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A paper on microstrip patch antenna for 5G applications

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ABSTRACT

In today's life, wireless communication is the key thing. Life will be difficult without wireless communication because everything is dependent on the internet, data transmission etc. Although there is an option of wired internet, there are many drawbacks to it, for example installation of wired internet is difficult, more time is required, cost is higher, due to wires, it looks less organized, less flexible etc.

As we talk about data transmission over the internet there is data rate and bandwidth, which are key points to consider. Data rates and bandwidths in previous generations of mobile networks were limited. To solve this problem MIMO technology based on 5G is in its development phase. 5G provides high data rates over a limited bandwidth and with good channel capacity. Microstrip antennas are low- profile, high gain provider devices. By introducing MIMO technology in the microstrip patch antenna it increases the gain and efficiency of the antenna, which we really require. MIMO is used in low power and a no. of antennas together, which makes it more reliable, it also has low latency and high gain provider technology. 5G ranges between 3 and 300 GHz, so it may be very useful to solve the data rates and bandwidth issues. The lower range has already been used in many technologies like Wi-Fi, WLAN, Bluetooth, etc. The upper spectrum has some complications which can be solved by using the frequency reuse concept. The MIMO antenna is stimulated using CST software for the range of 32–46 GHz. The gain is 9.22dBi at 37.7 GHz in 3D dimensions. The efficiency is 70%.

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1. Introduction

In recent years, 5G technology has been in development phase. The main reason behind it is, rapid increase in mobile traffic. This increases the demand for high data rates and bandwidth. To solve this problem, MIMO (Multiple Input, Multiple Output) is used. MIMO provides higher data rates with improved spectral efficiency and channel capacity by using the multipath property without changing the input power. High element isolation and broadband should be possessed by MIMO. The range targeted by 5G is 3–300 GHz, which can further help to provide higher data rates with wide bandwidth. The reason behind the range is also that the lower spectrum is already used by many wireless technologies and the higher spectrum is not utilized and could be used for 5G applications. When the higher spectrum is used, the challenge of free space propagation of higher frequencies arises. These frequencies provide the low coverage area but the problem can be solved by the frequency reuse property.

To prepare this paper, we have done some literature reviews. In the Reference paper[1], the frequency is 35 GHz with a gain of about 6dBi and the size of antenna is 12.5x12.5x0.8 mm^3. The frequency in the Reference paper [2] is 28–38 GHz with a gain of about 5.5dBi and size of 10x10x0.78 mm^3. The reference paper [3] specifies a frequency range of 28–38 GHz, a gain range of 7.14dBi to 9.24dBi for dual frequencies, and an antenna size of 55mmx110mmx0.508 mm. In reference paper [4], the frequency is 25.5–29.6 GHz with a gain of about 8dBi and size of the antenna is 30x35x0.76 mm^3. In reference paper [5], the frequency is 23–40 GHz with a gain of about 12dBi. In this paper there are 4 ports and the size of antenna is 80x80x1.57 mm^3, material also different. Because of these parameters, the gain is different with respect to our paper. In reference paper [6], frequency is at 28 GHz with gain about 5.42dBi and size of antenna is 30x15x0.25 mm^3 etc. In reference paper [7], the frequency is 28 GHz with a gain of about

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