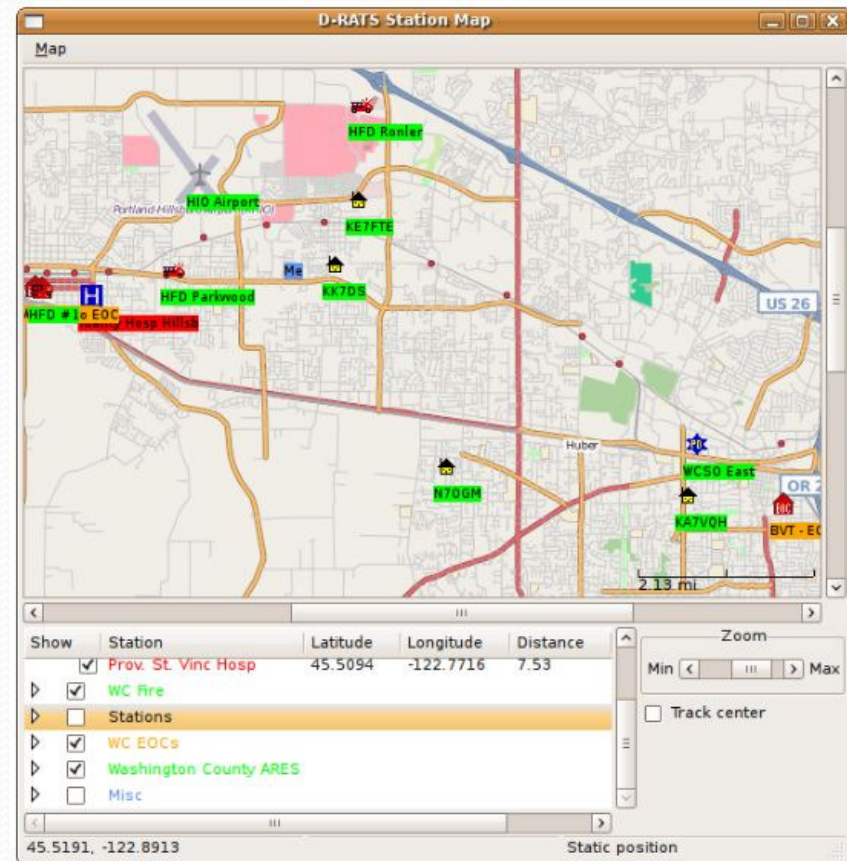
- Several “chat” and file transfer programs exists for use with D-Star.
- With D-Star both voice and data can be sent simultaneously, but the unit can only send or receive at one time. You can not listen to voice while sending data and vice verse.
- Most dominant program is D-Rats.
 - D-Rats can be used over a RF link via D-Star radios or,
 - Via the Internet.

D-RATS:

Computer-Internet or RADIO

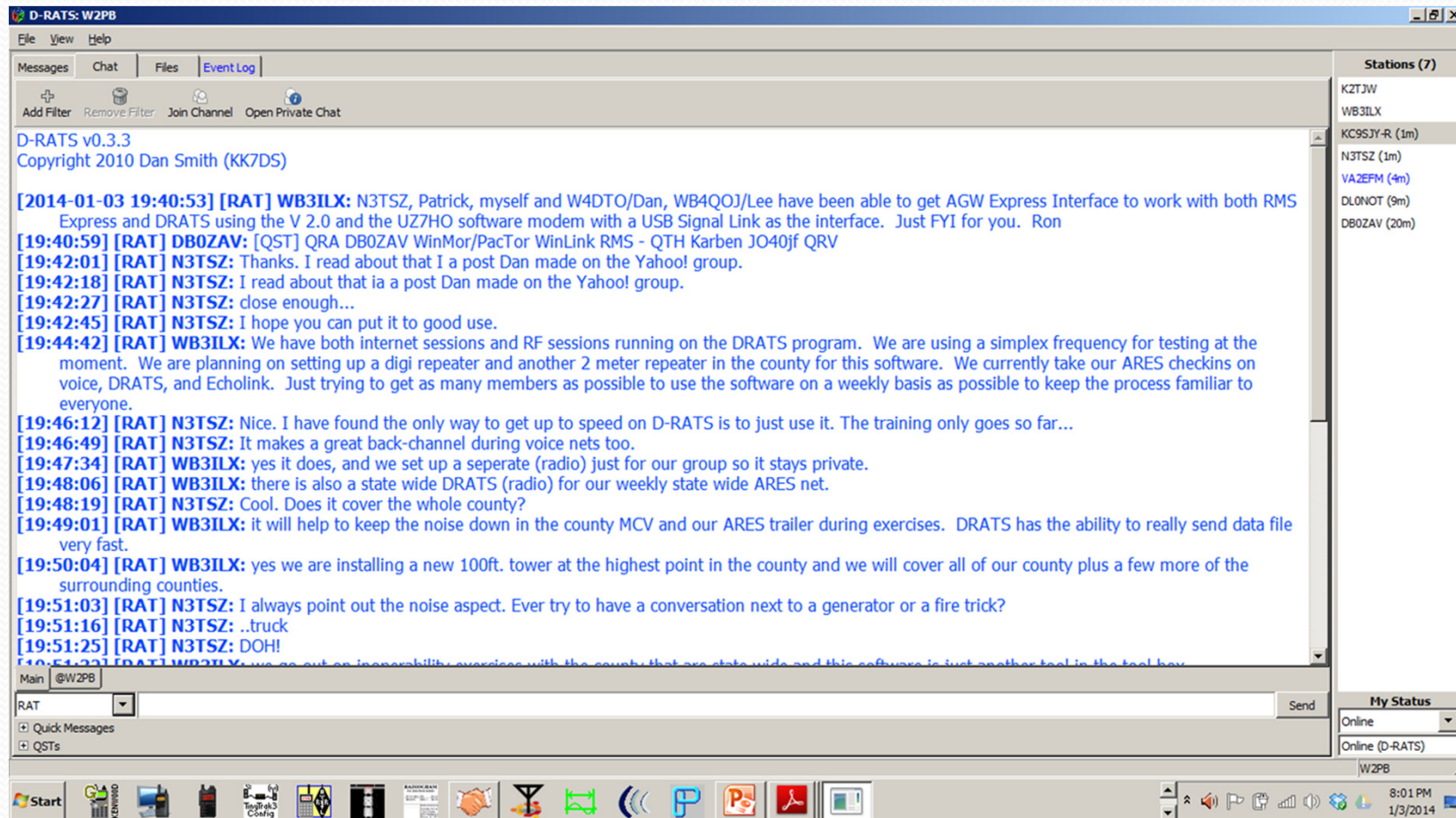


Messages Panel



Map Button Function

D-RATS CHAT PANEL:



Great Reference Book for the D-Star Newbie

Nifty E-Z Guide to D-STAR Operation



D-STAR Voice and Data Operating Modes
Gateway Registration and Usage
Call Sign and Gateway Call Routing
Setting Call Sign Memories
Short Text Messaging
DV Dongle and DV Tool Operation
Locating Repeaters and Last Heard Stations
i*Chat and D-RATS Digital Software Applications

Bernie Lafreniere, N6FN

Shortcuts:

- [DV Dongle:](#)
- [DVAP](#)
- [Hotspot:](#)
- [FA-DV Adapter:](#)
- [Non-Icom Repeater:](#)

- [Linking:](#)

QUESTIONS:

- *Any Questions?*

https://www.dropbox.com/s/kq59fkq80o5na39/D-Star_Basics_RCARC.ppt

- 
- D-STAR BASICS
 - Part Two



Talking around the world (D-Star)

- With most D-Star repeater installations, there is a local computer that also connects the repeater to the Internet.
 - This computer is called the “gateway”.
 - However, it is the user’s radio, not the gateway, that converts the audio to a digital signal before transmission, and decodes it upon reception.



Talking around the world (FM)

- Using no RF at all you can connect an USB device, known as a **DVDongle**, (DV=Digital Voice) to your computer to use the Internet to connect to local, regional or any word-wide gateway connected repeater.
 - What repeater(s) transmit your D-Star audio is a function of the computer software.
- Using your HT and a DV Access Point (**DVAP**) and a computer with an Internet connection you can have the same connectivity. Where your signal is remotely transmitted is controlled by your HT.

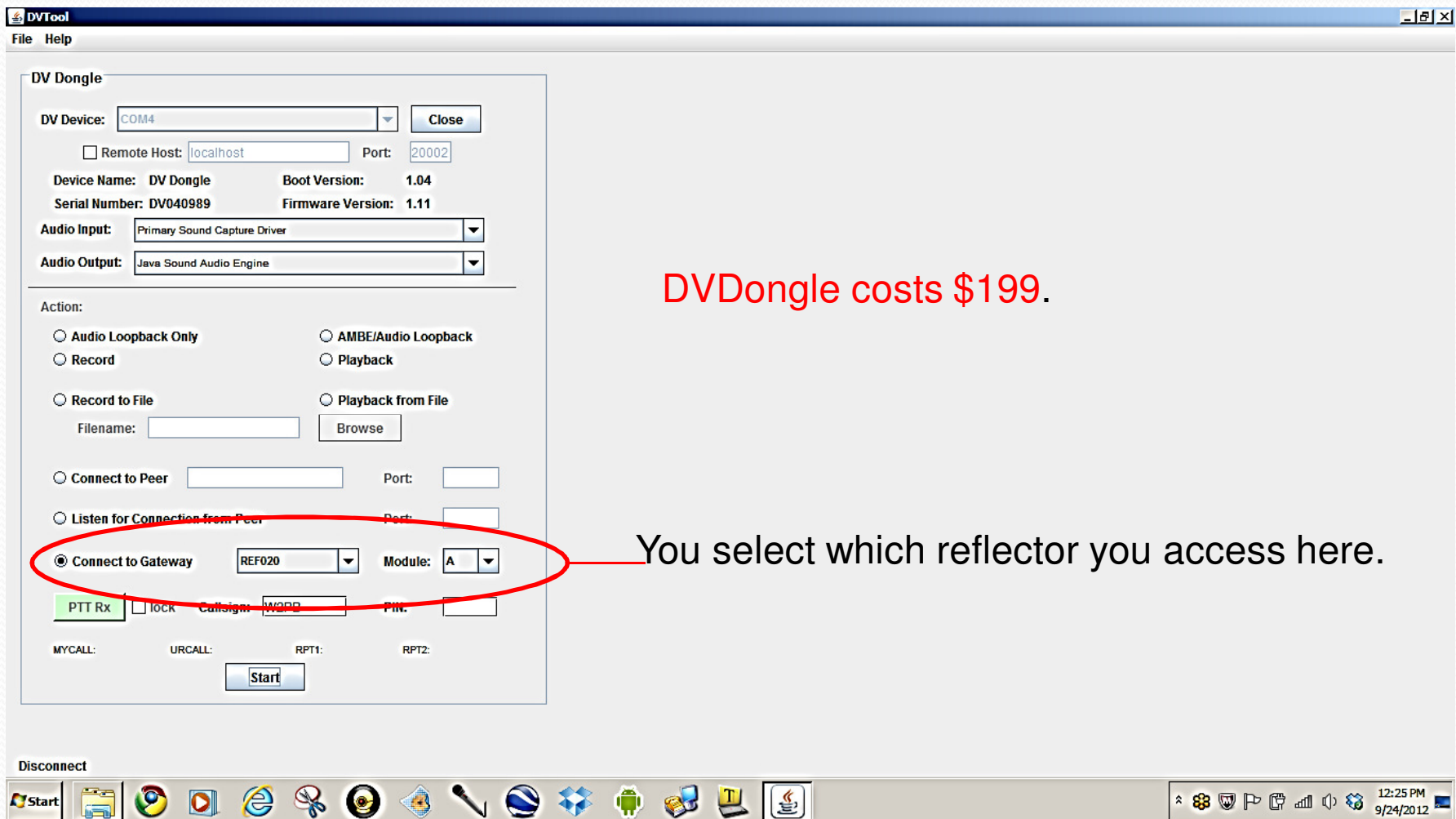
Getting on D-Star:

D-STAR DV Dongle

Access D-STAR radios and repeaters from your computer!



DV Dongle Software:



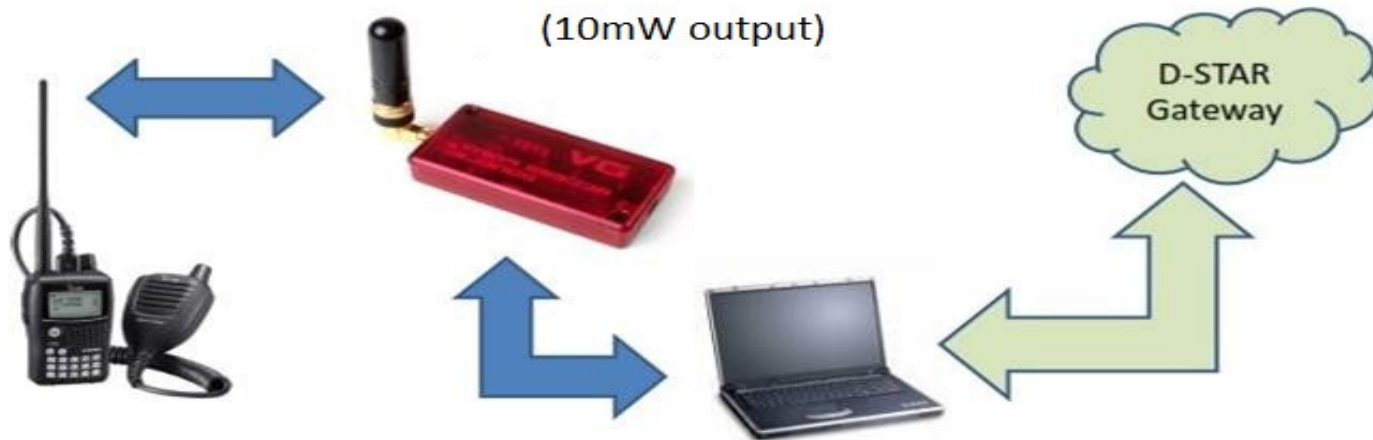
DVDongle costs \$199.

You select which reflector you access here.

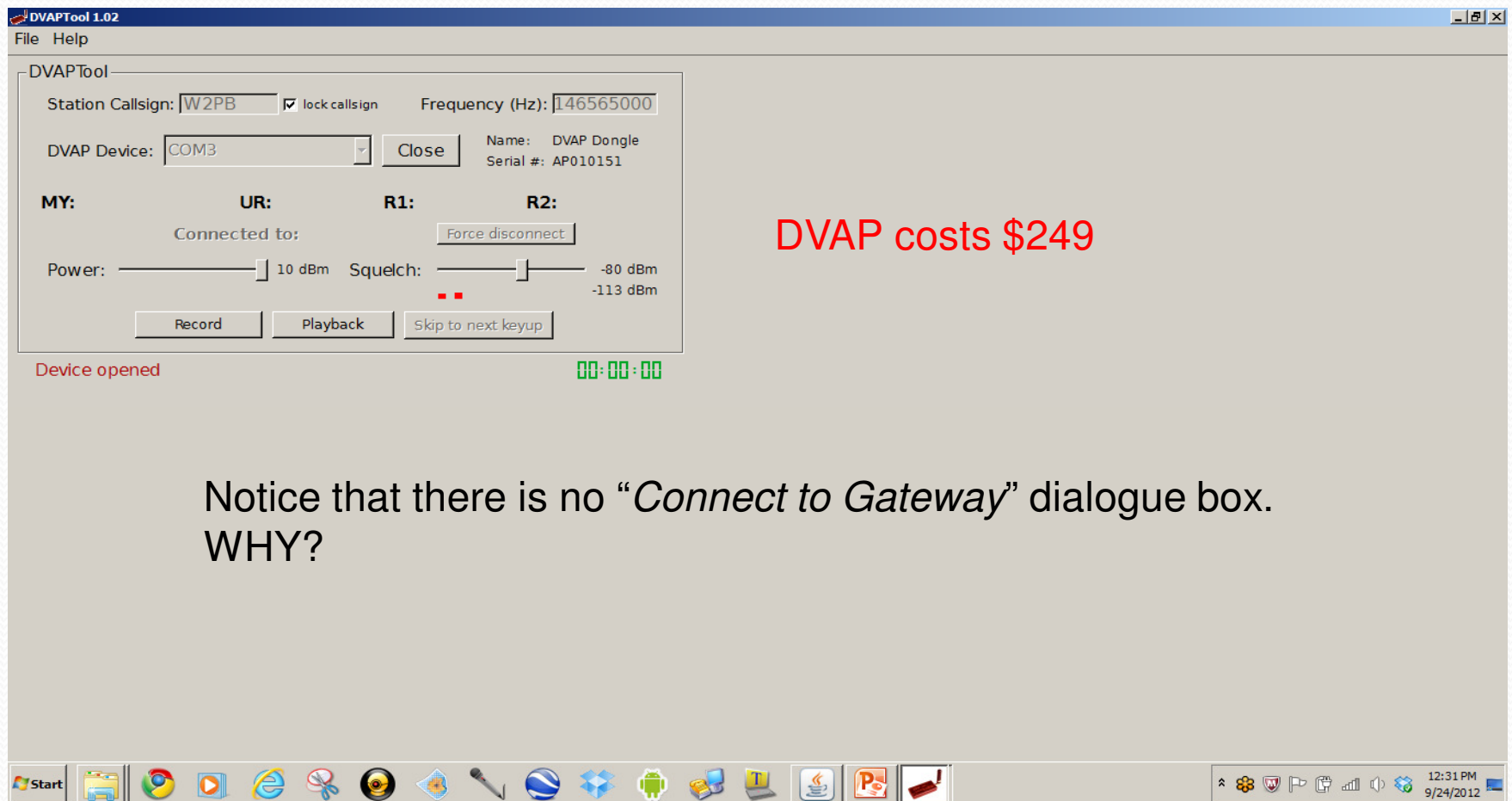
Getting on D-Star:

D-STAR DV Access Point (DVAP)

Lets D-STAR radios access the network when repeaters are not available!
A simplex 'digital hotspot' for D-STAR (similar to a WiFi hotspot)



DVAP Software:



DVAP costs \$249

Notice that there is no “*Connect to Gateway*” dialogue box.
WHY?

Getting on D-Star:

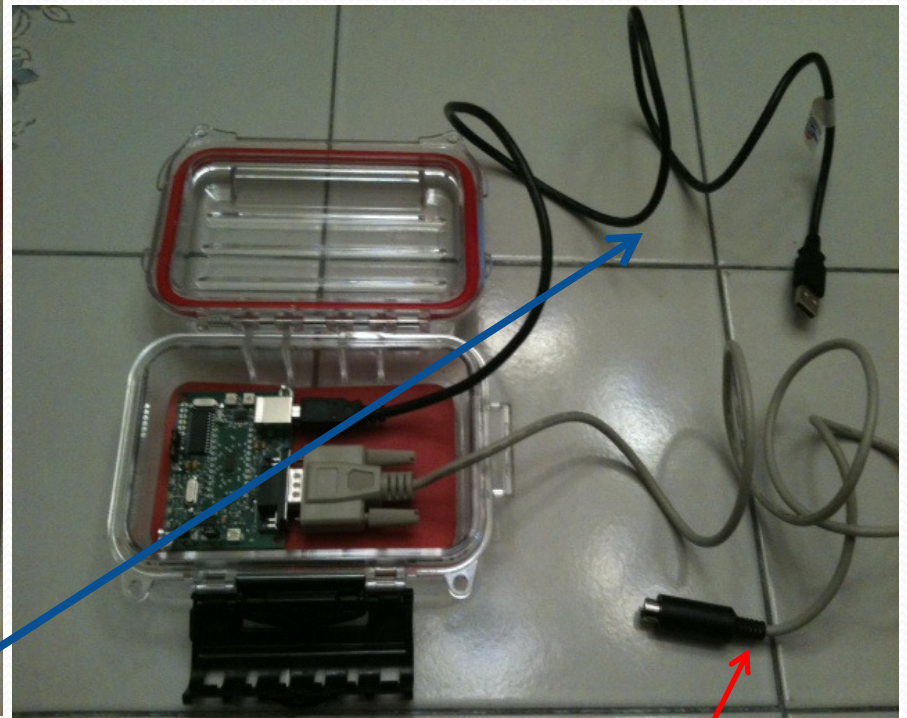
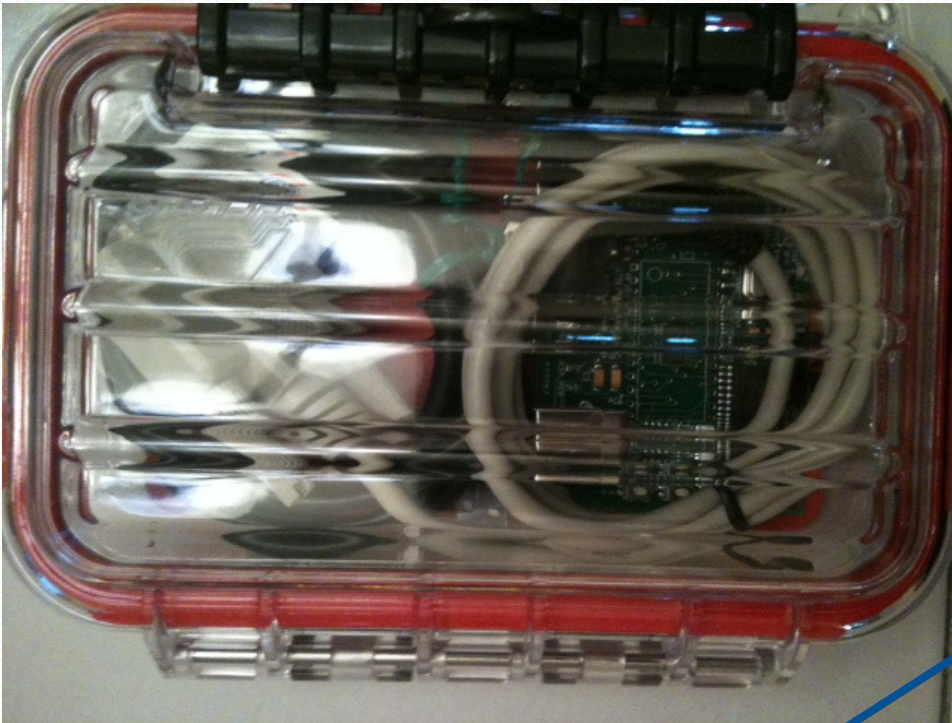
D-STAR Hotspots

D-STAR Hot Spot - System Diagram



D-Star Hotspot:

Hotspot board costs \approx \$120



Requires:

(1) USB connection to your PC

(1) Cable to 9600 baud port on radio



*“Is there anything I can add
to my analog radio to
receive/transmit D-STAR?”*

The answer is “Yes.....but...”

FA-DV Adapter:

- Plugs into the 9600 Baud Packet Port on your transceiver
- Allows VHF/UHF FM D-Star and
- HF narrowband FM D-Star
- All without any modification to radio, wiring, antenna, etc.



Why have a FA-DV Adapter?

- Can convert any analog FM transceiver to D-Star capability via radio's 9600 baud Packet port
- If you are deployed to a non D-Star capable EOC, or any other site with a typical analog FM transceiver, connection is not required to antenna, power supply, etc.

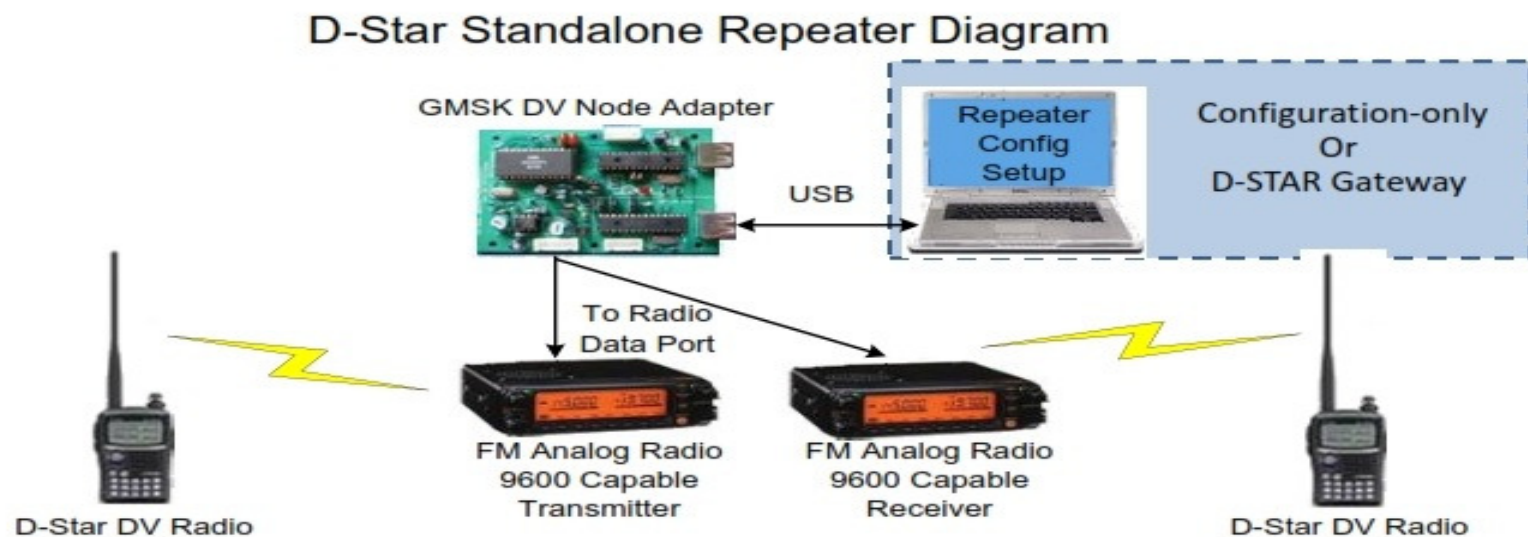
Can also be used on HF



No extensive re-wiring!

Building Your Own Repeater:

Make-shift D-STAR Repeater



www.kc7key.org/presentations/D-Star%20Hotspot.ppt

“Flat audio” must be used for receive and transmit.



The D-Star network

- There are four ways to communicate with other users on other D-Star repeaters, using the D-Star network:
 1. “Repeater routing” – this is part of the original D-Star design.
 2. “Call sign routing” – this is part of the original D-Star design.
 3. Using “repeater linking” – this capability was added by “D-Plus”, a gateway software add-on.
 4. Using “reflector linking” – this capability was added by “D-Plus”, a gateway software add-on.
- #s 1 & 2 are slightly complex, and if both you & the other user don’t “get it right”, you will not be able to talk.
- #s 3 & 4 are much simpler to setup & use, and often the repeater is already set in that mode.

Linking/Routing Summary:

CALL TYPE	URCALL	RPT1 CALL	RPT2 CALL	DESCRIPTION
SIMULCAST	WA6IRC_	WA6IRC_C	WA6IRC_G	Transmit on all 3 local DV ports
CALLSIGN ROUTING	K2CFA	WA6IRC_C	WA6IRC_G	Route call to last location K2CFA was heard
REFLECTOR LINK START	REF001CL	WA6IRC_C	WA6IRC_G	Start link to C module on REF001 After hearing "Linked" message change URCALL to CQCQCQ.
GATEWAY QSO	CQCQCQ	WA6IRC_C	WA6IRC_G	Sends DV traffic to remote Gateway or Reflector
UNLINK	_____U	WA6IRC_C	WA6IRC_G	Drop the Gateway or Reflector link
LOCAL RF ACTIVITY	_____A	WA6IRC_C	WA6IRC_G	Last local RF user via text message
GATEWAY LINK STATUS	_____IX	WA6IRC_C	WA6IRC_G	Plays audio files describing current link configuration
ECHO TEST	_____E	WA6IRC_C	WA6IRC_G	Plays back your transmission
REPEATER ID	_____I	WA6IRC_C	WA6IRC_G	Repeater ID if unlinked; "System Linked" message if linked

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D-Star network basic setup (1)

- To use **any** of these D-Star network modes, you must specify the “Rpt2Call” field:
 - The “Rpt2Call” field designates the gateway computer, which is considered the “G” D-Star module.
 - In the USA, the “Rpt2Call” field also contains the **local** repeater call sign (never the remote repeater or gateway).
 - You **must** set the gateway call sign & module into the “Rpt2Call” field. The module (“G”) **must** be set in the 8th character position of the “Rpt2Call” field.



D-Star network basic setup (2)

- “MyCall” is set to your call sign.
- “YourCall” is initially set to “CQCQCQ” or “/” (the latter is recommended on Icom IC-80AD and ID-880H radios).
- “Rpt1Call” is set to the local repeater call sign, with the module (“A”, “B”, or “C”) in the 8th character position of the “Rpt1Call” field.
- Even for local repeater calls, it is best to always set “Rpt2Call” to the local gateway call sign, with the module (“G”) in the 8th character position of the “Rpt2Call” field.



D-Star “network routing” overview

- Advantages of call sign routing:
 1. You can call another user without knowing which repeater that user is currently on.
- Limitations of repeater or call sign routing :
 1. You can't hear what is happening on the remote repeater.
 2. You usually need to initially announce that you are remote, so that the remote user(s) know to set up their radios for repeater or call sign routing.
 3. If the remote user doesn't setup his/her radio correctly, you will be unable to have a successful two-way conversation.



D-Star “network linking” overview

- Advantages of repeater or reflector linking:
 1. You can hear what is happening on the remote repeater(s).
 2. The remote user does not need to configure his/her radio in order to respond.
 3. A repeater can be left in this configuration for new users.
- Limitations of repeater or reflector linking :
 1. You can't call another user without knowing which repeater that user is currently on.



D-Star networking details

- The details of repeater & call sign routing, and repeater & reflector linking, are not covered in depth in this presentation.



D-Star network commands

- These commands only work if:
 1. You have set the “**Rpt2Call**” field to specify your local gateway (otherwise the gateway will never see them).
 2. Your local gateway **must** be running:
 - “**D-Plus**”, the gateway software add-on (written by Robin Cutshaw / AA4RC) to Icom’s gateway software; or
 - “**D-Extra**” software on systems running non-Icom gateway software.
- These commands are set into the “**YourCall**” field of the radio. You key your radio to send the command to the gateway.



D-Star network commands

- Other D-Star network commands are available, but not described in detail here:
 - Report the current repeater state (i.e, linked). [-----I]
 - Link to another repeater or reflector. [REF030AL]
 - Unlink from any other repeater or reflector. [-----U]



“Can you hear me now?”

- (with apologies to Verizon’s advertizing slogan).
- Ever want a **truly objective** signal report? Use the “echo” command:
 - Program a “YourCall” value of seven (7) spaces, followed by an “E” in the 8th (module) position.
 - Key your radio & speak a short test message of your choice (I recommend using the words “echo test” in it).
 - When you unkey your radio, the gateway will play back (“echo”) your transmission.
 - Remember to change your “YourCall” value back to **CQCQCQ!**



A Word About “Reflectors”

- Reflectors are used to link many repeaters into a regional coverage area.
 - i.e. REF001C is a worldwide chat reflector
 - REF010C is New England repeaters
 - REF012A is California repeater linking
 - REF020A is New Jersey/NY repeaters
 - REF030C is Southeast US repeaters
- Here is a list of current reflectors:
 - <http://www.dstarinfo.com/reflectors.aspx>
- Here is the “dashboard” (status) for Ref020A
 - <http://ref020.dstargateway.org/status.html>



YouTube Videos

- Weather Net on Reflector 002A (REF002A):
 - http://www.youtube.com/watch?v=WfZ_LciQruc&feature=related
- Weak Signal FM versus D-Star:
 - <http://www.w2sjw.com/sounds/Weak%20Signal%20D-STAR.mp3>



Comments:

- On the net video both the Net Control and the check-ins could have given instructions and reports by using the “TX Message” feature (20 characters) of their D-Star radios.
 - EXAMPLE:
 - Net Control: “Give loc/wx report”
 - Checkin: “Nararre FL 48F W12 clr”
 - Checkin: “Mobile AL 32F FR”



“We interrupt this presentation for an emergency message!”

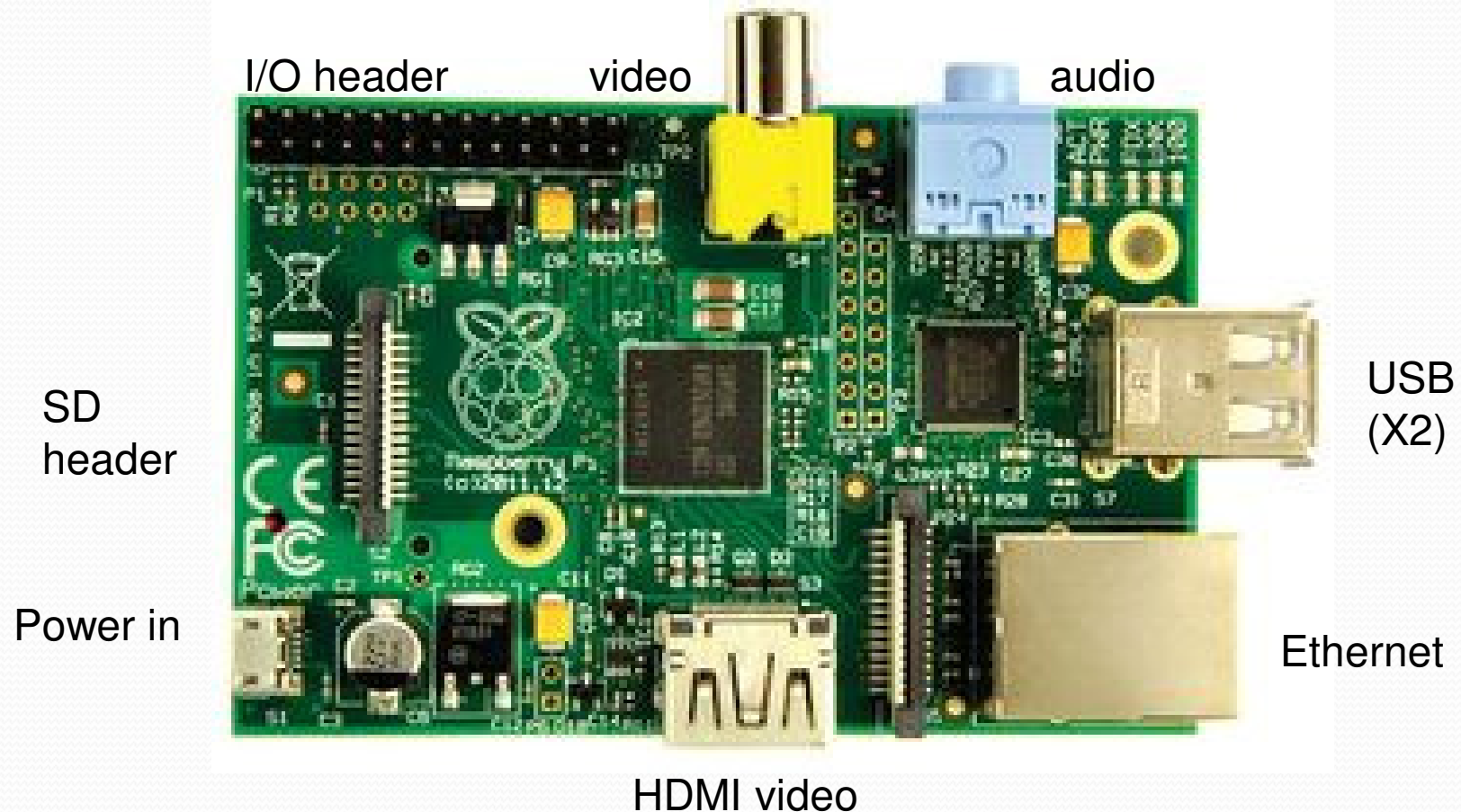
- D-Star also allows for “Break-In” and “Emergency” break-in into QSOs.
- By configuring “URCALL” to “BRK” you can break into a QSO even if the stations are using selective call sign routing or call sign squelch.
- You can also break in with “emergency” traffic by configuring “URCALL” to “EMG” you can break into a QSO and also raise receiving stations volume, even when their radios are turned down.



Anyone for a piece of Raspberry “Pi”?

- Recently a device call “Raspberry Pi” has been introduced to D-Star.
- It is a very small (size of deck of cards) computer than can run D-Star gateway software.
 - No keyboard, monitor or mouse is required one software has been loaded.
- Raspberry Pis are in use running DVAP, DV Dongles, gateways, etc.
- Cost for basic board is \$35 but there is \$45-50 when ordering with an optional plastic case

Anyone for a piece of Raspberry “Pi”?



Raspberry Pi + DVAP = “the world”

Driving to
Florida?

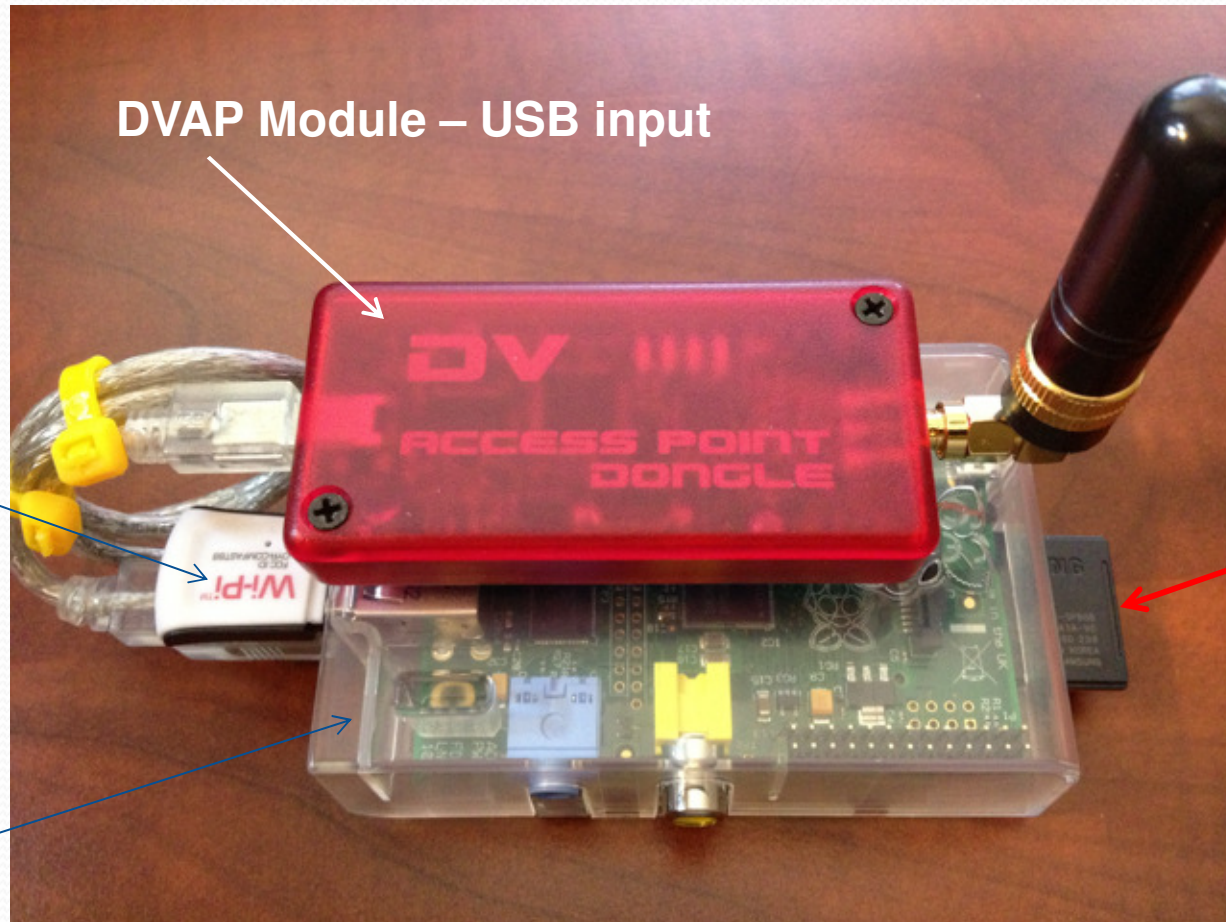
-Use this with a
cell phone WiFi
connection to
stay in contact.

WiFi
dongle

Raspberry Pi
Computer

DVAP Module – USB input

SD
Memory
card



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Raspberry Pi and D-Star

- What's required:
 - Raspberry Pi model B,
 - WiFi adapter and network to connect to for Internet access,
 - 8 GB SD card with "Wheezy" OS, and D-Star software
 - a. DVAPTool, VNC, ircddb software, or
 - B. DVAPTool (AA4RC's version)
 - USB A to mini A cable to connect DVAP to Pi
 - DVAP (Red box)
- What does it look like?

Raspberry Pi + DVAP = “the world”

- Connects to:
 - All the repeaters around the US and the world,
 - All the Reflectors (groups of repeaters) around the world.
- [Time for a short video should Rpi + DVAP in action](#)

Around the World with D-Star

Reflector	Usage	Location
REF001A		Aurora IL, United States
REF001B	Illinois D-STAR repeaters	Aurora IL, United States
REF001C	D-STAR's MegaRepeater	Aurora IL, United States
REF002A	Southeastern US D-STAR Weather Net	Nebraska, United States
REF002B	Some Nets	Nebraska, United States
REF002C	Some Nets	Nebraska, United States
REF003A	Ad-hock & Emergency Use - Australia	Australia
REF003B	Permalink for Repeaters, including all WIA Port B Repeaters – Australia	Australia
REF003C	Australian Nets	Australia
REF004A	Alternate for Southeastern US D-STAR Weather Net	United States
REF004B	Texas Permalink Repeaters	United States
REF004C	General Rag Chew (English only please)	United States
REF005A	UK Nets, Permalink Repeaters	London, England
REF005B	French Language - Swiss and French users	London, England
REF005C		London, England
REF006A	Scottish Net	London, England
REF006B	Denmark, Sweden, and Norway Repeaters	London, England
REF006C	German Net	London, England
REF007A		Italy
REF007B		Italy
REF007C		Italy
REF008A	Japan G2 repeaters, DVDongles and DVAPs	Japan
REF008B	Japan G2 repeaters, DVDongles and DVAPs	Japan
REF008C	Japan G2 repeaters, DVDongles and DVAPs	Japan

In Closing:

- You don't need a D-Star transceiver to get on D-Star.
 - You can use a DV-Dongle (\$199 new)
 - You can use a DV-Access Point (\$249 new)
 - A high power version of the DVAP is known as a "hotspot". (\$120)
 - Used D-Star HT's are on Ebay sometimes for as little as \$250 (IC-91AD), or less,
- **Be careful when purchasing used D-Star equipment and check twice that the transceiver comes with the D-Star board (UT-xxx).**
 - If not, the D-Star board could set you back \$200-250.
 - Only D-Star HT radios that comes with GPS and D-Star board as stock is the ID-31A and its' follow on ID-51A.



D-Star network information

- Icom web site: www.icomamerica.com. Click on “D-Star”
- Icom’s On-Line D-Star Training Course:
 - [http://proficia.com/tampadstar/Gateway cert training.pdf](http://proficia.com/tampadstar/Gateway_cert_training.pdf)
- www.DstarDB.com (tracks D-Star usage)
- www.dstarinfo.com (D-Star programming calculator)
- www.dstarusers.org (D-Star repeater list)
- www.jfindu.net (and other APRS stuff)
- www.aprs-is.net/DPRSCalc.aspx (D-PRS calculator)
- D-Star Basics www.dstardb.net/media/D-Star_Basics.ppt
- wiki.ncrdstar.org/images/c/c5/ARRL_DSTAR_Webinar_Session
- **Plenty of YouTube™ videos on D-Star**



Thank you for your attention.
Any Questions?

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