A System of Computer Network: Based On Artificial Intelligence

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Abstract*— The artificial intelligence (AI)-enhanced computer network system examined in this research aims to increase automation, security, and efficiency. Intelligent decision-making, cyber threat detection, and data flow optimization are all made possible by AI-driven networks. AI- based systems improve performance and lower latency by adapting to real-time conditions, in contrast to traditional networks. Algorithms for machine learning assist in automating network administration and failure prediction. Through AI integration, this system provides a more intelligent, self- sufficient network that improves resource sharing, connection, and network dependability in contemporary computing settings.

Keywords*— computer networking, technology, artificial intelligence, network.

I. INTRODUCTION

Networking provides communication between two industries running on physically separate computers. A computer network is a group of computers which are connected in some way to other computers on the network so that they can share data. A set of computers exchange data using communication channels in accordance with protocols, which are standard operating procedures[1]. An interconnected group of independent computers is called a computer network. The term "interconnected" refers to the ability of the computers to share information. A College network with local area networks, or LANs, linking computers to the internet, other servers.

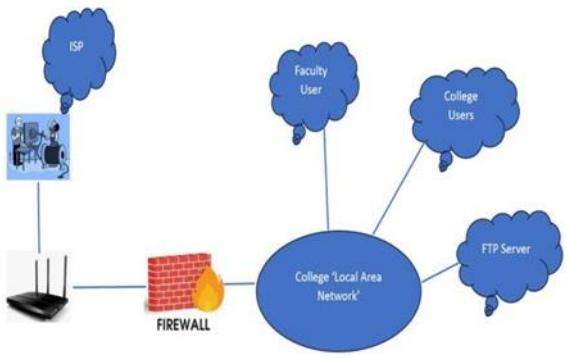

Fig 1: Representation of Network in a collage.

II. NETWORK CONFIGURATION

A. *Peer-to-peer network*

Since every computer has the same status—thus the word "peer"—and communicates with every other computer on an equal basis. All computers on the network can share files, and any device is attached to a single computer, like a printer or scanner, can be shared by all those machines .

Fig:2 Peer-to-peer network

B. *Client/server network*

A client-server network is a kind of network configuration that makes it easier for clients to use LAN or WAN to access resources and services from the central computer.

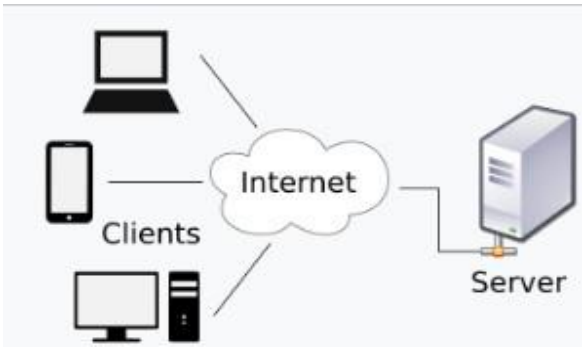

Fig 3: Client/server network

Advantages of Client-server networks:

- Centralized
- Security
- Performance
- Scalability

III. COMPUTER NETWORKS ATTRIBUTES

Promote communication:

People may connect effectively and conveniently through a network using chat rooms, video conferencing, email, instant messaging, and phone conversations. Permit the exchange of data, files, and other kinds of information. In a network environment, data and information saved on other computers on the network may be accessed by authorized users[2].

Promotes Communication Between People:
E-mail, chat rooms, moment informing, video phone discussions, and video conferencing are all viable and helpful ways for individuals to put through.

Possibly Helpless:
Computer wafers can utilize a computer organize to contaminate gadgets with computer infections or worms or avoid dissent of benefit (piece) gadgets from getting to the arrange.

May interfere with other technologies:
Certain types of radio communication, such as amateur radio, are severely disrupted by power line transmission. Additionally, it might disrupt last-mile access technologies like VDSL and ADSL. Setting up a complicated computer network can be challenging.

IV.THE COMPONENTS OF A NETWORK

The following elements make up a computer network

- Two computers or more, at the very least.
- Computers are connected via cables, while wireless connectivity is increasingly popular.
- Every computer is a form of network interface device, commonly referred to as a network interface card or NIC.
- The data is moved from one location to another via a "switch." Hubs have become obsolete.
- Network software for operating systems

V. DIFFERENT KIND OF NETWORK

A. Local area network (LAN)

The most popular kind of network is a local area network or LAN. It enables users to connect in a shared space within a short distance. Users can access the same resources after connecting[3]. When you connect your laptop to the internet at home and print a document from a printer connected to the same network, for instance, you may be using a local area network (LAN).

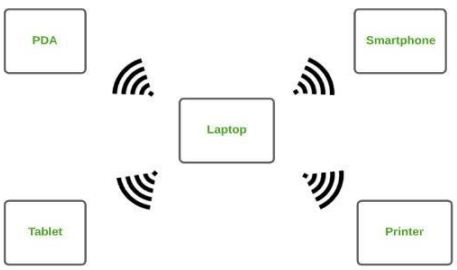

Fig 4: Local Area Network

B. Personal area network

A local area network is usually privately owned and connects some hosts in a single office, school and college.

Which is an address that uniquely defines the host in the LAN.

C. Wireless local area network

A WLAN functions similarly to a LAN in that it permits data transfer within a specific area. Usually, a cable connection is not necessary for devices that use a WLAN. Although a WLAN usually weaker and less secure than other networks, allows users access to their devices in different locations.

Fig 5: WLAN

D. Campus area network

Academies, College, and other educational institutions use campus area networks, or CAN. Though each department may have its own LAN, a CAN may link all of the school's LAN's Campus area networks combine several distinct networks into a single united whole. A CAN could be used, for example, to create a direct channel of communication between the engineering and English departments of a university.

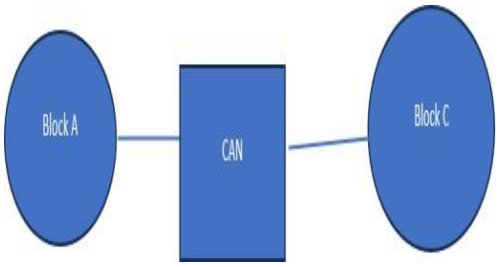

Fig 6: Campus Area Network

E. Metropolitan area network

A medium-sized network larger than a CAN is called a metropolitan area network, or MAN. A MAN offers effective connectivity between devices over a large geographic area while being an expensive network.

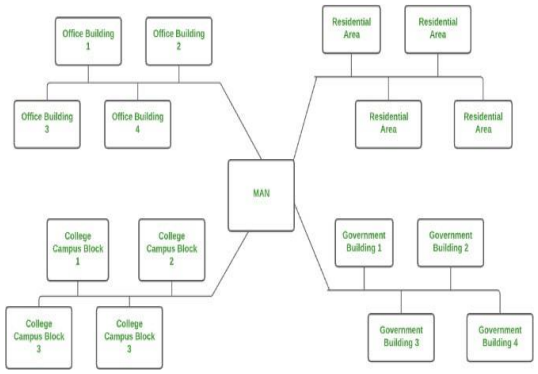

Fig 7: Metropolitan area network

F. Wide area network

A wide area network, also referred to as a WAN, is a vast network that crosses international boundaries. WANs can be used by corporations and global enterprises to provide a shared network with a large number of connections.

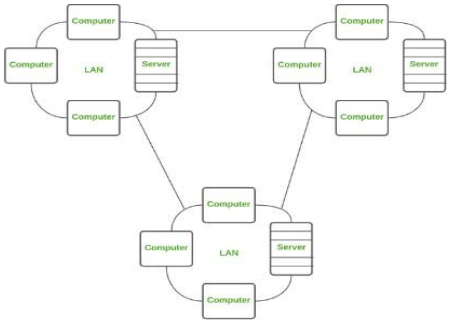

Fig 8: Wide Area Network

G. Storage area network (SAN)

Storage area networks, are used by teams to store a lot of sensitive data. Separate from the main working network, this non-localized network enables data centralization. An example of a SAN would be if your team maintains client data on a separate network so as to keep the fast speeds of your primary network

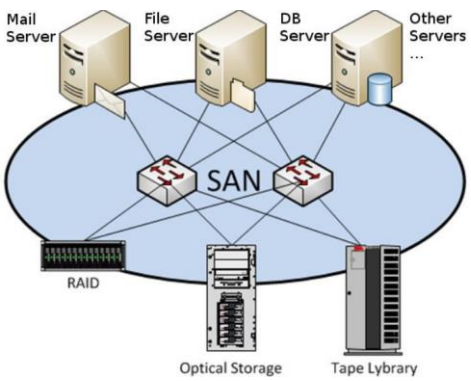

Fig 9: Storage Area Network

H. Passive optical local area network

A passive optical local area network, is a network that is cheap that connects many places to a single central network. POLANs can be used to connect multiple entities to a single information hub. A POLAN may be used, for example, if a college system's headquarters has to communicated with each college in the district.

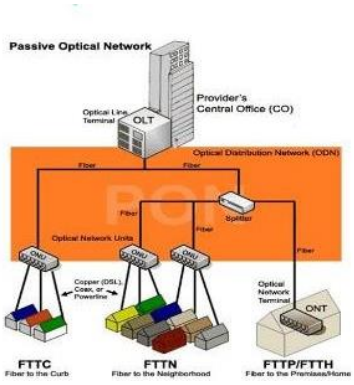

Fig 10: Passive Optical Access Network

I. Enterprise private network

A college can manage data and interact privately on a secure network as an enterprise private network (EPN). It is not provided to the public and is made to fit the particular requirements of the college.

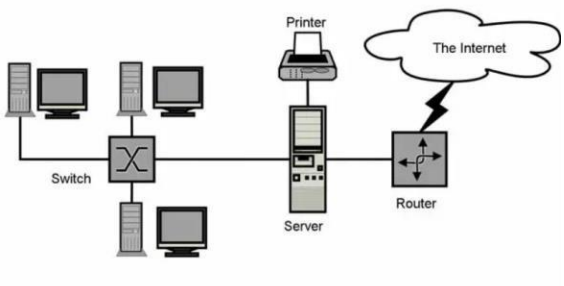

Fig 11: Enterprise Private Network

J. Virtual private network (VPN)

A virtual private network, or VPN, is a private network that can be accessed online. This kind of network operates similarly to an EPN because it provides a private, secure connection. In general, EPNs need more infrastructure as VPNs do.

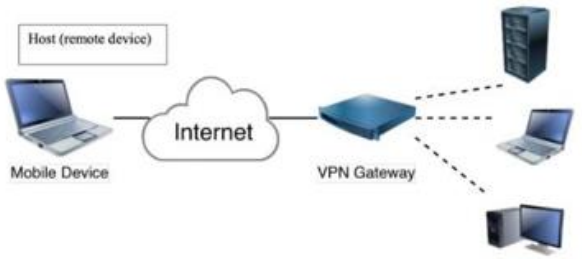

Fig 12: Virtual Private Network

K. System-area network (SAN)

A framework range organize could be a huge neighborhood arrange that gives associations in clusters. gadgets associated to a SAN work together as a single framework. As of late created, high-speed systems are known as SANs.

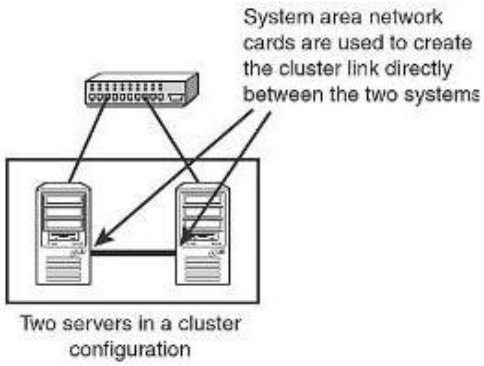

Fig 13: System Area Network

VI. Using Computer Network Technology Overview

A. Traditional computer network

The result of combining computer technology is communication technology and computer network technology. The computer network will be located in a different place, consisting of several relatively independent machines interconnected.

Different Location:

Describes a computer network where the computers are typically spread out over several physical locations, such as a room or building, or they may be thousands of miles distant. For occurrence, the server is available and the PCs we utilize are at a diverse area when we visit a WEB benefit online, and we do not allow a damn around where our clients are found.

Relatively autonomously function:

ICEMET 2015 (International Conference on Education Technology, Management, and Economy) copyright 2015. An operating system with input/output and operation functions is installed on these computers. A computer network is established to exchange information and resources. The resources that are shared could be either software or hardware. printer sharing can be empowered over the arrange, permitting the office computer organize to operate additionally to a shared printer. Regularly a common outline of hardware resource sharing. Fundamental program as an additional layout, some computers require a troublesome disk workstation; instep, they depend on the ROM to boot up and interface to the arrange. One party can exchange the medium that signals are transmitted over to another.

B. Development of computer networks

There are four general stages that computer networks go through as they evolve.

Stage 1: the early years of computer network development, from the late 1960s to the early 1970s. Its essential capacities incorporate expanding handling control and asset sharing and interfacing little computers to exploratory systems. ARPANET, he US Division of Defense built the primary inaccessible packet-switching organize[4].

LAN come to a major formative organize. The presentation of LANs as a novel computer design into the mechanical division is one of its primary highlights

Stage 2: Within the 1980s, the neighborhood zone organize computer period created. One of its essential preferences is that LAN ISO can totally execute the OSI protocol's equipment communication mode. Neighborhood range systems developed quickly after the appearance of cleverly systems (IN) and coordinates commerce information communications systems (ISDN)

C. The Next Generation of Computer Networks

Since the late 1990s, IP technology has formed the backbone of the Internet, and its development and growth tendency have been exponential. In light of the broad utilize of IP communication, which illustrated that a vigorous IP arrange might provide broadcast communications administrations, the another- era arrange concept is put out. Organize of the Following Era (NGN) Essential characteristics: The center thought behind Following Era Systems (NGN), which are based on parcel exchanging innovation, are planning to upgrade on existing IP innovation in arrange to improve the capacity of computer systems.

VII. Literature Review

Literature reviews also help researchers adopt appropriate theoretical frameworks, research methods, and data analysis techniques by situating their work in the broader academic debate (Kitchenham & Charters, 2007). However, there are several disadvantages to traditional literature evaluations like narrative reviews. Their subjective selection process, which provides authors or authors with free choices and choices, can be particularly inadequate and overly subjective. It also limits complete checks and can lead to bias (Hart, 1998). The innovative AI capabilities of management and companies have attracted great interest. Literature assessment has become important in providing insights as companies aim to use AI to leverage competitive advantages and manage complexity[5]. The amount of reviews of the AI literature is often narrow and focuses on specific issues in specific areas of research These literary notes provide information on permeation of related areas, but are often concentrated in specific areas of application. Research on the information

systems literature considers the effects of AI and AI in many questions, particularly fitness recommendation systems (Venkatachalam and N. Gurler et al. For example, Data Management and Information 8 (2024) 1000763 Ray). Opinions in the marketing field have investigated AI in consumer-machine relationships (Pentina et al., 2023) and customer relationship management (Ledro et al., 2022).

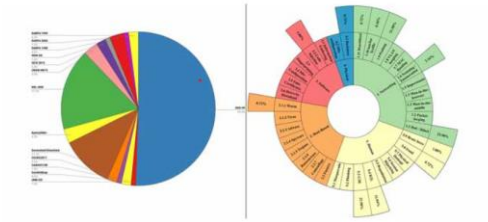

Fig 15: A Taxonomy of Network Threats Data

Certain evaluations concentrate on two topics, such as the use of AI in information systems and operational management, and certain organizations that traverse other domains, such the objectives of sustainable development (Di Vaio et al., 2020) (Grover et al., 2022). The broader ideas of AI and business have been taken into consideration in other opinions. Loureiro et al. (2021) Research 404 publications select 18 areas and consider future trends. Arsenyan & Piepenbrink (2023) evaluates 6324 articles published between 1990 and 2020 to analyze IA research in five areas of management. Two estimates show that research on artificial intelligence in the field of management has developed considerably in recent years.

VIII. The effect of AI on Self-Optimizing Networks, Predictive Maintenance, and Network Security

This provides faster response times using automated measurements such as compromised devices. AI\prediction skills support aggressive safety and predict risk before it arises. To predict equipment failures, AI analyzes sensor data, mechanical newspapers, and maintenance records. This allows for aggressive planning and reduces downtime. To avoid catastrophic failures, real -time surveillance allows you to intervene quickly[6].

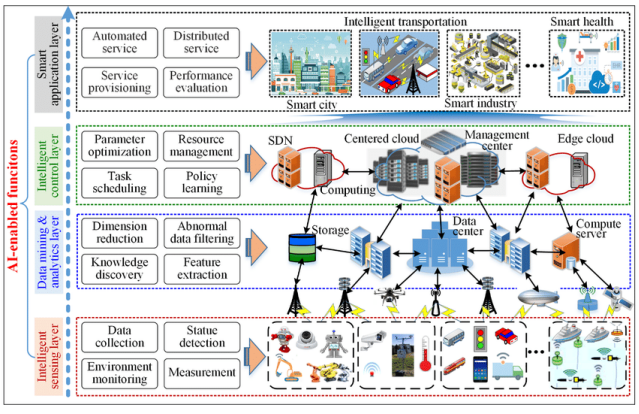

Fig 16: AI enhanced network architecture

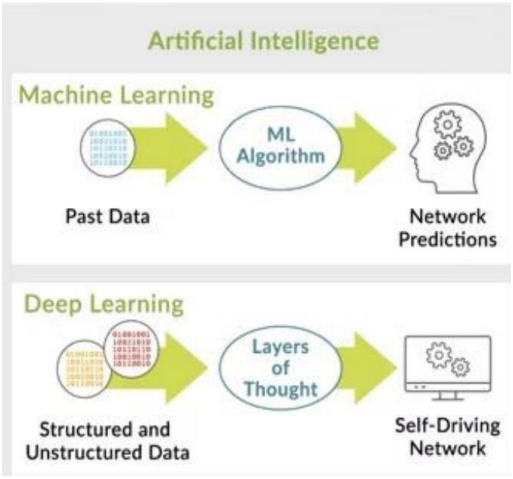

Fig 17: Artificial Intelligence

IX. Compare traditional network management with AI-driven network automation.

This includes methods such as image recognition, machine learning, and dialect comprehension. Artificial intelligence alters the architecture of systems that analyze information, develop conclusions from it, and base decisions on its claims. This enables frameworks to handle significant issues and operate faultlessly. The role of AI in a network setting is depicted in Figure 16.

A. AI Applications in Networking

There are many adaptable uses for artificial intelligence in organizing. AI is necessary for network automation and administration. Manually setting up and resolving problems is time-consuming and often leads to mistakes. These procedures are automated using real-time data with the help of AI-based network management. It continuously modifies the resources at hand to satisfy current needs keeps an eye on problems and resolves them before they become problems.

B. Benefits of AI in Networking

Using artificial intelligence in an organization's foundation certainly has some interesting benefits. First, the entire industry will show greater consistency and adaptability, leading to stable, integrated smart systems. Artificial Intelligence (AI) uses megadonts and analytics to identify trends and models to prevent or avoid problems and obstacles.AI then makes proactive adjustments to settings to preserve network stability and optimal performance[7].

X. SOFTWARE DEFINE NETWORK

The unused applications such as Google Maps, vehicle apps such as reservation vehicle booking, car on rent, and residential movement food supply systems increase the net ask.[6] For modern high-speed web request and transmission capacity, the administrators are updating new frameworks within the phone fundamental trades and introducing modern framework to fulfill the request of the clients. Within the display information organize, there was delay, jitter, and throughput were moo. The switches are utilized for keeping the enlist of IP addresses and giving directing plans. The fundamental working of switches is given in Figure 16.

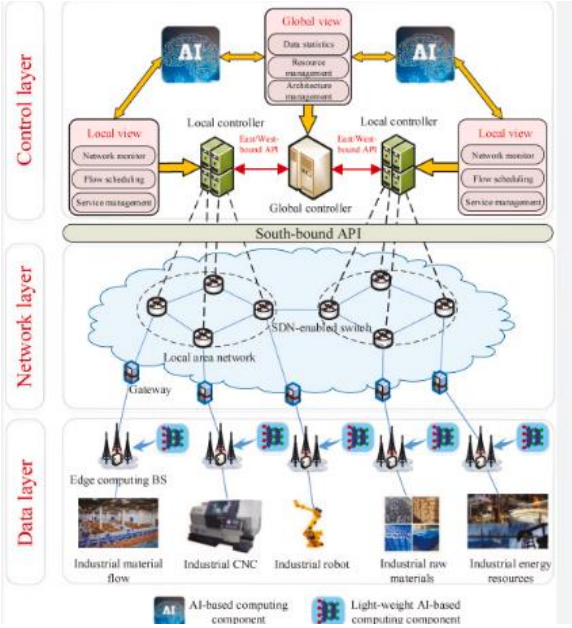

Fig 18: Software Define Network

There were numerous issues related to the switches since the switch keeps data on the neighbor's hub, but their switches have no data on the another arrange hubs. So, these switches get IP addresses and send parcels to their goal without knowing approximately blockage another to hubs or within the organize[8]. The SDN controller understands this issue by isolating the control and steering arrange from routers as appeared within the Course optimizations play an imperative part in information systems to decrease the delay and speed of bundle exchange to the goal. There are numerous steering calculations for distinctive applications given in Table 1.

Table 1. Route Optimization Algorithms

S.NO	Algorithm
1	Greedy algorithm
2	Genetic algorithms (GA)
3	Ant colony algorithms (ACO)
4	Dijkstra's algorithm
5	A* algorithm
6	Bellman-Ford algorithm
7	Floyd-Warshall algorithm

XI. NETWORK FUNCTION VIRTUALIZATION

Service providers and operators' networks can reduce their capital expenditures (CapEx) and operational expenditures (OpEx) and adjust to changing customer needs with NFV's lower-cost flexible software-based infrastructures. Through an innovation cycle of software-based QoE-rich service deployment, it also shortens the time it takes for new network services to reach the market.

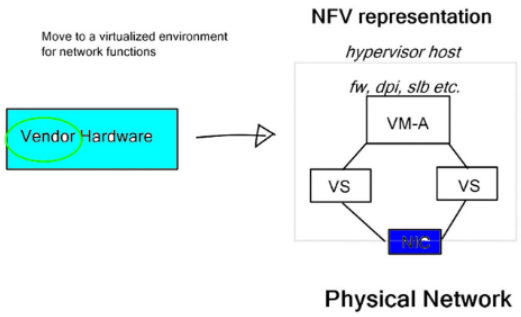

Fig:19 Network Function and Virtualization

V. CONCLUSION

In a globalized environment, computer networking has become essential for data exchange and communication. The research highlighted the basic ideas and developing technology influencing modern networks, ranging from local area networks to the vast internet. Robust and dependable

infrastructure is crucial, and we looked at a variety of network topologies, protocols, and security issues. Even faster speeds, reduced latency, and improved connectivity are anticipated with future networking developments, such as 5G and beyond, which will further change the way people communicate, work, and live. To meet the growing needs and complex of this constantly developing industry, research and development must continue.

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