

Section 18:Building a Real-World Network

141. Network Types

Need to know what these are

LAN - Local Area Network (Switch(es) with a bunch of computers hooked to it. They are all on the *same broadcast Domain*). No router

WAN - Wide Area Network (More than one LAN connected by a Router) *Cant have a WAN without a router*

CAN - Campus Area Network (Buildings (Each with LANs and WANs. They are interconnected)

MAN - Metropolitan Area Network (City with interconnected buildings)

Internet - Connected cities

Private Network = Intranet

WLAN - Wireless Local Area Network (WiFi)

PAN - Personal Area Network (Bluetooth)

142. Network Design

1. Network design begins by assessing customer needs
2. Assess current networking infrastructure
3. Incorporate security considerations early in the design process
4. Analyze existing network documentation
5. Check for compatibility with existing network hardware
6. Check operating system compatibility
7. Assess wireless needs
8. Multiple ISPs

Review:

*Network design starts with assessing customer needs

*Design considerations include documentation, compatibility with existing hardware and software

*Bring in security early and make sure to assess external connectivity

143. Power Management

UPS - *Uninterruptable power supply* (Some batteries that are put together inline between your power supply and your individual hosts or networking equipment)

UPS (Individual Computers):



UPS (on the networking equipment rack):



A UPS only runs for a few minutes to a few hours (for short term problems)

Power Generator

Home or small office generator example: (Runs on natural gas and can keep you running for days or weeks.)



Udermy

Large office Example: Diesel



Udermy

Dual Power Supplys

Extremely common for networking equipment

Example:



Redundant circuits

Review:

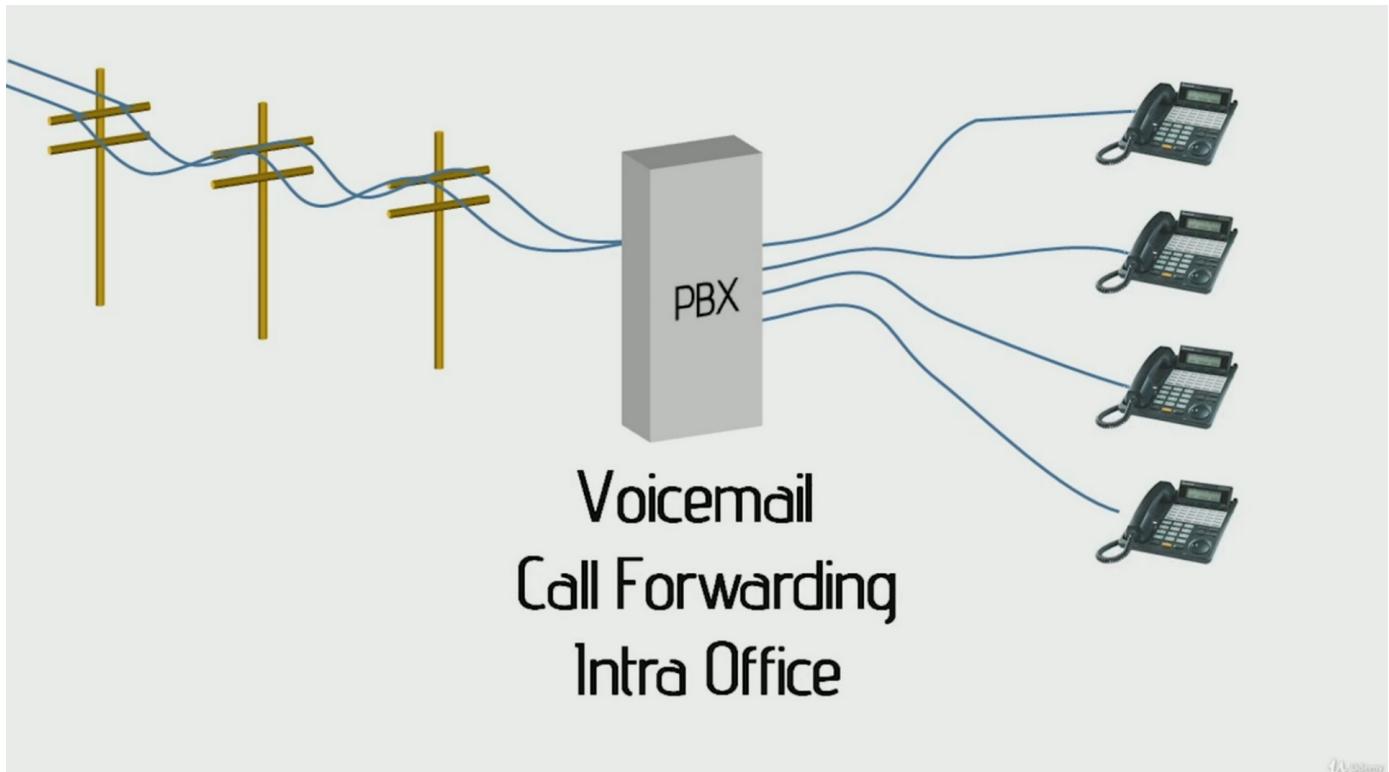
- A UPS is a battery backup and should be used for short-term power loss
- Power generators can be diesel or gas and are used to maintain power for when electric power is not available
- Dual power supplies and redundant circuitry are hardware power management and often used in critical systems

144. Unified Communications

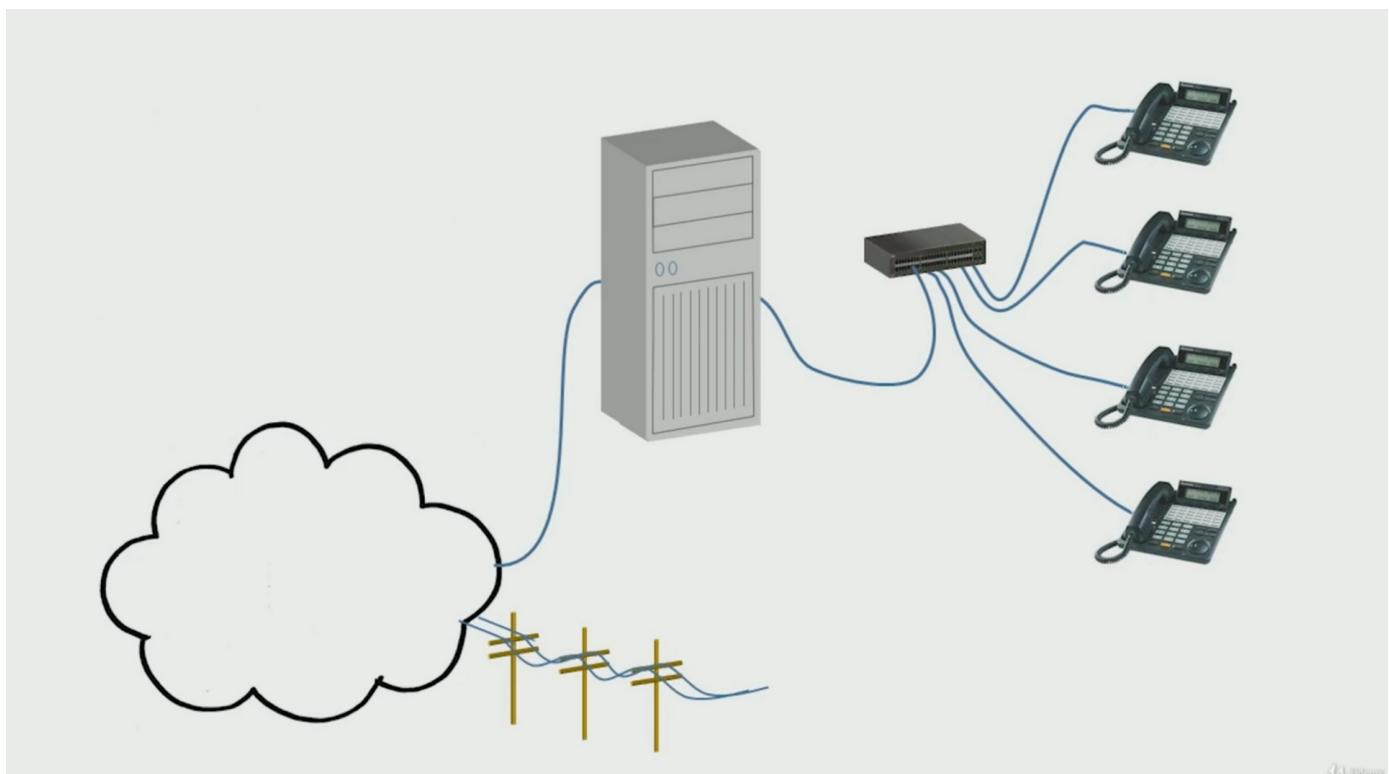
Voice over IP (VoIP)

Old PBX vs. Modern VoIP

OLD PBX:



VoIP:



Unified communication (VoIP on steroids):

Unified Communication



- Collaborative Tools/Workflow
- Presence Information
- Video Conferencing/Real Time
- Fax
- Messaging

*Know the difference between video conferencing and real time video

-Video conferencing is pretty much one way and one person talks to everyone
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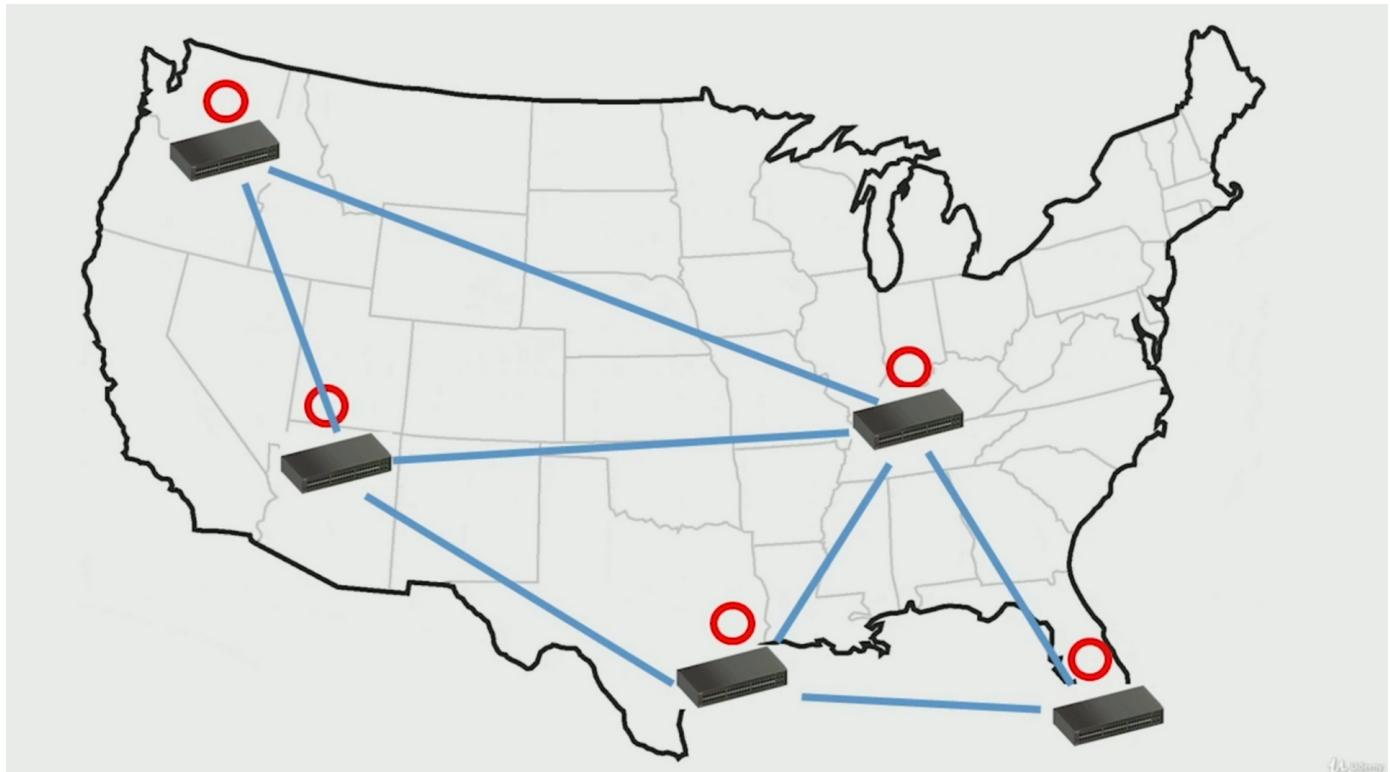
-Real time video everyone can talk to everyone else (google chat groups):
![Screen Shot 2020-06-10 at 3.14.03 AM.png]
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Different UC Devices:

- A UC Device: Mic, Camera, Display
- UC server: local call connector, stores VM, makes connections for calls
- UC Gateway: acts as interconnection between two offices far away

Medianet - a bunch of UC gateways that using quality of service techniques make sure that our voice and video data gets from one place to the next in a timely basis.

Example:



POR TS

*RTP (Realtime Transfer Protocol) - UDP ports 5004 and 5005

*SIP (Session Initiation Protocol) - TCP ports 5060 and 5061

*H.323 (ITU Protocol which determines how to switch and control how different types audio and video over a network) - TCP port 1720

*MGCP (Media Gateway Control Protocol) - (UDP and ICP) 2427 and 2727

Review:

*Unified communication combines VoIP phones, video, fax, chat, and more into a single system

*Key components of UC are the UC device, UC Server, and the UC gateway

*Know the ports

UC does not provide virtualization. Unified communication (UC) integrates a number of communication features including collaboration/workflow, presence information, video conferencing and real time video.

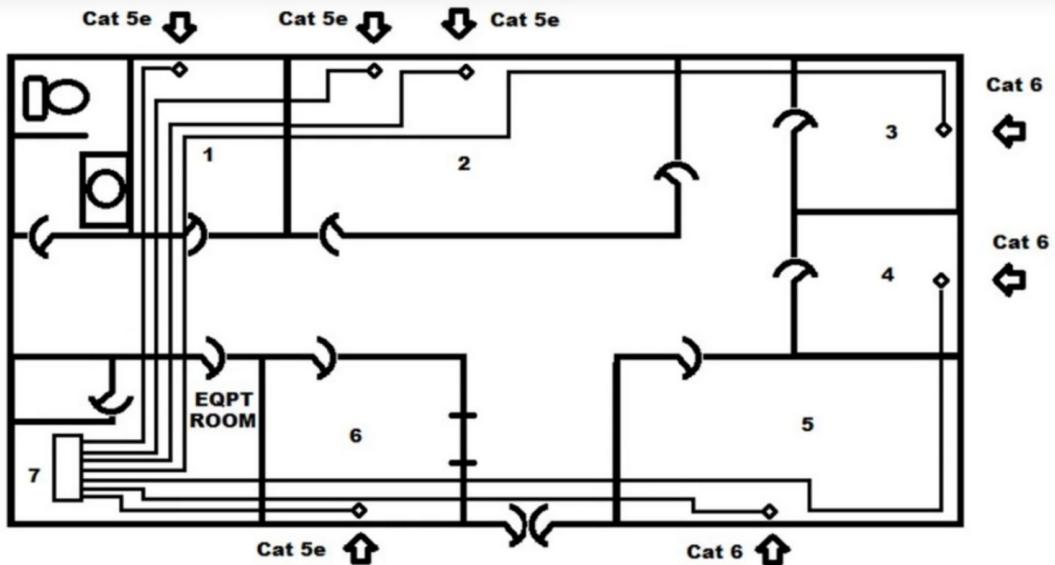
145. Network Documentation

- Inventory Management
- Physical documentation - Things you can look at and hang on to
- Logical documentation - logical addresses, VLAN etc

Physical:

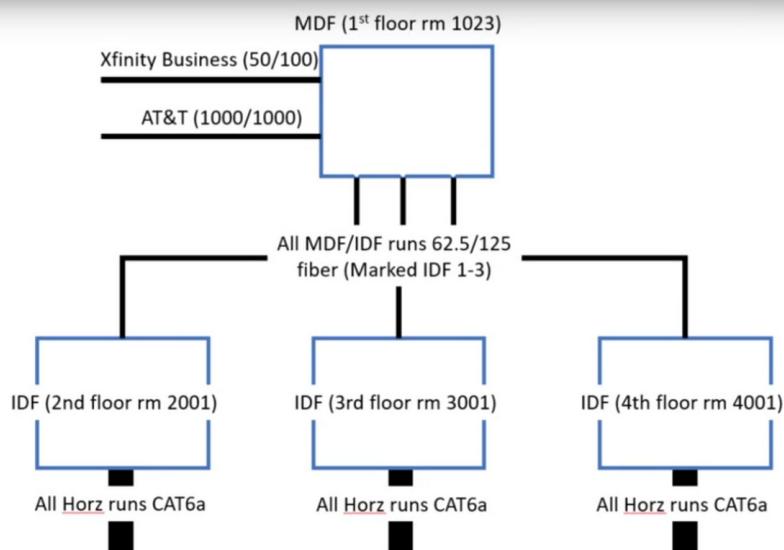
Wiring Diagrams:

Wiring Diagram



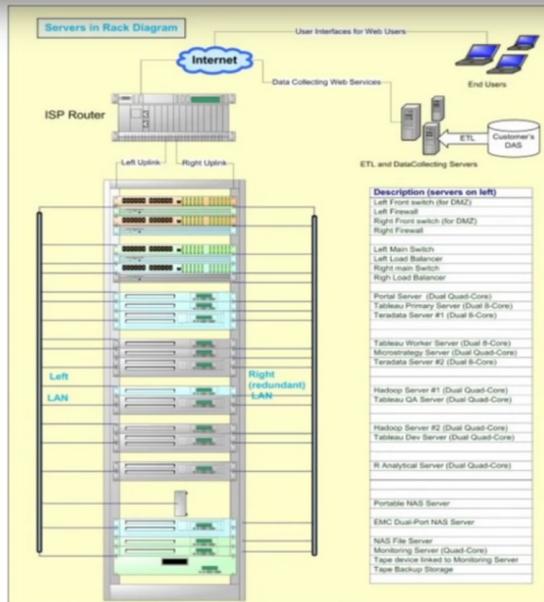
IDF/MDF Diagrams:

IDF / MDF



Rack Diagrams:

Rack Diagram



Cisco Icons 1 (left to right): (Switch Icon, router Icon)

Cisco Icons



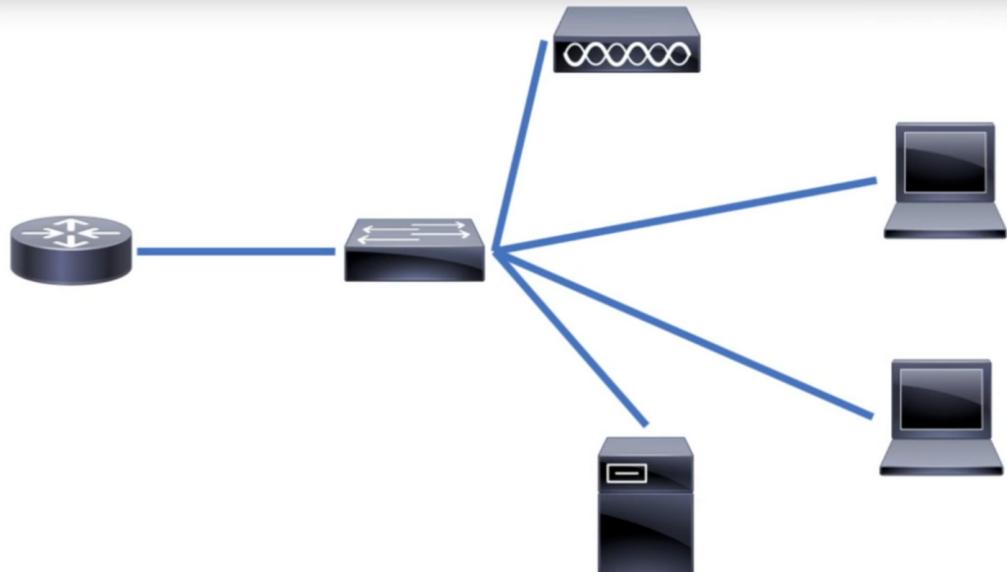
Cisco Icons 2 (Left to right): (Server, Firewall, broadband router, wireless access point)

Cisco Icons



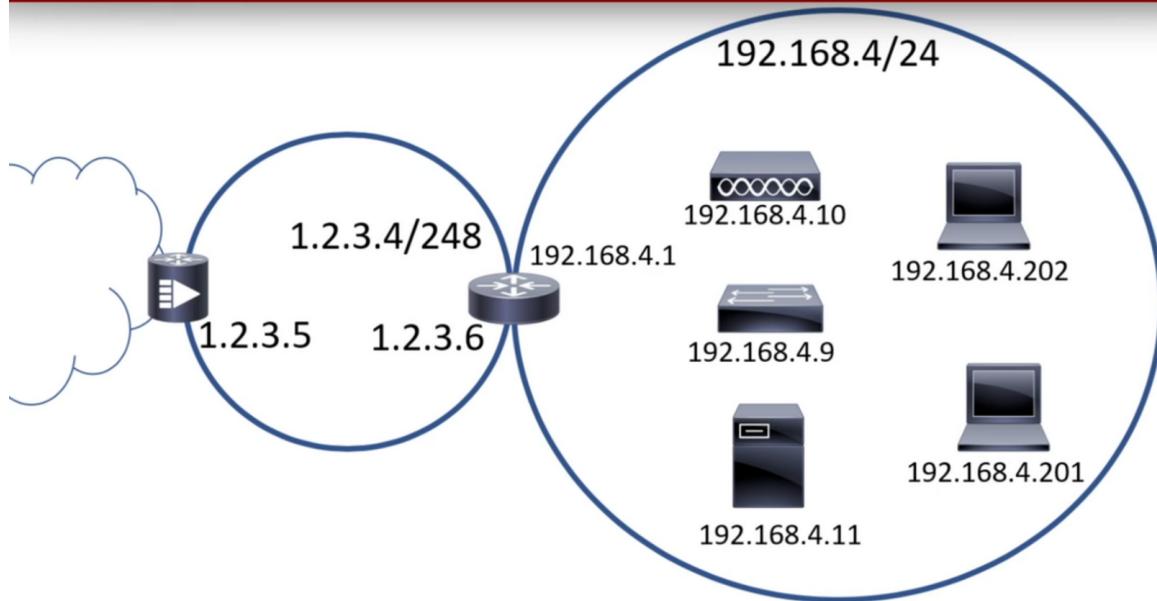
Physical Network Diagram:

Physical Diagram



Logical Network Diagram: (Circles Rep different Network IDs)

Logical Diagram



SOP/Work Instructions (procedures):

SOP/Work Instructions

Firewall ACL update procedure

- 1) Make sure to call Mike @ 8160 before you do this!
- 2) Backup running config
- 3) Make additions to ACLUser only! Do not touch ACLhome
- 4) Screenprint config change and send to Mike @8160 before commit.
- 5) Document ACL change date/time.

Review:

*Questions will not ask about the diagrams. They show diagrams assuming you know them and give you questions about diagnosing issues.

*Physical documentation includes a wiring diagram of the network, drop locations, and enumeration of equipment

*Rack diagrams specify physical location and specification of each piece of equipment in the rack

*Logical documentation shows the VLANs, domains, and port and primary TCP/IP information

146. Contingency Planning

1. Disaster Recovery (e.g. Hurricane):

-Evacuation plan

--Back up sites:

---Cold site:

----It takes week to bring online

----Basic Office space: Buildings, chairs, AC

----No operational equipment

----Cheapest recovery site

---Warm Site:

----Takes days to bring online

----Operational equipment but little or no data

---Hot site

----It takes hours to bring online

----real-time synchronization

----Almost all data ready to go - often just a quick update

----Very expensive

Things to Consider when thinking about backup sites:

- Distance and location
- Internet requirements
- Housing and entertainment
- Legal issues

2. Business Continuity (keeping things running):

The order of restoration:

Example:

1. Power
2. Wired LAN
3. ISP Link
4. Active Directory/DNS/DHCP servers
5. Accounting servers
6. Sales and accounting workstations
7. Video production servers

8. Video Production workstations
9. wireless
10. Periferals (Printers, cameras, scanners, faxes)

Annual Exercises:

- practice things e.g. moving servers to backup location
- Failover: The process of making back up sites happen
- Alternative processing sites
- Alternative business practices
- After action reporting

Review:

*Contingency planning attempts to mitigate adverse incidents to preserve business continuity

*Understand the pros and cons of the offsite options available: cold site, ware site, hot site

*Thorough planning and practice is what makes recovery plans successful when disasters occur

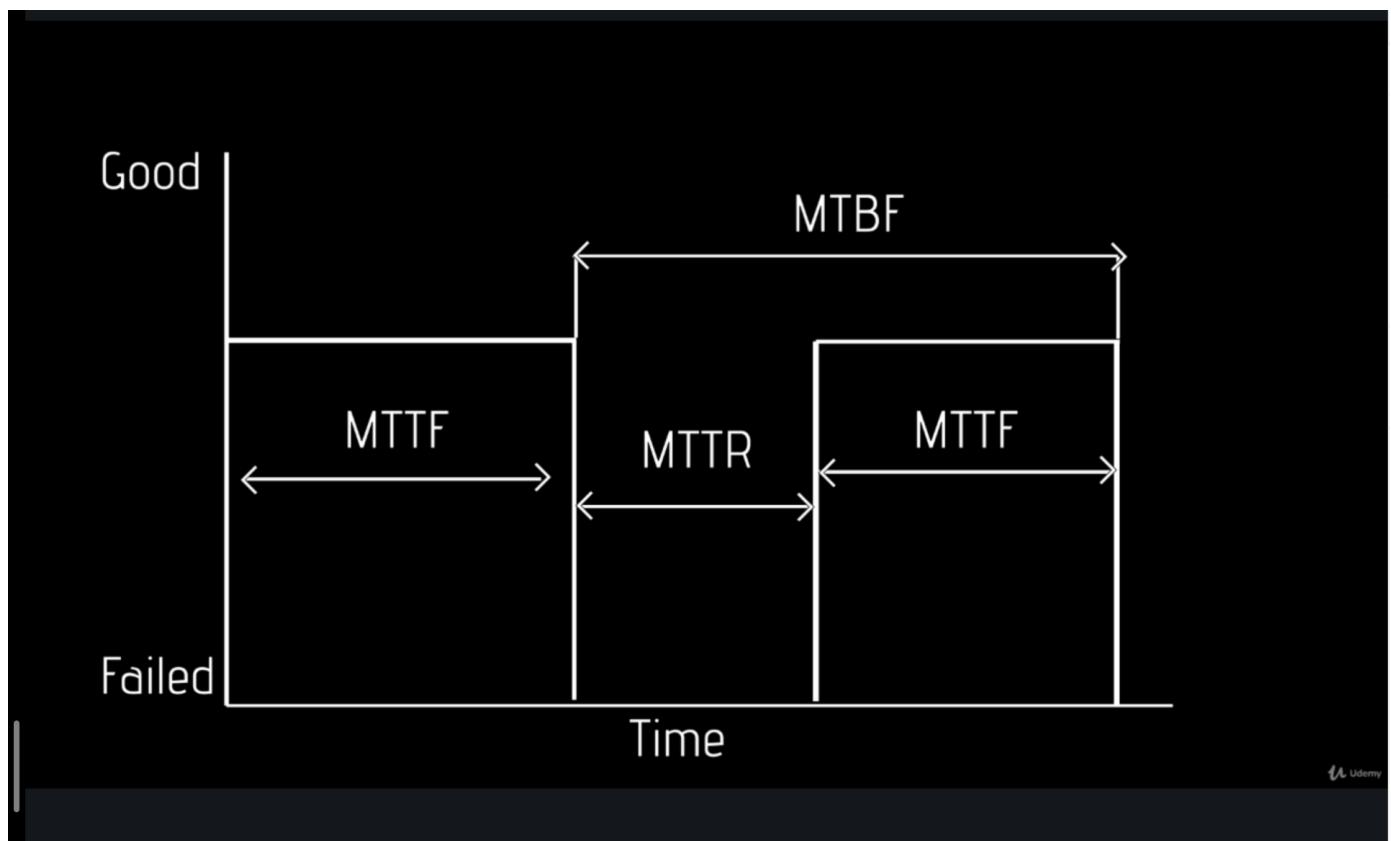
147. Predicting Hardware Failure

Terms:

MTTF - Mean Time To Failure

MTTR - Mean Time To Repair

MTBF - Mean Time Between Failure



SLA - Service Level agreement

*Mission critical equipment should have a known MTTF, MTTR, and MTBF

*SLA with a third party can be used on equipment to define expected downtime and offline periods

*For continuity, estimate expected turnaround time for parts and services if the system goes down

148. Backups

Backup methods -

*Backup of everything = full backup

File systems

- Have features that help know when a file has been changed

cmd stat file - linux

archive attribute - windows

*Differential Backup - Backup of all the changes since the last full backup (less back up sets but bigger)

*Incremental Backup - Only backs up changes made from last back up (More back up sets but smaller)

*Snapshots - typically on virtual machines

*Local Back ups - e.g. tapes, external hard drives (Conveniently close, easy)

Offsite back ups- (Not as convenient, but safer from local fires etc)

Local Backups + Offsite backups are best.

*Cloud backups - They take up a lot of time to get the initial backups going, however there is continuous ongoing incremental backups once they are set up.

Review:

*Understand the differences between an incremental and differential backup

*Snapshots are typically used with virtual machines and are usually not stored on separate media

*Be able to describe the pros and cons of local vs. remote vs. cloud-based backups

QUIZ

1. Which of the following is not a network category type?

- a. LAN
- b. WAN
- c. CAN
- d. SAN**
- f. MAN

2. Which choice is not an element of unified communication (UC)?

- a. Collaboration
- b. Presence Information
- c. Video conferencing

d. Virtualization

e. Real time video

3. Which of the following is not an element of contingency planning?

a. Disaster recovery

b. Business Continuity

c. Fire suppression systems

d. Backup site

e. Restoration order of operations

4. Which choice is not a backup methodology?

a. Full

b. Incremental

c. Photographic

d. Differential

e. Snapshot

5. A technician has been tasked with planning for equipment failures. Which specs will the technician not need to review in order to create a failure plan?

a. MTTR

b. SLA

c. MTBF

d. MTTF