An Introduction to Computer Networking: A Survey

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Abstract

Computer networks are a system of interconnected computers for the purpose of sharing digital information. The concept of a network began in 1962 when a server at the Massachusetts Institute of Technology was connected to a server in Santa Monica, California. Since that time the proliferation of computers and computer networks has increased significantly. One of the most significant challenges to networks is attacks on their resources caused by inadequate network security. In this research paper we highlight and overview concept of computer networks. Computer networks have become increasingly ubiquitous. In today's world, a computer network is much more than a collection of interconnected devices. Computer networks are a system of interconnected computers for the purpose of sharing digital information. The computer network enables to analyze, organize and disseminate the information that is essential to profitability. The rise of intranets and internets is the important aspect of computer networking. Intranets and internets are private business networks that are based on internet technology. The businesses are currently implementing intranets at a breakneck pace and for one reason only, an intranet enables a business to collect, manage and disseminate information more quickly and easily than ever before. Many businesses are implementing intranets simply to remain competitive; business that delay is likely to see their competition outdistance them. In this article we are presenting the basic concepts of networking.

Keywords: Inter-Networks, Intra-Networks, Communication Medium, Computer Networks, Wireless Communication

I. INTRODUCTION

Networking supports communication between two or more programs running on physically distant machines. A computer network is a collection of computers, which are in some way connected such that they can exchange data between themselves and other computers on the network. A network is created when two or more computers are connected to share information and resources [1]. A set of computers exchanging information by common conventions called protocols over communication media. A computer network is simply computers wired together in a way that lets them share data and/or devices such as hard drives, CD-ROMs, fax-modems, printers, etc [2]. A computer network is an interconnected collection of autonomous computers where interconnected means that the computers can exchange information and autonomous means that no computer can start, stop or control another computer connected to the network.

II. HISTORY

Making devices talk to each other for the purposes of communication is nothing new. Early forays into telephony such as the telegraph and telephone have since evolved into more complicated devices, and now a computer can be networked to the Internet, another PC, or even a home stereo. In the early 1960s, individual computers had to be physically shared, making the sharing of data and other information difficult. Seeing this was impractical, researchers developed a way to "connect" the computers so they could share their resources more efficiently. Hence, the early computer network was born [3].

Through the then-new communication protocol known as packet switching, a number of applications, such as secure voice transmission in military channels became possible. These new circuits provided the basis for the communication technologies of the rest of the 20th century, and with further refinement these were applied to computer networks. These networks provided the basis for the early ARPANET, which was the forerunner of the modern Internet. The Advanced Research Projects Agency (ARPA) submitted the proposal for the project on June 3, 1968 which was approved a few weeks later. This proposal entitled "Resource Sharing Computer Networks" would allow ARPA not only the further sharing of their data, but would allow them to further their research in a wide variety of military and scientific fields [4]. After being tested in four locations, the network spread and the new protocols created for its use evolved into today's World Wide Network.

In 1977, early PC-based Local Area Networks, or LANs (Local Area Networks) were spreading, and while initially restricted to academics and hobbyists, they eventually found their way into the workplace and in homes, although the explosion into the latter two arenas is a relatively recent phenomenon [5, 6]. LAN variants also developed, including Metropolitan Area Networks (MANs) to cover large areas such as a college campus, and Wide Area Networks (WANs) for university-to-university communication. With the widespread use of computers in the corporate world, the speed and convenience of using them to communicate and transfer data has forever altered the landscape of how people conduct business. Networks have become an integral part of the corporate

world. Ubiquitous computing and Internet-capable cellular phones have allowed people to remain connected, even if the individual is away from a fully wired office environment.

III. COMPONENTS OF A NETWORK

A computer network comprises the following components:
- A minimum of at least two computers.
- Cables that connect the computers each other, although wireless communication is becoming more common [7].
- A network interface device on each computer (this is called a network interface card or NIC).
- A "switch" used to switch the data from one point to another. Hubs are outdated.
- Network operating system software [4].

IV. TYPES OF NETWORK

There are many types of computer networks, the common types of area networks including those five: LAN - Local Area Network, WAN - Wide Area Network, WLAN - Wireless Local Area Network, MAN - Metropolitan Area Network and CAN - Campus Area Network [9, 10].

A. LAN (Local Area Network)

Can go up to 1 KM radius. A local area network (LAN) is a group of computers and associated devices that share a common communications line or wireless link to a server. Typically, a LAN encompasses computers and peripherals connected to a server within a distinct geographic area such as an office or a commercial establishment.

B. WAN (Wide Area Network)

No Limit. A wide area network (WAN) is a network that exists over a large-scale geographical area. A WAN connects different smaller networks, including local area networks (LANs) and metro area networks (MANs). This ensures that computers and users in one location can communicate with computers and users in other locations. WAN implementation can be done either with the help of the public transmission system or a private network.

C. WLAN (Wireless Local Area Network)

A wireless local area network (WLAN) is a wireless computer network that links two or more devices using wireless communication within a limited area such as a home, school, computer laboratory, or office building. This gives users the ability to move around within a local coverage area and yet still be connected to the network. Through a gateway, a WLAN can also provide a connection to the wider Internet.

D. MAN (Metropolitan Area Network)

A metropolitan area network is a computer network that interconnects users with computer resources in a geographic area or region larger than that covered by even a large local area network (LAN) but smaller than the area covered by a wide area network (WAN). The term is applied to the interconnection of networks in a city into a single larger network (which may then also offer efficient connection to a wide area network). It is also used to mean the interconnection of several local area networks by bridging them with backbone lines. The latter usage is also sometimes referred to as a campus network.

E. CAN (Campus Area Network)

A campus area network is a computer network made up of an interconnection of local area networks (LANs) within a limited geographical area. The networking equipments (switches, routers) and transmission media (optical fiber, copper plant, Cat5 cabling etc.) are almost entirely owned by the campus tenant / owner: an enterprise, university, government etc.

V. CONCLUSION

While the age-old concept of the network is foundational in virtually all areas of society, Computer Networks and Protocols have forever changed the way humans will work, play, and communicate. Forging powerfully into areas of our lives that no one had expected, digital networking is further empowering us for the future. Computer communication, it seems, will become a much more useful networking tool when large numbers of people with similar interests acquire access to the technology. Though it can expedite the formation of new interpersonal networks by overcoming the space and time barriers faced by traditional networking techniques, it still requires a great deal of concentrated effort and resources to get the people to use it. This problem should become increasingly minimized over the coming years as the technological innovations become more diffused throughout society [8]. New protocols and standards will emerge, new applications will be conceived, and our lives will be further changed and enhanced [11,

12]. While the new will only be better, the majority of digital networking's current technologies are not cutting-edge, but rather are protocols and standards conceived at the dawn of the digital networking age that have stood solid for over thirty years.

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