

# Campus Area Network

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**Abstract**— A Campus Area Network (CAN) is a different type of network in which different devices such as computers and other device are interconnected with each other. The networking equipment's such as switches, routers and transmission media such as optical fiber, copper plant, Cat5 cabling etc. are almost entirely owned several universities, schools, companies, etc. A Campus Area Network (CAN) is larger than a Local Area Network (LAN) but smaller than a Metropolitan Area Network (MAN) or Wide Area Network (WAN). This paper represents an overview of Campus Area Network (CAN) i.e. what are its advantages and disadvantages, what additional features can be added into it, etc.

**Keywords:** Local Area Network (LAN); Campus Area Network (CAN); Internet; Security threats

## I. INTRODUCTION

A campus network, campus area network, corporate area network or CAN is a computer network made up of an interconnection of local area networks within a limited geographical area. Every area has different sets of hosts or computers connected to a switch. If there are many blocks in an area, for e.g.: Block A, Block B and Block C and so on. And every block is having a single standalone system, and then it becomes very difficult for the network administrator to handle each block and also leads to the increase in the OpEx cost. Thinking of this problem, we have come up with a solution to have a centralized system or simply a centralized campus network. If the campus area network is a standalone system it leads to the increase in maintenance of the network, also increases the complexity, since each Block having in standalone network required dedicated skilled person to monitor and report. This is leading to huge OpEx cost. We thought of making it a little less complex and reducing the OpEx cost by connecting all the blocks together and make it a centralized network. This would also make all the blocks able to send information to each other and in a more secured way. All the blocks would then be able to communicate with each other and we can then have a single administrator managing all the blocks through a centralized network.

It is usually set in Campus Area Network of colleges or schools, but the same kind of planning can be applied for the other purposes for e.g., military bases, office building, industrial complexes, public places like supermarket, theatres or entertainment centers, etc. Another form of temporary CAN exist during special event such as rallies, religious festivals. The elementary can also arise spontaneously due to the distance of spread the radio signals from the access points that are not limited by building walls. It is also sensible to have additional access points for the larger and more complex Campus Area Networks, located at specially places chosen for serving clients.

Today's, education system, i.e. one way or another, aims to form student's abilities to work with information. Existing or coming before in times of education development pay special attention to form skills of information processing,

which later becomes the mainstay of professional activity of graduates in the information society, i.e., it is a necessary component of information culture. In such situations, students will get the necessary knowledge to express them creatively, they also learn to evaluate the accuracy of the information, develop critical thinking, and distinguish information, knowledge, etc. Local networks are common in the education field. Most schools and other educational institutions and also the small companies, cyber- cafe has computers connected to a local network. At the same time, modern technologies allow to connect even the computers that are on different nations as well as continents, and not only in the same room or building. There are various numbers of educational institutions have branches in different countries, with computer connected via local network. Local Area Networks can connect computers from different colleges or universities. Using Internet, any student can get easily access to education materials that can be presented in the form of presentation or Wikipedia (e-text), as well as in the form of complex interactive systems, computer models of virtual learning environments, etc. In today's generation, the number of users and information sources of Internet is continuously increasing. In addition, there is a constant quality of telecommunications services improvement. Because of this, not only companies but organizations also operating in the economic and other fields have a high-quality access to the Internet, but also educational institutions.

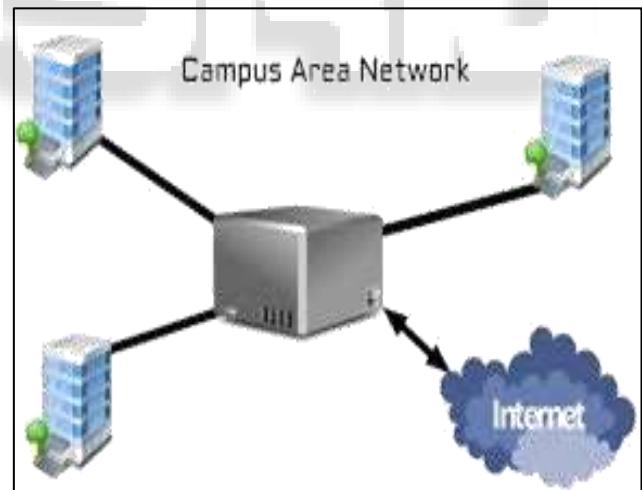


Fig. 1: Campus Area Network

## II. BACKGROUND

There are various types of networks such as Local Area Network (LAN), Personal Area Network (PAN), Campus Area Network (CAN), Storage Area Network (SAN), Wide Area Network (WAN) and Metropolitan Area Network (MAN).

A PAN is a network which surrounds itself around an individual person. PAN normally involves mobile computer, cell phones or handheld computing devices such as PDA. A LAN is a group of computers in a particular area which are connected via cables. A MAN is a network that

interconnects users with computer resources in geographic area or region. MAN is larger than the LAN and smaller than WAN. Examples of MAN are FM Radio, etc. A CAN is relating to Local Area Network (LAN) or set of connected LANs. A Storage Area Network (SAN) is a high speed network of storage device that also connect those storage devices to servers.

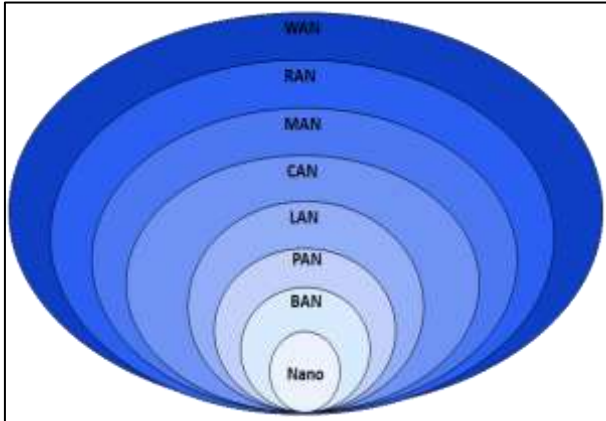


Fig. 2: Computer Network types by spatial scope

**A. Architecture of Campus Area Network:**

The campus is designed in a hierarchical manner. It is common practice in campus and enterprise networks. A hierarchical design avoids the need of fully meshed design i.e. complex structures.

IP telephony network is comparatively more interesting and exciting than campus network designing. Moreover, emerging applications like these are built upon the campus foundation. It is similar to the construction of a house; if the engineers skip the foundation level then the house will crack and eventually collapse.

**B. Types of Network Attacks:**

There are various types of active network attacks, close-in attacks, exploitations attacks by insider, attacks by the service provider. Due to these the hackers can get to know about the information, cyber-attacks can also done by the other nations, etc.

- 1) Passive Attack
- 2) Active Attack
- 3) Distributed Attack
- 4) Insider Attack
- 5) Close-in Attack
- 6) Phishing Attack
- 7) Hijack attack
- 8) Spoof attack
- 9) Buffer overflow
- 10) Exploit attack
- 11) Password attack

Real time data: some network attacks

**C. Denial of Service (DoS);**

Denial of Service (DoS) is an interruption of service, it can be held either due to system is destroyed or it is temporarily unavailable. For examples, include destroying a computer's hard disk, severing the physical infrastructure, and using up all available memory on a resource. Fig1 shows a real time

attack data in a campus network using Cyberoam security device. After Configure Firewall and VLAN for DoS attack

Attack Type	Source		Destination	
	Applied	Traffic Dropped	Applied	Traffic Dropped
SYN Flood	Yes	44844	No	0
UDP Flood	Yes	48240	No	0
TCP Flood	No	0	No	0
ICMP Flood	Yes	27	Yes	429

UDP Flooders	
IP Address	Last Seen
103.21.42.205	Sat 20 June 14:04:48
103.21.42.206	Sat 20 June 14:56:31
172.16.20.141	Sat 20 June 15:19:15
172.16.20.222	Sat 20 June 16:22:57
172.16.21.140	Sat 20 June 16:04:01
172.16.22.22	Thu 18 June 16:59:49
172.16.22.82	Sat 20 June 13:11:56
173.194.49.104	Sat 20 June 14:03:06
173.194.49.112	Sat 20 June 13:48:55
182.48.85.204	Sat 20 June 15:13:37
182.48.85.206	Sat 20 June 15:56:10
185.23.127.61	Fri 19 June 17:06:11
216.58.220.37	Sat 20 June 23:27:40
52.74.248.98	Fri 19 June 17:02:37
74.125.214.208	Sat 20 June 13:58:12

Fig. 3: Attacker IP List

**D. ARP Spoofing Attack**

ARP spoofing attack is a type of attack in which a malicious actor sends falsified ARP (Address Resolution Protocol) messages over a local area network. This results in the linking of an attacker's MAC address with the IP address of a legitimate computer or server on the network.

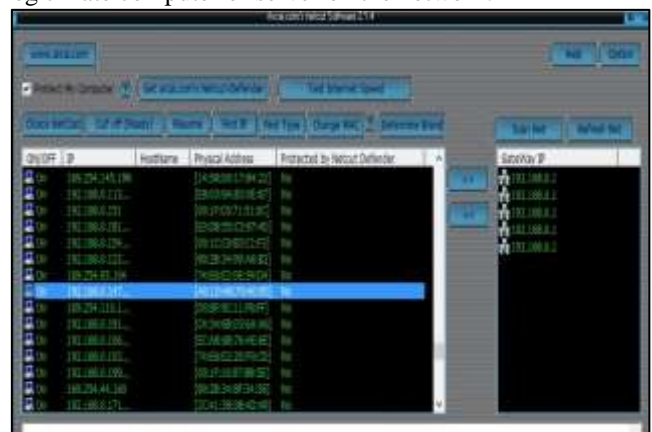


Fig. 4: ARP Spoofing Attack in Campus network

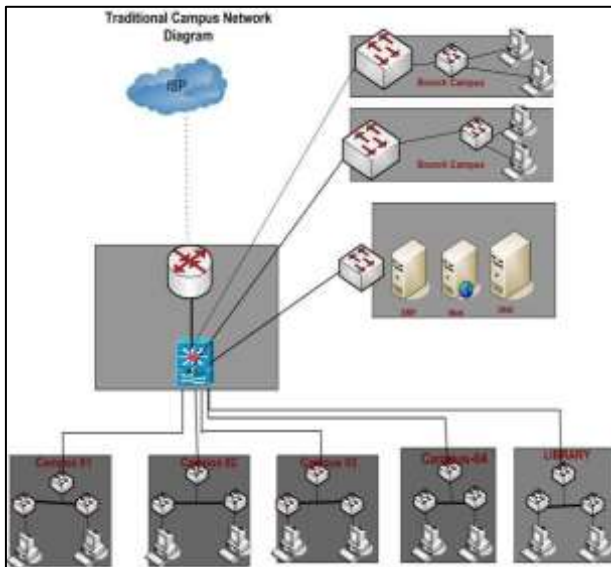


Fig. 5: Traditional Campus Network design

### III. PROBLEM DEFINITION

The problem related to campus networks are the type of wired media or wireless are to be used between buildings, outside cable specifications, rights-of-way, avoidance of natural barriers, underground or aerial cabling requirements, line of site for underbuilding wireless transmissions, and security problem. Each Block in the design was having a standalone network which increased the OpEx cost. Since, each block having in standalone network required dedicated skilled person to monitor and report. This is leading to huge OpEx cost.

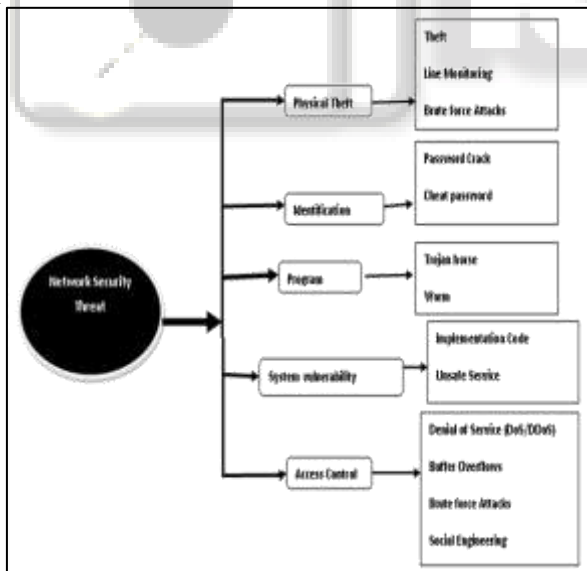


Fig. 6: Security threat of Network

Campus Area Network is more likely to have undesirable interactions between nodes. It incurs more expenditure for software development and maintenance. Maximum number of nodes is also not specified in campus area network. It also supports 64 nodes due to electrical loading.

### IV. SOLUTIONS OF IDENTIFIED PROBLEMS AND ADVANTAGES

#### A. Solutions:-

As there are many disadvantages of Campus Area Network, it can be solved by using following methods:-

- 1) Design centralized network and Connect all Block with OFC Single mode (SM) 8 core cable backbone network:-
- 2) Design and Implement network redundancy at Layer 3 core switch level
- 3) Implement Centralized monitoring System.
- 4) Implement different VLAN at Zone Level to avoid network traffic Collision.
- 5) Implement Inter VLAN Connectivity by enabling the routing capabilities.

#### B. Advantages:-

The advantages of Campus Area Network are as follows:-

- 1) Economical: Campus Area Network is economical since it uses fewer hubs, switches, routers, etc.
- 2) Sharing of data is easy: In CAN the message is sent at once and it transferred to all the linked departments.
- 3) Wireless communication: CAN is a wireless connection for connecting different types of departments, buildings, or other organizations.
- 4) Transferring files is fast: In CAN file can be transferred with high speed over the Internet.

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