

# A Literature Review: Extensible Network Model Architecture

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**Abstract:-** In today's modern educational institutions continuous aiming to enhance scalability and adaptability to meet the growing demands of digital education. In this research paper reviewed the literatures which is for extensible network model development, in this literature review paper focused on network architecture into educational institutions. In research I required to learn and generate the architecture or a model for the network which helps me to extend the research which is required for the development of network model. Here research paper learned for the network architecture, IP addressing, IP addressing lookup, IPv4 and IPv6 implementations, packet sending and receiving and packet generations which gives the idea to get or pass the information or a signal to get accessibility of the system informations from the centralized systems or from the particular system.

**Keywords:-** IP Addressing, Network Model, Networking Architecture, IP Lookup, Packet, Protocols, Packet Switching, Security, Firewall.

## I. INTRODUCTION

In modern education system good networking infrastructure is play major role to grow up educational institution and to facilitate the continuous communication, collaboration, and an accessibility of resources from the anywhere any department can maintain their resources and get the informations.

When the technologies are continuously growing updatable, educational institutes must update themselves, there is a need for extensible network model that can adapt to evolving demands and provide a robust foundation for various activities are held throughout the computer network system.

To make extensible network model for educational institution must learn and study some basic things which are helpful to make extensible network model powerful and provide the better security, utilization of proper resources and also they must build strong network management for the computer system from the specific authorization.

To study this type of research I must go through the different division of the study which are not fixed it may take changes during the research when it requires and as per

the requirement of educational network model, to design and develop this type of model must go throughout the following study and research of current availability in market and what I can give them new.

- *What is Network? How to design and utilize?*
- *Understandability of IP address and packets (Hardware based and Software based)*
- *Security and firewall utilization*
- *Network Services and Network Monitoring and Management Tools*
- *Computer System Configuration and Monitoring itself*
- *Understandability of Computer Operating Systems*
- *Accessibility of Operating System files and directories*

In some of the educational institutions there is the large infrastructure and a wide area and they are utilizing the computer system into currently growing Information & Technology, to manage and maintain all this they must establish the powerful extensible network model for the controlling and monitoring from the centralized or from the particular system. To study all this must learn some basic topics which I have been listed above.

For the full research I must go through the all point to create model right now here I am discussing about the network, network architecture and the IP address <sup>[1]</sup> and packets accessibility how they are working in a network and how all those things are helped me to create efficient and effective network architecture.

And also must understand the IP addressing and its utilization how to assign into extensible network architecture model, and also must understand the packet utilization and classification <sup>[2]</sup> how they are passing throughout the network architecture using certain devices over network.

- *What is Network? How to design and develop network Architecture?*

This section provides an overview of the fundamental network and network infrastructure components typically found in educational institutions. It explores concepts such as local area networks (LANs), wide area networks (WANs), wireless networks, wired networks and their respective architectures.

Designing and developing network architecture involves the following key steps:

- **Requirements Gathering:** Understand the needs of the network, including the number of devices, expected traffic and the number of systems, types of applications to be supported, security requirements, and any specific constraints or limitations.
- **Network Topology:** Determine the network's physically and logically layout. This will define the type of topology, such as a star, bus, ring, or mesh, and planning the placement of devices like routers, switches, and access points.
- **Addressing Scheme:** Develop an IP addressing scheme to assign unique addresses to devices on the network. This involves deciding whether to use IPv4 or IPv6, choosing appropriate address ranges, and defining the requirement based IP addressing on a different router settings as per the department based.
- **Network Protocols:** The protocols that will be used for communication within the network and with external networks. This includes protocols such as TCP/IP, Ethernet, Wi-Fi, DNS, DHCP, and others based on the specific requirements of the network into educational institutions.
- **Network Security:** Plan and implement security measures to protect the network from unauthorized access, data breaches, and other threats. This may involve setting up firewalls, implementing encryption, using virtual private networks (VPNs), and establishing access control policies. Instead of using VPNs here in research I can implement the centralized domain system network which each system can get data information and accessibility as per the authorization.
- **Network Management:** By defining the strategies for monitoring and managing the network. This includes selecting network management tools, establishing monitoring processes, configuring devices, and implementing policies for troubleshooting, performance optimization, and regular maintenance.
- **Testing and Deployment:** Before deploying the network, conduct thorough testing to ensure its functionality and performance. Test connectivity, security measures, and various network services. Once testing is successful, deploying the network and configurations for each and every system into educational institutions which considering factors like user impact and downtime minimization and the utilization of the systems into educational institutions.
- **Ongoing Maintenance:** Regularly review and update the network architecture to accommodate changing requirements, technological advancements, and security updates. Perform periodic audits, monitor performance, and address any issues that arise.

➤ *Understandability of IP address and packets (Hardware based and Software based)*

This Section provides the understandability of IP address and packets how I can deploy into hardware like routers, switches, and system NICs. And also utilizing the some of the software to check the IP addresses and

implementation of the packets. Also I can use the software to for the data packets how much data packets are available and how to generate new packets<sup>[3]</sup> into current network architecture if required otherwise which type of packets I must generate for the fast data transmission to get the system information into the client systems.

IP addresses, whether in IPv4 or IPv6 format, are essentially numerical identifiers assigned to devices on a network. The understandability of an IP address<sup>[4]</sup> depends on the following factors:

**Format:** IPv4 addresses are represented in a dotted-decimal format, where four sets of numbers ranging from 0 to 255 are separated by periods (e.g., 192.168.0.1).

IPv6 addresses are represented in a hexadecimal format, consisting of eight sets of four hexadecimal digits separated by colons (e.g., 2001:0db8:85a3:0000:0000:8a2e:0370:7334). Users may need to be aware of the conventions used to represent the IP format itself.

Understanding the context of an IP address involves knowing whether it represents a host or a network interface and understanding the hierarchy of networks and subnets. For example, the IP address 192.168.0.1 might indicate a specific device within a local network, while a network administrator would need to understand how it relates to other addresses in the network.

**Address Classes and Ranges:** In IPv4, IP addresses are categorized into different classes<sup>[1] [4]</sup> (A, B, C, etc.) based on the size of the network they represent. Each class has a specific range of addresses that can be assigned. Understanding the class and range of an IP address can provide insights into its potential use and scope.

**Subnetting:** Subnetting<sup>[5]</sup> involves dividing a larger network into smaller subnetworks. Understanding subnetting allows network administrators to allocate IP addresses efficiently and manage network resources effectively. It involves understanding subnet masks, network prefixes, and how they relate to IP addresses.

**Packet Understandability:**<sup>[6]</sup> Packets are units of data that carry information across networks. The understandability of packets depends on the following aspects:

**Packet Structure:**<sup>[1] [6] [7]</sup> Packets typically consist of a header and payload. The header contains control information, such as source and destination IP addresses, protocol information, sequence numbers, and error-checking data.

The payload carries the actual data being transmitted. Understanding the structure of packets helps in interpreting and processing the information they contain.

Protocols <sup>[8]</sup>: Various network protocols, such as IP, TCP, UDP, and ICMP, are involved in packet transmission. Each protocol has its own specific structure and purpose. Understanding these protocols helps in interpreting the information encapsulated within the packets and determining how they should be handled.

**Hardware-Based Packet Processing** <sup>[9]</sup>  
 Understandability: Hardware-based packet processing often occurs at high speeds and involves specialized networking hardware, such as routers and switches. The understandability of packet processing in such systems primarily lies in configuring and managing the hardware devices. Network administrators need to be familiar with the specific hardware platforms, their capabilities, and the configuration options available to optimize packet routing and forwarding.

**Software-Based Packet Processing Understandability:** Software-based packet processing, such as software-defined networking (SDN) <sup>[2] [10]</sup>, involves the use of software running on general-purpose servers or switches to handle packet processing tasks. The understandability of software-based packet processing revolves around the programming languages, network protocols, and APIs used to develop and configure the software-defined networking infrastructure. Network administrators and software developers need to understand these technologies to effectively manage and customize the behaviour of the software-based packet processing systems.

In this part, we can understand of IP addresses and packets depends on factors such as their format, context, address classes, subnetting, packet structure, protocols, and the specific hardware or software technologies used for processing. With these aspects enables network administrators and developers to effectively interpret, configure, and manage IP addresses and packets in educational institutions network architecture design and development of extensible network model

#### ➤ *Security and firewall Utilization*

Security and firewall utilization <sup>[4] [6]</sup> are the main part of network and information security. Firewalls are network security devices <sup>[12]</sup> that monitor and control incoming and outgoing network traffic based on prearranged security rules. They act as a hurdle between trusted internal networks and untrusted external networks, such as the internet, to protect against unauthorized access, malicious attacks, and data breaches. Here are some of the main points that we must understand for security and firewall utilization:

- *Threat Prevention:*

Firewalls play a vital role in preventing unauthorized access and protecting against various threats, including malware, intrusion attempts, and denial-of-service (DoS) attacks. They can analyse network traffic, block suspicious or malicious connections, and enforce security policies to minimize the risk of security incidents.

- *Access Control:*

Firewalls allow organizations to define access control policies that regulate network traffic flow. These policies specify which types of traffic are allowed or denied based on criteria such as IP addresses, port numbers, protocols, and application-level information. By enforcing access control, firewalls ensure that only authorized connections are permitted, reducing the attack surface and enhancing network security.

- *Network Segmentation:*

Firewalls can be used to create network segments, dividing a network into smaller subnets or virtual LANs (VLANs). Network segmentation enhances security by isolating sensitive resources and limiting the potential impact of a security breach. Firewalls can control communication between different network segments, allowing organizations to enforce stricter security policies for critical systems or confidential data.

- *Intrusion Detection and Prevention:*

Advanced firewalls often include intrusion detection and prevention system (IDPS) capabilities. IDPS functionality enables the detection and prevention of known attack patterns, abnormal behaviour, and suspicious network activities. These features can help identify and moderate attacks in real-time, reducing the impact of security incidents.

- *VPN and Remote Access:* <sup>[13] [14]</sup>

Firewalls can provide secure remote access to internal networks through Virtual Private Network (VPN) connectivity. By implementing VPN services, organizations can enable secure remote connections for employees, partners, or clients. Firewalls can authenticate and encrypt remote connections, ensuring data confidentiality and integrity.

But in this research not utilizing the concept of VPN for remote accessibility, instead of remote connection all the control that providing throughout the centralized domain access only so this research can give the extensible network model for the educational institution from anywhere into the campus that can be possible through the proper design and development of network architecture model.

- *Logging and Monitoring:* <sup>[15]</sup>

Firewalls generate logs that capture information about network traffic, connection attempts, and security events. Effective security practices involve regularly reviewing and analysing firewall logs to identify potential security incidents, policy violations, or abnormal network activities. Real-time monitoring and alerts can help respond promptly to security events and improve incident response capabilities.

- *Regular Updates and Patch Management:*

Firewalls, like any other software, require regular updates and patches to address security vulnerabilities and maintain optimal protection. It is important to keep firewalls

up to date with the latest firmware or software releases provided by the firewall vendor.

- *Security Policy Enforcement:*

Firewalls should be configured to enforce a comprehensive security policy aligned with an organization's security objectives. The policy should consider factors such as allowed and blocked traffic, application-level filtering, user authentication, encryption requirements, and network usage policies. Regular review and adjustment of the security policy are essential to address emerging threats and evolving business requirements.

It is important to note that while firewalls are a necessary component of network security, they should be complemented with other security measures, such as intrusion detection systems, antivirus software, strong access controls, employee awareness programs, and regular security audits.

➤ *Network Services and Network Monitoring and Management Tools* <sup>[2] [16] [17] [15]</sup>

Network services refer to the various functionalities and capabilities provided by computer networks to enable communication, resource sharing, and application access. These services facilitate the efficient and secure operation of networks. Here are some commonly used network services:

- *Domain Name System (DNS):*

DNS <sup>[18]</sup> translates domain names (e.g., [www.example.com](http://www.example.com)) into IP addresses. It helps user's access websites and other network resources by resolving human-readable domain names into machine-readable IP addresses.

- *Dynamic Host Configuration Protocol (DHCP):*

DHCP automates the process of assigning IP addresses, subnet masks, gateway addresses, and other network configuration parameters to devices on a network. It simplifies network administration by dynamically managing IP addressing.

- *Network Time Protocol (NTP):*

NTP is used to synchronize the clocks of devices on a network. It ensures accurate timekeeping across systems, which is essential for various network operations, security protocols, and time-sensitive applications.

- *File Transfer Protocol (FTP):*

FTP is a standard protocol for transferring files between systems over a network. It allows users to upload, download, and manage files on remote servers.

- *Simple Mail Transfer Protocol (SMTP):*

SMTP is a protocol used for sending and receiving email messages between mail servers. It enables email communication over networks.

- *Secure Shell (SSH):*

SSH provides secure remote access to network devices or servers. It allows encrypted communication and secure remote command execution.

Using all this protocols and services in research it can conclude the implementation and use of network model which going to build for the educational institution not using the remote connection, by implementing the centralized domain system implementation that can accessible throughout the educational institution.

- *Network Monitoring and Management Tools:*

Network monitoring and management tools help administrators monitor, analyze, and manage network performance, security, and resources. These tools provide intuitions into network behaviour, identify issues, and assist in troubleshooting and optimization.

✓ *Here are some common types of network monitoring and management tools:*

**Network Monitoring Software:** Network monitoring tools monitor network devices, traffic, and performance metrics in real-time. They collect data on bandwidth usage, latency, device health, and other parameters, generating alerts and reports for network administrators.

- *Network Performance Analysis Tools:*

These networking tools <sup>[4] [10]</sup> analyze network performance <sup>[13]</sup> and identify blocks or areas for optimization. They provide detailed graphical representations, and historical data to help to solve and improve network performance. Wireshark, SolarWinds Network Performance Monitor, Cisco Network Analysis Module (NAM), NMAP, EhterApe, IPConfig, cURL, Datadog are examples of such tools.

- *Bandwidth Monitoring Tools:* <sup>[19] [15]</sup>

These tools measure and monitor network bandwidth usage. They provide insights into bandwidth consumption, traffic patterns, and application-level usage. They help optimize network resources and plan for capacity upgrades. Examples include NetFlow Analyzer, SolarWinds Bandwidth Analyzer Pack, and Manage Engine Op Manager.

- *Network Configuration and Change Management Tools:* <sup>[13] [20]</sup>

These tools help manage network configurations, track changes, and ensure compliance with policies. They provide version control, configuration backups, and auditing capabilities. Examples include SolarWinds Network Configuration Manager, Cisco Prime Infrastructure, and InfobloxNetMRI.



## II. REVIEWS AND FINDINGS

Table 1 Reviews and Findings

Paper Title	Abstract	Advantage	Findings
<b>An Evaluation of IP-Address Lookup Algorithms</b>	This paper presents IP address-lookup algorithms it has been covered the problem of packet classification and the survey of software & hardware algorithms.	In this process of categorizing packets into flows in a router, which has an important role in firewalls, intrusion detection, differentiate services and fulfilling the requirements of Voice Over IP in next generation networks.	This paper presents an evaluation of the major existing and newly proposed schemes for addressing the IP address lookup problem in internet routers.
<b>Design and Implementation of Network Management System Based on Mixed-Mode</b>	This paper mainly focused on analysis of advantages and disadvantages in the C/S mode and B/S mode, design and implementation of network management system based on the mixed mode with C/S mode and B/S mode.	<p><b>C/S Mode System:</b> Strong interaction, Development targeted, Personalize interface design with intuitive, Simple, convenient features, Customized to meet customer operational requirement, More secure access mode, Little traffic, Fast response</p> <p><b>B/S Mode System:</b> Not require on the operating system and software platform. By installing any generic named browser on clients, Business expansion, easy upgrade and just upgrade the server side, Especially suitable for online information published, Unlimited number of the front users, Users can expand arbitrarily, No need for additional investment, Saves the cost</p>	This paper compares the both the mode C/S mode System and B/S mode system. How they are implementing for the specific application mode by using B/S mode with C/S mode algorithms and found the network management capability. Also they gives the basic about network management services, by using the some basic protocol implementations and also provide the some key technologies which is helpful to implement into this research.
<b>The Control of Onboard Computer Network</b>	The on board network is mainly focused on solving a narrow range of tasks with a given quality of solution. Main goal of network control is meeting the quality requirements for the problem solving.	It takes an account for the dynamics of network development associated with the emergence of new applications, changing the composition of network equipment, connecting new users, changing the structure and peculiarities of interaction with the external environment	It just compares the network and gives analytical and mathematical findings and possibilities, so for that it is not convenient as per research area for the development of this research.
<b>A protocol for Packet Network Intercommunication</b>	In this paper we present a protocol design and philosophy that supports the sharing of resources that exist in different packet switching networks. It describes the function of a GATEWAY as an interface between networks and discusses its role in the protocol.	<p>Using gateway notion, we can intercommunicate with more network to send or receive large data.</p> <p>Uses the full duplex for communication full length messages and data streaming represents as sequence finite. Process level communication uses the TCP which transmits data and do the packet switching.</p> <p>TCP automatically recovers the packets.</p> <p>Connection free protocols with associations</p>	Here it describes and discussed the basic fundamentals issues of interconnection of packet switching networks. They try to implement the flexible and powerful protocol implementation in to single network so they can give the larger data transmission. By using this type of implementation or uses in my research area if it is required, then must create or implement this type of protocol.
<b>Design and implementation of a user-extensible network packet generator</b>	This paper defines the network security based new packet generator which uses the network and network tools to overcome the situation of network threats and data theft over the network.	<p>It cannot send TCP/IP packet simulation attacks.</p> <p>Also it can send scalable custom protocol packets.</p>	Basis on this article I found that we can generate new packets as per our needs and how to make the data network and data network security for the client server

		It ensures the security, stability and protocol consistency of network security devices.	communication with the new packets when this research providing the model for the accessibility of the network systems into educational institution it can be utilize.
<b>The Development and Application of Extensible Computer Network Design System</b>	This paper focuses on analysing the development and application of extensible computer network design system. They define that computer network technology has three different directions. Visual Software function accessibility Performance analysis ability extensibility Software external interface extensibility	In this network topology devices process mainly to initialize the network: setup event table, complete the simulation operation work, improve the dynamic display network of operation process, to achieve application of results performance	Basis on this paper found that how to make simple, effective extensible computer network application design. They covered the basic of implementation network and equipment data, topology design, simulation operation, project analysis using this type of design and development of simple network model utilize into extensible network model.
<b>Performance Evaluation of VPN with different Network Topologies</b>	This paper discusses the performance of different VPN technologies. They are using the L2TP protocol to evaluate the VPN performance.  VPN functions for establishing private network using tunnel technology on the public network for personal communication.	Explores the impact of three basic topologies on the performance of VPN.  When the chain cascade network structure is adopted, as the chain length of the network is greater than or equal to 3 the performance is reduced.  When we design the VPN topologies it is recommended to adopt a star topology or tree topology	This paper give the information that using of VPN we can access the different machines by implementing or using certain protocols and by checking some tools we can analyze the results of data sending and receiving performance and when we use the internet services it changes the performance of VPN.
<b>Study and Evaluation of Voice Over IP Signaling Protocols Performances on MIPv6 Protocol in Mobile 802.11 Network</b>	In this paper, they study MIPv6 and evaluate the Voice over IP (VOIP) performance with its two SIP and H.323 architectures. They performed homogeneous 802.11e network in the context of a horizontal handover taking into account the MIPv6 technology.	In the presence of real time applications, this network change delay is not accepted. For the mobile network lacking they use the Macro Mobility and Micro Mobility implementation. MIPv6 protocol implementations VOIP's signalling protocol it uses the H.323 protocol, H.245 protocol, Q.931 protocol, RAS protocol, RTP/RTCP protocol, and SIP Protocol.	In this paper, they study MIPv6 and evaluate the Voice over IP (VOIP) performance with its two SIP and H.323 architectures. They performed homogeneous 802.11e network in the context of a horizontal handover taking into account the MIPv6 technology. From this get the understandability of SIP protocol and H.323 protocol who is the better and faster for the quality information and data passing.
<b>A Minicomputer Network Management Monitoring, and Analysis System Using APL</b>	This article describes an integrated group of utilities distributed for an eleven super minicomputer network for the purpose of network wide file backup without user interaction, centralized verification of all archive processes, centralized monitoring and analysis of	This type of network allows a computer to be used in each of the functional groups within the its department like email, word processing document, spreadsheets, graphics files, data base and database results and to generate reports as they needed.  Easy to operate for the centralized	From this research I can get the information how they are trying to communicate the minicomputers into network and how they are using the resources of the computers on the remote systems, but in same pattern I am going to apply

	network and individual node statistics, general system housekeeping, and notification of systems staff of trouble spots.	administrator.	by using the web domain by providing the centralized domain and the number of nodes, nodes can directly get the information and they can configure as per its requirement instead of using remote connection and older version APL.
<b>A Resource sharing executive for the ARPANET</b>	This article describes the facility to play important role in removing the distinction between ‘local’ and ‘remote’ by allowing users of geographically separated hosts to interact with one another as if they were members of a single user.	The RSEXEC is respond to users request if require from one or more remote hosts. In each hosts in RSEXEC system runs the service program as a “demon” process which is prepared to provide service to any remote process that observes protocol.	In this RSEXEC has shown that it is capable of supporting significant resource sharing among the TENEX Hosts in the ARPANET, they don’t provide the resource accessibility without the its boundaries. So for that they are using RSEXEC to provide access resources within a computer network that makes network transparent by removing distinction between the local and remote. From this get the information to also I can use this type of protocol and commands to access the resources of the system instead of remote.
<b>A Novel reconfigurable hardware architecture for IP address lookup</b>	In this they added and removes prefixes at rate of 2 million updates per second. A route updates fail due to physical resources limitations. For that they discuss about rate of architecture and properly reconfigure the more resources as per its needed.	Fast in performing IP lookup operation by setting up 100 Gbps router to work rate of 100 mbps Scalable in terms of routing tables growth by increasing number of users.  Scalable for migrating from IPv4 to IPv6.  Terms of implementation costs, achieving all other objectives at a minimal cost.  Gain performance as possible from limited hardware resources by tuning configuration.  Hard wired data structures can be used to accelerate performance. The system cost can be reduced by fitting multiple features and applications on a single reconfigurable hardware platform.	In this IP address lookup found the new reconfigurable hardware to reduce the resource usage, which is the problem in other architectures but only in hash operation collisions. Basis on that I can get the IP lookup algorithm and the updates of the hardware and what to configure or reconfigure.
<b>An Insight into IP Addressing</b>	In this paper Internet Protocol version 4 is studied to understand the <i>pros</i> and <i>cons</i> . Into the different addressing levels such as logical, physical, port and specific addressing is defining its own aspects of needs. They also discuss about IPv4 addressing	They implement the OSI Model for the addressing.  Solve the issues by port addressing where each port represents a particular process or application on a particular host.	From this paper it describes the addressing mechanisms and they give the good informations related to IPv4 and IPv6 addressing how they are working into the network and how they are defining the IP addresses

	with its size and different classes, where each class differs by its network and host ID part. They also discuss about devices to use not to be till improved IPv4 to IPv6 addressing.	IPv4 is robust and easily implemented on network architecture.	with its address. From this research paper I can understand the network IP addressing process which is helpful to setup the routing into the network architecture. Also I can establish the own network domain architecture as research needed.
<b>An Overview of IP Addressing</b>	This research journal discusses how this process works with the help of different sources that are gathered and summarized. They also discuss the paper and analysis i.e. An insight into IP addressing (2017), Research on IP address Allocation of Tactical Communication Network (2019), IP Address (2022), which all discuss about the IP addressing works configuration of TCP/IP configuration, subnetting and any process of IP addressing.		This paper gives the information of IP addressing how to utilize the IP addresses into the current network architecture by using the IPv4, IPv6, subnetting and IP address classes with the CIDR Notation.
<b>Application for Determining whether IP Addresses belong to a Map by Coordinates</b>	This article presents a part of project they just focused on developing and measuring device for gigabit-capable passive optical networks. They are using python application to detect whether captured IP addresses belong to a map by their coordinates.	Author presents the possibilities of application for data mining technique to increase the security level of mobile application system. The developed application serves the automatic determination of the identity of the IP addresses to the selected MAP base according to their coordinates.	In this research I can get the information for the IP addressing by using the Map Coordinates and by implementing the Software application get the location information. Here nothing useful for my research but got the information that I can also see the concept of the location mapping by using IP addressing.
<b>CMT: An Efficient Algorithm for Scalable Packet Classification</b>	In this packet classification plays essential role in diverse network functions such as quality of service, firewall filtering and load balancer. By implementing efficient packet classifier, it gets worse. in the software defined network, which frequent rule updates are performed, and complex flow tables are used.	When packet classification was an offline problem is past, rule-set updates are not frequent. Packet classification is turned into an online problem under the new networking paradigm i.e. SDN (Software Base Network) The OpenFlow switches can receive thousands of rule updates per second	This paper first proposes the common mask free structures for implementing efficient packet classification, they guide for constructing CMT from practical rulesets is given in this paper, They implemented fast and dynamic rule-set update schemes. Using this I can understand the packet division or its classification how to implement into the network architecture.
<b>Computer Network Development to Achieve Resource Sharing</b>	In this paper computer network is defined to be set of autonomous, independent computer systems, interconnected to permit interactive resource sharing between any pair of system. The goal of the computer network is for each computer network is for each computer to make every	Communication systems being designed to carry very redundant information for direct human consumption.  The line errors can be easily fixed through error detection and retransmission.	In this they discuss about how to share and communicate the network and how they are sharing the resources using some of the programming software implementation methods. This paper gives the information for resource



	<p>local resource available to any computer in the net and also to local users can be used remotely without degradation.</p> <p>In this involves complete reprogramming of software or reformatting the data files. This extremely costly and has led to considerable pressure for both very restrictive language standards use of identical hardware systems.</p>		<p>sharing into the network by using software application and methods.</p>
<p><b>Dynamic Memory Model based Framework for Optimization of IP Address Lookup Algorithm</b></p>	<p>In this work, they propose a dynamic memory model that captures data movement between hierarchical memories and the memory access cost.</p> <p>Using the model, they formulate the design of IP address lookup algorithms as a well-defined optimization problem that minimizes an algorithm’s average lookup time.</p> <p>Also it first show the problem is NP-hard and then present an optimization framework and associated algorithm based on Lagrange multipliers that terminates in a bounded-error solution and simulation shows the produced algorithm has noticeable performance gain over existing techniques or not.</p>	<p>If forwarding performance within a router were infinitely fast, then the overall performance of the network.</p> <p>Modern general-purpose processors use hierarchical memories to enhance performance.</p>	<p>In this paper, formalized the IP address lookup algorithm as an optimization problem, where optimality is defined with respect to a machine model and a prefix Markov model. Also shown the problem is NP-hard, and presented an optimization framework and an associated approximate algorithm using Lagrange multipliers. It shown that proposed algorithm has noticeable improvement over existing algorithms in the literature. So using of this I can try to implement models for the IP lookup address.</p>
<p><b>High Speed IP Address Lookup Architecture Using Hashing</b></p>	<p>In this they explored a practical IP address lookup scheme which converts longest prefix matching problem into the exact matching problem.</p> <p>In this article they create proposed architecture it composed of multiple SRAMs and each SRAM represents an address lookup table in a single prefix. They also applied to each address lookup table in order to find out matching entries in parallel and the entry matched with the longest prefix among them is selected.</p> <p>Also they show data from MAE-WEST router that a large routing table with 37000 entries is connected to a forwarding table of 189 Kbytes.</p>	<p>Apply hashing for IP address lookup. Degermark proposed a scheme which constraints a forwarding table using a small size memory.</p> <p>A lookup scheme proposed by Gupta offers the maximum two memory accesses for an address lookup but it uses 33 Mbytes of DRAM.</p> <p>Waldvogel proposed an address lookup scheme require a worst-case time of <math>\log_2</math> (address bit) hash lookups and additional memory space to store markets remembering the last found BMP.</p> <p>Huang and Zhau proposed a scheme constructing next hop array based on the extension of the hode-compression concept used in tries.</p>	<p>From this parallel IP lookup address algorithm exploring the exact matching and parallel hashing in prefix length.</p> <p>Also in this scheme forwarding table is composed of multiple SRAMs and each SRAM represents address lookup table.</p> <p>Also I can understand the simulation process of MAE-WEST router performed the propose scheme is evaluated.</p> <p>So basis on that IP addressing architecture gives the idea to implement and do the practice using different routers.</p>
<p><b>High Speed Route Lookup for Variable-Length IP Address</b></p>	<p>In this paper they applied new IP into the devices with the same LAN using separate IP addresses instead of four they are using five segment as variable-length.</p>	<p>CAMs matching scheme to shorten the extremely long New IP addresses and reduce TCAM storage space consumption.</p>	<p>In this paper, found that high speed new IP route lookup mechanism to achieve LPM using a hybrid configuration of</p>

	<p>They combine the hash scheme and CAMs matching scheme to shorten the extremely long new IP addresses and reduce TCAM storage space consumption.</p>	<p>The mechanism can provide high speed route lookup with low power consumption.</p> <p>New IP is a new network protocol suit under this architecture the protocol uses variable-length structured address design.</p> <p>The address space can be smoothly expanded according to the network scale without modifying the old network address configuration.</p>	<p>BCAMs and TCAMs are used to convert structured New IP addresses into flat label addresses.</p> <p>Also in this TCAMs can perform the LPM of label addresses efficiently they combine the hash scheme and CAMs matching scheme to shorten the extremely long address and reduce TCAM storage space consumption.</p> <p>Basis on that particular implementation of IP address lookup using CAM, BCAM, and TCAMs.</p>
<p><b>High-performance IP Lookup Using Intel Xeon Phi: a Bloom filters based approach</b></p>	<p>In this they implementation on the Intel Xeon Phi (Intel Phi) many core coprocessor and on multi-core CPUs, and also evaluate the cooperative execution using both computing devices with several optimizations.</p> <p>In this attain high IP lookup throughputs of up to 182.7 Mpps (Million packets per second) for IPv6 packets on a single Intel Phi.</p>		<p>In this they implemented Longest Prefix Matching (LPM) till the development of CIDR (Classless Inter-Domain Routing). Here they investigate the use of Intel Xeon Phi processor as a platform for efficient execution of LPM algorithms for IP Lookup. Also they implemented the Bloom filters (BFs) and hash tables (HTs) to find the LPM for IPv4 and IPv6. Basis on that again for the IP lookup addressing I must see the Bloom filter and hash table algorithms for the IPv4 and IPv6 implementation.</p>
<p><b>Implementing High Speed IP Address Lookups in Hardware</b></p>	<p>This paper will discuss the aspects surrounding high speed IP address lookup architecture for hardware implementation. Also the paper will conclude with some discussion on the state of the art in the area and its future direction. Also they discuss here for routing and prefixes with the CIDR (Classless Inter-Domain Routing)</p>	<p>Using current hardware technology it encouraged a steady rise in the number of proposed solution designed specifically for hardware in current few years.</p>	<p>In this paper understands the binary trie based hardware implementation which uses the different architecture i.e. pao and waldvogel. This two architecture tested and used for IP lookups up to 5 memory levels they can checked the IPv4 and IPv6 lookup.</p>
<p><b>IP Address Lookup in an IP Router Based On a Reorganized Binary Prefixes Value Tree (RBPVT)</b></p>	<p>In this paper the tests and evaluation of the access memory number of the longest prefix match search algorithm shows that the IP address lookup algorithm based on RBPVT tree to improve the performance of the IP routers in terms of average memory access number.</p> <p>To improve the routing information search time in the prefixes values binary tree by recognizing the tree according to</p>	<p>By using binary tree prefixes strings of varying lengths they can naturally represents by binary tree it is simple data structure.</p>	<p>Again here in this paper understand the implementation of binary tree algorithm with the its prefix implementation to a new algorithm that is RBPVT based algorithm implementation.</p>

	<p>the use of prefixes the most recently used prefixes are stored in the higher levels of the reorganized binary prefixes value tree (RBPVT) which improves the data packets routing time.</p>		
<p><b>IP Address Lookup Using GPU</b></p>	<p>In this paper, they proposed a parallel IP address lookup architecture, which is a novel concept based on graphics processing unit (GPU) via Compute Unified Device Architecture (CUDA). Device function in GPU only perform IP address data lookup. Host function is exploited to construct and update the data structure of IP address lookup.</p>	<p>TCAM gives the effect of forwarding is fast as 250 million packets per second (MPPS). G92 achieve a throughput more than 1.3 GPPS.</p>	<p>In this paper they focused on CUDA based IP forwarding engine for large number of packets and maximizing the forwarding capability of the engine. Also they investigate several GPU properties to benefit the lookup performance, including the memory architecture of dual data structures for fast prefix updates. Basis on that I can utilize the hardware support basis on the GPU and CUDA architecture.</p>
<p><b>Network Performance Comparison of VPN Protocols on Wired and Wireless Networks</b></p>	<p>This paper discussed the VPNs are a method employed by organizations to secure their data communications across un-trusted networks. VPN also allow the flexibility for staff to be able to access network resources in a secure manner from anywhere in the world.</p>		<p>In this UDP throughput for the IPv4 wired network without any of the VPN protocols showed speeds of 95.3 MBPS, the UDP receive buffer size was gradually increased and found for all protocols was at 128KB. Same thing all the other protocols are measured with its speed up to 70 MBPS to 95.3 MBPS. So basis on this I can only implement the concepts of other protocols which are helpful to make network architecture and connect with the server and client.</p>
<p><b>Network virtualization tools-analysis and application in higher education</b></p>	<p>In this paper education of networking professionals requires not only the knowledge of theory but also acquiring practical skills. For this purpose, specialized networking laboratories equipped with the required diverse technology have been built for years, Here in this they are building them is lengthy, expensive, and ultimately laboratories have several limitation, for example in terms of flexibility, sustainability, financial and energy demands, etc.</p>	<p>In educational system students can learn the virtualization techniques and tools. Virtualization techniques and tools help to solve limitations and also add some new possibilities</p>	<p>From this research paper get the new optimization and simulation tools that can help me to utilize into my research area, and also they implemented the virtualization tools and techniques for system into educational institutions, so I can study them and implement the idea but not virtualization.</p>
<p><b>Research on IP Address Allocation of Tactical</b></p>	<p>A tactical communication network IP allocation method based on Classless Inter-Domain</p>	<p>IP address allocation of existing tactical communication is dominant, randomness is easy and error is easy.</p>	<p>This paper proposes a tactical communication network IP allocation based</p>

<p><b>Communication Network</b></p>	<p>Routing (CIDR) addressing technology and without network-wide routing configuration is proposed. Also they discuss addressing method and allocation process of the method are analysed in details. Based on this, the algorithm and model of IP address allocation in tactical communication network are given.</p>	<p>Each unit is separately allocated and lacks systematic distribution strategies. Separation of communication and allegations, lacking integrated design and distribution.</p>	<p>on CIDR addressing technology and without whole network routing configuration. Which give the fast and automatic IP address allocation and configuration of communication devices of tactical communication network. Basis on that I can get the idea to build the better communication network by assigning the IP address to specific system on a network.</p>
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**III. LIMITATIONS**

When research is going and analyzing the researches and reviews of papers found the different types of architectures, models and implementations of the network which are uses the hardware and software tools for the testing and examination.

Also researches says that how to utilize the network into educational institutions for that must study the particular educational institutions environment and its campus who is working smartly and developing itself modern into information and technology so for that must grow up with the technology research must have that type of network model which manage and maintains from the centralized domain but they can manage itself as per its requirement where they can get all the information related regarding the particular systems and configurations so they can build setup itself.

In today’s current environment of the educational institutions they are using the centralized accessibility by using either VPNs or Remote Desktop Connectivity. This type of network model sometimes create the problems for the educational institutions and there is chances to theft the data from the particular systems.

**IV. CONCLUSION**

In this research paper for the literature review in extended network control architecture model development, IP addressing, IP address lookup, hardware based packet data sending and receiving literatures, all this are giving the its own algorithm, tools and techniques. From all this here in research implementing the extended network control model for the education institution, which is built for the monitoring the system control in centralized network, analyze the system information and store and manage that particular system implementation in network. How to manage it? How to control and monitor with the tools that are discussed in this research paper.

Based on this research paper build the extended network control architecture into educational institutions as per its growing digital educational system. For that educational institutions must upgrade its hardware and software resources for the implementation of the extended network model for the different IP structure by routing the IP address and controlled by the centralized system and monitor itself what are the needs of computer systems to upgrade or update the hardware or softwares.

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