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Editorial

We would like to wholeheartedly thank our honorable Chairman, **Lion.Dr.K.S.Rangasamy** and vice chairman **Mr.R.Srinivasan**, and Principal **Dr.M.Venkatesan** for their continuous encouragement and constant support for bringing out the magazine. We profoundly thank our Head of the Department **Dr.P.Meenakshi Devi** for encouraging and motivating us to lead the magazine a successful one right from the beginning. **DIGITIMES** serves as a platform for updating and enhancing upcoming technologies in Information Technology. We are also grateful to all the contributors and faculty coordinator to bring this magazine.

By,
Editorial Board

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NETWORKING TECHNOLOGY

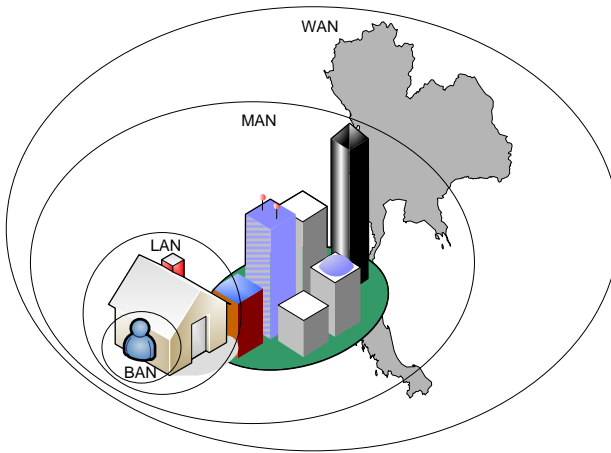
What is networking technology?

Network technology is the use of connected systems either via optic cable, satellite, wireless connections to relay various data, communication and resources in different parts of the world. It uses a build infrastructure to relay information either through communication, internet networking, voice calls, etc.



TYPES OF NETWORK

1. Based on Transmission medium



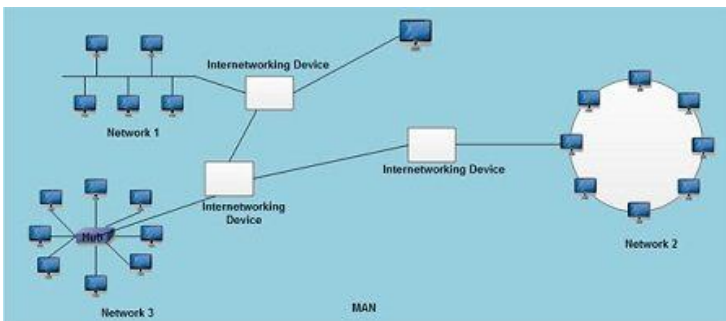
LAN

A **Local Area Network** is a privately owned computer **network** covering a **small Networks geographical area**, like a home, office, or groups of buildings e.g. a school Network. A LAN is used to connect the computers and other network devices so that the devices can communicate with each other to share the resources. The resources to be shared can be a hardware device like printer, software like an application program or data. The size of

LAN is usually small. The various devices in LAN are connected to central devices called Hub or Switch using a cable.

Now-a-days LANs are being installed using wireless technologies. Such a system makes use of access point or APs to transmit and receive data. One of the computers in a network can become a server serving all the remaining computers called Clients.

MAN (Metropolitan Area Networks)

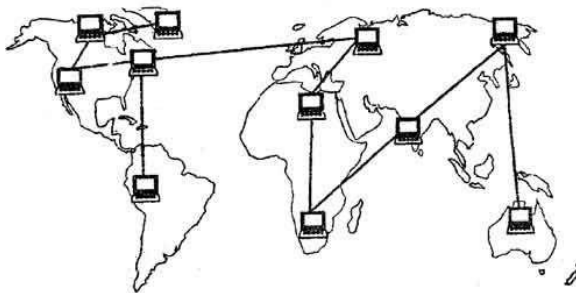


MAN stands for Metropolitan Area Networks is one of a number of types of networks. A MAN is a relatively new class of network. MAN is larger than a local area network and as its name implies, covers the area of a single city. MANs rarely extend beyond 100 KM and frequently comprise a combination of different hardware and transmission media.

It can be single network such as a cable TV network, or it is a means of connecting a number of LANs into a larger network so that resources can be shared LAN to LAN as well as device to device.

WAN (Wide Area Networks)

A wide area network (WAN) is a telecommunication network. A wide area network is simply a LAN of LANs or Network of Networks. WANs connect LANs that may be on opposite sides of a building, across the country or around the world. WANS are characterized by the slowest data communication rates and the largest distances. WANs can be of two types: an enterprise WAN and Global WAN.



WAN

2. Based on Transmission medium

Wired

A **wired network** is a common type of **wired** configuration. Most **wired networks** use Ethernet cables to transfer data between connected PCs. In a small **wired network**, a single router may be used to connect all the computers. Larger **networks** often involve multiple routers or switches that connect to each other.



Wireless

Wireless networking is a method by which homes, telecommunications networks and business installations avoid the costly process of introducing cables into a building, or as a connection between various equipment locations.[2] Wireless telecommunications networks are generally implemented and administered using radio communication.



BY

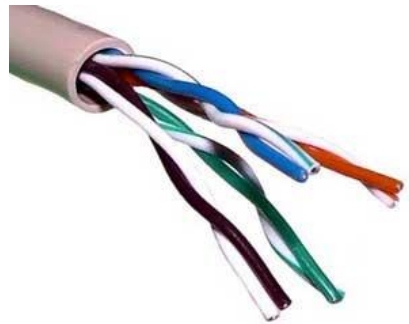
HEMAPRIYA M III Year/IT

TRANSMISSION MEDIA TYPES

UTP - Unshielded twisted pair

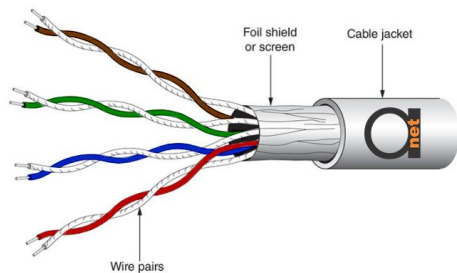
Short for *unshielded twisted pair*, a popular type

of cable that consists of two unshielded wires twisted around each other. Due to its low cost, UTP cabling is used extensively for local-area networks (LANs) and telephone connections. UTP cabling does not offer as high bandwidth or as good protection from interference as coaxial or fiber optic cables, but it is less expensive and easier to work with.



STP - Shielded twisted pair

Shielded twisted pair (STP) cable was originally designed by IBM for token ring networks that include two individual wires



covered with a foil shielding, which prevents electromagnetic interference, thereby transporting data faster.

STP is similar to unshielded twisted pair (UTP); however, it contains an extra foil wrapping or copper braid jacket to help shield the cable signals from interference. STP cables are costlier when compared to UTP, but has the advantage of being capable of supporting higher transmission rates across longer distances.

Coaxial (thick and thin)



Coaxial cabling has a single copper conductor at its center. A plastic layer provides insulation between the center conductor and a braided metal shield. The metal shield helps to block any outside interference from fluorescent lights, motors, and other computers.

Although coaxial cabling is difficult to install, it is highly resistant to signal interference. In addition, it can support greater cable lengths between network devices than twisted pair cable. There are two types of coaxial cabling: thick coaxial and thin coaxial.

Fiber Optic

A thin flexible and transparent wire prepared for light propagation is called optical fibre. The optical fibre has been constructed for the following reasons: The light wave cannot traverse long distance in air without any losses. To make loss less light wave communication, the optical waves can be guided through optical fibre

Infrared

IR wireless is the use of wireless technology in devices or systems that convey data through infrared (IR) radiation. Infrared is electromagnetic energy at a wavelength or wavelengths somewhat longer than those of red light.



Radio

The two-way type of **radio network** shares many of the same technologies and components as the broadcast-type **radio network** but is generally set up with fixed broadcast points with co-located receivers and mobile receivers/transmitters or transceivers.

Microwave

A microwave link is a communications system that uses a beam of radio waves in the microwave frequency range to transmit video, audio, or data between two locations, which can be from just a few feet or meters to several miles or kilometers apart.

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MEPHYMONY D II Year/IT

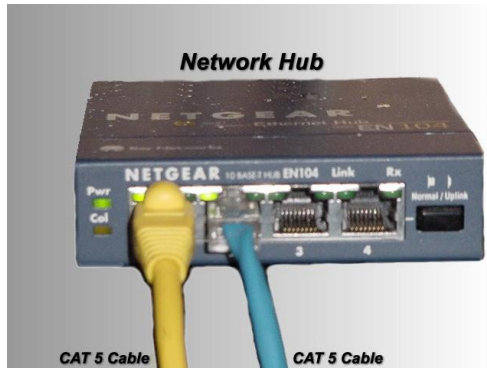
Types of Network Connections

- 1. Fixed Broadband Internet*
- 2. Mobile Internet*
- 3. Virtual Private Network
(VPN)*
- 4. Dial-up Networks*
- 5. Local Area Network (LAN)*
- 6. Direct Networks*

NETWORKING DEVICES

Network Hub:

Network Hub is a networking device which is used to connect multiple network hosts. A network hub is also used to do data transfer. The data is transferred in



terms of packets on a computer network. So when a host sends a data packet to a network hub, the hub copies the data packet to all of its ports connected to. Like this, all the ports know about the data and the port for whom the packet is intended, claims the packet.

However, because of its working mechanism, a hub is not so secure and safe. Moreover, copying the data packets on all the interfaces or ports makes it slower and more congested which led to the use of network switch.

Network Switch:



Like a hub, a switch also works at the layer of LAN (Local Area Network) but you can say that a switch is more intelligent than a hub. While hub just does the work of data forwarding, a switch does ‘filter and forwarding’ which

is a more intelligent way of dealing with the data packets.

So, when a packet is received at one of the interfaces of the switch, it filters the packet and sends only to the interface of the intended receiver. For this purpose, a switch also maintains a CAM (Content Addressable Memory) table and has its own system configuration and memory. CAM table is also called as forwarding table or forwarding information base (FIB).

Modem:



A Modem is somewhat a more interesting network device in our daily life. So if you have noticed around, you get an internet connection through a wire (there are different types of wires) to your house.

This wire is used to carry our internet data outside to the internet world. However, our computer generates binary data or digital data in forms of 1s and 0s and on the other hand, a wire carries an analog signal and that's where a modem comes in. A modem stands for (Modulator+Demodulator). That means it modulates and demodulates the signal between the digital data of a computer and the analog signal of a telephone line.

Network Router:



A router is a network device which is responsible for routing traffic from one to another network. These two networks could be a private company network to a public network. You can think of a router as a traffic police who directs different network traffic to different directions.

Bridge:

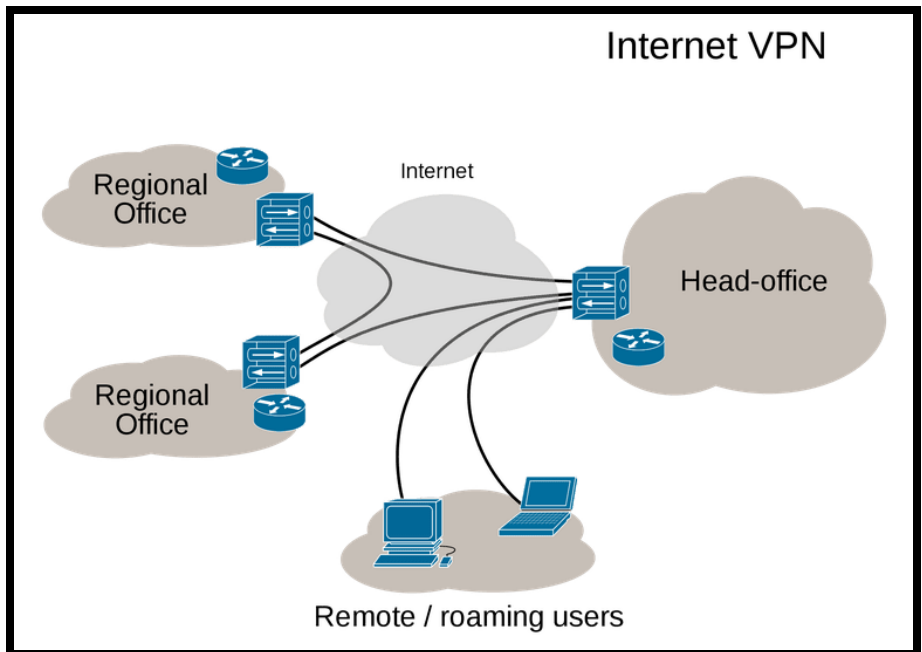
If a router connects two different types of networks, then a bridge connects two subnetworks as a part of the same network. You can think of two different labs or two different floors connected by a bridge.

**Repeater:**

A repeater is an electronic device that amplifies the signal it receives. In other terms, you can think of repeater as a device which receives a signal and retransmits it at a higher level or higher power so that the signal can cover longer distances.

For example, inside a college campus, the hostels might be far away from the main college where the ISP line comes in. If the college authority wants to pull a wire in between the hostels and main campus, they will have to use repeaters if the distance is much because different types of cables have limitations in terms of the distances they can carry the data for.

BY
GNANASEKAR N II Year/IT



COMMON PROTOCOLS

TCP/IP - Unique IP needed

TCP/IP stands for Transmission Control Protocol/Internet Protocol, which is a set of networking protocols that allows two or more computers to communicate. The Defense Data Network, part of the Department of Defense, developed TCP/IP, and it has been widely adopted as a networking standard

SLIP/PPP - dial up access

One of the most practical and economical connections to the Internet is to dial in to an Internet Access Provider (IAP) using either the Serial-Line Internet Protocol (SLIP) or the Point-to-Point Protocol (PPP).

IPX/SPX – Novell

IPX/SPX stands for Internetwork Packet Exchange/Sequenced Packet Exchange. IPX and SPX are networking protocols used primarily on networks using the Novell NetWare operating systems.

IPX and SPX are derived from Xerox Network Systems' IDP and SPP protocols, respectively. IPX is a network layer protocol (layer 3 of the OSI Model), while SPX is a transport layer protocol (layer 4 of the OSI Model). The SPX layer sits on top of the IPX layer and provides connection-oriented services between two nodes on the network. SPX is used primarily by client–server applications.

NetBEUI – Microsoft

etBEUI (NetBIOS Extended User Interface) is a new, extended version of NetBIOS, the program that lets computers communicate within a local area network. NetBEUI (pronounced net-BOO-ee) formalizes the frame format that was not specified as part of NetBIOS. NetBEUI was developed by IBM for its LAN Manager product and has been adopted by Microsoft for its Windows NT, LAN Manager, and Windows for Workgroups products.

AppleTalk

AppleTalk is a set of proprietary networking protocols developed by Apple for their computer systems. AppleTalk was included in the original Macintosh released in 1984. In 2009, it became unsupported with the release of Mac OS X v10.6 and was dropped in favor of

TCP/IP networking, allowing Apple computers to use the same standard to communicate with other computers.

The design of AppleTalk followed the OSI Model of protocol layering with two protocols aimed at making the system completely self-configuring: AppleTalk Address Resolution Protocol (ARP): Allowed hosts to automatically generate their own network addresses Name Binding Protocol (NBP): A dynamic system that maps network addresses to user-readable names.

DLC (Data Link Control) - HP Jetdirect

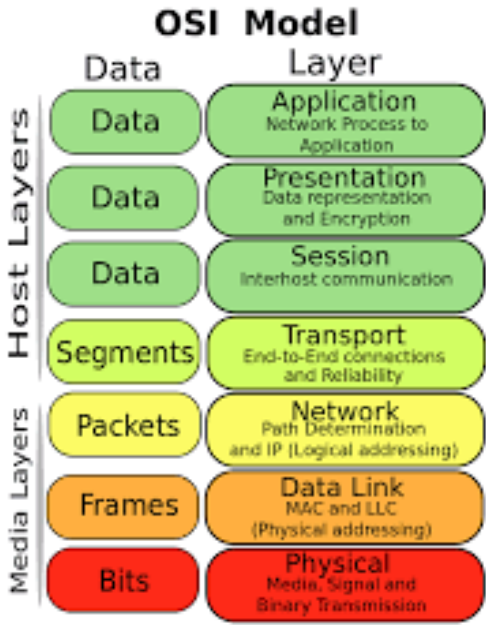
In the OSI networking model, Data Link Control (DLC) is the service provided by the data link layer. There is also a network protocol with the name Data Link Control. It is comparable to better-known protocols such as TCP/IP or AppleTalk.

HP Jetdirect print servers support a variety of network protocol suites, including TCP/IP, IPX/SPX, DLC/LLC, and AppleTalk protocols. In addition, HP provides software for network configuration on the following networks: Microsoft Windows 2000, XP, Server 2003.

BY

VENNILA A, IV YEAR/IT

OSI MODEL



The Open System Interconnection (OSI) model defines a networking framework to implement protocols in seven layers. ... The OSI model doesn't perform any functions in the networking process. It is a conceptual framework so we can better understand complex interactions that are happening.

BY
KAUSHIK PRABHU M IV Year/IT

TECHNOLOGY TRENDS

Cloud Computing

Learn what the different types of clouds - public, private, and hybrid - can do for your business today. Read about the technologies and services that can help you achieve the full potential of your cloud strategy.

Software Defined Networking (SDN)

SDN delivers speed and agility when you deploy new applications and business services. Flexibility, policy, and programmability are the hallmarks of our SDN solutions. See how Cisco can handle today's most demanding networking needs.

Internet of Things (IoT)

The IoT will bring greater and accelerated connectivity to machines, devices, and things. Learn more about the IoT—what it is, and how it will affect your industry, company, and what you do. See how Cisco helps companies transition to a connected world.

BY
SRIVIDHYA N IV Year/IT

REAL TIME NETWORKING APPLICATIONS**Telephone Network**

A telephone network is a telecommunications network used for telephone calls between two or more parties.

There are a number of different types of telephone network:

A landline network where the telephones must be directly wired into a single telephone exchange. This is known as the public switched telephone network or PSTN.

A wireless network where the telephones are mobile and can move around anywhere within the coverage area.

A private network where a closed group of telephones are connected primarily to each other and use a gateway to reach the outside world. This is usually used inside companies and call centres and is called a private branch exchange (PBX).

Integrated Services Digital Network (ISDN)

Public telephone operators (PTOs) own and build networks of the first two types and provide services to the public under license from the national government. Virtual Network Operators (VNOs) lease

capacity wholesale from the PTOs and sell on telephony service to the public directly

- The largest worldwide computer network, specialized for voice
- Switching technique: Circuit-switching

Internet



The Internet is the global system of interconnected computer networks that use the Internet protocol suite (TCP/IP) to link devices worldwide. It is a network of networks that consists of private, public, academic,

business, and government networks of local to global scope, linked by a broad array of electronic, wireless, and optical networking technologies. The Internet carries a vast range of information resources and services, such as the inter-linked hypertext documents and applications of the World Wide Web (WWW), electronic mail, telephony, and file sharing.

- A new global and public information infrastructure

- Switching technique: Datagram packet switching
- Was intended to replace telephone networks and data networks, but lost momentum due the success of the Internet
- Switching technique: VC packet switching

ATM

An automated teller machine (ATM) is an electronic telecommunications device that enables customers of financial institutions to perform financial transactions, such as cash withdrawals, deposits, transfer funds, or obtaining account information, at any time and without the need for direct interaction with bank staff.



Email programs

They allow users to type messages at their local nodes and then send to someone on the network. It is a fast and easy way of transferring mail from one computer to another. Examples of electronic mail programs (Clients) are:-

- Pegasus mail
- Outlook express
- Eudora Windows mail
- Fox mail
- Opera
- Poco mail
- Mozilla Thunderbird
- Windows mail

File transfer protocol (FTP)

This application facilitates transfer of files from one computer to another e.g. from a client to a server. There are 2 common processes involved in FTP

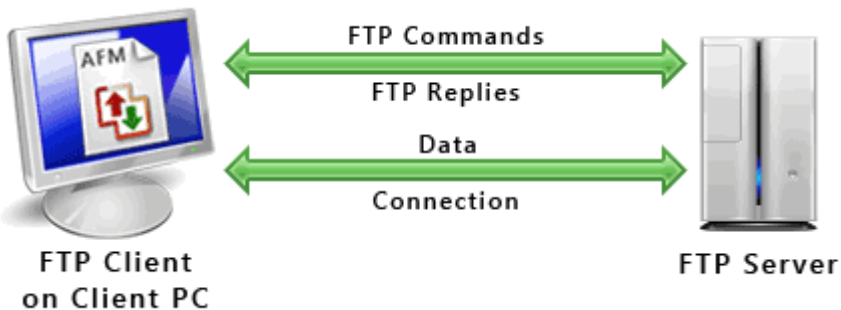
Downloading: - This is the process of obtaining files from a server to a workstation or a client (for example when you download programs and music from a server).

Uploading:- This is obtaining of files from a workstation to a server (for instance when you attach documents and upload them to a server, a good example being when you upload photos to Facebook).

Examples of FTP programs are:-

- FTP in Unix
- FTP in Linux or
- FTP in Windows

File Transfer Protocol Process



File transfer protocol process

Terminal Emulation (TELNET)

It allows a workstation to access the server for an application program. This enables you to control the server and communicate with other servers on the network. The workstation appears as a down

terminal that is directly attached to the server. The user feels like he/she is using the server directly. **TELNET** enables PCs and workstations to function as dumb terminals in sessions with hosts on inter-networks.

Groupware

These applications are used to automate the administration functions of a modern office for instance **video conferencing** and **chatting**. They facilitate the work of groups and improve on their productivity; they can be used to communicate, co-operate, coordinate, solve problems, compete, negotiate among others.

(i) Video Conferencing

This is the process of conducting a *conference* between two or more participants at different sites by using computer networks to transmit audio and video data.



Each participant has a video camera, microphone, and speakers mounted on his or her computer. As the two participants speak to one another, their voices are carried over the network and delivered to the others speakers, and whatever images appear in front of the video camera appear in a window on the other participant's monitor.

(ii) Chatting

It is a real-time communication between two users via computer. Once a chat has been initiated, either user can enter text by typing on the keyboard and the entered text will appear on the other user's monitor. The two must be online for a chat to be initiated. Most networks, cybers and online services offer a chat feature which enables computer users to chat as they go on with their work.

Stand Alone Applications

These are applications that run on **stand alone computers** (computers not connected to any other). In order to extend their activity, they are rebuild to run on network environments e.g. word processors, spreadsheets, database management systems, presentations graphics, project management etc. They function even when the computer is offline.

BY

SOWNTHIRYA M II Year/IT

FUTURE OF NETWORKING

Technology Radar Trends

We're living in a world that is changing faster than ever imagined. We use our Cisco Technology Radar to identify and track novel technologies and trends emerging around the world. Learn more about some technology trends that will change the future of the networking industry. (Cisco employee login required).

Wireless datalinks for drones



The aviation industry isn't exactly known for being a wireless networking trendsetter. When we fly a commercial airline, we're lucky if we can check email in-flight. Even if we can do that, bandwidth is usually pretty limited.

But Unmanned Aerial Vehicles (UAVs) — or drones, as they're more popularly known — stand to help change that. Academic and industry researchers are now working to make long-distance, high-speed

wireless networking feasible. Their research is geared toward streamlining communication between UAVs and manned aircraft, which will no doubt be a hot topic as drones continue to explode in popularity, and take on a greater presence in the skies.

The work has broader implications in the aviation industry and beyond, however. For instance, it's easy to imagine trains and cars (including those headless ones Google now has roving around), also benefitting from wireless networks that can sustain high bandwidth, across wide distances, at high speeds.

Ambient backscatter

On the topic of major advances in wireless communications, researchers at the University of Washington are working to open new doors in the Wi-Fi world by “backscattering” wireless signals. That means re-using existing radio frequency signals instead of generating new ones. Because the devices don't generate their own radio signals, they also don't need any energy to operate.

Imagine being able to use wireless signals for networking where access to power is limited or non-existent and you get a sense of the tremendous possibilities for this new technology.

4D network

This research project, hosted at Carnegie Mellon University, has a hugely ambitious goal: Replace the Internet Protocol (IP) as the basis for computer networking. (Here, 4D refers to four network planes: decision, dissemination, discovery, and data.)

It's easy, of course, to complain about the inefficiencies and complexities that now plague IP as a result of all the networking applications that have been grafted on to it — applications that were barely conceivable when the protocol was developed decades ago. So these researchers are examining how it could all be done better, especially when it comes to security, one of IP's weaknesses.

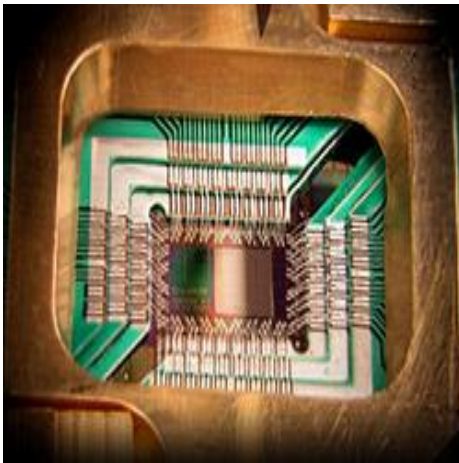
We don't recommend betting against the venerable Internet Protocol as the basis for real-world networking for a long time to come, but we like some of the concepts behind 4D.

eXpressive Internet Architecture

In a way, this is a more realistic take on the work the 4D network researchers are pursuing. The eXpressive Internet Architecture, or XIA, project aims to build “a single network that offers inherent support for communication between current communicating principals — including hosts, content, and services — while accommodating unknown future entities.”

In other words, the researchers want to engineer a new one-size-fits-all system for network communications that does away with the convoluted and ad hoc mechanisms on which modern networks often rely. Like the 4D network project, XIA also has a strong focus on providing better security than existing standards can provide. See a trend here?

Quantum computing



While it's not strictly network-related, quantum computing is fast becoming a more realistic prospect for practical applications. For now, a few laws of physics still stand in the way of unlocking the unfathomable computational speed that quantum hardware stands to deliver. But don't

discount it as the foundation for the IT world of the future. With Google, among others, investing heavily in quantum research, it might only be a matter of time before humanity unlocks the secret to rocketing away from the zeroes and ones of present-day microprocessing.

The Machine from HP

Speaking of nano-age super-computers, HP engineers are also hard at work on new hardware and software that stands to revolutionize the way computers think and communicate.

Called simply the Machine, the platform brings three new computing components to the table: nanoelectric memory called memistors, ultra-fast photonic buses, and an operating system tailor-made for the device.

What's more, HP says the Machine, which will be an alternative to the x86-based computers that predominate today, will come to market within the next few years. So this isn't a nerdy experimental project, but something that's very likely to be a real and present part of our world in the next decade.

Time cloaking

The goal behind this Purdue University project is to create "bubbles in time" by tracking gaps between photons. If that works, information can be encoded within the gaps and transmitted by laser lights and fiber optics.

The big deal here isn't communicating with light — that solution is already at the core of modern network infrastructure. The real

excitement is the ability to conceal data by making it impossible to detect that a message was even sent.

For now, this remains highly experimental stuff. But it's easy to see the value in a successful implementation of time cloaking, especially as a way to add new levels of security and privacy to network communications.

Diamond semiconductors



No one is talking about Diamond Valley yet, but those precious stones that most people currently encounter may soon take the place of silicon as a core component of computer hardware.

Smaller than silicon wafers, 20 times better at displacing heat, and more efficient as a conductor of electrons, diamonds are already helping to build new generations of devices. As a bonus, synthetic diamonds work just as well in constructing semiconductors as the ones dug up in mines, meaning this new computer hardware technology is also cost-efficient.

BY

PRAKASH V IV Year/IT

NETWORKING TECHNOLOGY

PROS AND CONS

Advantages of Computer Networking

It enhances communication and availability of information.

It allows for more convenient resource sharing.

It makes file sharing easier.

It is highly flexible.

It is an inexpensive system.

It increases cost efficiency.

It boosts storage capacity.

Disadvantages of Computer Networking

It lacks independence.

It poses security difficulties.

It lacks robustness.

It allows for more presence of computer viruses and malware.

Its light policing usage promotes negative acts.

It requires an efficient handler.

It requires an expensive set-up.

BY

REVATHY V P III Year/IT

CLOUD NETWORKING

Cloud Based Networking

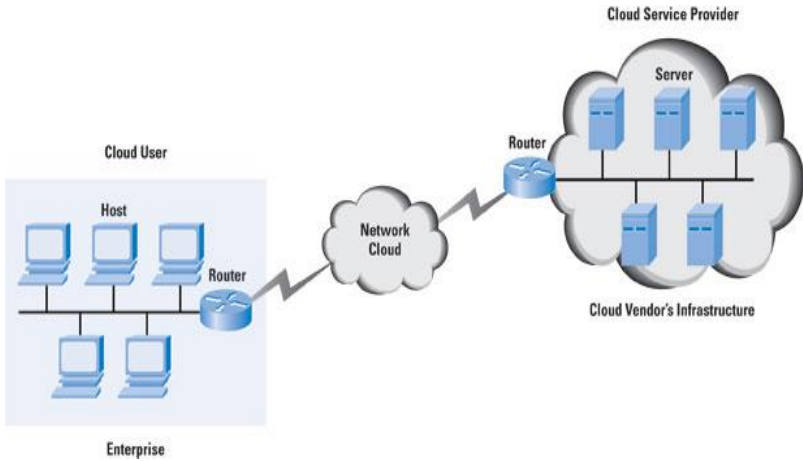
Cloud networking (and Cloud based networking) is a term describing the access of networking resources from a centralized third-party provider using Wide Area Networking (WAN) or Internet-based access technologies.

Cloud networking is related the concept of cloud computing, in which centralized computing resources are shared for customers or clients. In cloud networking, the network can be shared as well as the computing resources. It has spurred a trend of pushing more network management functions into the cloud, so that fewer customer devices are needed to manage the network.

Wireless LAN Leads the Charge

The Wireless LAN market was one of the first to start using a more distributed, cloud-based approach to building private networks using WAN and Wireless LAN connections. Companies including Aerohive Networks, Meraki, and Pareto Networks popularized the use of cloud networking techniques to create large, distributed Wireless LANs that could be centrally managed

in the cloud. Meraki was acquired by Cisco and Pareto was acquired by Aerohive Networks.



Improved Internet access and more reliable WAN bandwidth have made it easier to push more networking management functions into the cloud. This has been one of the drivers of cloud computing services as well as enterprise cloud software. This, in turn, has spurred demand for cloud networking as well, as customers look for easier ways to access to build networks using cloud-based services.

A standard cloud networking product provides centralized management, visibility, and control of the network. This could include the management of distributed Wireless access routers or branch-office devices using centralized management in the cloud. The goal is to create and manage secure private networks by

leveraging WAN connections and a centralized management function that can reside in a data center. Connectivity, security, management and control are pushed to the cloud and delivered as a service.

Cloud networking is a form of Software Defined Networking (SDN) technology, in which groups of networking switches and access devices can deploy over the wide area as shared, virtual resources. Other terms that describe this shift include Software-Defined WAN (SD-WAN) and Cloud WAN.

Some of the startups pursuing new technology for optimizing connectivity using SD-WAN include Cloudgenix, Pertino, VeloCloud, and Viptela.

Software-Defined WAN

The basic concept of cloud networking, in which fewer management devices are installed in the branch offices or client premises and more routing and management functions are pushed to the cloud, is now being pursued resulting in a wider range of networking products, which include branch office routers, WAN optimization software, and firewalls.

The use of cloud-based networking to manage and deploy network functions across the WAN is described as Software

Defined WAN or Cloud WAN. The trend is broadening, as a wider array of network functions can be deployed using the cloud. The main goal is to free up services from being attached to specific hardware so that services can be deployed more quickly using software over a networking connection.

BY

LEELAVATHI S IV Year/IT

11 Types of network

- 1. Personal Area Network (PAN)*
- 2. Local Area Network (LAN)*
- 3. Wireless Local Area Network (WLAN)*
- 4. Campus Area Network (CAN)*
- 5. Metropolitan Area Network (MAN)*
- 6. Wide Area Network (WAN)*
- 7. Storage-Area Network (SAN)*
- 8. System-Area Network (also known as SAN)*
- 9. Passive Optical Local Area Network (POLAN)*
- 10. Enterprise Private Network (EPN)*
- 11. Virtual Private Network (VPN)*