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Department of Electronics – Wayamba University of Sri Lanka

CUSTOMIZED HIGH GAIN WIFI ANTENNA FOR FACULTY OF APPLIED SCIENCES OF WAYAMBA UNIVERSITY OF SRI LANKA

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ABSTRACT

Wireless Fidelity (Wifi) has become a vital part in networking. When working with a wired local area network, there are issues when it comes to scalability, mobility and troubleshooting. But when it comes to wireless local area network (WLAN)things are much easier. IEEE standard for Wifi is 802.11. Wifi operates in ISM band (2.4 GHz to 5 GHz) but most of the Wifi versions (including the network at University) are operating on 2.4 GHz. Even many methods use the same frequency, all of them have different data rate according to the standard. This study is an attempt to increase the range of the Wifi access point by adding an external antenna to the router without using any more access points and repeaters. By using this antenna the gain is increased and the antenna radiating pattern is changed as required.

Keywords: *Wifi, Antenna, Omnidirectional*

1.0 INTRODUCTION

The existing configuration only included the internal antenna that was integrated to the access point[1]. So the particular range for an access point was fixed. But in commercial level high end access points like cisco aironet 1200 there is an external port for an external antenna[1].Because the current internal antenna in the AP could not provide coverage to the whole geometric area, new external antenna can be fixed to solve the range problem. Previous solutions were to implement more access points and repeaters to the areas, where there was less Wifi signal. Also when increasing the range, antenna gain is also improved.

But the external antennas are expensive and the radiation pattern is not as required. All of these external antennas need to be imported and subjected to inspection by TRC and pay extra taxes[2].

2.0 EXPERIMENTAL

The proposed system was based on an antenna that has a gain of 6 dbi. With the readings that were obtained from the spectrum analyser Anritsu spectrum master EMS2711W, was decided that a gain of 6 dbi would be sufficient with this antenna. To match the impedance and improve gain, only the physical properties of the antenna were changed because of the high frequency impedance matching circuit can change the transmitting signal. Initial requirement was to implement the antenna but after the discussion with the system administrator there was a requirement that the antenna had to be away from the access point at least 5 m. So an antenna was designed to fulfil these requirements. Radiation pattern was changed to the way as required[3]. With this solution it is not needed to have more access points or repeaters, thereby the existing access pointscan be used to get full coverage.

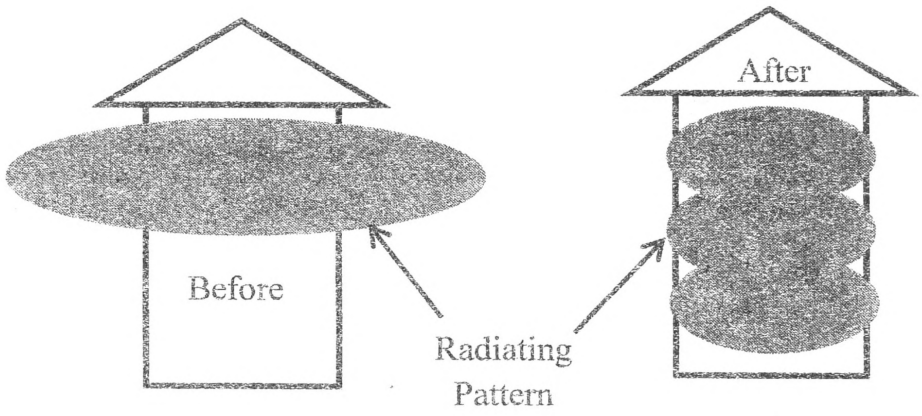

Figure 1: Radiation Pattern before and after the solution

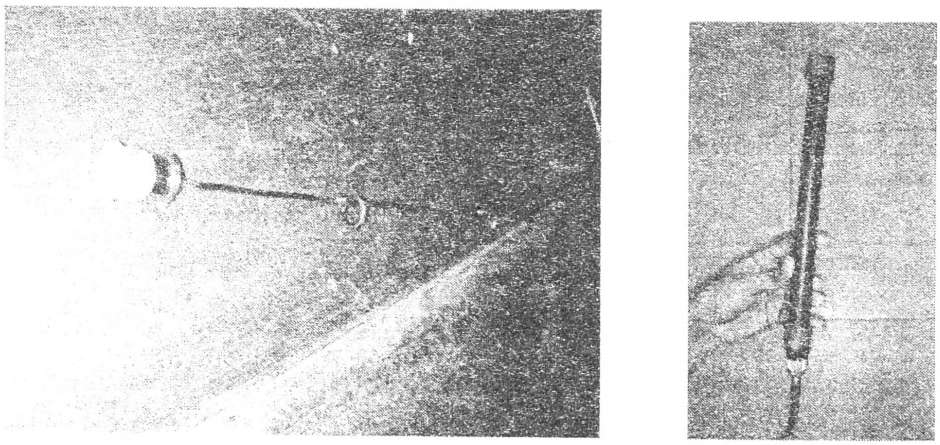

Figure 2: Pictures of Implemented Antenna

3.0 RESULTS AND DISCUSSION

This antenna has changed the radiation pattern and now the lower levels receive more signals (signal greater than -85 dBm). The measured impedance value for 50 ohms at the 2.48 GHz frequency. So in order for this antenna to have the minimum mismatch loss Wifi channels need to be used where it uses required frequency range (channel 10 to channel 12). The channels that are used within the system can be changed by logging into the access point. Maximum results can be obtained by configuring the router to use the channels at the end of Wifi frequency range (channel 6 to channel 14).

4.0 CONCLUTION

With this customised antenna solution cost for implementing Wifi system can be reduced by increasing the range of the Wifi coverage. With impedance matching at Wifi working range this antenna will have the minimum mismatch loss. With the changed in the radiation pattern, now users have the maximum range of coverage of the Wifi network. Increased gain will help the users to receive more signal strength to their devices thus enabling them to use the full services of WLAN. After conducting excessive testing this antenna can be produced for commercial purposes if TRC approval is provided.

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REFERENCES

[1]. Cisco Aironet 1200 Series Access Point data sheet

[2]. http://www.trc.gov.lk/index.php/services/technical-standards.html

[3]. http://www.webopedia.com/TERM/W/Wi_Fi.html