

Enhancing the College Network

Prof.Pallavi.G¹, Prof Daina K.K², Jagadish K.P³, Pavan Kumar⁴

Assistant Professor, Department of Information Science Engineering SKIT, Bengaluru, Karnataka, India¹

Assistant Professor, Department of Computer Science Engineering, CIT, Ponnampet, Karnataka, India²

U.G. Student, Department of Information Science Engineering, SKIT, Bengaluru, Karnataka, India³

U.G. Student, Department of Information Science Engineering, SKIT, Bengaluru, Karnataka, India⁴

ABSTRACT: College Network is a set of vlan that covers the whole campus. The college network through its application interface provide sustain different activities in the college and hence this network is to be designed in advance. This paper is proposed for advanced college network through integrating IOT devices with classical network device in college network and to design the proposed college network design we use Cisco packet tracer simulation software version 7.0.

KEYWORDS: College Network (CN), Advanced college network design (ACND), Virtual local area network (VLAN), Internet of things (IOT)

I. INTRODUCTION

Local area network (LAN) is an computer network that interconnect computers within a limited area network such as residence, school, college, laboratories, university campus, office building and soon. Virtual local area network (VLAN) is any broadcast domain that is partitioned and isolated in computer network at data link layer and it provides virtual access to the users. Internet of things is the network of physical devices, home appliances, and other item embedded with the electronics, software sensors, actuators, and connectivities. And which enables this object to connect and exchange the data. College network is the integrated network within the college, which as been designed mainly for share, access and manage different activities of the college campus between its different sections (Branches, Library, Admin block, Principal office, Examination section and so on). The Advanced College Network Design (ACND) his structured using different layers like core layers, distribution layer and access layer, each layer performs the different activities. Cisco currently release new version of packet tracer that include IOE device with classical network device.

II. LITERATURE SURVEY

In Comparison between the physical devices and simulator software for Cisco network technology teaching [1], the concepts of Cisco network technology mainly including routing and switching in teaching are difficult to be assimilated because of more abstract and no visualization. The research proposed simulator software solution to the above problem, and made comparison between physical lab with virtual lab, and analyzed the features available in some kinds of simulator software for selection, finally for students in different period who use three different lab ways, summarized the effect of simulator software in Routing & Switching Technology course through the comparison and analysis about typical dynamic routing protocol lab in course.

In towards the definition of internet of things [2], Internet of Things is an application domain that integrates different technological and social fields. Despite the diversity of research on IOT, its definition remains fuzzy. We'd like to address this challenge, because having a sound definition that addresses all the IOT's features can facilitate a better understanding of the subject, lead to further research and advance our understanding of this emerging concept.

In design and simulation of local area network using Cisco packet tracer [3], the Local Area Network (LAN) is the most basic and important computer network owned by individual companies and could be used for interconnection with wide area networks. A LAN permits effective cost sharing of high-value data processing equipment such as mass

International Journal of Innovative Research in Science, Engineering and Technology

An ISO 3297: 2007 Certified Organization

Volume 7, Special Issue 6, May 2018

2nd National Conference on "RECENT TRENDS IN COMPUTER SCIENCE & INFORMATION TECHNOLOGY (RTCSIT'18)"

13th-14th March 2018

Organized by

Departments of Computer Science & Information Science Engineering, Sri Krishna Institute of Technology, Bangalore, India

storage media, mainframe computers or minicomputers, and high-speed printers. Resource sharing is probably equally as important where a LAN serves as the access vehicle for an intranet or the Internet. The study provides an insight into various concepts such as topology design, IP address configuration and how to send information in form of packets in a single network and the use of Virtual Local Area Networks (VLANs) to separate the traffic generated by different departments.

In Simulation Experimental Teaching of Computer Network Based on Packet Tracer [4], the formation of the campus network can make the student to carry on the comprehensive practice exercises. But in practical teaching to meet the class at the same time practice is difficult to achieve. In order to make students better learning network design, planning, organizing, configuration and check Using the Packet Tracer simulation simulated the construction of the campus network using the Packet Tracer simulator Configured the function of campus network which are commonly used including switches VLAN division, Web and the realization of the function of DNS server. Make every student independent complete network engineering, then reach the better combination of theory and practice of the teaching effect.

In hierarchical network design problem [5,] this paper presents the hierarchical network design problem (HNDP). The object of the HNDP is to identify the least cost, two-level hierarchical network. The network must include a primary path from a predetermined starting node to a predetermined terminus node. In addition, each node not on the primary path must be connected to some node on that path by means of a secondary path. The problem is initially formulated as an integer linear program. An heuristic is then presented which employs a K shortest path algorithm, and a minimum spanning tree algorithm. Heuristic results of two sample problems are presented and compared to the results obtained by solving the integer LP formulation. Potential applications of the formulation are also discussed.

III. PROPOSED SYSTEM

In this proposed system we design an advanced college network design(ACND) for the better use of college network components in the college campus. Thus we use network device like routers, switches, access points, servers, end devices like computers laptops etc.

IV. METHODOLOGY

In order to design the college network we use the Cisco packet tracer, it is an networking simulator used for teaching and learning programming by offering a unique combination of the realistic.

Benefits of packet tracer

- It offers a real time simulation and visualization.
- Permits user to design, to built, configure and troubleshoot complex networks.
- Allows students to explore concepts and conduct experiments.

The newly released Cisco packet tracer_7.0 includes new features like sensors and programming language with support of classically networking devices. Programming languages like python are dynamically supported by this simulator software.

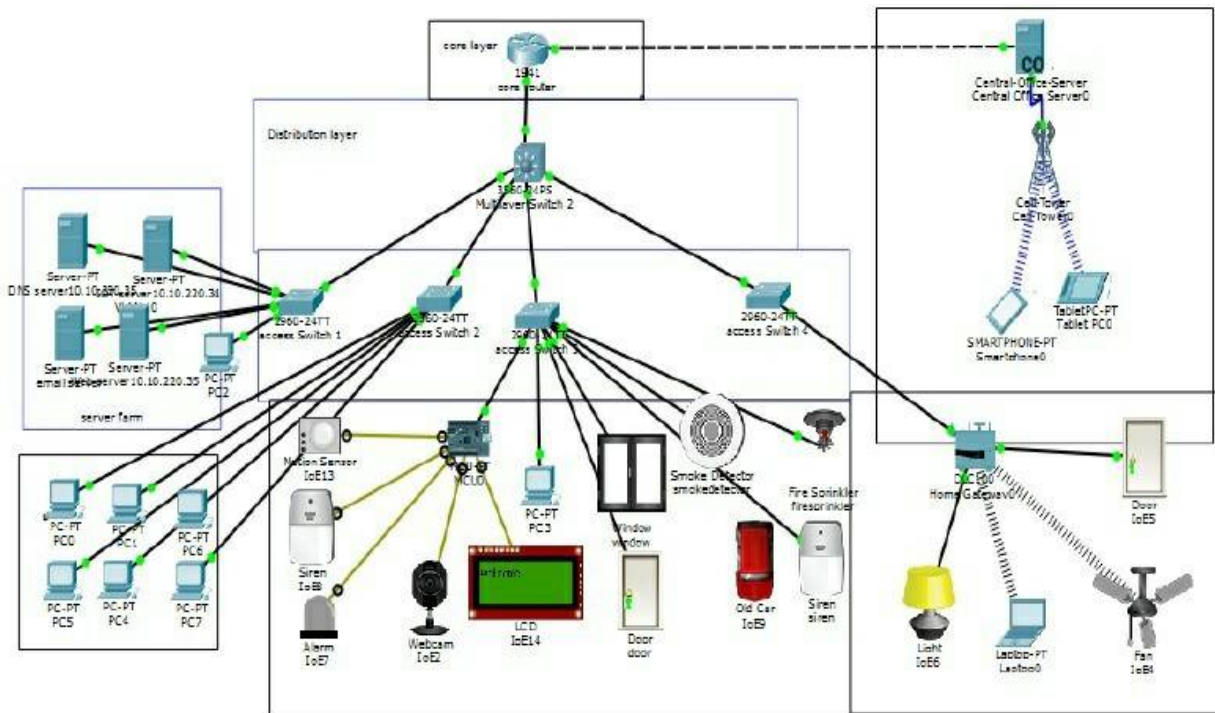


Figure: ACND architecture

Cisco packet tracer contains the following components. They are

1. **Smart things:** They are attached to registration server or home gateway network through a network interface. It has 4 sub-categories:
 - Smart city
 - Home
 - Industrial
 - Power grid
2. **Components:** Micro controller (MCU-PT) single boarded computers (SBC-PT) are been linked to components. These components can communicate through analog or digital slots. Microcontrollers using programming language controls the smart things connected to the two these boards.

Smart things are configured with IOE service after registering with IOE server. Home gateway being configured with the “Home gateway” SSID, in addition it has four Ethernet ports to a wireless access points. Configure WEP/WPA-PSW WPAL for wireless home gateway for the secure wireless connection.

V. IMPLEMENTATION

To implement Advance College Network Design (ACND) different networking devices used are Cisco router (2811), switch(2960), central office server, cell tower.

International Journal of Innovative Research in Science, Engineering and Technology
An ISO 3297: 2007 Certified Organization *Volume 7, Special Issue 6, May 2018*
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Further more about the device is shown in below table

NO	Device	Function
1.	Router(2811)	It is used to connect college network to internet.
2.	Layer two switch(2960)	It is used to distribute access to lower layer.
3.	Layer three switch(3560)	It performs intra Vlan routing.
4.	Server	Control smart thing registered on it and provides difference server functionalities.
5.	Control office server	Connects cellular system to router.
6.	Micro controller unit(MCU)	Interconnects different components or the smart things.
7.	Personal computer	Connect to access layer.
8.	Fan	Used to ventilate the campus based on some condition.
9.	Web cam	Capture the movement in college.
10.	Siren	Alarms for the college for some event.
11.	Light	Provide light
12.	Motion detector	Connect to the home gateway
13.	Smart door	Provide cellular System coverage for different user.
14.	Cell tower	Provide cellular system coverage for different user
15.	Tablet	Used to control the campus from outside.
16.	Old car	To detect smoke
17.	LCD	To display text
18.	Motion sensor	To sense motion by mouse movement

Device configuration

To implement college network design on Cisco packet tracer here using class D IP address that is 192.168.1.0/24 subnet and this subnet divided into eight subnet from this 24 subnet. Here only 4 of them are used and the rest are reserved for future scalability. After configuration is done the device get IP address dynamically and IOE device registered to IOE server or home gateway. Legitimate user can log the system from remote or local to control smart thing registered on system. The python programming language has been used in MCU to control and safe resource used by difference smart things.

VI. CONCLUSION

To improve the campus network service, this paper proposes advanced college network design (ACND) by integrating the IOT device with the classically available network device. Each smart device which has been registered to the IOT server or home gateway and is being controlled by the legitimate user. The hierarchical design is used to group devices into multiple layers, and hence we have been effectively used the hierarchical design. The Micro Controller Unit (MCU) is used to inter connect different IOE device and control them by means of coding, here python programming language is used for coding. And finally to design the proposed system, the Cisco simulator software is been used.

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