



NETWORKING

VOCATIONAL TRAINING



Bharat Heavy Electricals Limited
Heavy Equipment Repair Plant Varanasi

VATSAL AGRAWAL

Bachelor Of Technology College ID-----
COMPUTER ENGINEERING IIInd Year



COLLEGE OF TECHNOLOGY
GOVIND BALLABH PANT
UNIVERSITY OF
AGRICULTURE AND
TECHNOLOGY
PANTNAGAR



Ref :HR/TRAINEE/TR19242 dt 28/06/2019

WORKING AND MAINTANECE OF HERP
NETWORKING AND SERVER SYSTEM
INSTRUCTOR – Mr. ABHISEKH SRIVASTAV

Cloud Server



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I feel myself deeply indebted to all the above-mentioned people. I really thank all the people for their help.



Bharat Heavy Electricals Limited
Heavy Equipment Repair Plant

VOCATIONAL TRAINING

CERTIFICATE OF ACHIEVEMENT

This Acknowledges That

VATSAL AGRAWAL

B. TECH COMPUTER ENGINEERING IIInd Year
College of Technology GBPUA&T Pantnagar

Ref: HR/TRAINEE/TR19242 dt 28/06/2019
College Id 51963

HAS SUCCESSFULLY COMPLETED THE TRAINING ON

WORKING AND MAINTANECE OF
BHEL HERP NETWORKING AND
SERVER SYSTEM

MR. ABHISEKH SRIVASTAV
INSTRUCTOR

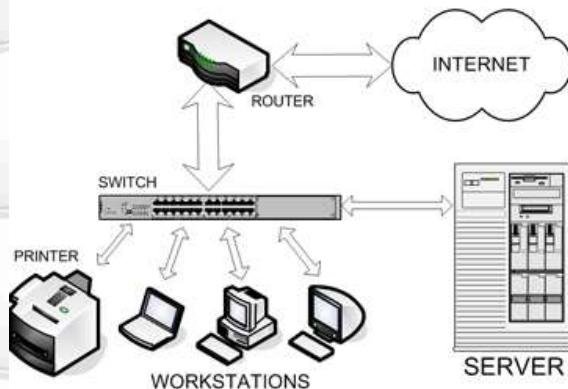
TRAINING PERIOD
FROM
TO

DATE OF
COMPLETION

REMARKS--

PREFACE and Aim

The objectives of the practical training are to learn something about industries practically and to be familiar with the working style of a technical person to adjust simply according to the industrial environment. It is rightly said practical life is far away from theoretical one. We learn in class room can give the practical exposure or real life experience no doubt they help in improving the personality of the student in long run of life and will be able to implement the theoretical knowledge .



A computer network is created by connecting various computers by various network links. Network professionals are typically well-versed in the technical aspects of networking: router and switch configuration, server deployment and management, and so on.

Here in Bhel we will learn abou the above mention aspects and the use of them with different devices to make useful and advance system which can help in reducing man efforts as well as in ease of data communication resulting in increase of security, peace of mind, etc



Bharat Heavy Electricals Limited

BHEL is one of the largest engineering and manufacturing companies of its kind in India engaged in design, engineering, construction, testing, commissioning and servicing of a wide range of products and services with over 180 product offerings to meet the ever-growing needs of the core sectors of economy. Bharat Heavy Electricals Limited (BHEL) owned and founded by the Government of India, is an engineering and manufacturing company based in New Delhi, India. Established in 1964, BHEL is India's largest power generation equipment manufacturer.

It has a network of 17 manufacturing units, 2 repair units, 4 regional offices, 8 service centres, 8 overseas offices, 15 regional centres, 7 joint ventures, and infrastructure allowing it to execute more than 150 projects at sites across India and abroad. The company has established the capability to deliver 20,000 MW p.a. of power equipment to address the growing demand for power generation equipment

It also has been exporting its power and industry segment products and services for over 40 years. BHEL's global references are spread across over 76 countries across all the six continents of the world. The cumulative overseas installed capacity of BHEL manufactured power plants exceeds 9,000 MW across 21 countries including Malaysia, Oman, Iraq, UAE, Bhutan, Egypt and New Zealand. Their physical exports range from turnkey projects to after sales services.

Vision - A global engineering enterprise providing solutions for a better tomorrow

Mission - Providing sustainable business solutions in the fields of Energy, Industry & Infrastructure

BHEL places strong emphasis on innovation and creative advancement, which leads to the development of technologically competitive products and services. The research and developmental efforts of the company are not only aimed at improving the performance of the products of current manufacture, but also developing new products and systems using state-of-the-art technologies, relevant to the needs of the various business sectors. With a spending of nearly 2.5% of its annual turnover on R&D projects, BHEL is the largest spender on R&D in the heavy industry segment, to which it belongs. BHEL also generates nearly 20% of its annual turnover from in-house developed products and services introduced in last five years

Spearheading this process is BHEL's highly qualified manpower engaged in R&D activities in the Corporate R&D Division, Hyderabad, and the Research and Product Development (RPD) centers at its manufacturing units

To carry out research in identified specialized areas, BHEL has established 14 Centres of Excellence. The Corporate R&D Division is currently equipped with ten Centers of Excellence (COE) carrying out advanced R&D in engineering disciplines like, Simulators, Computational Fluid Dynamics (CFD), Permanent Magnet Machines (PMM), Surface Engineering, Intelligent Machines and Robotics, Machine Dynamics, Compressor and Pumps, Nano Technology, Ultra High Voltage (UHV) and Advanced Transmission Systems. Two COEs, for Power Electronics, IGBT and Controller Technology, and for Control and Instrumentation (C&I), are located at Electronics Division, Bengaluru. Two COEs, for Advanced Fabrication Technology and Coal Research Centre, are established the Tiruchirappalli unit.

Technology Development:

Development of new products and processes for automation. The activities include development of 3 & 5 Axes CNC part programs, scoop milling technology, RFID, CAD-CAM-CNC-CAI interfacing with PC based controllers and development of non-traditional machining techniques.

Programmable Control Systems:

Development of electric control systems for the automation of industrial processes and power plants. The major activities include development of computer and microprocessor based systems for process control and monitoring, development of equipment health monitoring systems and application of artificial intelligence techniques in the designs.

Centre of Excellence for Simulators:

Centre of Excellence for Simulators (COE-S) highlights the power plant simulation capabilities of BHEL. Having the core expertise in power plant domain, the following products and services were developed and offered by COE-S: Products: Operator Training Simulators (OTS), Compact Generator Simulator (CGS), Sequence of Events (SOE) Simulator and Performance Analysis, Diagnostics and Optimization (PADO) package. Services: Dynamic Simulation Studies, Remote Monitoring and Diagnostic Service (RMDS) and training and development of New Control Logics

Significantly, BHEL is one of the only four Indian companies and the only Indian Public Sector Enterprise figuring in 'The Global Innovation 1000' of Booz & Co., a list of 1,000 publicly traded companies which are the biggest spenders on R&D in the world.







Heavy Equipment Repair Plant Varanasi

In line with BHEL's objective of providing quality service at doorsteps, HERP was established in the vicinity of National Power capital belt of India. HERP has progressed by leaps & bounds till date, achieving a turnover of Rs. 403 Crore in the year 2013-14. Starting as a manufacturer of mainly O&M spares for Bowl Mills XRP-603 & XRP-803 family (Up to 210MW), Repair activities took off on firm footing in 1990 when reboring of TG set bearings was taken up.

With Passage of time, HERP has developed the capability of manufacturing all sub-assemblies and spares of Bowl Mills upto XRP-1043 family (600 MW). HERP has also diversified in manufacturing of Steam Turbine Spares (up to 600 MW) , Hydro Turbine Spares and Load Hangers. Since its inception, HERP has successfully discharged the responsibility of providing urgent repair and spare services for Thermal Power Plants all over the country which has resulted in minimising the downtime.

Apart from conventional spares and assemblies of Bowl Mills & Steam Turbines, HERP is also manufacturing and supplying Bowl Mill foundation items, Tools & Accessories, Seal Air Headers, and Turbine Tools and Tackles (required for erection and commissioning/ major overhaul of turbines) for various power projects.



VISION

A global engineering enterprise providing solutions for a better tomorrow



MISSION

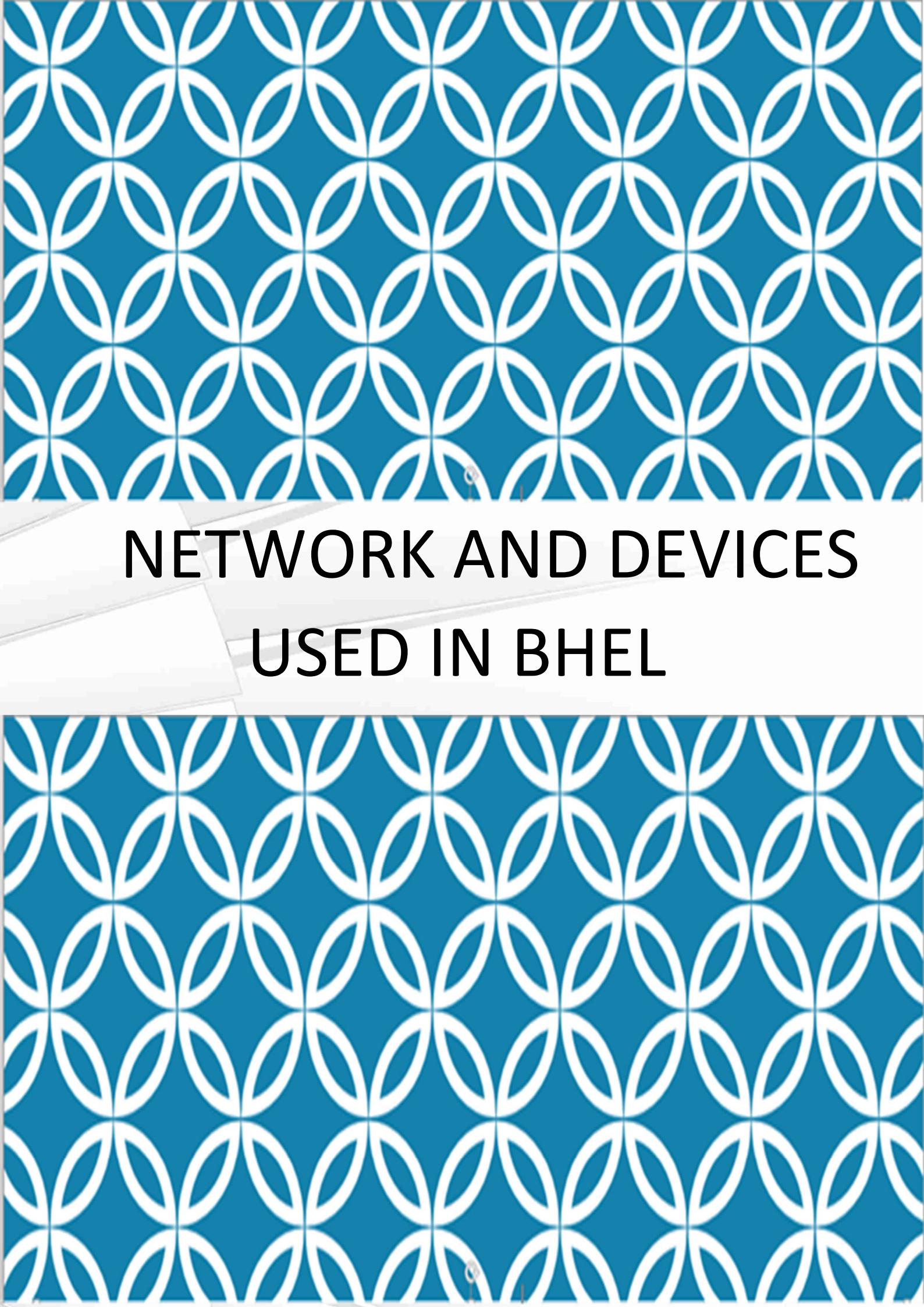
Providing sustainable business solutions in the fields of Energy, Industry & Infrastructure

VALUES

- GOVERNANCE** : We are stewards of our shareholders' investments and we take that responsibility very seriously. We are accountable and responsible for delivering superior results that make a difference in the lives of the people we touch.
- RESPECT** : We value the unique contribution of each individual. We believe in respect for human dignity and we respect the need to preserve the environment around us.
- EXCELLENCE** : We are committed to deliver and demonstrate excellence in whatever we do.
- LOYALTY** : We are loyal to our customers, to our company and to each other.
- INTEGRITY** : We work with highest ethical standards and demonstrate a behaviour that is honest, decent and fair. We are dedicated to the highest levels of personal and institutional integrity.
- COMMITMENT** : We set high performance standards for ourselves as individuals and our teams. We honour our commitments in a timely manner.
- INNOVATION** : We constantly support development of newer technologies, products, improved processes, better services and management practices.
- TEAM WORK** : We work together as a team to provide best solutions & services to our customers. Through quality relationships with all stakeholders we deliver value to our customers.

GR-ELICIT





NETWORK AND DEVICES USED IN BHEL

Networking

Networking is a practice of linking of two or more computing devices such as PCs, printers, faxes etc., with each other. Connection between two devices is through physical media or logical media to share information, data and resources. Networks are made with the hardware and software. Here are many different ways to connect your computer to another computer or a network.

- Using a direct cable connection.
- using a modem or an integrated service digital network adapter or a network adapter card.
- network using a virtual private network
- another computer by having another computer call your computer

The interconnected collection of autonomous computers is called computer network. Two computers are said to be interconnected if they are able to exchange information. The connection need not be via a **copper wire, fiber optics, microwaves and communications satellites** can be used

Models of Networking

- *CLEINT SERVER MODEL*

In a Client server model we have one server and many clients. Client can share the resources of server, but a server cannot share the resources on clients. In the point of view of administrator it is very easy to control the network because we combine with the server also at security point of view. It is very useful because it uses user level security in which users have to remember only one password to share the resources.

- *Peer to Peer Model Workgroup Model*

In Peer to Peer networking model all computers are in equal status, that is we cannot manage centralisation, administration security. In Peer to Peer networking client use operating system like Windows

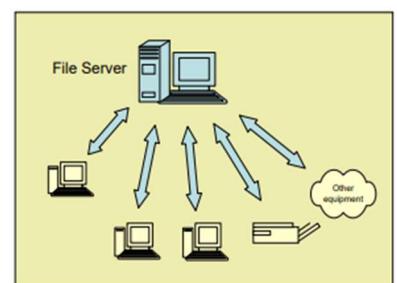


Fig 3: Client - Server Networking

- *Domain Model*

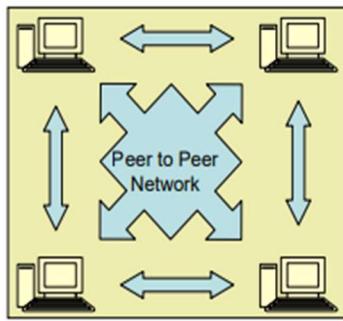
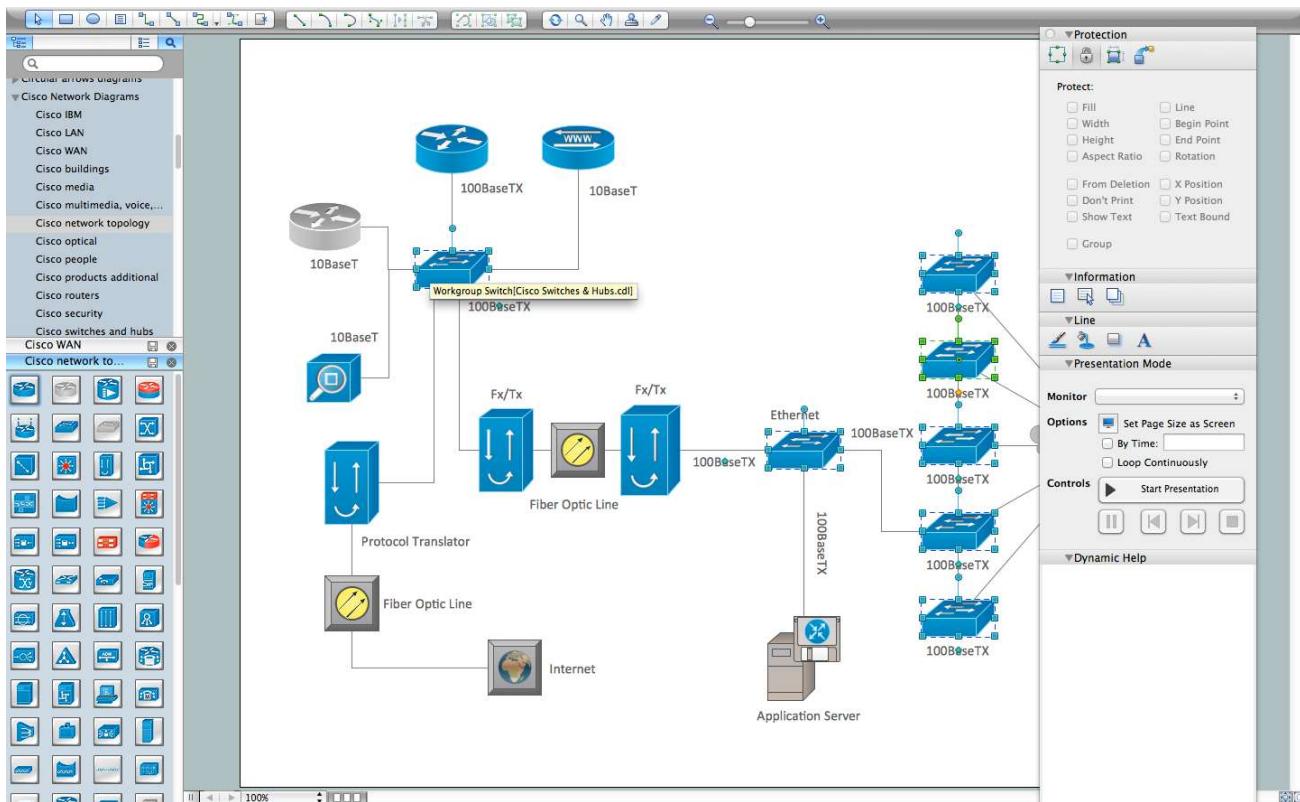


Fig 2: Peer to Peer Networking

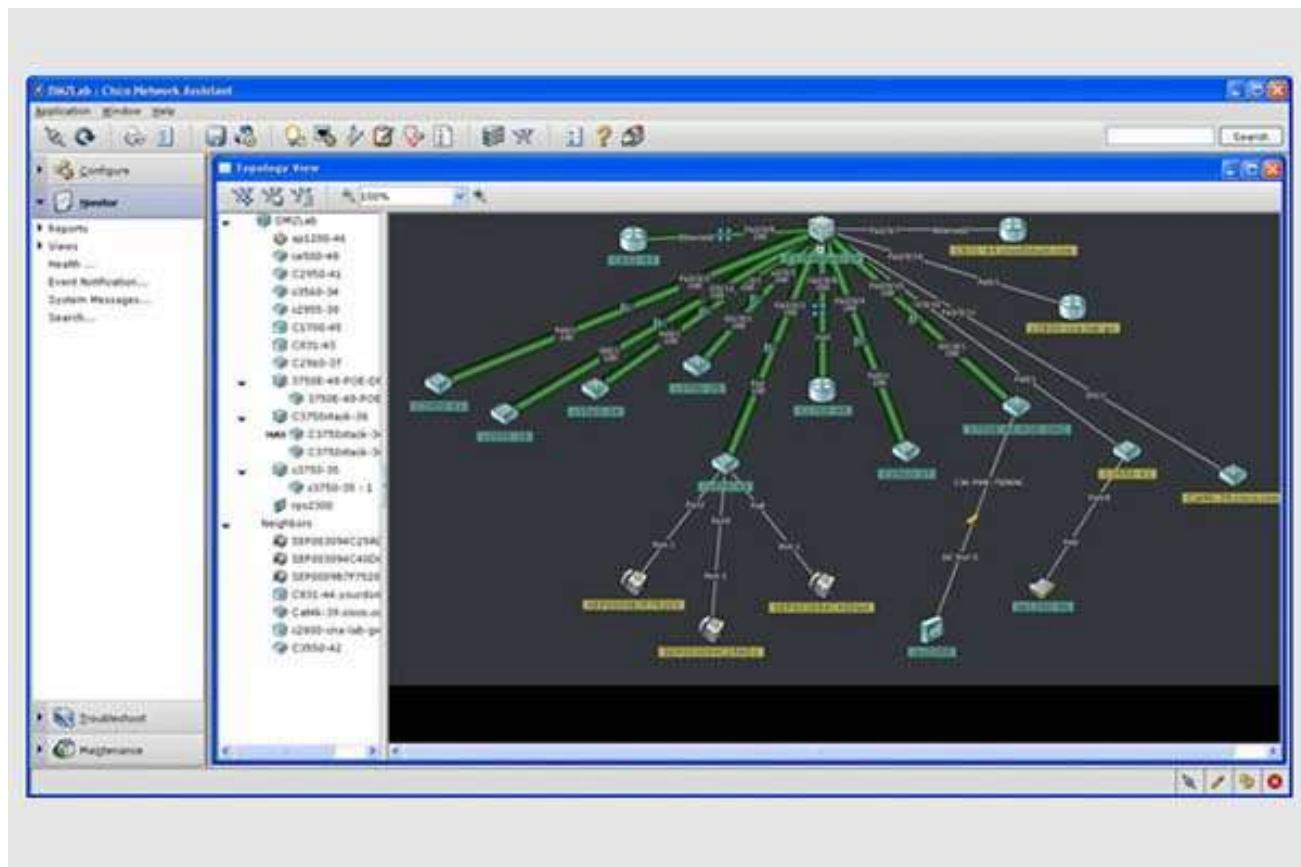
It is a mixture of client server and peer to peer model. In this clients can share their resources as peer to peer but with the permission of the server as in client server model therefore it is commonly used model because in this security is more as we can put restriction on both server and clients. **widely used in BHEL**

A wide area network (WAN) is a telecommunications network that extends over a large geographical area for the primary purpose of computer networking. Wide area networks are often established with leased telecommunication circuits. Business, as well as education and government entities use wide area networks to relay data to staff, students, clients, buyers, and suppliers from various locations across the world. In essence, this mode of telecommunication allows a business to effectively carry out its daily function regardless of location. **This type of communication is Used in BHEL**

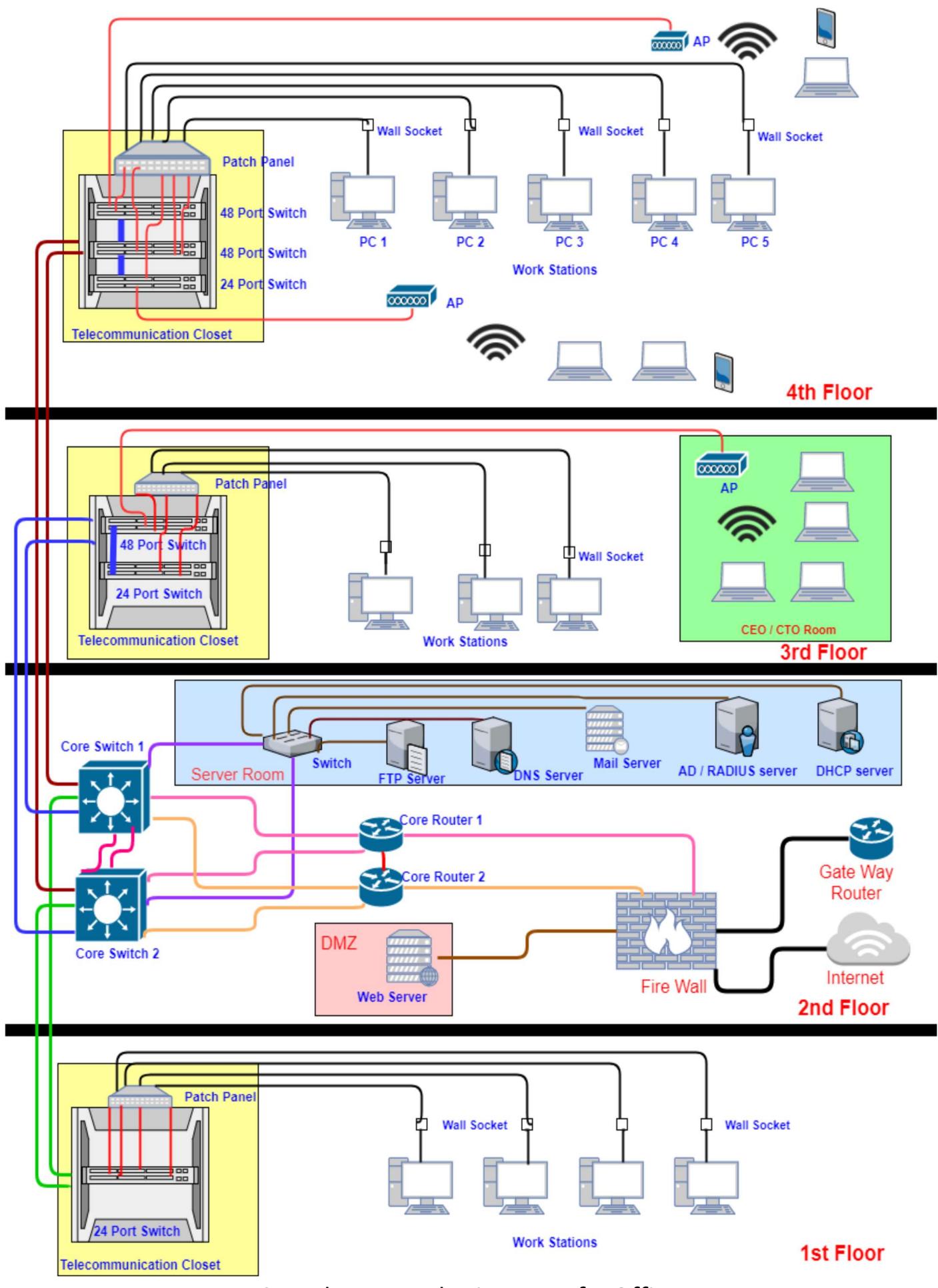
In the world of modern small / mid-size businesses and organizations the use of computers is inevitable. Multiple computers and users can be organized in peer-to-peer or server-based networks (server networks). These unfortunate difficulties of peer-to-peer networks gave rise to a rapid development of a mighty technology named 'File Server' which is the core of Server-base network. Basically it is a very reliable computer which always provides access to data over the office network. This solution is more expensive than a peer-to-peer approach however one can easily see its great advantages: It is a Server-based Network that can provide redundancy and security to all information of our organization. It is a Server-based Network that can gracefully resolve challenges of organizing your data, establishing and maintaining various personnel permissions. It is a Server-based Network which gives you an ultimate peace of mind when it comes to the safety of your data because it can be centrally backed up with multiple copies stored across several secure locations. Management and technical support becomes much more versatile in the environment where all computers are orchestrated by a server. It consumes substantially less time (money!) and it provides superior monitoring and preventive actions.



Cisco Networking Diagram software



Cisco Network Assistant



COMMUNICATION SYSTEM

Fiber-optic communication

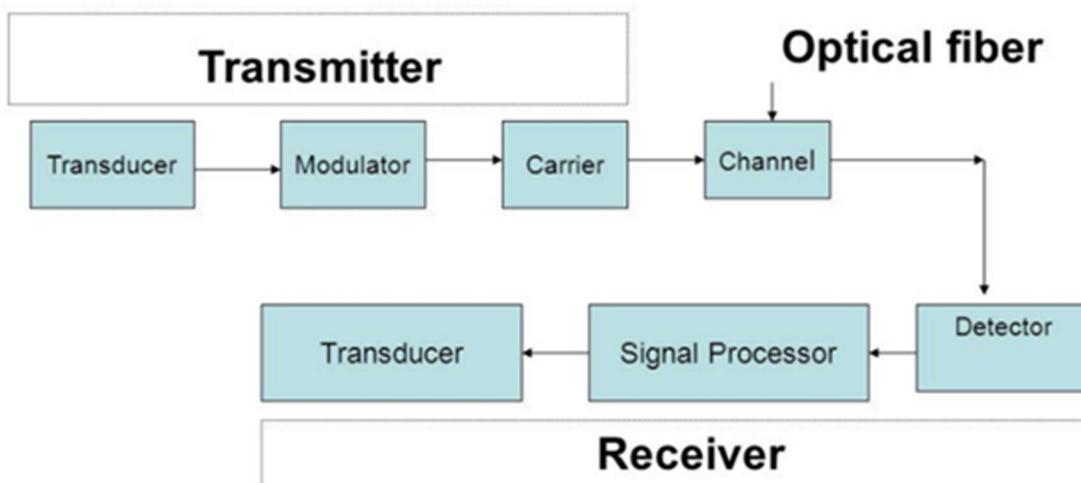
Fiber-optic communication is a method of transmitting information from one place to another by sending pulses of light through an optical fiber. The light forms an electromagnetic carrier wave that is modulated to carry information. Fiber is preferred over electrical cabling when high bandwidth, long distance, or immunity to electromagnetic interference are required.

Optical fiber is used by many telecommunications companies to transmit telephone signals, Internet communication, and cable television signals. Researchers at Bell Labs have reached internet speeds of over 100 petabit×kilometer per second using fiber-optic communication.

Transmitters

A GBIC module, is an optical and electrical transceiver. The most commonly used optical transmitters are semiconductor devices such as light-emitting diodes (LEDs) and laser diodes. The difference between LEDs and laser diodes is that LEDs produce incoherent light, while laser diodes produce coherent light. For use in optical communications, semiconductor optical transmitters must be designed to be compact, efficient and reliable, while operating in an optimal wavelength range and directly modulated at high frequencies.

Fiber optic communication system



In its simplest form, an LED is a forward-biased p-n junction, emitting light through spontaneous emission, a phenomenon referred to as electroluminescence. The emitted light is incoherent with a relatively wide spectral width of 30–60 nm. LED light transmission is also inefficient, with only about 1% of input power, or about 100 microwatts, eventually converted into launched power which has been coupled into the optical fiber. However, due to their relatively simple design, LEDs are very useful for low-cost applications. Communications LEDs are most commonly made from Indium gallium arsenide phosphide (InGaAsP) or gallium arsenide (GaAs). Because InGaAsP LEDs operate at a longer wavelength than GaAs LEDs (1.3 micrometers vs. 0.81–0.87 micrometers), their output spectrum, while equivalent in energy is wider in wavelength terms by a factor of about 1.7. The large spectrum width of LEDs is subject to higher fiber dispersion, considerably limiting their bit rate-distance product (a common measure of usefulness). LEDs are suitable primarily for local-area-network applications with bit rates of 10–100 Mbit/s and transmission distances of a few kilometers. LEDs have also been developed that use several quantum wells to emit light at different wavelengths over a broad spectrum and are currently in use for local-area WDM (Wavelength-Division Multiplexing) networks.

Today, LEDs have been largely superseded by VCSEL (Vertical Cavity Surface Emitting Laser) devices, which offer improved speed, power and spectral properties, at a similar cost. Common VCSEL devices couple well to multi mode fiber. A semiconductor laser emits light through stimulated emission rather than spontaneous emission, which results in high output power (~100 mW) as well as other benefits related to the nature of coherent light. The output of a laser is relatively directional, allowing high coupling efficiency (~50 %) into single-mode fiber. The narrow spectral width also allows for high bit rates since it reduces the effect of chromatic dispersion. Furthermore, semiconductor lasers can be modulated directly at high frequencies because of short recombination time.

Laser diodes are often directly modulated, that is the light output is controlled by a current applied directly to the device. For very high data rates or very long distance links, a laser source may be operated continuous wave, and the light modulated by an external device,



A GBIC module (shown here with its cover removed), is an optical and electrical transceiver. The electrical connector is at top right and the optical connectors are at bottom left

an optical modulator, such as an electro-absorption modulator or Mach-Zehnder interferometer. External modulation increases the achievable link distance by eliminating laser chirp, which broadens the linewidth of directly modulated lasers, increasing the chromatic dispersion in the fiber. For very high bandwidth efficiency, coherent modulation can be used to vary the phase of the light in addition to the amplitude, enabling the use of QPSK, QAM, and OFDM.

A transceiver is a device combining a transmitter and a receiver in a single housing (see picture on right).

Fiber optics have seen recent advances in technology. "Dual-polarization quadrature phase shift keying is a modulation format that effectively sends four times as much information as traditional optical transmissions of the same speed."

Receivers

The main component of an optical receiver is a photodetector which converts light into electricity using the photoelectric effect. The primary photodetectors for telecommunications are made from Indium gallium arsenide. The photodetector is typically a semiconductor-based photodiode. Several types of photodiodes include p-n photodiodes, p-i-n photodiodes, and avalanche photodiodes. Metal-semiconductor-metal (MSM) photodetectors are also used due to their suitability for circuit integration in regenerators and wavelength-division multiplexers.

Optical-electrical converters are typically coupled with a transimpedance amplifier and a limiting amplifier to produce a digital signal in the electrical domain from the incoming optical signal, which may be attenuated and distorted while passing through the channel. Further signal processing such as clock recovery from data (CDR) performed by a phase-locked loop may also be applied before the data is passed on.

Coherent receivers use a local oscillator laser in combination with a pair of hybrid couplers and four photodetectors per polarization, followed by high speed ADCs and digital signal processing to recover data modulated with QPSK, QAM, or OFDM.

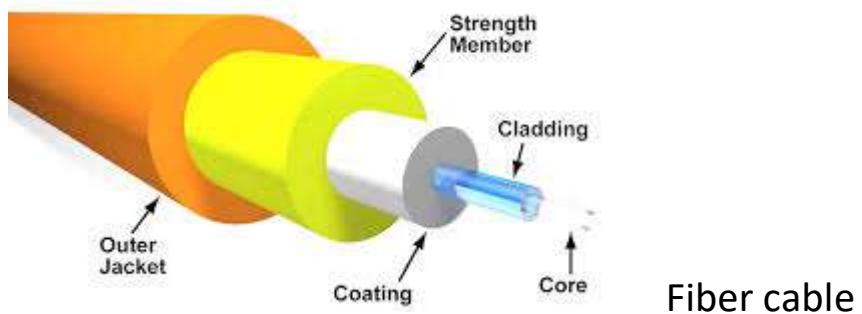
Fiber cable

An optical fiber cable consists of a core, cladding, and a buffer (a protective outer coating), in which the cladding guides the light along the core by using the method of total internal reflection. The core and the cladding (which has a lower-refractive-index) are usually made of high-quality silica glass, although they can both be made of plastic as well. Connecting two optical fibers is done by fusion splicing or mechanical splicing and requires special skills and interconnection technology due to the microscopic precision required to align the fiber cores.

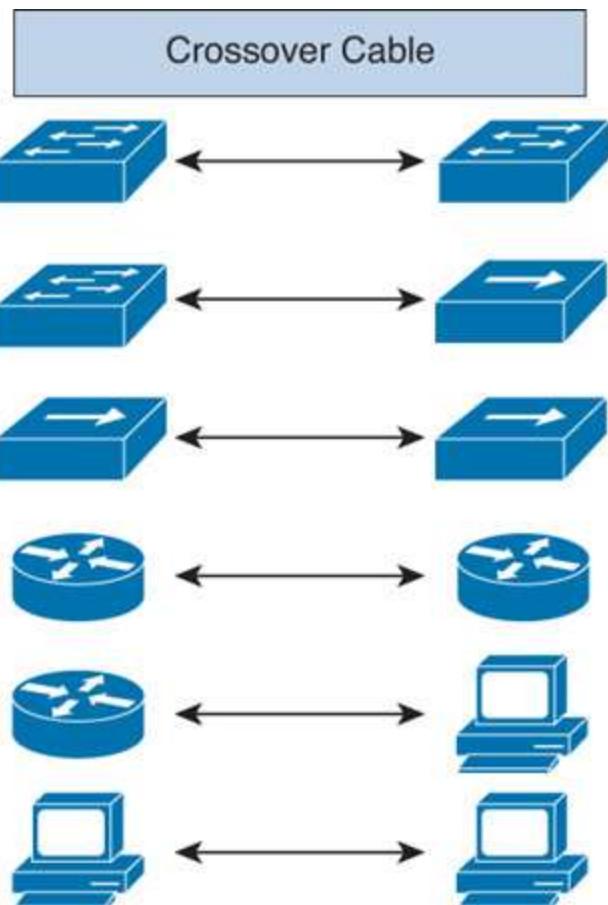
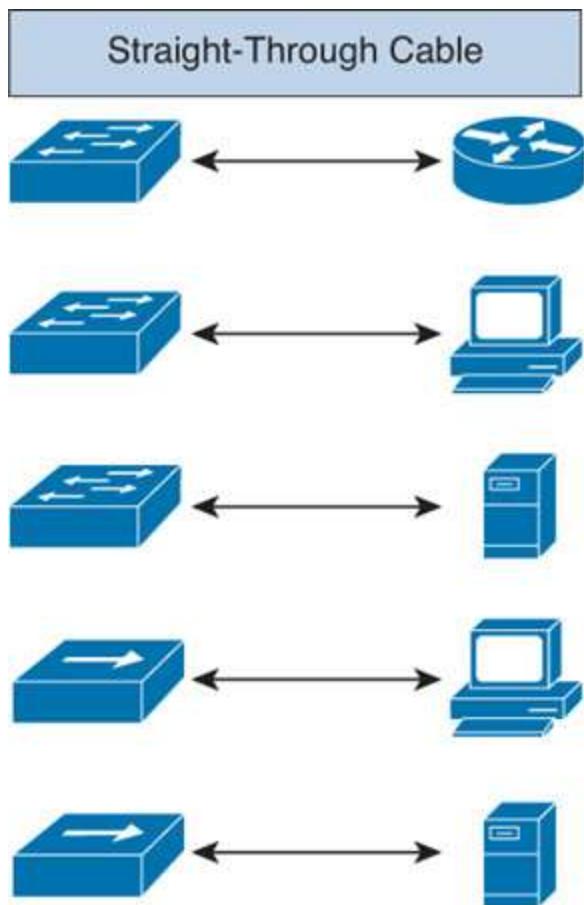
Two main types of optical fiber used in optic communications include multi-mode optical fibers and single-mode optical fibers. A multi-mode optical fiber has a larger core (≥ 50 micrometers), allowing less precise, cheaper transmitters and receivers to connect to it as well as cheaper connectors. However, a multi-mode fiber introduces multimode distortion, which often limits the bandwidth and length of the link. Furthermore, because of its higher dopant content, multi-mode fibers are usually expensive and exhibit higher attenuation. The core of a single-mode fiber is smaller (<10 micrometers) and requires more expensive components and interconnection methods, but allows much longer, higher-performance links. Both single- and multi-mode fiber is offered in different grades.

Ethernet Cable

Ethernet cable used to connect computing devices together directly where they would normally be connected via a network switch, hub or router, such as directly connecting two personal computers via their network adapters. Category 6 cable, commonly referred to as Cat 6, is a standardized twisted pair cable for Ethernet and other network physical layers that is backward compatible with the Category 5/5e and Category 3 cable standards. Compared with Cat 5 and Cat 5e, Cat 6 features more stringent specifications for crosstalk and system noise. The cable standard also specifies performance of up to 250 MHz compared to 100 MHz for Cat 5 and Cat 5e.



Fiber cable



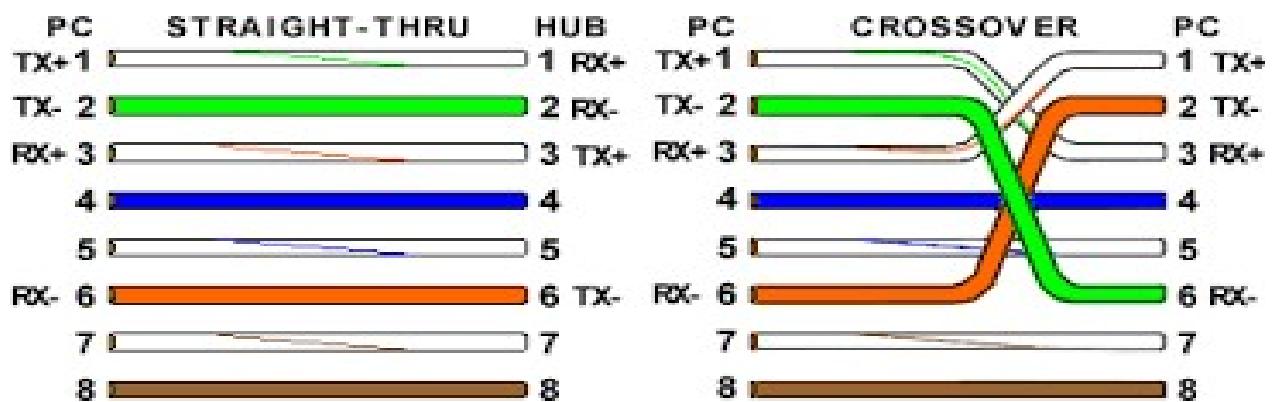
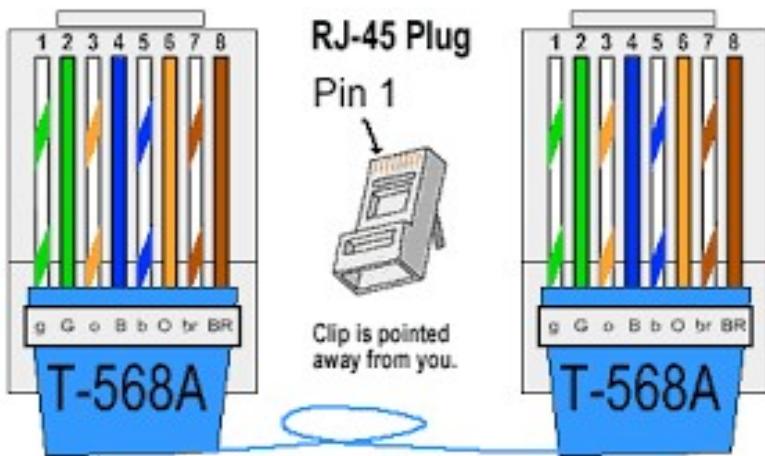
Ethernet cables can be wired as straight through or crossover. The straight through is the most common type and is used to connect computers to hubs or switches. They are most likely what you will find when you go to your local computer store and buy a patch cable. Crossover Ethernet cable is more commonly used to connect a computer to a computer and may be a little harder to find since they aren't used nearly as much as straight through Ethernet cable.

T568A And T568B Wiring Standard Basis

A RJ45 connector is a modular 8 position, 8 pin connector used for terminating [Cat5e patch cable](#) or [Cat6 cable](#). A pinout is a specific arrangement of wires that dictate how the connector is terminated. There are two standards recognized by ANSI, TIA and EIA for wiring Ethernet cables. The first is the T568A wiring standard and the second is T568B. T568B has surpassed 568A and is seen as the default wiring scheme for twisted pair structured cabling. If you are unsure of which to use, choose 568B.

A straight through cable is a type of twisted pair cable that is used in local area networks to connect a computer to a network hub such as a router. This type of cable is also sometimes called a patch cable and is an alternative to wireless connections where one or more computers access a router through a wireless signal.

A crossover Ethernet cable is a type of Ethernet cable used to connect computing devices together directly. Unlike straight through cable, the RJ45 crossover cable uses two different wiring standards: one end uses the T568A wiring standard, and the other end uses the T568B wiring standard. The internal wiring of Ethernet crossover cables reverses the transmit and receive signals.



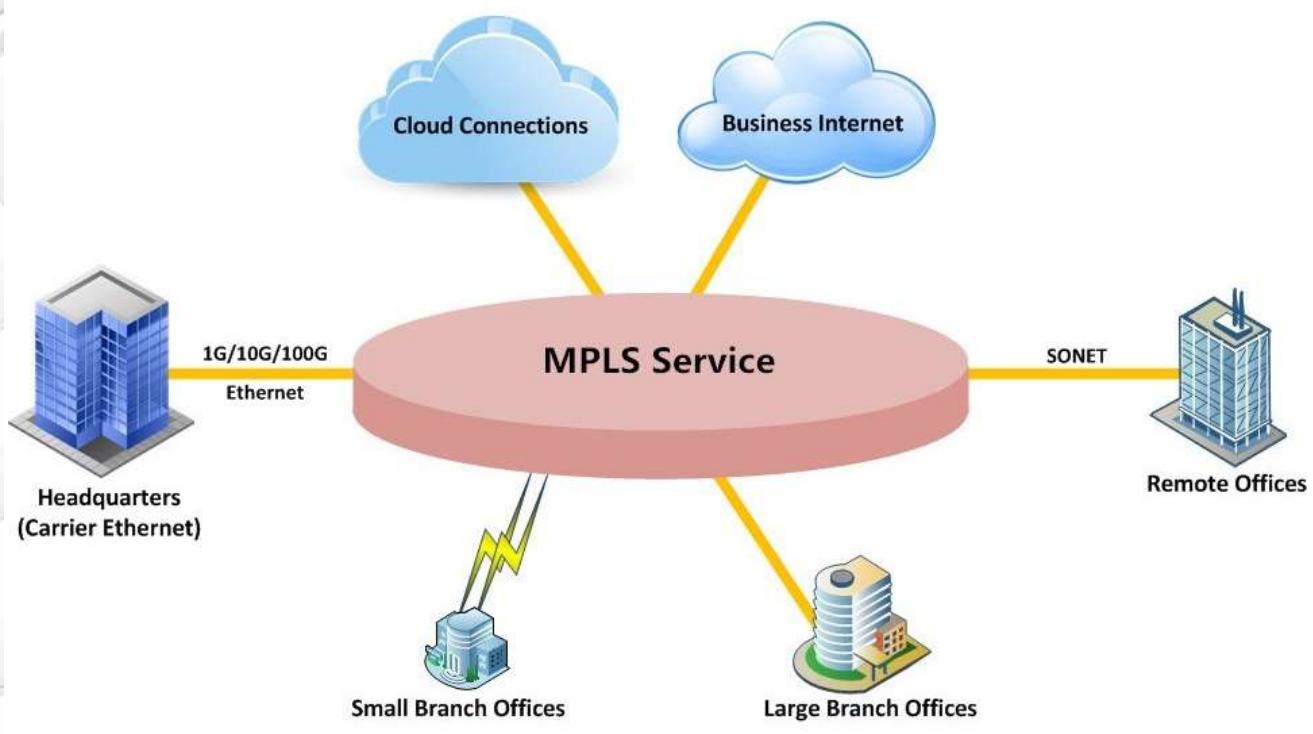
- Switch to router
- Switch to PC or server
- Hub to PC or server
- Switch to switch
- Switch to hub
- Hub to hub
- Router to router
- Router Ethernet port to PC NIC
- PC to PC

MPLS

The two most popular WAN connectivity options are MPLS ((Multiprotocol Label Switching) and Ethernet .

MPLS is a protocol for efficient network traffic flow between multiple locations. MPLS operates similarly on a data switch and router, sitting between layers 2 and layer 3 network. MPLS uses labels for fast packets forwarding and routing within a network. In MPLS network, the MPLS switch (typically Gigabit Ethernet switch and 10GbE switch) transfers data by popping off its label and sending the packet to the next switch label in the sequence. The main benefits of MPLS network service are listed as below.

- Reliability: MPLS is most widely used way to interconnect data centers with remote offices and branches to other branches since MPLS does require an entire block of IPs.
- Service: With MPLS, there is a higher service level agreement that include delivery guarantees for speed and class of service (COS), unlike consumer broadband.
- Labor Cost: MPLS allows businesses to leave WAN routing to the service provider and keep fewer WAN engineers on staff



Multiprotocol Label Switching (MPLS) is a routing technique in telecommunications networks that directs data from one node to the next based on short path labels rather than long network addresses, thus avoiding complex lookups in a routing table and speeding traffic flows. The labels identify virtual links (paths) between distant nodes rather than endpoints. MPLS can encapsulate packets of various network protocols, hence the "multiprotocol" reference on its name.

Role and functioning

MPLS is scalable and protocol-independent. In an MPLS network, data packets are assigned labels. Packet-forwarding decisions are made solely on the contents of this label, without the need to examine the packet itself. This allows one to create end-to-end circuits across any type of transport medium, using any protocol. The primary benefit is to eliminate dependence on a particular OSI model data link layer (layer 2) technology, such as Asynchronous Transfer Mode (ATM), Frame Relay, Synchronous Optical Networking (SONET) or Ethernet, and eliminate the need for multiple layer-2 networks to satisfy different types of traffic. Multiprotocol label switching belongs to the family of packet-switched networks.

Most ISPs nowadays also offer an ISP-managed MPLS service, so they can manage the equipment, and basically get an Ethernet handoff to a switch, which is the so called “MPLS over Ethernet”. No matter which solution you would prefer, your network selection will influence the quality, reliability, service and cost of your WAN connectivity.

Parameter	MPLS	Ethernet
Scalability	Scale to over thousands of sites	Scale to up to hundreds of sites
Application	Interconnect data centers with branch offices and branches to other branches	Interconnect data centers
WAN routing	Leave WAN routing to the service provider and keep fewer WAN engineers on staff	Give WAN engineers control and responsibility over routing
WAN protocol behavior	Handle any-to-any connectivity, including voice and video	Offer low-latency and high-throughput, which is ideal for disaster recovery.
Quality of service (QoS)	QoS options to enable preferential treatment of latency-sensitive traffic like VoIP	Network engineers can bypass QoS complexity by hooking switches directly to Ethernet pipes
WAN management	Complex	Simple
Cost	High	Low

Switches ,Servers and Other Devices

Network switch

A network switch (also called switching hub, bridging hub, officially MAC bridge) is a computer networking device that connects devices on a computer network by using packet switching to receive, process, and forward data to the destination device.

A network switch is a multiport network bridge that uses hardware addresses to process and forward data at the data link layer (layer 2) of the OSI model. Some switches can also process data at the network layer (layer 3) by additionally incorporating routing functionality. Such switches are commonly known as layer-3 switches or multilayer switches. Switches for Ethernet are the most common form of network switch. The first Ethernet switch was introduced by Kalpana in 1990. Switches also exist for other types of networks including Fibre Channel, Asynchronous Transfer Mode, and InfiniBand. Unlike less advanced repeater hubs, which broadcast the same data out of each of its ports and let the devices decide what data they need, a network switch forwards data only to the devices that need to receive it.

Types of Network switches:

Unmanaged Switch

Unmanaged network switches are frequently used in home networks, small companies and businesses. It permits devices on the network to



HP SWITCH

connect with each other, such as computer to computer or printer to computer in one location. An unmanaged switch does not necessarily need to be configured or watched. It is simple and easy to set up. If you want to add more Ethernet ports, you can use these plug and play types of switches in networking.

Managed Switch

Compared to unmanaged switches, the advantage of managed switches is that they can be customized to enhance the functionality of a certain network. They offer some features like QoS (Quality of Service), Simple Network Management Protocol (SNMP) and so on. These types of switches in networking can support a range of advanced features designed to be controlled by a professional administrator. In addition, there is smart switch, a type of managed switch. It has some features that managed switch has, but are more limited. Smart network switch is usually used for the networking devices such as VLANs.

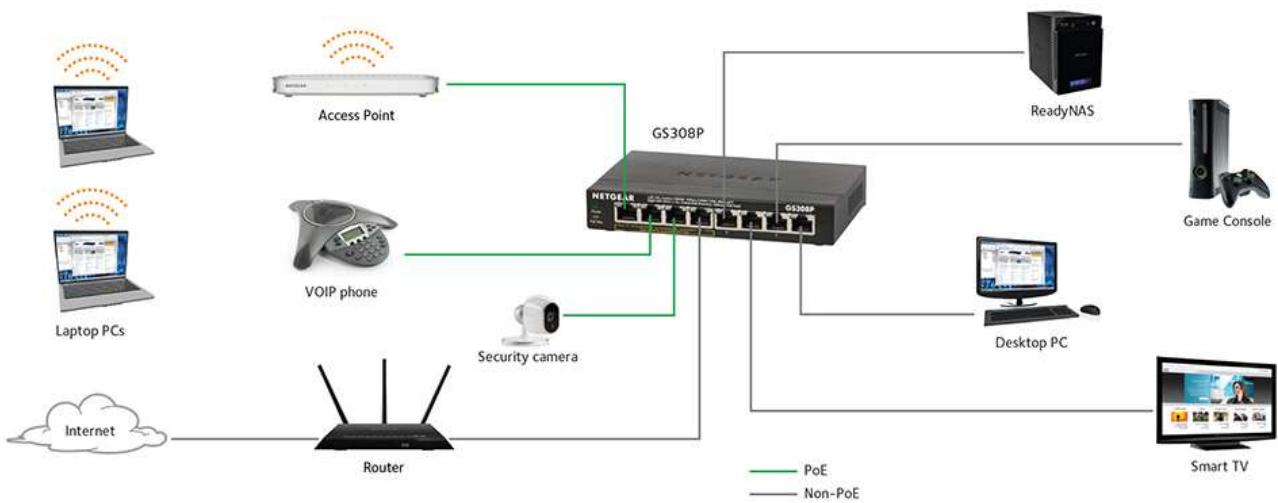
PoE Switch

PoE Gigabit Ethernet switch is a network switch that utilizes Power over Ethernet technology. When connected with multiple other network devices, PoE switches can support power and data transmission over one network cable at the same time. This greatly simplifies the cabling process. These types of switches in networking provide greater flexibility and you will never have to worry about power outlet when deploying network devices.

Servers

In computing, a server is a computer program or a device that provides functionality for other programs or devices, called "clients".

This architecture is called the client–server model, and a single overall computation is distributed across multiple processes or devices. Servers can provide various functionalities, often called "services", such as sharing data or resources among multiple clients, or performing computation for a



client. A single server can serve multiple clients, and a single client can use multiple servers. A client process may run on the same device or may connect over a network to a server on a different device. Typical servers are database servers, file servers, mail servers, print servers, web servers, game servers, and application servers.

Client–server systems are today most frequently implemented by (and often identified with) the request–response model: a client sends a request to the server, which performs some action and sends a response back to the client, typically with a result or acknowledgement. Designating a computer as "server-class hardware" implies that it is specialized for running servers on it. This often implies that it is more powerful and reliable than standard personal computers, but alternatively, large computing clusters may be composed of many relatively simple, replaceable server components.

ROUTER

It is a networking device whose software and hardware are usually tailored to the tasks of routing and forwarding information. For example, on the Internet, information is directed to various paths by routers. Routers connect two or more logical subnets, which do not necessarily map one-to-one to the physical interfaces of the router. The term "layer 3 switch" often is used interchangeably with router, but switch is a general term without a rigorous technical definition. In marketing usage, it is generally optimized for Ethernet LAN interfaces and may not have other physical interface types. Routers may provide connectivity inside enterprises, between enterprises and the Internet, and inside Internet Service Providers (ISP). Internal use Routers intended for ISP and major enterprise connectivity will almost invariably exchange routing information with the Border Gateway Protocol Edge Router: Placed at the edge of an ISP network, it speaks external BGP (eBGP) to a BGP speaker in another provider or large enterprise Autonomous System (AS). Subscriber Edge Router: Located at the edge of the subscribers network, it speaks eBGP to its providers AS. It belongs to an end user (enterprise) organization. o Inter-provider Border Router: Interconnecting ISPs, this is a BGP speaking router that maintains BGP sessions with other BGP speaking routers in other providers Core router: A router that resides within the middle or backbone of the LAN network rather than at its periphery periphery.



Cisco Small Business RV Series Router



An Internet Protocol camera, or IP camera, is a type of digital video camera that receives control data and sends image data via the Internet. They are commonly used for surveillance. Unlike analog closed-circuit television (CCTV) cameras, they require no local recording device, but only a local area network. Most IP cameras are webcams, but the term IP camera or netcam usually applies only to those used for surveillance that can be directly accessed over a network connection.

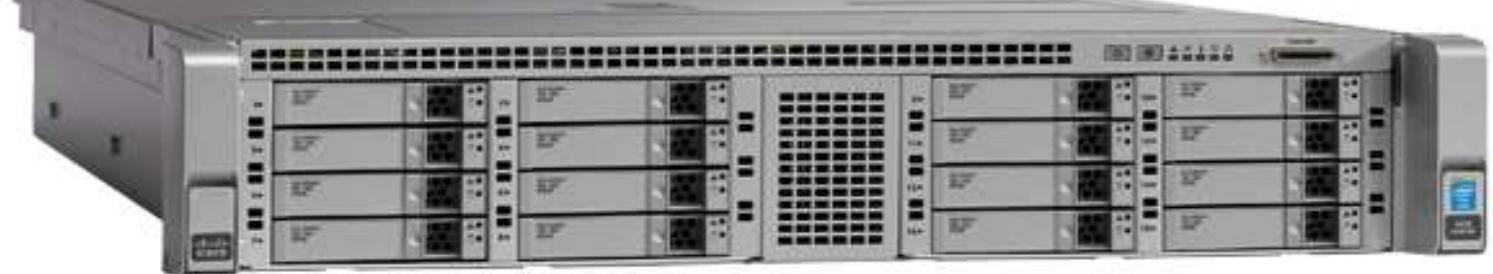
Some IP cameras require support of a central network video recorder(NVR) to handle the recording, video and alarm management. Others are able to operate in a decentralized manner with no NVR needed, as the camera is able to record directly to any local or remote storage media.

IP cameras differ from previous generation analog cameras that transmitted video signals as a voltage, whereas IP cameras send images digitally using the transmission and security features of the TCP/IP protocol. Advantages to this approach include:

- Two-way audio via a single network cable allows users to listen to and speak to the subject of the video (e.g., a clerk assisting a customer through step-by-step instructions)
- Use of a Wi-Fi or wireless network
- Distributed artificial intelligence (DAI)—as the camera can contain video analytics that analyze images
- Secure data transmission through encryption and authentication methods such as WPA or WPA2, TKIP or AES
- Remote accessibility that lets users view live video from any device with sufficient access privileges
- Power over Ethernet (PoE) to supply power through the ethernet cable and operate without a dedicated power supply
- Better image Resolution, typically four times the resolution of an analog camera



Cisco UCS C240 M4 Rack Server



The Cisco UCS C240 M4 Rack Server is an enterprise-class server designed to deliver exceptional performance, expandability, and efficiency for storage and I/O-intensive infrastructure workloads. This includes big data analytics, virtualization, and graphics-rich and bare-metal applications.

Features and Capabilities

Performance for Data-Intensive Applications

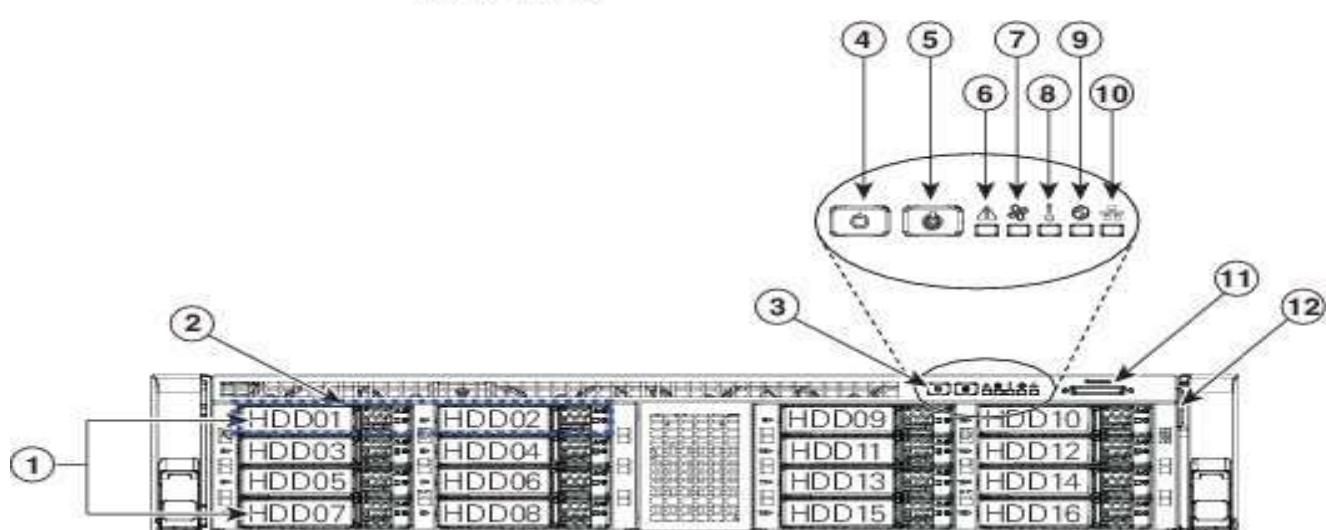
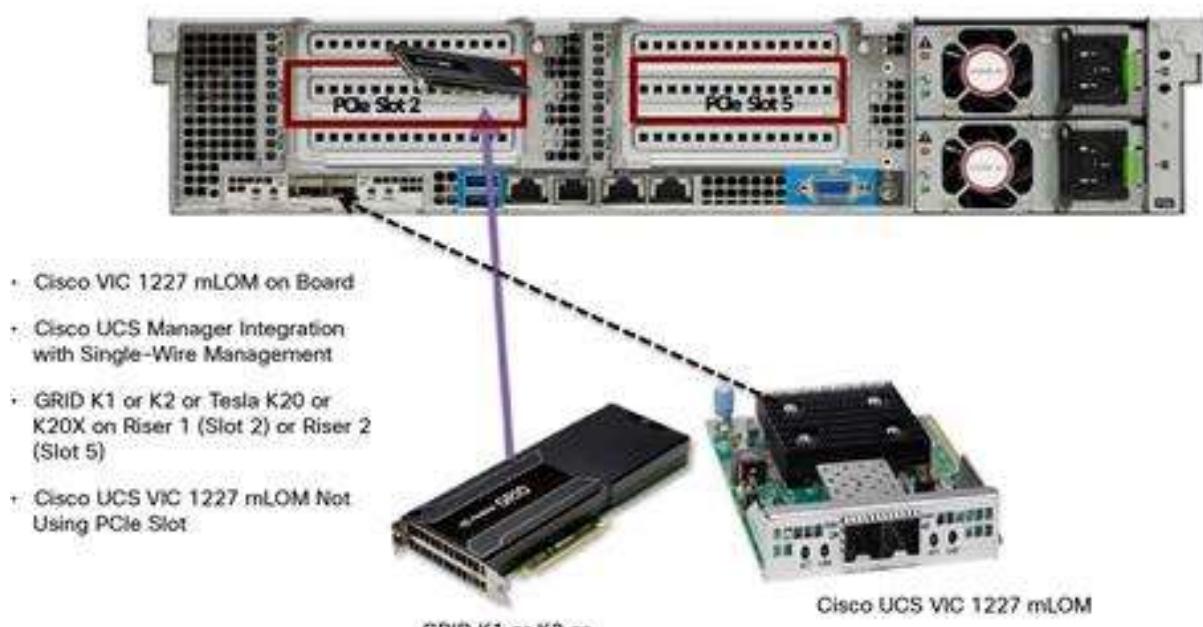
The UCS C240 M4 Rack Server delivers outstanding levels of expandability and performance for standalone or UCS-managed environments in a two rack-unit (2RU) form factor. It provides:

- Dual Intel® Xeon® E5-2600 v3 or v4 processors for improved performance suitable for nearly all two-socket applications
- Next-generation double-data-rate 4 (DDR4) memory, 12-Gbps SAS throughput, and NVMe PCIe SSD support
- Innovative Cisco UCS virtual interface card (VIC) support in PCIe or modular LAN-on-motherboard (mLOM) form factor
- Graphics-rich experiences to more virtual users with support for the latest NVIDIA graphics processing units (GPUs)

The UCS C240 M4 server also offers maximum reliability, availability, and serviceability (RAS) features, including:

- Tool-free CPU insertion
- Easy-to-use latching lid
- Hot-swappable and hot-pluggable components
- Redundant Cisco Flexible Flash SD cards

One GPU Card

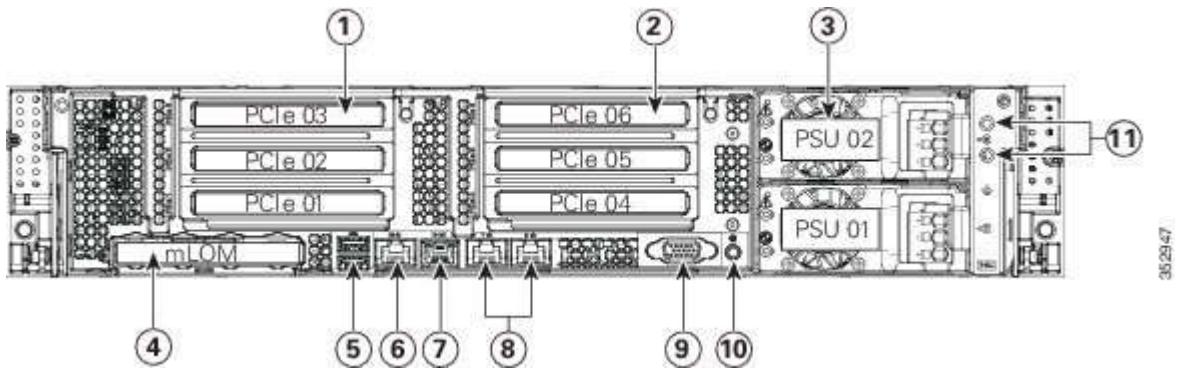


1	Drive bays 1–16 support SAS/SATA drives.	7	Fan status LED
2	Drive bays 1 and 2 support NVMe PCIe SSDs and SAS/SATA drives.	8	Temperature status LED
3	Operations panel buttons and LEDs	9	Power supply status LED
4	Power button/LED	10	Network link activity LED
5	Unit Identification button/LED	11	KVM connector (used with KVM cable that provides two USB 2.0, one VGA, and one serial connector)
6	System status LED	12	Pull-out asset tag

The Cisco UCS C240 M4 server can be deployed standalone or as part of the Cisco Unified Computing System (UCS). Cisco UCS unifies computing, networking, management, virtualization, and storage access into a single integrated architecture that can enable end-to-end server visibility, management, and control in both bare-metal and virtualized environments. With Cisco UCS-managed deployment, UCS C240 M4 takes advantage of our standards-based unified computing innovations to significantly reduce customers' TCO and increase business agility.

Specifications at a Glance

Item	Specification
Chassis	Two rack-unit (2RU) server
Processors	Either 1 or 2 Intel® Xeon® processor E5-2600 v3 or v4 product family CPUs
Chipset	Intel C610 series
Memory	Up to 24 double-data-rate 4 (DDR4) dual in-line memory (DIMMs) of up to 2400 MHz speeds
PCIe slots	Up to 6 PCI Express (PCIe) Generation 3 slots (four full-height and full-length; four NCSI-capable and VIC-ready; two GPU-ready)
Hard drives	Up to 24 small-form factor (SFF) drives or 12 large form-factor (LFF) drives, plus two optional internal SATA boot drives, and NVMe drive support
Embedded NIC	Two 1-Gbps Intel i350-based Gigabit Ethernet ports
mLOM	mLOM slot can flexibly accommodate 1-Gbps, 10-Gbps, or 40-Gbps adapters
RAID controller	Cisco 12 Gb SAS modular RAID controller for internal drives Cisco 9300-8E 12 Gb SAS HBA for external drives Embedded software RAID (entry RAID solution) for up to four SATA drives



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1	PCIe riser 1 (slots 1, 2, 3*) *Slot 3 not present in all versions. See Replacing a PCIe Card for riser options and slot specifications.	7	Serial port (RJ-45 connector)
2	PCIe riser 2 (slots 4, 5, 6)	8	Dual 1-Gb Ethernet ports (LAN1, LAN2)
3	Power supplies (DC power supplies shown) See Power Specifications for specifications and options.	9	VGA video port (DB-15 connector)
4	Modular LAN-on-motherboard (mLOM) card slot	10	Rear Unit Identification button/LED
5	USB 3.0 ports (two)	11	Grounding-lug holes (for DC power supplies)
6	1-Gb dedicated management port		

ACHEIVMENT AND CONCLUSION

An internship is a door that opens up the industrial world to the student. A student who has always studied about stuff in his books will be amazed to see these very things happening in front of his eyes. The same happened to me. Got information how a company works different level of administration exist. As well as working of communication between different offices, workers, employee, etc. I developed a positive outlook over a course of time. It had taught me to be punctual, responsible and goal-oriented. I had the experience to work with a team. I mingled around with people,

At BHEL, one gets multiple opportunities to work nourished in a learning culture ensuring the growth of employees backed by the support and counsel from the seniors and the unbridled enthusiasm of the peers. Fresh Inductees are roped into the organizational activities right from the beginning, to give them the head start and direction.

I Conclude by stating the driving force of the progress in this field is, above all, the growing role of the Internet and electronic transfers in modern society. Therefore, considerable number of applications is concentrated in the area of electronic commerce and. Learning Experience Working on this project was a pleasure for me as I learned lot of things which was unknown to me before doing this project.

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Thank
You
