



Washington Digital Radio Enthusiasts

Getting the most of your 2nd
generation D-STAR transceiver with
the Spokane D-STAR repeater




OWNERS:

GLEN-K1RR & RANDY-W4LKS



BASICS

WHAT IS D-STAR?

- Real-time digital voice encoding and decoding specifically designed for Amateur Radio.
 - End-to-end digital routing of voice and data simultaneously.
 - Encoded at the microphone, decoded at the speaker.
 - Robust Internet based infrastructure to route voice and data streams.
 - DPLUS added Many features, including linking and reflectors.
- 
- 
- 

Some FAQs

Q: How come we can't have D-STAR on the analog repeater system?

A: D-STAR is all digital. FM receivers would only hear hissing.

Q: How much bandwidth does D-STAR use?

A: Voice uses 1200 bps, Data uses 1200 bps for a total bandwidth of 2400 bps modulated over the air with FM using a 6.25 khz wide swath of the spectrum.

Q: Is D-STAR secure?

A: NO! FCC rules do not allow encryption to conceal messages. Anyone can hear what you say and see what you type.

Q: Why do the ICOM D-STAR capable transceivers cost so much?

A: Patented technology used, No real competitors until recently, it's ICOM. Other manufacturers could make a low-cost D-STAR transceiver, but none have.

Sample of D-STAR Audio

2ND GENERATION TRANSCIVERS

- Transceivers with “DPLUS Features”
- ICOM radios with “To” and “From” fields in the display.
- Has DR memories

ID-31
\$295



ID-51
\$495



ID-5100
\$600 to \$850



IC-7100
\$1,275

REPEATER HARDWARE

- 443.125 Mhz DV “B” module
- 1293.3 mhz DV “A” module
 - ICOM IC-9100
 - ICOM ID-1
- 1249.0 DD transceiver
 - ICOM ID-1 Only
 - Would be a great for emergency services!
- No 2M DV “C” module
- Gateway computer, Linux, Robust
- Site Host: SHMC/Providence



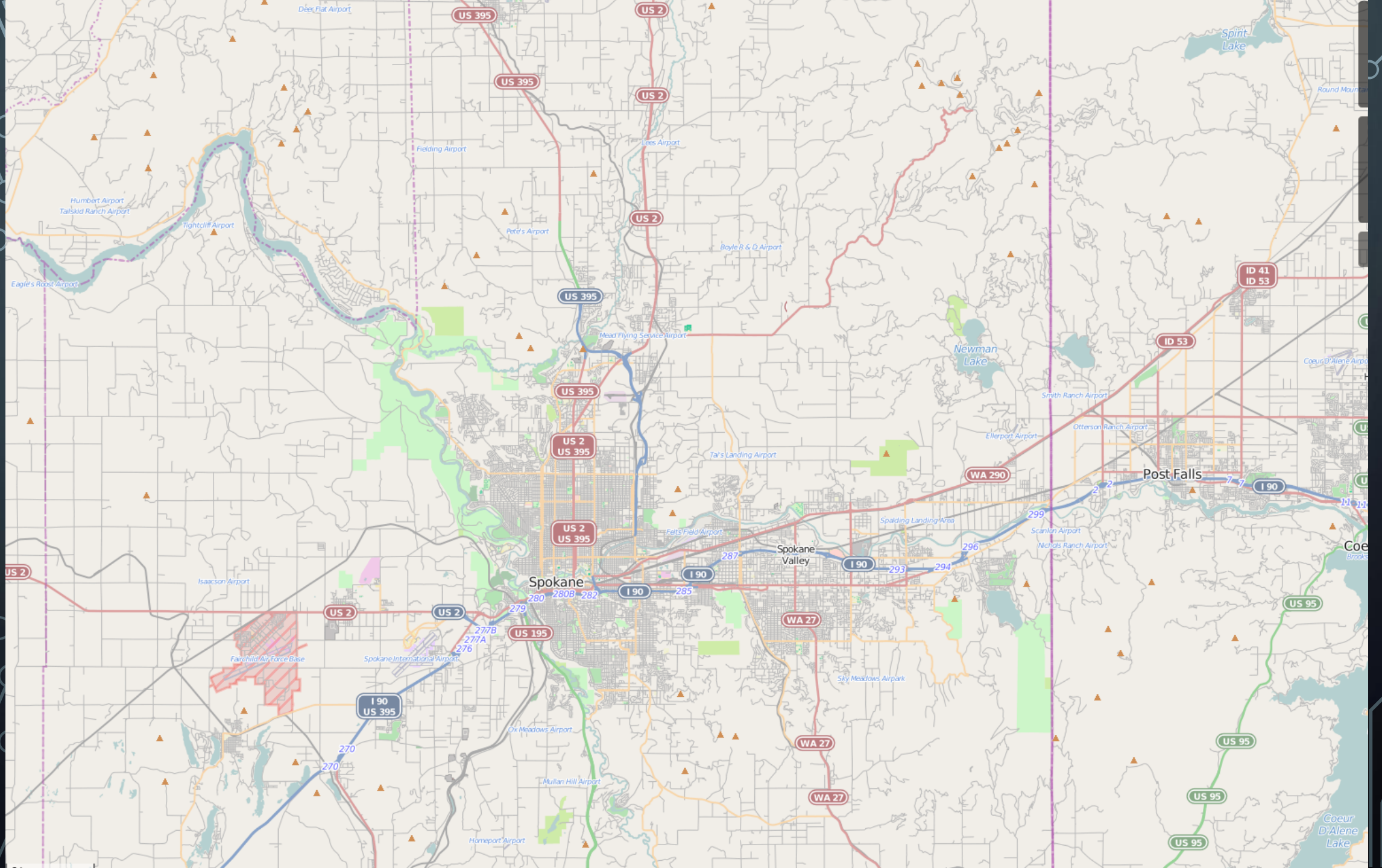
Many cavity filters

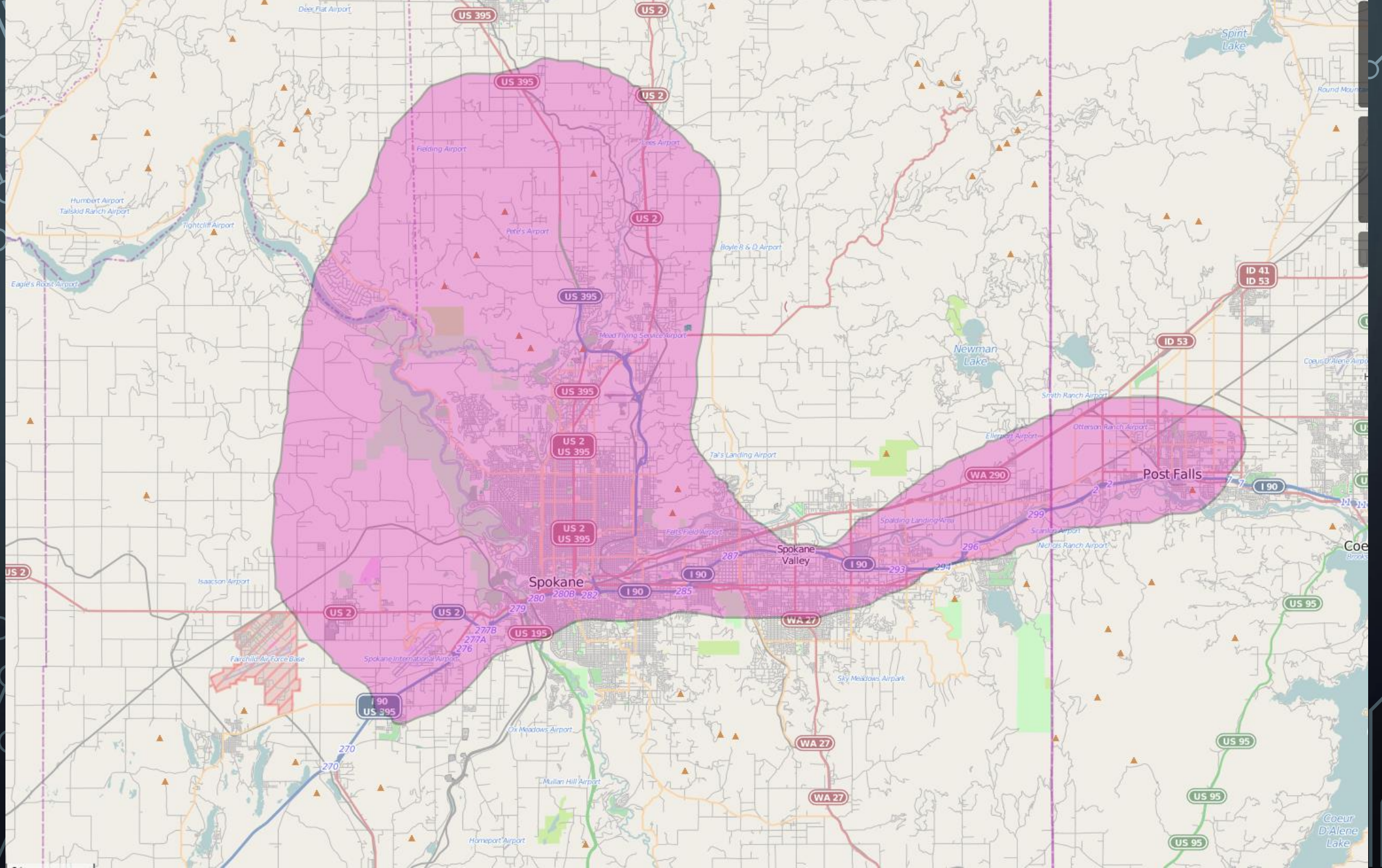


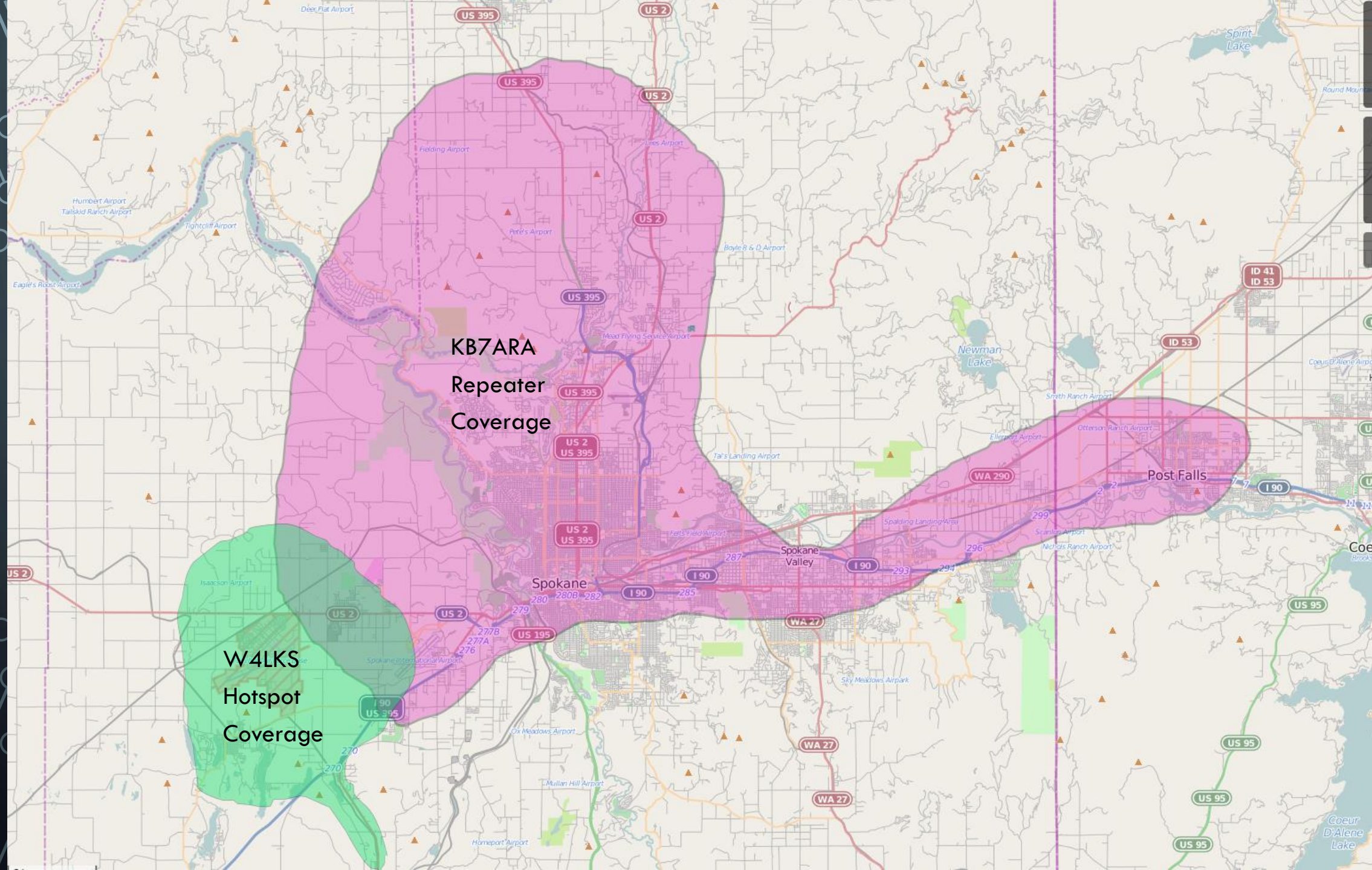
ANTENNAS

Tom-K7TNS is touching the 1.2 ghz D-Star antenna, Directly behind him is the 440 D-Star Antenna. Both mounted on stainless steel masts.









WHAT DO I NEED?

D-STAR Transceiver

Register your callsign

Good Options:

- SD Card to record QSOs and transfer files.
- Computer for programming frequencies
- RT Systems Software and cable for programming
- DVAP

DPLUS Dashboard | Gateway Status and Control

Registration | KB7ARA Repeater System | DPLUS version 2.2k

Linked Gateways / Reflectors

Module	Linked to
A	REF035 C
B	REF001 C
C	unlinked
D	unlinked
E	unlinked

Remote Users

Callsign	User Message	Last TX on	Type
W7SSK		listening	DV AP

Last Heard

Callsign	User Message	Last TX on	Time
W4LKS	Randy..Spokane..2820	B	2014/09/19 15:45:47
WA7BFN	5100	B	2014/09/19 14:57:29
K7HRT	K7HRT 73	A	2014/09/19 11:13:35

Status as of 2014/09/19 21:40:29

AUTOMATIC LINKING

Normal Schedule:

Monday thru Saturday, 6am – 10pm Connected to WA reflector, Module C (REF035C)

Sunday, 6am – 4pm Connected to WA reflector, Module C (REF035C)

Automatic reconnects at 9am, Noon, 3pm, 4:10pm

Regular Nets:

Saturday, 7pm Pacific – Saturday Night D-STAR net, REF035C

Sunday, 5pm Pacific – International D-STAR net, REFO001C

Before “DPLUS Features” were added

▪ = Single Space Char

MYCALL	W4LKS ▪ ▪ ▪
URCALL	CQCQCQ ▪ ▪
RPT1	KB7ARA ▪ B
RPT2	KB7ARA ▪ G

Using “D-PLUS Features”

2nd Gen Transceivers

Separate TO and FROM memory banks

URCALL TO	CQCQCQ ▪ ▪
RPT1 FROM	KB7ARA ▪ B
RPT2	KB7ARA ▪ G

What Goes In The TO Field?

CQCQCQ ▪ ▪ TX to the repeater, no callsign routing

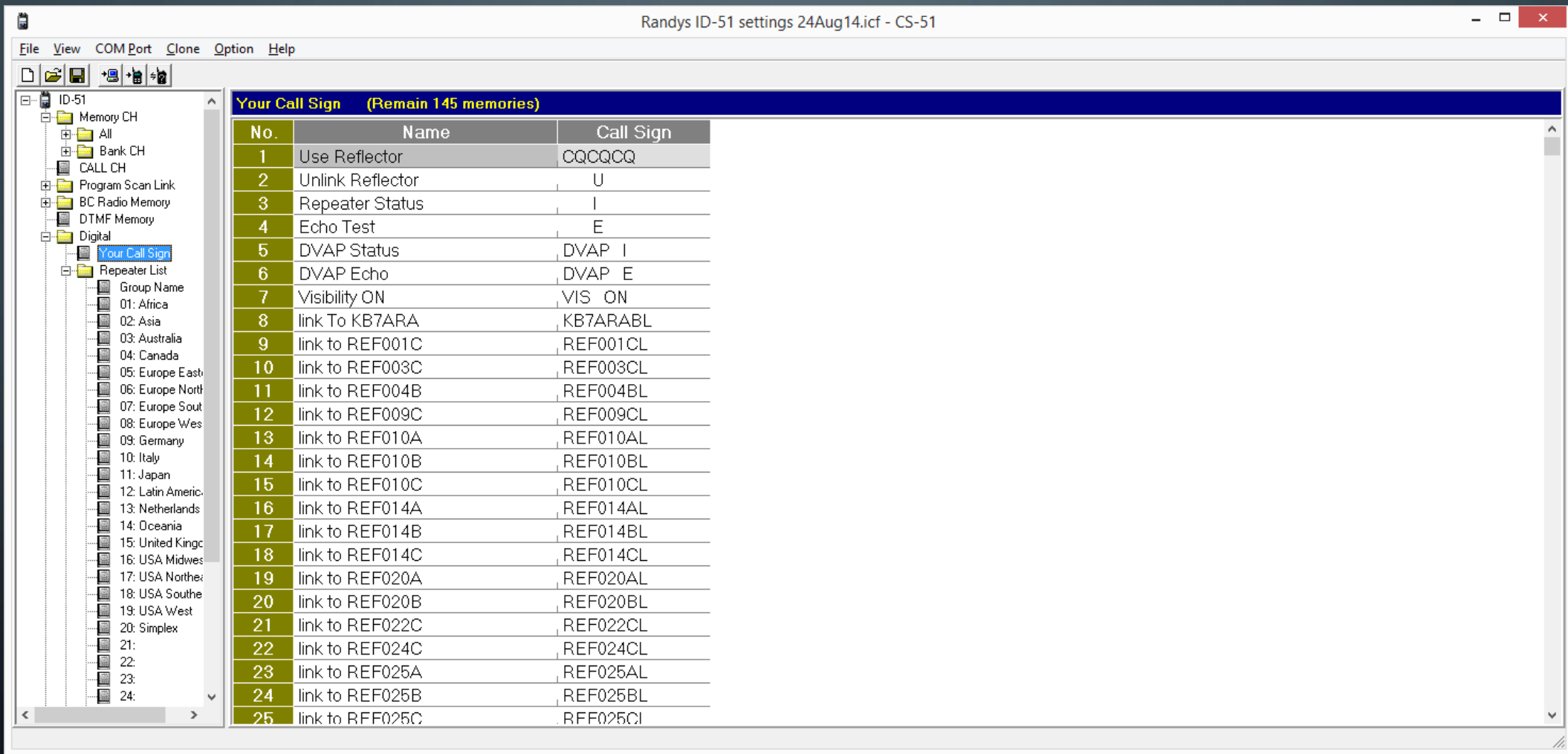
W4LKS ▪ ▪ ▪ Callsign route to W4LKS wherever he is

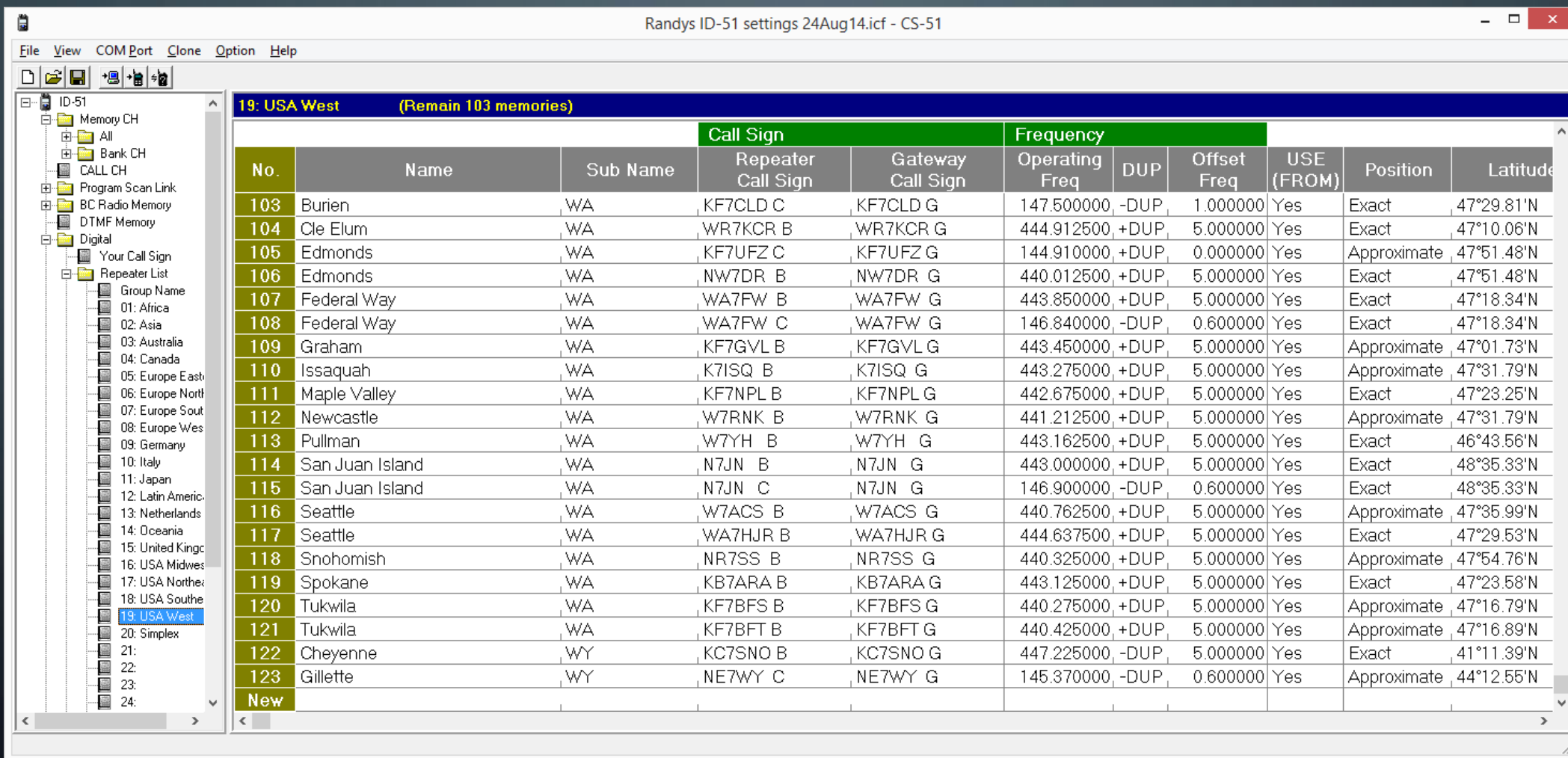
WR7KCR ▪ ▪ Callsign route to WR7KCR Repeater

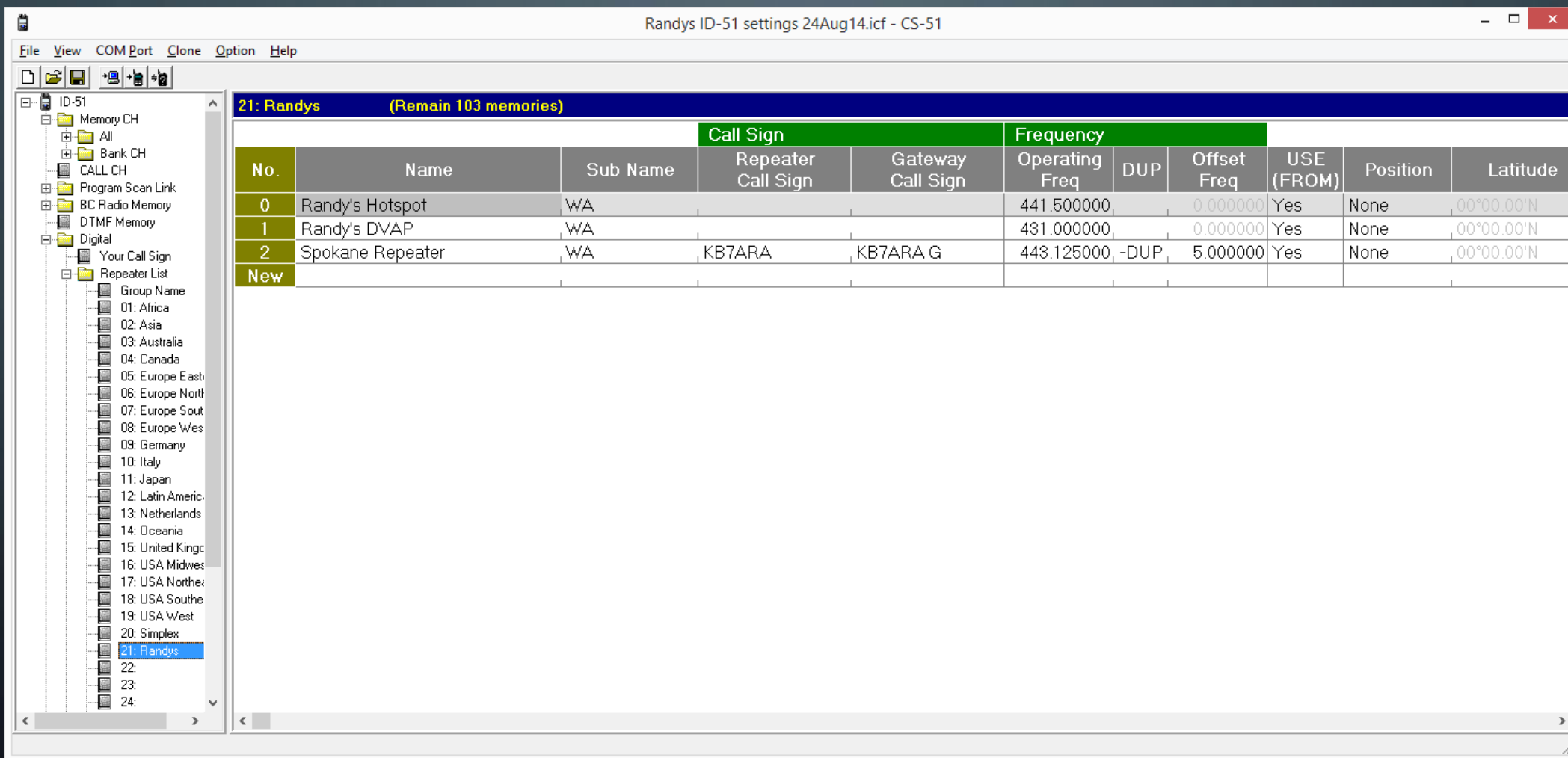
Interrogate command (▪ ▪ ▪ ▪ ▪ ▪ ▪ I)

Unlink command(▪ ▪ ▪ ▪ ▪ ▪ ▪ U)

Echo Command (▪ ▪ ▪ ▪ ▪ ▪ ▪ E)







LINK COMMANDS:

...go in the TO field

KB7ARABL

If Repeater		
Repeater Call	Module	L = Link
KB7ARA	B	L

Modules:

A = 23 cm (1.2 Ghz)
B = 70 cm (440 Mhz)
C = 2 m (150 Mhz)

REF035CL

If Reflector		
Repeater Call	Channel	L = Link
REF035	C	L

Channels:
A thru E

REFLECTORS

Data center computers with extremely high speed Internet connections.

Some popular reflectors:

REF035 Washington State Reflector – Most activity on channel C

REF001C London, world wide mega-reflector

REF030C Georgia, Wide use

DEMONSTRATIONS

Status Interrogation:

IC-7100



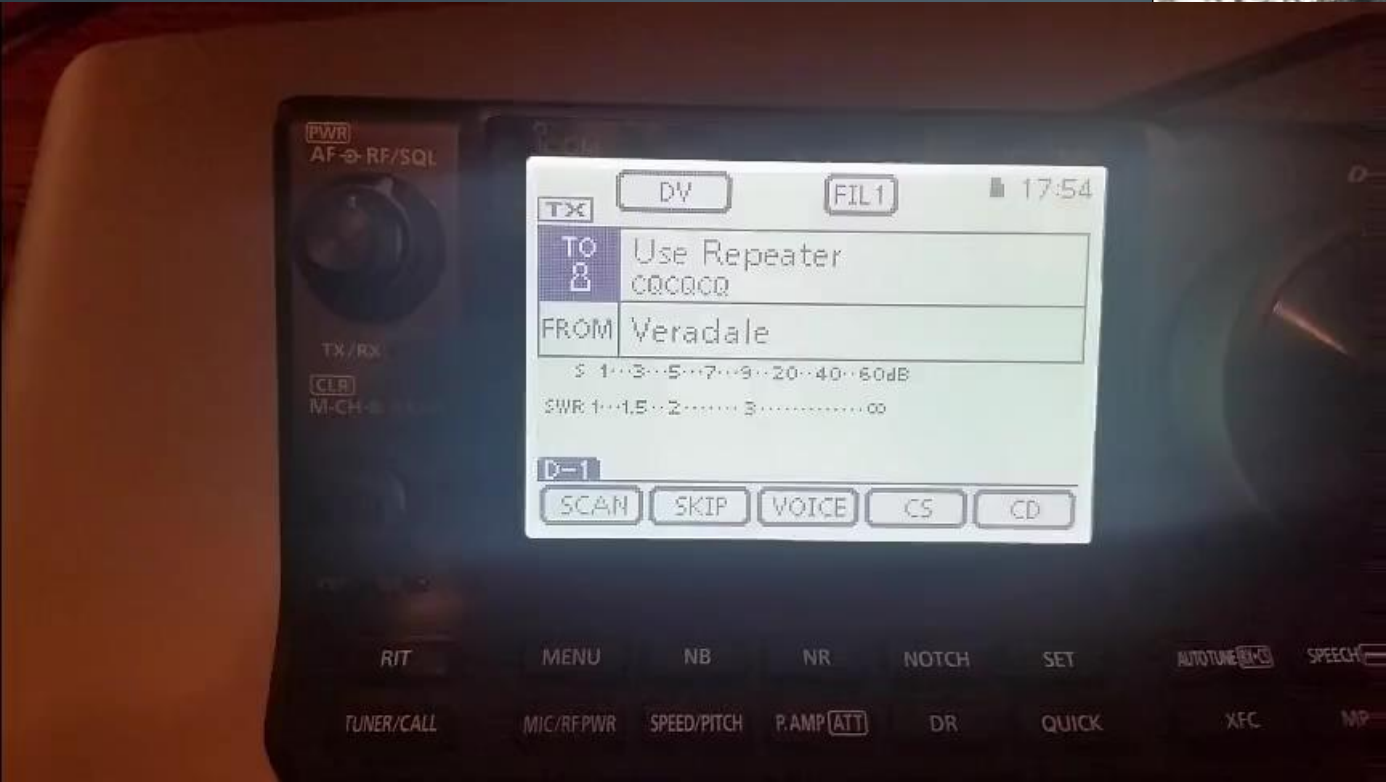
ID-51

TO
FROM	KB7ARA ▪ B
(RPT2)	KB7ARA ▪ G

DEMONSTRATIONS

Echo Test:

IC-7100



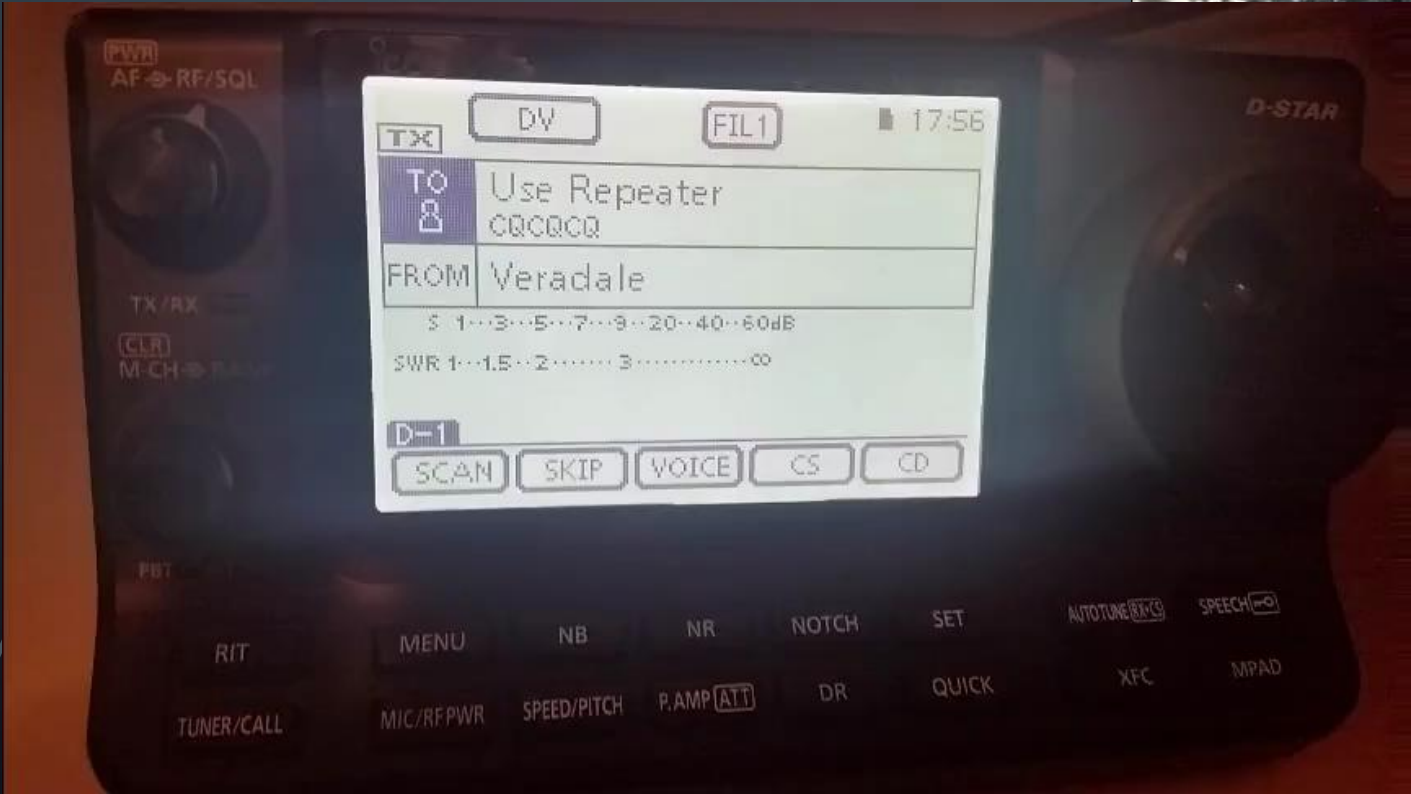
ID-51

TO	• • • • • E
FROM	KB7ARA • B
(RPT2)	KB7ARA • G

DEMONSTRATIONS

Unlink From Reflector:

IC-7100



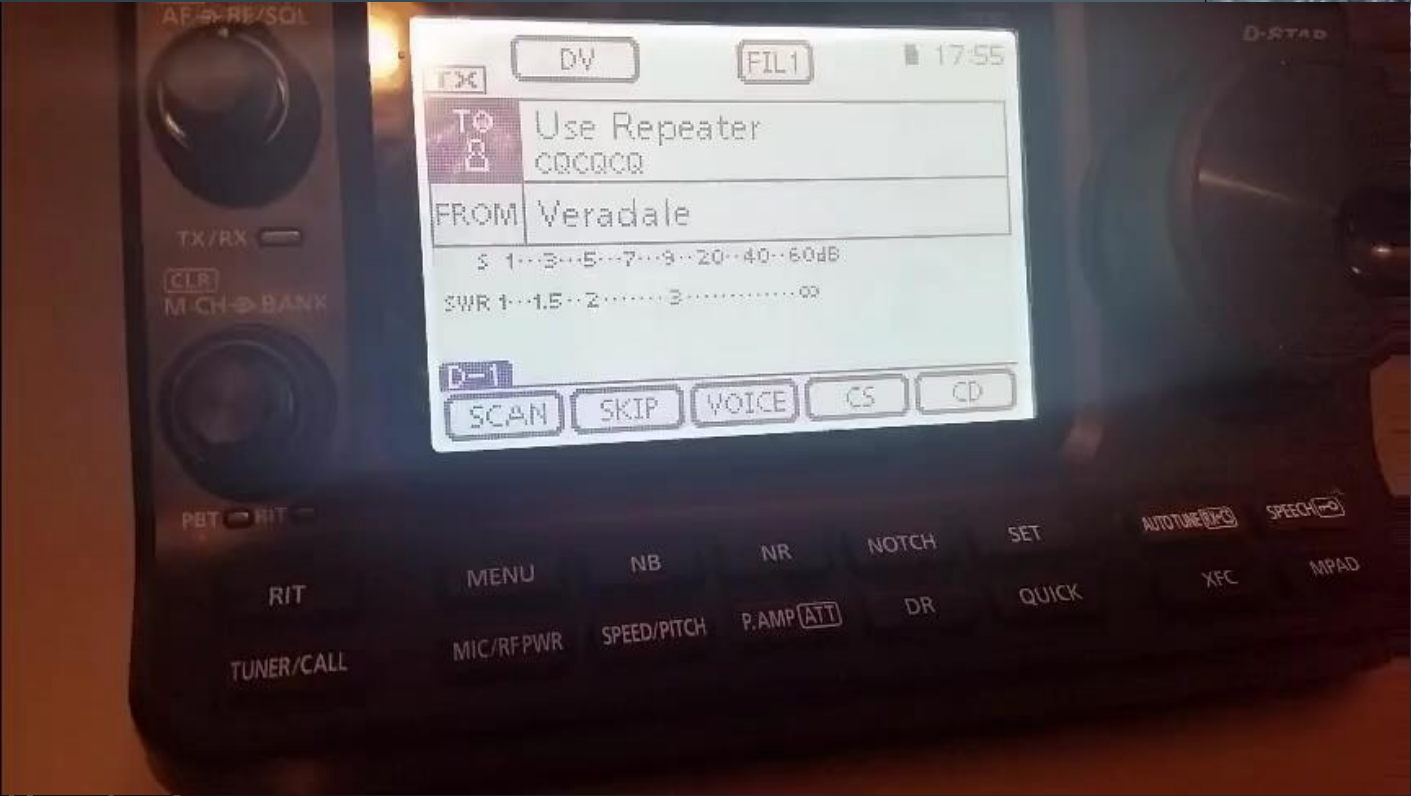
ID-51

TOU
FROM	KB7ARA.B
(RPT2)	KB7ARA.G

DEMONSTRATIONS

Link to Reflector:

IC-7100



ID-51

TO	REF035CL
FROM	KB7ARA ▪ ▪
(RPT2)	KB7ARA ▪ G

DEMONSTRATIONS

Link to Reflector REF001C:



DEMONSTRATIONS

Callsign Routing:



DASHBOARD

Status in real-time

<https://kb7ara.dstargateway.org>

The screenshot shows a web browser window with the address <https://kb7ara.dstargateway.org>. The page title is "DPLUS Dashboard | Gateway Status and Control". Below the title bar, there are three tabs: "Registration", "KB7ARA Repeater System", and "DPLUS version 2.2k". The main content area is titled "Linked Gateways / Reflectors" and contains a table with 5 rows and 2 columns. Below this, there is a section titled "Remote Users" with a table containing 1 row and 4 columns. Finally, there is a section titled "Last Heard" with a table containing 5 rows and 4 columns. At the bottom of the page, it says "Status as of 2014/07/23 22:41:08".

DPLUS Dashboard | Gateway Status and Control

Registration | KB7ARA Repeater System | DPLUS version 2.2k

Linked Gateways / Reflectors

Module	Linked to
A	unlinked
B	unlinked
C	unlinked
D	unlinked
E	unlinked

Remote Users

Callsign	User Message	Last TX on	Type
W7SSK	Don in Mukilteo, WA	B	DV AP

Last Heard

Callsign	User Message	Last TX on	Time
K7EHT	ID-51 \$	B	2014/07/23 20:36:13
W7SSK	Don in Mukilteo, WA	B	2014/07/23 20:03:51
WA7BFN	5100	B	2014/07/23 17:52:35
K7HRT	K7HRT 73	A	2014/07/23 15:58:49

Status as of 2014/07/23 22:41:08

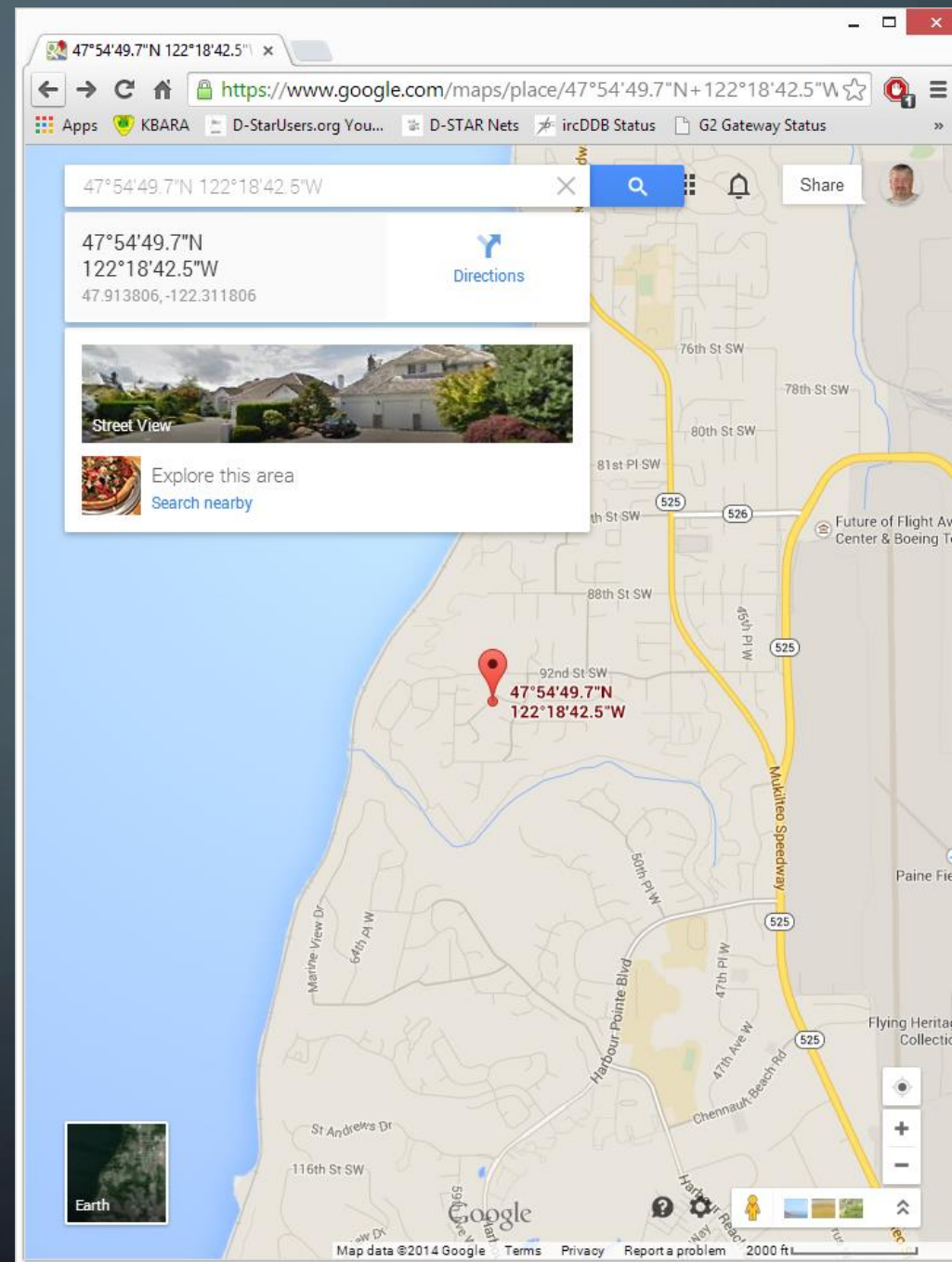
APRS LOCATION

If user has DV-A mode turned on

Turn on GPS-A mode (DV-A mode) to report your Lat/Long each time you key up.

The KB7ARA repeater will also report your Lat/Long info to aprs.fi within seconds.

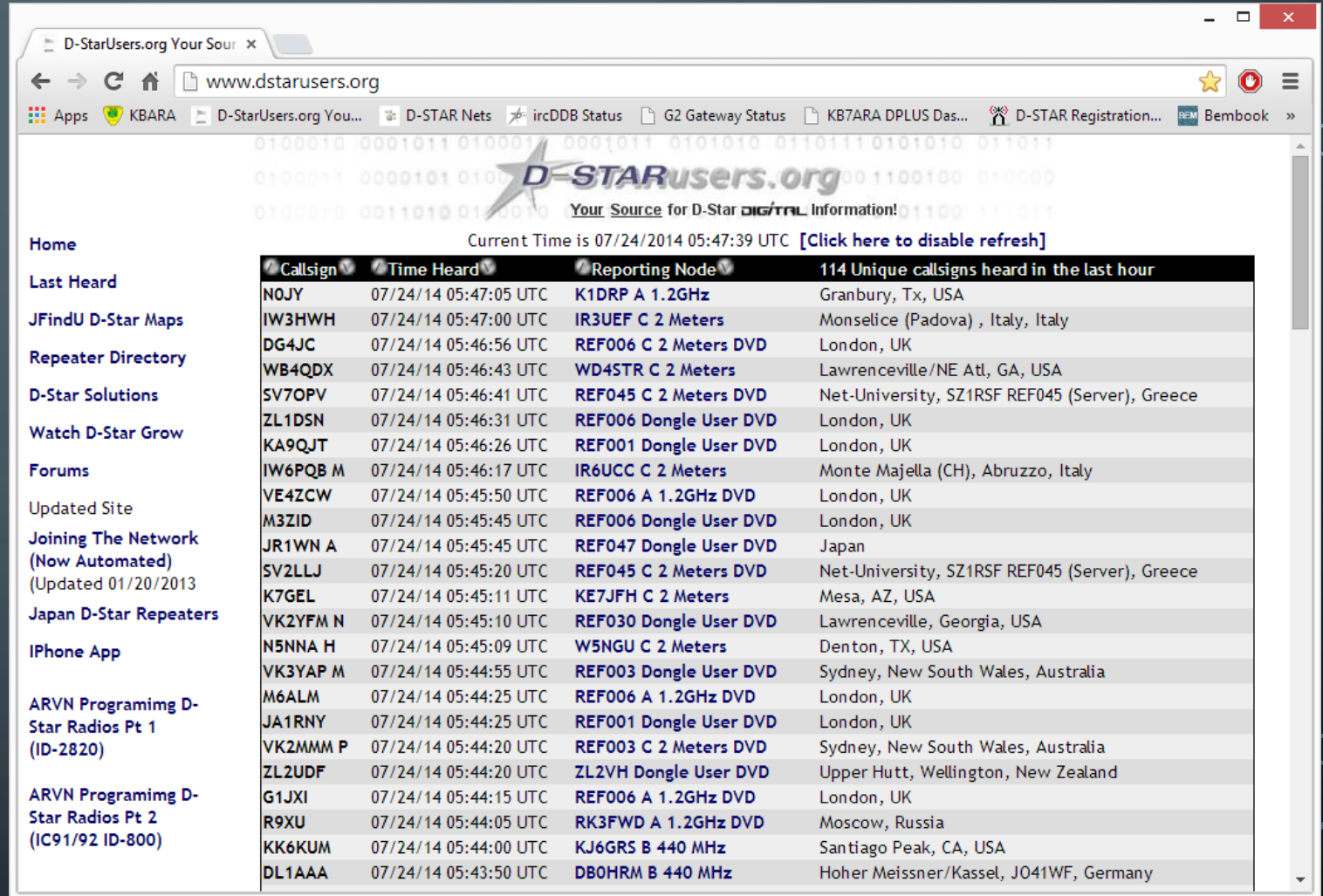
Turn APRS Beconing on – Get yelled at.



LAST HEARD LISTS

<http://www.dstarusers.org>

Key up with “VIS ■ ■ ■ ON” in TO field
to turn on reporting for IRCDDb
last-heard lists.



D-StarUsers.org Your Source for D-Star DIGITAL Information!

Current Time is 07/24/14 05:47:39 UTC [Click here to disable refresh]

114 Unique callsigns heard in the last hour

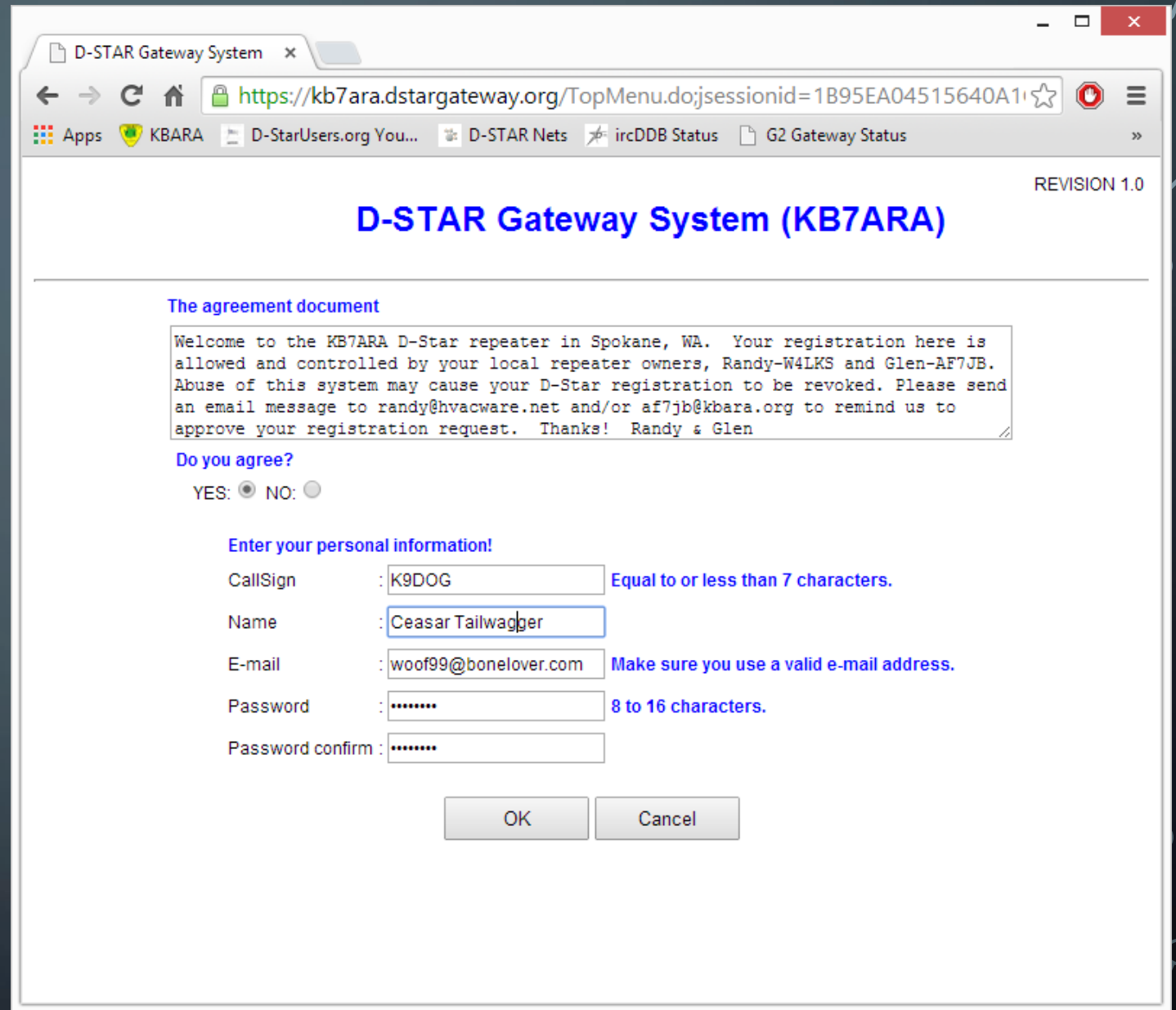
Callsign	Time Heard	Reporting Node	
N0JY	07/24/14 05:47:05 UTC	K1DRP A 1.2GHz	Granbury, Tx, USA
IW3HWH	07/24/14 05:47:00 UTC	IR3UEF C 2 Meters	Monseice (Padova) , Italy, Italy
DG4JC	07/24/14 05:46:56 UTC	REF006 C 2 Meters DVD	London, UK
WB4QDX	07/24/14 05:46:43 UTC	WD4STR C 2 Meters	Lawrenceville/NE Atl, GA, USA
SV7OPV	07/24/14 05:46:41 UTC	REF045 C 2 Meters DVD	Net-University, SZ1RSF REF045 (Server), Greece
ZL1DSN	07/24/14 05:46:31 UTC	REF006 Dongle User DVD	London, UK
KA9QJT	07/24/14 05:46:26 UTC	REF001 Dongle User DVD	London, UK
IW6PQB M	07/24/14 05:46:17 UTC	IR6UCC C 2 Meters	Monte Majella (CH), Abruzzo, Italy
VE4ZCW	07/24/14 05:45:50 UTC	REF006 A 1.2GHz DVD	London, UK
M3ZID	07/24/14 05:45:45 UTC	REF006 Dongle User DVD	London, UK
JR1WN A	07/24/14 05:45:45 UTC	REF047 Dongle User DVD	Japan
SV2LLJ	07/24/14 05:45:20 UTC	REF045 C 2 Meters DVD	Net-University, SZ1RSF REF045 (Server), Greece
K7GEL	07/24/14 05:45:11 UTC	KE7JFH C 2 Meters	Mesa, AZ, USA
VK2YFM N	07/24/14 05:45:10 UTC	REF030 Dongle User DVD	Lawrenceville, Georgia, USA
N5NNA H	07/24/14 05:45:09 UTC	W5NGU C 2 Meters	Denton, TX, USA
VK3YAP M	07/24/14 05:44:55 UTC	REF003 Dongle User DVD	Sydney, New South Wales, Australia
M6ALM	07/24/14 05:44:25 UTC	REF006 A 1.2GHz DVD	London, UK
JA1RNY	07/24/14 05:44:25 UTC	REF001 Dongle User DVD	London, UK
VK2MMM P	07/24/14 05:44:20 UTC	REF003 C 2 Meters DVD	Sydney, New South Wales, Australia
ZL2UDF	07/24/14 05:44:20 UTC	ZL2VH Dongle User DVD	Upper Hutt, Wellington, New Zealand
G1JXI	07/24/14 05:44:15 UTC	REF006 A 1.2GHz DVD	London, UK
R9XU	07/24/14 05:44:05 UTC	RK3FWD A 1.2GHz DVD	Moscow, Russia
KK6KUM	07/24/14 05:44:00 UTC	KJ6GRS B 440 MHz	Santiago Peak, CA, USA
DL1AAA	07/24/14 05:43:50 UTC	DB0HRM B 440 MHz	Hoher Meissner/Kassel, JO41WF, Germany

Navigation menu:

- 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)

REGISTER YOUR CALLSIGN

http://www.dstargateway.org/D-Star_Registration.html



The screenshot shows a web browser window titled "D-STAR Gateway System". The address bar displays the URL <https://kb7ara.dstargateway.org/TopMenu.dojsessionid=1B95EA04515640A1>. The browser's tab bar shows several tabs: "Apps", "KBARA", "D-StarUsers.org You...", "D-STAR Nets", "ircDDB Status", and "G2 Gateway Status". The page content features the title "D-STAR Gateway System (KB7ARA)" in blue text, with "REVISION 1.0" in the top right corner. Below the title, a section titled "The agreement document" contains a text box with the following text: "Welcome to the KB7ARA D-Star repeater in Spokane, WA. Your registration here is allowed and controlled by your local repeater owners, Randy-W4LKS and Glen-AF7JB. Abuse of this system may cause your D-Star registration to be revoked. Please send an email message to randy@hvacware.net and/or af7jb@kbara.org to remind us to approve your registration request. Thanks! Randy & Glen". Below this, a "Do you agree?" section has two radio buttons: "YES:" (which is selected) and "NO:". Underneath, a section titled "Enter your personal information!" contains five input fields: "CallSign" with the value "K9DOG" and a note "Equal to or less than 7 characters."; "Name" with the value "Ceasar Tailwagger"; "E-mail" with the value "woof99@bonelover.com" and a note "Make sure you use a valid e-mail address."; "Password" with masked characters "*****" and a note "8 to 16 characters."; and "Password confirm" with masked characters "*****". At the bottom right of the form are two buttons: "OK" and "Cancel".

D-STAR Gateway System (KB7ARA) REVISION 1.0

The agreement document

Welcome to the KB7ARA D-Star repeater in Spokane, WA. Your registration here is allowed and controlled by your local repeater owners, Randy-W4LKS and Glen-AF7JB. Abuse of this system may cause your D-Star registration to be revoked. Please send an email message to randy@hvacware.net and/or af7jb@kbara.org to remind us to approve your registration request. Thanks! Randy & Glen

Do you agree?

YES: ☒ NO: ☐

Enter your personal information!

CallSign : K9DOG Equal to or less than 7 characters.

Name : Ceasar Tailwagger

E-mail : woof99@bonelover.com Make sure you use a valid e-mail address.

Password : ***** 8 to 16 characters.

Password confirm : *****

REGISTER YOUR CALLSIGN

http://www.dstargateway.org/D-Star_Registration.html

D-STAR Gateway System - Windows Internet Explorer

https://w4doc.dstargateway.org/PersonalInfoInit.do Certificate Error Google

File Edit View Favorites Tools Help

Google Go Bookmarks 0 blocked Check AutoLink Settings

D-STAR Gateway System Page Tgols

D-STAR D-STAR Gateway System (W4DOC) REVISION 1.0

Login : W5BJV Logout

User Information GW Information Terminal Information Personal Information

Please, edit after making a left check box on.

☐ Name : Marcel Pizini

☐ 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	pcname	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		

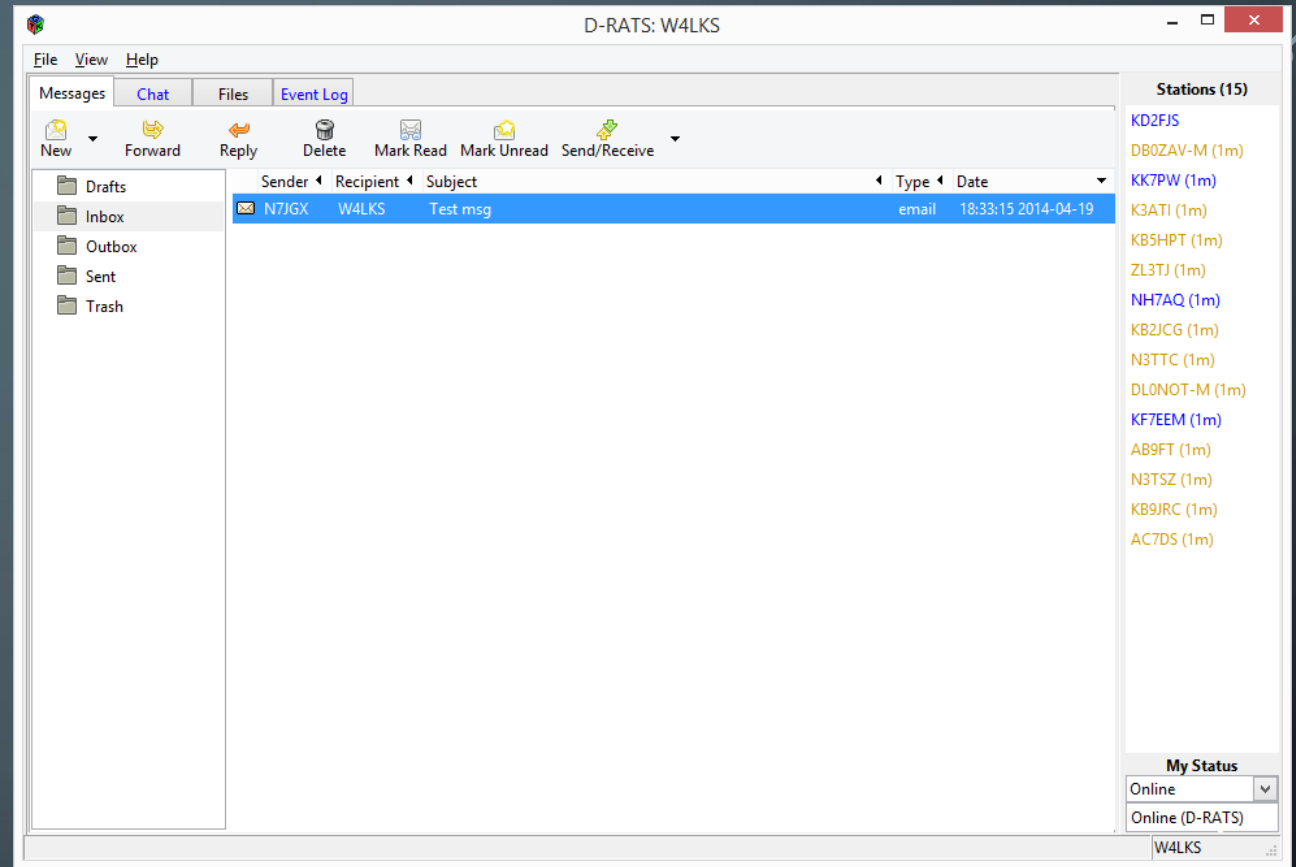
Check item and change a set value.
Click the Update button.

Update

Done Internet 100%

D-RATS Messaging

- Messaging app for use with D-STAR
- Supported by the KB7ARA gateway
- Makes use of the 1200 bps data stream that accompanies every D-STAR transmission.
- Excellent for Emergency Communications



D-RATS Chat

The screenshot shows the D-RATS: W4LKS chat application window. The window has a menu bar with 'File', 'View', and 'Help'. Below the menu bar are tabs for 'Messages', 'Chat', 'Files', and 'Event Log'. The 'Chat' tab is active, showing a list of messages. The messages are timestamped and include the name of the station sending the message, followed by their status and location. The station list on the right side of the window shows 16 stations, including WX1DER, KD2FJS, DB0ZAV-M, KK7PW, K3ATI, KB5HPT, ZL3TJ, NH7AQ, KB2JCG, N3TTC, DL0NOT-M, KF7EEM, AB9FT, N3TSZ, KB9JRC, and AC7DS. The 'My Status' section at the bottom right shows the user's status as 'Online' and 'Online (D-RATS)'. The 'Send' button is visible next to the input field.

File View Help

Messages Chat Files Event Log

Add Filter Remove Filter Join Channel Open Private Chat

Copyright 2010 Dan Smith (KK7DS)

[2014-09-21 17:18:33] AC7DS: Now Unattended: Dave, Tucson, AZ - DM42oc (Port RAT)

[17:18:34] KB9JRC: Now Unattended: Online (D-RATS) (Port RAT)

[17:18:34] N3TSZ: Now Unattended: Patrick in Cheltenham, PA (Port WA7FW)

[17:18:35] KB5HPT: Now Unattended: KB5HPT. Lew, El Paso, TX, DM61sv (Port WA7FW)

[17:18:36] N3TTC: Now Unattended: Online (D-RATS) (Port RAT)

[17:18:36] DL0NOT-M: Now Unattended: QRA de DL0NOT-EmComm-Mobile-MailDrop- QTH Karben JO40jf QRV (Port RAT)

[17:18:36] KF7EEM: Now Online: Online (D-RATS) (Port RAT)

[17:18:36] AB9FT: Now Unattended: Online (D-RATS) (Port RAT)

[17:18:37] ZL3TJ: Now Unattended: Online (D-RATS) (Port RAT)

[17:18:37] NH7AQ: Now Online: Online (D-RATS) (Port RAT)

[17:18:37] KB2JCG: Now Unattended: Online (D-RATS) (Port RAT)

[17:18:37] KD2FJS: Now Unattended: Online (D-RATS) (Port RAT)

[17:18:38] K3ATI: Now Unattended: Smitty, Forest City, Pa. FN21gp (Port RAT)

[17:18:39] KK7PW: Now Online: Online (D-RATS) (Port RAT)

[17:18:40] DB0ZAV-M: Now Unattended: [QRA DB0ZAV WinMor/PacTor WinLink RMS - QTH Karben JO40jf QRV] (Port RAT)

[17:19:26] KD2FJS: Now Online: Online (D-RATS) (Port RAT)

[17:21:23] WX1DER: Now Online: Online (D-RATS) (Port RAT)

Main [WA7FW] [RAT]

RAT

Quick Messages

QSTs

Send

My Status

Online

Online (D-RATS)

Station WX1DER is now Online: Online (D-RATS)

Stations (16)

WX1DER

KD2FJS (2m)

DB0ZAV-M (3m)

KK7PW (3m)

K3ATI (3m)

KB5HPT (3m)

ZL3TJ (3m)

NH7AQ (3m)

KB2JCG (3m)

N3TTC (3m)

DL0NOT-M (3m)

KF7EEM (3m)

AB9FT (3m)

N3TSZ (3m)

KB9JRC (3m)

AC7DS (3m)

W4LKS

Emergency Communications Capability

- Repeater/gateway on UPS + Generator emergency backup power
- SHMC/Providence hardened Internet connection
- SHMC/Providence full support
- File Transfer and messaging at 1200 bps using any 2nd Gen transceiver and D-RATS.
- 3600 bps using Anniversary Edition of ID-51
- Repeater supports 128 kbps DD on 1.2 ghz for use with ID-1 DV/DD Transceiver



OTHER D-STAR ACCESS METHODS

DV Dongle

- Has AMBE Chip
- Turns computer into D-STAR transceiver
- Requires NO D-STAR Radio

DV Access Point (DVAP)

- No AMBE chip
- Makes a mini D-STAR Simplex hotspot
- Still requires a D-STAR Radio

From Internet Labs – Robin Cutshaw-AA4RC



\$200



\$270

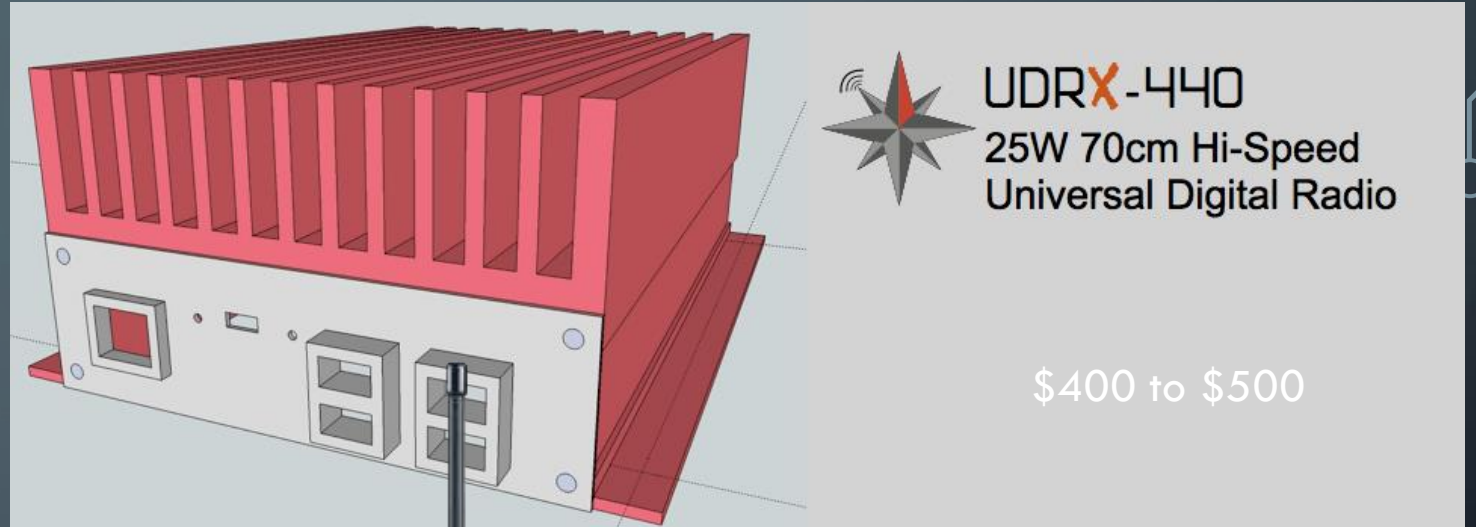
FORTHCOMING

NW Digital Radio

<http://nwdigitalradio.com/>

Connect Systems

CS7000@yahoogroups.com



\$250



THE END

Washington Digital Radio Enthusiasts

