Chapter 5: Radio Frequency Signal and Antenna Concepts

While many of us are familiar with the concepts of WiFi, bands, RF, and networking, the science behind antennas that transmit those frequencies are rarely explored. In chapter 5, each antenna type is detailed, and their uses are explained. To measure the output of an antenna, the industry standard is to use a polar chart that shows the radio frequency patterns that the antenna uses. These charts have typically have two graphs, one for the bird's eye view of the antenna (aka the azimuth or H-plane) and one that shows the side view of the antenna (aka the E-plane). For an omnidirectional antenna, the azimuth is almost a perfect circle. This means that it will distribute the radio frequencies in every direction horizontally. If the E-plane of the same antenna were inspected, it would show that the antenna doesn't do a very good job of transmitting in the vertical direction. Omnidirectional antennas are useful for use in a centralized location that does not need to transmit vertically. If we look at a semi directional antenna, the pattern shows that the signal travels efficiently in a general direction both vertically and horizontally. These antennas are great for sending a signal across short to medium distances, as the margin of error is reduced compared to a highly directional, and the signal strength is increased compared to an omnidirectional. Lastly, the book describes a highly directional antenna, which requires direct line of sight with the receiver on the other end. This signal must be placed accurately, but when it is, the signal is at its strongest. Typically, this type of antenna is used in satellite dishes and will automatically align themselves with the satellite orbiting the earth, which in turn will return the signal to another part of the world. This can also be used to connect two campuses from a long distance, as long as the antennas are aligned.