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Data communication and Networking: Review

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ABSTRACT

This article is the reviews of data communication and networking. Data communications is the transfer of data (a digital bitstream or a digitized analog signal) over a point-to-point or point-to-multipoint communication channel. Examples of such channels are copper wires, optical fibers, wireless communication channels, storage media and computer buses. The data are represented as an electromagnetic signal, such as an electrical voltage, radiowave, microwave, or infrared signal. Networking is the exchange of information and ideas among people with a common profession or special interest, usually in an informal social setting. Networking is used by professionals to expand their circles of acquaintances, to find out about job opportunities in their fields, and to increase their awareness of news and trends in their fields or in the greater world. (The term computer networking refers to linking multiple devices so that they can readily share information and software resources. Networking often begins with a single point of common ground. The most obvious is a professional affiliation, such as stock brokers, but some people find effective networking opportunities in a college alumni group, a church or synagogue social group, or a private club. Data communications globally is something that people can expect as technology advances. Wireless communications has a lot of benefits and can make the world a lot more efficient.

Keywords: Data, communication, networking.

INTRODUCTION

Data communications refers to the transmission of this digital data between two or more computers and a computer network or data network is a telecommunications network that allows computers to exchange data. The physical connection between networked computing devices is established using either cable media or wireless media. The best-known computer network is the Internet. Data communications is the transfer of data (a digital bitstream or a digitized analog signal [1] over a point-to-point or point-to-multipoint communication channel. Examples of such channels are copper wires, optical fibers, wireless communication channels, storage media and computer buses. The data are represented as an electromagnetic signal, such as an electrical voltage, radiowave, microwave, or infrared signal [2].

Networking is the exchange of information and ideas among people with a common profession or special interest, usually in an informal social setting. Networking is used by professionals to expand their circles of acquaintances, to find out about job opportunities in their fields, and to increase their awareness of news and trends in their fields or in the greater world. (The term computer networking refers to linking multiple devices so that they can readily share information and software resources [3].

Analog or analogue transmission is a transmission method of conveying voice, data, image, signal or video information using a continuous signal which varies in amplitude, phase, or some other property in proportion to that of a variable. The messages are either represented by a sequence of pulses by means of a line code (baseband transmission), or by a

limited set of continuously varying wave forms (passband transmission), using a digital modulation method [4] [5]. The passband modulation and corresponding demodulation (also known as detection) is carried out by modem equipment. According to the most common definition of digital signal, both baseband and passband signals representing bit-streams are considered as digital transmission, while an alternative definition only considers the baseband signal as digital, and passband transmission of digital data as a form of digital-to-analog conversion.

Data transmitted may be digital messages originating from a data source, for example a computer or a keyboard [6]. It may also be an analog signal such as a phone call or a video signal, digitized into a bit-stream, for example, using pulse-code modulation (PCM) or more advanced source coding (analog-to-digital conversion and data compression) schemes. This source coding and decoding is carried out by codec equipment.

The meanings of source and receiver are very simple [7]. The device that transmits the data is known as source and the device that receives the transmitted data is known as receiver. Data communication aims at the transfer of data and maintenance of the data during the process but not the actual generation of the information at the source and receiver.

Datum mean the facts information statistics or the like derived by calculation or experimentation. The facts and information so gathered are processed in accordance with defined systems of procedure. Data can exist in a variety of forms such as numbers, text, bits and bytes [8]. The Figure is an illustration of a simple data communication system.

A data communication system may collect data from remote locations through data transmission circuits, and then outputs processed results to remote locations. Figure provides a broader view of data communication networks. The different data communication techniques which are presently in widespread use evolved gradually either to improve the data communication techniques already existing or to replace the same with better options and features. Then, there are data communication jargons to contend with such as baud rate, modems, routers, LAN, WAN, TCP/IP, ISDN, during the selection of communication systems. Hence, it becomes necessary to review and understand these terms and gradual development of data communication methods [9].

Types of Networking

Networking often begins with a single point of common ground. The most obvious is a professional affiliation, such as stock brokers, but some people find effective networking opportunities in a college alumni group, a church or synagogue social group, or a private club.

For professionals, the best networking opportunities may occur at trade shows, seminars, and conferences, which are designed to attract a large crowd of like-minded individuals.

Networking helps a professional keep up with current events in the field, and develops relationships that may boost future business or employment prospects. Needless to say, it also provides opportunities to help other people find jobs, make connections and catch up on the news [10].

Business Networking

Small business owners network to develop relationships with people and companies they may do business with in the future. These connections help them establish rapport and trust among people in their own communities [11].

Successful business networking involves regularly following up with contacts to exchange valuable information that may not be readily available outside the network.

Online Networking

Professional networking platforms such as LinkedIn provide an online location for people to engage with other professionals, join groups, post blogs, and share information. And, of course, they provide a place to post a resume that

can be seen by prospective employers, to search for jobs, or to identify job candidates [12].

These days, a business-to-business customer pipeline can be developed almost entirely through the use of a social networking site. Online networking forum allows professionals to demonstrate their knowledge and connect with like-minded people.

LinkedIn is the largest professional network, but there are many others. Some cater to particular subsets of people, such as Black Business Women Online. Others have a different focus, such as MeetUp, which encourages its members to meet in person off-site. Lunchmeet is just what it sounds like: It's a mobile app that identifies folks in your field who are available locally for a meet-up [13].

Brief history of Data Communication

Data has been sent via non-electronic means since the advent of communication. Analog signal data has been sent electronically since the advent of the telephone. However, the first data electromagnetic transmission applications in modern time were telegraphy (1809) and teletypewriters (1906), which are both digital signals. The fundamental theoretical work in data transmission and information theory by Harry Nyquist, Ralph Hartley, Claude Shannon and others during the early 20th century, was done with these applications in mind [14].

Data communication is utilized in computers in computer buses and for communication with peripheral equipment via parallel ports and serial ports such as RS-232 (1969), Firewire (1995) and USB (1996). The principles of data transmission are also utilized in storage media for Error detection and correction since 1951.

Data communication is utilized in computer networking equipment such as modems (1940), local area networks (LAN) adapters (1964), repeaters, repeater hubs, microwave links, wireless network access points (1997), etc.

In telephone networks, data communication is utilized for transferring many phone calls over the same copper cable or fiber cable by means of Pulse code modulation (PCM), i.e. sampling and digitization, in combination with Time division multiplexing (TDM) (1962). Telephone exchanges have become digital and software controlled, facilitating many value added services [15]. For example, the first AXE telephone exchange was presented in 1976. Since the late 1980s, digital communication to the end user has been possible using Integrated Services Digital Network (ISDN) services. Since the end of the 1990s, broadband access techniques such as ADSL, Cable modems, fiber-to-the-building (FTTB) and fiber-to-the-home (FTTH) have become widespread to small offices and homes. The current tendency is to replace traditional telecommunication services by packet mode communication such as IP telephony and IPTV.

Transmitting analog signals digitally allows for greater signal processing capability. The ability to process a communications signal means that errors caused by random processes can be detected and corrected. Digital signals can also be sampled instead of continuously monitored. The multiplexing of multiple digital signals is much simpler to the multiplexing of analog signals.

Because of all these advantages, and because recent advances in wideband communication channels and solid-state electronics have allowed scientists to fully realize these advantages, digital communications has grown quickly. Digital communications is quickly edging out analog communication because of the vast demand to transmit computer data and the ability of digital communications to do so.

The digital revolution has also resulted in many digital telecommunication applications where the principles of data transmission are applied. Examples are second-generation (1991) and later cellular telephony, video conferencing, digital TV (1998), digital radio (1999), telemetry, etc.

Data communications is the physical transfer of data (a digital bit stream or a digitized analog signal[1]) over a point-to-

point or point-to-multipoint communication channel. Examples of such channels are copper wires, optical fibers, wireless communication channels, storage media and computer buses. The data are represented as an electromagnetic signal, such as an electrical voltage, radiowave, microwave, or infrared signal.

While analog transmission is the transfer of a continuously varying analog signal over an analog channel, digital communications is the transfer of discrete messages over a digital or an analog channel. The messages are either represented by a sequence of pulses by means of a line code (baseband transmission), or by a limited set of continuously varying wave forms (passband transmission), using a digital modulation method. The passband modulation and corresponding demodulation (also known as detection) is carried out by modem equipment. According to the most common definition of digital signal, both baseband and passband signals representing bit-streams are considered as digital transmission, while an alternative definition only considers the baseband signal as digital, and passband transmission of digital data as a form of digital-to-analog conversion.

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Components of Data Communication system

A Communication system has following components:

1. Message: It is the information or data to be communicated. It can consist of text, numbers, pictures, sound or video or any combination of these.
2. Sender: It is the device/computer that generates and sends that message.
3. Receiver: It is the device or computer that receives the message. The location of receiver computer is generally different from the sender computer. The distance between sender and receiver depends upon the types of network used in between.
4. Medium: It is the channel or physical path through which the message is carried from sender to the receiver. The medium can be wired like twisted pair wire, coaxial cable, fiber-optic cable or wireless like laser, radio waves, and microwaves.
5. Protocol: It is a set of rules that govern the communication between the devices. Both sender and receiver follow same protocols to communicate with each other.

A protocol performs the following functions:

1. Data sequencing. It refers to breaking a long message into smaller packets of fixed size. Data sequencing rules define the method of numbering packets to detect loss or duplication of packets, and to correctly identify packets, which belong to same message.
2. Data routing. Data routing defines the most efficient path between the source and destination.
3. Data formatting. Data formatting rules define which group of bits or characters within packet constitute data, control, addressing, or other information.
4. Flow control. A communication protocol also prevents a fast sender from overwhelming a slow receiver. It ensures resource sharing and protection against traffic congestion by regulating the flow of data on communication lines.
5. Error control. These rules are designed to detect errors in

messages and to ensure transmission of correct messages. The most common method is to retransmit erroneous message block. In such a case, a block having error is discarded by the receiver and is retransmitted by the sender.

6. Precedence and order of transmission. These rules ensure that all the nodes get a chance to use the communication lines and other resources of the network based on the priorities assigned to them.
7. Connection establishment and termination. These rules define how connections are established, maintained and terminated when two nodes of a network want to communicate with each other.
8. Data security. Providing data security and privacy is also built into most communication software packages. It prevents access of data by unauthorized users.
9. Log information. Several communication software are designed to develop log information, which consists of all jobs and data communications tasks that have taken place. Such information may be used for charging the users of the network based on their usage of the network resources.

The effectiveness depends on four fundamental characteristics of data communications

1. Delivery: The data must be deliver in correct order with correct destination.
2. Accuracy: The data must be deliver accurately.
3. Timeliness: The data must be deliver in a timely manner.late delivered Data useless.
4. Jitter: It is the uneven delay in the packet arrival time that cause uneven quality

CONCLUSION

In conclusion, wireless communications globally is something that people can expect as technology advances. Wireless communications has a lot of benefits and can make the world a lot more efficient. It does have concerns though as with every other new advancement that is made in today's world. The issues with security regarding access to a person's personal information or the negative impact that it may seem to have on society are a few things that are holding back the progress that wireless technology could be making. With more research and experiments conducted, the problems associated with wireless communications can be reduced and make it a more significant part of the world. Wireless technology will be very important in the near future where the need for wires connecting individual devices seems to be coming to an end.

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