

## **DMR – what it is – setting it up**

- Digital Mobile Radio (DMR)
- Open standard defined by the European Telecommunications Standards Institute (ETSI)
- Two-slot Time Division Multiple Access (TDMA) within the existing 12.5 kHz channel



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Presenter: W4BRU, Bruce MacAlister. See bio on [www.qrz.com](http://www.qrz.com)

# Digital VHF-UHF ham radio in the RVA

## D-Star

D-Star is the oldest in RVA. Joint Japan Amateur Radio League & ICOM open standard

## DMR

Digital Mobile Radio the Motorola implementation of the DMR protocol. DMR originated as a business communication standard in Europe

## System Fusion

Fusion was designed by YAESU and is not an open standard

## P25

Project 25 or APCO-25 standards for digital mobile radio communications designed for public safety organizations in North America.

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D-Star is probably the digital mode with the most function and the most adaptable to the individual. The least expensive transceiver is the just under \$300.

Fusion repeaters combine analog with digital so that users with analog can be part of QSOs with digital users. Great for a small area that can only afford a single repeater. It's Yaesu-only with the least expensive HT at \$155

P25 is an older technology that's being used in Richmond for experimenting. Used Motorola HTs are used.

DMR has become the most popular with lots of local supporters and HTs at \$90 and less.

[www.mikemyers.me/blog/2016/2/19/d-star-dmr-fusion-which-is-right-for-you](http://www.mikemyers.me/blog/2016/2/19/d-star-dmr-fusion-which-is-right-for-you)

Feature / Item	D-Star	DMR	Fusion
Ease Of Use	Easy	Easy	Easy
Ease Of Programming	Medium	Low	High
Cost	Low-Medium	Low-High	Medium
Flexibility	High	Low	High
Survivability	High	Low	Low
Extendability	High	Low	Low
Multiple Manufactures	Few	Lots	One

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Cheaper (DMR) is not better if it doesn't do what you want it to do.

Do a search on "mike meyers dstar dmr fusion" for his excellent comparison with some detail. Use that to pick the digital system that has the functions you really want to use.

## The W4BRU choice

- Try digital
- Not likely to use it heavily
- Frugal



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Why I chose DMR

# RVA digital repeaters

147.2550	+0.6 MHz	Richmond	(independent) W4FJ	OPEN	+
443.7125	+5 MHz	Richmond	(independent) W4FJ	OPEN	+
1284.0000	-12 MHz	Richmond	(independent) W4FJ	OPEN	+

145.1100	-0.6 MHz	127.3 Richmond	(independent) WA4MAS	OPEN	+
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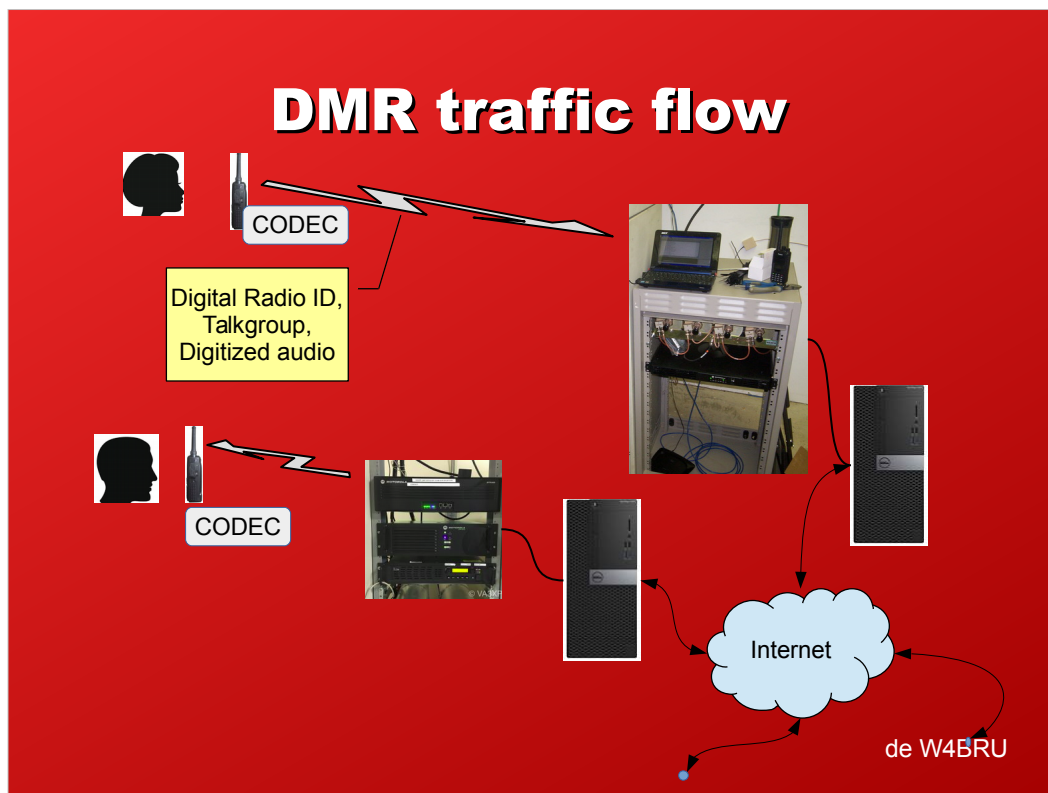
442.6875	+5 MHz CC1	Petersburg	(independent) WA4FC	OPEN	+
443.5375	+5 MHz CC1	Richmond	(independent) WA4FC	OPEN	+
443.5875	+5 MHz CC1	Bon Air, WCVE Tower	Chesterfield W4RAT	OPEN	+

145.4300	-0.6 MHz	74.4 Richmond, Central City of Richmond	(independent) KG4MRA	OPEN	+
927.0500	-25 MHz	100.0 Richmond, Downtown	(independent) WA4FC	OPEN	+
927.0750	-25 MHz	100.0 Richmond, Southside Richmond	Chesterfield WA4FC	OPEN	+

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Richmond area digital repeaters as of early 2018, top to bottom:

- D-Star
- Fusion
- DMR
- P25



You have to do a PTT on the Talkgroup to “sign in”. Otherwise you will hear nothing.

Your Radio ID is recorded for the Talkgroup you “signed in” to by your transmission.

Only then do you hear the others on that Talkgroup. You are sharing the repeater connection with others who you never hear unless they “signed in” to the same Talkgroup.

Because you are sharing one repeater with others, there will sometimes be substantial delays in hearing a reply from someone you are talking to.

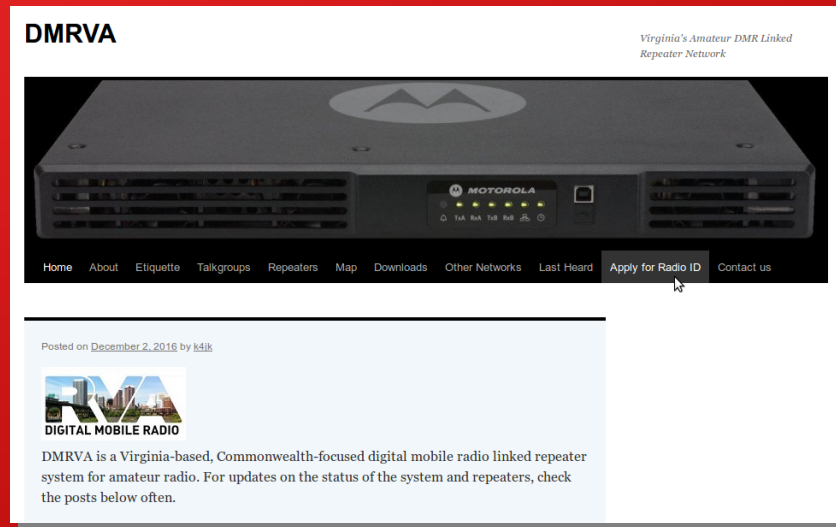
# DMR Transceivers



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# Instructions & sign up

[www.dmrva.org/](http://www.dmrva.org/)



It can take 2 minutes to 2 days to get a Radio ID assigned depending on how busy the volunteers are. You are vetted to make sure you have a valid license and are who you say you are. You need a separate Radio ID for each radio you use.



## A few DMR terms

- Mototrbo/DMR = Amateur
- Zone = Repeater or group of Repeaters
- Talkgroup = Channel
- Contact = Identification number
- Color Code = DPL
- Time slot = ½ digital channel
- Code Plug = Radio Program

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Talkgroup is like an analog repeater frequency. You hear everyone using that same Talkgroup and they all hear you.

There will be others using that same physical repeater but on different Talkgroups.

You do not hear those others even when they're using the same repeater.

Codeplug is a combination of the software running the radio and the Zones, Talkgroups, Contacts, and Color Codes usually for a region. You could write your own but it's a difficult software task.

## TYT MD-380 screens



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Sample screens on the W4BRU DMR HT.  
Echotest is your best DMR friend. You hear no courtesy tones or repeater tails so you don't know if you are reaching the repeater. Use Echotest to find out if you are reaching the repeater.  
The other items are set in the Codeplug.  
You use the Menu button on your HT to pick from the items loaded up with your Codeplug.

# Where to get software & codeplugs

Search: dmr code plugs virginia

## DMRVA | Virginia's Amateur DMR Linked Repeater Network

[www.dmrva.org/](http://www.dmrva.org/)

The antenna is roughly at the 300 foot level. Many thanks to the large team that came from three states to make this installation happen! The repeater has the standard DMRVA talkgroup line up. Local TG is linked to the Valley Local's (H'burg, C'ville and Linden). New **codeplugs** should be posted on the website in the next ...

### Downloads

Downloads. Files updated February 14, 2018. Please see ...

### Codeplugs

A new round of updated codeplugs are available on the downloads ...

### Kd4bpz

Posted on October 17, 2017 by kd4bpz. On October 20-22 ...

[More results from dmrva.org »](#)

### Virginia's Amateur DMR ...

Virginia's Amateur DMR Linked Repeater Network | Page 2.

### Virginia's Amateur DMR ...

Virginia's Amateur DMR Linked Repeater Network | Page 4 ...

### Last Heard

DMRVA Last Heard. Note: currently works in Chrome and ...

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Most states or regions have their website where you can download Codeplugs that cover their Zones (~repeaters) and Talkgroups.

# Codeplugs: pick your radio

## Portables

[Anytone D858](#)

[Anytone AT-D868UV](#)

[Connect Systems CS700](#)

[Connect Systems CS750](#)

[Motorola XPR6550](#)

[Motorola XPR7550](#)

[Tytera MD-380](#)

[Tytera MD-2017](#)

## Mobiles

[Connect Systems CS800](#)

[Connect Systems CS800D](#)

[Motorola XPR4550 high power](#)

[Motorola XPR5550 high power](#)

[Tytera MD-9600](#)

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Before picking your radio, check the DMR websites for the areas you plan to visit.  
Find out brands and models they have Codeplugs for.  
Buy a radio that has supporting Codeplugs.

# Software & Codeplugs

A code plug is simply a radio's configuration file.

ContactManagerV220.exe	364.5 kB	Program
MD_390.exe	2.9 MB	Program
rdt2csv.exe	127.5 kB	Program
MD380_MD390_CodePlug_Editor.exe	1.4 MB	Program

Name	Size	Type
MD-380-DMRVA-02192017.rdt	262.7 kB	Program
W4BRU-TYT-MD-380-Load.rdt	262.7 kB	Program
MD-380-DMRVA-02192017-W4BRU.rdt	262.7 kB	Program
Basic-PRN-Code-Plug-For-MD-380.rdt	262.7 kB	Program
Basic-NC-PRN-Code-Plug-For-MD-380.rdt	262.7 kB	Program
Basic-NC-PRN-Code-Plug-For-MD-380-W4BRU.rdt	262.7 kB	Program

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The software is at the top.

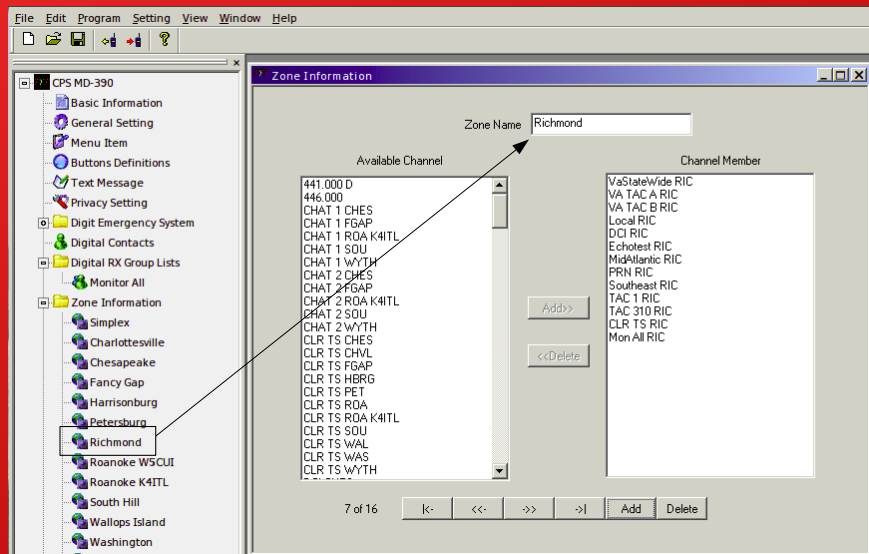
MD-390 is the reader-writer to load Codeplugs from-to your radio.

The Codeplug editor lets you combine parts of various Codeplugs for a custom version. I've not yet tried it.

The Codeplugs are at the bottom

Those with VA in the name are for Virginia, the NC for North Carolina.

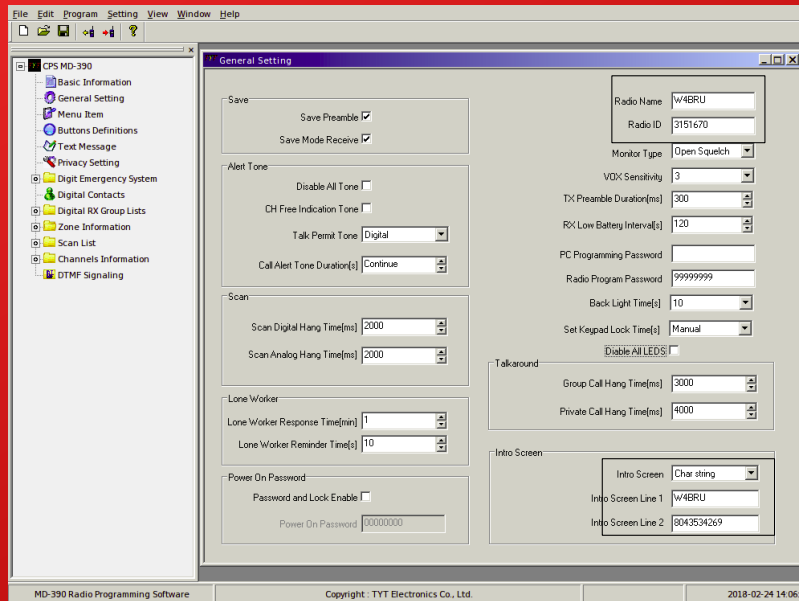
# Zones, Channels, Talkgroups



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With the Richmond "Zone" picked, the Talkgroups supported are seen on the right.

# Codeplugs contain...



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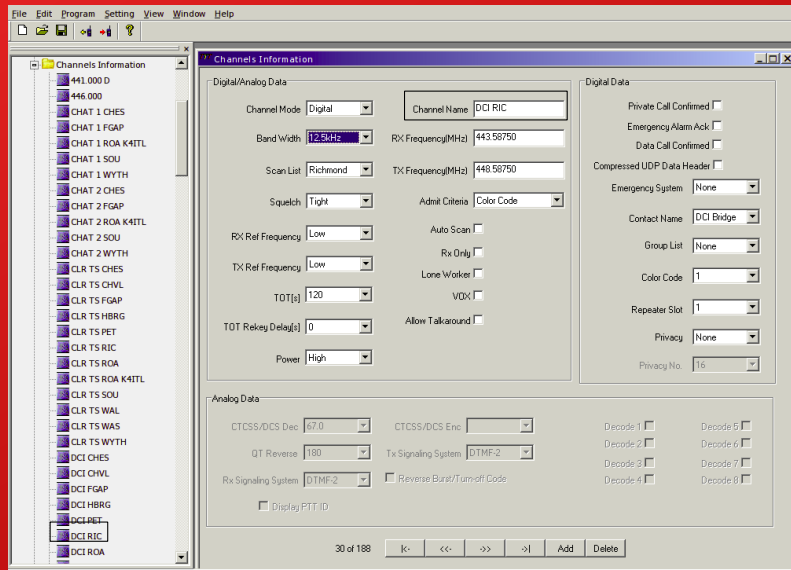
You have to enter your Radio ID in the upper right along with what you want transmitted with it.

If this is your personal radio, your call sign is the best choice.

The bottom right is what will appear on the screen when the radio is turned on.

I prefer my call sign and my mobile number in the hope that if it's found, the finder will call me.

# Channels ~ Talkgroups + repeaters

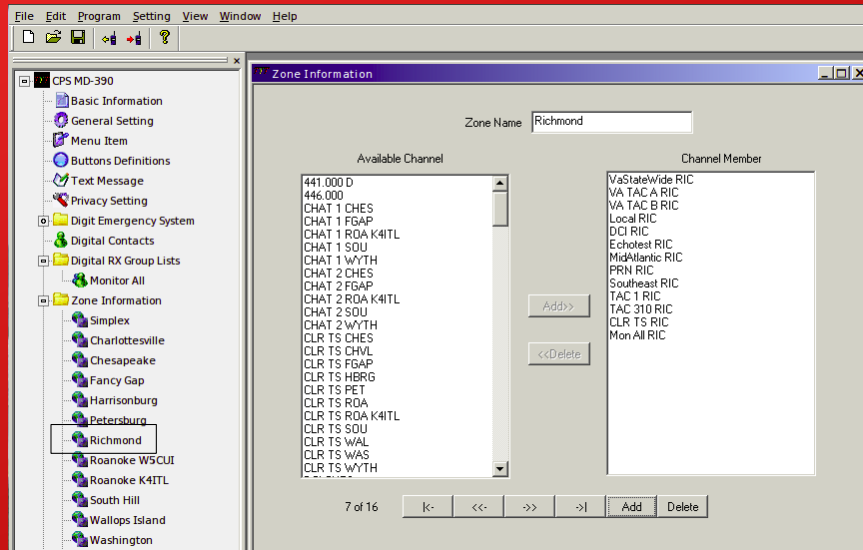


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Example of a Channel-Talkgroup showing what's in this Codeplug.  
This one is the international DCI Talkgroup.

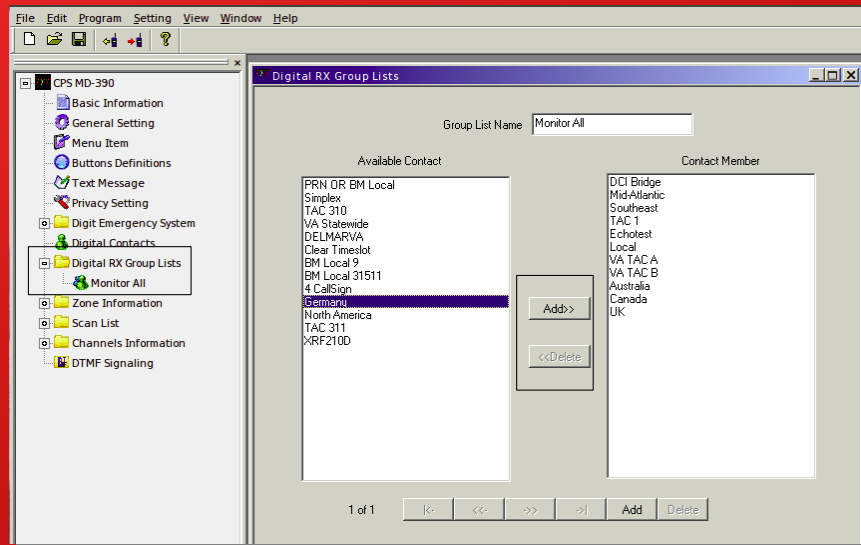


# Zones to channels



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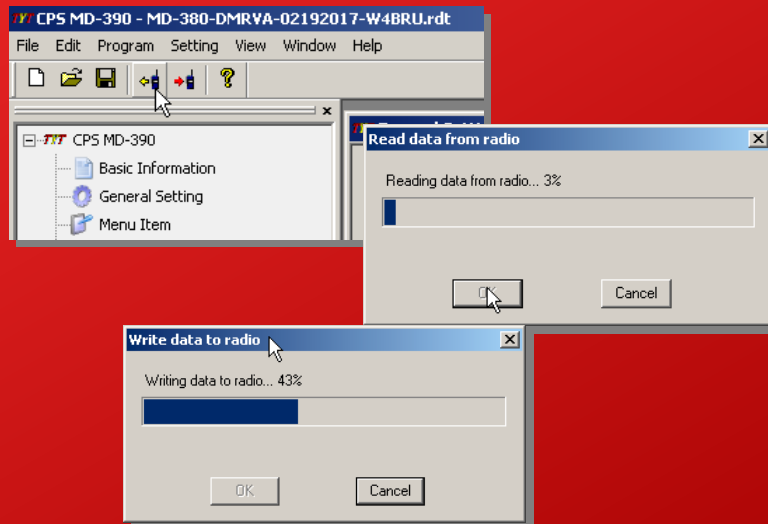
# Monitor



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“Monitor All” as it appears on your radio really isn’t all the Contacts-Talkgroups.  
Here you see what’s in my VA Codeplug. You can add and delete entries.  
You Add from the list on the left.

# Read & Write to radio



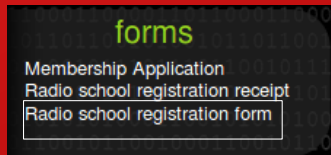
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When you first get your radio:

- Start the Codeplug software on your computer
- Plug in your radio and turn it on
- Read the contents of your radio into the Codeplug software
- Save it with a name like “as-delivered” so you can bring the radio back to its original state if needed
- Load the Codeplug file you want for your radio
- As shown on Slide 14, in the General section, enter your call sign, Radio ID, and what you want to appear on your radio screen at power on.
- Write to your radio.
- Unplug your radio and you are ready to use it.

## For the details

- **DMR Details**
- Apr 28 9am to noon
- BAUMC second floor classrooms
- \$10
- Instructor: Mike Baker, N4LSP
- Registration form at <http://www.rarclub.net/> click



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The Saturday Seminar to get the DMR details, what you can do with it, etc.

## Some things a little different



RFinder radio +  
Android mobile phone  
\$700



USB stick containing 70 cm data  
transceiver. Works with D-Star,  
DMR, Fusion, APCO25 and  
other digital modes which are  
based on GMSK, 2FSK or 4FSK  
\$150

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When I had a beach-time QSO with Susy, the Portuguese ham on vacation in Switzerland, she told me the mountains kept her from hitting a DMR repeater. She had one of the digital dongles. She used her HT to connect to the dongle a half-meter away from her. That took her over the Internet for her QSOs.