

Wireless Mic & RF Basics Cheat Sheet

A practical pre-gig checklist for keeping wireless systems clean and dropout-free.

BEFORE YOU BUY OR DEPLOY

- **Legal frequency use varies by country and changes over time** as spectrum gets reallocated. Always confirm what's legal to use in your region before buying or deploying a wireless system, rather than assuming a frequency range is safe because it was fine somewhere else.
- **Licensed vs. license-exempt operation** is a real distinction in many regions: some frequency ranges require registration or a license for professional use, others are open but more crowded. Check your local regulator's current rules.

US SPECTRUM MAP: WHAT'S AVAILABLE, WHAT'S NOT (FCC)

The chart below covers the **United States only** (FCC rules) and only the core 470–806 MHz range where most wireless mic activity happens. It is not to scale below the segment level and is not a substitute for checking current FCC rules yourself — other countries allocate this range completely differently.

470–608 MHz	608–698 MHz	698–806 MHz
TV Ch. 14–36	600 MHz band	700 MHz band
Available (secondary/shared use) Mostly unavailable, narrow exceptions Not available for mic use		
BAND	STATUS (US / FCC)	WHAT'S SHARING IT / NOTES
TV Channels 2–36 (54–608 MHz)	Available, secondary	Primary usable range; you share it with broadcast TV and must not interfere with broadcast operations
600 MHz guard band (614–616 MHz)	Available, unlicensed only	Narrow legal sliver inside the otherwise-cleared 600 MHz range
600 MHz duplex gap (653–663 MHz)	Available (653–657 licensed / 657–663 unlicensed)	Another narrow legal sliver inside the cleared range
600 MHz service band (617–652 & 663–698 MHz)	NOT available	Sold to wireless carriers in the 2017 incentive auction; mic use here was banned outright as of July 2020
700 MHz band (698–806 MHz)	NOT available	Public safety radio & wireless broadband; mic use banned here since 2010
900 MHz ISM (902–928 MHz)	Available, unlicensed	Shared with cordless phones and other ISM-band devices
1920–1930 MHz	Available, unlicensed	Used by some digital wireless mic systems
2.4 GHz & 5 GHz (portions)	Available, unlicensed	Shared with Wi-Fi and Bluetooth — often the most congested option in a venue full of phones and routers

Source: FCC "Operation of Wireless Microphones" and FCC Wireless Microphones bureau guidance, current as of this writing. Rules and allocations change; verify before you buy or deploy.

FREQUENCY COORDINATION BASICS

Running multiple wireless channels at once means avoiding **intermodulation distortion**: when two or more RF signals mix and produce unwanted extra frequencies that can land on top of another channel you're using. This is why wireless channels aren't spaced randomly.

- Use your manufacturer's frequency coordination software or built-in scan/group-and-channel system rather than picking frequencies by hand for anything beyond one or two channels.
- Re-scan for a clean frequency at each new venue. A frequency that was clear last week can be occupied by another production, a TV broadcast, or someone else's gear this week.
- Keep transmitters and receivers from the same manufacturer's coordinated group together as a set; mixing coordinated groups from different systems can reintroduce the intermodulation problems the coordination was solving.

RF BASICS ON THE DAY OF THE GIG

- **Antenna placement**: keep receiver antennas within line of sight of the performers where possible, and avoid mounting them directly against metal racks or surfaces, metal close to an antenna can detune it.
- **Diversity reception**: most professional wireless systems use two antennas per receiver channel and switch to whichever has the cleaner signal moment to moment. Keep both antennas reasonably spaced apart rather than bundled together.
- **Distance and obstructions**: bodies, walls, and especially metal staging or truss between transmitter and receiver reduce range. Line of sight is always the best case.
- **Fresh batteries, every time**. A transmitter running low on power is one of the most common causes of a wireless channel that was fine at soundcheck and isn't fine two hours later.

COMMON SYMPTOMS & LIKELY CAUSES

SYMPTOM	LIKELY CAUSE
Dropouts in specific spots on stage	RF dead zone, obstruction, or interference at that location
Garbled or "underwater" audio	Weak signal, often low battery or out of effective range
Distorted signal even at close range	Transmitter input gain set too hot, this is a gain-staging problem, not an RF problem
Sudden dropout mid-show that wasn't there at soundcheck	New interference source came online nearby (another production, broadcast van, etc.)

Worth remembering: not every wireless problem is an RF problem. A transmitter with its input gain set too hot will sound distorted no matter how strong the signal is, that's a gain-staging fix, not a frequency fix. Check the simple stuff (battery, gain, antenna orientation) before assuming you need to re-coordinate frequencies.