

# System and Network Administration

Ex 01 not attended : Slides.

What is a system. ?

- Simple definition.

What is a system administrator.

- Definition.

Introduction to system administration.

- Definition.
- System admin functions.

Enterprise resource planning.

- Rata-

System administrators.

Ex 02 Attended

→ Common system administration task.

- This requires more efforts and is more suitable for boys.

- slide -

- slide 02

Cloud computing SW vendor based in palo alto califonia

With VMware server virtualization  
a hypervisor is installed on the physical  
server to allow for multiple virtual machines  
(VMs) to run on the same physical server.

→ Challenge :-

slide + Facilitate customer according  
to their needs -

→ Access control :-

slide + If you want to provide auth-  
orization to the customer , client or  
server network -

- install windows server 2016 / 2019.

- install DNS then active directory  
control (ADC)

- AAA service .

\* ADC :

## \* AAA Services :-

AAA stands for authentication, authorization, accounting. AAA is a framework for intelligently controlling access to computer resources, enforcing policies, auditing usage and providing the information necessary to bill for services.

## \* For security :

- Username and password
- Time to access

\* At present, FET's data center is using peer to peer network. When 30-40 employees are required to provide services while there are only few.

## \* ITC or ITSC -

→ Limiting access to port

eg: Bandwidth limited to abt. 1mbps.

→ User management:

slide +

- Updating permissions when user changes role

- VPN not provided to undergraduates.

- Research scholars of MPhil or PhD

- are provided VPN service access.
- Graduates and undergraduates in FYP needs VPN.

→ Challenge :-

- \* Work group network :-
  - Peer to peer
  - No centralization.
- \* AAA can access who and how is anyone using (misusing) the internet.
  - otherwise there is no access, they only can access which dept.
- \* Network OS are both multi-user and multitasking
  - while windows are only multi-tasking (not multi-user).

⇒ Monitoring

- Pro-active
- Re-active

→ Proactive testing :-

- Maintain updates (slide)

\* SLA : Service level agreement

SLAs are the contracts that specify the performance parameters within which a network service is provided -

⇒ Two categories of updates.

- Operating system updates + slide
- Application updates + slide -

\* Microsoft agreement alliance

\* Agreement with HEC.

⇒ Typical update procedure:

\* NOC : Network operating center.

⇒ System admin utilities -

Points :

→ If there is fault in IT, report will be sent to network admin -

→ Operation group and I and M groups are part of system admin.

→ Engineering group involves both admins.

\* ⇒ Network admin vs system admin.

Data from google.

→ SAN is also configured by system admin.

\* UICS (Unified computing system)  
There may be servers in this.

\* Patch panel:

A patch panel in a LAN is a mounted hardware assembly that contains ports used to connect and manage incoming and outgoing LAN cables.

eg DLink patch panel.

\* Patch cord:

A patch cable, patch cord or patch lead is an electrical or optical cable used to connect one electronic or optical device to another for signal routing.

eg Fibre optic patch cord

\* SFP: Small form factor

\* SFP connector: Light signal to electronic and vice versa

\* Copper wire: Electronic

\* Fibre optic: Light signals

⇒ Network admin:

Intro

⇒ Roles of network admin

- Ethics
- Careers
- Summary

⇒ Working conditions:

- \* Telecommute : Work from home.
- ⇒ Employment

\* ⇒ Basic Networking concepts:-

- Network components and types
- Network topologies and description-

\* If we talk about LAN : Star network

wireless/wifi : Infrastructure network (central point)

Bluetooth : Adhoc (no central point)

\* Catalyst switch :-

Brand for a variety of network switches,  
wireless controllers and wireless access points sold by  
Cisco Systems.

→ Catalyst 200 series : CLI Based

→ Catalyst 300 series : CLI Based.

\* UOS LAN Diagram : ss.

(Must watch ss)

Mostly nowadays adhoc network is adopted.  
(No central point) unless wifi

Wireless mesh network -

- Wireless
- Mesh
- Adhoc
- Infrastructure
- Sensor

\* Tunnel : Type of a secure path :-

→ Network topologies and description :-

⇒ Difference b/w WLAN and VPN

- WAN is simply wide area network while  
A VPN is a secure tunnel b/w two networks  
that allows private traffic pass over another  
network- which may be untrusted.

→ Brief history of connection technologies -

- ISDN = usually used for telephone -

\* ⇒ Which network technology would you use ?

- We mostly use fibre optic  
leased line connectivity through pvn in mostly  
universities when we need large broadband.

⇒ ISDN replaced by DSL (digital subscriber line)  
mostly. /  
also called asymmetric DSL.

PERN :

PERN provide :

- (i) 1.56 mbps internet bandwidth
- ii) Infravosity intranet
- iii) OS and application sw licence.
- iv) Turnitin service (used to check thesis (asmnt)
- v) Public IPs (video conferencing, Email server, voice over IP (VoIP), DNS, cloud, VPN server)

⇒ Three types of cloud:

- Public
- Hybrid

⇒ DSL, Cable and Fibre

Then we used ISDN. now DSL

\* WATIN, PTCL providing leased line 90%

⇒ Line of sight (eye to eye connectivity)  
- mostly we use wireless radio bridges.

⇒ 1

Different types of antennas used :-

- Directional antenna (Dish antenna (Parabolic))  
used in - LOS - Unicast
- Bi-directional - Two directions - Multicast
- Omni Antenna - Arial types antenna  
- used for broadcast connections -

⇒ Satellite :-

- Repeater in the sky :-
- Our future is satellite
- Used where other options not available.
- There is more delay.

\* Longest geo-stationary orbit

- Space b/w earth and satellite.
- 3500 Km. (22,3300 ft)

\* Geo-stationary = speed of earth - speed of satellite.

→ 3 satellites are enough for earth.

8 degree  $45^\circ$

→ Our future is "Internet in sky".

\* There are some projects in continuation for satellites

⇒ LEO project : Iridium, orbcom, teledesic

These are Bill Gates project based on "internet in sky"

⇒ MEO : GPS

⇒ GEO : Geosynchronous

\* PoE : Power over ethernet :-

Distributing power over an ethernet network.

Because the power and signals are on the same cables, PoE enables remote network devices such as ceiling mounted access points, surveillance cameras and LED lighting to be installed far away from AC power sources.

\* Firewall : wall b/w public network and private network-

Note \* Rain drops absorb electromagnetic signals-

=> Challenges of wireless connections:

- Disalignment

- Security

-

-

\* VSAT: Very small Aperture Terminal

Small sized earth station used in the transmit or receive of data, voice and video signals over a satellite communication network, excluding broadcast television.

=> Mobile hotspot and tethering

=> Networking protocols and standards

=> Transport layer protocol

$\Rightarrow$  TCP/IP Model.

$\Rightarrow$  Classify application port numbers.

\* Source socket = source IP + source port

\* Destination socket

$\Rightarrow$  WLAN Protocols:

\* Coverage of wireless connection depends upon height of antenna + Power.

\* RFC : Request for comments

- Numbered document which includes appraisals, descriptions, definitions of online protocols, concepts and methods and programs.

$\Rightarrow$  Bluetooth, NFC, RFID

$\Rightarrow$  RFID : Radio frequency ID  
It is used in NIC etc.

\* IoT : Internet of things..

$\Rightarrow$  Zigbee and ZigoWave

$\Rightarrow$  Cellular Generation

1st generation: AMPS

D- AMPS

1G, 2G, 3G, 4G

Q \* Through what way IPs are allocated in the different regions of the world.

⇒ Servers

Work group networks vs

client servers

↓  
No OS required

No single computer in charge,

\* Network printer : Part of a work group or network of computers that can access all the same printers at same time.

\* Local printer : Directly connected to a specific computer via USB cable.

⇒ Proxy server :

- Utilize bandwidth
- Minimize waste of bandwidth

\* Temporary files command

?> Temp ?<

⇒ Protocols used for authentication:

AAA

Radius

ADC

⇒ Protocols used in Data link layer:

- PPP
- PAP
- CHAP

⇒ Syslog server :-

Network services performance stored here.

⇒ Network interface card:

ARP : IP to hardware.

\* Port is used instead of IP. NIC.

⇒ Repeater, Bridges, Hub

→ Repeater

- Regenerate signals
- Also amplifies signal
- Active devices (Power dependent)
- Switches and Hub also used as repeater

\* Google these:

AP / WiFi router

CSMA / C.A

CSMA / CD

- \* 150  
Chandan*
- \* Switch work like a bridge - It allow multi-users to access the network - 200, 1000, 10 GB.
  - \* Hub used for one user at a time.

⇒ Difference b/w router and bridge :-

- Router connect different networks.
- Bridge also connect different network but with same IP type (Net Id)

\* Cisco ASA firewall:

- Related to security and hacking.

\* PoP : Point of presence :-

Access point or physical location at which two or more networks or communication devices share a connection.

→ In IITs there it is in English faculty and Tech.

\* UCF :

⇒ Wireless APs :

Used for same network - unlike wifi -

- Indoor : 100 meters
- outdoor : 200 meters.

⇒ Routers

- Baseband : Limited coverage area
- Broadband : Wider coverage area.

⇒ Router protocols:

- RIP
- IGRP

- \* Layer 3 switches are manageable.
- \* Sometimes used instead of router.

→ Firewalls

→ IDS and IPS

→ UTMS : Universal threat manager

→ Security devices

→ UTMS

→ Endpoint management server

\* PERN Network management system.

ss Must see.

\* If access switches are wireless then  
wireless radio bridges are required.

\* Possibilities for failure

- 
- 
- 

→ Other network devices

→ Patch panel

→ Power over ethernet and ethernet over power.

→ RJ pin 4,5,7,8 used for power supply-

→ Cloud-based network controller-

→ Network cables

→ Network tools and descriptions-

⇒ Cable types

⇒ Coaxial cables

→ Bus topology:

Thinnel - 10Base2

Thicknet - 10Base5

⇒ Twisted pair cables

UTP - Indoor - Easy and cheap

STP - outdoor - expensive

\* Fibre optic cable needed for one building to other building but light to electricity converter needed.

\* → In straight through both sides should have T568B  
(same color coding on both ends)

\* → In cross over cable / patch cord T568A on one and T568B on B side needed.

\* → Cross over cable is used to connect 2 computer without interface.

→ Pair 1 : white blue

→ Pair 2

→ Pair 3

→ Fibre optic cable

- High speed

- o interface

## APPLIED Networking:

⇒ Part I Interconnectivity :-

⇒ Network addresses :-

- Two network addresses

- MAC

- IP

→ Two parts of MAC address

- Both are Hexadecimal form

1 - Organizationally unique identifier 32 bit

2 - 24 bit

\* → To check all configured addresses : (MAC)

C:\> arp\all

\* Ethernet MAC address is used for  
NIC to NIC on the same network.

ARP : Address resolution protocol

RARP: Reverse ARP

- Both topics in next few slides.

→ IPv4

- 32 bit

→ IPv6

- 128 bit

→ Displaying the addresses :-

C:\> ipconfig /all

C:\> arp /s

→ Display

C:\> arp /a

→ Display arp table for particular IP address

\* Study IP address from video lectures in details

⇒ IP address has two parts

- Network

- Host

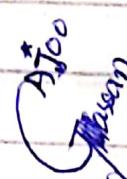
\* If net Id is over(ends) we borrow bits from host Id.

⇒ For router setup:

→ Connecting wired device to the internet.

→ Logging into router.

Video: How to configure router at home.



⇒ NAT for IPv4 :-

To achieve this, the translation of a private IP address into Public IP is required.

⇒ Quality of service:

- IPv4 don't have QoS built-in.
- IPv6 have.

\* → If we need QoS in IPv4, we have QoS packet scheduling service available.

\* Server zone b/w internet and intranet is called demilitarized zone (DMZ)

Important for exam :-

\* Network troubleshooting process: (6 steps) -

\* What is looping problem.

⇒ When looping problem occurs due to department wise IP scheme, we have to isolate that specific dept and then we have to troubleshoot.

⇒ At hardware level : (Problems)

- Access switch may be turned off.

→ Port problems in access switch:

- Sometimes ports of the access switch start to generate the storms.

Q => It is duty of the system/network admin to check if there is SW/HW medium issue?

→ DHCP - Limited access

→ Static - Unlimited access.

\* important

→ Responsibilities of system and network admins.

→ What is domain of both sys/net admin?

\* Primary work of network administration is: ~~to plan~~ network

PTO

Ajoo  
Misan

\* Telecommunication in USA  
Google it.

- To plan network
- To design proposal of network-
- To implement the network-
- Failure of the network -

⇒ Network has two entities:

- Logical
- Physical

\* Primary work of system admin:

- Decide user privileges
- Installation
- 
- 
- 

\* To install VMware

First enable visualization setting in Bios.

→ Common/advanced problems and solutions.

Q \* ⇒ If there is network connected and no internet access, what issues may be the cause

Keep me in ur prayers—!

⇒ If IP address unknown-

- Use 'IP config' command to return all IPs

⇒ FTP transfer files and install the apps as well.

\* ⇒ SFP: Light to electrical signal and vice versa.