



# HOT SPOTS In a Nutshell

Malcolm KY4RY



## How to achieve Global V/UHF Communications

# Introduction to HAM Radio Digital Hotspots

## What is a Digital Hotspot?

- A small device enabling HAM radio operators to connect to global digital networks via the internet.
- Acts as a bridge between your digital radio and worldwide communication systems.
- Typically supports multiple digital modes; DMR, D-STAR, Fusion, and others.

## Why Use a Hotspot?

- Access repeaters and networks outside your local area.
- Operate from anywhere with internet connectivity.
- Perfect for areas with limited repeater coverage or during EMCOMM scenarios.
- Can perform cross mode capability

# Types of HAM Radio Digital Hotspots

## Standalone Hotspots

- Devices with built-in Wi-Fi, configured via a web interface.
- Examples: OpenSpot, ZumSpot, Pi-Star-based hotspots.

## Pi-Star Hotspots

- Built on Raspberry Pi boards and MMDVM (Multi-Mode Digital Voice Modem).
- Flexible, cost-effective, and highly customizable.
- Popular models: JumboSpot, NanoSpot.
- Pi-Star software EoL no longer supported & replaced by WPSD

## Cross-Mode Hotspots

- Support cross-mode operation (e.g., DMR to YSF, D-STAR to DMR).
- Ideal for operators with multiple radios.

## Premium Devices

- Higher-end devices with robust hardware and seamless configuration -SharkRF OpenSpot.



# Key Features to Consider

## Supported Modes

- Common modes: DMR, D-STAR, System Fusion (YSF), P25, NXDN.
- Ensure your hotspot supports the digital mode of your radio.

## Configuration Ease

- Beginners may prefer plug-and-play models like OpenSpot.
- Experienced users can explore customizable options like Pi-Star.

## Internet Connectivity

- Wi-Fi or Ethernet compatibility.
- Portable hotspots often include built-in batteries for on-the-go use.

# Key Features to Consider – Cont.

## **Cross-Mode Capabilities**

- If you use different digital systems, look for a hotspot supporting cross-mode features.

## **Build Quality & Price**

- Affordable options are available for hobbyists.
- Premium models offer enhanced performance and reliability.
- Commercially built or DIY

# Hot Spot

## What are they

### **Two Basic Solutions.**

- USB Dongle or Stand-alone based solution.
- They can be connected to the internet either via Bluetooth, WiFi or ethernet cable.

### **Dongle Solution - No Operator Radio Required (usually USB devices)**

- USB Dongle solution, requires computer mic and headset plus USB port to power dongle
- Communication is via headset and no radio is required

### **Standalone Solution - Operator Radio Required (HT or mobile/base)**

- Uses Single Board Computer (SBC) usually Raspberry Pi + software Pi-Star and Operator RADIO
- Uses hotspot/appliance/transceiver with Operator RADIO

# Evaluate Compatibility

## Mode

- Match the hotspot with your radio's digital capabilities.

## Set a Budget

- Entry-level hotspots cost less but require more setup.
- Premium hotspots are ready-to-use but cost more.

## Research and Compare

- Read reviews, watch tutorials, and consult forums.
- Popular choices: OpenSpot 4 Pro, ZumSpot, Pi-Star-based devices.

## Consider Future Needs

- If you plan to explore new modes or cross-modes, invest in a versatile device.



# Cross Mode Capability

Setting	Value	
DMR Mode:	<input type="checkbox"/>	RF Hangtime: 20 Net Hangtime: 20
D-Star Mode:	<input type="checkbox"/>	RF Hangtime: 20 Net Hangtime: 20
YSF Mode:	<input checked="" type="checkbox"/>	RF Hangtime: 60 Net Hangtime: 60
P25 Mode:	<input type="checkbox"/>	RF Hangtime: 20 Net Hangtime: 20
NXDN Mode:	<input type="checkbox"/>	RF Hangtime: 20 Net Hangtime: 20
YSF2DMR:	<input checked="" type="checkbox"/>	
YSF2NXDN:	<input type="checkbox"/>	
YSF2P25:	<input type="checkbox"/>	
DMR2YSF:	<input type="checkbox"/>	Uses 7 prefix on DMRGateway
POCSAG:	<input type="checkbox"/>	POCSAG Paging Features
MMDVM Display Type:	OLED	Port: /dev/ttyAMA0 Nextion Layout: G4KLX

**DMR, C4FM, D-Star** are **non-compatible**. A Yaesu C4FM Radio cannot connect or work DMR or vice-versa. Many Hot Spots support **Cross Mode Working** - capability for Digital Radio of one mode to “Cross Work” to another. Example: a **Yaesu Fusion HT** can **communicate** with the **DMR** Network via Hotspot. In this example we’re looking at Pi-Star but other solutions have similar functionality. YSF Mode is selected telling Hotspot a YSM radio is working. 2<sup>nd</sup> button selects YSF to DMR cross mode.

# DV-Dongle D-STAR Only

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- Good for when there's no local D-Star repeater and you don't own a radio and just want to get on D-Star
- Requires Computer with good internet connection, headphones and Mic
- Requires USB port on computer
- Requires D-star registration
- Connects to D-Star Gateways & Reflectors worldwide
- Software – DV Tool – free download and runs on Microsoft Windows, Mac OS X, or many distributions of Linux.

**DV Dongle**

[http://www.dvdongle.com/DV\\_Dongle/Home.html](http://www.dvdongle.com/DV_Dongle/Home.html)

# DV-Access Point Dongle

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- Creates instant local access point for small area without D-STAR repeater
- Connects to Computer via USB
- Includes a 10mw 2m or 70cm transceiver and stubby antenna
- Use HT or other D-STAR radio nearby for full network access without local repeater.
- Software module for configuration and operation using Windows, Mac OS X, or many distributions of Linux



**DV Access Point Dongle**

[http://www.dvapdongle.com/DV\\_Access\\_Point\\_Dongle/Home.html](http://www.dvapdongle.com/DV_Access_Point_Dongle/Home.html)

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# EuroNode

## 159.50 €

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- EuroNode is a stand-alone solution based on Raspberry Pi and MMDVM hardware plus either Pi-Star or WPSD Software.
- Provides cross mode connectivity with appropriate digital radio.
- WiFi, and Ethernet connection



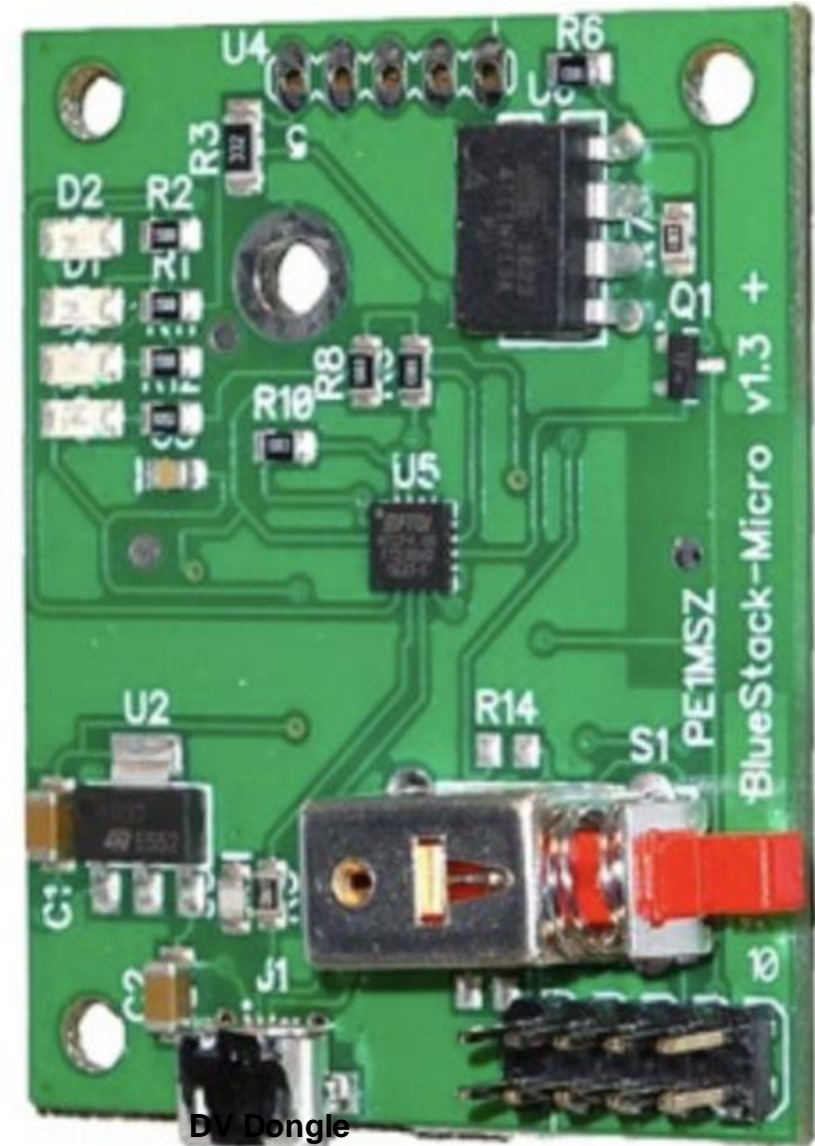
### **Euronode**

[https://www.combitronics.nl/index.php?route=product/product&product\\_id=130](https://www.combitronics.nl/index.php?route=product/product&product_id=130)

# BlueStack-Micro+ \$40

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- Bluestack, supports either MMDVM or DVMEGA on raspberry pi, both dual and singleband.
- Requires BlueDV app
- Access to DMR, D-star C4FM Fusion



DV Dongle

[http://www.dvdongle.com/DV\\_Dongle/Home.html](http://www.dvdongle.com/DV_Dongle/Home.html)



# Open Spot 4 SharkRF

## \$210 - \$294

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- One of the most popular “out of the box” solutions in its 4<sup>th</sup> Generation.
- Battery: Polymer Lithium-Ion 1300 mAh
- Power supply: 5 V DC through the USB-C port
- Support all modes; D-Star, DMR, Fusion C4FM, P25, NXDN & POCSAG Pager.
- No Display like most MMDVM solutions
- Stable, reliable and simple setup.



[https://www.sharkrf.com/products/openspot4\\_products/openspot4](https://www.sharkrf.com/products/openspot4_products/openspot4)

# Nano-Spot

## \$249

There are a number of commercially built MMDVM Pi-Star Solutions available. They are based on the open source Pi-Star and its successor WPSD.

The support all Digital Modes as well as Cross Mode

For the more “Hands-on HAM’ the MMDVM Oper Source option provides greatest flexibility and experimentation

Supports NEXION Screens that can be programmed

Also available Allstar and Echolink analog nodes



[www.micro-node.com](http://www.micro-node.com)

# Programing Hot Spot

Programming Pi-Star and its successor WPSD is straightforward.

Prompt Menu Driven – error flagged

Connect to Internet

Enter personal Data

Select desired digital service and/or cross service

Dashboard log of activity

Status of networks

## Pi-Star Digital Voice Dashboard for KY4RY

Dashboard | Admin | Live Logs | Power | Update | Configuration

### Gateway Hardware Information

Hostname	Kernel	Platform	CPU Load	CPU Temp
pi-star	5.10.63-v7+	Raspberry Pi 3 Model B Plus Rev 1.4	0.64 / 0.32 / 0.22	51.5°C / 124.7°F

### Service Status

MMDVMHost	DMRGateway	YSFGateway	YSFParrot	P25Gateway	P25Parrot
DStarRepeater	ircDDBGateway	TimeServer	PiStar-Watchdog	PiStar-Remote	PiStar-Keeper

### Active BrandMeister Connections

BrandMeister Master	Repeater ID	Static TGs	Dynamic TGs
BM 3102 United States	3194877	None	None

### NXDN Link Manager

Reflector	Link / Un-Link	Action
65000 - 176.9.1.168 ▾	<input checked="" type="radio"/> Link <input type="radio"/> UnLink	<input type="button" value="Request Change"/>

### Gateway Activity

Time (EST)	Mode	Callsign	Target	Src	Dur(s)	Loss	BER
16:35:55 Nov 24th	NXDN	VK7HSE (GPS)	TG 65000	Net	1.1		
15:33:30 Nov 24th	NXDN	K9DKQ (GPS)	TG 65000	Net	240.4		??%
13:15:23 Nov 24th	DMR TS2	4000	TG 8	Net	2.3	0%	0.0%
12:10:33 Nov 24th	NXDN	12345	TG 65000	Net	1.3		
11:41:32 Nov 24th	NXDN	VE7KH (GPS)	TG 65000	Net	1.9		
05:59:28 Nov 24th	NXDN	KK6RQ (GPS)	TG 65000	Net	0.8		
05:44:10 Nov 24th	NXDN	DM8WP (GPS)	TG 65000	Net	7.5		
18:11:44 Nov 23rd	DMR TS2	KY4RY (GPS)	TG 6	Net	6.3	0%	0.0%
11:14:56 Nov 23rd	NXDN	WL7LP (GPS)	TG 65000	Net	6.4		

### Modes Enabled

D-Star	DMR
M17	NXDN
P25	YSF
DMR XMode	YSF XMode
FM	POCSAG

### Network Status

D-Star Net	DMR Net
M17 Net	NXDN Net
P25 Net	YSF Net
DMR2NXDN	DMR2YSF
YSF2DMR	YSF2NXDN
YSF2P25	POCSAG Net

### Radio Info

Trx	Listening
Tx	445.525000 MHz
Rx	440.525000 MHz

# MMDVM Commercial HotSpots



Elite 3.5 LCD ZUMspot

ZUM Spot \$249



Bridgecom sky Bridge Max \$424

Both provide the same functionality and based on MMDVM boards and free to use open source software

Two of the more popular commercial Hot Spots are the Zum and Skybridge Max

# Home Brew Hot Spots

- This is a duplex MMDVM Pi-Star based Hot Spot I built
- Costs
  - Raspberry Pi \$75
  - MMDVM Board \$35
  - Pi-Star \$0
  - Nexion Screen \$59
  - Purpose Case \$35
  - Total Cost \$204
  - Satisfaction 100%
- Cheaper Solutions
  - Jumbo Spot \$ 30 – 50 also built



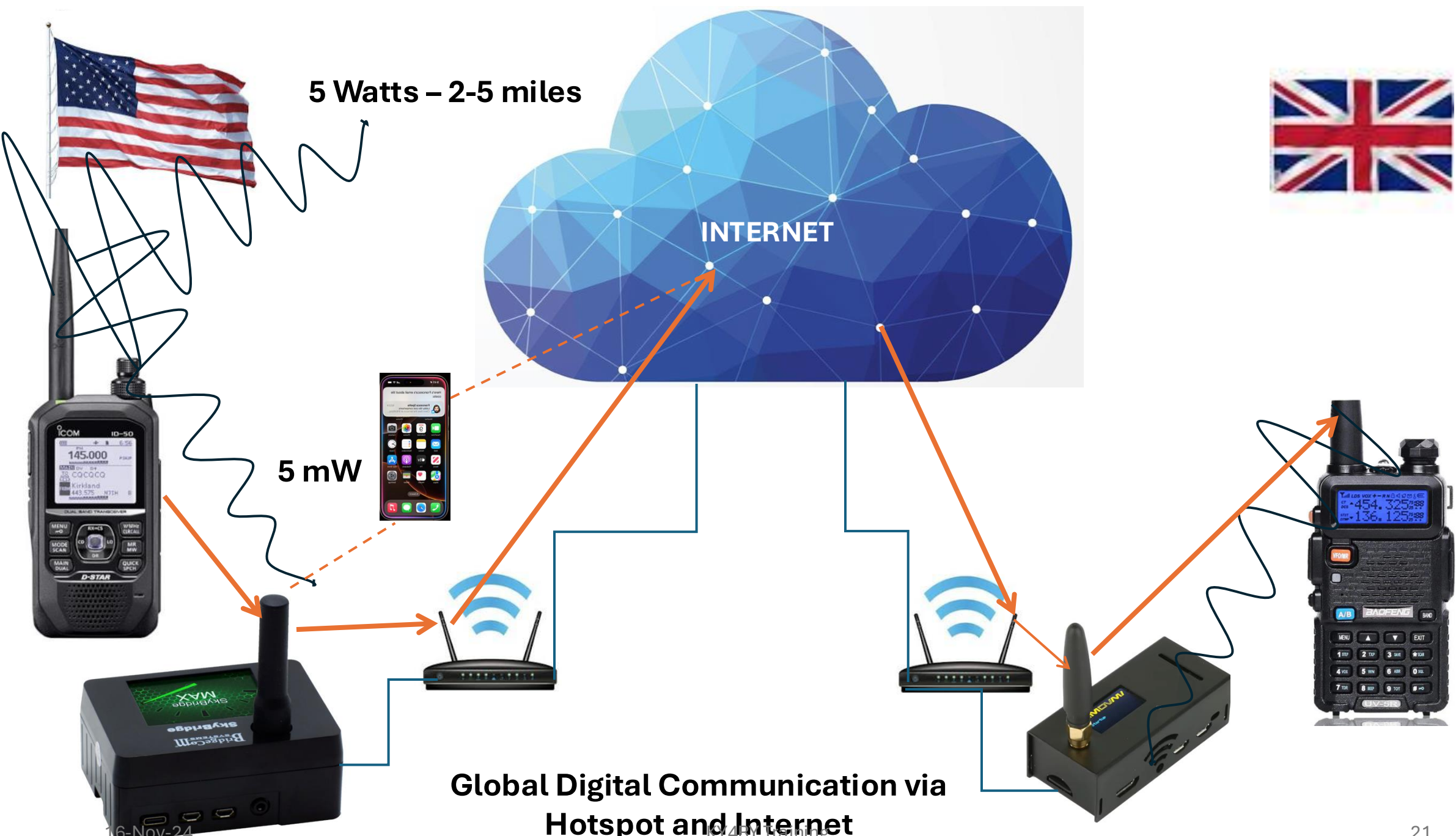


## Point to Point 'Simplex' Tx and Rx on same Frequency Limited to Line-of-Sight



**Typical VHF range with 5Watt HT  
2 – 5 miles - Terrain impacted**





**Global Digital Communication via Hotspot and Internet**



Malcolm Green  
[ky4ry@obxco.com](mailto:ky4ry@obxco.com)