

# Look for differences

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## RF Introduction

Radio frequency systems are used in many devices and every day to communicate wirelessly. Each of those systems can use a multitude of different characteristics specific to the requirements for the application. Those characteristics of a communication radio signal can be<sup>1,2</sup>:

- Frequency / Spectrum (Hz, from 30 Hz [10,000km] to 300 GHz [1mm])
- Min/Max power (W units used to describe antenna power signal and V/m[electric] and A/m[magnetic] to describe field strengths, and mW/cm<sup>2</sup> to describe power density at distances)
- Bandwidth (Hz)
- Modulation technique(s) (FM – frequency modulation [used mainly for digital processing], AM – amplitude modulation [used mainly for analog processing])
- Intended use and expected maximum range

## Signal differences

The signals that will be analyzed for the mentioned characteristics are:

- WiFi
- Bluetooth
- GPS
- GPRS
- Zigbee

Name	Frequency (Hz)	Total Bandwidth (Hz)	Min/Max Power (mW)	Intended use and expected range
WiFi <sup>3,4,5</sup>	2.401 GHz / 4.910 GHz / 5.725 GHz / 61.25 GHz	495 MHz / 965 MHz / 100 MHz / 250 MHz	1/1000	Wireless Networking, 100m/50m/20m
Bluetooth <sup>6</sup>	2.400 GHz	83.5 MHz	0.5/100	Low power / short range (100m/30m/5m for different classes) communications / accessories
GPRS <sup>7,8,9</sup>	(usually) 0.890 GHz / 1.7102 GHz	70 MHz / 169.9 MHz	1/8000	Long distance mobile communications,
GPS <sup>10,13</sup>	1575.42 MHz / 1227.60 MHz	10.23 MHz / 10.23 MHz	500 W	Long distance time and location information, determining position for devices, 20200km
Zigbee <sup>5,12</sup>	2.400 GHz / 784 MHz / 868 MHz / 915 MHz	100 MHz /	1/100	Personal Area Networking with low power digital radios, 10m-100m

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