

John Davis

WB4QDX

Georgia D-STAR

D-STAR BASICS AND MORE

What is D-STAR?

- D-STAR is an open worldwide standard for digital communications over Amateur Radio
- The D-STAR standard was developed by the Japan Amateur Radio League (JARL)
- D-STAR uses the AMBE vocoder chip under license from DVSI
- Icom is initial manufacturer of mobiles, HTs, repeaters and controllers
- Non-Icom hardware and software developed for repeaters, hotspots, access points and accessories



How D-STAR Works

- ⦿ D-STAR is digital modulation
- ⦿ Voice is converted from analog to digital for transmission
- ⦿ Data is combined with digitized voice for transmission at 4800 bps
 - 2400 bits for Voice
 - 1200 bits for voice Forward Error Correction
 - 1200 bits for Data
- ⦿ Callsign is sent with each transmission

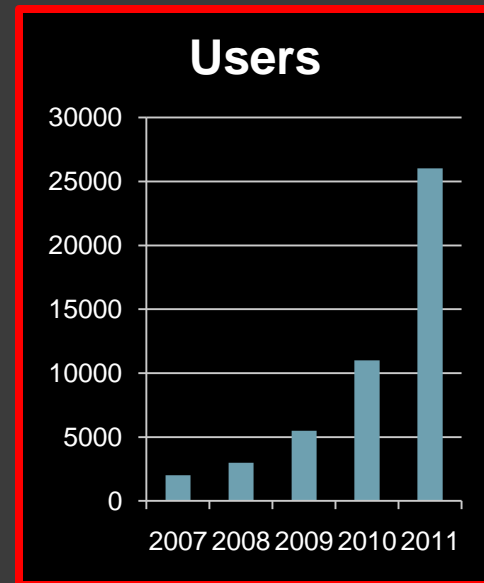
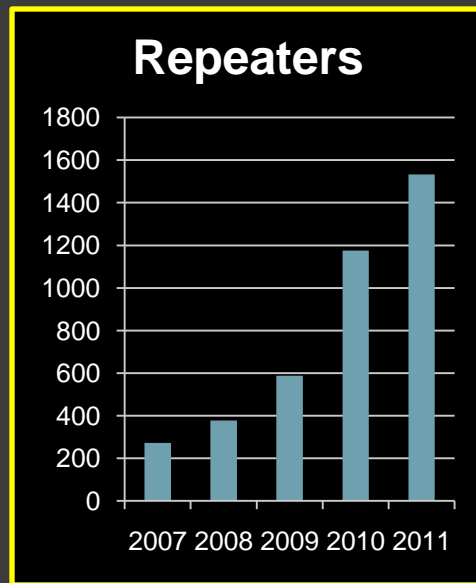
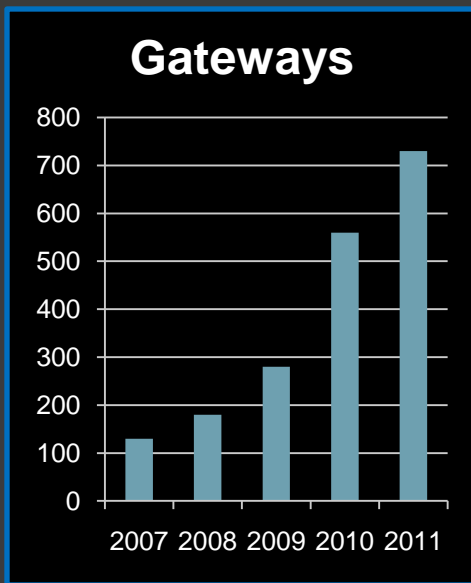


What can D-STAR Do?

- ◉ 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 (42 now in operation worldwide)

D-STAR Continues to Grow

- As of May 15th, 730 Gateways, 1,533 Repeaters and 26,026 registered users



D-STAR Basics

- ⦿ Know repeater frequency and callsign
- ⦿ The big four parameters:
 1. MY - My callsign
 2. UR – Your callsign (CQCQCQ for general call)
 3. RPT1 – Repeater callsign/module I'm talking to (WD4STR B)
 4. RPT2 – Where do I want to go? (usually repeater callsign and gateway example WD4STR G)
- ⦿ The magic eighth position – Designate module regardless of callsign length (WX4GPB C, W4DOC B, W4PL C)

Programming Example for KI4SBA 2 Meter Repeater

Frequency: 145.35-

MY: WB4QDX
(programmed one time)

UR: CQCQCQ
RPT1: KI4SBA C
RPT2: KI4SBA G

D-STAR Linking

- Reflectors allow multiple repeaters to connect together
- No special programming required by users on each repeater

First send linking command

```
Link W4DOC C to  
REF001C  
  
Frequency: 145.35-  
  
MY: WB4QDX  
UR: REF001CL  
RPT1: W4DOC C  
RPT2: W4DOC G
```

Then use as local QSO

```
QSO in Linked Mode  
  
Frequency: 145.35-  
  
MY: WB4QDX  
UR: CQCQCQ  
RPT1: W4DOC C  
RPT2: W4DOC G
```

- To unlink, send “-----U” (seven spaces and U) in UR

Radio Memory Management - Group

One method to organize channels stored in memories:

- Create a group or bank of memories for each repeater
- Store commands for each linking function in a memory of the group

| CH No | Frequency | Dup | Offset | TS | Mode | Name | Your Call Sign | RPT1 Call Sign | RPT2 Call Sign |
|-------|-----------|------|--------|-------|------|----------|----------------|----------------|----------------|
| 1 | 145.200 | DUP- | 0.6 | 10kHz | DV | KI4SBA C | CQCQCQ | KI4SBA C | KI4SBA G |
| 2 | 145.200 | DUP- | 0.6 | 10kHz | DV | UNLINK | U | KI4SBA C | KI4SBA G |
| 3 | 145.200 | DUP- | 0.6 | 10kHz | DV | SBA C ID | KI4SBA I | KI4SBA C | KI4SBA G |
| 4 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF001C | REF001CL | KI4SBA C | KI4SBA G |
| 5 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF002A | REF002AL | KI4SBA C | KI4SBA G |
| 6 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF004A | REF004AL | KI4SBA C | KI4SBA G |
| 7 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF030A | REF030AL | KI4SBA C | KI4SBA G |
| 8 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF030B | REF030BL | KI4SBA C | KI4SBA G |
| 9 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF030C | REF030CL | KI4SBA C | KI4SBA G |
| 10 | 145.200 | DUP- | 0.6 | 10kHz | DV | ECHOTEST | KI4SBA E | KI4SBA C | KI4SBA G |

Radio Memory Management - Talk

- Use this channel for general QSO
- No linking commands required or repeater already linked
- CQCQCQ in UR field

| CH No | Frequency | Dup | Offset | TS | Mode | Name | Your Call Sign | RPT1 Call Sign | RPT2 Call Sign |
|-------|-----------|------|--------|-------|------|----------|----------------|----------------|----------------|
| 1 | 145.200 | DUP- | 0.6 | 10kHz | DV | KI4SBA C | CQCQCQ | KI4SBA C | KI4SBA G |
| 2 | 145.200 | DUP- | 0.6 | 10kHz | DV | UNLINK | U | KI4SBA C | KI4SBA G |
| 3 | 145.200 | DUP- | 0.6 | 10kHz | DV | SBA C ID | KI4SBA I | KI4SBA C | KI4SBA G |
| 4 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF001C | REF001CL | KI4SBA C | KI4SBA G |
| 5 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF002A | REF002AL | KI4SBA C | KI4SBA G |
| 6 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF004A | REF004AL | KI4SBA C | KI4SBA G |
| 7 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF030A | REF030AL | KI4SBA C | KI4SBA G |
| 8 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF030B | REF030BL | KI4SBA C | KI4SBA G |
| 9 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF030C | REF030CL | KI4SBA C | KI4SBA G |
| 10 | 145.200 | DUP- | 0.6 | 10kHz | DV | ECHOTEST | KI4SBA E | KI4SBA C | KI4SBA G |

Radio Memory Management - ID

- Use to see if repeater is linked or unlinked
- If linked, repeater says "Remote system linked"
- Data line will indicate where repeater or reflector linked
- Return to CQCQCQ channel to talk

| CH No | Frequency | Dup | Offset | TS | Mode | Name | Your Call Sign | RPT1 Call Sign | RPT2 Call Sign |
|----------|----------------|-------------|------------|--------------|-----------|-----------------|-----------------|-----------------|-----------------|
| 1 | 145.200 | DUP- | 0.6 | 10kHz | DV | KI4SBA C | CQCQCQ | KI4SBA C | KI4SBA G |
| 2 | 145.200 | DUP- | 0.6 | 10kHz | DV | UNLINK | U | KI4SBA C | KI4SBA G |
| 3 | 145.200 | DUP- | 0.6 | 10kHz | DV | SBA C ID | KI4SBA I | KI4SBA C | KI4SBA G |
| 4 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF001C | REF001CL | KI4SBA C | KI4SBA G |
| 5 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF002A | REF002AL | KI4SBA C | KI4SBA G |
| 6 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF004A | REF004AL | KI4SBA C | KI4SBA G |
| 7 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF030A | REF030AL | KI4SBA C | KI4SBA G |
| 8 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF030B | REF030BL | KI4SBA C | KI4SBA G |
| 9 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF030C | REF030CL | KI4SBA C | KI4SBA G |
| 10 | 145.200 | DUP- | 0.6 | 10kHz | DV | ECHOTEST | KI4SBA E | KI4SBA C | KI4SBA G |

Radio Memory Management - Link

- Tune to channel and key briefly to initiate link command
- System will say “Remote system linked” if successful
- Return to CQCQCQ channel to talk

| CH No | Frequency | Dup | Offset | TS | Mode | Name | Your Call Sign | RPT1 Call Sign | RPT2 Call Sign |
|-------|-----------|------|--------|-------|------|----------|----------------|----------------|----------------|
| 1 | 145.200 | DUP- | 0.6 | 10kHz | DV | KI4SBA C | CQCQCQ | KI4SBA C | KI4SBA G |
| 2 | 145.200 | DUP- | 0.6 | 10kHz | DV | UNLINK | U | KI4SBA C | KI4SBA G |
| 3 | 145.200 | DUP- | 0.6 | 10kHz | DV | SBA C ID | KI4SBA I | KI4SBA C | KI4SBA G |
| 4 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF001C | REF001CL | KI4SBA C | KI4SBA G |
| 5 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF002A | REF002AL | KI4SBA C | KI4SBA G |
| 6 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF004A | REF004AL | KI4SBA C | KI4SBA G |
| 7 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF030A | REF030AL | KI4SBA C | KI4SBA G |
| 8 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF030B | REF030BL | KI4SBA C | KI4SBA G |
| 9 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF030C | REF030CL | KI4SBA C | KI4SBA G |
| 10 | 145.200 | DUP- | 0.6 | 10kHz | DV | ECHOTEST | KI4SBA E | KI4SBA C | KI4SBA G |

Radio Memory Management - Unlink

- Tune to channel and key briefly to initiate link command
- System will say “Remote system unlinked” if successful
- Return to CQCQCQ channel to talk

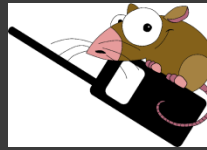
| CH No | Frequency | Dup | Offset | TS | Mode | Name | Your Call Sign | RPT1 Call Sign | RPT2 Call Sign |
|-------|-----------|------|--------|-------|------|----------|----------------|----------------|----------------|
| 1 | 145.200 | DUP- | 0.6 | 10kHz | DV | KI4SBA C | CQCQCQ | KI4SBA C | KI4SBA G |
| 2 | 145.200 | DUP- | 0.6 | 10kHz | DV | UNLINK | U | KI4SBA C | KI4SBA G |
| 3 | 145.200 | DUP- | 0.6 | 10kHz | DV | SBA C ID | KI4SBA I | KI4SBA C | KI4SBA G |
| 4 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF001C | REF001CL | KI4SBA C | KI4SBA G |
| 5 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF002A | REF002AL | KI4SBA C | KI4SBA G |
| 6 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF004A | REF004AL | KI4SBA C | KI4SBA G |
| 7 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF030A | REF030AL | KI4SBA C | KI4SBA G |
| 8 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF030B | REF030BL | KI4SBA C | KI4SBA G |
| 9 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF030C | REF030CL | KI4SBA C | KI4SBA G |
| 10 | 145.200 | DUP- | 0.6 | 10kHz | DV | ECHOTEST | KI4SBA E | KI4SBA C | KI4SBA G |

Radio Memory Management - Echotest

- Tune to channel, key and speak
- System will echo back your transmission
- Return to CQCQCQ channel to talk

| CH No | Frequency | Dup | Offset | TS | Mode | Name | Your Call Sign | RPT1 Call Sign | RPT2 Call Sign |
|-------|-----------|------|--------|-------|------|----------|----------------|----------------|----------------|
| 1 | 145.200 | DUP- | 0.6 | 10kHz | DV | KI4SBA C | CQCQCQ | KI4SBA C | KI4SBA G |
| 2 | 145.200 | DUP- | 0.6 | 10kHz | DV | UNLINK | U | KI4SBA C | KI4SBA G |
| 3 | 145.200 | DUP- | 0.6 | 10kHz | DV | SBA C ID | KI4SBA I | KI4SBA C | KI4SBA G |
| 4 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF001C | REF001CL | KI4SBA C | KI4SBA G |
| 5 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF002A | REF002AL | KI4SBA C | KI4SBA G |
| 6 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF004A | REF004AL | KI4SBA C | KI4SBA G |
| 7 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF030A | REF030AL | KI4SBA C | KI4SBA G |
| 8 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF030B | REF030BL | KI4SBA C | KI4SBA G |
| 9 | 145.200 | DUP- | 0.6 | 10kHz | DV | REF030C | REF030CL | KI4SBA C | KI4SBA G |
| 10 | 145.200 | DUP- | 0.6 | 10kHz | DV | ECHOTEST | KI4SBA E | KI4SBA C | KI4SBA G |

There's a RAT in D-STAR



- D-RATS is a full function data communications tool for D-STAR and more...and it's **FREE**
- Written by Dan Smith, KK7DS
- Utilizes D-STAR low-speed data mode (~1200 baud)
- PC connects directly to D-STAR radio (No TNC required)
- Windows, Linux and Mac versions available
- Can be used without radio over Internet or with DV Dongle
- Provides chat, messaging, email, forms, file transfer (unattended), mapping (maps included)
- www.d-rats.com

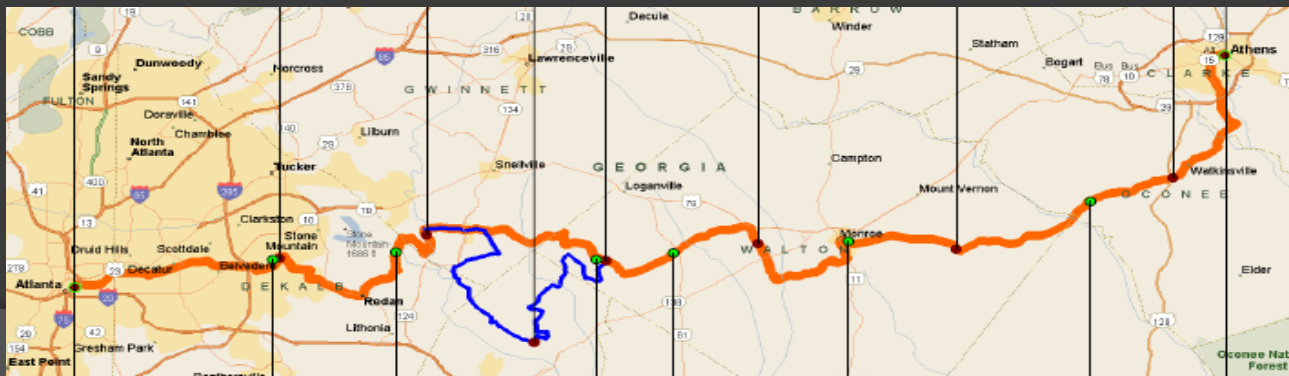
The screenshots illustrate the D-RATS software interface. The top window displays a chat log with messages from stations like N4RDX, KK7DS, and AF6BY. The middle window shows a list of online stations including IW2OHL, N1SO, and N1RCW. The bottom window shows a file transfer window with a list of files like '9A6AIB-Ports-2010-12-19.txt' and a map window showing a map of the area around Hartsfield-Jackson Atlanta International Airport with a red location marker.

D-STAR for EmComm

- Voice and data communications in one radio (no TNC required)
- Operates over wide areas with Internet repeater linking (ad-hoc nets)
- Serves local area through local repeater
- Same capabilities on simplex
 - *Expanded capabilities with no infrastructure required*

D-STAR at Work (Public Service)

- MS Bike Ride 2010 (Atlanta)
 - 100 mile course from Atlanta to Athens, GA
 - No single repeater covers route
 - Need voice and position information from SAG vehicles
 - D-STAR used exclusively
 - 3 linked repeaters available to cover course
 - 10 SAG vans use IC-2820 for voice and D-PRS
 - Position info displayed on map at Race Operations



D-STAR at Work (EmComm)

- Southeast Tornadoes
 - Early warning with NWS/Skywarn
 - Damage Assessment and Cleanup
- Search and Rescue
 - GPS position reporting
- Airborne Photo Transmission
 - Near real time photos from air using ID-1 high speed data on 1.2 GHz

What's Coming to D-STAR

- Open standard allows more capabilities to be developed
 - Repeater-based utilities
 - Hotspots
 - Other hardware
- New radio released – Icom 9100
 - HF through 1.2 GHz

D-STAR Quiz – Fact or Fiction

- ⦿ D-STAR is a proprietary standard **FALSE**
- ⦿ D-STAR is a fad that will go away **FALSE**
- ⦿ D-STAR requires the Internet **FALSE**
- ⦿ Only one vendor supports D-STAR **FALSE**
- ⦿ D-STAR radios are too expensive **FALSE**
- ⦿ D-STAR is too complicated **FALSE**

- ⦿ Repeat after me...."I LOVE D-STAR"

QUESTIONS?