

Technical Guide - Wireless Microphone Systems

'Off the shelf' wireless microphone systems are ideal if just one microphone is needed, However, the individual components of a wireless mic system can also be purchased individually to make up a bespoke system, thereby offering the opportunity to add different microphone types for different uses.

Hand held wireless mic transmitters sometimes have interchangeable microphone capsules with different pick-up characteristics or different frequency responses which may be better for speech or singing. A handheld mic is great as a Q&A roving mic but presenters on stage may prefer a tie clip or headset mic to keep their hands free. In this case, the mic plugs into a wireless bodypack transmitter worn discreetly within clothing.

Some transmitters operate on standard alkaline batteries, but for more frequent use a rechargeable model offers better value for money. The chargers are usually specific to the range or brand so take care to select the correct one. Drop-in chargers are most convenient – instead of removing batteries to charge separately, the whole beltpack or handheld transmitter simply slots into the charger.

Wireless microphones operate on various frequencies, all of which have their own merits. We explain some of the benefits & drawbacks of the different transmission systems below.

Types of Frequency Transmission

VHF (173.8MHz to 175.0MHz)

- Very few VHF systems are available now as the technology is very basic.
- Licence free to use within the UK.

UHF (approx 450MHz to 900MHz)

- Most wireless microphones use the UHF band for superior audio performance.
- A maximum of 4 systems will work together, intermodulation free, on a section of TV channel 70 (863 to 865MHz), licence free.
- At least 8 systems will work together, intermodulation free, on TV Channel 38. One licence is needed for the complete band at £75 per year.
- A licence for an individual frequency in the Interleaved spectrum of several other TV channels costs around £25 per year. (Call for more information)

Digital (2.4GHz)

- Up to 8 systems will work together, licence free.
- The wavelength limits the range from around 30m to 100m maximum.
- Shares the crowded Wifi band, so the more complex interference reduction technology may impact on the number of systems which can be operated together.

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Digital (5.8GHz)

- Up to 12 systems will work together, licence free.
- The wavelength limits the range from around 30m to 100m maximum.
- Doesn't use the crowded Wifi band, so a greater number of systems can be operated together.

Infra-red

- Licence free
- Operating range is limited to a maximum of 10m with standard systems
- Unlimited number of systems can be used in adjacent rooms (as long as there are no windows between the rooms)
- A very limited number of systems can be used in the same room, normally maximum of two
- Only really suitable for line of sight transmission from transmitter to receiver

Types of Systems and Their Uses

Non-diversity

Low cost, non-diversity radio microphone receivers are equipped with a single antenna. Their operating range is limited to line of sight and suitable for small rooms only and simple applications where one or two systems are used together. Up to four non-diversity wireless microphone systems can be used together in simple room layouts.

Switching diversity (or space diversity)

Most entry-level radio microphone systems use switching where two antennae feed a single receiver module. The receiver constantly monitors the signal strength of both antennae to distinguish between a strong (line of sight) signal and a weak (reflected) signal and reduce drop out.

True Diversity

True diversity technology offers increased performance by having a separate internal receiver for each of the two antennae. This results in improved sensitivity and accuracy and reduces dropouts.

System Planning

Questions to ask when proposing a wireless radio microphone system might include:

- How many systems do you want to run together?
- What are the operating conditions; size and layout of the room and location of the building, and will remote antenna and distribution systems be required?
- Are there any other radio microphone systems in use in the same building or adjacent buildings?
- What types of microphone are required; handheld, head-worn or lapel?

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Frequently Asked Questions

“How far will my radio microphone transmit?”

Normal expectations are 75 to 100m line of sight. This range is reduced considerably if the transmitter and receiver are separated by a wall, and if the room of operation is full of people and other obstructive objects.

Some systems feature a high power switch, which will increase the RF output, but will shorten the battery life.

If a receiver can only be installed in an adjacent room, then you will most likely need to employ remote antenna, cable and probably antenna boosters.

“When should I use an antenna distribution amplifier?”

If you are operating several radio microphone systems in the same area, it is strongly advisable to use an antenna distribution amplifier. This will minimize the number of receiving antenna in the system which improves system performance and appearance, and it can also distribute power to each receiver from one mains point.

“My radio microphone systems interfere with each other when multiple systems are switched on together”

This is normally the result of trying to run multiple systems too close to each other when talking about transmitting frequency and channel numbers. It may also be a result of one system producing a harmonic which then interferes with another system.

Careful consideration must be made to system planning and how many systems you are expecting to use together. Usually, the more expensive systems provide the possibility of running a higher number of systems concurrently as the receiver section of the wireless system incorporate more sophisticated RF filters.

Operating a wireless transmitter too close to their receiver may also affect system performance; normally it is advisable to leave at least 5m distance between the two components.

“I have heard a lot about changes to radio microphone use within the UK. How will I know if this affects my system?”

There have been many changes to the frequencies that you can operate wireless microphones on in the UK, and to the uninitiated it can appear daunting and complicated.

If you do not own a licence and operate a radio microphone then you should only be using the licensed free frequencies of 863 to 865MHz for UHF systems, 173.8 to 175.0MHz for VHF and 2.4GHz for digital systems. Use of frequencies outside this band is illegal unless you have the correct licence. Further details of radio microphone licensing can be found from JFMG, www.jfmg.co.uk

This is intended as a basic guide to the different wireless microphone systems available. Please contact us for more information and guidance if required.

For licensing enquiries, please contact JFMG, www.jfmg.co.uk