

Radio Guide for the Trail



ARRL *The national association for
AMATEUR RADIO*

Radio Guide for the Trail

Frequently Asked Questions –

- What radio service is everyone using?
- What is “the best” radio service to use?
- What type of radio should I get?
- What brand / model radio should I get?

Who is Marc? Why is he talking?

- Started my career as a computer software developer and electronics technician at age 12.
- 37+ years' experience as a Computer Scientist, Computer Systems Engineer, Electronics Engineer.
- 18 years as a licensed amateur radio operator
- Over 10 years as a licensed GMRS operator

What Radio Service is Everyone Using?

Short answer... All of them.

Amateur Radio (not very common for off-road specific use)

Most popular are part of the Personal Radio Service (PRS), which includes:

- Citizens Band (CB)
- Family Radio Service (FRS)
- General Mobile Radio Service (GMRS)
- Multi-Use Radio Service (MURS)

What Do You Need?

Evaluate your needs.

- Vehicle to Vehicle (a few hundred yards)?
- Around town or camp; we got separated. Where are you?
- Family and emergency communications in any given region (neighborhood, PWC, Northern VA)?
- You literally want to talk to everyone, no matter where in the world you and they are, and you have \$2,000 in cash you can spend?

The Tech and Limits

High Frequency (HF) –

- CB Radio

Very High Frequency (VHF) –

- MURS

Ultra High Frequency (UHF) –

- FRS
- GMRS

The Tech and Limits

Line Of Sight (LOS) Propagation –

- Every radio has a LOS restriction
- Elevation, Elevation, Elevation

Skywave Propagation – HF

- Very reliable and predictable in behavior
- Don't Need Much Power
- Reflection and Refraction
- Near Vertical Incidence Skywave (NVIS)

Diffraction / Scatter Propagation

- Bending and spreading of radio waves, like water flowing.
- Shadowing.
- Signal degradation and redirection.

What is “The Best” Radio Service to Use?

- Off-Road World is Trending GMRS.
- Jeep Jamboree now requires GMRS, with Midland as their main sponsor.
- What is in use with the group you are going to wheel with?
- Based on what you want to do and how the technology works, its really up to you.

What is “The Best” Radio Service to Use?

CB –

- No license needed.
- It's on HF
- Mostly mobile with limited handheld options
- 40 channels
- Between 2 and 12.5 watts
- Typical Range of 1 to 20 miles
 - Gear and quality of install dependent.

What is “The Best” Radio Service to Use?

FRS –

- No License Needed
- It's on UHF
- Limited to Handheld
- Low power
 - 0.5w to 5w
- 22 channels
- Typical range is less than 2 miles

What is “The Best” Radio Service to Use?

GMRS –

- License Required. \$70 for 10 years. Covers all immediate family.
- It's on UHF
- Handheld and Mobile Options
- Power options from 0.5w to 50w
- The exact same 22 channels that are assigned to FRS
- Additional 8 channels for repeater capable models
 - The repeater listens on one of the additional 8 channels, but retransmits on one of the channels between 15 and 22.
- Typical range without a repeater is 5+ miles
- Maximum range with a repeater is about 80 miles

What is “The Best” Radio Service to Use?

MURS –

- No License Needed
- It's on VHF
- Restricted to Handhelds
- Power up to 5w
- Only 5 channels
- Typical Range is 3 to 5 miles

What is “The Best” Radio Service to Use?

Amateur Radio (Ham) –

- License Needed
 - Technician, General and Extra
 - Skills tests are required to ensure you know the laws and technology.
 - Fees for test only. Varies test-site to test-site.
- Licenses support common bands in HF, VHF & UHF
- Handheld, Mobile and Base Station options
- Power up to 1,500w
- Nearly unlimited channels (frequency equivalents)
- Range is literally the entire planet (based on license).

What type of radio should I get?

Handheld – Pros

- Affordable
- Portable
- Can use inside and outside of a vehicle
- Good for spotting
- Good for walking around / near others and staying in contact
- Limited repeater access

What type of radio should I get?

Handheld – Cons

- Short battery life
- Short range
- Low power
- Prone to being dropped
- No mods, improvements, or upgrade options
- Disposable resource / no repairs

What type of radio should I get?

Mobile – Pros

- Infinite battery life
- Extended range (possibly planet wide and outer space. ISS and satellite comms)
- Less prone to impact damage
- More power
- Almost all VHF / UHF are repeater ready
- Mods, improvements, and upgrades
- Reparable

What type of radio should I get?

Mobile – Cons

- Several hundred-dollar investment in most cases.
- Not Portable.
 - Can only be used inside of one vehicle.
 - Uninstall and reinstall is needed for another vehicle.
- External antenna required.

Privacy Codes and Subchannels

- No such thing as Privacy or Subchannels
- They are non-technical names for a type of signal squelching.
- Makes it so you don't hear others.
 - They can still hear you... maybe.
- Continuous Tone-Coded Squelch System or CTCSS.
 - A low frequency audio tone to your transmission.
- Digital-Coded Squelch (DCS) or Continuous Digital-Coded Squelch System (CDCSS).
 - Adds sub-audible bitstream to the transmission
 - Trademark names – Digital Private Line (DPL), Digital Channel Guard (DCG), and Digital Tone Code Squelch (DTCS).

What Brand / Model Radio Should I Get?

Citizens Band (CB)

- Major Brands
 - Cobra, Uniden, Galaxy, etc.
 - I prefer Galaxy DX959 CB Radio with Sideband.
- AM and SSB for maximum range and compatibility with other operators.
- Recommend 102" or 108" steel whip bolted to the body.
 - If insist on a coil antenna, recommend 4' Firestick

What Brand / Model Radio Should I Get?

Family Radio Service (FRS)

- Major Brands
 - Cobra, Uniden, Midland, Motorola, etc.
- Beware of clones and counterfeit radios.
- If in doubt, check with the FCC.
 - <https://fcc.report/FCC-ID/>
- Recommend pairs, so you have a backup.

What Brand / Model Radio Should I Get?

General Mobile Radio Service (GMRS)

- Major Brands
 - Rugged, Midland, Motorola, etc.
- Beware of clones and counterfeit radios.
- If in doubt, check with the FCC.
 - <https://fcc.report/FCC-ID/>
- Recommend full power radios for mobiles.
- Recommend getting repeater compatible radio.

What Brand / Model Radio Should I Get?

Multi-Use Radio Service (MURS)

- Major Brands
 - Midland, Motorola, Wouxun, Btech/Baofeng, etc.
- Beware of clones and counterfeit radios.
- If in doubt, check with the FCC.
 - <https://fcc.report/FCC-ID/>
- Recommend pairs, so you have a backup.

What Brand / Model Radio Should I Get?

Amateur Radio (Ham)

- Major Brands
 - Kenwood, Yaesu, iCom, Anytone, Alinco, etc.
- Beware of clones and counterfeit radios.
- Several tiers of license will limit product options.

Questions?



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