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Introduction

A diverse set antenna can be used for transmitting and receiving data from satellites. They play a vital role in wireless communication, as they are efficient when converting electronic signals into electromagnetic waves [1]. There, however remain other types of antennas, which can be utilized and it all depends on the application and the purpose of the requirements of the project. This paper summarizes the different applications of satellite antennas as well as ground-based antennas and their functionality.

Commercial Based Applications

Ground Antenna Arraying

This is a technology that NASA has harnessed to send and receive more data accurately to pinpoint satellites in space and determine their health as well as other important facts about the satellites. Due to the increase in the amount of data being transferred, there was a need to increase the capacity and capability to send and receive more data to interact and interface with different things in space. Either building larger antennas or building an array of smaller antennas could achieve this. The latter became the better option in terms of efficiency, risk evaluation and cost [3].

SATCOM Antenna System

Military communications experts at Science Applications International Corp. (SAIC) chose EMS Defense & Space in Norcross, Ga., to set up an X-band satellite communications (SATCOM) antenna system for the U.S. Army RC-12X aircraft. EMS Defense & Space antenna designers derived the company's X-band SATCOM antenna system by converting the EMS Wavestorm GS-X antenna to an airborne version, called the Wavestorm AS-X, for this application [4]. The antenna system for the Wavestorm AS-X has a gain of Tx 28.4 db and an Rx gain of 27.8 db and frequency ranges of Tx: 7.9 – 8.4 GHz and Rx: 27.8 db [5] .

Wi-Fi Antennas

This is probably one of the biggest applications of antennas. Wi-Fi antennas range from 400 MHZ to 5.8 GHZ to address many wireless LAN solutions including WISP, SCADA, RFID,

public hotspot and more. The costs of these antennas vary depending on the specifications like the bandwidth, the frequency as well as the size and application [6].

Technological properties of Antennas

Some properties of antennas that are important to take into consideration are: antenna gain, aperture, bandwidth and effective length. These properties are important as they differentiate antennas and their eventual application and uses.

Antenna Gain

This is a relative measure of an antenna's ability to direct or concentrate radio frequency energy in a particular direction or pattern. This is an important measure when designing an Antenna as it is designed in a way to raise power in wanted directions and decrease power in other directions.

Bandwidth

This is another important property that antennas are compared against and valued. It is the range of frequencies that an antenna can properly radiate and receive energy. Different antennas have different bandwidths and again according to the use and application a certain bandwidth is chosen.

Effective length

The effective length is defined as the ratio of the EMF at the receiver input to the intensity of the electric field occurred on the antenna. This parameter is again important because it characterizes the efficiency of receiving and sending of electromagnetic waves [1][7].

Conclusion

After looking into the different applications of antennas as well as the technical aspects of them, it is clear that antennas depend on many properties as stated above and they have plenty of applications that make them customizable as well as interchangeable in many scenarios. It is interesting to note that the emphasis on hardware components for antennas is much higher. It is the hardware and the physics that control the different specifications of the each antenna.

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