

MARC D-STAR Presentation

January 7

Bruce Semple
WA3SWJ

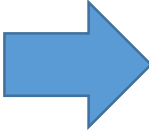
Credits

- John Davis – WB4QDX
- Maryland D-Star
- TAPR – Digital Communications Conference – John Hays (K7VE)
- Mark Holmes – KJ4VO
- Jim Moen – K6JM
- Fred Van Kempen – PA4YBR
- Jim McClellan – N5MIJ
- Guy, Larry, & Ray
- Ron Milione Ph.D. W2TAP

Topics

- D-STAR – What is it?
- What Can I do with it?
- The Repeater / Gateway System
- D-STAR User Equipment
- D-STAR User Registration
- Your First D-STAR Call - The Four Call Signs
- D-STAR Routing

Topics

- 
- D-STAR – What is it?
 - What Can I do with it?
 - The Repeater / Gateway System
 - D-STAR User Equipment
 - D-STAR User Registration
 - Your First D-STAR Call - The Four Call Signs
 - D-STAR Routing

D-Star – What is it ?



D-STAR (Digital Smart Technologies for Amateur Radio) is a digital voice and data protocol specification (published in 2001) developed as the result of research by the [Japan Amateur Radio League](#) to investigate digital technologies for [amateur radio](#). ICOM provided the equipment used for development and testing.

- **D-STAR is an open protocol** – although it is published by JARL, it is available to be implemented by anyone. While ICOM is the only company to date that manufactures D-STAR- compatible radios, any equipment or software that supports the D-STAR protocol will work with a D-STAR system. D-STAR systems can be built using both commercial and homebrew equipment and software.
- In a D-STAR system, the **air link portion of the protocol applies to signals travelling between radios or between a radio and a repeater. D-STAR radios can talk directly to each other without any intermediate equipment** or through a repeater using D-STAR voice or data transceivers. **The Gateway portion of the protocol applies to the digital interface between D-STAR repeaters.**
- **D-STAR also specifies how a voice signal is converted to and from streams of digital data**, a function called a codec.
 - The D-STAR codec is known as **AMBE (Advanced Multi-Band Excitation)** from Digital Voice Systems, Inc (DVS) (www.dvsinc.com)
 - The voice signal is transmitted in the D-STAR system at 3,600 bps (3.6kbps)

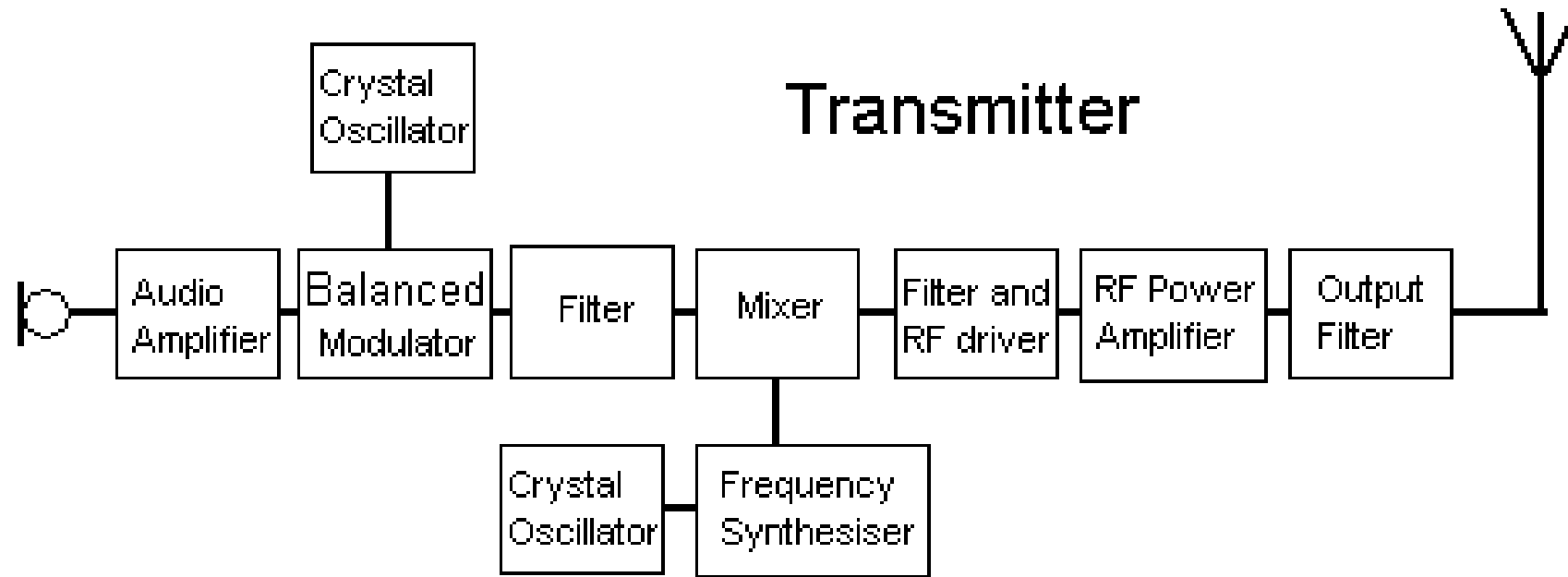
AMBE-2020™ Vocoder Chip

**Now Available! PC Decoder Software
for AMBE-2000™ and AMBE-2020™ Applications**

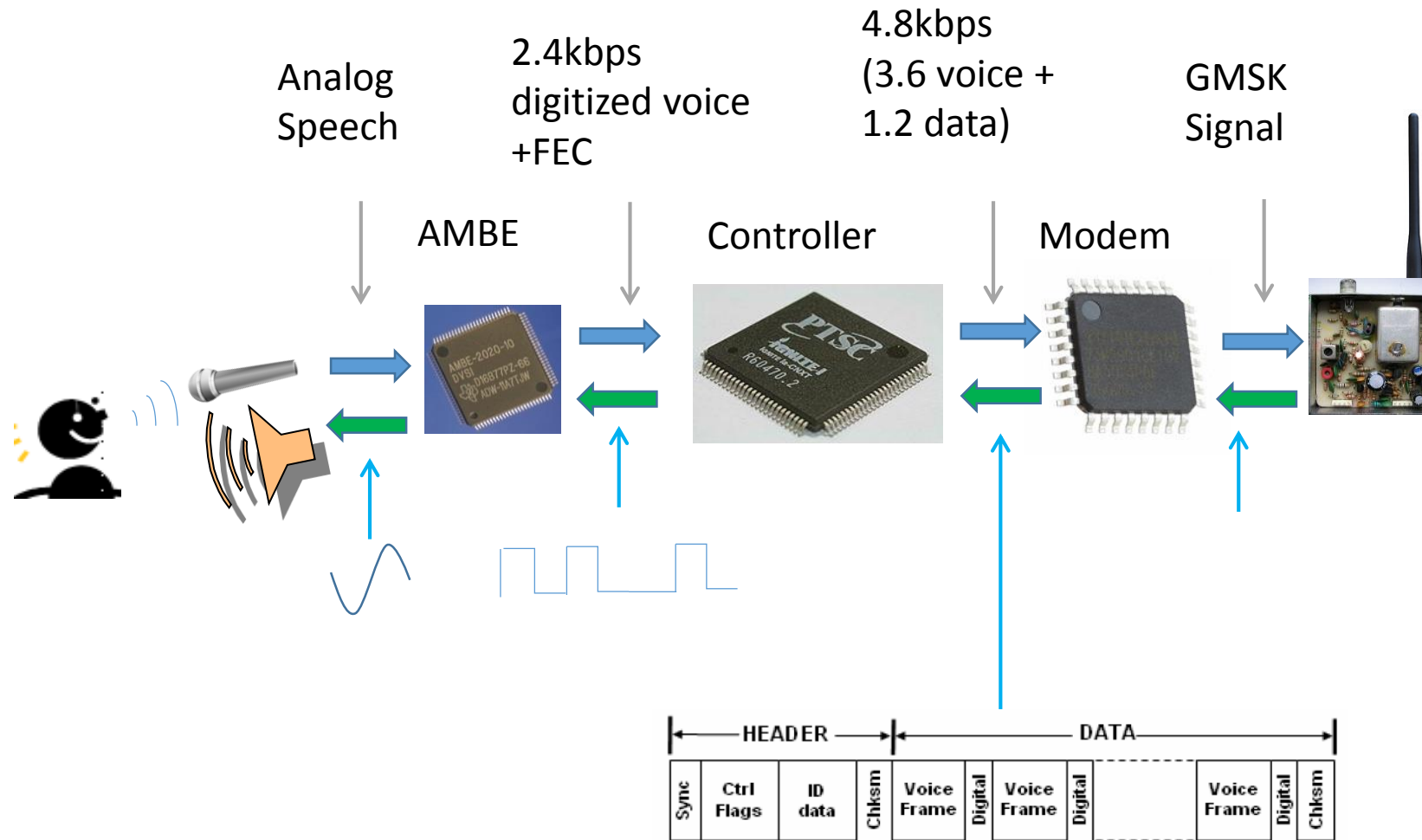
For OEM customers purchasing DVSI's AMBE-2000™ or AMBE-2020™ vocoder chips, DVSI can provide PC-based decoder software that is able to decode speech from the encoded bit stream by the vocoder chip. This decoder software, which operates at select bit rates, is available under DVSI license. It enables a PC to playback speech from an encoded bit stream produced by AMBE-2000™ or AMBE-2020™ vocoder chips, and can be used in a wide range of applications.

This PC-based decoder software (executable code) is offered through a standard software license agreement. Please contact DVSI for more details.

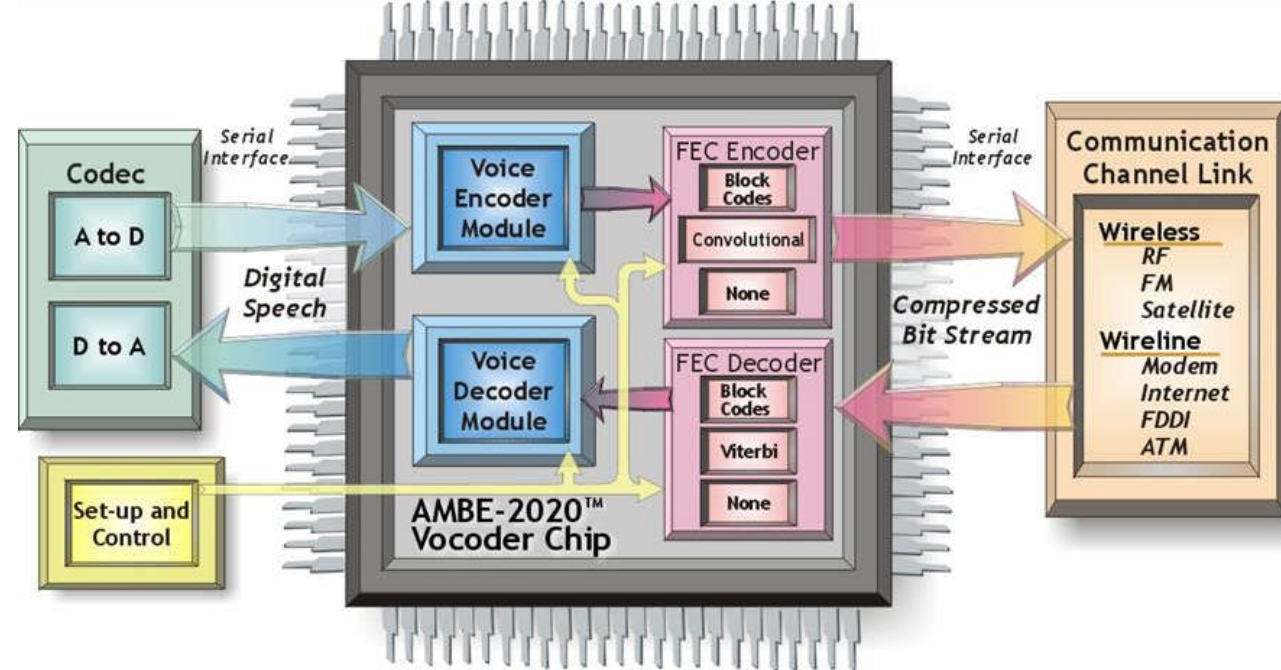
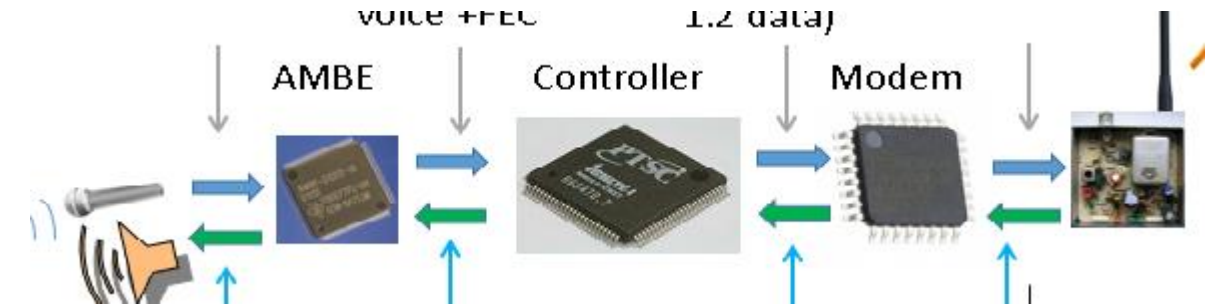
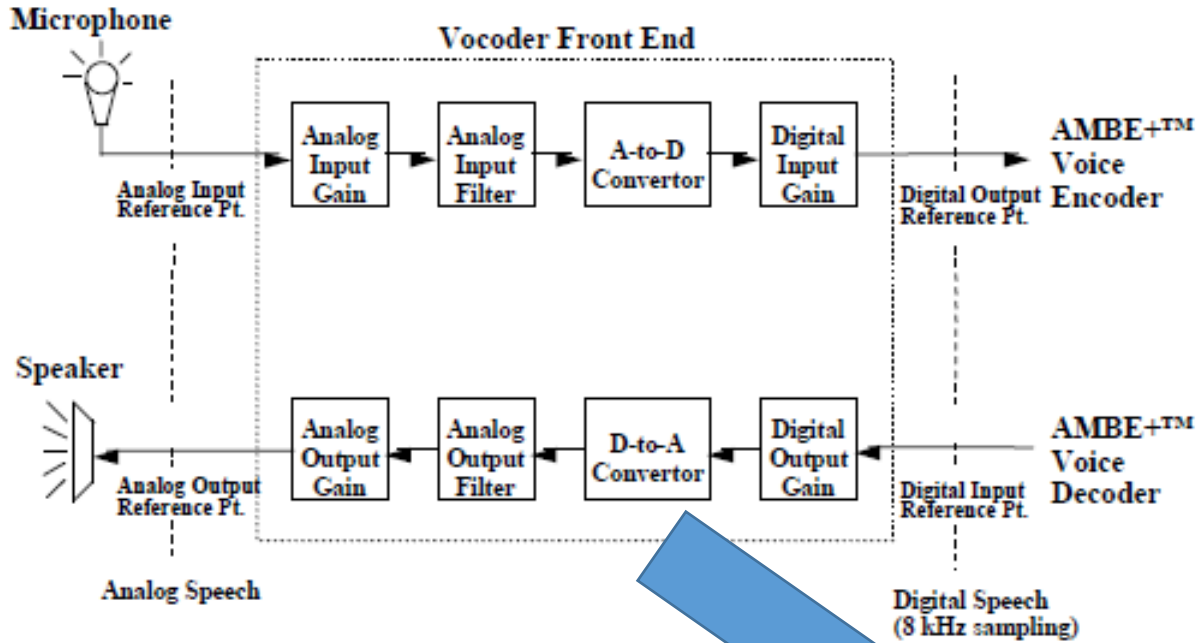
Analogue FM Transmitter Block Diagram



Look inside the D-STAR radio



Digital Voice Encoder

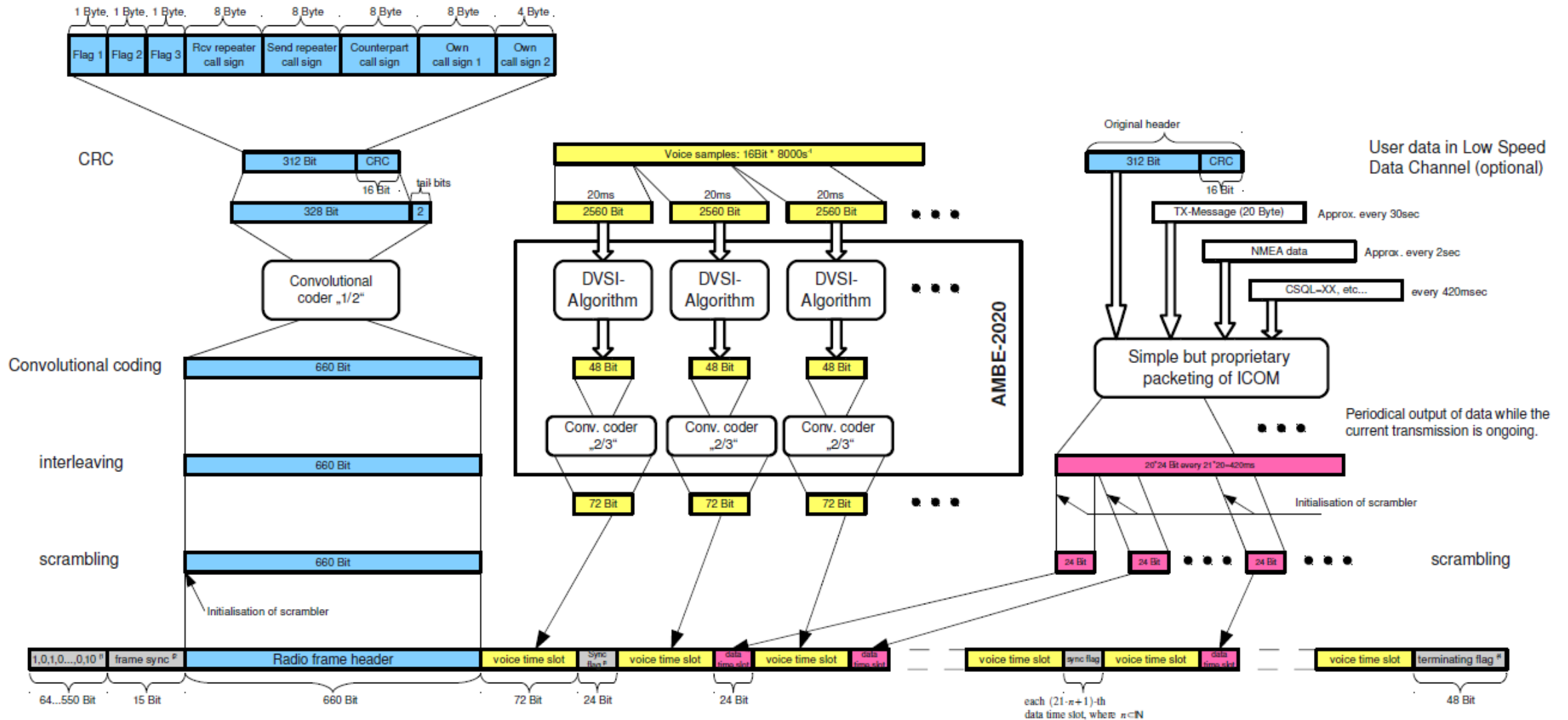


Some Protocol Specification Terminology

- Digital Voice (DV)
 - 3600 bps data stream real time encoded with
 - 2400 bps voice (AMBE encoded)
 - 1200 bps Forward Error Correction (FEC) for voice
 - 1200 bps data (text messages, GPS, telemetry, etc.)
 - About 900 bps available for transmission of “user data”
 - 6.25 kHz. Bandwidth using GMSK
- Digital Data (DD) (23cm only - ID-1 Radios)
 - 128 kbps data stream
 - 150 kHz. Bandwidth
 - Possible extensions to other rates and bandwidths

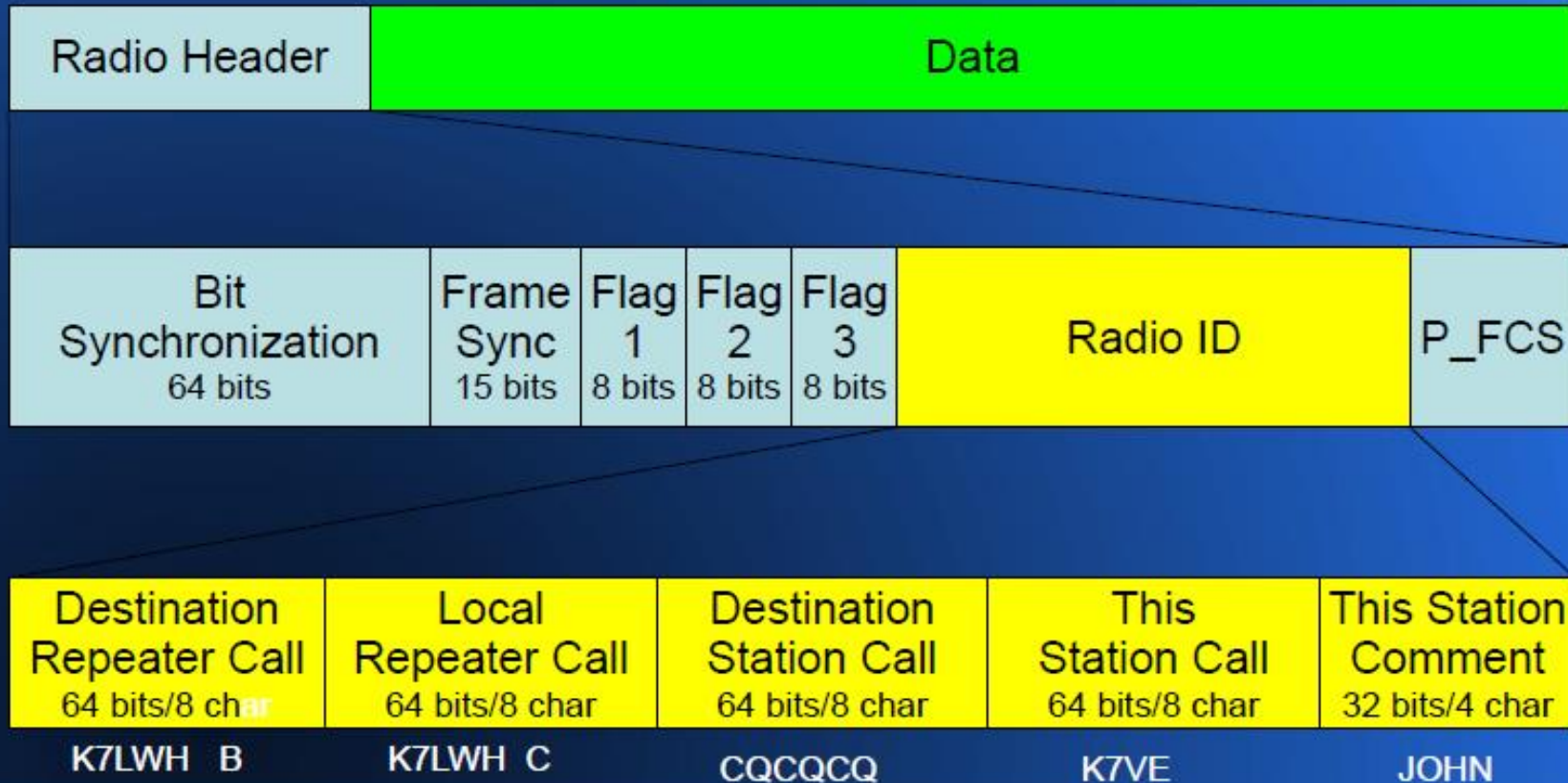
D-STAR Radio Frame Structure in DV mode

-- The work of the "Controller"



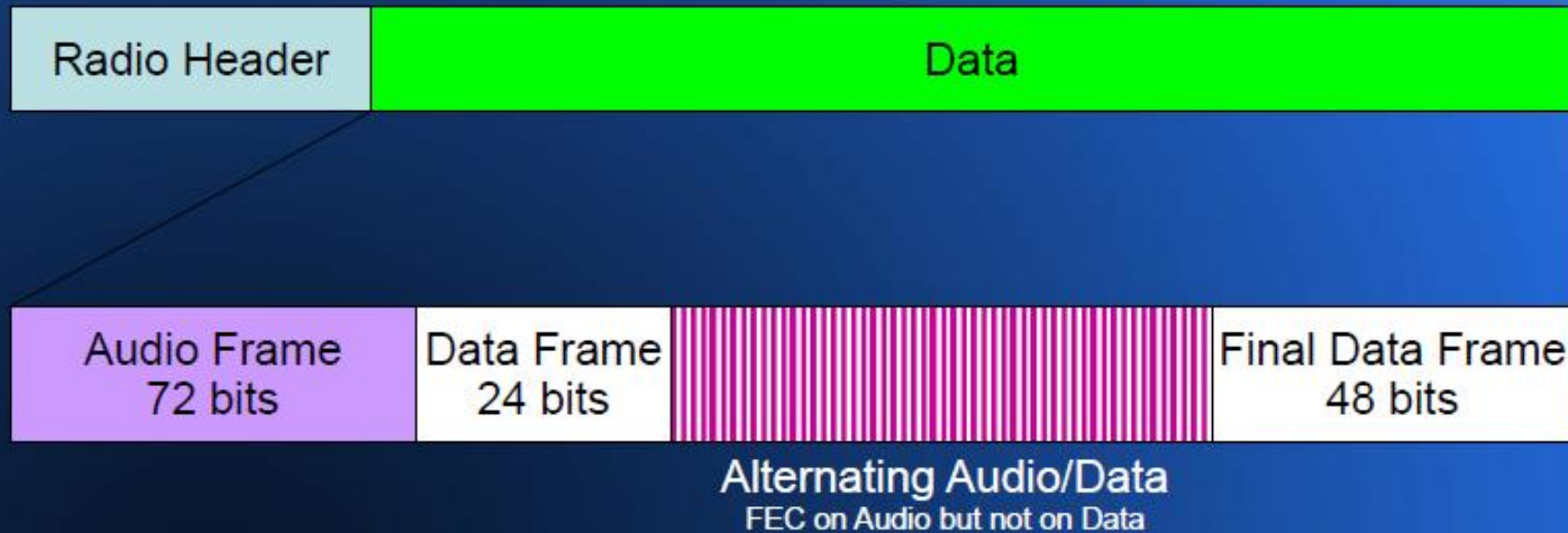
The DV Protocol

Common Air Protocol – Techie Stuff



The DV Protocol

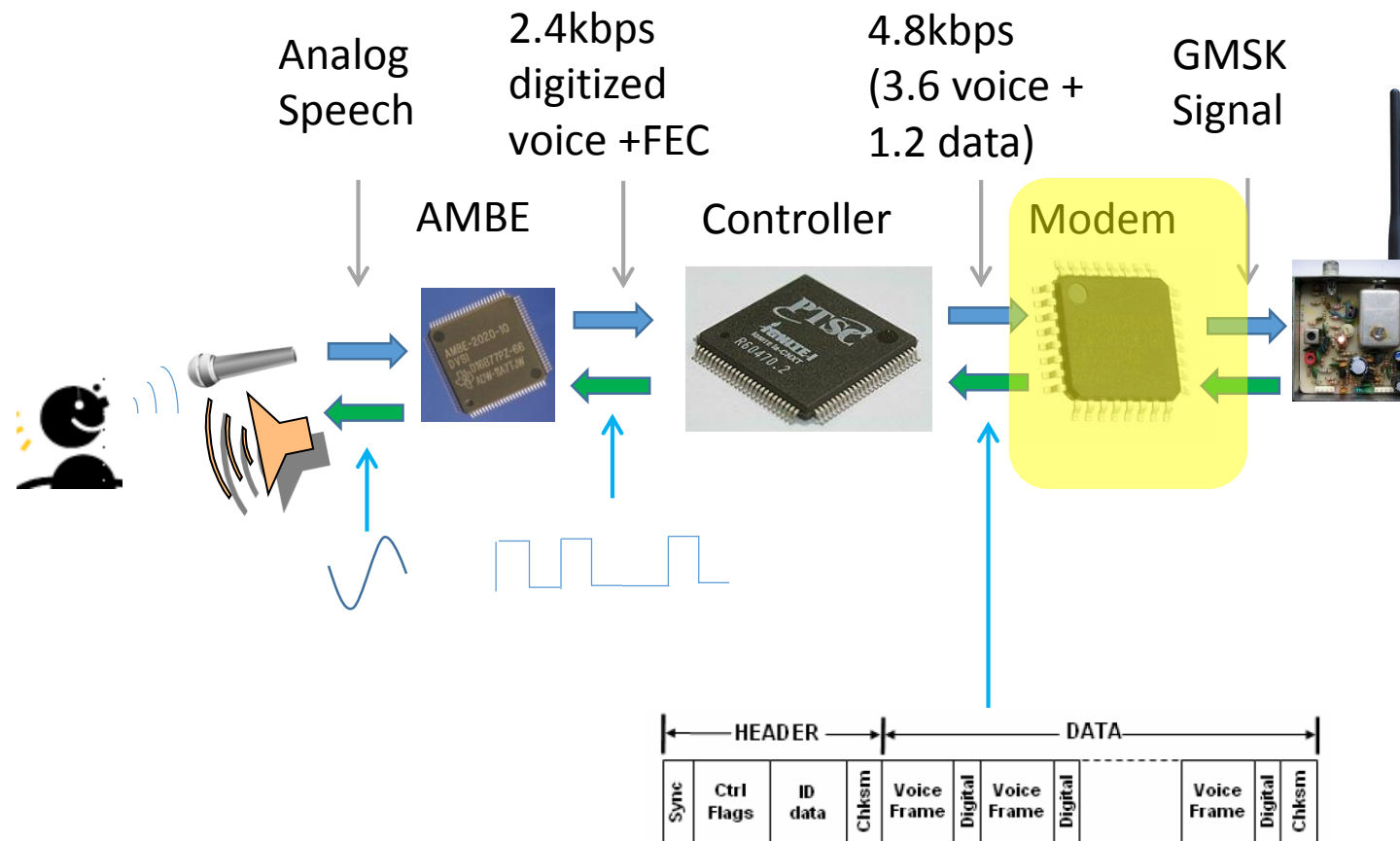
Common Air Protocol – Techie Stuff



D-STAR Radio Frame Structure Notes

- 1) The preamble of radio frame according [shogen] consists of 64 bits (alternating 1 and 0). Based on the fact, that conventional amateur transmitter needs more time to lock its PLL after the PTT was activated, the preamble is transmitted up to 550bits (and longer), before the “frame sync” will be started. The “frame sync” is following bit pattern: {1,1,1,0,1,1,0,0,1,0,1,0,0,0,0}.
- 2) The “sync flag” consists of following bit pattern: {1,0,1,0,1,0,1,0,1,0} + {1,1,0,1,0,0,0} + {1,1,0,1,0,0,0}. The “sync flag” is transmitted in the 1st and than in each 21th data time slot. The “sync flag” is used in the receiver for correction of time synchronization to the transmitter as well it is used as preamble in case if the receiver was switched on during an ongoing transmission and missed the regular header.
- 3) The “terminating flag” is send at the end of the ongoing transmission in order to indicate a regular end of it. The “terminating flag” consists of {1,0,1,0,...,1,0,1,0}32 Bit+ {0,0,0,1,0,0,1,1,0,1,0,1,1,1,1,0} 16Bit. After that approximately 20 Zeros or Ones are send. The Transmitter is switched off (PTT deactivation) after 10th such Zero or One.

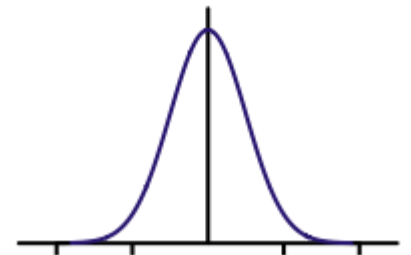
Look inside the D-STAR radio





GMSK

In [digital communication](#), **Gaussian minimum shift keying** or **GMSK** is a continuous-phase [frequency-shift keying modulation scheme](#). It is similar to standard minimum-shift keying (MSK); however the digital data stream is first shaped with a [Gaussian filter](#) before being applied to a frequency modulator. This has the advantage of reducing [sideband](#) power, which in turn reduces out-of-band interference between signal carriers in adjacent frequency channels.^[2] However, the Gaussian filter increases the [modulation memory](#) in the system and causes [intersymbol interference](#), making it more difficult to differentiate between different transmitted data values and requiring more complex channel equalization algorithms such as an [adaptive equalizer](#) at the receiver. GMSK has high [spectral efficiency](#), but it needs a higher [power](#) level than [QPSK](#), for instance, in order to reliably transmit the same amount of [data](#).

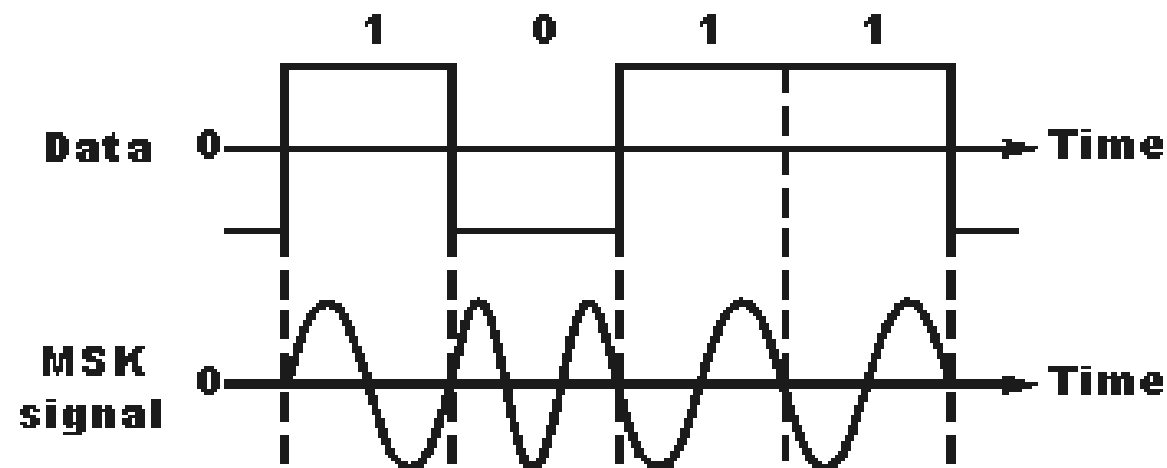


From – www.radio-electronics.com

GMSK basics

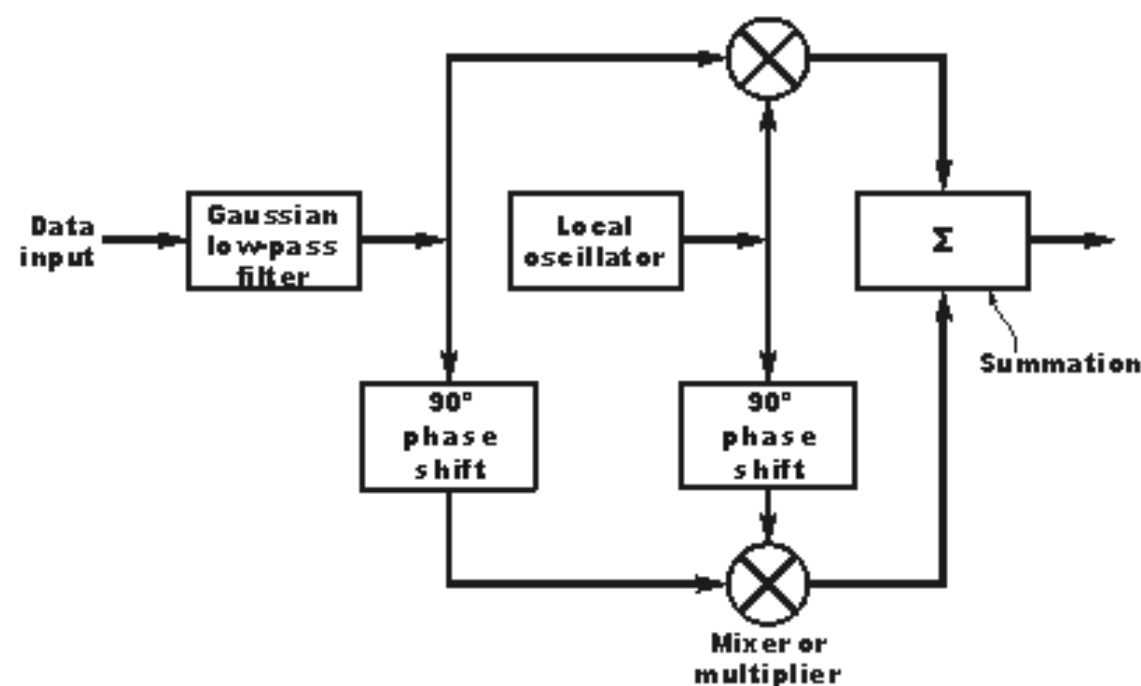
GMSK modulation is based on MSK, which is itself a form of continuous-phase frequency-shift keying. One of the problems with standard forms of PSK is that sidebands extend out from the carrier. To overcome this, MSK and its derivative GMSK can be used.

MSK and also GMSK modulation are what is known as a continuous phase scheme. Here there are no phase discontinuities because the frequency changes occur at the carrier zero crossing points. This arises as a result of the unique factor of MSK that the frequency difference between the logical one and logical zero states is always equal to half the data rate. This can be expressed in terms of the modulation index, and it is always equal to 0.5.



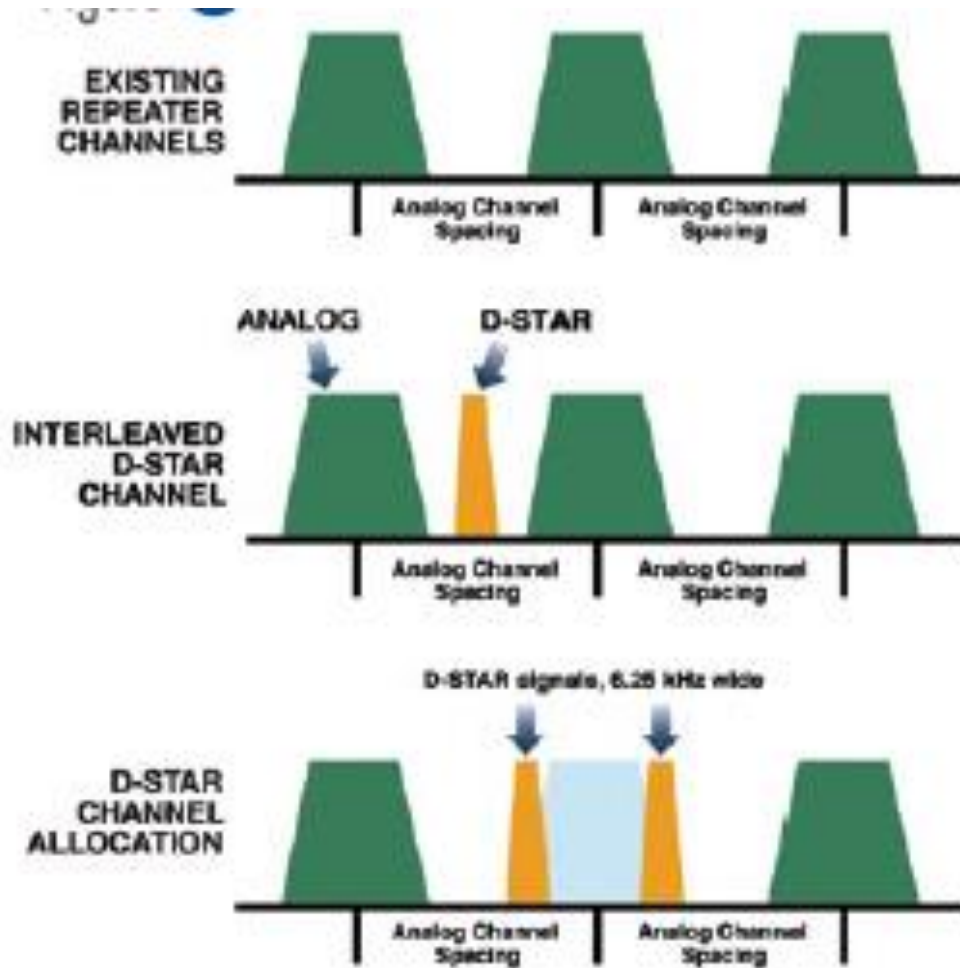
Generating GMSK using a Gaussian filter and VCO

A second method is more widely used. Here what is known as a quadrature modulator is used. The term quadrature means that the phase of a signal is in quadrature or 90 degrees to another one. The quadrature modulator uses one signal that is said to be in-phase and another that is in quadrature to this. In view of the in-phase and quadrature elements this type of modulator is often said to be an I-Q modulator. Using this type of modulator the modulation index can be maintained at exactly 0.5 without the need for any settings or adjustments. This makes it much easier to use, and capable of providing the required level of performance without the need for adjustments. For demodulation the technique can be used in reverse.



Block diagram of I-Q modulator used to create GMSK

D-STAR Channel Spacing



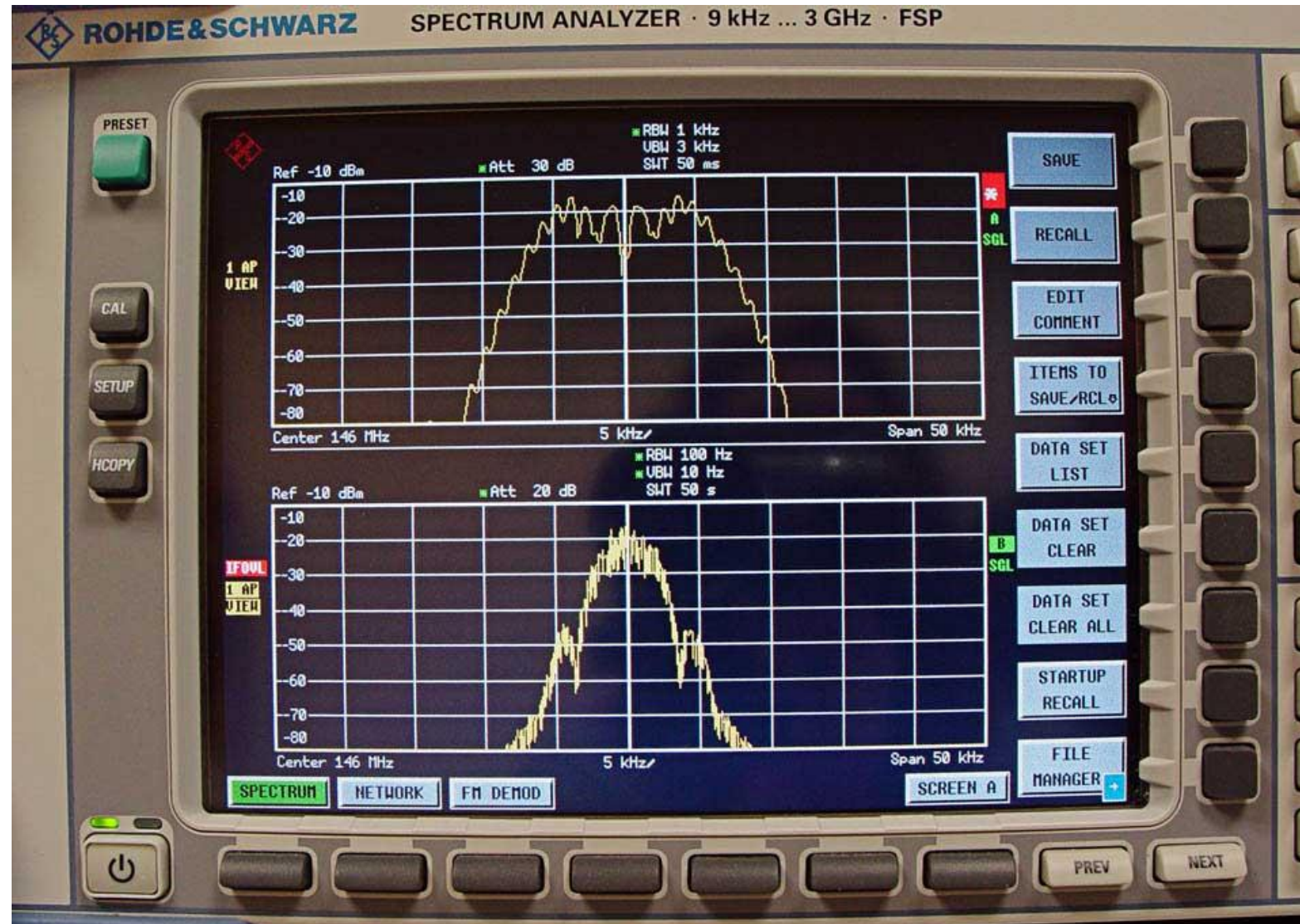
T-MARC – getting a 2M or 440 repeater frequency pair – is a huge challenge

The D-STAR voice and low speed data signal offers a significant improvement in spectrum efficiency, requiring only a 6 KHz channel instead of the 20,25, or even 30KHz of analog wide-band FM.

D-Star repeaters could be “interleaved” between existing analogue 2M / 440 channels.

D-STAR

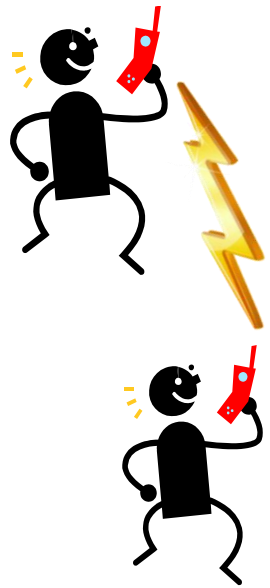
Spectral Efficiency



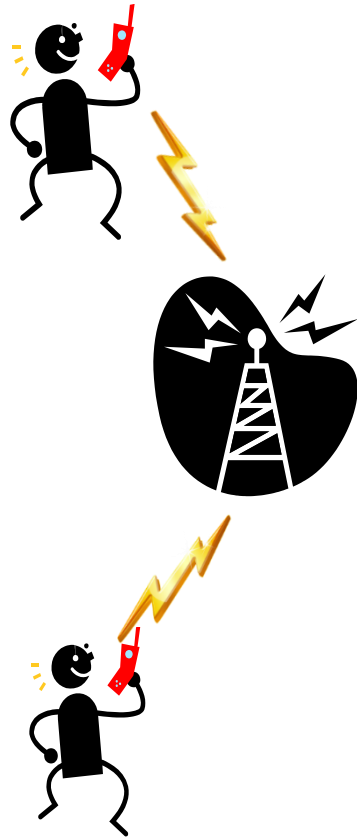
Topics

- D-STAR – What is it?
- What Can I do with it?
- The Repeater / Gateway System
- D-STAR User Equipment
- D-STAR User Registration
- Your First D-STAR Call - The Four Call Signs
- D-STAR Routing

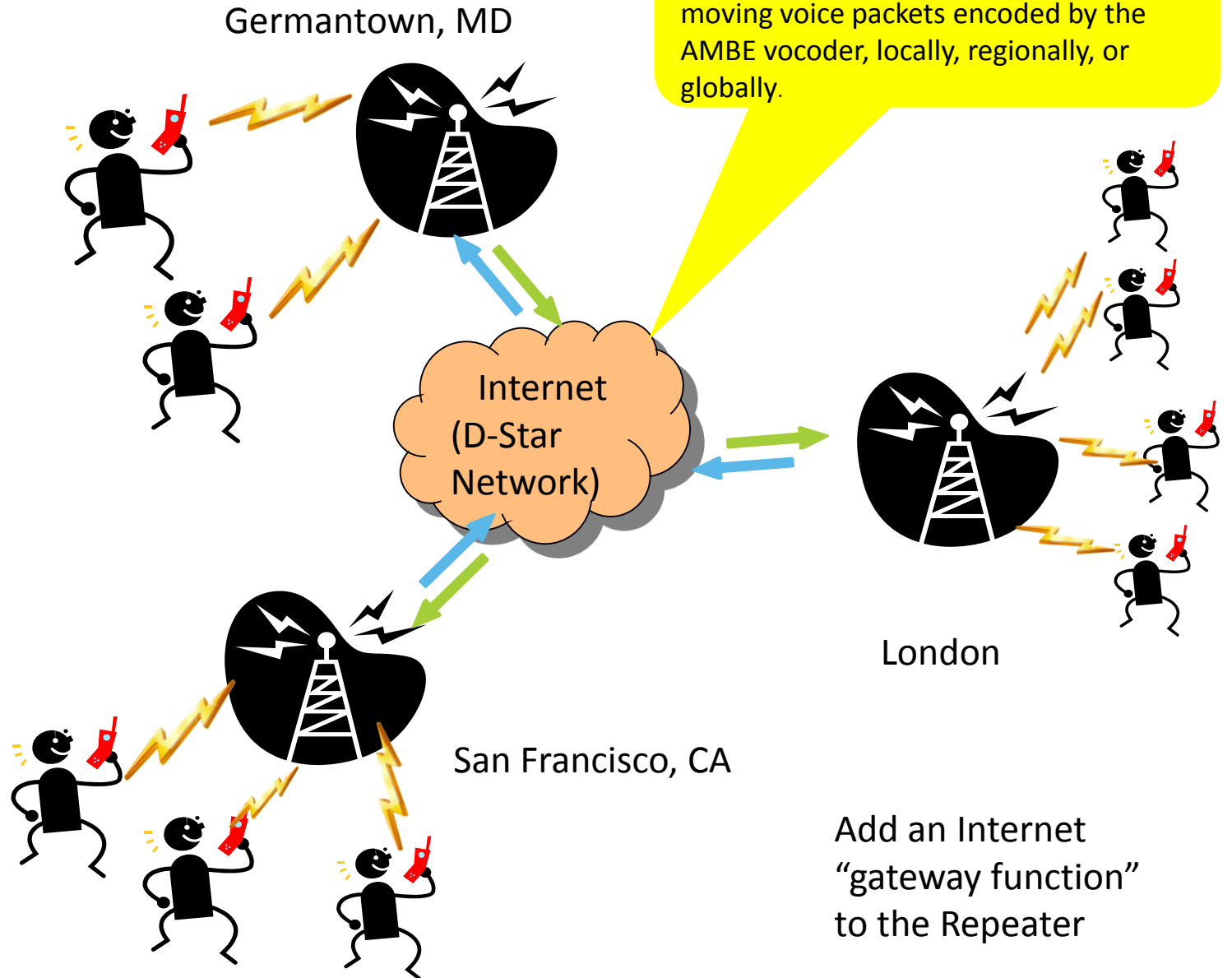
What Can I do with it ...



Simplex
Operation



Local Repeater



Add an Internet
"gateway function"
to the Repeater

Application 1

Digital voice (DV mode)

Analog audio is modulated to a digital signal and transmitted in the digital mode signal by the D-STAR radio.



Internet connection*

The Internet gateway allows linking of D-STAR repeater sites over the Internet. You can uplink to your local repeater and downlink from a remote repeater, even from a foreign country!

Application 5

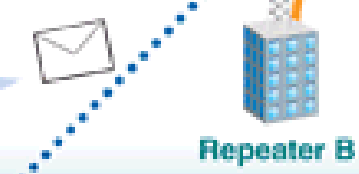
IP camera (DD mode)

You can transmit live images in DD mode and watch real-time images from a remote location.



Application 2

Short data message (DV mode)



Call sign identification and short data messages are available.

INTERNET

GPS satellite

Repeater C

Repeater D

Application 3

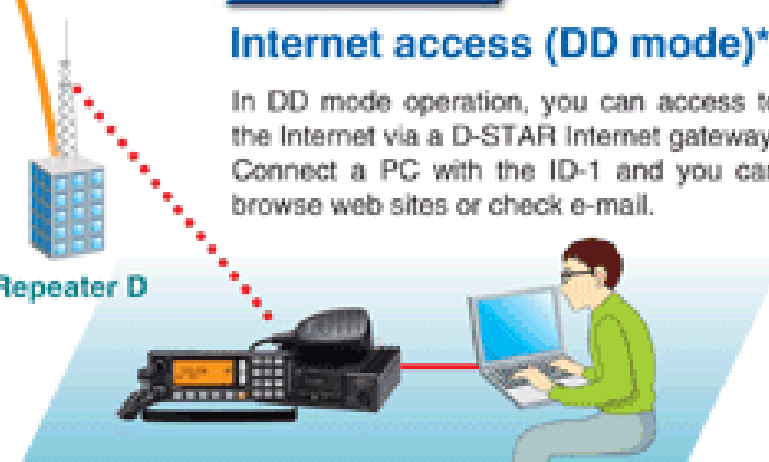
GPS tracking (DV mode)

With a GPS receiver, you can send your current position information to another radio.

Application 4

Internet access (DD mode)*

In DD mode operation, you can access to the Internet via a D-STAR Internet gateway. Connect a PC with the ID-1 and you can browse web sites or check e-mail.

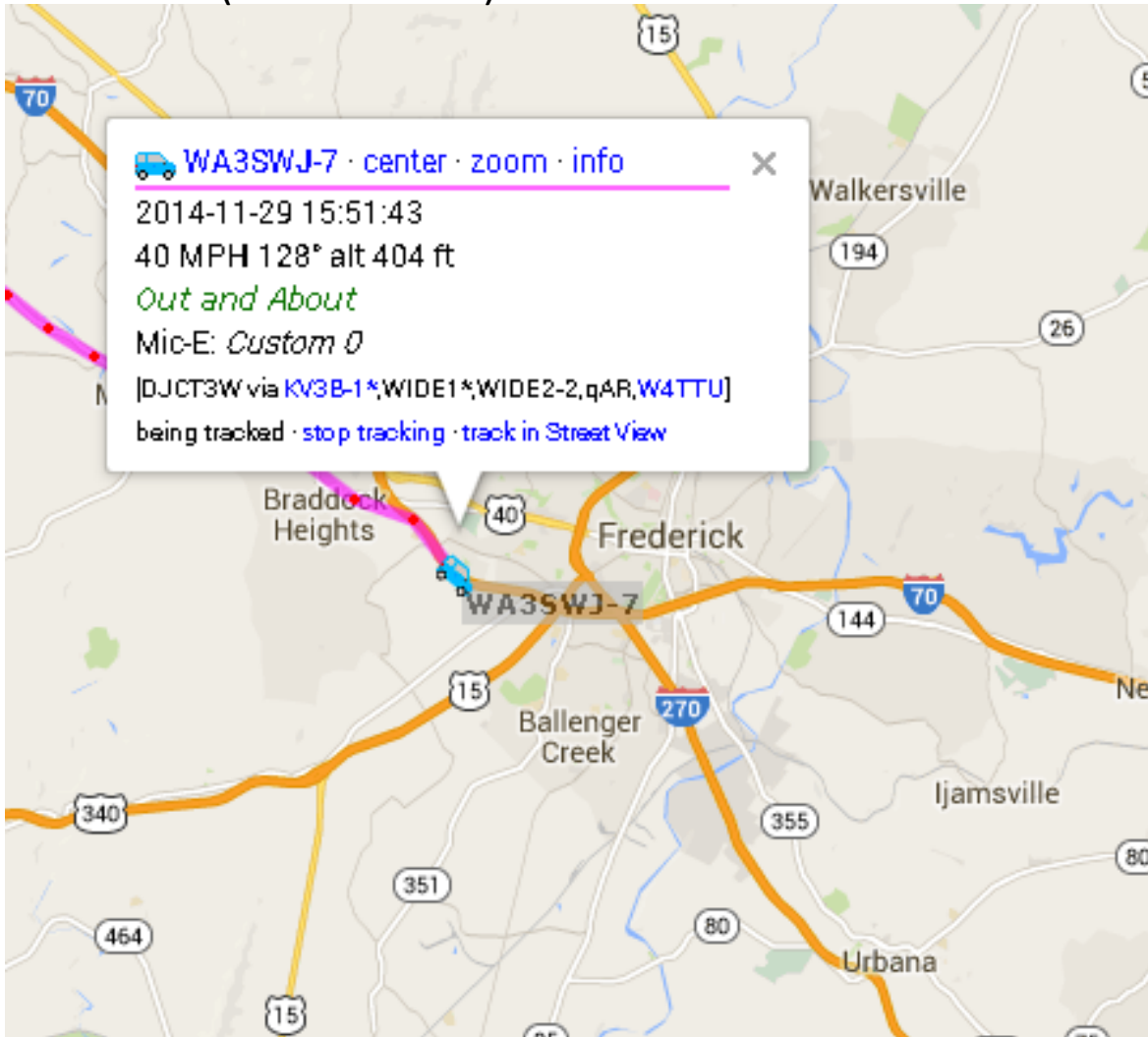


- Internet
- DV mode (4.8kbps)
- DD mode (128kbps)

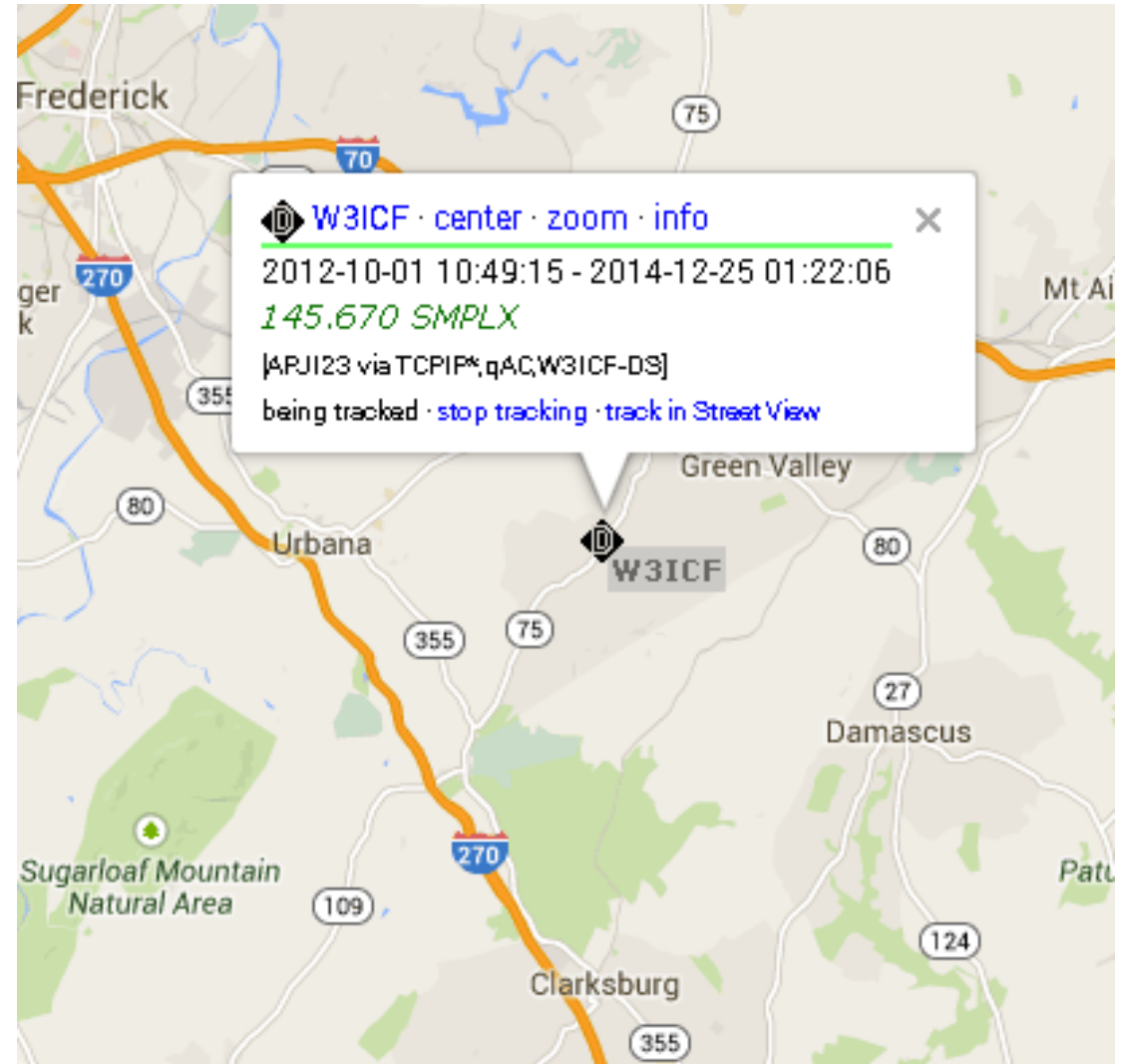
* Some restrictions may apply depending on specific countries' regulations.

http://aprs.fi/info/DSTAR

Position reported via APRS
(144.390 Mhz)



Position reported via D-STAR
(any D-Star repeater)



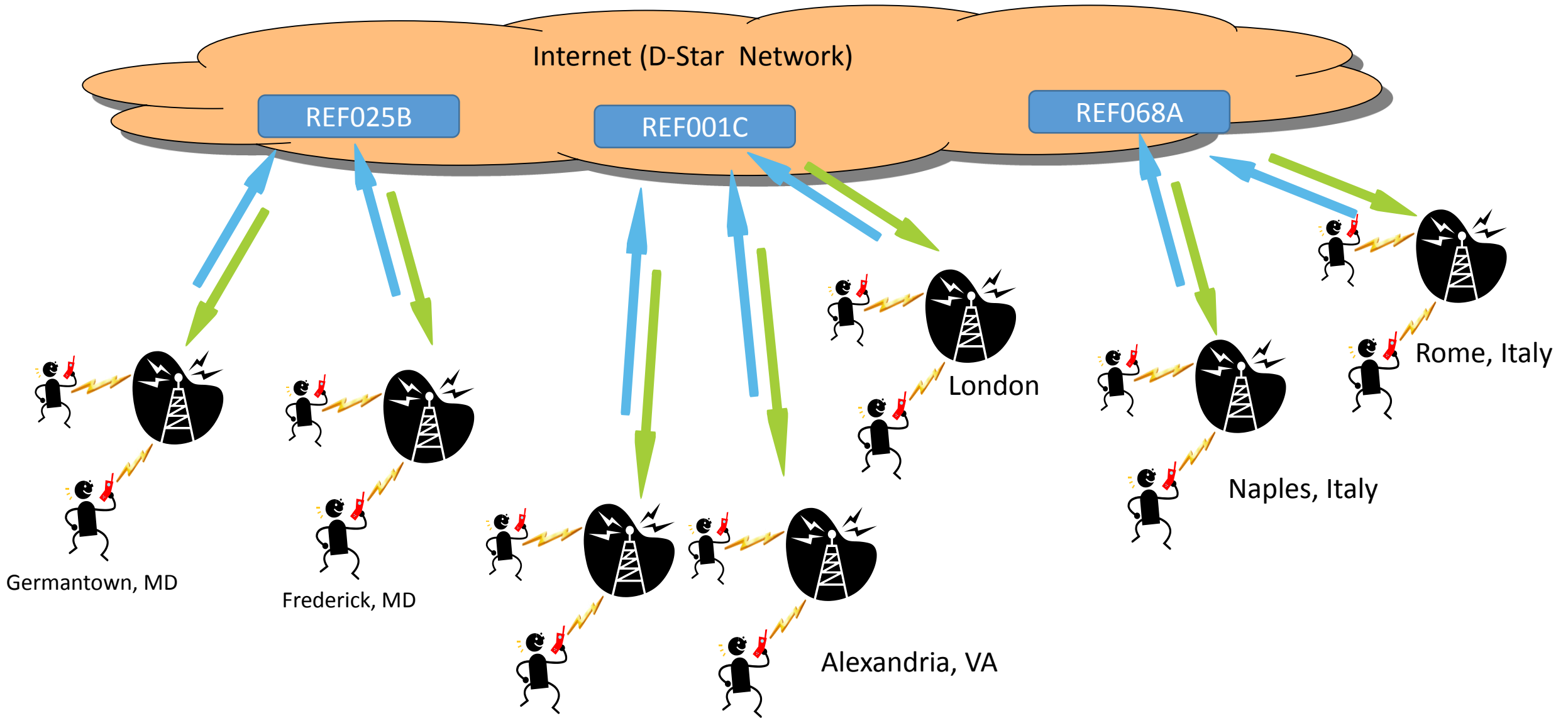
Gateway Status Page

<http://dsync.dstarusers.org/>

388 (75%) Gateways Up To Date, 126 with errors - Tue, 30 Dec 14 04:57:59 +0000

AA1HD	GB7WP	JP9YEI	KB1ZEG	KE5PFA	KJ4FCS	N5APB	PY2KPE	VE1DSR	W0HF	W4LDG	W6MLI	WB6BA
AA1KK	GB7ZP	K0MDG	KB3TOG	KE7JFH	KJ4GGV	N5HDS	PY2KPP	VE2CST	W0MAO	W4LET	W7AES	WB7DZG
AA3E	HB9BO	K1DRP	KB3WNO	KE7MVI	KJ4JAL	N5MAD	RK3FWD	VE2FCT	W0MI	W4MT	W7GC	WB8THD
AC7O	HB9DD	K1HBR	KB3YBB	KE7WTB	KJ4KLD	N5MDS	S55DMX	VE2REX	W0MXW	W4NVU	W7KDS	WB9FDZ
CQ0DCH	HB9H	K1HRO	KB3YBH	KE7WTC	KJ4LJN	N5MNY	SK0MQ	VE2RID	W0OMD	W4NYR	W7MOT	WC3PS
CQ0DLX	HB9IAC	K1MRA	KB5DRP	KF5BSZ	KJ4MKV	N7ARR	SK0QO	VE2RKI	W0REA	W4OVH	W8BAP	WC7SO
CQ0DOA	IR0K	K1XC	KC0CVU	KF5MMX	KJ4OXT	N7CI	SK7HW	VE2RM	W1AAD	W4PDE	W8CCE	WD2NY
CQ0DSE	IR0UP	K2BWK	KC0WLB	KF5PIE	KJ4PXY	N7IH	SK7RNQ	VE2RMF	W1DSR	W4PL	W8CMH	WD4STR
DB0DF	IR1BZ	K2DIG	KC2TGB	KF5SEB	KJ4PYA	N7NDS	SR1UVS	VE2RQF	W1ECV	W4PLB	W8DF	WD4WDW
DB0DJ	IR1CJ	K2PUT	KC2TXB	KF5VBD	KJ4RYG	N7QQU	SR2UVG	VE2RQT	W1HQ	W4PVW	W8DIG	WD5STR
DB0DON	IR1UCB	K3AWS	KC2TXX	KF5VBE	KJ4TJD	N7SNO	SR5UVA	VE2RVR	W1IXU	W4RNG	W8GO	WD8MKG
DB0HRF	IR1UDI	K3CR	KC5ULN	KF5VBF	KJ4YNR	NC2EC	SR5UVR	VE2VPS	W1KK	W4RNT	W8HEQ	WF4X
DB0ICM	IR1UII	K3PDR	KC5ZJY	KF5YVX	KJ6BWR	NC4BS	SR7UVK	VE3LSR	W1MRA	W4SRT	W8HHF	WH6DIG
DB0MYK	IR2UBG	K4DSO	KC9LKZ	KF5ZLE	KJ6LJZ	ND5N	SR7UVL	VE3PLF	W1NLK	W4VLD	W8RNL	WI0OK
DB0RIG	IR2UDY	K4GAR	KC9OKW	KF5ZUZ	KJ6LVV	NE7WY	SR8UVB	VE3RXR	W1SCC	W4WBC	W8RTL	WJ4FD
DB0RZS	IR2UEZ	K4RPT	KC9PWC	KF6RAL	KK4BXE	NJ2DG	SR9UVM	VE3SSF	W1SCV	W5AC	W8SHI	WL7CWI
DB0SBX	IR2UFH	K4WPB	KC9RBB	KF7BFS	KK4DFC	NJ2MC	SR9UVZ	VE3TIR	W2ECA	W5AQA	W8ZX	WR4DH
DB0WZ	IR3EE	K5ELK	KC9SJY	KF7BFT	KK4JDH	NJ2SC	SV2F	VE3TTT	W2TOB	W5AW	W9ARP	WR7AAA
EA3RCC	IR3UBZ	K5LET	KC9WDW	KF7CLD	KK4KYK	NM5WR	SV4J	VE3YRK	W3DHS	W5ELP	W9BCC	WR7KCR
ED2ZAA	IR3UEF	K5NEM	KC9YFX	KF7CUF	KK4LVF	NO5RA	SV8S	VE3YYZ	W3EOC	W5ETX	W9BIL	WS4VA
ED2ZAB	IR3UIB	K5PRK	KD0CGR	KF7NPL	KK4SGC	NR7SS	SZ2RLF	VE4WDR	W3EXW	W5FC	W9CEQ	WT0O
ED3YAK	IR3UIC	K5PTR	KD0IAI	KG4NXO	KK4VQG	NS9RC	SZ7SER	VE6IPG	W3PRO	W5GAD	W9EBN	WV8BSA
ED4ZAD	IR4MO	K5RKN	KD0IAN	KG4TCC	KK6GFX	NT3ST	TF3RPI	VE6WRN	W4AB	W5GB	W9HSY	WW5EM
ED5ZAB	IR5UBM	K5SST	KD0JOS	KG7FOJ	KL7FF	NT5RN	TG0AA	VE6WRO	W4AES	W5HAT	W9ICE	WW6BAY
ED5ZAC	IR6L	K5TIT	KD0JOT	KG7HBZ	KN5V	NU7TS	UR0DUA	VE7RAG	W4AKH	W5HCT	W9PPF	WX0BC
ED6ZAB	IR6UCC	K5URR	KD0JOU	KI4SAY	KO4TM	NV4FM	V53W	VE7RCK	W4AP	W5HDR	W9PIA	WX4EMA
ED7ZAD	IR6UCY	K6ACS	KD0LUX	KI4SAZ	KR4AIK	OE1XDS	VA2REX	VE7VIC	W4BSF	W5HDT	W9QCR	WX4GPB
F1ZPL	IR6UDO	K6IFR	KD0PBV	KI4SBA	KR4CHS	ON0CPS	VA2RKA	VK2RAG	W4BUG	W5IAS	W9TE	WX4PCA
GB7AU	IR7UBA	K6SOA	KD0PBW	KI4SBB	KR4RAL	ON0DAS	VA2RVO	VK2RWN	W4DOC	W5MPZ	W9UIH	WX8GRR
GB7BP	IR8AF	K7LWH	KD0RDI	KI4SBC	KR7ST	ON0DST	VA3AAR	VK3RGV	W4DSI	W5NEM	W9YR	XE3RCC
GB7DB	IR8BA	K7RST	KD0RED	KI4SDI	KS1R	ON0LB	VA3NAG	VK3RMC	W4FAN	W5NGU	WA0COL	YD0ZUA
GB7DV	IR8BT	K7YI	KD0SWQ	KI4TMJ	KT8APR	ON0LGE	VA3ODG	VK3RWN	W4FJ	W5OKT	WA2UMX	ZL1VHD
GB7DX	IR8UAF	K8BIG	KD0YLG	KI4WXS	KV3B	ON0OS	VA3RDD	VK4RBX	W4FWD	W5SF	WA4YZY	ZL1ZLD
GB7FK	IR8UCN	K8DXA	KD2EQY	KI4WZA	KW6HRO	ON0SNW	VA3SDG	VK5REX	W4GSO	W5SHV	WA6IRC	ZL2VH
GB7GL	IR9BJ	K8ETN	KD8QCC	KI6JKA	KX4DOR	OZ2REA	VA3SRG	VK5RWN	W4GWM	W5SSV	WA7DR	

Reflector Operation



D-STAR - Reflectors

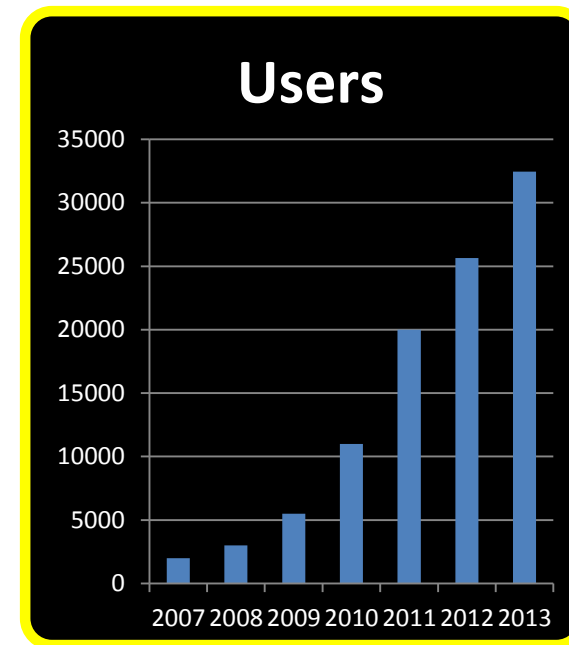
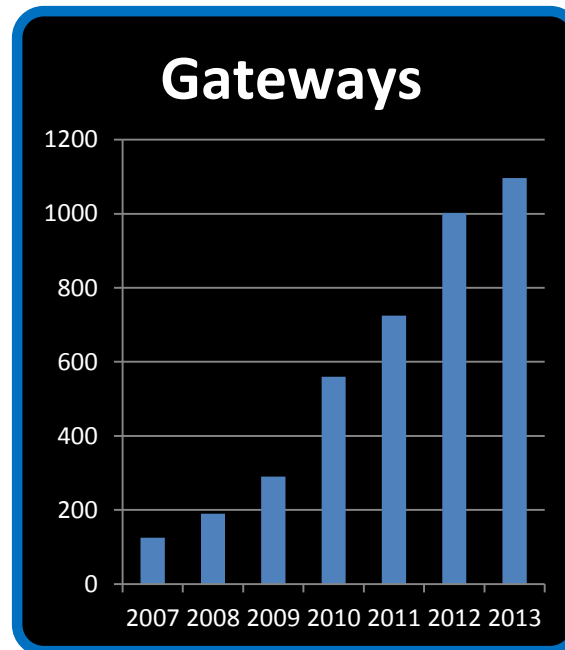
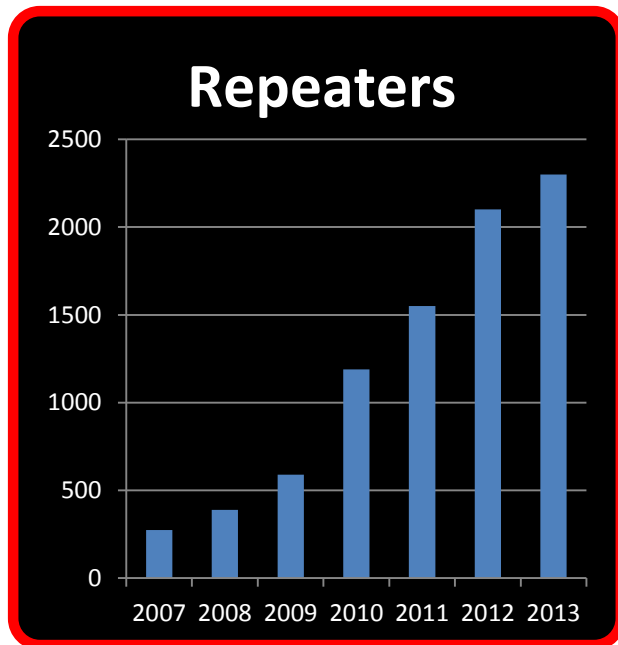
Reflector	Usage	Location
REF001A		London, England
REF001B	Illinois D-STAR repeaters	London, England
REF001C	D-STAR's MegaRepeater	London, England
REF002A	Southeastern US D-STAR Weather Net	NE, United States
REF002B	Some Nets	NE, United States
REF002C	Some Nets	NE, United States
REF003A	Ad-hock & Emergency Use - Australia	Australia
REF003B	Permalink for Repeater, 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		London, England
REF006C	German Net	London, England
REF007A	Florida	Orlando, FL, United States
REF007B	Florida	Orlando, FL, United States
REF007C	Florida	Orlando, FL, United States
REF008A	Japan G2 repeaters, DVDongles and DVAPs	Japan
REF008B	Japan G2 repeaters, DVDongles and DVAPs	Japan
REF008C	Japan G2 repeaters, DVDongles and DVAPs	Japan
REF009A		AZ, United States
REF009B		AZ, United States
REF009C	Arizona Permalink Repeaters	AZ, United States
REF010A	Emergency Communications	New England, United States
REF010B	Open	New England, United States
REF010C	New England Repeaters	New England, United States
REF011A		Italy
REF011B		Italy
REF011C		Italy
REF012A	Permalink Repeaters	Southern California, United States
REF012B		Southern California, United States

REF059C	Missouri repeaters /EmComm	St. Louis, MO, United States
REF060A	Tennessee EmComm/ARES Use	Nashville, TN, United States
REF060B	Tennessee/Southeast repeaters	Nashville, TN, United States
REF060C	Tennessee/Southeast repeaters	Nashville, TN, United States
REF060D	Tennessee digital data use (D-RATS)	Nashville, TN, United States
REF061A	South Carolina ARES/EmComm only	Florence, SC, United States
REF061B	South Carolina Repeater Linking & ARES/EmComm	Florence, SC, United States
REF061C	South Carolina Linked Repeaters	Florence, SC, United States
REF061D	South Carolina data use	Florence, SC, United States
REF062A	North Central / Northeast Maryland ACS Repeaters	Hunt Valley, MD, United States
REF062B	North Central / Northeast Maryland ACS Nets	Hunt Valley, MD, United States
REF062C	Maryland ACS Linked Repeaters	Hunt Valley, MD, United States
REF062D	Maryland ACS Digital Data	Hunt Valley, MD, United States
REF063A		Pittsburgh, PA, United States
REF063B		Pittsburgh, PA, United States
REF063C	Western Pennsylvania Repeaters	Pittsburgh, PA, United States
REF064A	Near Narita Airport Repeaters	Chiba, Japan
REF064B	Near Narita Airport Repeaters	Chiba, Japan
REF064C	Near Narita Airport Repeaters	Chiba, Japan
REF065A	Worldwide HF DX Voice Spotting	Asheville, NC United States
REF065B	HF DXing Chat	Asheville, NC, United States
REF065C	North carolina Linked Repeaters	Asheville, NC, United States
REF065D	North Carolina data use	Asheville, NC, United States
REF066A	KSELK, Elk City, Oklahoma	Dallas, Texas, United States
REF066B	General Use	Dallas, Texas, United States
REF066C	D-STAR on US Route 66	Dallas, Texas, United States
REF066D	General Use	Dallas, Texas, United States
REF067A	HamWAN discussion and activities	Memphis, Tennessee, United States
REF067B	Mid-South Nets	Memphis, Tennessee, United States
REF067C	General use	Memphis, Tennessee, United States
REF067D	Digital data use (D-RATS)	Memphis, Tennessee, United States
REF068A	Italy	Italy
REF068B	Italy	Italy
REF068C	Italy	Italy
REF068D	Italy	Italy
REF069A	Emergency Use ONLY	CT, United States
REF069B	General Use	CT, United States
REF069C	CT DSTAR Group Northeast Network Permalink	CT, United States
REF069D	Digital Data Use or other testing	CT, United States

REF025A	Public Service, Skywarn & Emergency Use	Washington, DC, United States
REF025B	National Capital Region Association Permalink	Washington, DC, United States
REF025C	General Usage & Sunday Night NCR Net	Washington, DC, United States

D-STAR Growth Continues

- *As of May 1, 2014 – 1,111 DPLUS Gateways, over 2,575 Voice Repeaters, 218 Data Modules and 34,298 registered users on US Trust Server and 62+ DPLUS reflectors in operation*
- *Other users, repeaters and reflectors on DCS and XREF systems*

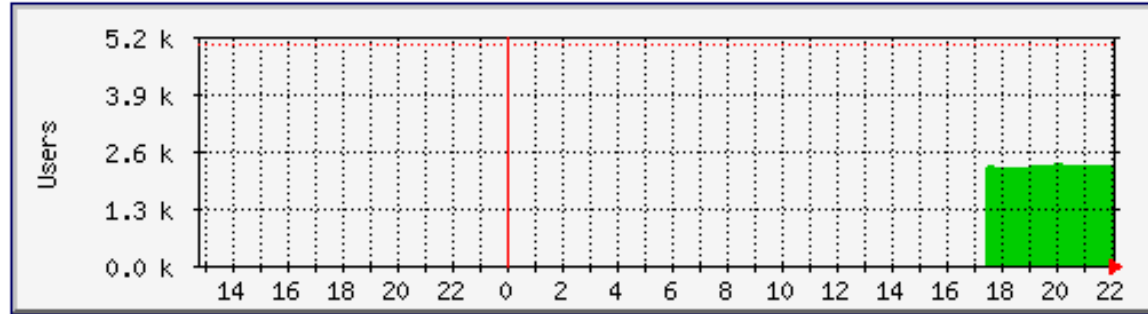


- *D-STAR has largest base of users and repeaters of all digital modes*

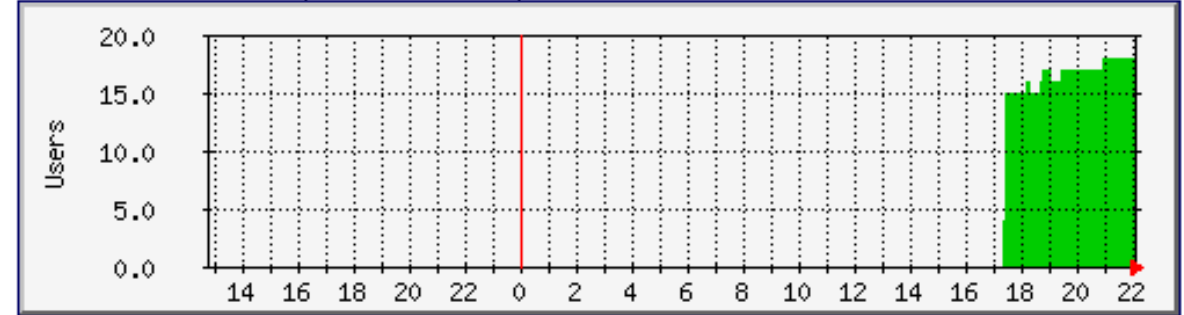
From D-STARUSERS.ORG – Watch D-Star Grow

(snap shot taken on 01/02/2015)

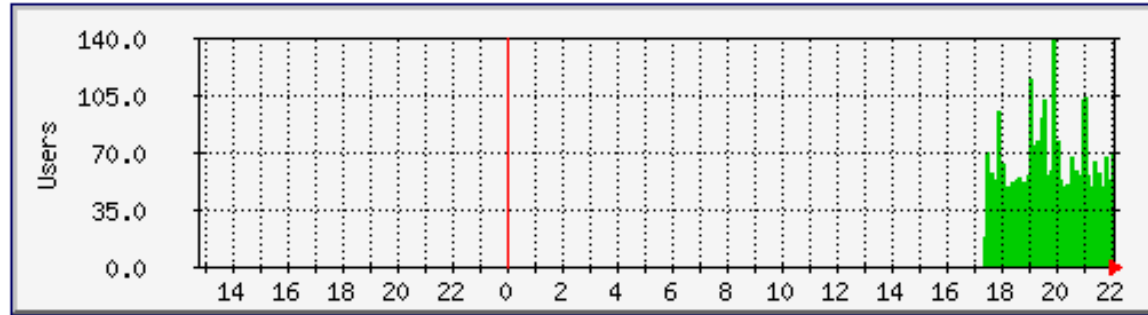
World Wide D-Star Users in Last 24 Hours



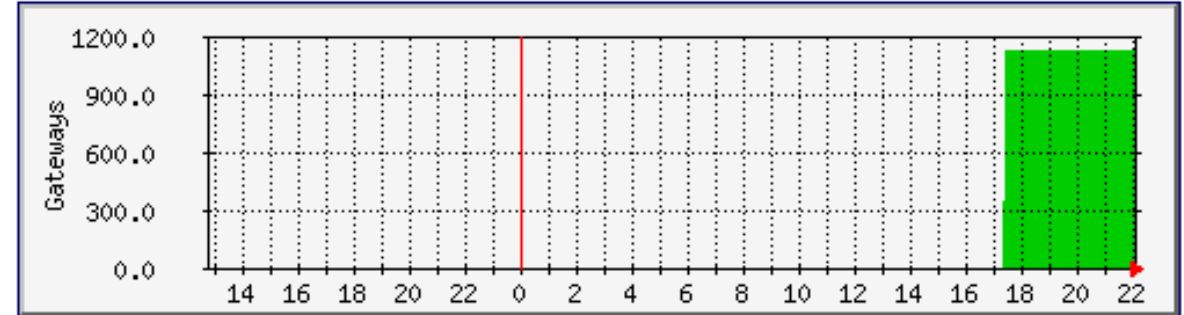
New Registrations (Last 24 Hours)



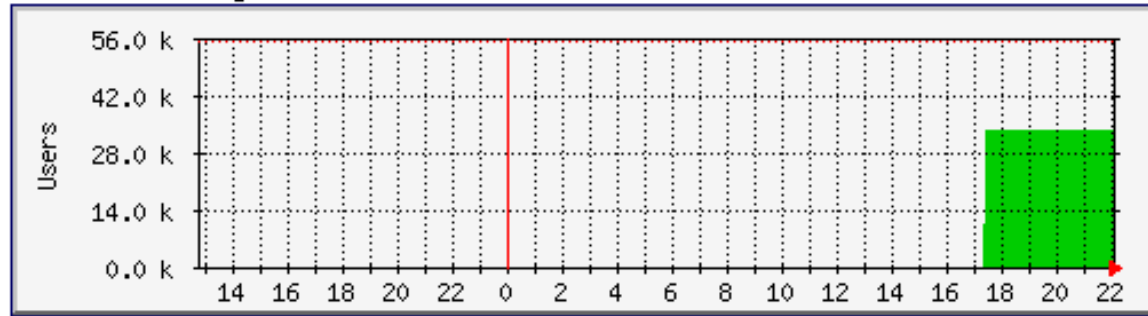
World Wide D-Star Users Last 5 Minutes



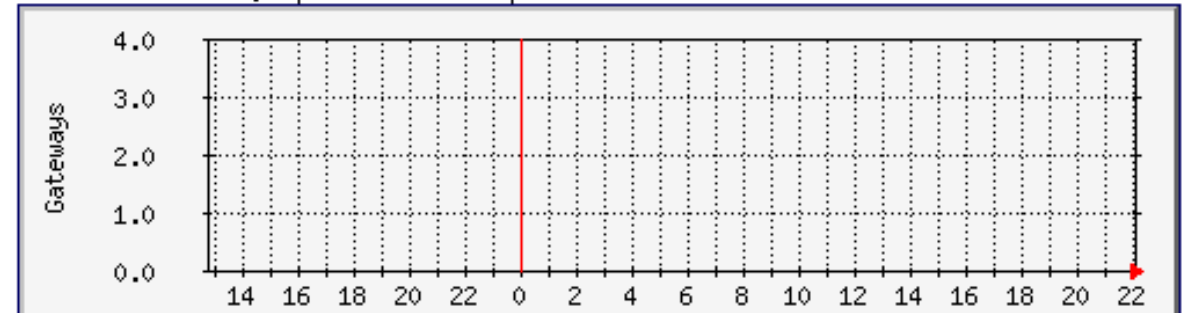
World Wide Version 2 Gateways



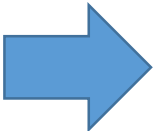
World Wide Registered GW-2 D-Star Users



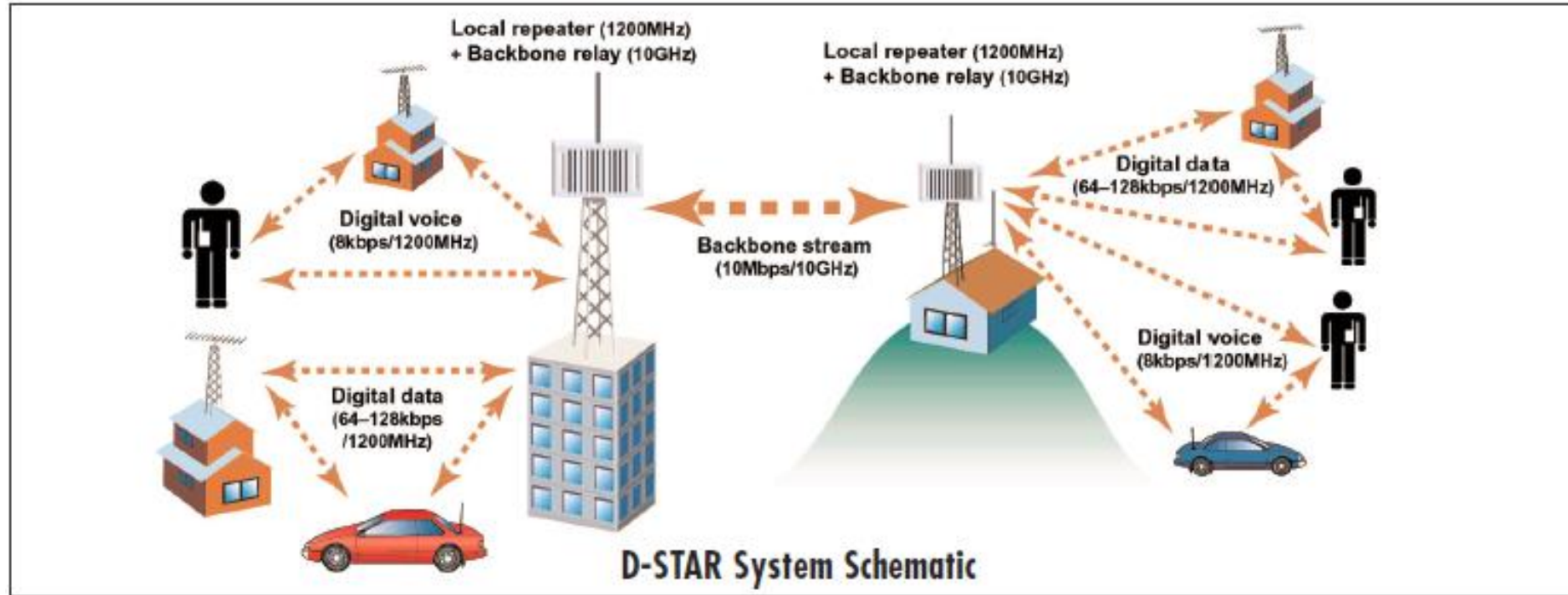
New V2 Gateways (Last 24 Hours)



Topics

- D-STAR – What is it?
- What Can I do with it?
-  • The Repeater / Gateway System
- D-STAR User Equipment
- D-STAR User Registration
- Your First D-STAR Call - The Four Call Signs
- D-STAR Routing

D-STAR OV-1 (From ICOM – New Concept Sheet)



Features of the D-STAR System

- Digitally-modulated voice and data communication
- High-speed 64–128 kbps data access
- Complies with IP connection
- Repeaters can handle both digital and analog voice
- System operates on multi-site and backbone connection

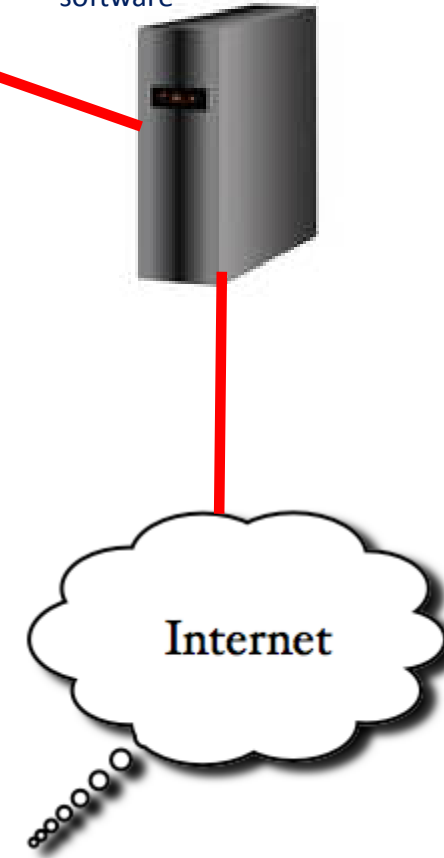
D-STAR Repeater Architecture

Many D-Star repeater installations have more than one repeater. Each repeater is on a different amateur radio band. By convention:

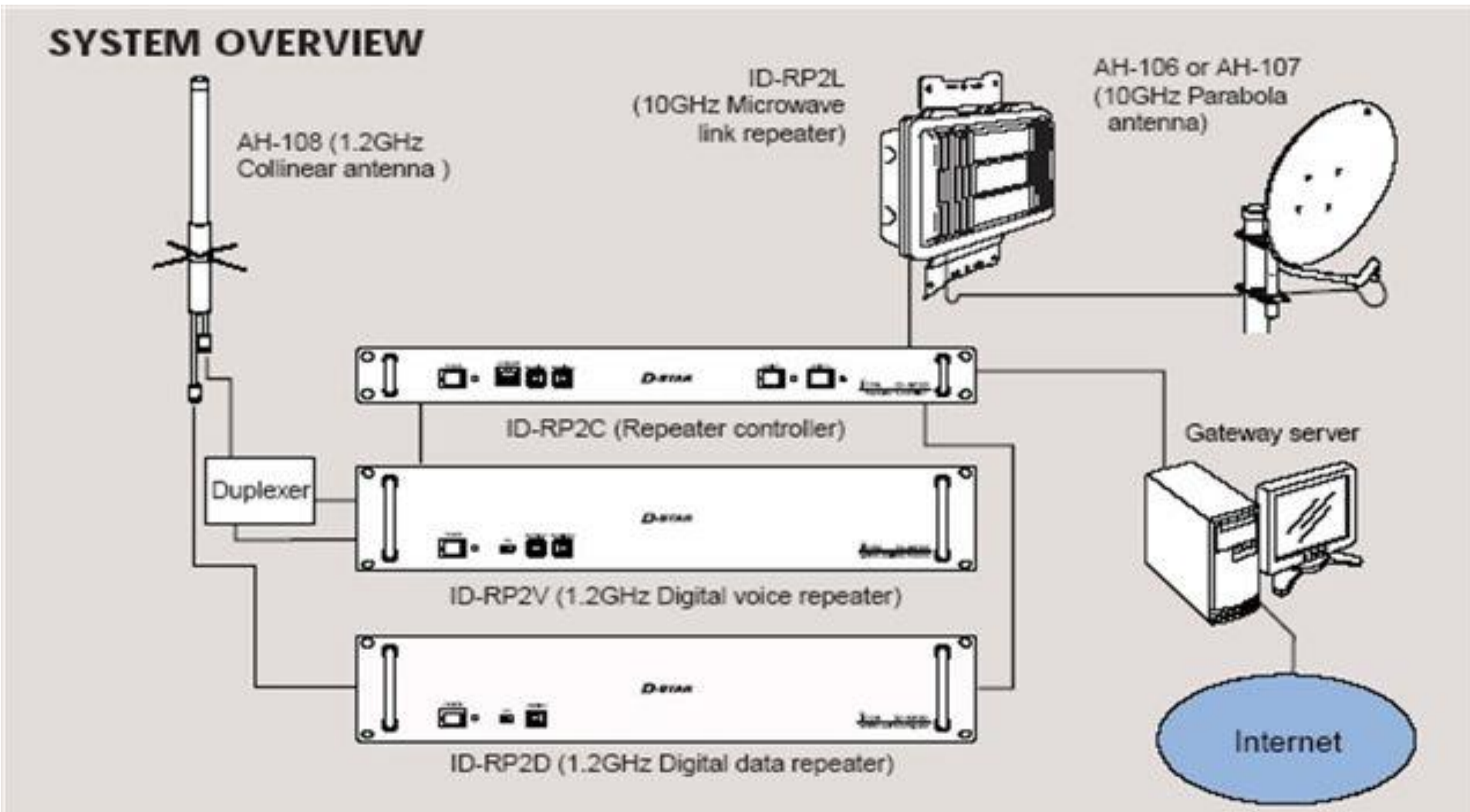
- The “C” module is on the “2m” band (144-148 MHz).
- The “B” module is on the “70cm” band (440-450 MHz).
- The “A” module is on the “23cm” band (1.2 GHz).



Linux Gateway PC
Running G2 Gateway
software



Provision for an “Alternate Backbone”

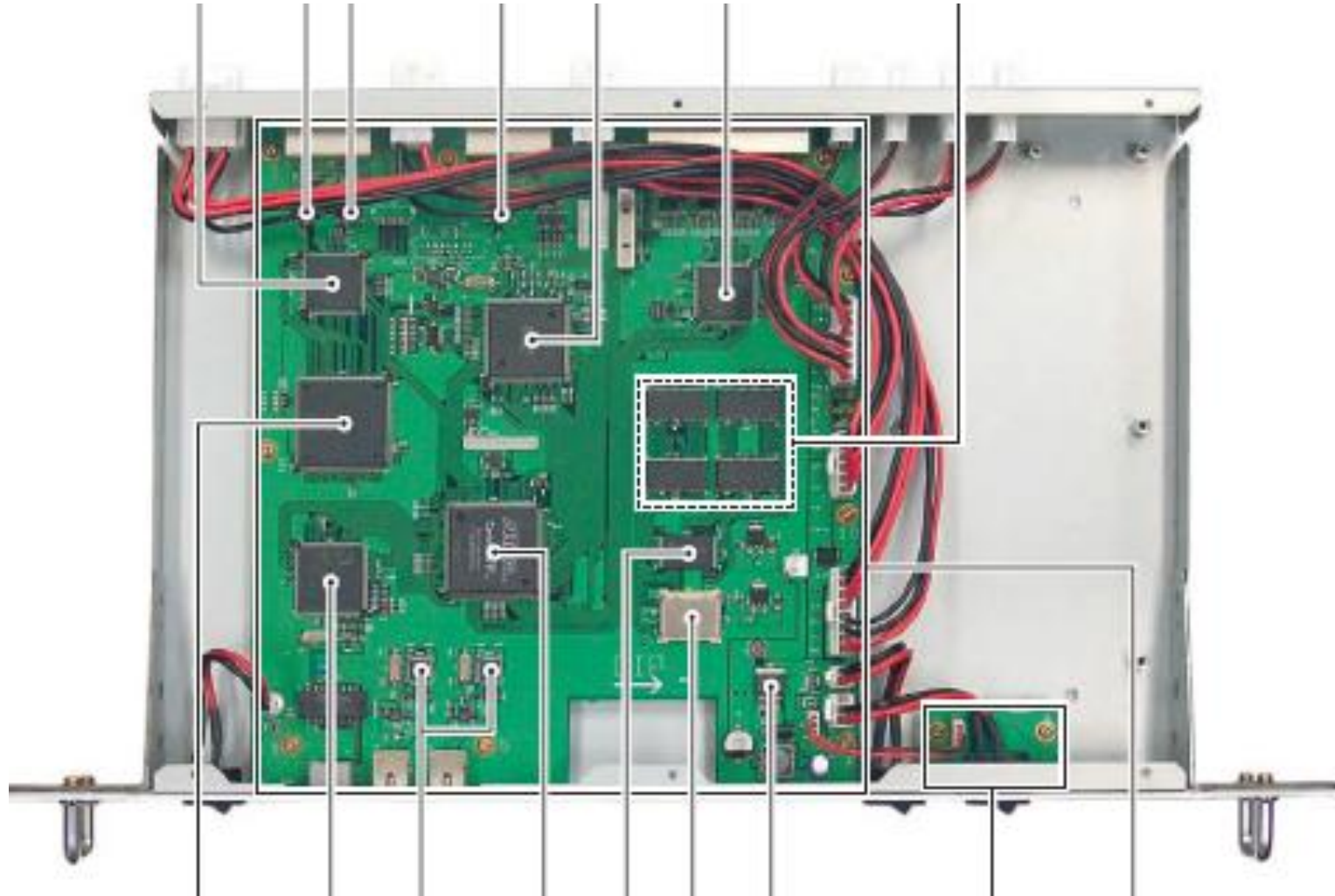


ICOM -- D-STAR Controller – and 70cm RF deck

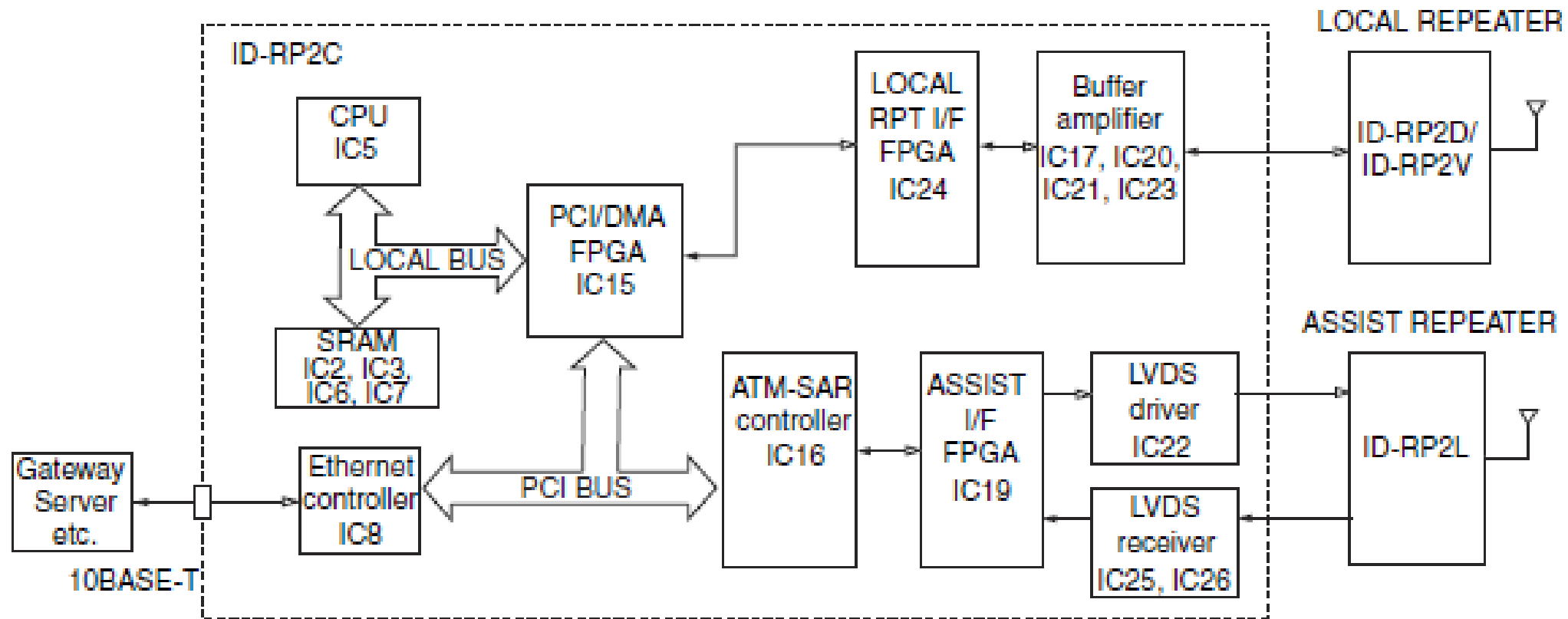




ICOM Repeater Controller

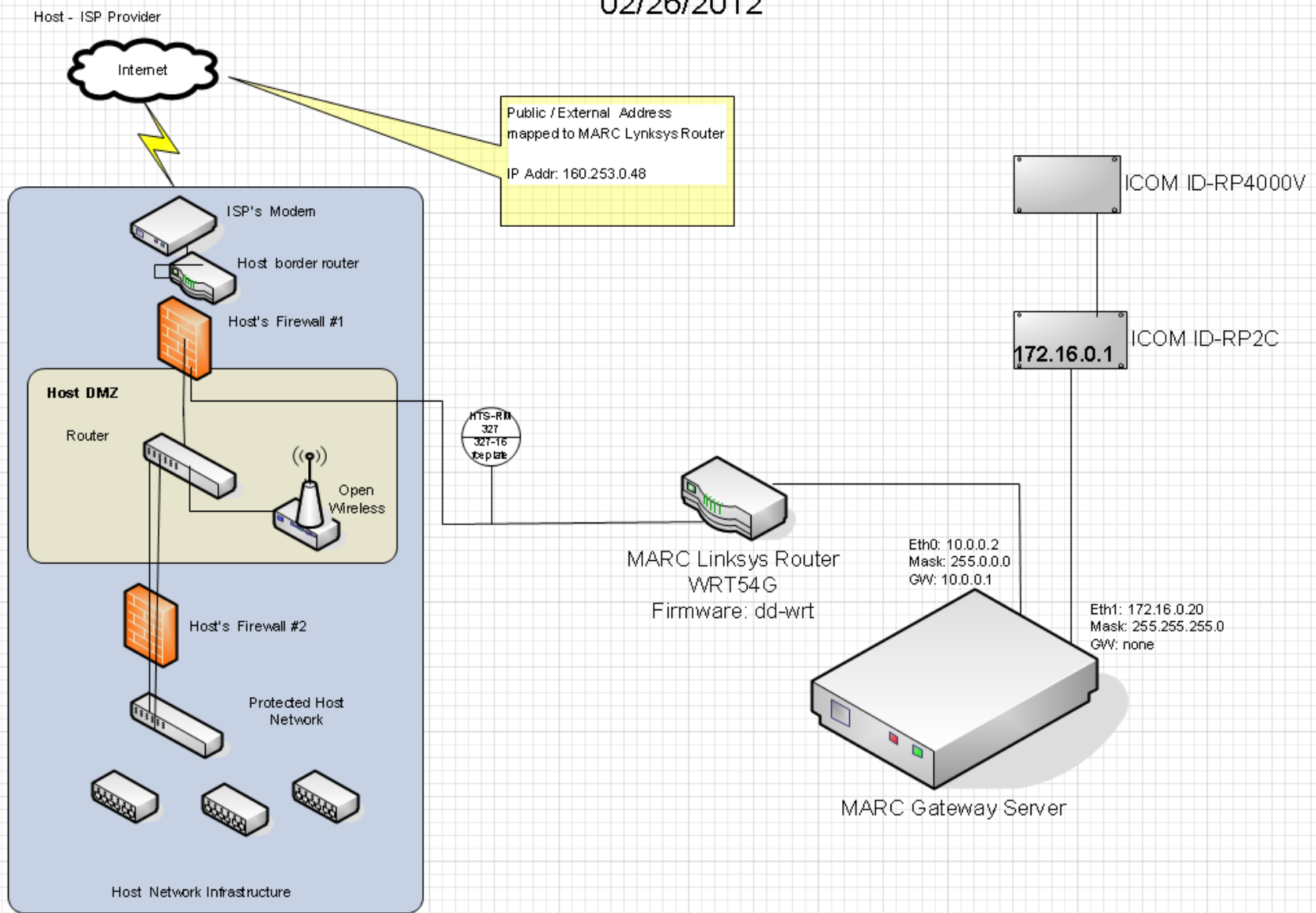


ICOM Repeater Controller – Block Diagram

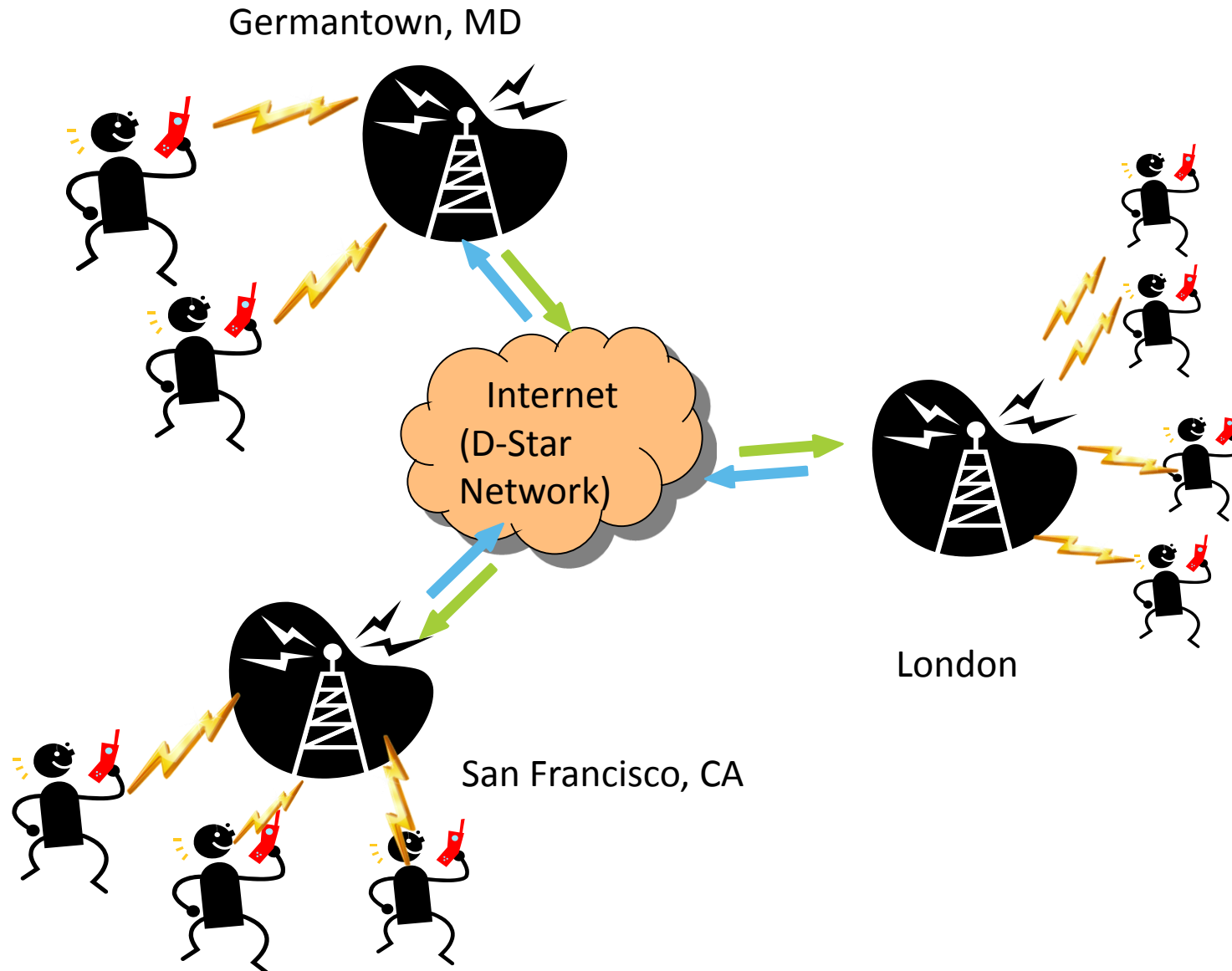


MARC – DSTAR Network Plan

02/26/2012



We are one node in the D-Star Network



Gateway Status Page

<http://dsync.dstarusers.org/>

388 (75%) Gateways Up To Date, 126 with errors - Tue, 30 Dec 14 04:57:59 +0000

AA1HD	GB7WP	JP9YEI	KB1ZEG	KE5PFA	KJ4FCS	N5APB	PY2KPE	VE1DSR	W0HF	W4LDG	W6MLI	WB6BA
AA1KK	GB7ZP	K0MDG	KB3TOG	KE7JFH	KJ4GGV	N5HDS	PY2KPP	VE2CST	W0MAO	W4LET	W7AES	WB7DZG
AA3E	HB9BO	K1DRP	KB3WNO	KE7MVI	KJ4JAL	N5MAD	RK3FWD	VE2FCT	W0MI	W4MT	W7GC	WB8THD
AC7O	HB9DD	K1HBR	KB3YBB	KE7WTB	KJ4KLD	N5MDS	S55DMX	VE2REX	W0MXW	W4NVU	W7KDS	WB9FDZ
CQ0DCH	HB9H	K1HRO	KB3YBH	KE7WTC	KJ4LJ	N5MNY	SK0MQ	VE2RID	W0OMD	W4NYR	W7MOT	WC3PS
CQ0DLX	HB9IAC	K1MRA	KB5DRP	KF5BSZ	KJ4MKV	N7ARR	SK0QO	VE2RKI	W0REA	W4OVH	W8BAP	WC7SO
CQ0DOA	IR0K	K1XC	KC0CVU	KF5MMX	KJ4OXT	N7CI	SK7HW	VE2RM	W1AAD	W4PDE	W8CCE	WD2NY
CQ0DSE	IR0UP	K2BWK	KC0WLB	KF5PIE	KJ4PXY	N7IH	SK7RNQ	VE2RMF	W1DSR	W4PL	W8CMH	WD4STR
DB0DF	IR1BZ	K2DIG	KC2TGB	KF5SEB	KJ4PYA	N7NDS	SR1UVS	VE2RQF	W1ECV	W4PLB	W8DF	WD4WDW
DB0DJ	IR1CJ	K2PUT	KC2TXB	KF5VBD	KJ4RYG	N7QQU	SR2UVG	VE2RQT	W1HQ	W4PVW	W8DIG	WD5STR
DB0DON	IR1UCB	K3AWS	KC2TXX	KF5VBE	KJ4TJD	N7SNO	SR5UVA	VE2RVR	W1IXU	W4RNG	W8GO	WD8MKG
DB0HRF	IR1UDI	K3CR	KC5ULN	KF5VBF	KJ4YNR	NC2EC	SR5UVR	VE2VPS	W1KK	W4RNT	W8HEQ	WF4X
DB0ICM	IR1UII	K3PDR	KC5ZJY	KF5YVX	KJ6BWR	NC4BS	SR7UVK	VE3LSR	W1MRA	W4SRT	W8HHF	WH6DIG
DB0MYK	IR2UBG	K4DSO	KC9LKZ	KF5ZLE	KJ6LJZ	ND5N	SR7UVL	VE3PLF	W1NLK	W4VLD	W8RNL	WI0OK
DB0RIG	IR2UDY	K4GAR	KC9OKW	KF5ZUZ	KJ6LVV	NE7WY	SR8UVB	VE3R XR	W1SCC	W4WBC	W8RTL	WJ4FD
DB0RZS	IR2UEZ	K4RPT	KC9PWC	KF6RAL	KK4BXE	NJ2DG	SR9UVM	VE3SSF	W1SCV	W5AC	W8SHI	WL7CWI
DB0SBX	IR2UFH	K4WPB	KC9RBB	KF7BFS	KK4DFC	NJ2MC	SR9UVZ	VE3TIR	W2ECA	W5AQA	W8ZX	WR4DH
DB0WZ	IR3EE	K5ELK	KC9SJY	KF7BFT	KK4JDH	NJ2SC	SV2F	VE3TTT	W2TOB	W5AW	W9ARP	WR7AAA
EA3RCC	IR3UBZ	K5LET	KC9WDW	KF7CLD	KK4KYK	NM5WR	SV4J	VE3YRK	W3DHS	W5ELP	W9BCC	WR7KCR
ED2ZAA	IR3UEF	K5NEM	KC9YFX	KF7CUF	KK4LVF	NO5RA	SV8S	VE3YYZ	W3EOC	W5ETX	W9BIL	WS4VA
ED2ZAB	IR3UIB	K5PRK	KD0CGR	KF7NPL	KK4SGC	NR7SS	SZ2RLF	VE4WDR	W3EXW	W5FC	W9CEQ	WT0O
ED3YAK	IR3UIC	K5PTR	KD0IAI	KG4NXO	KK4VQG	NS9RC	SZ7SER	VE6IPG	W3PRO	W5GAD	W9EBN	WV8BSA
ED4ZAD	IR4MO	K5RKN	KD0IAN	KG4TCC	KK6GFX	NT3ST	TF3RPI	VE6WRN	W4AB	W5GB	W9HSY	WW5EM
ED5ZAB	IR5UBM	K5SST	KD0JOS	KG7FOJ	KL7FF	NT5RN	TG0AA	VE6WRO	W4AES	W5HAT	W9ICE	WW6BAY
ED5ZAC	IR6L	K5TIT	KD0JOT	KG7HBZ	KN5V	NU7TS	UR0DUA	VE7RAG	W4AKH	W5HCT	W9PPF	WX0BC
ED6ZAB	IR6UCC	K5URR	KD0JOU	KI4SAY	KO4TM	NV4FM	V53W	VE7RCK	W4AP	W5HDR	W9PIA	WX4EMA
ED7ZAD	IR6UCY	K6ACS	KD0LUX	KI4SAZ	KR4AIK	OE1XDS	VA2REX	VE7VIC	W4BSF	W5HDT	W9QCR	WX4GPB
F1ZPL	IR6UDO	K6IFR	KD0PBV	KI4SBA	KR4CHS	ON0CPS	VA2RKA	VK2RAG	W4BUG	W5IAS	W9TE	WX4PCA
GB7AU	IR7UBA	K6SOA	KD0PBW	KI4SBB	KR4RAL	ON0DAS	VA2RVO	VK2RWN	W4DOC	W5MPZ	W9UIH	WX8GRR
GB7BP	IR8AF	K7LWH	KD0RDI	KI4SBC	KR7ST	ON0DST	VA3AAR	VK3RGV	W4DSI	W5NEM	W9YR	XE3RCC
GB7DB	IR8BA	K7RST	KD0RED	KI4SDI	KS1R	ON0LB	VA3NAG	VK3RMC	W4FAN	W5NGU	WA0COL	YD0ZUA
GB7DV	IR8BT	K7YI	KD0SWQ	KI4TMJ	KT8APR	ON0LGE	VA3ODG	VK3RWN	W4FJ	W5OKT	WA2UMX	ZL1VHD
GB7DX	IR8UAF	K8BIG	KD0YLG	KI4WXS	KV3B	ON0OS	VA3RDD	VK4RBX	W4FWD	W5SF	WA4YZY	ZL1ZLD
GB7FK	IR8UCN	K8DXA	KD2EQY	KI4WZA	KW6HRO	ON0SNW	VA3SDG	VK5REX	W4GSO	W5SHV	WA6IRC	ZL2VH
GB7GL	IR9BJ	K8ETN	KD8QCC	KI6JKA	KX4DOR	OZ2REA	VA3SRG	VK5RWN	W4GWM	W5SSV	WA7DR	

KV3B Gateway – Detailed Status

KV3B	
Date/Status Tag	Status
Registration Status:	Registered with US Root.
Last Synchronization:	2014-12-30 04:56:49 (3 minutes ago)
Required Update Status:	No recent updates!
Latest Checksum Reported:	Checksums: All up to date (2014-12-30 05:00:34)
Previous Checksum Reported:	Checksums: All up to date (2014-12-30 04:45:35)
Gateway Software	Icom G2
System Clock	Okay
Last Status Reported:	dsipsvd (root:19192) dsgwd (root:19150) postgres (postgres:19055) httpd (root:19084) java (root:2437) dplus (root:10611) named (named:1915) DSM 3.0.4b02 Running, PID = 2437 Mem: 455MB Free, 2534MB Total GW_VER=2.1
Last Version Reported:	/dstar/scripts/gw_schedule 2.1b Linux version 2.6.18-398.el5
Unique IPs in 48 hours	1
Trust Server Info Reported:	Valid Trust Server Entry usroot.dstarusers.org 10.0.0.1 (2014-12-30 04:45:35)
Registration Page:	Registration Page Okay
Dplus Page:	DPLUS Page Okay

KV3B Gateway – DPLUS Dashboard

<https://kv3b.dstargateway.org/>

--- or ---

<https://dstar-mc.marccclub.org/>

DPLUS Dashboard | Gateway Status and Control

Registration | KV3B Repeater System | DPLUS version 2.2k

Linked Gateways / Reflectors

Module	Linked to
A	unlinked
B	REF025 B
C	unlinked
D	unlinked
E	unlinked

Remote Users

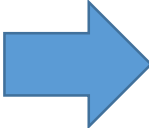
Callsign	User Message	Last TX on	Type
----------	--------------	------------	------

Last Heard

Callsign	User Message	Last TX on	Time
N3OXA	Randy QTH Elkridge,	B	2015/01/04 17:06:47

Status as of 2015/01/05 13:55:29

Topics

- D-STAR – What is it?
- What Can I do with it?
- The Repeater / Gateway System
-  • D-STAR User Equipment
- D-STAR User Registration
- Your First D-STAR Call - The Four Call Signs
- D-STAR Routing

ID-1 for 1.2 GHz Voice and Data

- Operates FM, Digital Voice (DV), low speed data and high speed data (DV)
- High speed data connection is Ethernet compatible
- Acts as Ethernet bridge
- Used by MED team during MCM to provide TCP/IP connectivity



Icom Mobiles

- IC-2200 and ID-800 were initial mobiles
 - D-STAR board can be added to IC-2200
- ID-880 updated ID-800 with improved user functions
 - Dual-band, single receive mobile
- IC-2820 is full featured mobile
 - Dual-band, dual receive
 - Built-in GPS with external antenna
- New ID-5100 mobile offers new features
 - Dual-Band, dual receive
 - GPS built into head unit
 - Touchscreen display
 - Optional Bluetooth interface
 - DR Mode with 1200 included memories



Icom Handhelds

- IC-91AD was initial D-STAR handheld
 - Dual-band, dual receive
- IC-92AD dual-band, dual receive
 - Slightly larger frame with more heat sink
 - Waterproof
 - GPS spkr/mic optional accessory
- IC-80 introduced as lower cost handheld
 - Dual-band, single receive
 - GPS spkr/mic accessory available
- ID-31A is 70cm handheld
 - Waterproof
 - SD card for memory storage, update memory from downloads
 - Built-in GPS
 - User friendly DR Mode, locate closest repeater
- ID-51A is latest dual band handheld
 - All features of ID-31A, but dual band, dual receive

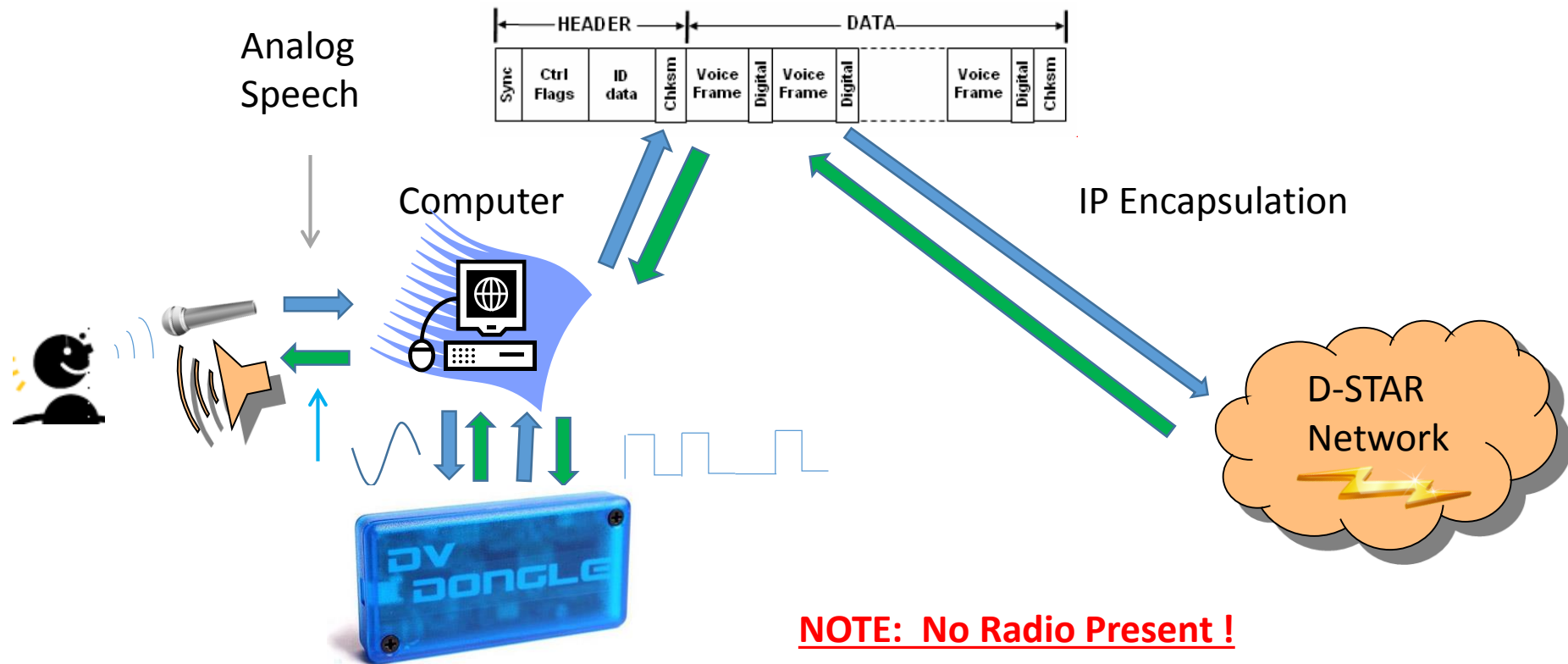


DV Dongle -- \$199.95

- Produced by Internet Labs, available at major ham dealers
- Provides access to D-STAR repeaters via PC without radio
- Small module connects to PC via USB
- Uses PC sound card for mic/speaker audio
- Windows software runs efficiently on PCs, Netbooks, Windows tablet
- Coming to Android tablets, smartphones
- Java-based software for Mac, Linux
- Connect to repeaters, reflectors, send data, view history.



DV Dongle – Connectivity



DV Access Point (DVAP) -- \$250

- Produced by Internet Labs, available at major ham dealers
- Creates instant local access point for limited area without D-STAR repeater
- Connects to PC via USB
- Includes 10mw 2m transceiver and stubby antenna
- Use HT, other D-STAR radio nearby for full network access without local repeater
- Windows software module for configuration and operation

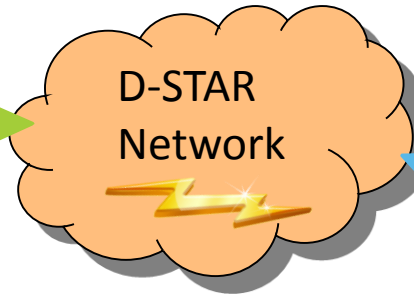
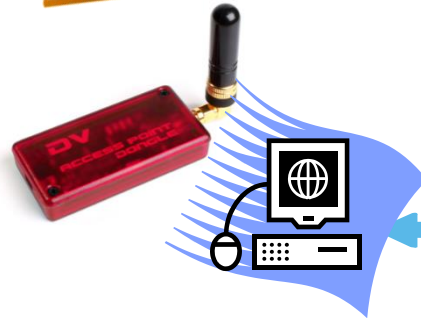


DVAP Connectivity

Must be a D-STAR enabled HT



Typical range:
Several hundred feet

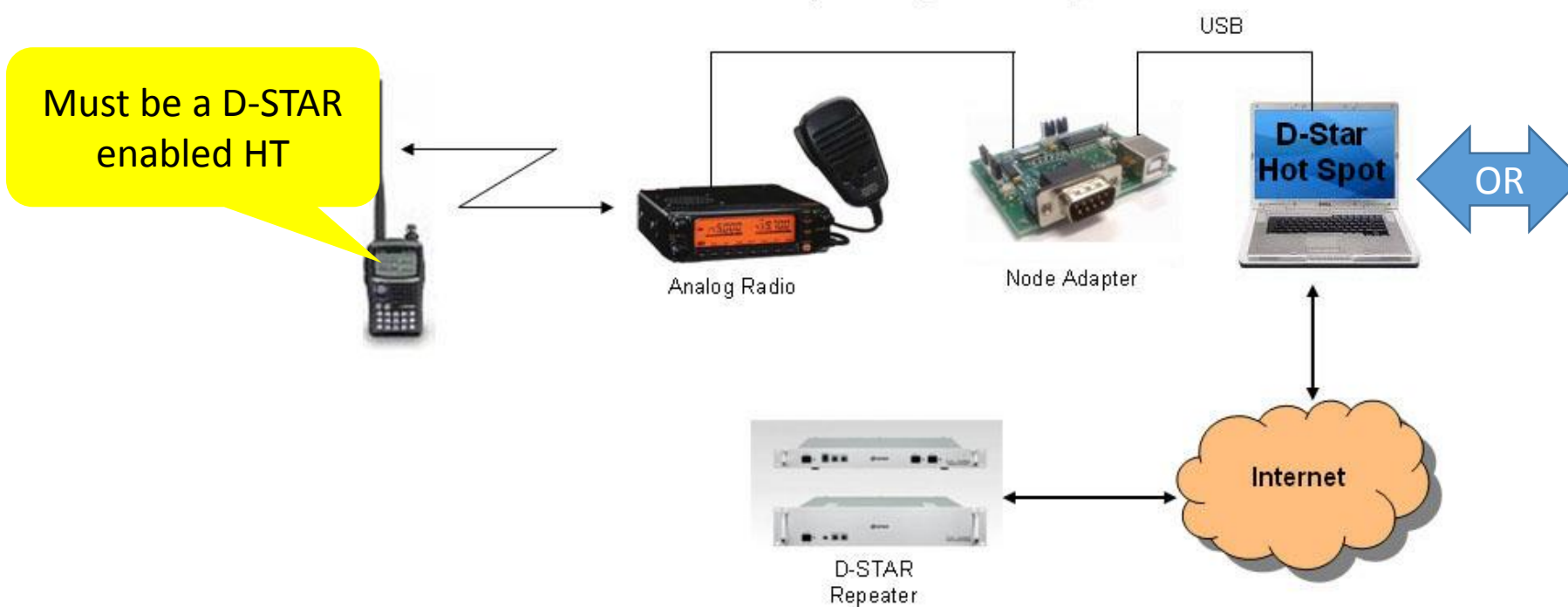


DV Node Adapters/GMSK Modems

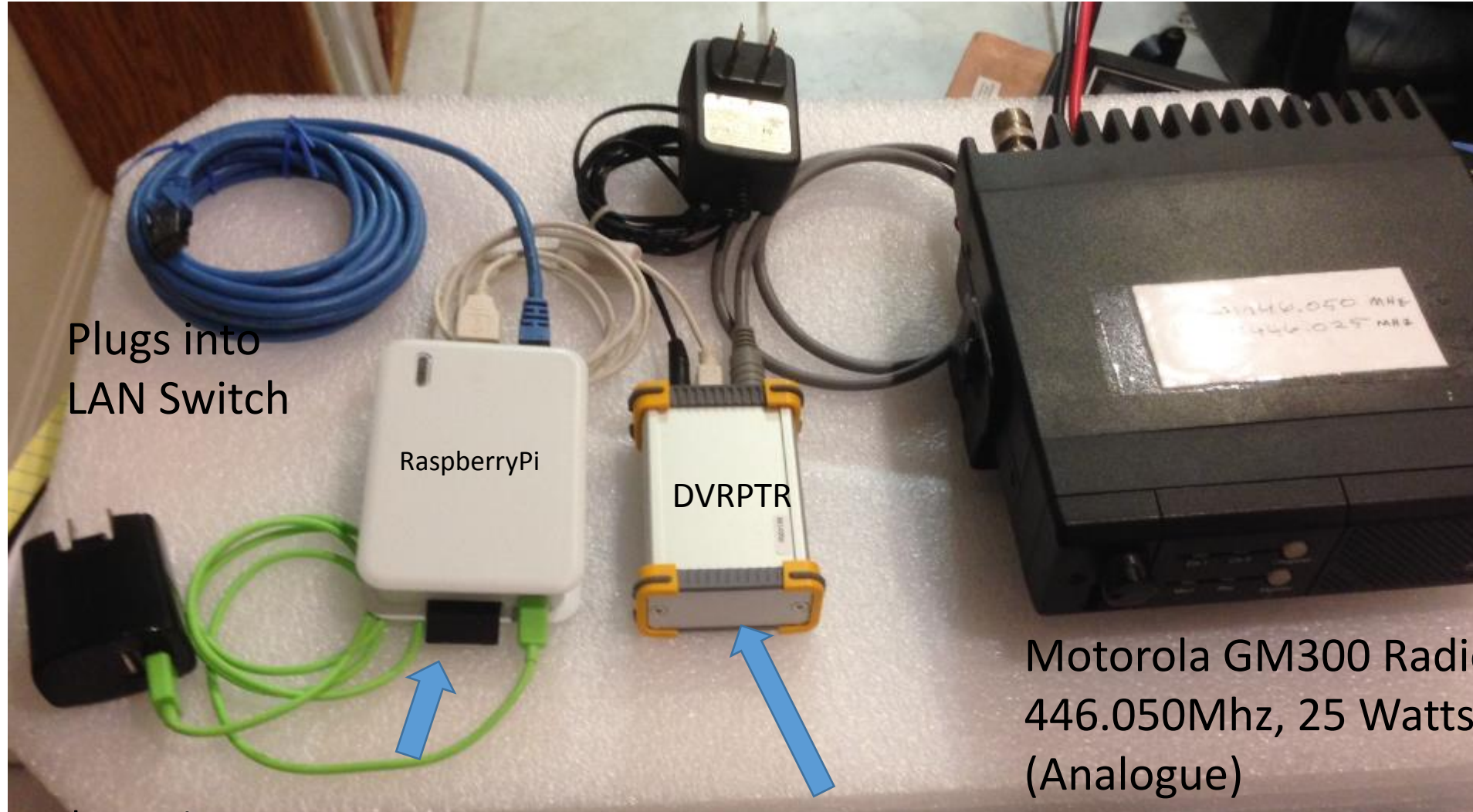
- Provides D-STAR interface to FM radio
- Can be used to create hotspot or repeater
- Can create D-STAR compatible radio with Dongle



D-STAR Hot Spot - System Diagram



New MARC D-STAR RaspberryPi based HotSpot



Plugs into
LAN Switch

RaspberryPi

DVRPTR

Motorola GM300 Radio
446.050Mhz, 25 Watts
(Analogue)

RaspberryPi
Running Maryland D-Star Image
(loaded on Memory card – visible)
(powered 5v - via USB cable/PS)

DVRPTR_V1 9600 GMSK Modem
(connects to radio – audio in, audio out, PTT)
(USB serial connection to Pi)
(powered 12v - by wall wart)

For Dongle, DVAP, Hotspot – Need to “punch holes” in your home Firewall for Digital Voice Audio Streams

LINKSYS
A Division of Cisco Systems, Inc.

Applications & Gaming

Wireless-G Broad

Setup | Wireless | Security | Access Restrictions | Applications & Gaming

Port Range Forward | Port Triggering | DMZ | QoS

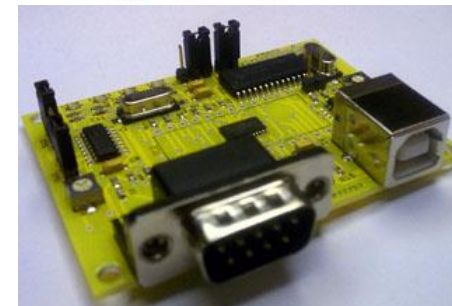
Port Range Forward

Port Range					
Application	Start	End	Protocol	IP Address	Enable
DSTAR	20000	to 20005	Both	10.0.0.2	<input checked="" type="checkbox"/>
DSTAR	40000	to 40000	Both	10.0.0.2	<input checked="" type="checkbox"/>
DSTAR	40001	to 40001	Both	10.0.0.2	<input checked="" type="checkbox"/>
DSTAR	443	to 443	Both	10.0.0.2	<input checked="" type="checkbox"/>
DSTAR	80	to 80	Both	10.0.0.2	<input checked="" type="checkbox"/>
DSTAR	522	to 522	Both	10.0.0.2	<input checked="" type="checkbox"/>
	0	to 0	Both	10.0.0.0	<input type="checkbox"/>
	0	to 0	Both	10.0.0.0	<input type="checkbox"/>
	0	to 0	Both	10.0.0.0	<input type="checkbox"/>
	0	to 0	Both	10.0.0.0	<input type="checkbox"/>

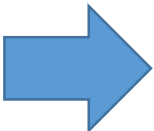
Save Settings | Cancel Changes

D-Star Hardware Review

- No D-Star Radio Required
 - DV Dongle
- D-Star Radio Required
 - DVAP (DV Access Point)
 - D-Star Hot Spot
 - D-Star Repeater

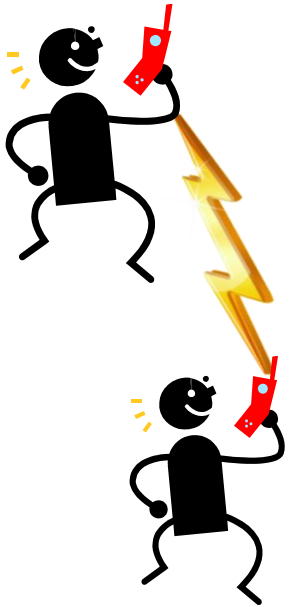


Topics

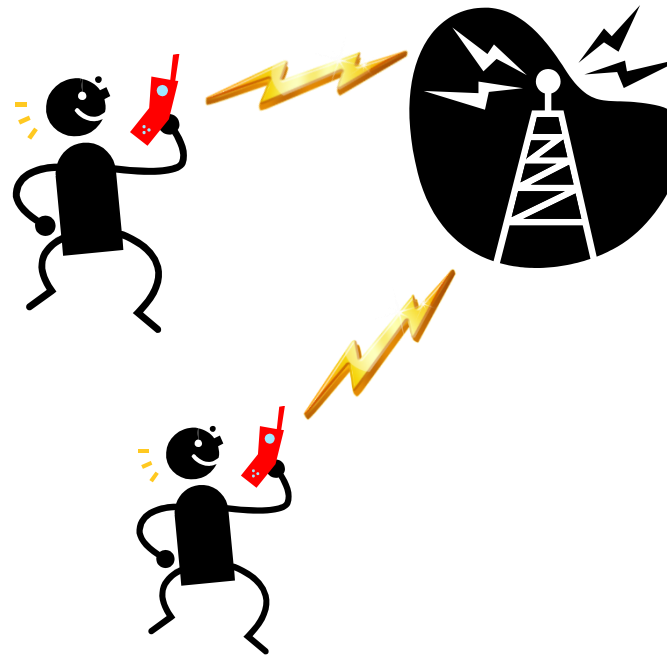
- D-STAR – What is it?
- What Can I do with it?
- The Repeater / Gateway System
- D-STAR User Equipment
-  • D-STAR User Registration
- Your First D-STAR Call - The Four Call Signs
- D-STAR Routing

Why Registration Required?

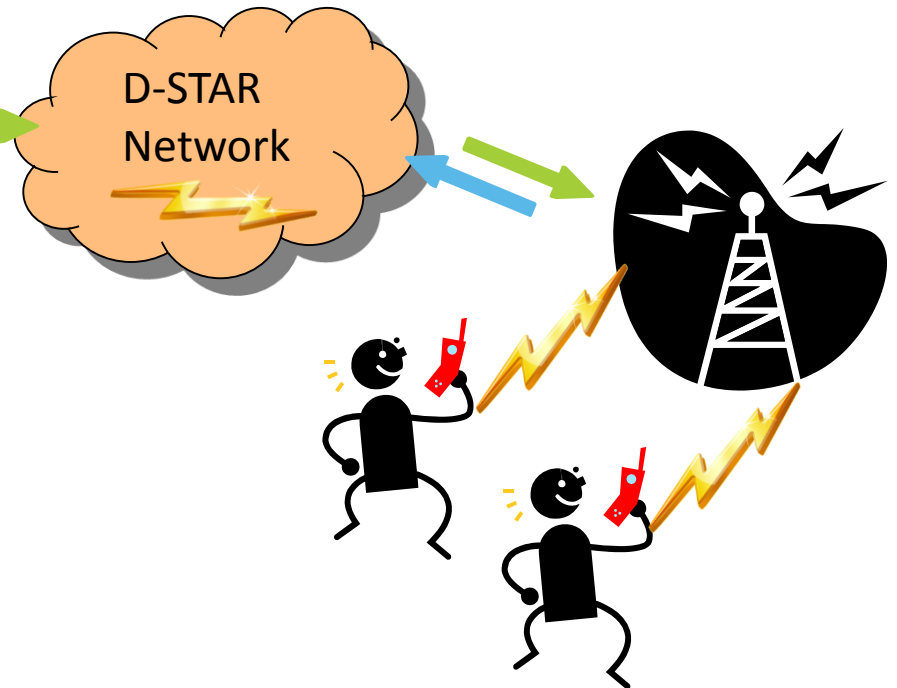
NOT
REQUIRED



NOT
REQUIRED



REQUIRED



Registration Document Available

- We have a nice 7 page document (with screen shots) listing the 12 simple steps
- Overview
 - Submit a “registration request” to the KV3B Gateway
 - Send an email to WA3SWJ@arrl.net to poke him about a registration that needs to be approved!
 - D-STAR Sys Admin verifies (1) active FCC license and that (2) you are not already registered at another gateway.
 - You only need to be registered at one of the Gateway’s in the D-STAR system
 - Sys Administrator notifies you that your registration has been completed
 - You log into your account on the Gateway and configure your personnel information
 - Register your D-STAR Device(s) (HT, Hotspot, mobile,etc)

KV3B Registration Page

<https://dstar-mc.marcclub.org/LogoutAction.do>

D-STAR Gateway System (KV3B)

Already registered?

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

CallSign :

Password :

Login

New user?

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

Register

D-STAR is a digital protocol developed by the Japan Amateur Radio League (the JARL)
and stands for **Digital Smart Technology for Amateur Radio**.

Registration Request

D-STAR Gateway System (KV3B)

The agreement document

I agree to abide by all rules and regulations of The Montgomery [Maryland] Amateur Radio Club (MARC) and FCC regulations Part 97. I understand that should I not comply, I may be removed permanently from the D-Star network without warning. For more information, visit www.marcclub.org

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

After notification by Sys Admin – Complete Personal Information

REVISION 1.0

D-STAR Gateway System (KV3B)

Login : K3CSX

User Information	GW Information	Terminal Information	Personal Information
------------------	----------------	----------------------	----------------------

Please, edit after making a left check box on.

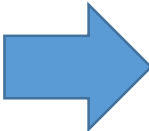
Name : Fred Bader
 E-mail : k3csx@arrl.net
 Password :
Password Confirm :

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 checked="" type="checkbox"/>	1:	K3CSX	<input type="checkbox"/>	10.196.67.232	k3csx-dongle	
<input type="checkbox"/>	2:	K3CSX	<input type="checkbox"/>	10.196.67.233		
<input type="checkbox"/>	3:	K3CSX	<input type="checkbox"/>	10.196.67.234		
<input type="checkbox"/>	4:	K3CSX	<input type="checkbox"/>	10.196.67.235		
<input type="checkbox"/>	5:	K3CSX	<input type="checkbox"/>	10.196.67.236		
<input type="checkbox"/>	6:	K3CSX	<input type="checkbox"/>	10.196.67.237		
<input type="checkbox"/>	7:	K3CSX	<input type="checkbox"/>	10.196.67.238		
<input type="checkbox"/>	8:	K3CSX	<input type="checkbox"/>	10.196.67.239		

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

Topics

- D-STAR – What is it?
- What Can I do with it?
- The Repeater / Gateway System
- D-STAR User Equipment
- D-STAR User Registration
-  • Your First D-STAR Call - The Four Call Signs
- D-STAR Routing

The Four call signs -- 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 (you only set this when you use the D-Star gateway system).
 - “**Rpt1Call**” (also called “**R1Call**”) is the call sign of the local repeater.
 - “**Rpt2Call**” (also called “**R2Call**”) is the call sign of the local gateway computer.

D-STAR CALLSIGN Fields

---- For Local simplex Operation

- **FOUR CALLSIGNS**

- THE ORIGINATION **MYCALL** **W2TAP**
- THE DESTINATION **URCALL** **CQCQCQ**
- THE FIRST ROUTING **RPTC1** **not used**
- THE NEXT ROUTING **RPTC2** **not used**

D-STAR CALLSIGN Fields – the Magical 8th Character

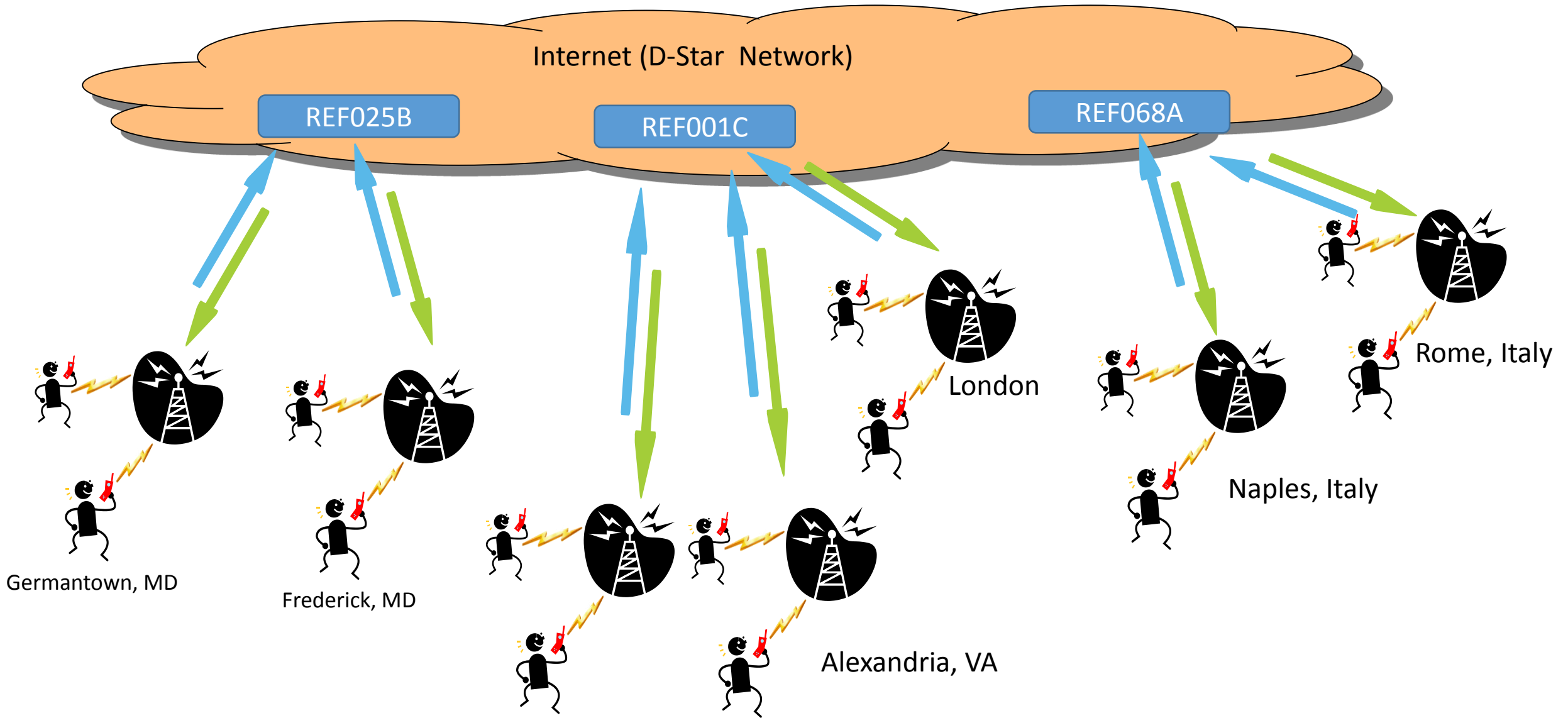
- **CALLSIGNS**
 - The station's call is up to **7 Characters** long
 - By definition the MYCALL must be the legal callsign of the originating station. Additional ID on the MYCALL of 4 characters
 - The MYCALL will look like "W2TAP ___ / Ron_"
 - The "/Ron_" portion is not used for routing
 - The **8th Character** of a callsign is the **PORT** of a D-Star Repeater
 - The Ports are by convention
 - **A** is 1200 Mhz or **BLANK** is routed as an "A"
 - **B** is 440 Mhz
 - **C** is 144 Mhz
 - **G** is the **GATEWAY COMPUTER** use only in RPTC2

ID 880 Programming – using RT Systems

7 spaces an the letter "I"
in the 8th position

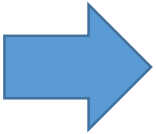
	Receive Frequency	Transmit Frequency	Offset Frequency	Offset Direction	Operating Mode	Name	Your Callsign	Rpt-1 CallSign	Rpt-2 CallSign
0	444.20000	449.20000	5.00 MHz	+DUP	DV	KV3B ID	I	KV3B B	KV3B G
1	444.20000	449.20000	5.00 MHz	+DUP	DV	KV3B B	CQCQCQ	KV3B B	KV3B G
2	444.20000	449.20000	5.00 MHz	+DUP	DV	ECHO	KV3B E	KV3B B	KV3B G
3	444.20000	449.20000	5.00 MHz	+DUP	DV	UNLINK	U	KV3B B	KV3B G
4	444.20000	449.20000	5.00 MHz	+DUP	DV	REF020A	REF020AL	KV3B B	KV3B G
5	444.20000	449.20000	5.00 MHz	+DUP	DV	REF025B	REF025BL	KV3B B	KV3B G
6	444.20000	449.20000	5.00 MHz	+DUP	DV	REF001C	REF001CL	KV3B B	KV3B G
7	444.20000	449.20000	5.00 MHz	+DUP	DV	REF030C	REF030CL	KV3B B	KV3B G
8	444.20000	449.20000	5.00 MHz	+DUP	DV	REF030D	REF030DL	KV3B B	KV3B G
9	444.20000	449.20000	5.00 MHz	+DUP	DV	REF DATA	REF015CL	KV3B B	KV3B G
10	444.20000	449.20000	5.00 MHz	+DUP	DV	REC	KV3B S0	KV3B B	KV3B G
11	444.20000	449.20000	5.00 MHz	+DUP	DV	PLAY	KV3B R0	KV3B B	KV3B G

Reflector Operation



Topics

- D-STAR – What is it?
- What Can I do with it?
- The Repeater / Gateway System
- D-STAR User Equipment
- D-STAR User Registration
- Your First D-STAR Call - The Four Call Signs
- D-STAR Routing



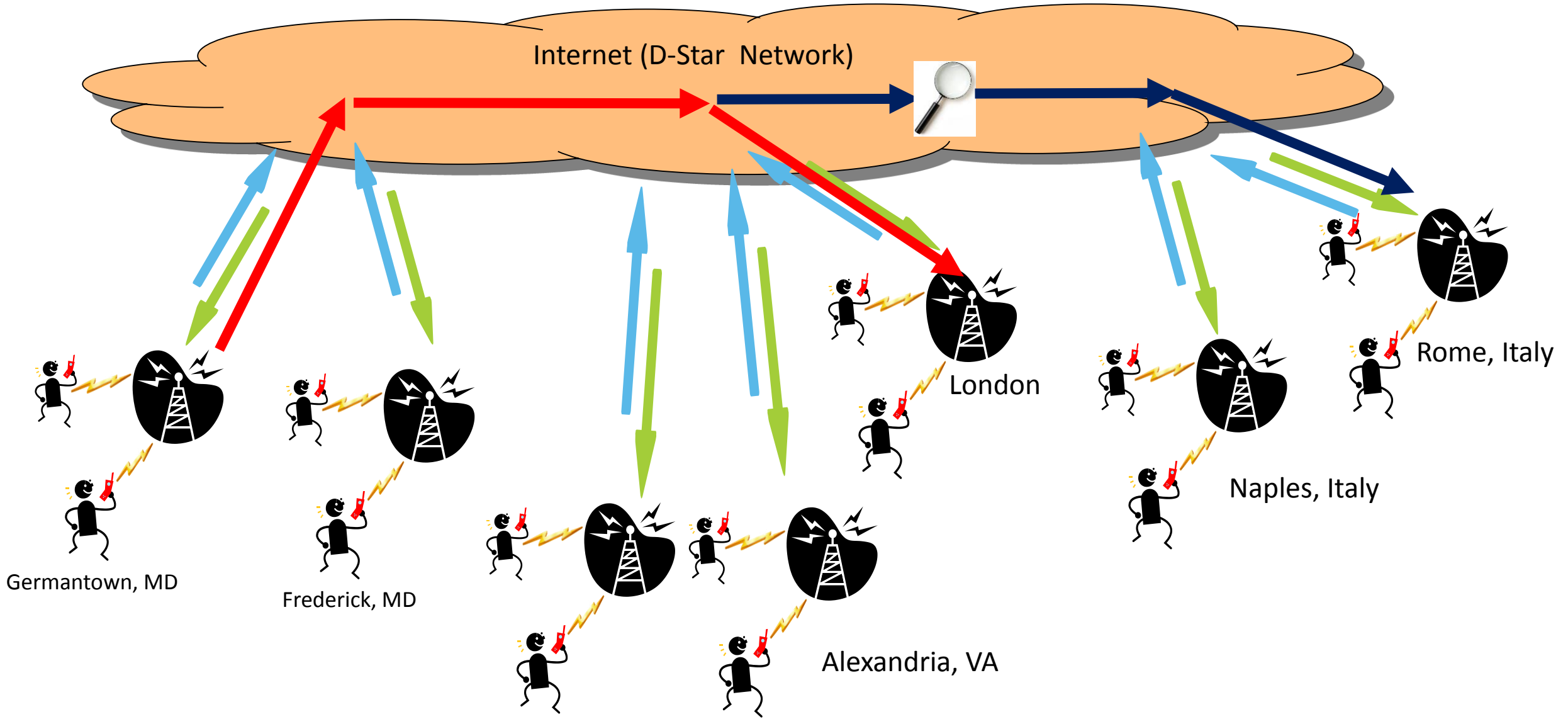
How is Traffic routed over the Internet

- Gateway system
 - **Associates** the user's callsign with a discrete IP number within the gateway system
 - Accomplished by user registration
 - **Associates** distant repeater callsigns with discrete IP number within the system
 - Assigned when the gateway system is commissioned
 - *The IP numbers used in routing are **NEVER** needed beyond the inner workings of the gateway system*
 - *All that is needed are the **CALLSIGNS** which are available to the user's "front panel"*
 - **Tracks** each user's callsign last location
 - **Routes** traffic for that user to the last known repeater and port

What is Routing?

- Two Routing Methods
 - Site Routing
 - **Where** you want to talk
 - Specific **System/Gateway** and *Port*
 - User Routing
 - **Who** you want to talk
 - Specific **User**

Site Routing (you specify the target Gateway/Repeater System)
User Routing (the D-Star Network "finds" the user for you)



Site Routing

- Given this information
 - W2TAP: Huntington, NY
 - W2KPQ: Selden, NY
 - W4DOC: Atlanta, GA
 - K6MDD: Mt. Diablo, CA
 - N7IH: Bellevue, WA (ICOM America HQ)
 - G7ICM: ICOM UK
 - VK8RAD: Darwin, Australia

- And I programmed my Radio
 - MYCALL = W2TAP
 - RPT 1 = W2KPQ--B
 - RPT 2 = W2KPQ--G
 - URCALL = /VK8RADB

Note the "/" as the first character to indicate repeater or site routing

• Results

- My call would be routed from the W2KPQ repeater, over the gateway, and come out on the UHF module in Darwin Australia

User Routing

- Given this same information

- W2TAP: Batavia, IL
- K5TIT: Dallas, TX
- W4DOC: Atlanta, GA
- K6MDD: Mt. Diablo, CA
- N7IH: Bellevue, WA (ICOM America HQ)
- G7ICM: ICOM UK
- VK8RAD: Darwin, Australia

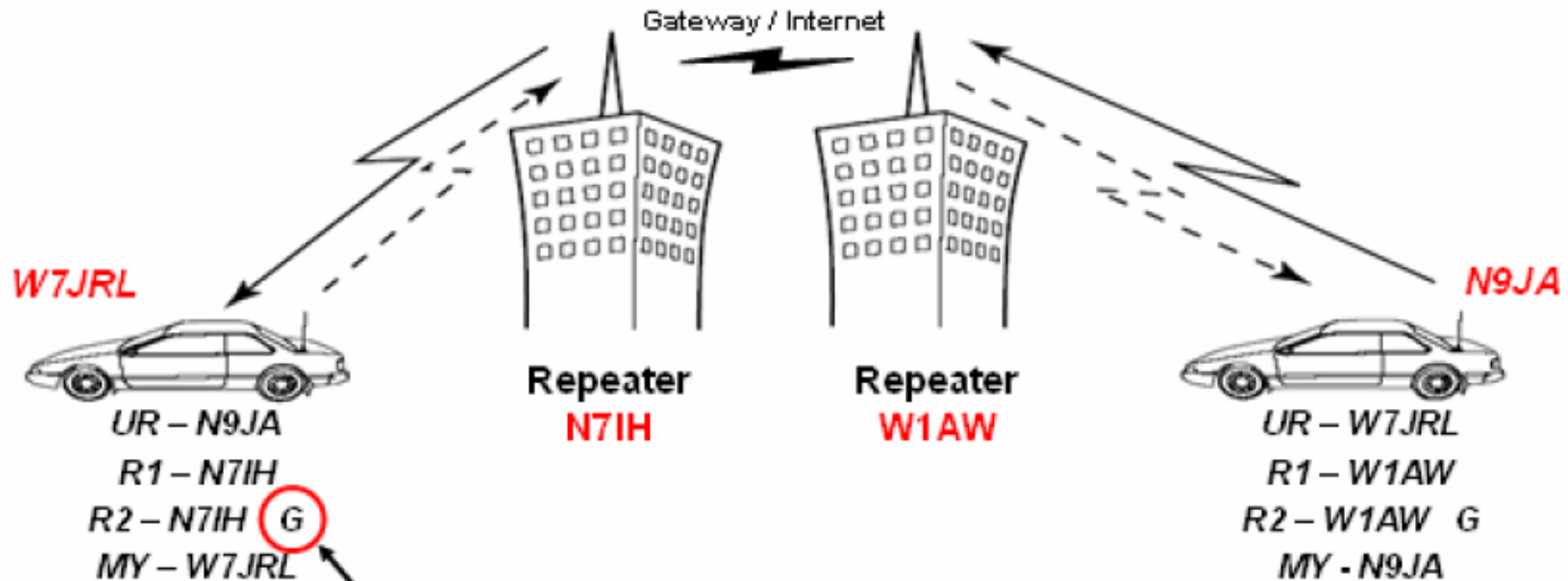
- And I programmed my radio

- MYCALL = W2TAP
- RPT 1 = W9CEQ---B
- RPT 2 = W9CEQ---G
- URCALL = N5MIJ

- **Results**

- W2TAP's voice and data communications would be routed from the W9CEQ repeater, over the gateway, and come out on the ***last RF module*** N5MIJ used any where in the world!
- Pretty Cool!

Basic Callsign Routing – Another Example



Instructs the N7IH repeater to use its registry to find the repeater on which N9JA last operated and route the packets there via the gateway



Your Source for D-Star DIGITAL Information!

[Home](#)

[Last Heard](#)

[JFindU D-Star Maps](#)

[Repeater Directory](#)

[D-Star Solutions](#)

[Joining The Network](#)



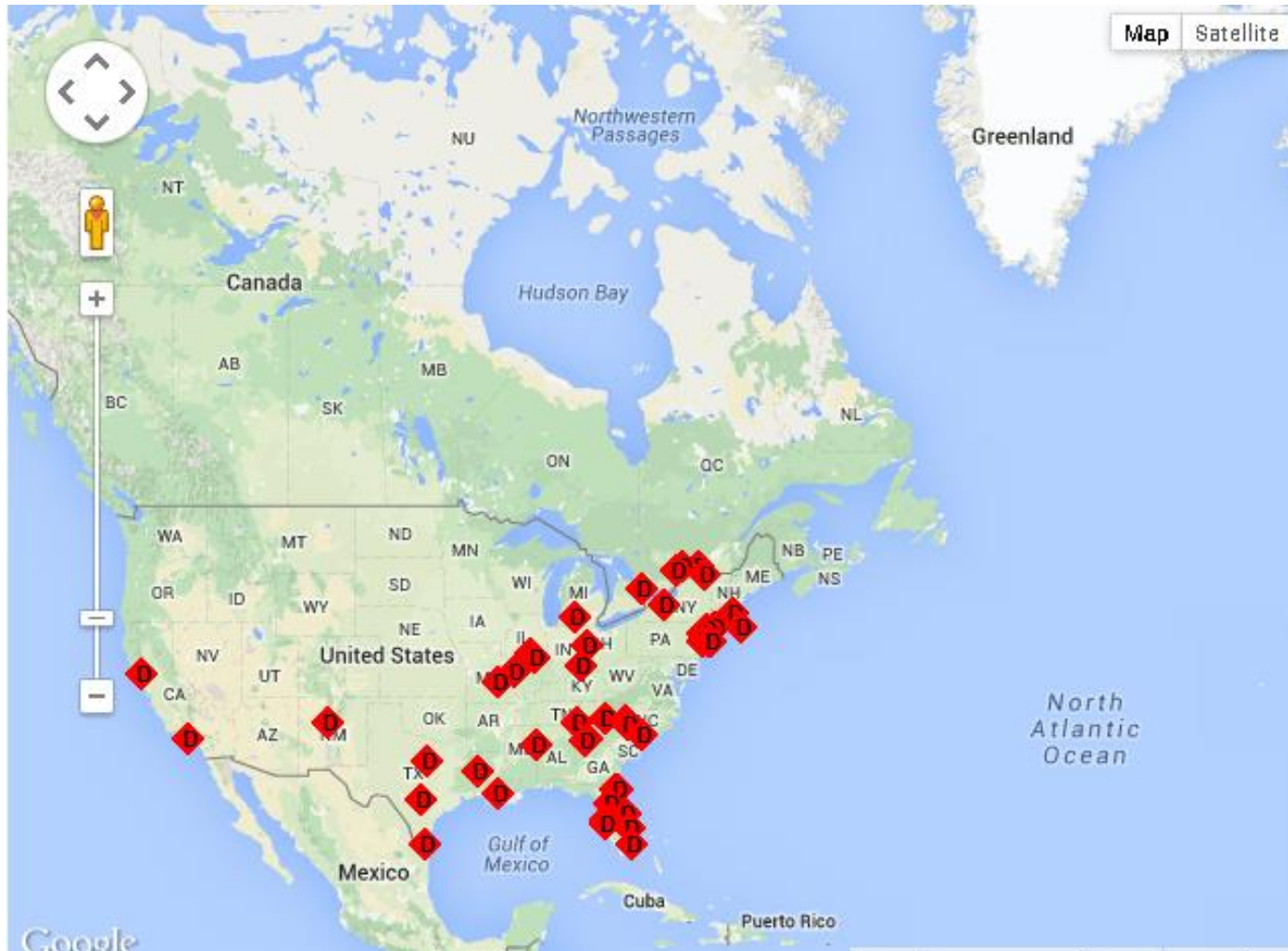
142 Unique callsigns heard in the last 24 hours

[\[Click here to disable refresh\]](#)

Current Time is 08/23/2007 15:18:37 UTC

Callsign	Time Heard	Reporting Node	
VE3EI	08/23/07 15:17:25 UTC	VE3YYZ C 2 Meters	Toronto, Cn
K6IXA	08/23/07 15:12:08 UTC	W6HHD A 1.2GHz	Atwater, Ca
WA6YTD	08/23/07 15:11:55 UTC	K6MDD C 2 Meters	Mt. Diablo, Ca
G4TKR	08/23/07 15:04:40 UTC	GB7IC B 440 MHz	ICOM UK
K9SGK	08/23/07 15:03:12 UTC	W9ICE B 440 MHz	Indianapolis, In
WA4MZE	08/23/07 14:58:59 UTC	KI4SAZ C 2 Meters	Magnolia Springs, Al
N9FNX	08/23/07 14:49:06 UTC	W9CEQ B 440 MHz	Batavia, Il
NJ6N 2	08/23/07 14:43:42 UTC	K6SOA A 1.2GHz	Laguna Beach, Ca
KI4PB	08/23/07 14:43:19 UTC	KI4SAZ C 2 Meters	Magnolia Springs, Al
W4MD	08/23/07 14:41:33 UTC	W4KCQ C 2 Meters	Tuscaloosa, Al
WA4SYI	08/23/07 14:41:10 UTC	KI4PPF C 2 Meters	Huntsville, Al
KE4ROC 5	08/23/07 14:33:24 UTC	KI4PPF C 2 Meters	Huntsville, Al
K6WL	08/23/07 14:31:51 UTC	K6MDD B 440 MHz	Mt. Diablo, Ca
KI6PR	08/23/07 14:24:24 UTC	W6HHD C 2 Meters	Atwater, Ca
W9GF	08/23/07 14:18:56 UTC	K5TIT C 2 Meters	Dallas, Tx
W2XAB	08/23/07 14:17:28 UTC	W4DOC C 2 Meters	Atlanta, Ga
KG4VPV	08/23/07 14:16:28 UTC	K5TIT B 440 MHz	Dallas, Tx
G8PPQ	08/23/07 14:15:14 UTC	GB7IC B 440 MHz	ICOM UK
KI6FQR	08/23/07 14:08:54 UTC	K6MDD B 440 MHz	Mt. Diablo, Ca

www.jfindu.net/DStarActivity.aspx



K8BIG Repeaters

[Locate K8BIG Repeaters](#)

[B](#) Range: 50nm 440 Voice 444.000 +5.00 MHz

[C](#) Range: 45nm 2m Voice 145.350 -0.600 MHz

DV stations last heard on K8BIG

Station	Last Heard	Repeater
KD8GIK	36s	K8BIG C
K8BIG	3h32m37s	K8BIG C
KD8BNS	10h42m3s	K8BIG C
W4CVG	14h32m21s	K8BIG C

Cross Band Operations

- **System Configuration**

- 23cm DV Port A
- 23cm DD Port A
- 70cm DV Port B
- 2m DV Port C

- **Result**

- Both Voice and Data Communications routed to NS9RC Port A, which is 1200 Mhz!

- **Goal**

- To talk to friends on another band, same system.

- **Callsign Programming**

- MYCALL = W2TAP
- RPT 1 = NS9RC---B
- RPT 2 = NS9RC---A
- URCALL = CQCQCQ

D-Star Routing

- 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. (tying two repeaters together)
 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.

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.
 2. Only “ties up” the two repeaters involved
- 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 repeater routing: call

- For the user wanting to contact another user using repeater routing, it's easy:
 - You set the “YourCall” field to the other repeater’s call sign:
 - The first character is a slash (“/”),
 - followed by the other repeater’s call sign,
 - followed by spaces to pad the field to seven (7) characters,
 - followed by the other repeater’s module (“A”, “B”, or “C”) in the 8th character position.
- The gateway computer routes the call to the indicated remote repeater.

D-Star call sign routing: reply

- If other users at the remote repeater hear your call and wish to reply, they must program their radios to send their transmissions back to the caller.
- To do this, they must set “YourCall” to either:
 1. the caller’s callsign; or
 2. the call sign of the repeater that the caller is on.
- This can be done by either:
 1. Manually setting the “YourCall” field; or
 2. immediately (before anyone else transmits) pressing the “RX->CS” button (the label varies among radio models).

Call sign vs. repeater routing

- So, what's the difference?
- Note that the radio setup to reply, appears to be the same for both call sign routing and for repeater routing!
- Both call sign routing and repeater routing accomplish the exact same thing!
- What is different, depends upon your intent:
 - If the person you are talking to, moves (eg, mobile) to another repeater, call sign routing will automatically route your transmissions to the new repeater.
 - Repeater routing is fixed until you change “YourCall”.

D-Star Call Sign Routing - Challenges

- Features: common to both call sign and repeater routing:
 - All radios listening to either repeater can hear both sides of the conversation.
HOWEVER:
 - If any other listener transmits on either repeater, only other listeners on that repeater will hear the transmission, **UNLESS** they **ALSO** program their radios for call sign or repeater routing.
 - This means if someone attempts to join the conversation, the local user should mention that call sign routing is in use.

D-Star call routing summary

- Normally, call sign routing is easier for the replying station to set (via the “Rx->CS” button), so it is normally used for remote calling.
- Repeater routing might be best if you want to talk to just anyone on the remote repeater.
- Of course, in any routing communications, some users can be using call sign routing and some can be using repeater routing.

D-Star linking - Using Reflectors

- Linking to D-Star repeaters and reflectors is made possible by the D-Star gateway software add-on by Robin Cutshaw / AA4RC.
- Linking to D-Star repeaters and reflectors was not envisioned in Icom's design of the D-Star network:
 - You can only link two D-Star repeaters together
 - A reflector is very similar to a D-Star gateway, but without any repeater modules. You can link many D-Star repeaters to one reflector.

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.

ID 880 Programming – using RT Systems

7 spaces an the letter "I"
in the 8th position

	Receive Frequency	Transmit Frequency	Offset Frequency	Offset Direction	Operating Mode	Name	Your Callsign	Rpt-1 CallSign	Rpt-2 CallSign
0	444.20000	449.20000	5.00 MHz	+DUP	DV	KV3B ID	I	KV3B B	KV3B G
1	444.20000	449.20000	5.00 MHz	+DUP	DV	KV3B B	CQCQCQ	KV3B B	KV3B G
2	444.20000	449.20000	5.00 MHz	+DUP	DV	ECHO	KV3B E	KV3B B	KV3B G
3	444.20000	449.20000	5.00 MHz	+DUP	DV	UNLINK	U	KV3B B	KV3B G
4	444.20000	449.20000	5.00 MHz	+DUP	DV	REF020A	REF020AL	KV3B B	KV3B G
5	444.20000	449.20000	5.00 MHz	+DUP	DV	REF025B	REF025BL	KV3B B	KV3B G
6	444.20000	449.20000	5.00 MHz	+DUP	DV	REF001C	REF001CL	KV3B B	KV3B G
7	444.20000	449.20000	5.00 MHz	+DUP	DV	REF030C	REF030CL	KV3B B	KV3B G
8	444.20000	449.20000	5.00 MHz	+DUP	DV	REF030D	REF030DL	KV3B B	KV3B G
9	444.20000	449.20000	5.00 MHz	+DUP	DV	REF DATA	REF015CL	KV3B B	KV3B G
10	444.20000	449.20000	5.00 MHz	+DUP	DV	REC	KV3B S0	KV3B B	KV3B G
11	444.20000	449.20000	5.00 MHz	+DUP	DV	PLAY	KV3B R0	KV3B B	KV3B G

“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!

D-Star repeater linking

- To link to another repeater (running “D-Plus” or “D-Extra”), you set the “YourCall” field to the other repeater’s call sign:
 - Enter the other repeater’s call sign,
 - followed by spaces to pad the field to six (6) characters,
 - followed by the other repeater’s module (“A”, “B”, or “C”) in the 7th character position,
 - followed by the “link” command (“L”) in the 8th character position.
- Key the radio briefly ONCE to set the link; you will hear a voice message announcing the result.
- Remember to change your “YourCall” value back!

After the link ...

- Once the link to a D-Star repeater or reflector has been established:
 - All repeaters linked together act as one repeater, with one caveat:
 - All users must insure that the “**Rpt2Call**” field is set to their local repeater’s gateway, or their transmissions will not be heard on the other repeater(s).
 - Users should set the “**YourCall**” field to “**CQCQCQ**” or “/” (the latter is required on D-star radios using the “DR” (“**D-Star Repeater**”) mode).

D-Star unlinking

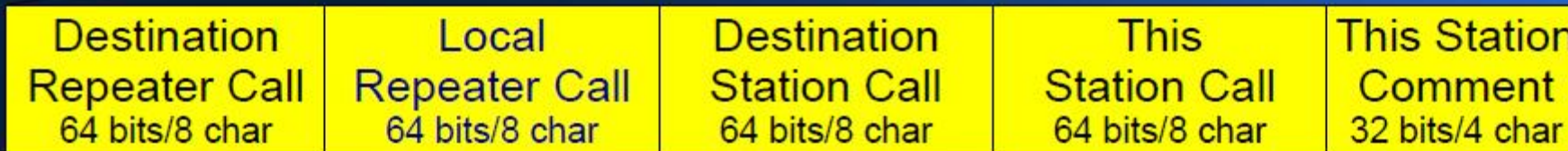
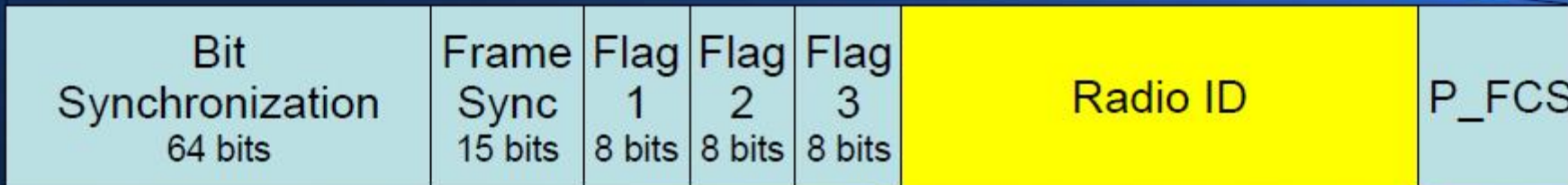
- Program a “YourCall” value of seven (7) spaces, followed by an “U” in the 8th (module) position.
- Key your radio
- When you unkey your radio, the gateway will play “say” UNLINKED
- Remember to change your “YourCall” value back!

D-Star tip: The new “DR” mode

- Icom’s new “D-Star Repeater” mode separates the “YourCall” memories from the “Rpt1Call”/Rpt2Call” memories.
- In “DR” mode, you can select the “YourCall” value, and then scroll through the “Rpt1Call”/Rpt2Call” memories without changing the “YourCall” value.
- Tip: Enter the “DR” mode **first**, before selecting a “YourCall” value.
- Tip: Save & use “/” as a “YourCall” value in place of “CQCQCQ”. When “YourCall” contains “CQCQCQ”, the “DR” mode will blank out the “Rpt2Call” field, and your transmissions will not be routed to the gateway (or a linked repeater or reflector).

The DD Protocol

Common Air Protocol – Techie Stuff



K7LWH G

K7LWH A

CQCQCQ

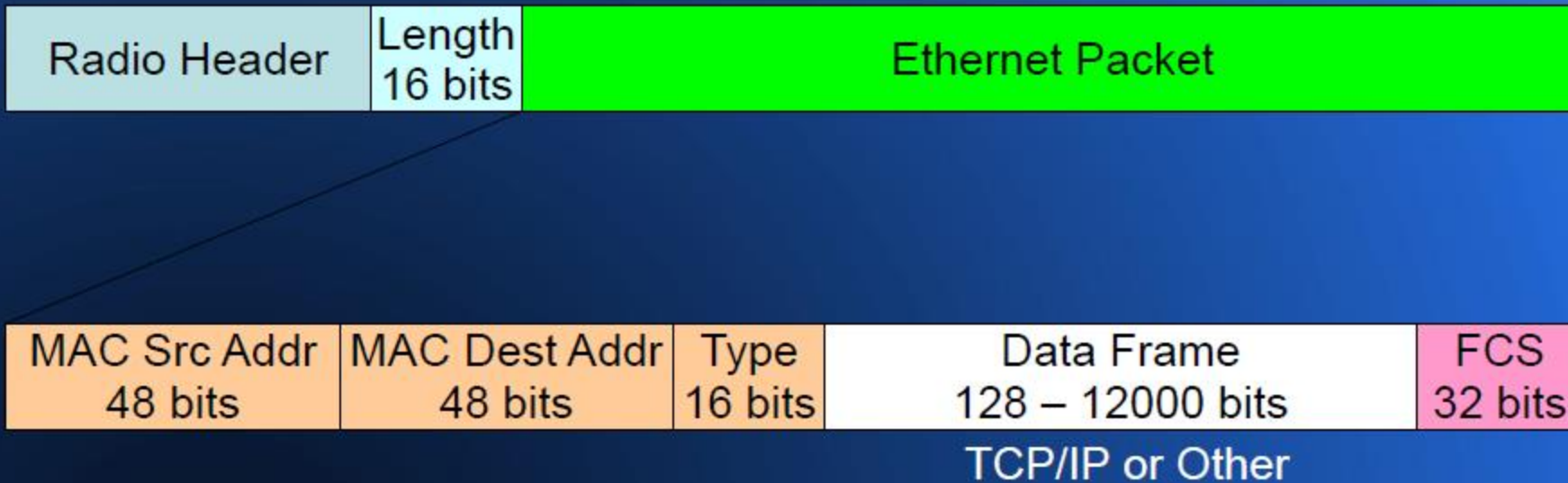
K7VE

JOHN



The DD Protocol

Common Air Protocol – Techie Stuff



D-Star network information

- This could be a whole session, so I will just list a few:
 - www.DstarDB.com (my site: 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)

Resources

- <http://dstarinfo.com>
- <http://dstarusers.org>
- <http://www.moencomm.com>
 - <http://www.k6jm.com/hs-setup.htm>
- <http://groups.yahoo.com>
 - [dstar_digital](#)
 - [gmsk_dv_node](#)
 - [DStar-Gateway](#)
- <http://dutch-star.eu>
- <http://www.k5tit.org>
- <http://ok-dstar.blogspot.com>

Questions

