



# Digital Smart Technologies for Amateur Radio



- **Overview**
- **D-STAR Network**
- **Technical Aspects**
- **D-STAR Routing & Linking**
- **Programming**
- **3<sup>rd</sup> Party D-STAR equipment & Developments**
- **D-STAR Applications**
- **D-STAR Statistics**
- **Milestones and the Future**
- **WS4VA Current & Future Coverage**
- **Useful Links**



# D-STAR Overview

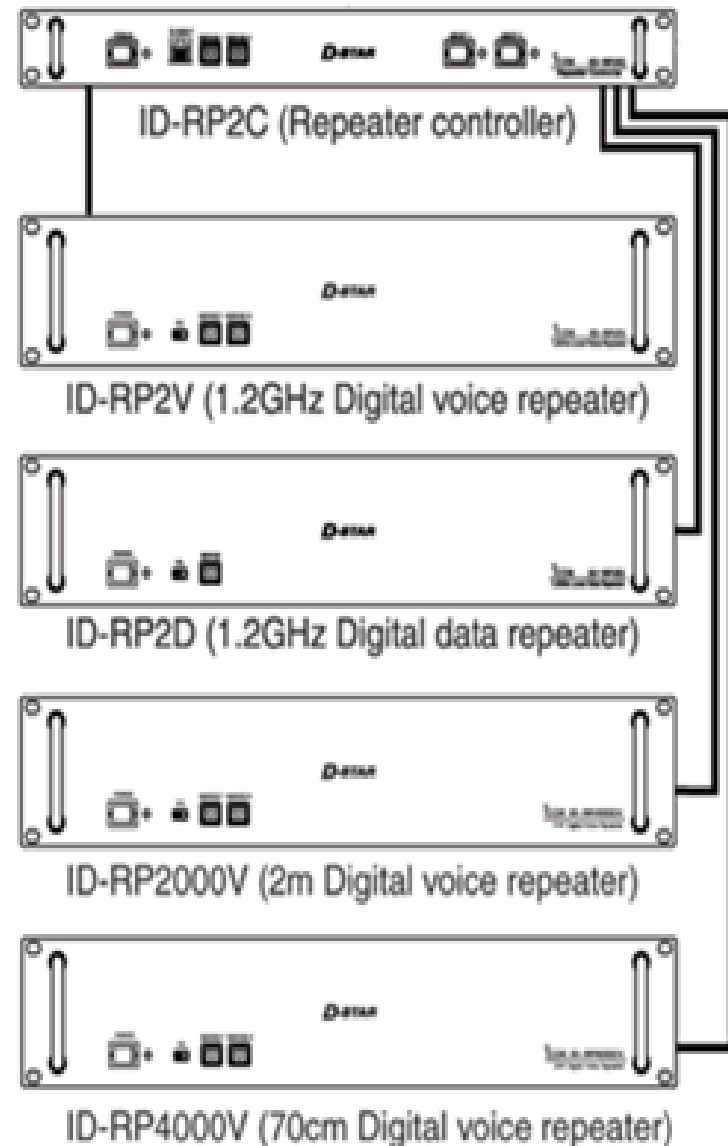
- 1999 Funded by the Japanese Government and administered by the Japanese Amateur Radio League (JARL)
- 2001 Open Specification Published
- Current Implementations
  - Digital Voice (with simultaneous low rate data) on 2 meters\ 70 centimeters\ 23 centimeters
  - Digital Data (128Kbps) on 23 centimeters
  - Backbone (10 Mbps) on 10 GHz. Band (Never really deployed outside of ICOM)
  - Internet Gateways
- Currently ICOM only commercial provider of D-STAR equipment outside of Japan
  - Kenwood produces small amount of D-STAR equipment sold only in Japan
- Numerous 3<sup>rd</sup> Party D-STAR equipment currently available with more in development
- Utilizes Internet to interconnect D-STAR Gateways
- D-STAR Growing every day



# D-STAR Network

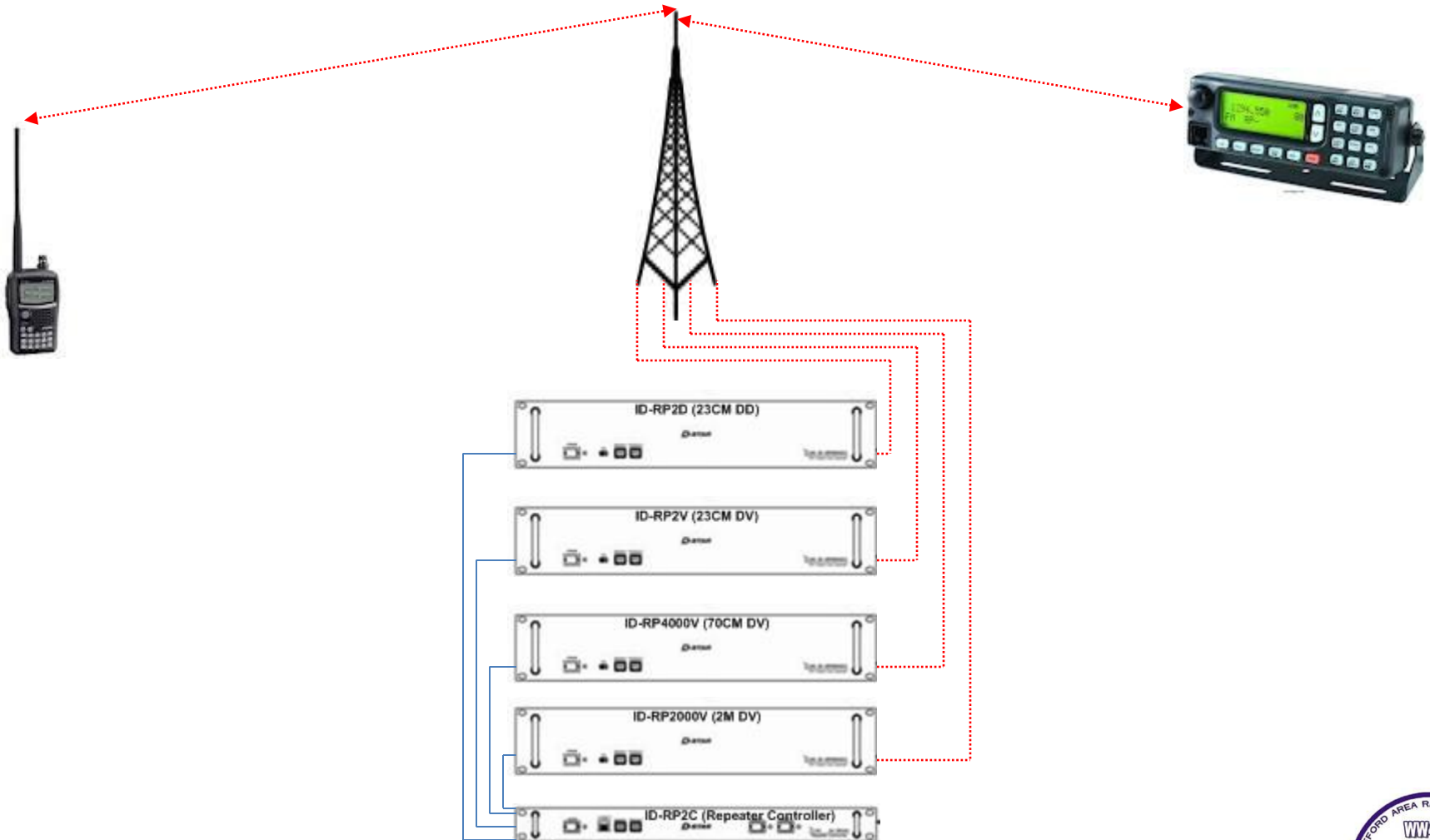
## ➤ Components:

- D-STAR Repeater
- D-STAR Controller
- D-STAR Gateway
- D-STAR Router
- 2M D-STAR Radio
- 70cm D-STAR Radio
- 23cm D-STAR Radio
- Gateway Controller
- Antenna's
- Can's



# D-STAR

## Local Communications

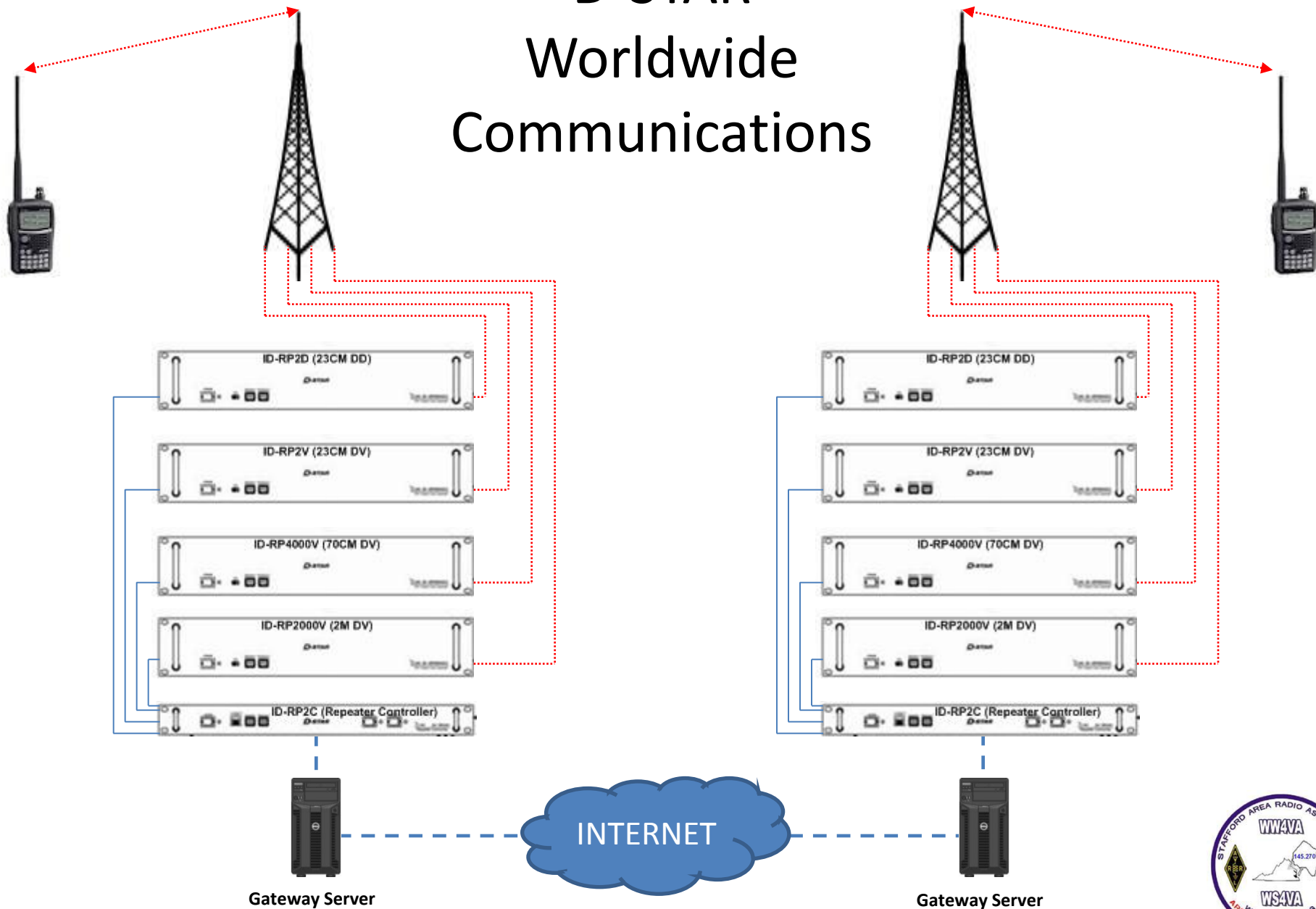


WS4VA

D-STAR

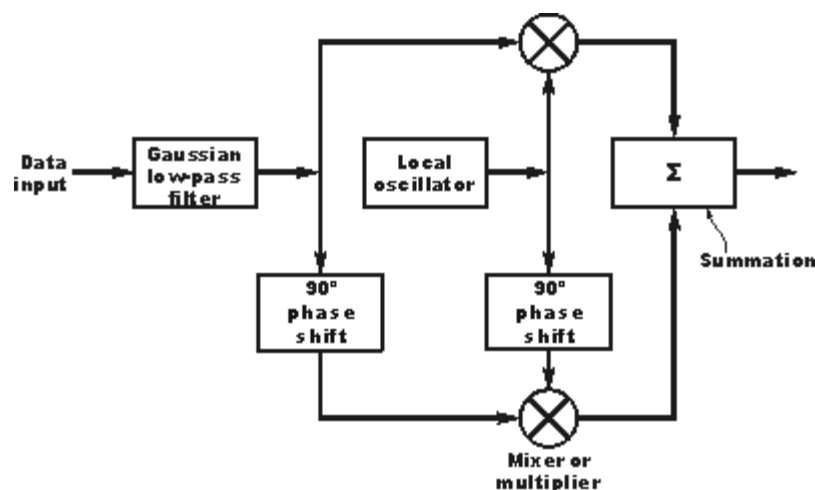
VK8RAD

# Worldwide Communications

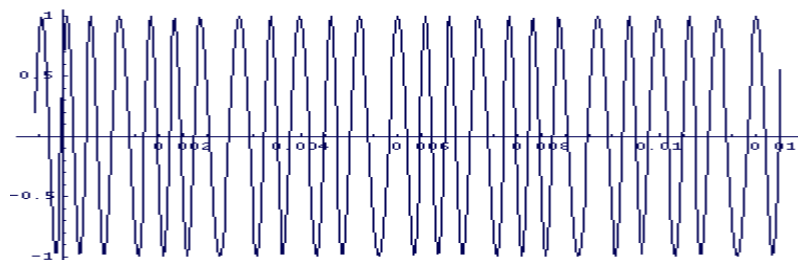


# D-STAR Modulation

- D-STAR modulations are Gaussian Minimum Shift Keying (GMSK)
  - Modulation generation is accomplished by directly injecting Non-Return to Zero (NRZ) data into the frequency modulator with its modulation index set for 0.5 with a Gaussian Filter
  - Results in a bandwidth of 6.25Khz



GMSK Modulation Scheme

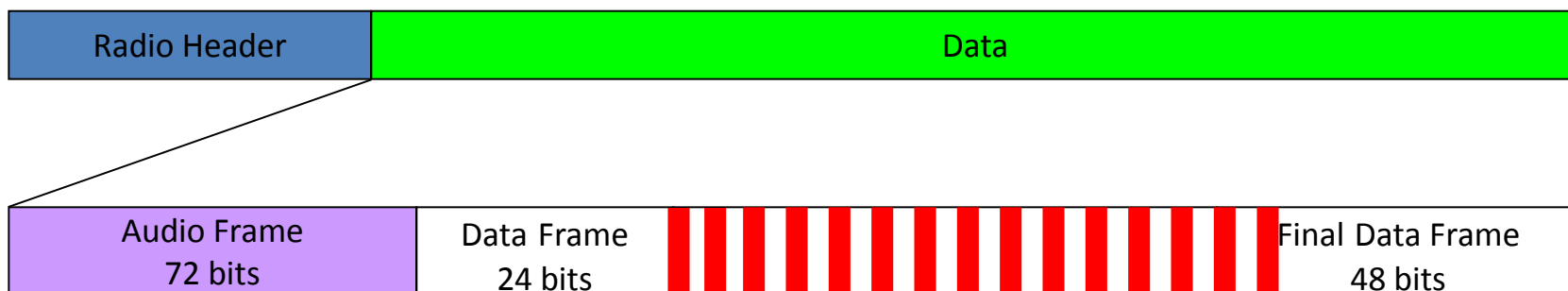
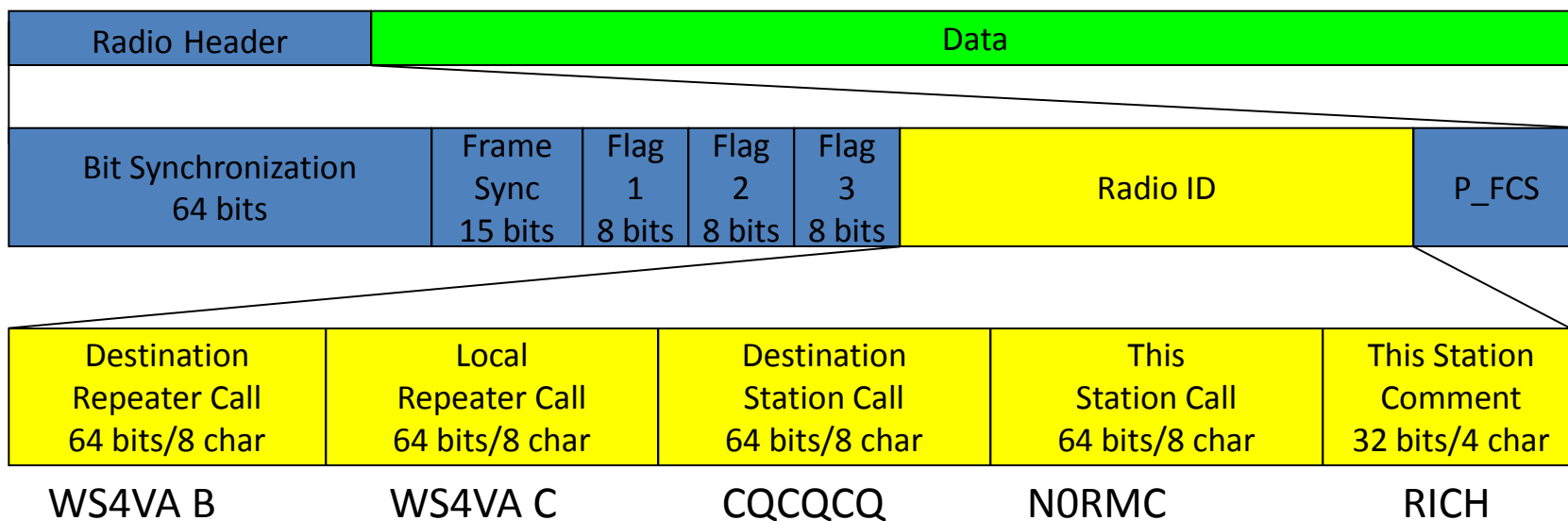


GMSK Modulated Signal



# Digital Voice Transmissions

- Digital Voice (DV) transmissions are 4800Bps on 2M/70cm/23cm
  - Voice input is encoded as a 3600Bps data stream using the AMBE Encoder
  - Low Speed Data utilizes the remaining 1200Bps with Forward Error Correction (FEC)

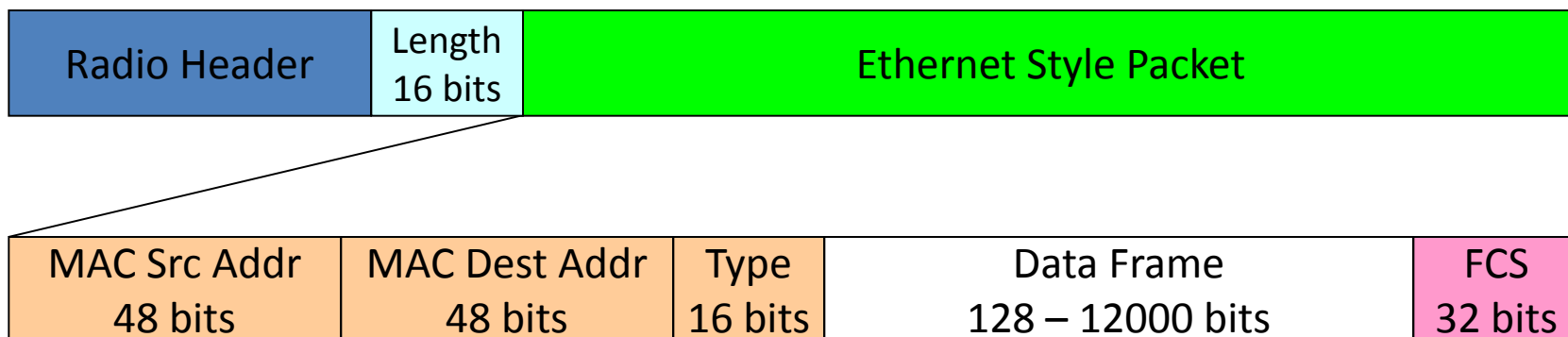
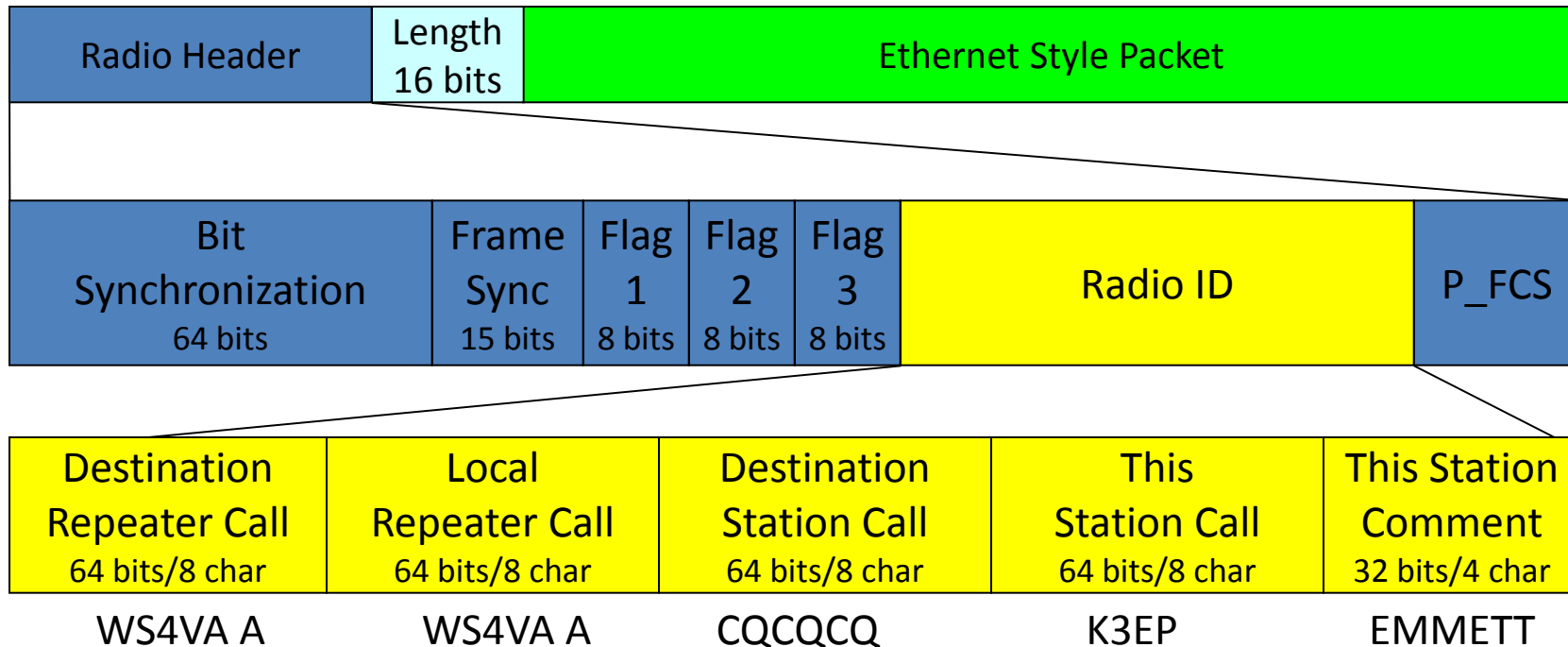


Alternating Audio/Data





# Digital Data Transmissions



TCP/IP



# D-STAR Technical Aspects

## ➤ **Transmission footprint**

- D-STAR is considered Narrow Band (NB) by FCC based on its 6.25Khz Bandwidth
- D-STAR frequency assignments are currently being assigned on the “Split” or interleaved channels between the typical FM repeater frequencies.
- 2M D-STAR frequency assignments are currently being assigned between Analog 2M FM due to its NB footprint. 10Khz separation from Analog FM repeaters
- 70cm & 23cm D-STAR frequency assignments are currently being assigned between Analog 70cm FM repeaters and Analog 23cm FM repeaters due to its NB footprint. 25Khz separation from Analog FM repeaters
- Typical 2M FM analog repeaters are separated by 20Khz
- Typical 70cm & 23cm FM analog frequency assignments are separated by 25Khz
- Terrain is always a factor in these assignments



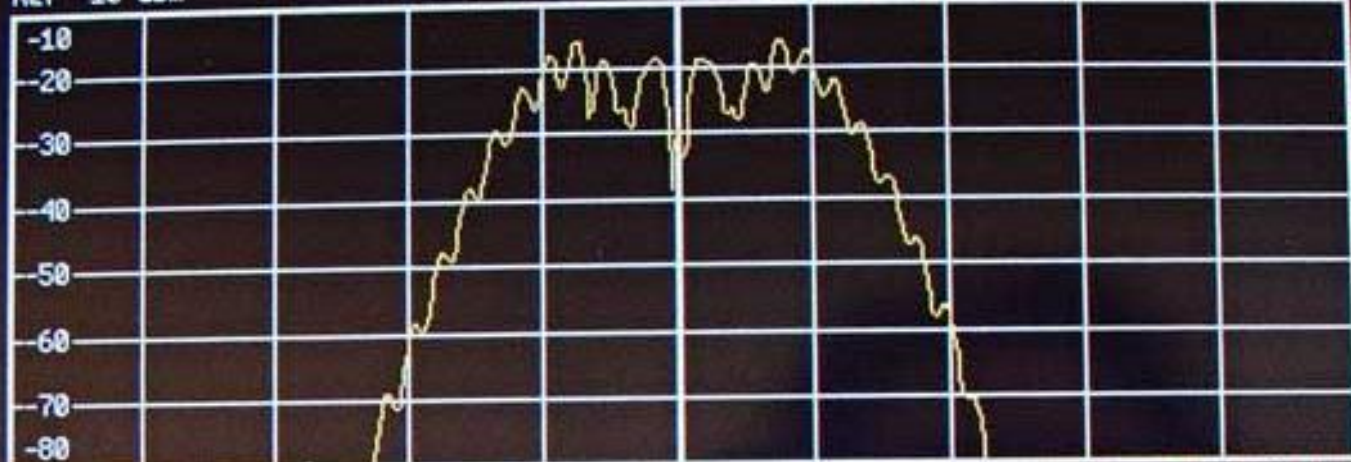


1 AP  
VIEW

Ref -10 dBm

Att 30 dB

RBW 1 kHz  
UBW 3 kHz  
SMT 50 ms



Center 146 MHz

5 kHz

Span 50 kHz

A  
SGL

SAVE

RECALL

EDIT  
COMMENT

ITEMS TO  
SAVE/RCL

DATA SET  
LIST

DATA SET  
CLEAR

DATA SET  
CLEAR ALL

STARTUP  
RECALL

FILE  
MANAGER

IF OUL

1 AP  
VIEW

Ref -10 dBm

Att 20 dB

RBW 100 Hz  
UBW 10 Hz  
SMT 50 s



Center 146 MHz

5 kHz

Span 50 kHz

B  
SGL

SPECTRUM

NETWORK

FM DEMOD

SCREEN A



# D-STAR Routing & Linking

- **ICOM designed D-Star to be a user routable system**
  - Allows call sign routing
  - Lacks the ability to conduct nets
  
- **DPLUS created by Robin Cutshaw (AA4RC) expands on the capabilities of D-STAR by adding a number of additional features:**
  - **Link**
    - Gateways
    - Reflectors
  - **Unlink**
    - Unlink from current module (Link established and terminated on 2M)
    - Unlink from alternate module (Link established on 2M and terminated from 70cm or 23cm)
  - **Echo Test**
  - **Gateway ID**
  - **Simulcast on all modules**
  - **Dynamic call sign routing**



# D-STAR Routing & Linking (Cont.)

- Entries are exactly 8 Characters in length
  - All 8 characters are required
  - “.” depict a space
  
- URCALL : Who you want to communicate with
  - CQCQCQ\_ = General Transmission (ICOM & Dplus)
  - /WA3CVB = Specific User you want to talk to (ICOM)
  - WA3CVB = Specific User you want to talk to (Dplus) \*
  - Repeater & Module
  - Reflector
  - “L, U, E, I” = Speciality Commands (Dplus)
- RPT1: This is the input repeater & module
- RPT2: This is the output repeater & module or Gateway
- MYCALL: This is your personal call sign
- \* Dynamic routing via Dplus send your transmission to the repeater/Gateway user was last heard on.





# IC-91AD Programming

Memory CH

		Frequency						Call Sign			Bank
CH	Select	Freq	DUP	Offset Freq	TS	Mode	Name	Your	RPT1	RPT2	Group
0		145.32000	-DUP	0.60000	5k	DV	WS4VA	CQCQCQ	WS4VA C	WS4VA G	
1	S	145.32000	-DUP	0.60000	5k	DV	2M_QSO	CQCQCQ	WS4VA C	WS4VA G	
2		447.27500	-DUP	5.00000	25k	DV	70CM_QSO	CQCQCQ	WS4VA B	WS4VA G	
3		145.32000	-DUP	0.60000	5k	DV	UNLINK	U	WS4VA C	WS4VA G	
4		145.32000	-DUP	0.60000	5k	DV	2M>70CM	CQCQCQ	WS4VA C	WS4VA B	
5		145.32000	-DUP	0.60000	5k	DV	2M>1.2Gh	CQCQCQ	WS4VA C	WS4VA A	
6		447.27500	-DUP	5.00000	25k	DV	70CM>2M	CQCQCQ	WS4VA B	WS4VA C	
7		447.27500	-DUP	5.00000	25k	DV	70CM>1.2	CQCQCQ	WS4VA B	WS4VA A	
8		145.32000	-DUP	0.60000	5k	DV	2M_DARWI	VK8RADCL	WS4VA C	WS4VA G	
9		447.27500	-DUP	5.00000	25k	DV	70CM_DAR	VK8RADCL	WS4VA B	WS4VA G	
10		145.32000	-DUP	0.60000	5k	DV	VERNON	AA1HD CL	WS4VA C	WS4VA G	
11		447.27500	-DUP	5.00000	25k	DV	70>UNLIN	U	WS4VA B	WS4VA G	
12		447.27500	-DUP	5.00000	25k	DV	70>JERRY	WA3CVB	WS4VA B	WS4VA G	
13		447.27500	-DUP	5.00000	25k	DV	70>HARRY	KI4JVE	WS4VA B	WS4VA G	
14		447.27500	-DUP	5.00000	25k	DV	70>ED	W4NEZ	WS4VA B	WS4VA G	
15		447.27500	-DUP	5.00000	25k	DV	70>BUTCH	KF4HR	WS4VA B	WS4VA G	
16		447.27500	-DUP	5.00000	25k	DV	REF025B	REF025BL	WS4VA B	WS4VA G	
17		145.32000	-DUP	0.60000	5k	DV	NCRD*	REF025CL	WS4VA C	WS4VA G	
18		145.32000	-DUP	0.60000	5k	DV	REF025C	REF025CL	WS4VA C	WS4VA G	
19		145.32000	-DUP	0.60000	5k	DV	GERMANY	DA5SATCL	WS4VA C	WS4VA G	
20		145.32000	-DUP	0.60000	5k	DV	DORTMUND	DB0DDOCL	WS4VA C	WS4VA G	
21		145.32000	-DUP	0.60000	5k	DV	KARLSBAD	DB0DJ CL	WS4VA C	WS4VA G	
22		145.32000	-DUP	0.60000	5k	DV	RIMBERG	DB0HRRCL	WS4VA C	WS4VA G	
23		145.32000	-DUP	0.60000	5k	DV	GRANDSBE	DB0RDHCL	WS4VA C	WS4VA G	
24		145.32000	-DUP	0.60000	5k	DV	GERMANY	DB0SATCL	WS4VA C	WS4VA G	
25		145.32000	-DUP	0.60000	5k	DV	GERMANY	DF0HMBCL	WS4VA C	WS4VA G	
26		145.32000	-DUP	0.60000	5k	DV	COURBEVO	F1ZPL CL	WS4VA C	WS4VA G	

# Making a Contact: Simplex

- General Call
  - Your Call: CQCQCQ
  - RPT1:
  - RPT2:
  - My Call: NORMC

General Call  
Calling CQ  
Round tables/Nets  
Most Common

- Specific Station
  - Your Call: KI4JVE
  - RPT1:
  - RPT2:
  - My Call: NORMC

Specific Station  
When other station is using callsign squelch  
Send Message

Emergency Override



# Making a Contact: Local Repeater

- General Call
  - Your Call: CQCQCQ
  - RPT1: WS4VA..C
  - RPT2:
  - My Call: N0RMC

General Call  
Calling CQ  
Round tables/Nets  
Most Common

- Specific Station
  - Your Call: K14JVE
  - RPT1: WS4VA..C
  - RPT2:
  - My Call: N0RMC

Specific Station  
When other station is using callsign squelch  
Send Message

Emergency Override





# Making a Contact: Zone Repeater

- General Call
  - Your Call: CQCQCQ
  - RPT1: WS4VA..C
  - RPT2: WS4VA..B
  - My Call: N0RMC

General Call  
Calling CQ  
Roundtables/Nets  
Most Common

- Specific Station
  - Your Call: W4NEZ
  - RPT1: WS4VA..C
  - RPT2: WS4VA..B
  - My Call: N0RMC

Specific Station

When other station is using callsign squelch  
Send Message

Emergency Override



# Making a Contact: Gateway

## ➤ General Call (Source Route) (ICOM)

- Your Call: /VK8RADB
- RPT1: WS4VA..C
- RPT2: WS4VA..G
- My Call: N0RMC

General Call Through Gateway  
Calling CQ

Most like IRLP

Be sure to give reverse routing

## ➤ Specific Station\User (Dplus)

- Your Call: VK8HF
- RPT1: WS4VA..C
- RPT2: WS4VA..G
- My Call: N0RMC

Specific Station Through Gateway  
Calling specific Station

Don't need to know other station's  
location (City, Repeater, Freq., ...)

When other station is using callsign  
squelch

Send Message

## ➤ Link to Repeater (Dplus)

- Your Call: VK8RADBL
- RPT1: WS4VA..C
- RPT2: WS4VA..G
- My Call: N0RMC

Link Repeaters

Initial key utilizes "L" in 8th Character

All transmissions following must have  
"CQCQCQ.." in the Your Call



# Specialty Commands

## ➤ Unlink Repeater\Reflector (Dplus)

- Your Call: .....U
- RPT1: WS4VA..C
- RPT2: WS4VA..G
- My Call: NORMC

### Unlink Repeaters\Reflectors

- 7 spaces followed by "U" in Your Call
- To unlink module from a different module position 7 identifies module to be unlinked

## ➤ Echo Test (ICOM)

- Your Call: WS4VA..E
- RPT1: WS4VA..C
- RPT2: WS4VA..G
- My Call: NORMC

### Echo Test

- Repeats your transmission

## ➤ Gateway ID (Dplus)

- Your Call: WS4VA..I
- RPT1: WS4VA..C
- RPT2: WS4VA..G
- My Call: NORMC

### Gateway Identification

- Announce Repeater Call Sign if no modules are linked
- Announce linked modules



# Specialty Commands

## ➤ Unlink Repeater\Reflector (Dplus)

- Your Call: .....U
- RPT1: WS4VA..C
- RPT2: WS4VA..G
- My Call: N0RMC

## Unlink Repeaters\Reflectors

7 spaces followed by “U” in Your Call

To unlink module from a different module position 7 identifies module to be unlinked

## ➤ Echo Test (ICOM)

- Your Call: WS4VA..E
- RPT1: WS4VA..C
- RPT2: WS4VA..G
- My Call: N0RMC

## Echo Test

Repeats your transmission

## ➤ Gateway ID (Dplus)

- Your Call: WS4VA..I
- RPT1: WS4VA..C
- RPT2: WS4VA..G
- My Call: N0RMC

## Gateway Identification

Announce Repeater Call Sign if no modules are linked

Announce linked modules



# DV Dongle



- The DV Dongle connects to your PC or Apple Mac via a USB port and provides encoding and decoding of compressed audio using the DVS1 AMBE2000 full duplex vocoder DSP chip.
- AMBE technology is used in all D-Star radios to provide efficient voice transmissions.
- It is also used in some HF digital protocols by vendors like AOR.
- The DVTool application used with the DV Dongle may be installed and run on Microsoft Windows XP/Vista, Mac OS X Leopard, or many flavors of Linux.



# D-STAR Hot Spot

- Software for Windows that creates a D-STAR 'point of presence' (or hot spot) utilizing an analog radio and a GMSK node adapter.
- The hot spot creates RF access to the D-STAR network where none previously existed.
- With a hot spot set up, you can use your D-STAR radio (IC-91AD, ID-92, etc.) to listen to, and talk on, any DPlus equipped D-STAR repeater or reflector.

**D-STAR Hot Spot - System Diagram**



# DV Access Point Dongle



- The DVAP, is similar to many of the homebrew D-STAR Hotspots.
- The device is used for simplex operations, but it does connect to the gateway.
- Like the DV Dongle it plugs into your Windows or MAC OS X computers via the computer's USB port and uses the internet connection to communicate with the D-STAR gateway.
- Very low-power signal at only about 10 mW.
- Similar to the functionality of a simplex Echolink link node.
- 2M only



# D-RATS

**D-RATS: NORMC**

File View Help

Messages Chat Files Event Log

New Forward Reply Delete Mark Read Mark Unread Send/Receive

Drafts  
Inbox  
Outbox  
Sent  
Trash

Sender Recipient Subject Type Date

Stations

- KC9IL
- N1KXJ
- KF4JKY
- SP1VDV
- N1RCW
- N1RCW-1
- 9Z4FZ
- KK4EYE
- N1KXJ-UB
- W3ICF
- K2TJW
- PA1EU
- K9CJD

My Status

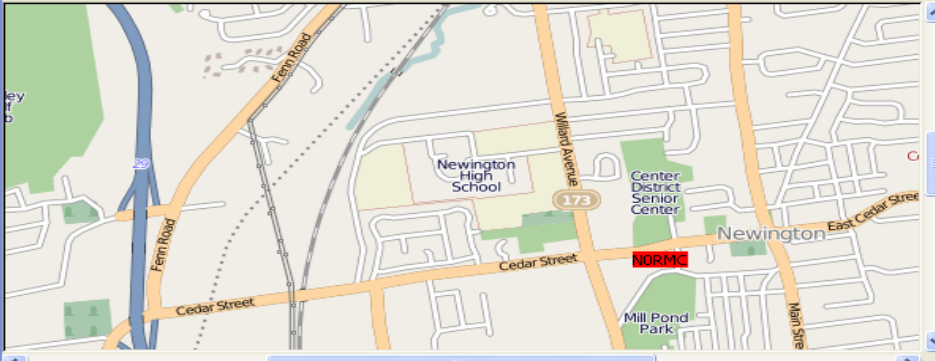
Online  
Online (D-RATS)

NORMC

Station KC9IL is now Offline: Going offline (D-RATS)

**D-RATS Map Window**

Map



Show Station Latitude Longitude Distance Direction

Zoom

Min Max

Track center

Static position

41.7098, -72.7244

**D-RATS: NORMC**

File View Help

Messages Chat Files Event Log

Show event type: All Containing text: Enter filter text

Time Description

- 2011-12-29 23:23:02 Station N1KXJ-UB is now Online: Online (D-RATS)
- 2011-12-29 23:23:02 Station KK4EYE is now Unattended: Ted in Valdese, NC
- 2011-12-29 23:23:02 Station 9Z4FZ is now Unattended: Online (D-RATS)
- 2011-12-29 23:23:02 Station N1RCW-1 is now Unattended: Online (D-RATS)
- 2011-12-29 23:23:02 Station N1RCW is now Online: Online (D-RATS)
- 2011-12-29 23:22:58 NORMC replied to ping from N3TSZ with: Running D-RATS 0.3.2 (Windows XP)
- 2011-12-29 23:22:56 N3TSZ pinged CQCCQ [RAT] (Request)
- 2011-12-29 23:22:45 Station N3TSZ is now Online: Patrick in Chentenharn, PA [FN20kb]
- 2011-12-29 23:21:49 NORMC replied to ping from KC9IL with: Running D-RATS 0.3.2 (Windows XP)
- 2011-12-29 23:21:49 KC9IL pinged NORMC [RAT] (Request)
- 2011-12-29 23:20:51 NORMC replied to ping from KC9IL with: Running D-RATS 0.3.2 (Windows XP)
- 2011-12-29 23:20:51 KC9IL pinged NORMC [RAT] (Request)
- 2011-12-29 23:19:56 D-RATS Started

Stations

- KC9IL (00:01)
- N1KXJ-UB (00:01)
- N1RCW-1 (00:01)
- 9Z4FZ (00:02)
- K2TJW (00:03)
- N1KXJ (00:07)
- KF4JKY (00:07)
- SP1VDV (00:07)
- N1RCW (00:07)
- KK4EYE (00:07)
- W3ICF (00:07)
- PA1EU (00:07)
- K9CJD (00:07)

My Status

Online  
Online (D-RATS)

NORMC

**D-RATS: NORMC**

File View Help

Messages Chat Files Event Log

[23:23:02] K2TJW: Now Online: K2TJW Hornell, NY (Port RAT)

[23:23:02] PA1EU: Now Online: Online (D-RATS) (Port RAT)

[23:23:02] K9CJD: Now Online: Online (D-RATS) (Port RAT)

[23:23:04] SP1VDV: Now Online: Online (D-RATS) (Port RAT)

[23:23:06] KF4JKY: Now Unattended: Online (D-RATS) (Port RAT)

[23:23:07] N1KXJ: Now Unattended: Online (D-RATS) (Port RAT)

[23:23:33] KC9IL: Now Offline: Going offline (D-RATS) (Port RAT)

[23:26:39] [RAT] K2TJW: [QST] WNY Ratflector:  
rat.starrsny.org Port 9000, open for gen. use as well as  
emergency traffic.

[23:27:46] [RAT] 9Z4FZ: [QST] Season Greeting wishing all a  
safe and enjoyable xmas season de Julien 9Z4FZ

Main

RAT

Quick Messages  
QSTs

Send

Stations

- 9Z4FZ
- K2TJW (00:01)
- KC9IL (00:04)
- N1KXJ (00:05)
- KF4JKY (00:05)
- SP1VDV (00:05)
- N1RCW (00:05)
- N1RCW-1 (00:05)
- KK4EYE (00:05)
- N1KXJ-UB (00:05)
- W3ICF (00:05)
- PA1EU (00:05)
- K9CJD (00:05)

My Status

Online  
Online (D-RATS)

NORMC



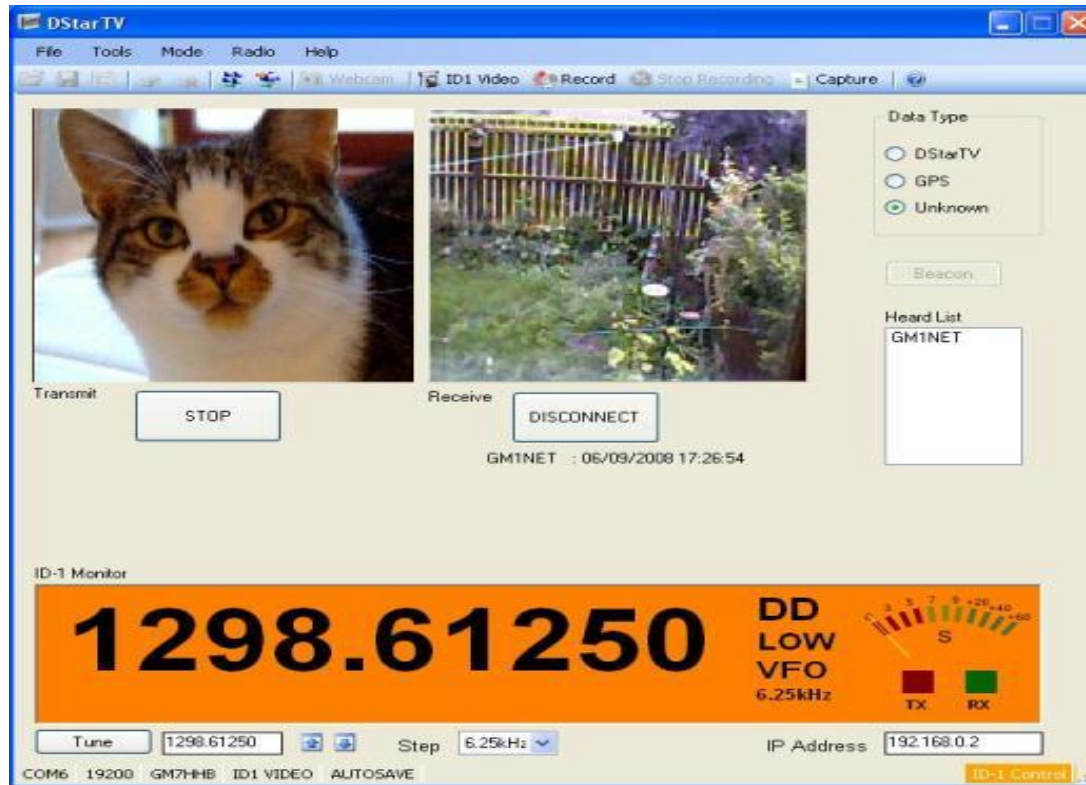
# D\* Chat



- Enables text based communications between multiple stations simultaneously.
- Works on simplex channel, through a repeater, or through the gateway network.
- Works with ALL current ICOM D-STAR radios
- Filters GPS data from the message stream.
- Random Delay feature helps avoid collisions on active channels.
- Bulletin-send feature sends text files with variable pause between lines.
- Timestamps can be enabled for RX and/or TX
- Optional audible alert for incoming messages.
- Simple re-transmission of last line sent.
- Customizable Logo and Title Text



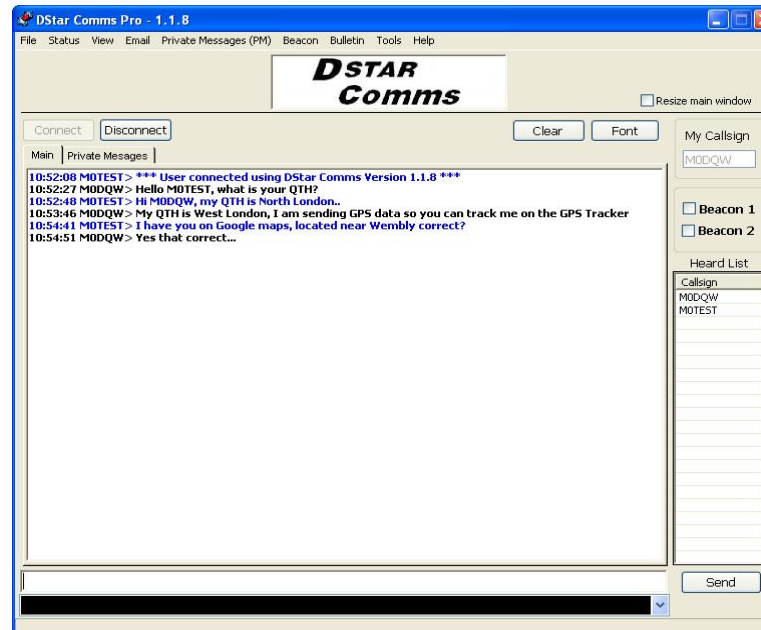
# D-STAR TV



- SSTV for D-Star Amateur Radios
- Fast Scan Video for Icom ID-1



# D-STAR COMMS



- Text Chat
- Beacon Mode
- POP 3 Email
  - Gateway, Composer, Address Book, Private Messages, Auto Reply, Log, etc.
- Heard List
- GPS Tracker
- GPS Beacon Emulator
- Network Node



# D-STAR Calculator

2.2.0.2



Source Repeater	United States, Virginia Stafford WS4VA Gateway
Source Module	DD A 1298.4000 RPS DV A 1282.2000 -12.0000 DV B 447.2750 -5.0000 DV C 145.3200 -0.6000
Function	Link to Repeater
Destination Repeater	Australia, Northern Territory Darwin VK8RAD Gateway
Destination Module	DD A 1274.0500 RPS DV A 1293.4000 -20.0000 DV B 438.7500 -5.0000 DV C 146.7000 -0.6000

For D-STAR News and Information, check out [www.DSTARINFO.com](http://www.DSTARINFO.com)



Programming for linking from WS4VA (port DV C) to VK8RAD (port DV C)

YOUR: **VK8RADCL**

RPT1: **WS4VA ■ ■ C**

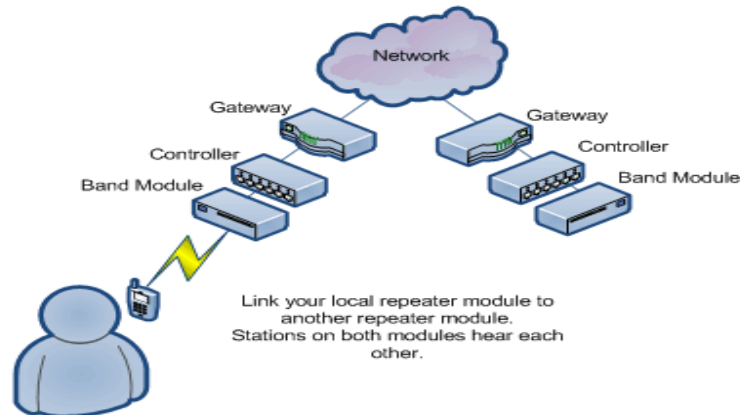
RPT2: **WS4VA ■ ■ G**

Set Radio To: **145.3200 MHz Offset -0.6000 MHz**

"■" represents a space

[Help!](#)

I'm near Stafford VA USA. I'm talking on  
WS4VA (port DV C) and my radio is set to  
145.3200 -0.6000



Before **linking**, identify yourself and your  
intentions.

I want to **link** this repeater module to VK8RAD (port DV C)

After **linking** switch back to your regular programming for this module.

Copyright 2009 Ed Woodrick WA4YIH



# D-STAR STATISTICS

Statistic	Count
Systems*	885
Repeaters	1511
Countries	36
A Modules	225
B Modules	664
C Modules	407
DD Modules	215

Country	Systems*	Repeaters*
USA	420	811
Germany	73	102
Italy	64	96
Japan	58	105
UK	45	58
Canada	44	88
Australia	21	49

• *A system can have between 1 and 4 repeater modules*

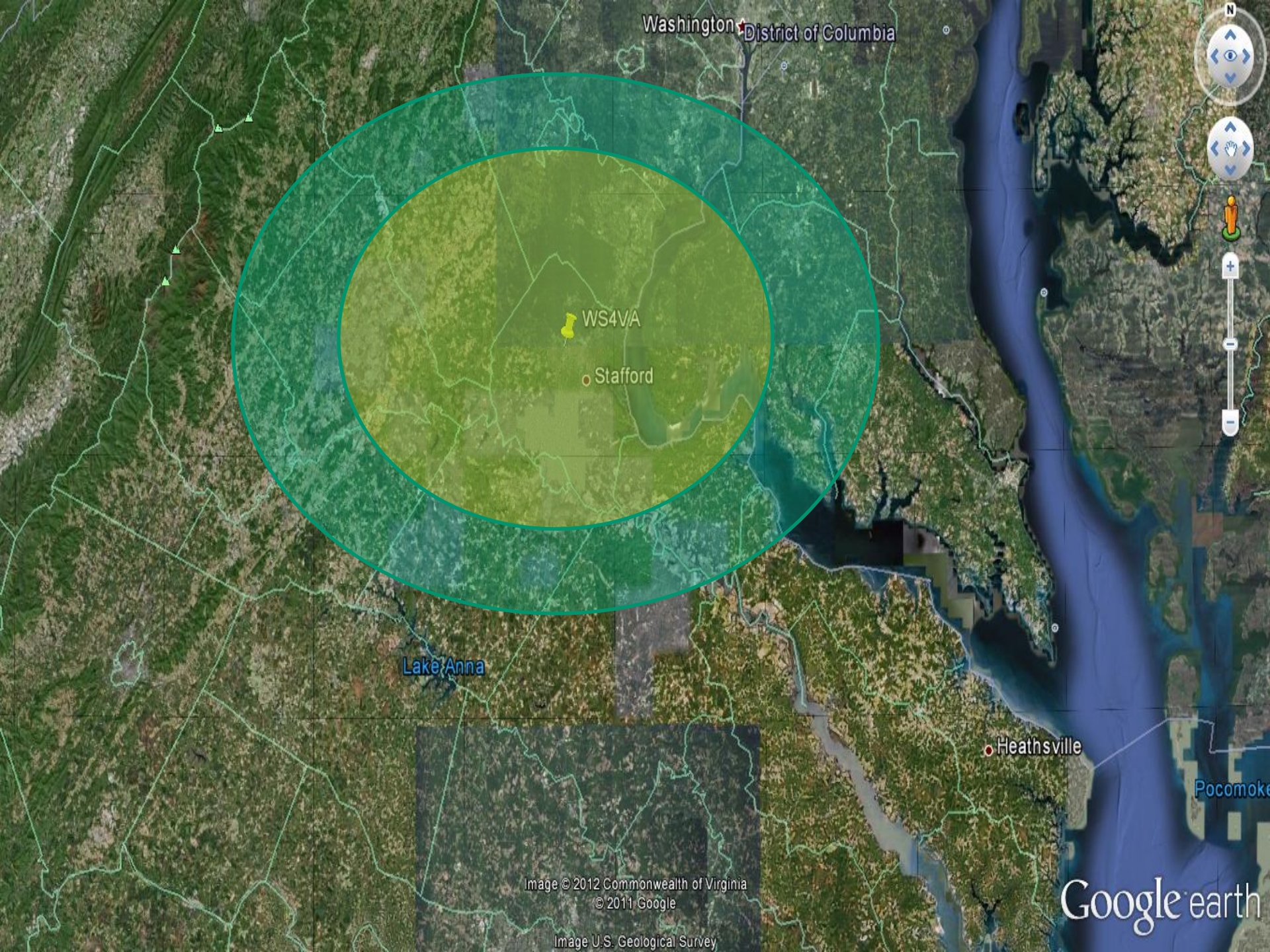


# Milestones & Future

- 1999 - Japanese government funded development of D-STAR and administered by the Japan Amateur Radio League (JARL).
- 2000 - D-STAR standard published.
- 2004 – ICOM begins offering D-STAR “Optional” and D-STAR “Capable” Hardware.
- 2005 – WS4VA D-STAR Activated
- 2007 - First D-Star over satellite QSO occurred between Michael, N3UC, FM-18 in Haymarket, Virginia and Robin, AA4RC, EM-73 in Atlanta, Georgia while working AMSAT's AO-27 microsatellite.
- 2009 - First non-Icom D-Star repeater GB7MH, fully linked to the K5TIT G2 network and D-Plus.
- 2009 – First 10M D-STAR QSO's
- 2012 - First D-Star capable microsatellite is scheduled for launch during early 2012. OUFTI-1 is a CubeSat and is built by Belgian students at the University of Liège and I.S.I.L (Haute École de la Province de Liège). The name is an acronym for *Orbital Utility For Telecommunication Innovation*.







Washington District of Columbia

WS4VA

Stafford

Lake Anna

Heathsville

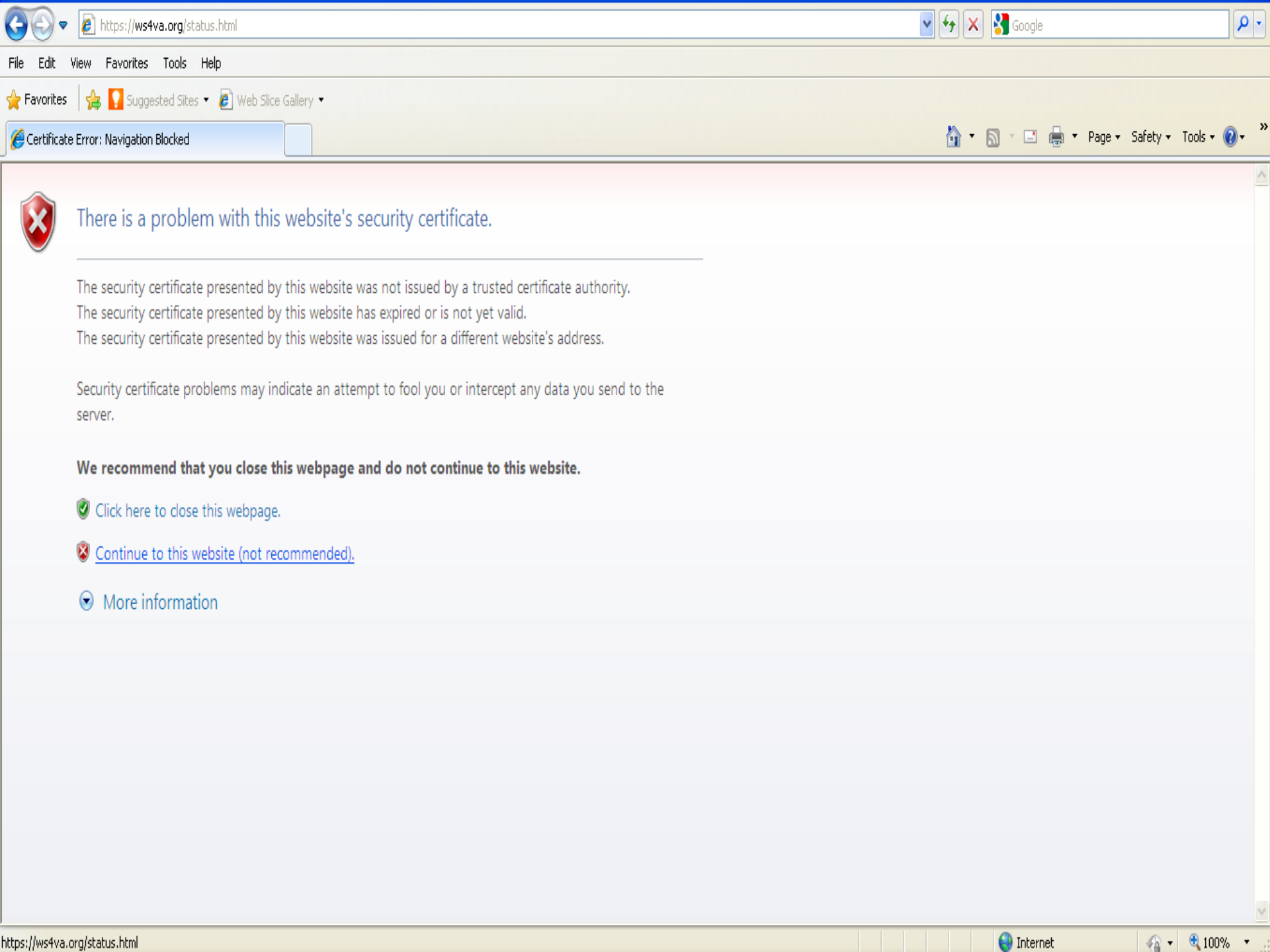
Pocomoke

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# DPLUS Dashboard | Gateway Status and Control

Registration

WS4VA Repeater System

DPLUS version 2.2g

## Linked Gateways / Reflectors

Module	Linked to
A	unlinked
B	unlinked
C	unlinked

## Remote Users

Callsign	User Message	Last TX on	Type
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## Last Heard

Callsign	User Message	Last TX on	Time
N0RMC	N0RMC2651@GMAIL.COM	C	2011/12/29 17:57:50

Current Time is 12/31/2011 14:44:20 UTC [\[Click here to disable refresh\]](#)

Callsign	Time Heard	Reporting Node	325 Unique callsigns heard in the last hour
SQ5DCP	12/31/11 14:44:20 UTC	REF032 A 1.2GHz DVD	Radom, Poland
IV3JDV N	12/31/11 14:44:20 UTC	IR3UIC Dongle User DVD	Trieste, Italy, Italy
PU2UBL D	12/31/11 14:44:19 UTC	PY2KPP A 1.2GHz	São Paulo, SP, Brazil
KF4REN	12/31/11 14:44:16 UTC	W4DSI B 440 MHz	Lexington, KY, USA
PA0WBB	12/31/11 14:44:15 UTC	REF017 Dongle User DVD	Amsterdam, The Netherlands
N0XIA	12/31/11 14:44:13 UTC	KJ4MMC C 2 Meters	Orlando, FL, USA
IK2WFFJ	12/31/11 14:44:10 UTC	IR2UEZ B 440 MHz	Cassano Magnago, Lombardy, Italy
IZ3LCJ	12/31/11 14:44:10 UTC	IR3UIB B 440 MHz	Pordenone, Italy, Italy
KB8QGH C	12/31/11 14:44:09 UTC	W1DSR Dongle User DVD	Holliston, MA, USA
KA8SCP	12/31/11 14:44:09 UTC	WB1GOF B 440 MHz	Westford, MA, USA
IW2KVT	12/31/11 14:44:05 UTC	IR2UEZ B 440 MHz	Cassano Magnago, Lombardy, Italy
SM7HZK	12/31/11 14:44:04 UTC	REF031 A 1.2GHz DVD	Unknown
MB6ST	12/31/11 14:44:04 UTC	GB7GD Dongle User DVD	Aberdeen, Scotland, UK
PD0MR	12/31/11 14:44:04 UTC	REF017 A 1.2GHz DVD	Amsterdam, The Netherlands
SM7VOY	12/31/11 14:44:00 UTC	SK7RMQ C 2 Meters	Linderöd, Skane, Sweden
SP5QWK	12/31/11 14:43:59 UTC	REF032 A 1.2GHz DVD	Radom, Poland
GW0GVY	12/31/11 14:43:59 UTC	REF005 A 1.2GHz DVD	London, UK
DL2AAW	12/31/11 14:43:54 UTC	DB0DB B 440 MHz	Hochblauen, JN37US, Germany
CT2KEV	12/31/11 14:43:49 UTC	REF018 B 440 MHz DVD	REF018, REF018, Brazil
PD0MR N	12/31/11 14:43:49 UTC	REF017 Dongle User DVD	Amsterdam, The Netherlands
SV1GZL	12/31/11 14:43:47 UTC	SV1U B 440 MHz	Athens- Mt. Ymittos, H.A.G, Greece
W1NGS	12/31/11 14:43:47 UTC	W1DSR C 2 Meters	Holliston, MA, USA
IZ6FGP	12/31/11 14:43:47 UTC	IR6UCC C 2 Meters	Monte Maiella (CH), Abruzzo, Italy
DO8RW	12/31/11 14:43:45 UTC	DB0DB B 440 MHz	Hochblauen, JN37US, Germany
LA4DSA	12/31/11 14:43:39 UTC	SR1UVS B 440 MHz DVD	SZCZECIN - Centrum, Zachodniopomorskie, Poland
N4EXW	12/31/11 14:43:21 UTC	W4DSI B 440 MHz	Lexington, KY, USA
LA3XSA	12/31/11 14:43:14 UTC	SR1UVS B 440 MHz DVD	SZCZECIN - Centrum, Zachodniopomorskie, Poland
G0ELO	12/31/11 14:43:14 UTC	REF005 A 1.2GHz DVD	London, UK
DG0CC	12/31/11 14:43:13 UTC	DM0MW B 440 MHz	Mittweida, SAX, Germany
JR3WZ A	12/31/11 14:43:09 UTC	REF047 B 440 MHz DVD	Japan

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\(Updated 11/24/2011\)](#)

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The first published book  
on D-Star!

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# Useful Links

- **WS4VA**
  - WS4VA D-STAR Status Page <https://ws4va.org/status.html>
  - WS4VA D-STAR Registration Page <https://ws4va.org/Dstar.do>
- D-STAR Users [www.dstarusers.org](http://www.dstarusers.org)
- D-STAR Calculator [www.dstarinfo.com/calculator.aspx](http://www.dstarinfo.com/calculator.aspx)
- NCR D-STAR [www.ncrdstar.org](http://www.ncrdstar.org)

