



Linking / Routing

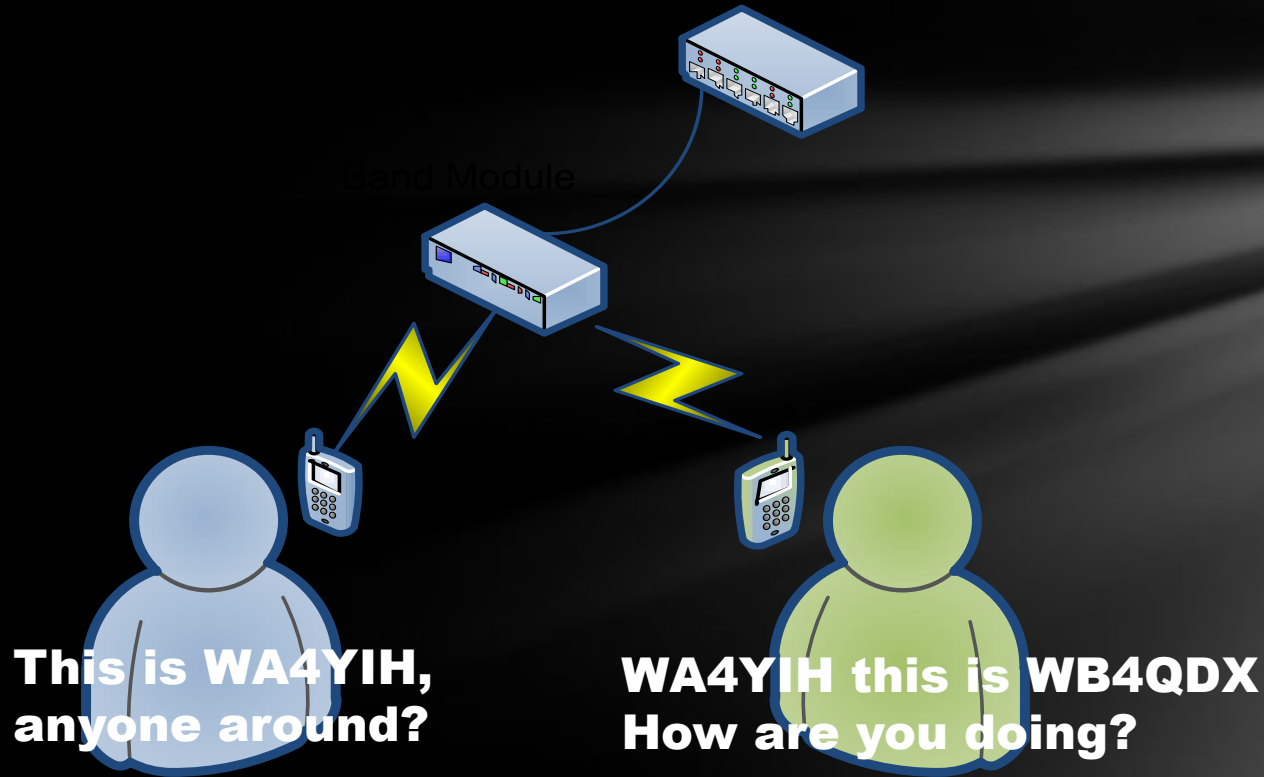
Ed Woodrick WA4YIH



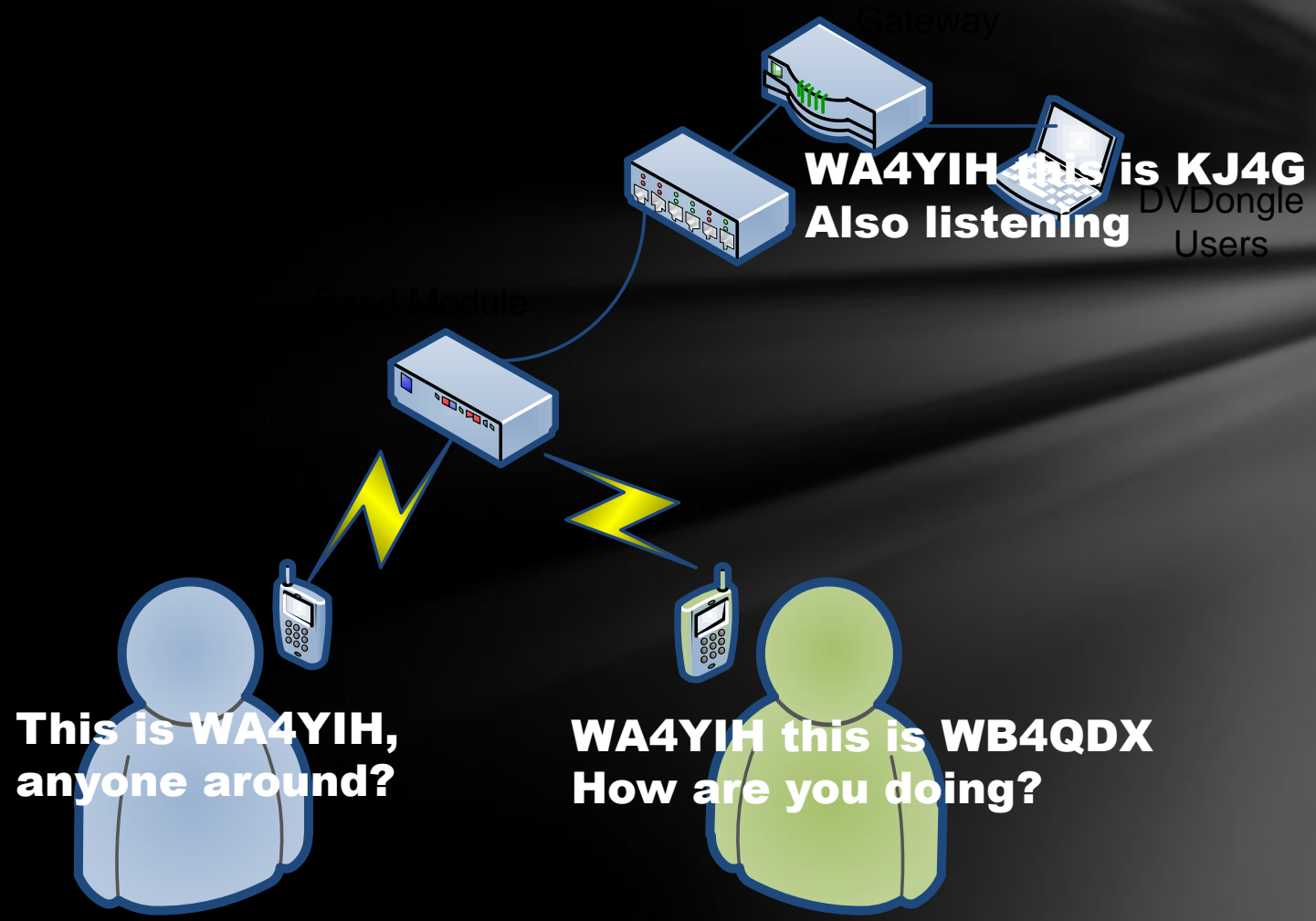
D-STAR Functions

What Can I Do?

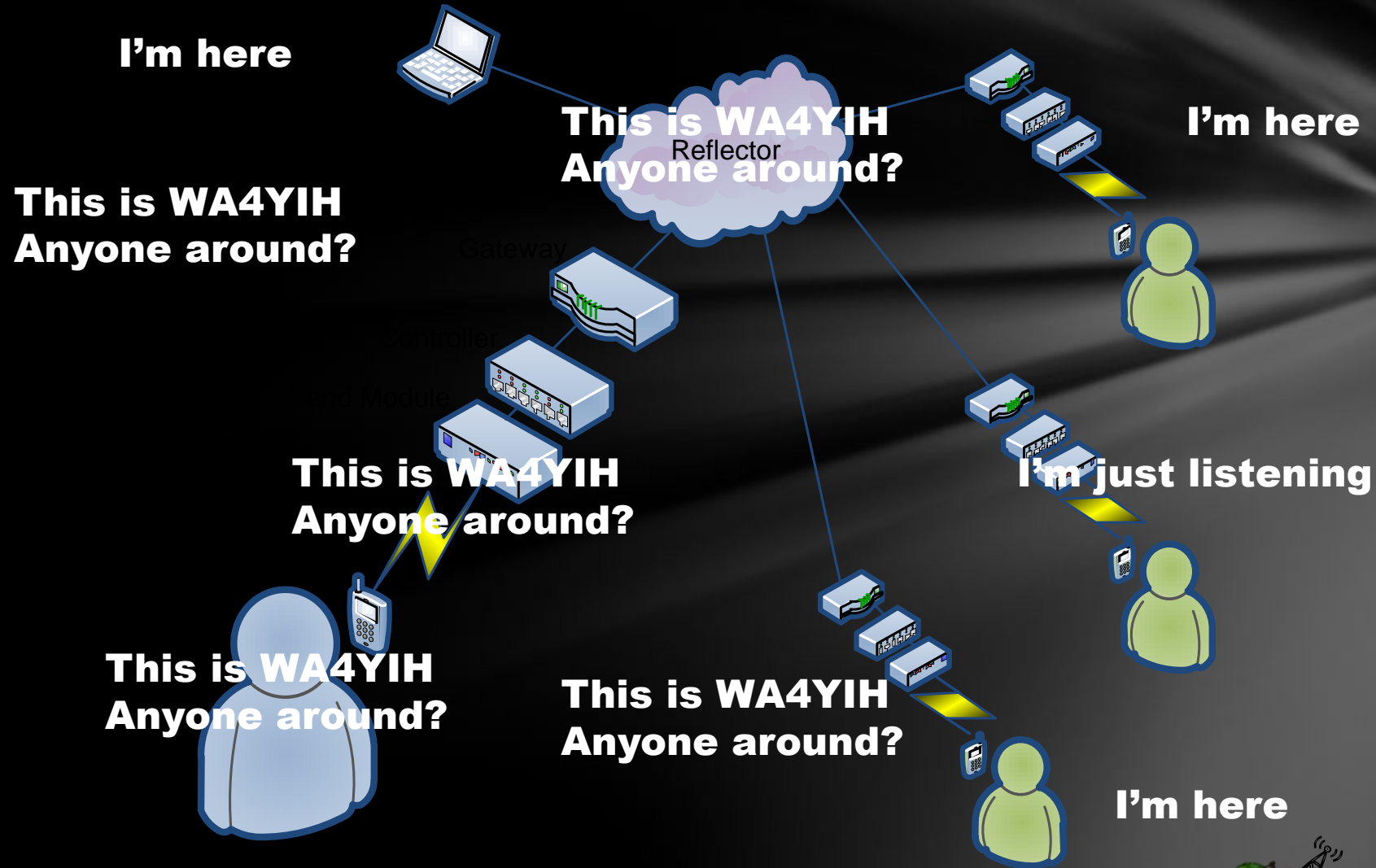
Local



Local – with Gateway



Linked Repeaters



Talking D-STAR

*Overcoming one of the hardest
obstacles in Amateur Radio.*

Programming your radio!

Setting Up the Radio

In the Old Days...

- Frequency Setting
 - Crystal (had to buy each channel)
 - Thumbwheel (single frequency)
 - Multiple Memories
- PL Support
 - After market board with DIP switches
 - Manufacturer supplied boards
 - Built-in to radio



Radios Today

Each Manufacturer uses different methods

Each Radio is different

Lots of channels are tedious to program and hard to edit

Software makes it easier



FM Repeaters

Name

Frequency

Offset (direction and amount)

Tone (encode and/or decode) (CTCSS or DCS)

Linkable?

- IRLP
- EchoLink



D-STAR Repeaters

Name

Frequency

Offset (direction and amount)

Mode

Repeater Call Signs



D-STAR Call Sign Fields

URs is MYne and MYne is URs.

Basic D-STAR Programming

Set Frequency

Set Offset direction and amount

Set Mode

Set Your call sign in MY field

Place CQCQCQ in UR field

Set repeater call sign in RPT₁ and RPT₂ fields

- In last character (8th) of the RPT₁, place module
- In last character (8th) of the RPT₂, place "G"

Module Lettering Standards

Supported Worldwide, except Japan

- 1.2 GHz Voice A
- 440 MHz Voice B
- 144 MHz Voice C

Sample – Basic Repeater

Sample for KJ4BDF Repeater
440.725 MHz +5.0 MHz Offset

- MY WA4YIH
- UR CQCQCQ
- RPT1 KJ4BDF ▪ B
- RPT2 KJ4BDF ▪ G

" ▪ " represents a space

Taking the Next Step

What else can I do?



DPLUS Functions

G – Gateway

E - Echo Test

I – Identification

L – Link Repeater

U – Unlink Repeater



Sample – Echo Test

Sample for KJ4BDF Repeater
440.725 MHz +5.0 MHz Offset

- MY WA4YIH
- UR ■■■■■■E
- RPT₁ KJ4BDF■B
- RPT₂ KJ4BDF■G

"■" represents a space

Sample – Linking

Sample for KJ4BDF Repeater
440.725 MHz +5.0 MHz Offset

- MY WA4YIH
- UR REF002AL
- RPT₁ KJ4BDF ▪ B
- RPT₂ KJ4BDF ▪ G

" ▪ " represents a space

Sample – UnLinking

Sample for KJ4BDF Repeater
440.725 MHz +5.0 MHz Offset

- MY WA4YIH
- UR ■■■■■■U
- RPT₁ KJ4BDF ■B
- RPT₂ KJ4BDF ■G

" ■ " represents a space

Call Sign Routing (to individual)

Sample for KJ4BDF Repeater
440.725 MHz +5.0 MHz Offset

- MY WA4YIH
- UR WB4QDX ■ ■
- RPT₁ KJ4BDF ■ B
- RPT₂ KJ4BDF ■ G

" ■ " represents a space

Call Sign Routing (to repeater)

Sample for KJ4BDF Repeater
440.725 MHz +5.0 MHz Offset

- MY WA4YIH
- UR /JP6YHRA
- RPT₁ KJ4BDF ▪ B
- RPT₂ KJ4BDF ▪ G

" ▪ " represents a space

D-STAR Error Response Codes

IC-g1AD

Example of displayed code	Repeater operation mode	Possible cause	Downlink	
			RPT ₁	RPT ₂
UR?AA1AAA/	Same repeater	No answer from other station (this is correct working).	YES	/
		"MY callsign" is not programmed.	YES	YES
		"UR callsign" is not programmed.	YES	YES
	Different repeater in same zone	No answer from other station (this is correct working).	YES	/
		"MY callsign" is not programmed.	YES	YES
		"UR callsign" is not programmed.	YES	YES
Through gateway	No answer from other station (this is correct working).	YES	YES	
	Wrong callsign is programmed in "RPT ₂ ".	YES	YES	
	Suffix "G" is not added when you program "RPT ₂ " callsign.	YES	YES	
RX:AA1AAA/	Same repeater		YES	/
	Different repeater in same zone	"MY callsign" is not programmed.	YES	YES
	Through gateway		YES	NO
RPT?AA1AAA/	Same repeater	Wrong callsign is programmed in "RPT ₁ ". (automatically programmed from next access.)	NO	/
			NO	NO
	Different repeater in same zone	Wrong callsign is programmed in "RPT ₁ ".	NO	NO
		Wrong callsign is programmed in "RPT ₂ ".	NO	NO
	Through gateway	Wrong callsign is programmed in "RPT ₁ ".	NO	NO
		Wrong callsign is programmed in "RPT ₂ ".	NO	NO
RPT?AA1BBB/	Different repeater in same zone	RPT ₂ is busy.	YES	NO
	Through gateway	RPT ₂ is busy.	YES	NO
RPT?AA1CCC_G/	Through gateway	"MY callsign" is not programmed.	YES	NO
		Incorrect data is programmed into "MY callsign".	YES	NO
		"MY callsign" is not registered on management server.	YES	NO
		"UR callsign" is not programmed.	YES	NO
		Incorrect data is programmed into "UR callsign".	YES	NO
		"UR callsign" is not registered on management server.	YES	NO
		"/" is not programmed at 1st digit of "UR" callsign when making CQ call in different zone.	YES	NO
		"CQCQCQ" is programmed into "UR callsign".	YES	NO

Programming Practice

You must pass before you get food

Example 1

You want to talk on the KJ4BDF Repeater

Callsign	City	Country / State	Gateway	C Module (MHz)	B Module (MHz)	A Module (MHz)	High-Speed Data
KJ4BDF	Buford	United States, Georgia	Gateway		440.7250 +5.0000		
WD4STR	Lawrenceville	United States, Georgia	Gateway	145.0600 +1.4000	440.5500 +5.0000		1298.0000 RPS
W9BIL	CADWELL	United States, Illinois	Gateway	145.1950 -0.6000	440.64375 +5.0000		

Example 1 - Solution

Function	Local on KJ4BDF with Gateway		
Frequency	440.725 _ _	Offset	_ + 5.0000
MY	RPT1	RPT2	YOUR
WA4YIH _ _	KJ4BDF _ B	KJ4BDF _ B	CQCQCQ

Example 2

You want to hear your transmitted signal on the KJ4BDF Repeater

Callsign	City	Country / State	Gateway	C Module (MHz)	B Module (MHz)	A Module (MHz)	High-Speed Data
KJ4BDF	Buford	United States, Georgia	Gateway		440.7250 +5.0000		
WD4STR	Lawrenceville	United States, Georgia	Gateway	145.0600 +1.4000	440.5500 +5.0000		1298.0000 RPS
W9BIL	CADWELL	United States, Illinois	Gateway	145.1950 -0.6000	440.64375 +5.0000		

Example 2 - Solution

Function	KJ4BDF Echo Test		
Frequency	440.725 _ _	Offset	_ + 5.0000
MY	RPT ₁	RPT ₂	YOUR
WA ₄ YIH _ _	KJ4BDF_ B	KJ4BDF_ B	KJ4BDF_ E

Example 3

You want to link KJ4BDF to Reflector 30 port C

Callsign	City	Country / State	Gateway	C Module (MHz)	B Module (MHz)	A Module (MHz)	High-Speed Data
KJ4BDF	Buford	United States, Georgia	Gateway		440.7250 +5.0000		
WD4STR	Lawrenceville	United States, Georgia	Gateway	145.0600 +1.4000	440.5500 +5.0000		1298.0000 RPS
W9BIL	CADWELL	United States, Illinois	Gateway	145.1950 -0.6000	440.64375 +5.0000		

Example 3 - Solution

Function	KJ4BDF link to REF030C		
Frequency	440.725 _ _	Offset	_ + 5.0000
MY	RPT1	RPT2	YOUR
WA4YIH _ _	KJ4BDF _ B	KJ4BDF _ B	REF030CL

Example 4

Unlink KJ4BDF Repeater

Callsign	City	Country / State	Gateway	C Module (MHz)	B Module (MHz)	A Module (MHz)	High-Speed Data
KJ4BDF	Buford	United States, Georgia	Gateway		440.7250 +5.0000		
WD4STR	Lawrenceville	United States, Georgia	Gateway	145.0600 +1.4000	440.5500 +5.0000		1298.0000 RPS
W9BIL	CADWELL	United States, Illinois	Gateway	145.1950 -0.6000	440.64375 +5.0000		

Example 4 - Solution

Function	KJ4BDF Unlink		
Frequency	440.725 _ _	Offset	_ + 5.0000
MY	RPT1	RPT2	YOUR
WA4YIH _ _	KJ4BDF _ B	KJ4BDF _ B	_____ U

Example 5

Link KJ4BDF Repeater to WD4STR Port B

Callsign	City	Country / State	Gateway	C Module (MHz)	B Module (MHz)	A Module (MHz)	High-Speed Data
KJ4BDF	Buford	United States, Georgia	Gateway		440.7250 +5.0000		
WD4STR	Lawrenceville	United States, Georgia	Gateway	145.0600 +1.4000	440.5500 +5.0000		1298.0000 RPS
W9BIL	CADWELL	United States, Illinois	Gateway	145.1950 -0.6000	440.64375 +5.0000		

Example 5 - Solution

Function	KJ4BDF link to WD4STR Port B		
Frequency	440.725 _ _	Offset	_ + 5.0000
MY	RPT1	RPT2	YOUR
WA4YIH _ _	KJ4BDF _ B	KJ4BDF _ B	WD4STRBL

Example 6

Link KJ4BDF Repeater to W9BIL Module C

Callsign	City	Country / State	Gateway	C Module (MHz)	B Module (MHz)	A Module (MHz)	High-Speed Data
KJ4BDF	Buford	United States, Georgia	Gateway		440.7250 +5.0000		
WD4STR	Lawrenceville	United States, Georgia	Gateway	145.0600 +1.4000	440.5500 +5.0000		1298.0000 RPS
W9BIL	CADWELL	United States, Illinois	Gateway	145.1950 -0.6000	440.64375 +5.0000		

Example 6 - Solution

Function	KJ4BDF link to W9BIL Port C		
Frequency	440.725 _ _	Offset	_ + 5.0000
MY	RPT1	RPT2	YOUR
WA4YIH _ _	KJ4BDF _ B	KJ4BDF _ B	W9BIL _ BL

Example 7

Call WB4QDX

Callsign	City	Country / State	Gateway	C Module (MHz)	B Module (MHz)	A Module (MHz)	High-Speed Data
KJ4BDF	Buford	United States, Georgia	Gateway		440.7250 +5.0000		
WD4STR	Lawrenceville	United States, Georgia	Gateway	145.0600 +1.4000	440.5500 +5.0000		1298.0000 RPS
W9BIL	CADWELL	United States, Illinois	Gateway	145.1950 -0.6000	440.64375 +5.0000		

Example 7 - Solution

Function	KJ4BDF call to WB4QDX		
Frequency	440.725 _ _	Offset	_ + 5.0000
MY	RPT1	RPT2	YOUR
WA4YIH _ _	KJ4BDF _ B	KJ4BDF _ B	WB4QDX _ _

Example 8

Call JP6YHR Repeater

Callsign	City	Country / State	Gateway	C Module (MHz)	B Module (MHz)	A Module (MHz)	High-Speed Data
KJ4BDF	Buford	United States, Georgia	Gateway		440.7250 +5.0000		
WD4STR	Lawrenceville	United States, Georgia	Gateway	145.0600 +1.4000	440.5500 +5.0000		1298.0000 RPS
W9BIL	CADWELL	United States, Illinois	Gateway	145.1950 -0.6000	440.64375 +5.0000		

Example 7 - Solution

Function	KJ4BDF call to JP6YHR Repeater		
Frequency	440.725 _ _	Offset	_ + 5.0000
MY	RPT1	RPT2	YOUR
WA4YIH _ _	KJ4BDF _ B	KJ4BDF _ B	/JP6YHRA

Programming Memories

Make it easy on yourself



Organize Your Memories

CH No	Frequency	Dup	Offset	TS	Mode	Name	Your Call Sign	RPT1 Call Sign	RPT2 Call Sign	Bank
1	145.2	DUP-	0.6 10kHz	DV	KI4SBA C	CQCQCQ		KI4SBA C	KI4SBA G	S0
2	145.2	DUP-	0.6 10kHz	DV	UNLINK		U	KI4SBA C	KI4SBA G	S1
3	145.2	DUP-	0.6 10kHz	DV	SBA C ID	KI4SBA I		KI4SBA C	KI4SBA G	S2
4	145.2	DUP-	0.6 10kHz	DV	REF001C	REF001CL		KI4SBA C	KI4SBA G	S3
5	145.2	DUP-	0.6 10kHz	DV	REF002A	REF002AL		KI4SBA C	KI4SBA G	S4
6	145.2	DUP-	0.6 10kHz	DV	REF004A	REF004AL		KI4SBA C	KI4SBA G	S5
7	145.2	DUP-	0.6 10kHz	DV	REF030A	REF030AL		KI4SBA C	KI4SBA G	S6
8	145.2	DUP-	0.6 10kHz	DV	REF030B	REF030BL		KI4SBA C	KI4SBA G	S7
9	145.2	DUP-	0.6 10kHz	DV	REF030C	REF030CL		KI4SBA C	KI4SBA G	S8
10	145.2	DUP-	0.6 10kHz	DV	ECHOTEST	KI4SBA E		KI4SBA C	KI4SBA G	S9



One Touch Repeater Operation



Programming Your Radio

Set VFO Mode (not memory)

Enter Frequency

Set DUP to + or –

Set Offset if non-standard
(0.6 MHz for 2M, 5.0 MHz for 440)

Set Mode to DV (FM, FM-N, AM, DV)

Key Radio





After Keying Radio

After a second, repeater will respond

Repeater Call Sign Auto Write turned on

- or

Press the One Touch (RX->CS) Key

Repeater Information will be written to temporary Call Signs

"G" may not be written into RPT₂, but you will be able to talk to local users



Questions

Schedule

Time	New User Track	Intermediate User Track	Repeater Owner, System Admin Track
8:45 – 9:30	Opening Session – Cisco Auditorium		
9:40 – 10:40	Getting Started with D-STAR Room 1110	Low Speed Data/DPRS Room 1120	Repeater Basics Room 1100
10:45 – 11:45	Linking/Callsign Routing Room 1110	High Speed Data/1.2 GHz Room 1120	G2 Gateway/Trust Server Room 1100
11:45 – 12:45	Lunch – Dining Hall in Student Center		
12:45 – 1:15	Demonstrations, Equipment Exhibits - Lobby		
1:15 – 2:15	Programming Radios Room 1100	Hotspots Room 1120	Repeater Operation, Maintenance – Room 1110
2:20 – 3:20	Programming Radio Practice Room 1100	D-RATS Room 1120	Gateway Utilities & Add-ons Room 1110
3:25 – 4:25	Using D-STAR Room 1100	DV Dongle and DVAP Room 1120	G4ULF Gateway Software Room 1110
4:30 – 5:30	Closing Session / Prizes – Cisco Auditorium		



For More Information

www.DSTARInfo.com

www.DSTARUsers.org

www.D-RATS.com

www.DVAPDongle.com

www.DVDongle.com

G4ULF.blogspot.com (G4ULF Repeater Software)

www.K4DSO.com (DPlusReport and Monlink)

Groups.Yahoo.com

- [DSTAR_digital](#)
- [DVAPDongle](#)
- [DVDongle](#)
- [GA_DSTAR](#)
- [SE_WXNet](#)
- [D-STAR_23cm](#)

