

Network Professional Training center

Providing Job role training in one of fastest growing IT Jobs Sector



Real life Network Experience

NPTC Lab Guide_3

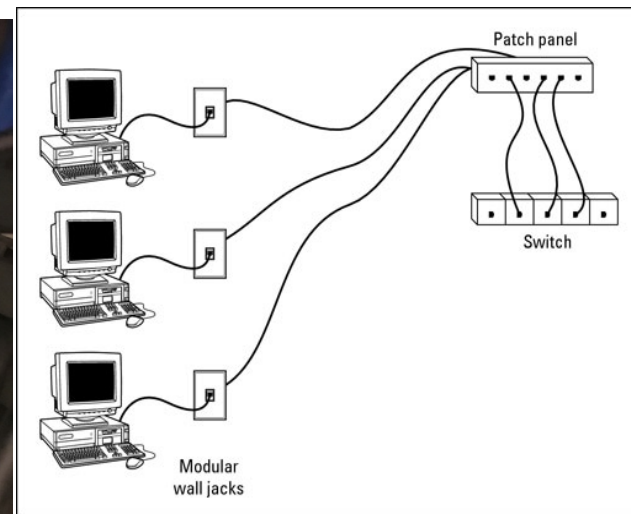
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Real Life Network Experience

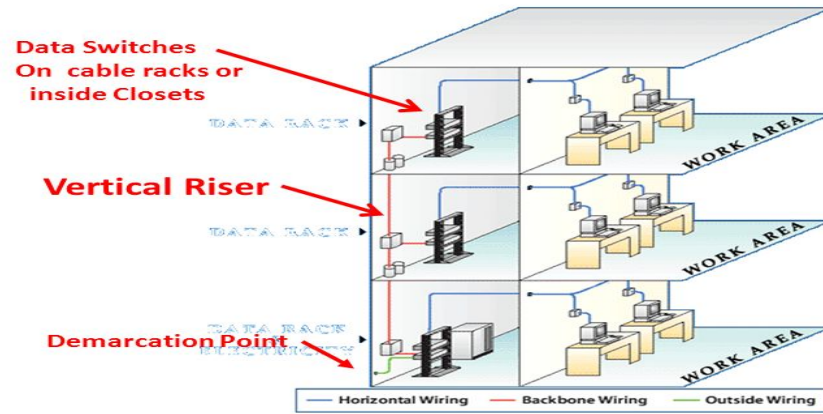
Enterprise Cabling Setup

Cabling from wall jack to patch panel to network switch

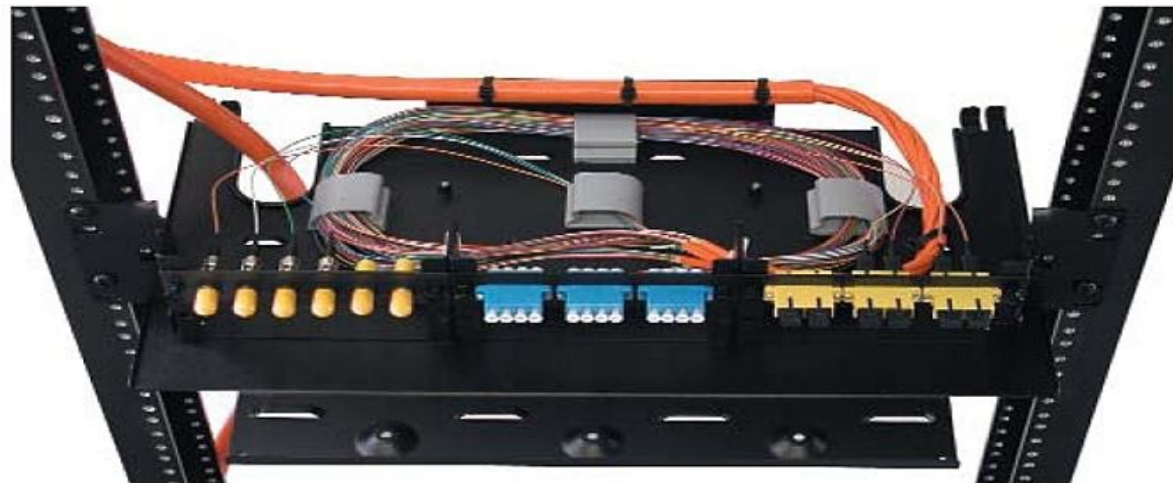
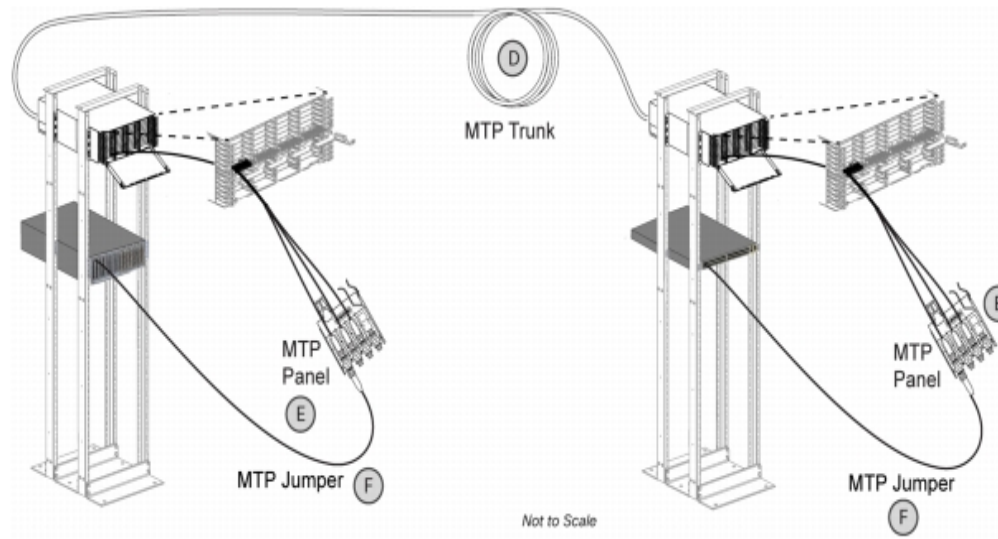


DMARC-Demarcation Point /IDF-Intermediate Distribution Frame /MDF-Main Distribution Frame

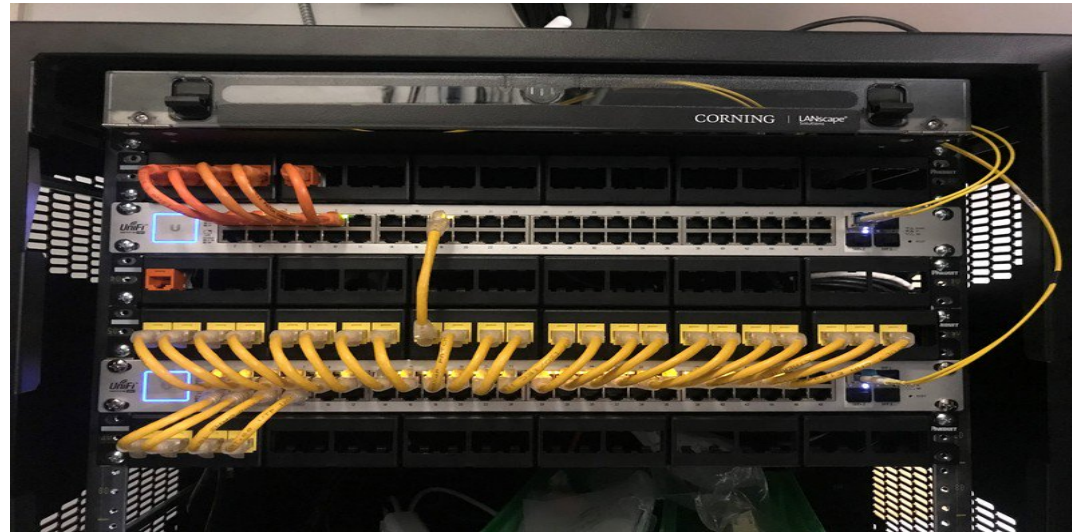
HORIZONTAL & VERTICAL RISER



Cabling from one IDF to MDF or another IDF



IDF (Data Closet with Access Switches connected to Users)



A Router with an MPLS Circuit





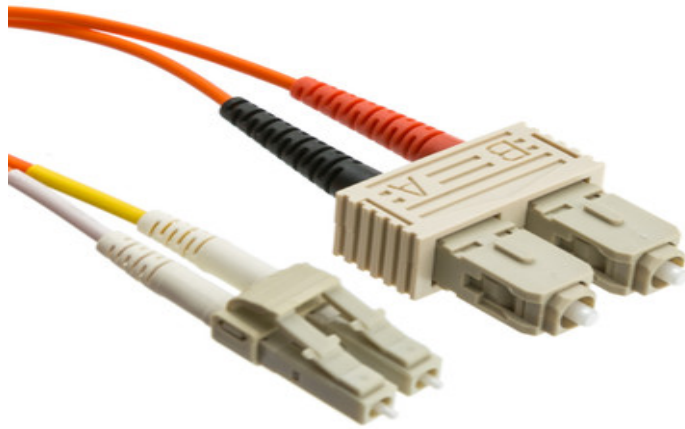
GBIC



SFP

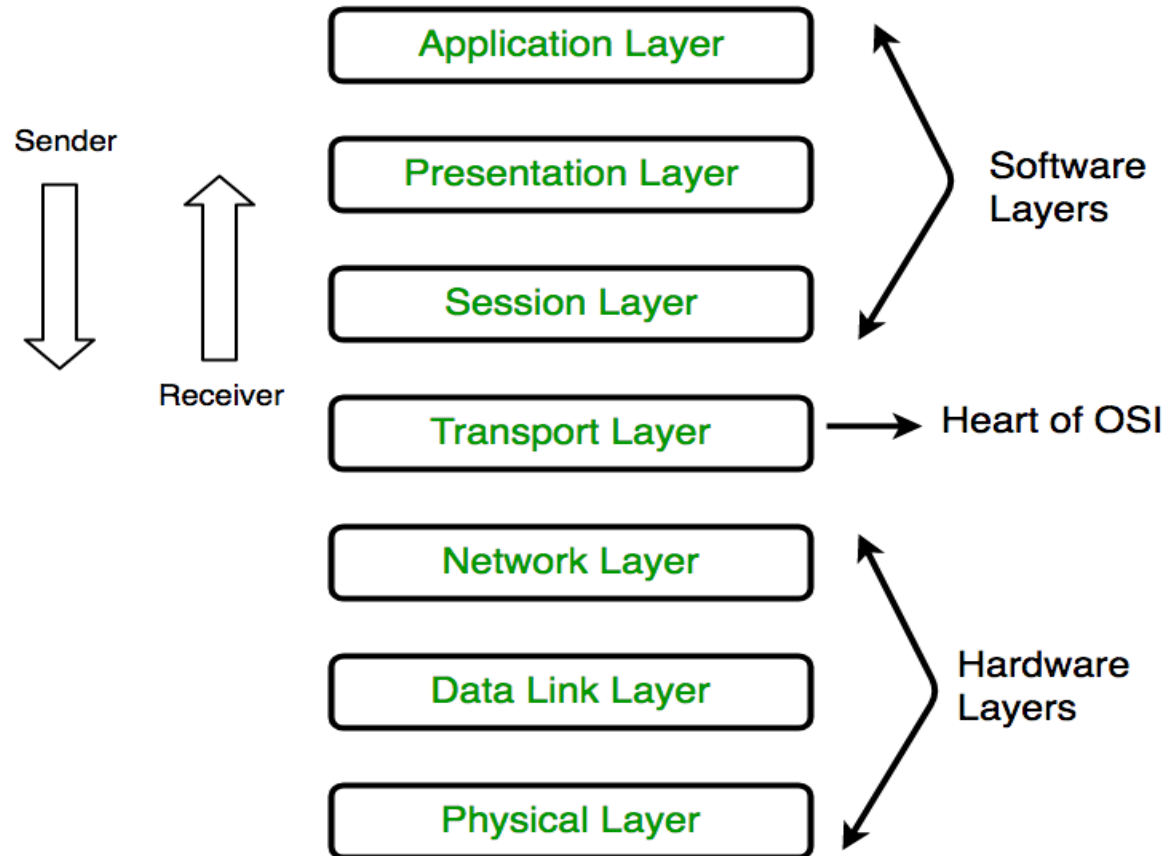
Copper SFP vs Fiber SFP





Open Systems Interconnection model (*OSI* model)

The model uses layers to help give a visual description of what is going on with a particular networking system. This can help network engineers narrow down problems (Is it a physical issue or something with the application).



Please Do Not Throw Sausage Pizza Away

Best practices for successful network troubleshooting

- 1. Identify the exact issue or problem:** Most of the time a problem report doesn't give us enough information. Users are very good at reporting "network is down" or "my computer doesn't work" but this doesn't tell us anything. We need to collect information by asking our users detailed questions or we use network tools to gather information
- 2. Localize and isolate the cause:** Attempt to isolate the problem to a single device, connection, or software application.
- 3. Formulate a network troubleshooting plan for solving the problem:** Research and/or consider the possible solutions to the problem. Consider the possibility that some solutions to the problem at hand may introduce other problems.
- 4. Test to verify that the problem has been resolved:** After you have implemented the solution, ensure that the entire problem has been resolved by having the user test for the problem again.
- 5. Document the problem and solution:** Documentation can be used for future reference to help you troubleshoot the same or similar problem. You can also use the documentation to prepare reports on common network problems for management and/or users, or to train new network users, network troubleshooters, or members of the network support team.

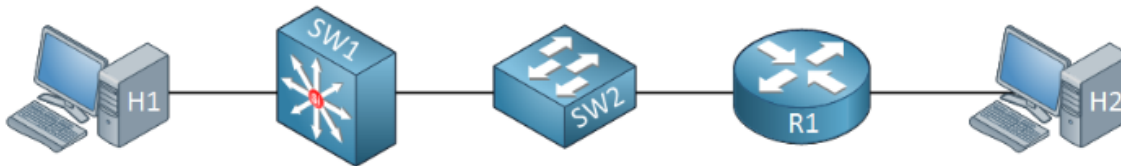
Methods use for Troubleshooting

Eliminating possible causes is an important step in the troubleshooting process and there are a couple of approaches how you can do this, here they are:

- **Bottom-up.**
- **Follow the traffic path.**
- **Spot the difference.**
- **Replace components.**

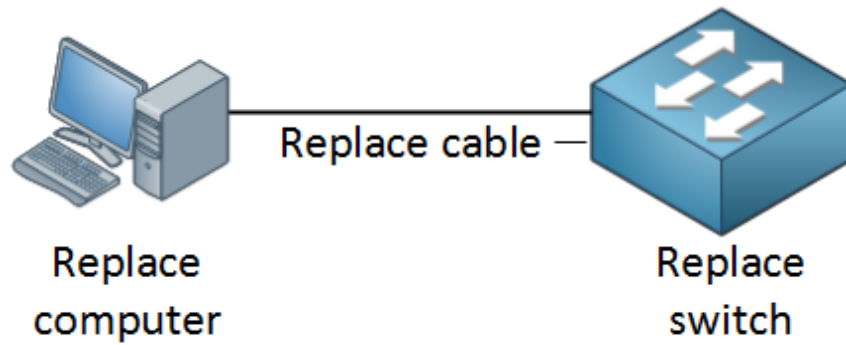
Let's walk through the different approaches one-by-one!

Bottom-up means we start at the bottom of the OSI model and we'll work our way up. We will start with the physical layer which means we check our cables and connectors, move up to the data link layer to see if Ethernet is working, Spanning-tree is working ok, port security is not causing issue, VLANs are configured properly and then move onto the network layer. Here we will check our IP addresses, access-lists, routing protocols and so on. This approach is very thorough but also time-consuming. If you are new to troubleshooting I would recommend to use this method because you will eliminate all the possible causes for problems.



The **follow the traffic path** is very useful. First we'll try to send a ping from H1 to H2. If it fails we'll check all the devices in its path. First we'll verify if SW1 is configured correctly, if it's looking good we'll move onto SW2, verify it and then move onto R1.

You've probably done one of these before. **Spotting the difference** in configurations or the output of show commands can be useful but it's very easy to miss something. If you have a number of branch routers with a similar configuration and only one is not working you can see if there's a difference in the configuration.



The last approach to solve our problem is to **replace components**. Let's say we have a scenario where a computer is unable to access the network. In the example above I could replace the computer to eliminate any chance of the computer being the problem. We could replace the cable and if we suspect the switch we can replace it with a new one and copy the old configuration to see if there are any hardware problems

Troubleshooting Check List For Real Life

Devices not communicating (Not pingable)

Checklist

- Know the scope of the issue (single device or multiple device)
- Determine the source and destination
- Check Cable connection
- Check if right vlan assign to the port
- Check if right vlan is available on the trunk port
- Check for Input errors , Output errors and CRC errors
- Check for Err-disable port
- Check for the IP settings on the device
- Ensure you are dealing with the right port for troubleshooting (by doing show logging when the user disconnect his device)
- Assign the same IP address on a laptop to isolate the device

Slow Performance of a device or Network

Checklist

- Know the scope of the issue (users going to the internet, just users of internal resources, whole LAN or users that cross the WAN) and get details of what they mean by Slow network
- Check the port errors, speed and duplex mismatch problems on a PC Port, Server port or internet gateway port(this usually cause extreme slowness)
- Bad cable
- Do a ping test with reply to see if there is a drop (with the source and destination IP)
- Do a ping test to check for the RTT
- Do a trace route to check for weird hops or really slow responses
- Look into the router or switch involve for high CPU or any errors in the log
- Check with the link Provider if they see any errors on the link.
- Use monitoring tool to check top talkers on the network to enforce network usage policy
- Educate the user with realities of life.

Slow internet

Checklist

- Know the scope of the issue
- Does slowness apply to a specific application or everything going to the internet
- Do a trace route with 8.8.8.8 or 4.2.2.2 to determine whether the traffic is going through the primary internet router or the backup because your backup will not be as fast the primary
- Do ping test with reply to see if the packet is dropping
- Use your monitoring tool to determine the bandwidth utilization
- Check the service provider port errors, speed and duplex mismatch
- Ping the internet router from the core switch to see if there is a drop
- Check the logs of the device

No internet Access

Checklist

- Know the scope of the issue (and check if devices have right IP address or APIPA address)
- Check for power on network devices
- Ping the internet router or remote router
- Check with ISP for any possible outage
- Reboot of the router
- Check if BGP neighbor is down
- Check with FW for any VPN issues
- Check if the link to provider is not disabled
- Ping the DNS server
- Do nslookup on command prompt

Department not having internet access

- Ping the switch at that location
- check the uplink cable and reboot the switch if is not pingable
- Check if the device has the right IP addresses
- Check the DHCP Server if the scope has run out of IP addresses

IP conflict

- Check on your router/core switch for any conflict(Show ip dhcp conflict)
- Off one device if you can still ping the same IP address
- Trace the device and find out if DHCP scope IP address has been assigned as static

URL issue

- Always find out if is a new project for the firewall to open port 80 and 443 or any service port needed
- Ping and trace the IP address of the URL
- Check with the server team if the application have no issues on the server

Routing Issue

- Check when the issue started.
- Check if is a new project to add the new route
- Check for any recent changes on the network
- Do ping and trace route to see where the packet was dropping
- Check the ACL rules

Day to Day Activities of a Network Engineer

1. Create a change request (Ticketing System)- Incident Ticket, Request Ticket
2. Procure Network Equipments- Routers, switches , APs , UPS, cables etc
3. Create a new network on core switches or Routers/Network Expansion
4. Connect Servers, Desktop, Access point, printers and others to the network
5. Documentation (Configuration templates, updating Network topology, and troubleshooting playbook)
6. Issue Static IP addresses to devices
7. Monitor network Devices – Solarwinds,Spectrum and NetQOS
8. Coordinate with ISP with Bandwidth and Circuit related issues
9. Create VPN tunnels on Cisco router
10. Connect your internet Router with ISP Circuit eg T1, Elan, MPLS, XO, OTV, VXLAN (internet circuit/connectivity circuit)
11. Setting up a new branch office
12. Trace the location of a desktop or corrupted devices and remove from the network
13. Replace dead switches/Routers
14. Password Recovery of Network devices
15. Device Maintenance -Upgrade IOS images (know the IOS images version)

4 Days Boot Camp Training Activities

Day -1 Activities

1. Knowing your Cables in real life and how to identify them

eg Fiber-SM and MM, Copper cables- Cat5,6,-10

2. Knowing your Transceivers and how to read them or identify in real life

eg. SR, LR, SX, LX

3. Knowing your Fiber cable connectors and how to identify them

Eg LC, SC, ST

4. Know your Network Devices models and how to identify them in real life

Routers- 1800, 2800, 2900 new 4300, 4400

Old Access Switches-2960, 3550, 3560, 3650, 3750 -Some 2960 and 3750 are stackable

Newer Access Switches 3850, 9200, 9300 all Stackable

Old Chassis Switches for Core Layer-6500, 6800

New Chassis Switches for Core Layer-9400, 9500

6. How to set up remote Office on a Rack with a Router or L3 Switch, Access switches, Stack switches(requirement in stacking) and Juniper switches

7. Patching in IDF & MDF (copper & Fiber)

8. How to read port on Access/Core Switches and Routers

Day-2

9. Installation of all network tools and documentations needed in real life

- a) Putty
- b) TFTP server
- c) Subnet Calculator

10. Documentations use in Real Life

- a) LAN IP management spreadsheet (Address book)
- b) Network Devices Spreadsheet
- C) ISP Spreadsheet
- d) Configuration Template
- f) Change Request Template

11. New Remote office set up requirement and Questions to ask:

- A) Number of users
- B) Wireless or wired network
- C) Equipment to Buy
- D) Bandwidth requirement)

Day 3 Activities

12. How to prepare a template for Remote Routers and Switches using below

- A) Designing Network Requirement template using solar winds calculator
- B) Configuration template used by the company

13. How to console to a switch or a router with console cables

14. How to activate port in real life

15. How assign an open port in real life

Day 4 Activities

16. How to install a new switch in an existing IDF

17. How to replace an existing switch with a new model

18. Replacing dead switch with or without a backup

19. How to managing Stack Switches and Core switches on production

- a) IOS and Model Requirement for stacking
- b) How to select a master switch
- c) How to add a new member in an existing Stack
- d) Replacing a dead switch on a stack
- e) Rebooting of a stack switch

20. Tracing a device on production and why we trace it

21. Discussion on Password recovery and IOS upgrade or downgrade

22. Branding yourself using LinkedIn

