Enterprise Wi-Fi Model using Cisco Packet Tracer

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Abstract: Computer network is an important thing to connect to various device to get desired information. Networks can be wired or wireless, but most networks will use both. The subsequent paper provides an outline regarding Wi-Fi model technologies using tool like packet tracer. This simulation tool is very easy to build network that can be used to accomplish, analyse numerous networking activities Also, it gives an idea of using WLC and LWAP component to connect to various department and to access the ISP it uses NAT process. WLC is commonly used in the company location to give an individual wireless network in a huge geographical region.

Keywords: Wi-Fi, WLC, LWAPP, ISP, NAT.

I. INTRODUCTION

Computer network is an important thing to connect to various device to get desired information. Computer network is a collection of two or more interconnected computer systems that has latent to transmit, receive and exchange data, voice and video traffic. In modern time, computer networks are crucial as information technology is increasing quickly all over the world.. In this scenario, Wi-Fi model is implemented using tool like packet tracer. This simulation tool is very easy to build network that can be used to accomplish, analyse numerous networking activities. Wi-Fi is a substitute network to wired network which is generally. Wi-Fi is a simple and cost-effective way to link to internet without the necessity of wires. It is rising in acceptance because of reducing costs and accessibility that it provides to users. WLC is a network component used to monitor and manage Access Point (AP) in bulk and it also support both GUI and CLI based configuration. WLC is commonly used in the company location to give an individual wireless network in a huge geographical region. This setup lets user turn the campus, building, office premise and still be linked to the network. WLC stretches the network administrators the ability to see all the data and information connected to the network. LWAPP is a protocol that can regulates several Wi-Fi models at once.

II. TECHNOLOGY TO BE USED

<u>Wireless LAN Controller (WLC)</u>: It is a network component used to monitor and manage Access Point (AP) in bulk. WLC are used to gain control over device like router, firewall, gateways, switches WLC supports features like distribution system port, service port, management interface, virtual interface. WLC supports both GUI and CLI based configuration.

<u>Service Set Identifier (SSID)</u>: It is also called Network ID. It is a unique name to distinguish between multiple Wi-Fi networks. It is case-sensitive and it can be up to 32 characters in length. Some special characters are allowed like dashes, period, spaces, underscore.

<u>Dynamic Host Configuration Protocol (DHCP)</u>: It is a management protocol, which is used to assign IP address and other information dynamically to each host on the network. Components of DHCP are server, client, Relay Agent, IP Address Pool, Subnet Mask. DHCP is an application protocol. DHCP uses port number 67 to send message from client to server and port number 68 is used to send message from server to client.

<u>Network Address Translation (NAT)</u> : It is a process of converting public IP address to private IP address and vice versa. It is usually applied on a router for translation of IP address. By applying NAT, security is provided for the entire internal network. There are three types of NAT namely Dynamic NAT, Static NAT and Port Address Translation..

<u>Lightweight Access Point Protocol (LWAPP)</u>: It is a cisco's proprietary protocol, which run on WLC. Time taken to configure, monitor or troubleshoot the huge network can be decreased. So that network can be analysed easily. If there are numerous APs in a network then LAPs are useful in that situation.

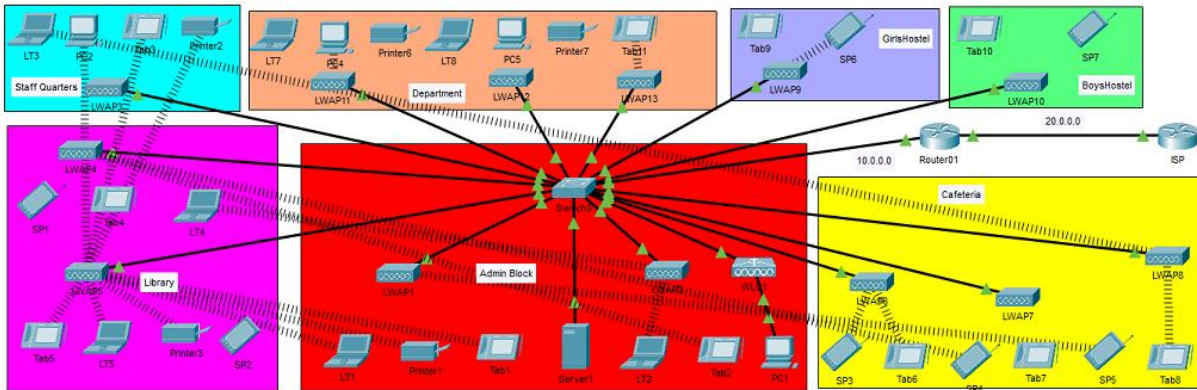## III. BASIC ARCHITECTURE

Fig.1. System Design

IV. WORKING OF ENTERPRISE WI-FI MODEL

The implementation part is divided into three phase they are:

- Connectivity phase.

- Inter-SSID communication phase.

- Campus Connectivity phase.

In connectivity phase, it includes number of wireless devices, LWAP, SSID, WLC, switches, router and servers required for the connection.

In Inter-SSID communication phase, servers are configured and DHCP services are applied, an account is created for the WLC and LWAP is placed in different block.

In Campus Connectivity phase, NAT is applied to the router and connectivity is made from any block to the ISP.

IP address for the management port of WLC is assigned using which network administrator can access the web browser using that IP address.
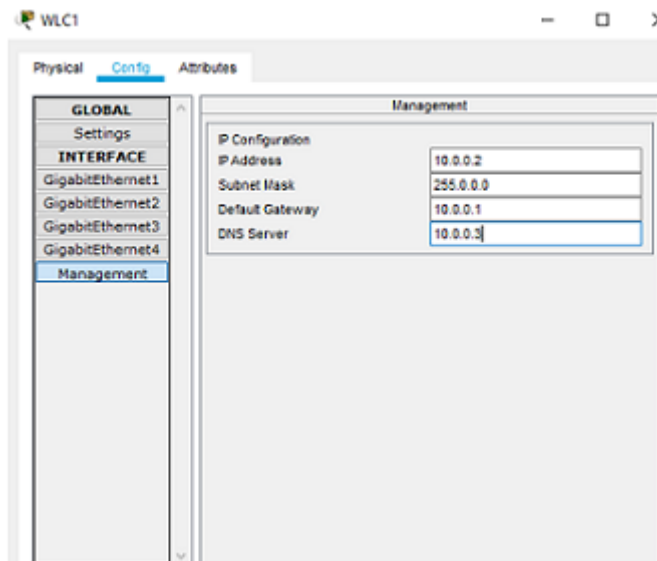

Fig.2. WLC Configuration

Once account is created for WLC, then directly login to WLC using username and password from web browser.
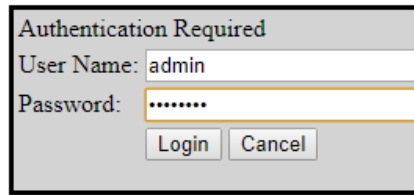
Fig.3.WLC Credentials

Login to machine and create number of WLAN for the scenario as shown below.

Fig.4.WLAN Creation

DHCP services are applied to the server, to provide IP addresses for the various devices.
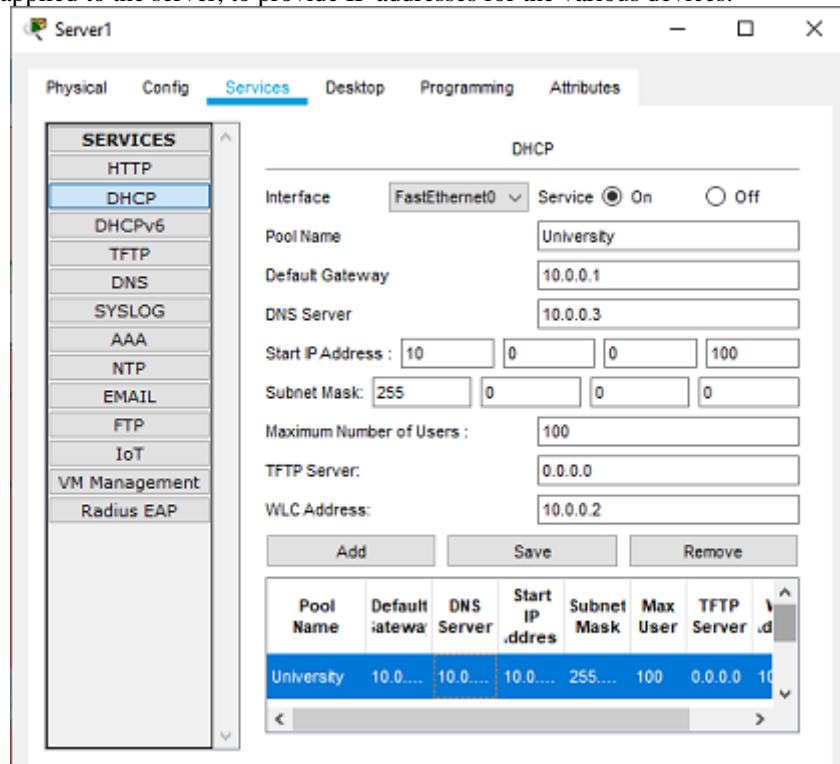

Fig.5.DHCP Services

V. RESULTS

Communication from different block i.e., Admin, staff quarters, Cafeteria to Teacher's system in staff quarter.

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num
	Successful	LT3	LT5	ICMP		0.000	N	0
	Successful	LT3	LT1	ICMP		0.000	N	1
	Successful	LT3	SP5	ICMP		0.000	N	2

Fig.6. Communication to Teacher's block

Communication from Admin block of student's system to Student system in Cafeteria block.

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num
	Successful	LT2	Tab7	ICMP		0.000	N	0

Fig.7.Communication to Student's block

Communication from teacher's system to other teacher's system in different block.
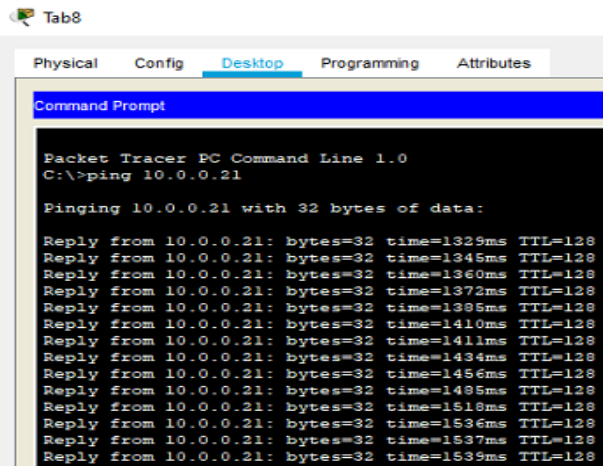

Fig.8.Communication between Teacher's block

VI.   CONCLUSION

In this paper, we initially discuss about Wi-Fi and its disadvantages. Then we explore various base papers and their implementation. Next, we analyse how WLC are more efficient than wired network and discuss about the methodology of Wi-Fi model using cisco packet tracer. Then we discussed about the NAT configuration of the router for the IP address translation. Finally, we discuss about the result. The systems in any block can communicate with each other and also the system can communicate to the ISP router for internet connectivity. Any systems can be added to the block without any issue.

REFERENCES

[1] Ashish Kumar (October-December, 2017) *Implementation of a Company Network Scenario Module by using Cisco Packet Tracer Simulation Software*, : Krishi Sanskriti Publications .
[2] Md. Anwar Hossain & Mahabuba Zannat (2019) *Simulation and Design of University Area Network Scenario (UANS) using Cisco Packet Tracer*, Global Journals.
[3] Surabhi Surendra Tambe (July 2015) *WIRELESS TECHNOLOGY IN NETWORKS*, International Journal of Scientific and Research Publications.
[4] Mangkhollen Singson (n.d.) *Awareness and use of Wi-Fi infrastructure in student's community: a case study Pondicherry University on campus students*.
[5] Janitor, J.; Jakab, F.; Kniewald, K., "Visual Learning Tools for Teaching/Learning Computer Networks: Cisco Networking Academy and Packet Tracer," Networking and Services (ICNS), 2010 Sixth International Conference on , vol., no., pp.351,355, 7- 13 March 2010
[6] Petcu, D.; Iancu, B.; Peculea, A.; Dadarlat, V.; Cebuc, E., "Integrating Cisco Packet Tracer with Moodle platform: Support for teaching and automatic evaluation," Networking in Education and Research, 2013 RoEduNet International Conference 12th Edition, vol., no., pp.1,6, 26-28 Sept. 2013 [3] CCNA by Todd Lammle, 5th edition.