Prespective

iMedPub Journals
www.imedpub.com

International Journal of Innovative Research in Computer and Communication Engineering

2023
Vol.8 No.1:108

Wired, Optical and Wireless Radio-Frequency Methods Which Can be Arranged in a Variety of Network Topologies

Jacob Dwinell*

Department of Information and Computer Science, Utrecht University, Utrecht, Netherlands

***Corresponding author:** Jacob Dwinell, Department of Computer Sciences, Loyola University Maryland, MD, USA; E-mail: dwinell.j@yahoo.com

Received date: October 28, 2022, Manuscript No. IJIRCCE-22-14834; **Editor assigned date:** October 31, 2022, PreQC No. IJIRCCE-22-14834 (PQ); **Reviewed date:** November 15, 2022, QC No. IJIRCCE-22-14834; **Revised date:** February 09, 2023, Manuscript No. IJIRCCE-22-14834 (R); **Published date:** February 16, 2023, DOI: 10.36648/IJIRCCE.8.1.108

Citation: Dwinell J (2023) Wired, Optical and Wireless Radio-Frequency Methods Which Can be Arranged in a Variety of Network Topologies. Int J Inn Res Compu Commun Eng Vol:8 No:1

Abstract

A collection of computers sharing resources on or provided by network nodes is referred to as a computer network. The computers communicate with one another *via* digital interconnections and common communication protocols. Telecommunication network technologies, based on physically wired, optical and wireless radio-frequency methods that can be arranged in a variety of network topologies, comprise these interconnections.

Keywords: Computer network; Maximum Transmission Unit (MTU); Protocols; Network Interface Controller (NIC); Media Access Control (MAC)

Introduction

Nodes of a computer network

Personal computers, servers, networking hardware and other specialized or general-purpose hosts are examples of the nodes of a computer network. They may have hostnames and are identified by their network addresses. The nodes' memorable hostnames are rarely altered after initial assignment [1]. Network addresses are used by communication protocols like the internet protocol to locate and identify the nodes. The transmission medium used to carry signals; bandwidth and communications protocols used to organize network traffic, network size, topology, traffic control mechanism and organizational intent are some of the criteria that can be used to classify computer networks. Access to the World Wide Web (WWW), digital video and audio, shared use of application and storage servers, printers and fax machines, as well as the use of email and instant messaging applications are all supported by computer networks. Protocols based on packet mode transmission are prevalent in today's computer networks.

Description

An organization parcel is a designed unit of information conveyed by a bundle exchanged network. There are two types of data in a packet: Control information as well as user data. The source and destination network addresses, error detection codes and sequencing information, among other things, are provided by the control information to the network so that it can deliver the user data. Control information is typically contained in the payload data and packet headers, respectively. The transmission medium's bandwidth can be shared among users more effectively with packets than with a circuit-switched network. The link can be filled with packets from other users when one user isn't sending any packets, so the cost can be shared with little interference if the link isn't used too much. A packet's required path through a network is frequently unavailable right away. The packet is then placed in a queue and waited until a link became available [2]. The physical link technologies of a packet network typically set a Maximum Transmission Unit (MTU) for the size of each packet. Before being transferred, a longer message might be broken up into smaller pieces, which are then put back together when the packets get there to make the original message. While the topology of a network's interconnections can have a significant impact on its throughput and reliability, the physical or geographical locations of network nodes and links typically have only a minor impact. A single failure can cause the entire network to fail with many technologies, such as bus or star networks. In general, the network's robustness increases with the number of interconnections; but the installation costs are higher. As a result, the majority of network diagrams are organized according to their network topology, which is a map of the logical connections between network hosts. A virtual network that is constructed on top of another network is known as an overlay network. Virtual or logical links connect the overlay network's nodes. The underlying network has a path that runs through each link, possibly through multiple physical links. The overlay network's topology may and frequently does, differ from the underlying networks. Overlay networks, for instance, are prevalent in peer-to-peer networks [3]. They are organized as nodes in a virtual network of links that runs on top of the Internet. Overlay networks have been around since the invention of networking, when modems connected computer systems over telephone lines before there was a data network.

Striking examples of an overlay network

The internet itself is the most striking example of an overlay network. Each internet node can communicate with virtually any other through an underlying mesh of sub-networks with wildly different topologies and technologies. The internet was initially constructed as an overlay on the telephone network [4]. A fully connected IP overlay network can be mapped to its underlying network *via* address resolution and routing. A distributed hash table, which maps keys to network nodes, is another example of an overlay network. An IP network serves as the underlying network in this instance and a key indexed table or map, serves as the overlay network. Additionally, overlay networks have been proposed as a means of enhancing Internet routing, such as achieving higher quality streaming media through quality of service guarantees. An overlay network, on the other hand, can be incrementally deployed on end hosts running the overlay protocol software without the cooperation of internet service providers. Previous proposals like IntServ, DiffServ and IP multicast have not received widespread acceptance due to the fact that they require modification of all routers in the network. Although the overlay network has no control over how packets are routed between two overlay nodes in the underlying network, it can control, for instance, the order in which a message travels through overlay nodes before reaching its destination. For instance, Akamai technologies oversees a content delivery overlay network that is dependable and effective (a type of multicast). End-system multicast, resilient routing and quality of service studies are just a few examples of academic research. Electrical cable, optical fibre and free space are the transmission media (also known as the physical medium) used to connect devices in a computer network. The OSI model defines the media handling software at layers 1 and 2, which are the physical layer and the data link layer. Ethernet is the collective name for a family that is widely used in LAN technology and makes use of copper and fibre media. IEEE 802.3 defines the media and protocol standards that make it possible for networked devices to communicate over Ethernet. While some wireless LAN standards use infrared signals as a transmission medium, others use radio waves [5]. Data is transmitted through power line communication by means of a building's power cabling. Low level network information can be processed by computer hardware known as a Network Interface Controller (NIC), which connects the computer to the network media.

Conclusion

The NIC may, for instance, include the circuitry necessary to accept a cable or an aerial for wireless transmission and reception. Each network interface controller in an Ethernet network has a distinct Media Access Control (MAC) address, which is typically stored in the controller's permanent memory. The Institute of Electrical and Electronics Engineers (IEEE) is in charge of ensuring that each MAC address remains unique in order to prevent address conflicts between network devices. Six octets make up an Ethernet MAC address. In order to identify NIC manufacturers, the three most significant octets are reserved. Using only their prefixes, these manufacturers assign each ethernet interface's three least significant octets in a unique way.

References

1. Chowdhury MZ, Hasan MK, Shahjalal M, Hossan MT, Jang YM (2020) Optical wireless hybrid networks: Trends, opportunities, challenges, and research directions. IEEE Commun Surv Tutor 22:930-966
2. Chevalier L, Sahuguede S, Julien-Vergonjanne A (2015) Optical wireless links as an alternative to radio-frequency for medical body area networks. IEEE J Sel Areas Commun 33:2002-2010
3. Peppas KP, Alexandropoulos GC, Datsikas CK, Lazarakis FI (2011) Multivariate gamma–gamma distribution with exponential correlation and its applications in radio frequency and optical wireless communications. IET Microw. Antennas Propag 5:364-371
4. Alsemmeari RA, Bakhsh ST, Alsemmeari H (2016) Free space optics *vs.* radio frequency wireless communication. Int J Inf Technol Comput Sci 8:1-8
5. Torres-Company V, Weiner AM (2014) Optical frequency comb technology for ultra broadband radio-frequency photonics. Laser Photonics Rev 8:368-393