

Rochester Amateur Radio Association, Inc.



D-STAR

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What is D-STAR?

D-STAR (Digital Smart Technologies for Amateur Radio)
Simultaneous digital voice and data
Packet-based (ready for computers and networks)
“Digital at the source” – voice quality is not degraded by the communications channel
Less bandwidth than analog counterparts
Callsign-based routing architecture
Stand-alone or gateway-enabled architectures

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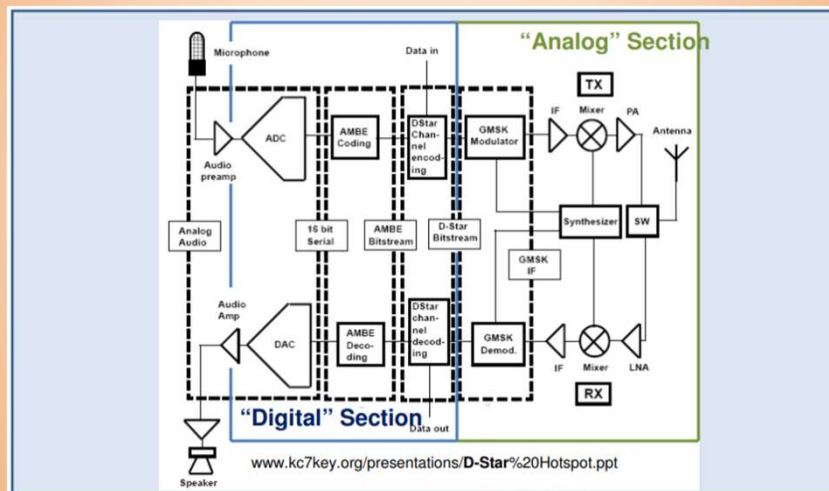
Examples of DSTAR Radios



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DSTAR Radio Block Diagram



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DSTAR Vocoder

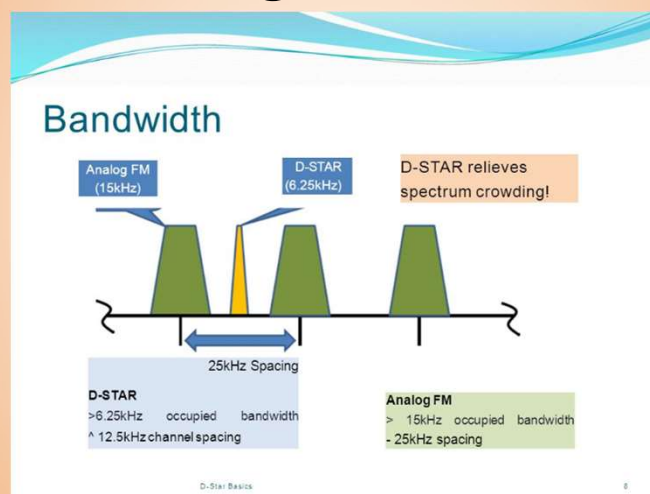
In the preceding slide the DSTAR Vocoder is depicted in the AMBE block (Advanced Multi-Band Excitation) speech compression technology developed by [Digital Voice Systems, Inc. \(DVSI\)](http://www.dvsi.com).

The DVSI Vocoder performs the encode and decode functions of the DSTAR system in hardware with forward error correction with the goal to minimize the transmitted signal bandwidth.

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DSTAR Signal Bandwidth



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DSTAR Audio

DSTAR is a narrow band transmission by design (+/- 6.25 KHz)
You will notice the compromised fidelity which results from the reduced bandwidth. [Here](#) is a sample.

There are times when the signal gets distorted. This can happen due to gaps in the received signal over the radio or the internet. This is called R2D2. [Here](#) is a sample

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DSTAR Connection Methods

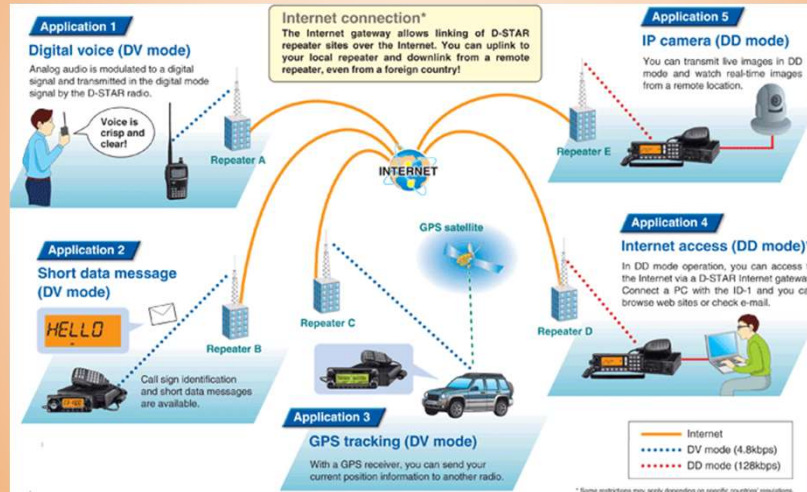
Long Distance Communication using DSTAR requires a connection between the transmitting station and receiving station. Connections are made to Repeaters, Reflectors, and Hotspots. Here are some of the mechanisms used:

Callsign Routing - Original Mechanism
G2 Multicast (group callsign)
dPlus Linking with Reflectors (REF, XRF)
[IRCDDB](#)
DCS Linking
CCS7 Uses DMR ID [Registration](#)

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D-STAR Connections



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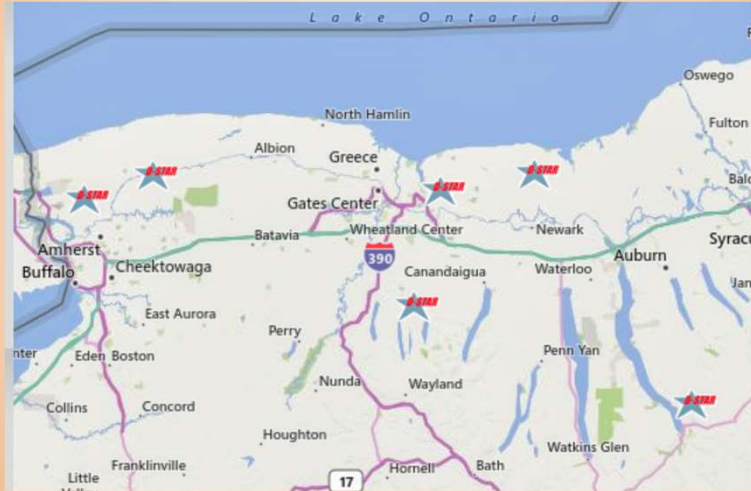
D-STAR Repeater



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D-STAR Repeater Locations



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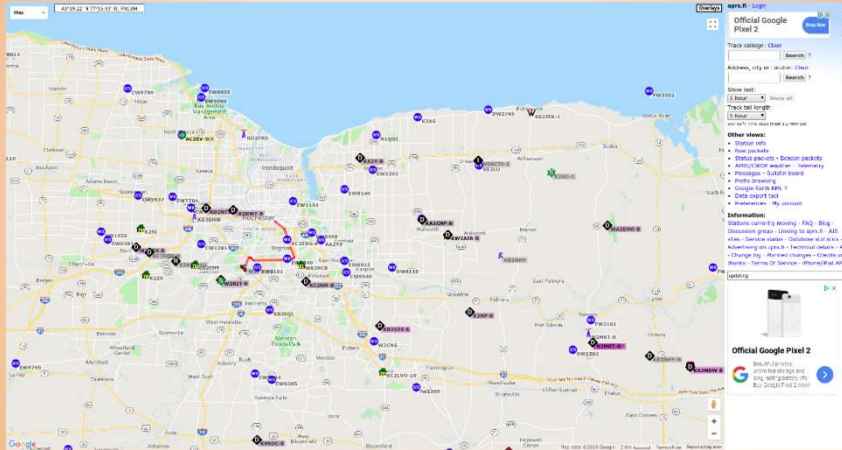
DSTAR Reflectors

In addition to repeaters which allow connected users to talk to each other, Reflectors are computer programs which reside in data centers or in the cloud. DSTAR users connect to the reflectors through repeaters or hot spots. Reflectors are sometimes dedicated to specific types of communications such as Skywarn, Hamvention, Regional Repeater linking etc.

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D-STAR Hotspot Locations



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DSTAR Hot Spots & Dongles

DSTAR hot spots are devices with a radio interface, modem, computer, and ethernet interface which receive the DSTAR signal and route conversations to the internet and allow connection to repeaters, reflectors, and other hot spots. Examples - Openspot, SharkRF, PIStar, DVAP

DSTAR dongles provide similar functionality using a Vocoder device which encodes the voice transmissions for the internet directly. Examples - DVdongle, ThumbDV

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DSTAR Hot Spots & Dongles



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DSTAR Connections

DSTAR Clients such as radios and dongle software have the callsign of the sender configured in the MYCALL field

Connections are made to the address configured in the URCALL Field

The path to be used is specified in the RPT1 and RPT2 fields

Once connection is made, communication proceeds with CQCQCQ in the URCALL field

To disconnect, place the U character in the 8th position of URCALL

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DSTAR Radio Programming

Earlier radios had memory channels which needed to be programmed with all combinations of MYCALL, URCALL, RPT1, and RPT2

Modern radios have the DR mode with MYCALL selected one time for configuration, RPT1 and RPT2 downloaded from an online database and selected manually or based on GPS location.

URCALL is selected manually then switched to CQCQCQ

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DSTAR Connection Example

MYCALL KC2NM RPT1 KB2VZSB RPT2 KB2VZSG URCALL REF009CL	MYCALL KC2NM RPT1 KC2NM B RPT2 KC2NM G URCALL C3162091	MYCALL KC2NM RPT1 KC2NM B RPT2 KC2NM G URCALL K2BWK BL
URCALL CQCQCQ	URCALL CQCQCQ	URCALL CQCQCQ
URCALL U	URCALL U	URCALL U

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ID-51 Memory Channel

CH	Operating Freq	DUP	Offset Freq	TS	Mode	Name	Skip	Repeater Tone	Repeater Freq	TSQL	DTCSS	DTCSS Polarity	Digital	Code	Call Sign	Year	RPT1
200	441.100000				5k DV	D Simplex									000000		
201	441.100000				5k DV	Hamvention		88.5	88.5	029	Both N	CSQL	19	000000			
202	444.800000	+DUP	5.000000		5k DV	CCS Unlink		88.5	88.5	029	Both N			000000	00SA	KB2VZSB	K
203	444.800000	+DUP	5.000000		5k DV	QQ		88.5	88.5	029	Both N			000000			
204	444.800000	+DUP	5.000000		5k DV	Unlink		88.5	88.5	029	Both N			00	U	KB2VZSB	K
205	444.800000	+DUP	5.000000		5k DV	Echo		88.5	88.5	029	Both N			00	E	KB2VZSB	K
206	444.800000	+DUP	5.000000		5k DV	Status		88.5	88.5	029	Both N			00	I	KB2VZSB	K
207	444.800000	+DUP	5.000000		5k DV	AL7MH		88.5	88.5	029	Both N			00	CCS7642	KB2VZSB	K
208	444.800000	+DUP	5.000000		5k DV	KA1NJL		88.5	88.5	029	Both N			00	CCS4112	KB2VZSB	K
209	444.800000	+DUP	5.000000		5k DV	Xerox		88.5	88.5	029	Both N			00	W2RFX BL	KB2VZSB	K
210	444.800000	+DUP	5.000000		5k DV	BWV C		88.5	88.5	029	Both N			00	K2BWV CL	KB2VZSB	K
211	444.800000	+DUP	5.000000		5k DV	BWV B		88.5	88.5	029	Both N			00	K2BWV BL	KB2VZSB	K
212	444.800000	+DUP	5.000000		5k DV	Stanley B		88.5	88.5	029	Both N			00	KD2HYJ CBL	KB2VZSB	K
213	444.800000	+DUP	5.000000		5k DV	FLL B		88.5	88.5	029	Both N			00	N4AB BL	KB2VZSB	K
214	444.800000	+DUP	5.000000		5k DV	Miami B		88.5	88.5	029	Both N			00	W4NVU BL	KB2VZSB	K
215	444.800000	+DUP	5.000000		5k DV	Miami C		88.5	88.5	029	Both N			00	W4NVU CL	KB2VZSB	K
216	444.800000	+DUP	5.000000		5k DV	Batav C		88.5	88.5	029	Both N			00	KD2FETL	KB2VZSB	K
217	444.800000	+DUP	5.000000		5k DV	Batav B		88.5	88.5	029	Both N			00	KD2FETB	KB2VZSB	K
218	444.800000	+DUP	5.000000		5k DV	Buf B		88.5	88.5	029	Both N			00	KD2STRB	KB2VZSB	K
219	444.800000	+DUP	5.000000		5k DV	YYZ C		88.5	88.5	029	Both N			00	VE3Y2CL	KB2VZSB	K
220	444.800000	+DUP	5.000000		5k DV	YYZ B		88.5	88.5	029	Both N			00	VE3Y2BL	KB2VZSB	K
221	444.800000	+DUP	5.000000		5k DV	Mega B		88.5	88.5	029	Both N			00	V43PMOBL	KB2VZSB	K
222	444.800000	+DUP	5.000000		5k DV	Port C		88.5	88.5	029	Both N			00	W8TDGCL	KB2VZSB	K
223	444.800000	+DUP	5.000000		5k DV	Port B		88.5	88.5	029	Both N			00	W8TDGBL	KB2VZSB	K
224	444.800000	+DUP	5.000000		5k DV	PHX C		88.5	88.5	029	Both N			00	W7MOT BL	KB2VZSB	K
225	444.800000	+DUP	5.000000		5k DV	Tuc B		88.5	84.5	029	Both N			00	KR7ST BL	KB2VZSB	K
226	444.800000	+DUP	5.000000		5k DV	DC B		88.5	88.5	029	Both N			00	W3AGB BL	KB2VZSB	K
227	444.800000	+DUP	5.000000		5k DV	DC C		88.5	88.5	029	Both N			00	W3AGB CL	KB2VZSB	K
228	444.800000	+DUP	5.000000		5k DV	RATLA		88.5	88.5	029	Both N			00	REF03AL	KB2VZSB	K
229	444.800000	+DUP	5.000000		5k DV	RATLC		88.5	84.5	029	Both N			00	REF03CL	KB2VZSB	K
230	444.800000	+DUP	5.000000		5k DV	RNJ A		88.5	88.5	029	Both N			00	REF03AL	KB2VZSB	K
231	444.800000	+DUP	5.000000		5k DV	RNJ C		88.5	88.5	029	Both N			00	REF03CL	KB2VZSB	K
232	444.800000	+DUP	5.000000		5k DV	RLVA		88.5	88.5	029	Both N			00	REF03AL	KB2VZSB	K

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ID-51 Repeater List

No.	Type	Name	Sub Name	Repeater Call Sign	Gateway Call Sign	Operating Freq	DUP	Offset Freq	Mode	Tone
0	DV Repeater	KC2NM Base	New York	KC2NM C	KC2NM G	446.150000	-DUP	0.000000	DV	—
1	DV Repeater	KC2NM Mobile	New York	KC2NM B	KC2NM G	446.125000	-DUP	0.000000	DV	—
2	DV Repeater	RIT HS	New York	W2RIT B	W2RIT G	446.075000	-DUP	0.000000	DV	—
3	DV Repeater	AL7MH HS	Arizona	AL7MH B	AL7MH G	446.125000	-DUP	0.000000	DV	—
4	DV Repeater	Pi Control	ircddb	RPTRCTLB	KC2NM G	446.150000	-DUP	0.000000	DV	—
5	DV Repeater	KA1NJL HS	New York	KA1NJL B	KA1NJL G	446.125000	-DUP	0.000000	DV	—
6	DV Repeater	Victor HS	New York	KD2HYJ B	KD2HYJ G	444.500000	-DUP	0.000000	DV	—
7	DV Repeater	Waterloo HS	New York	KA2NDWB B	KA2NDW G	446.125000	-DUP	0.000000	DV	—
8	DV Repeater	Webster	New York	KA2Y C	KA2Y G	145.610000	-DUP	0.000000	DV	—
New										

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ID-51 UR Call

No	Name	Call Sign
1	CQ	COCCOQ
2	Unlink	U
3	Status	I
4	Echo	E
5	Tupelo 2m	KE5LUXCL
6	Tupelo 70cm	KE5LUXBL
7	LondonA	REF001AL
8	LondonB	REF001BL
9	LondonC	REF001CL
10	ArizonaA	REF009AL
11	ArizonaB	REF009BL
12	AzPermaLinkC	REF009CL
13	NERepeaters	REF010CL
14	OhReflectorA	REF038AL
15	OhNoDigB	REF038BL
16	OhHamventionC	REF038CL
17	GrtLks Gateway	XRF004AL
18	Waterloo On	XRF005BL
19	Thurs Roundtable	XRF002AL
20	PAPA A	REF012AL
21	PAPA B	REF012BL
22	PAPA C	REF012CL
23	GA Spec Event	REF030AL
24	GA Linked Rep	REF030BL
25	GA Wide Rep	REF030CL
26	NEast General	REF049AL
27	NEast Repeater	REF049BL
28	NEast Emerg	REF049CL
29	KC2NM	CS1965Q2
30	K1N11	CS1965R3

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