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 be1,2:

* 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/cm2 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

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| --- | --- | --- | --- | --- |
| Name | Frequency (Hz) | Total Bandwidth (Hz) | Min/Max Power (mW) | Intended use and expected range |
| WiFi3,4,5 | 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 |
| Bluetooth6 | 2.400 GHz | 83.5 MHz | 0.5/100 | Low power / short range (100m/30m/5m for different classes) communications / accessories |
| GPRS7,8,9 | (usually)  0.890 GHz / 1.7102 GHz | 70 MHz / 169.9 MHz | 1/8000 | Long distance mobile communications, |
| GPS10,13 | 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 |
| Zigbee5,12 | 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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