Workshop

Build a Real Multi-Campus Network

Like a Networking Pro

Design → Configure → Secure → Troubleshoot→ Document. 100% hands-on. Zero theory.

Walk out with a job-ready portfolio that screams ‘Hire me.’

Objective Of The
Complete Practical Step-by-step Networking Workshop

- Gain highly advanced networking knowledge and hands-on experience

You are going to work on this Networking Project throughout your Workshop to configure the <u>NovaTech University Multi-Campus Network</u>

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NovaTech University Networking Project: Multi-Campus Design

Location: Olympus Site (Main Campus) and Atlas Annex (Smaller Campus)
Engineer: [Network Engineer Name] **Date:** [Date]

Project Scenario and Scope

- NovaTech University is a large academic institution requiring a secure, segmented, and fully routable network infrastructure across its two campuses, located 20 miles apart. The primary goal of this phase is to establish secure Layer 2 segmentation using VLANs and dynamic Layer 3 routing between all internal networks.

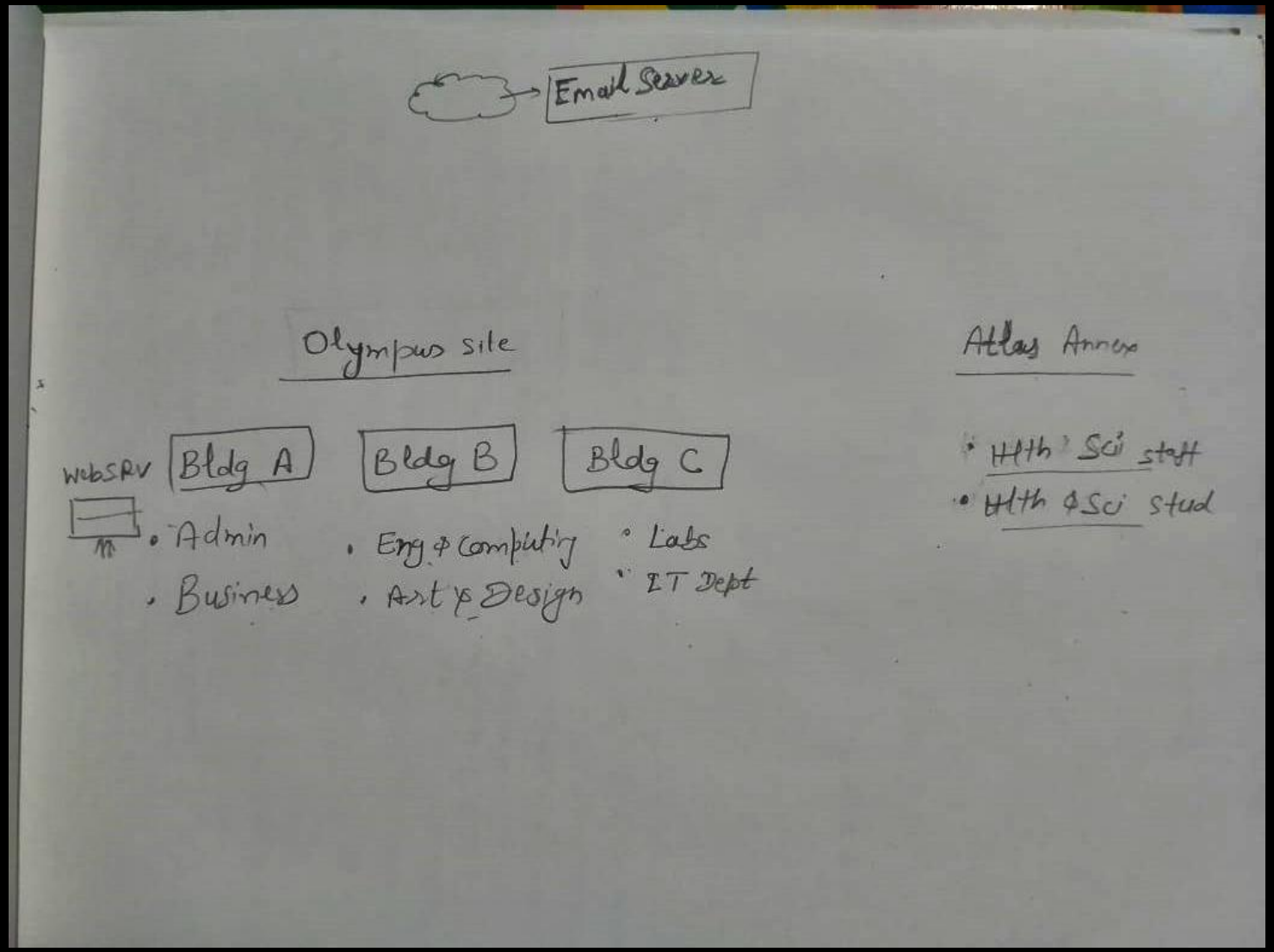
The Network Must:

- Provide physical connectivity and logical isolation for eight distinct departments/faculties.
- Utilize **RIPv2** for dynamic routing between the two campus gateways (R1 and R2).
- Implement a **router-based DHCP service** on the Main Campus for administrative and business staff.
- Ensure all devices can reach the external **Cloud Email Server** via a static route.
- Apply basic security measures (Port Security) on access switches.

Information about the site

Location	Department/Faculty
Olympus Site (Bldg A)	Admin (Management, HR, Finance)
Olympus Site (Bldg A)	Faculty of Business
Olympus Site (Bldg B)	Faculty of Engineering/Computing
Olympus Site (Bldg B)	Faculty of Art/Design
Olympus Site (Bldg C)	Student Labs
Olympus Site (Bldg C)	IT Department
Atlas Annex	Faculty of Health and Sciences (Staff)
Atlas Annex	Faculty of Health and Sciences (Students)
Servers (Olympus Site)	Web Server / Other Servers
External	Cloud Email Server
WAN Link	Campus to Campus Link

Site Diagram

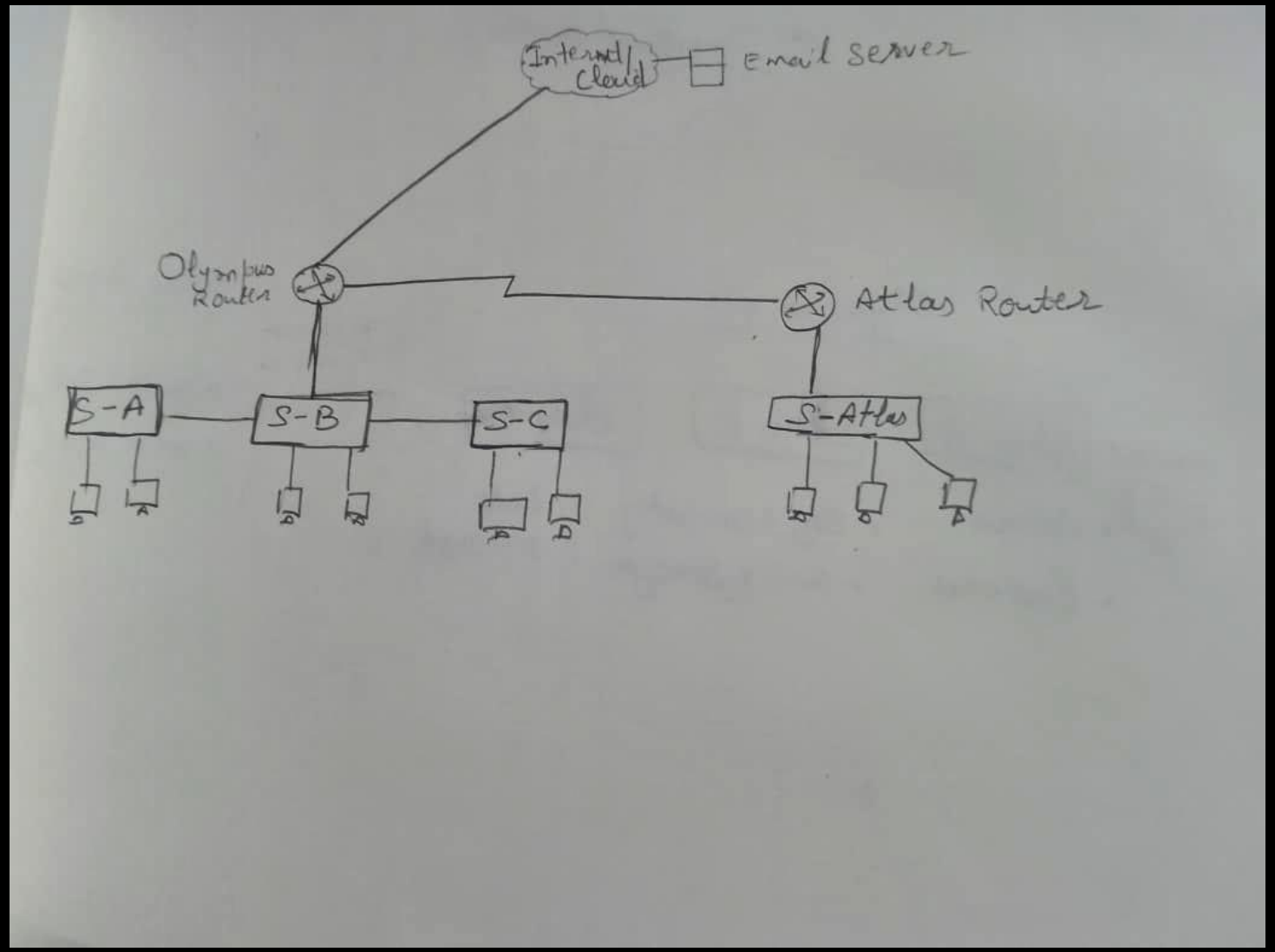


Estimate the number of devices required…

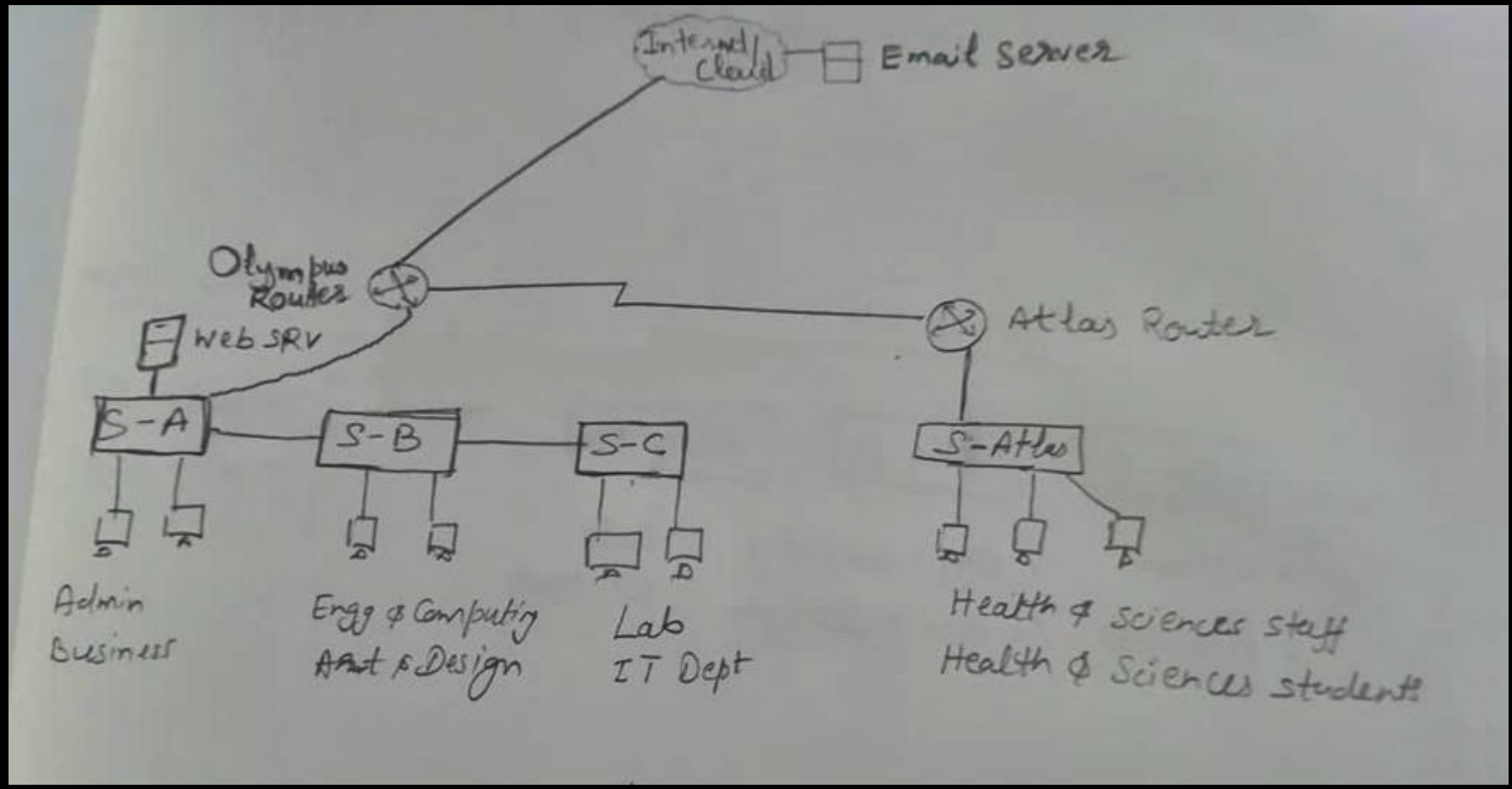
1. Physical Infrastructure Components	Device Type	Component Name	Model/Type in Packet Tracer	Quantity	Purpose in Topology
To organize the two campus locations in the Packet Tracer workspace, we will use a server room/wiring closet structure.	Rack	Equipment Rack	Rack	2 (at least)	One rack for the Olympus Site (R1, S-A, S-B, S-C, Server), and one rack for the Atlas Annex (R2, S-Atlas).
	Table	Desktop/Table	Table	5	To place PCs for local staff/students outside the central racks.

2. Network Devices (Mounted in Racks)	Device Type	Component Name	Model/Type in Packet Tracer	Quantity	Location
	Main Campus Router (R1)	Router	Cisco 2911	1	Olympus Site Rack
	Access Switches (S-A, S-B, S-C)	Switch	Cisco 2960-24TT	3	Olympus Site Rack
	Web Server	Server	Server PT	1	Olympus Site Rack
	Smaller Campus Router (R2)	Router	Cisco 2911	1	Atlas Annex Rack
	Access Switch (S-Atlas)	Switch	Cisco 2960-24TT	1	Atlas Annex Rack

Design the network topology (Cont.)



Change in the network topology



Identify the requirement of IP addresses

Location	Department/Faculty	VLAN ID	Network Address (e.g., /24)
Olympus Site (Bldg A)	Admin (Management, HR, Finance)	10	192.168.10.0
Olympus Site (Bldg A)	Faculty of Business	20	192.168.20.0
Olympus Site (Bldg B)	Faculty of Engineering/Computing	30	192.168.30.0
Olympus Site (Bldg B)	Faculty of Art/Design	40	192.168.40.0
Olympus Site (Bldg C)	Student Labs	50	192.168.50.0
Olympus Site (Bldg C)	IT Department	60	192.168.60.0
Atlas Annex	Faculty of Health and Sciences (Staff)	70	192.168.70.0
Atlas Annex	Faculty of Health and Sciences (Students)	71	192.168.71.0
Servers (Olympus Site)	Web Server / Other Servers	90	192.168.90.0
External	Cloud Email Server	N/A	203.0.113.10 (Example Public IP)
WAN Link	Campus to Campus Link	N/A	10.0.0.0/30

Create a Pre-Production/Staging/Test Bed/Pilot

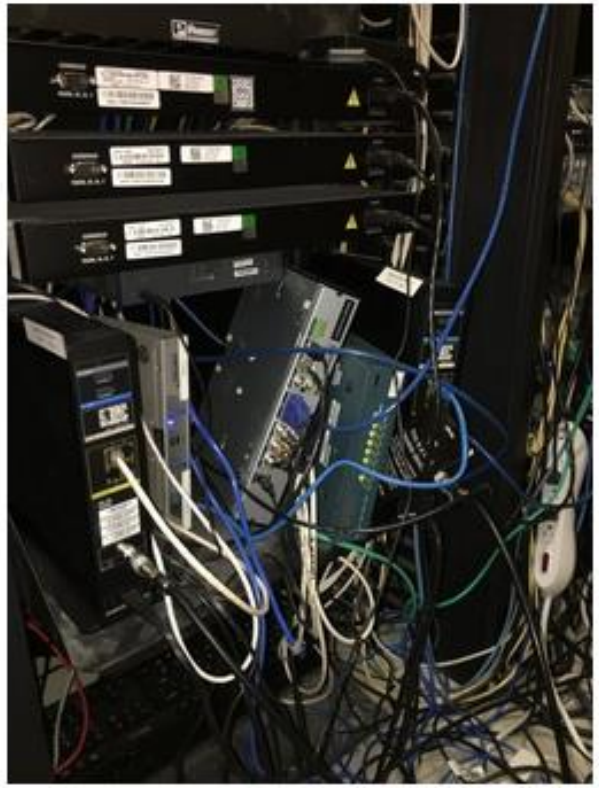
- We will build a network simulation environment using Cisco's Packet Tracer.
- You can download the Packet Tracer from https://www.netacad.com/

Well organized network…

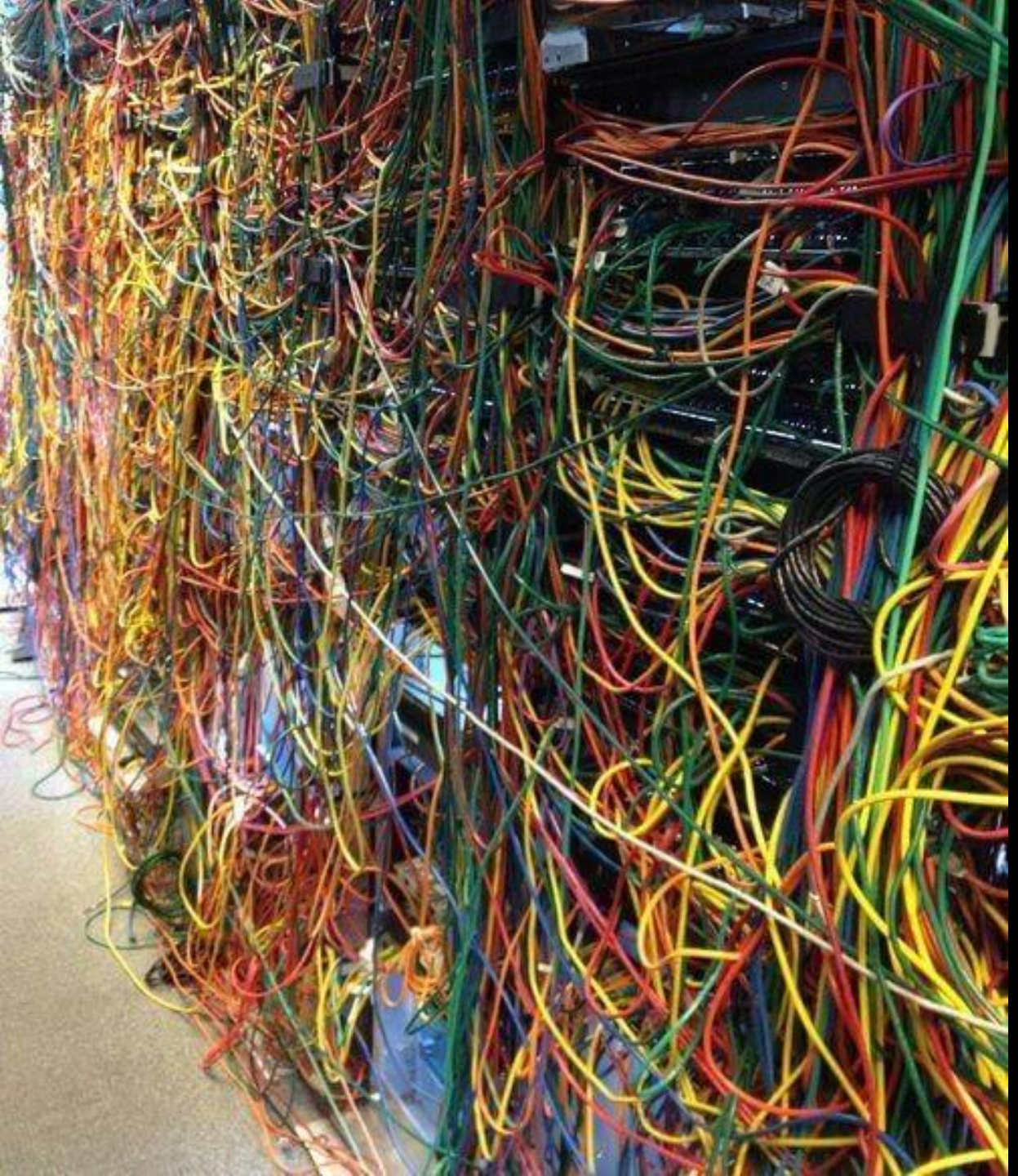
Before

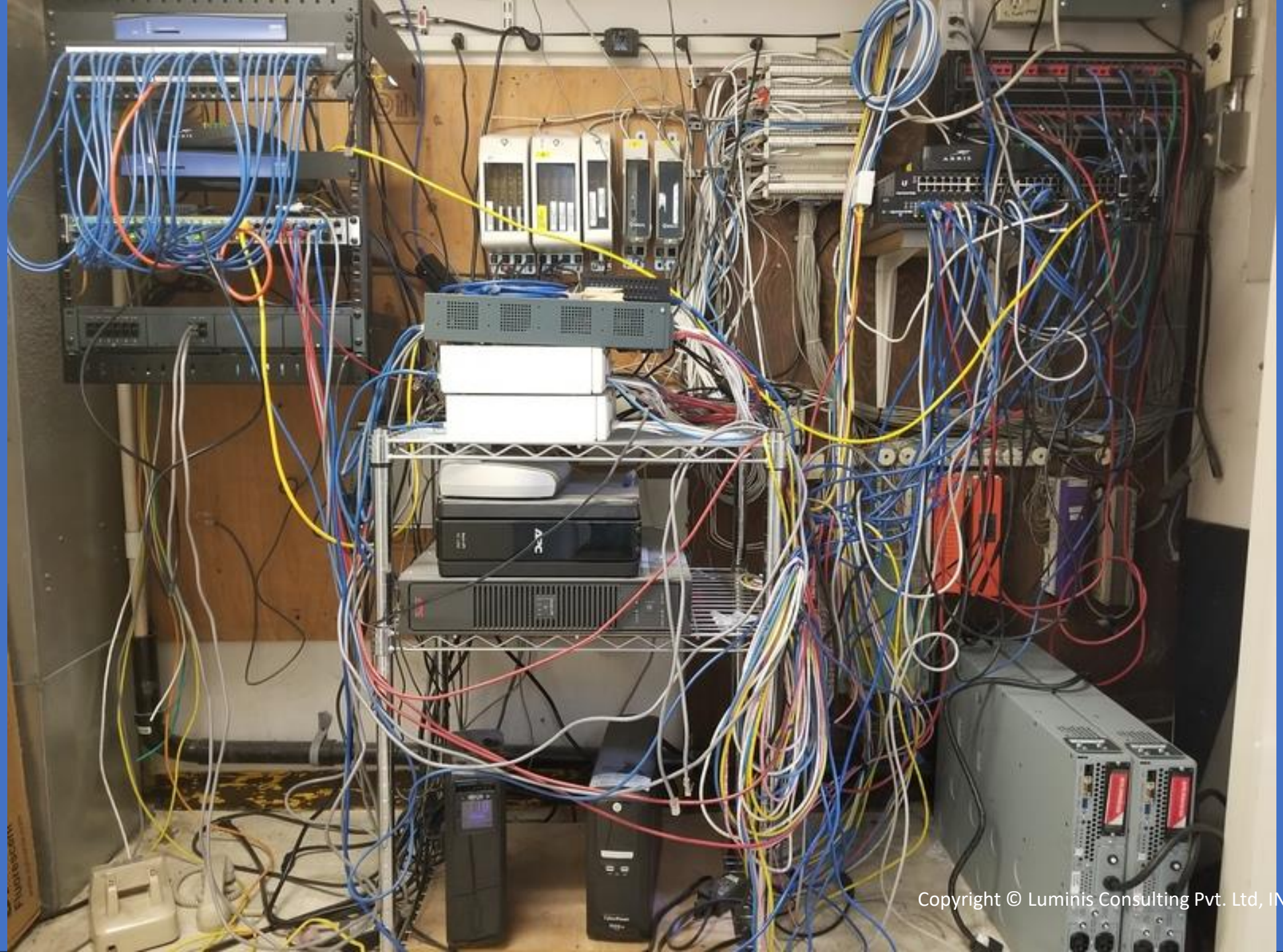
After

Before



After



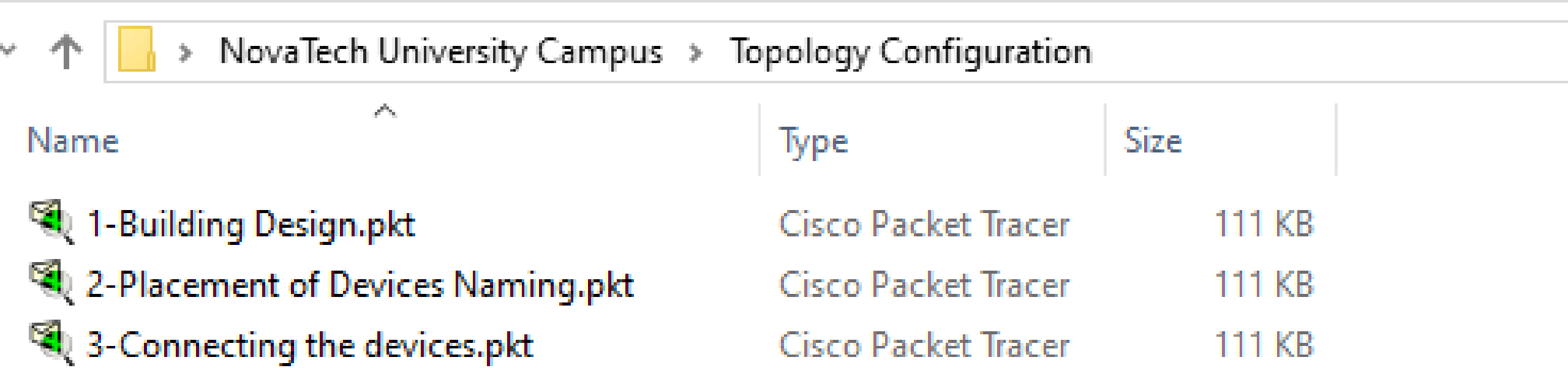


Let’s Start Working on the topology design…

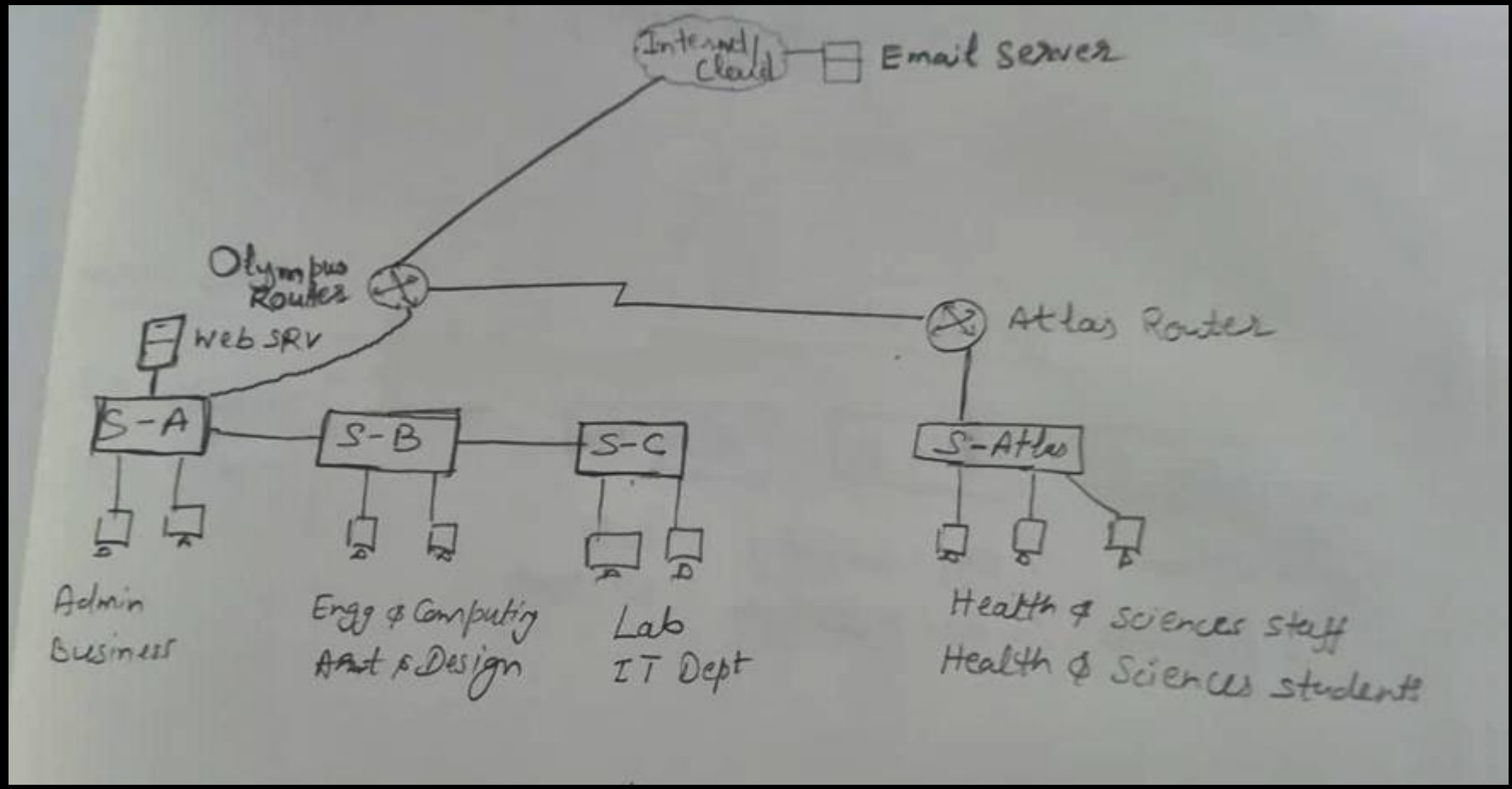
Major Phases

- Creating the topology.
- Rename the devices.
- Connect the devices.
- Configure the IP address.
- Test the connectivity.
- Configure the VLANs.
- Configure the Routing.

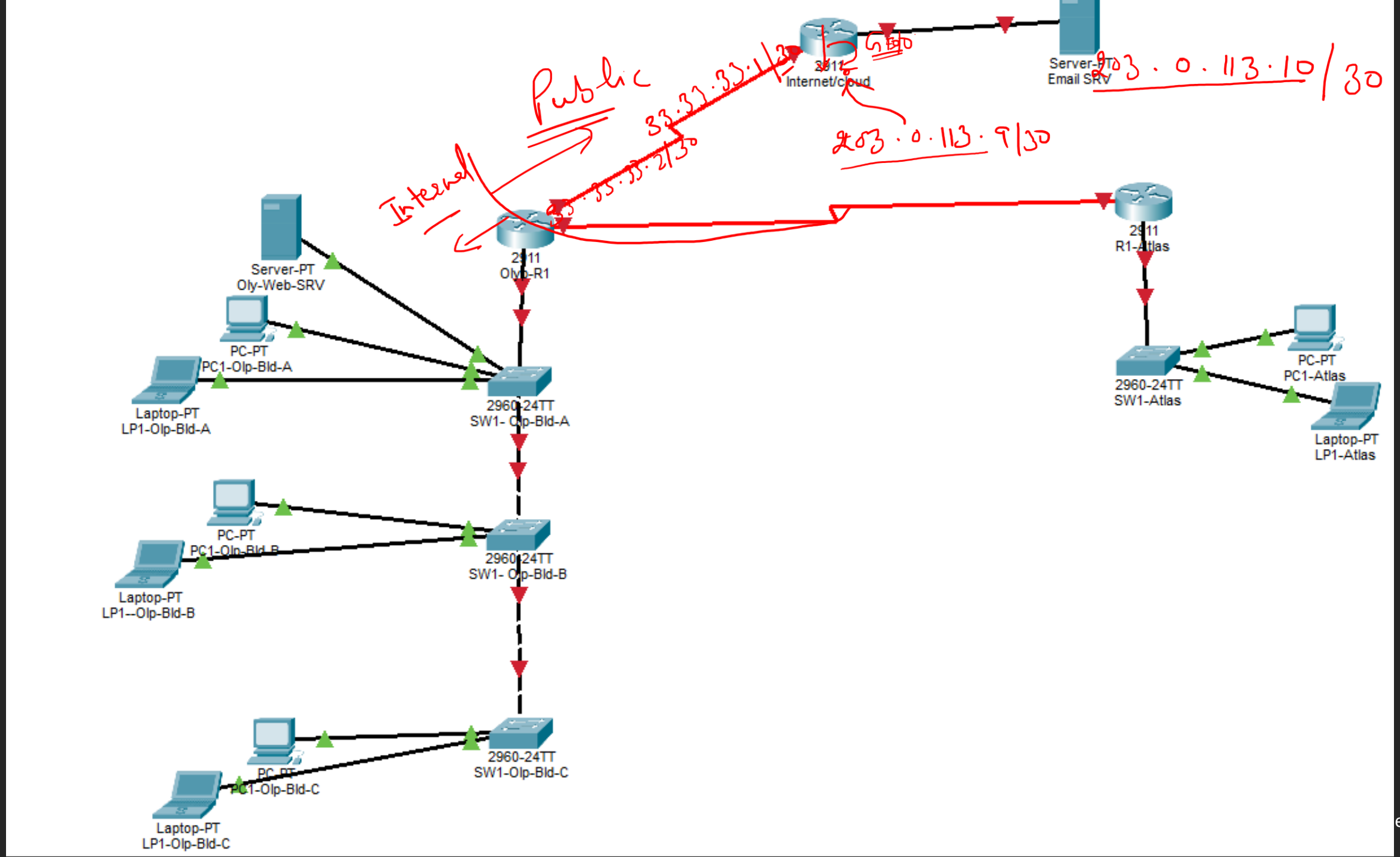
Configuration files at different Phases

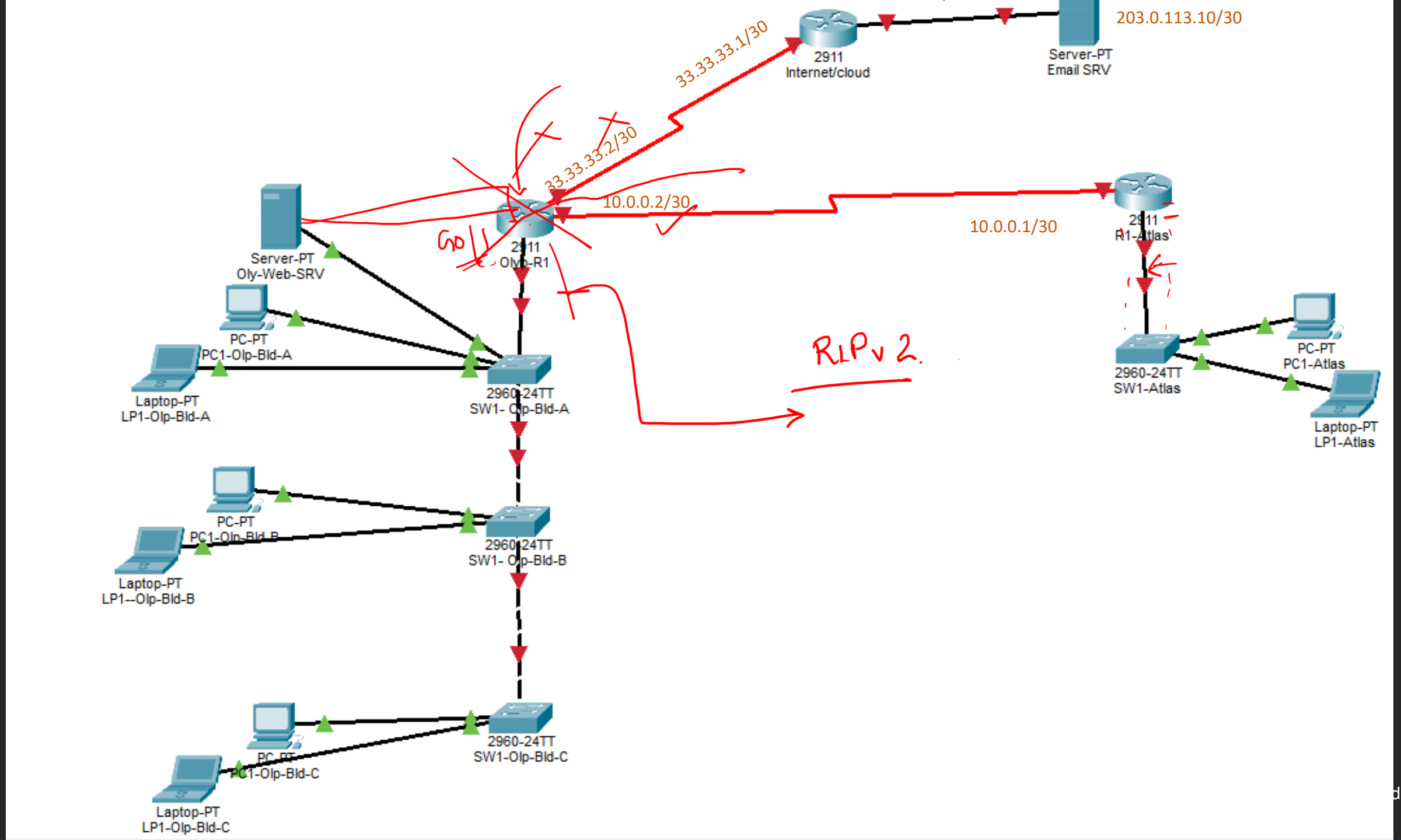


Design the network topology



Topology created in Packet Tracer for Testing


Public
Internal
2911
Internet/cloud
Server-PT
Email SRV
203.0.113.10/30
203.0.113.9/30
2911
Olyp-R1
Server-PT
Oly-Web-SRV
PC-PT
PC1-Olp-Bld-A
Laptop-PT
LP1-Olp-Bld-A
2960-24TT
SW1- Olp-Bld-A
PC-PT
PC1-Olp-Bld-B
Laptop-PT
LP1--Olp-Bld-B
2960-24TT
SW1- Olp-Bld-B
PC-PT
PC1-Olp-Bld-C
Laptop-PT
LP1-Olp-Bld-C
2960-24TT
SW1-Olp-Bld-C
2911
R1-Atlas
2960-24TT
SW1-Atlas
PC-PT
PC1-Atlas
Laptop-PT
LP1-Atlas


33.33.33.1/30
2911
Internet/cloud
Server-PT
Email SRV
203.0.113.10/30
33.33.33.2/30
10.0.0.2/30
10.0.0.1/30
2911
Olp-R1
2911
R1-Atlas
Server-PT
Oly-Web-SRV
PC-PT
PC1-Olp-Bld-A
Laptop-PT
LP1-Olp-Bld-A
2960-24TT
SW1- Olp-Bld-A
RIPv2.
2960-24TT
SW1-Atlas
PC-PT
PC1-Atlas
Laptop-PT
LP1-Atlas
PC-PT
PC1-Olp-Bld-B
Laptop-PT
LP1--Olp-Bld-B
2960-24TT
SW1- Olp-Bld-B
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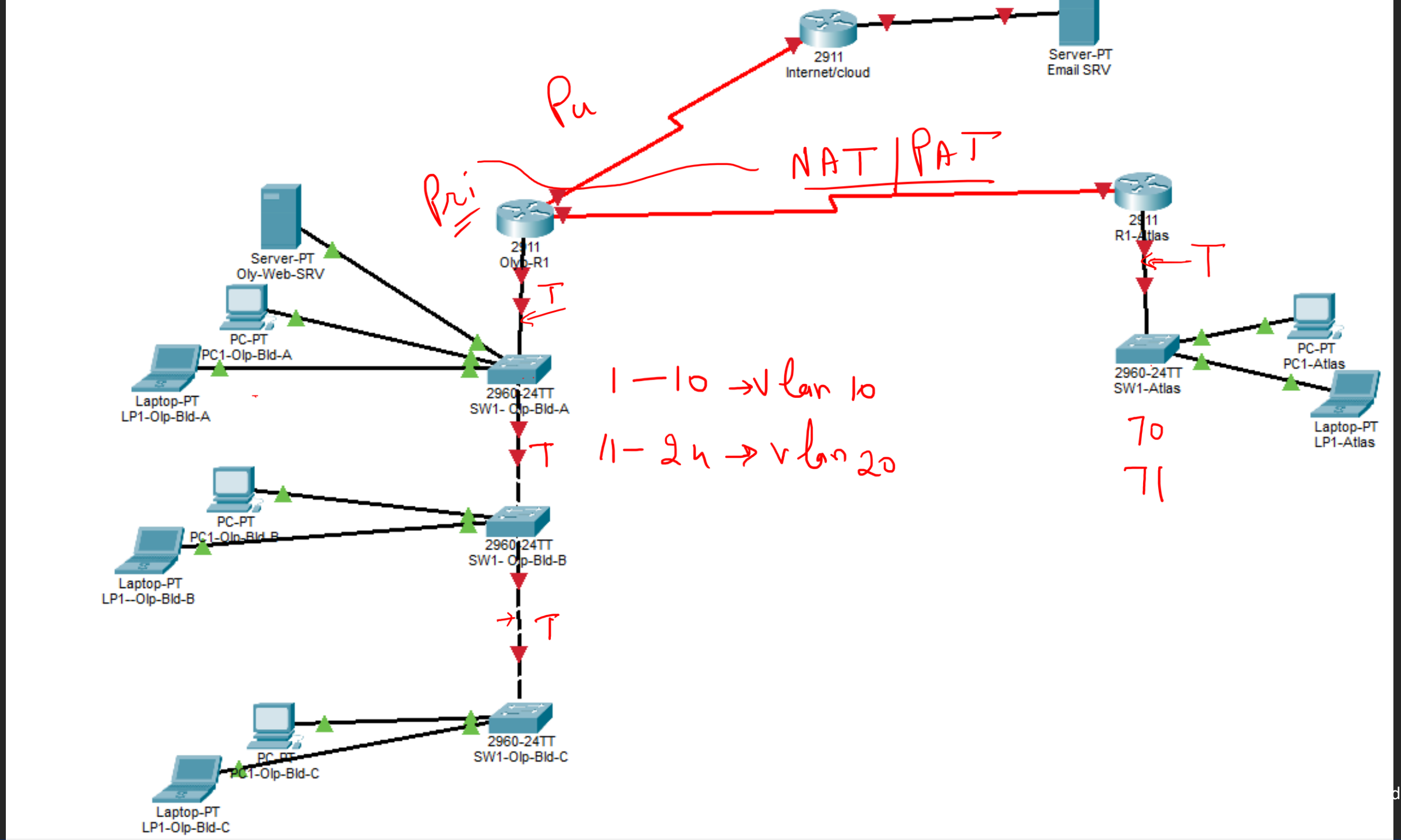
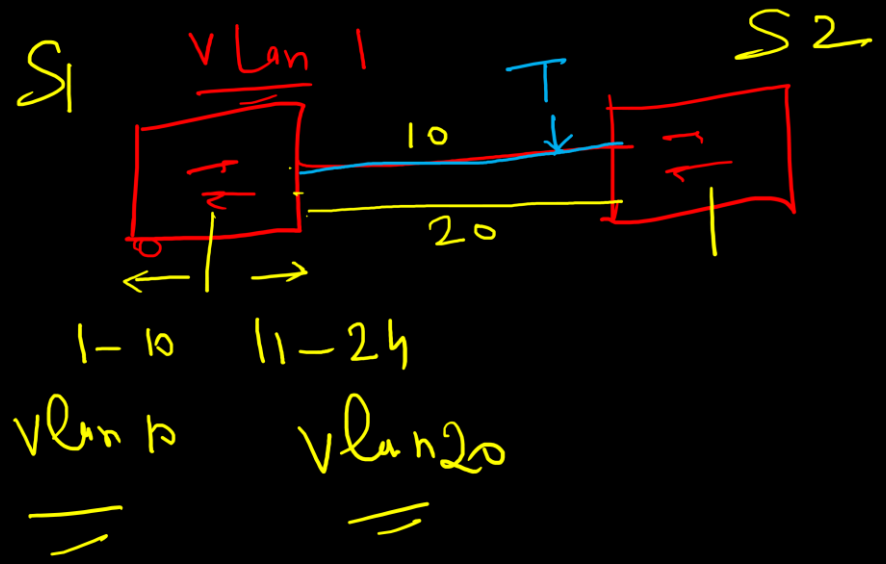
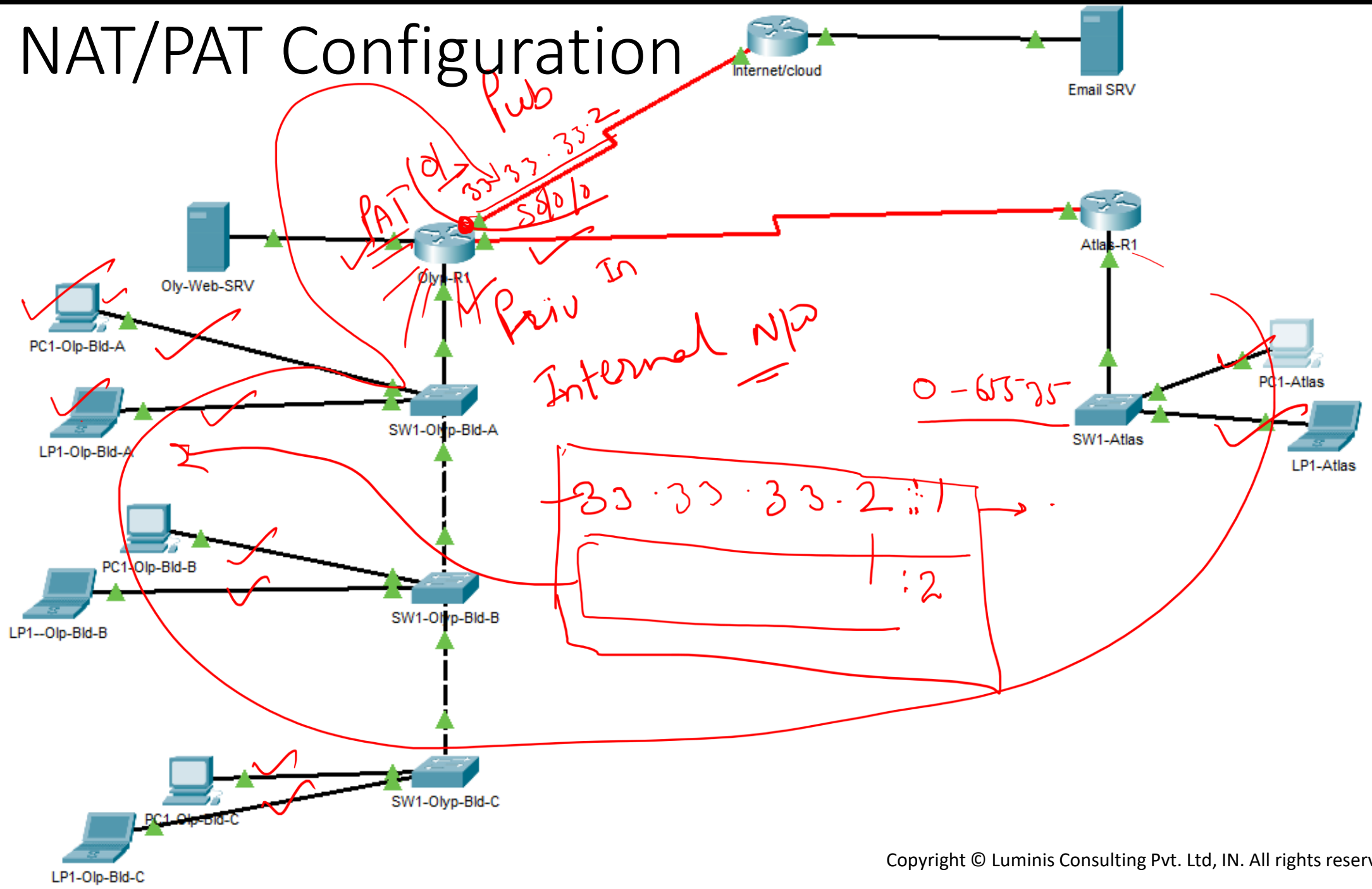
Laptop-PT
LP1-Olp-Bld-C
2960-24TT
SW1-Olp-Bld-C


2911
Internet/cloud
Server-PT
Email SRV
Pu
Pri
NAT | PAT
2911
Olp-R1
Server-PT
Oly-Web-SRV
PC-PT
PC1-Olp-Bld-A
Laptop-PT
LP1-Olp-Bld-A
2960-24TT
SW1- Olp-Bld-A
T
1 - 10 → Vlan 10
11 - 24 → vlan 20
PC-PT
PC1-Olp-Bld-B
Laptop-PT
LP1--Olp-Bld-B
2960-24TT
SW1- Olp-Bld-B
T
PC-PT
PC1-Olp-Bld-C
Laptop-PT
LP1-Olp-Bld-C
2960-24TT
SW1-Olp-Bld-C
2911
R1-Atlas
T
2960-24TT
SW1-Atlas
PC-PT
PC1-Atlas
Laptop-PT
LP1-Atlas
70
71

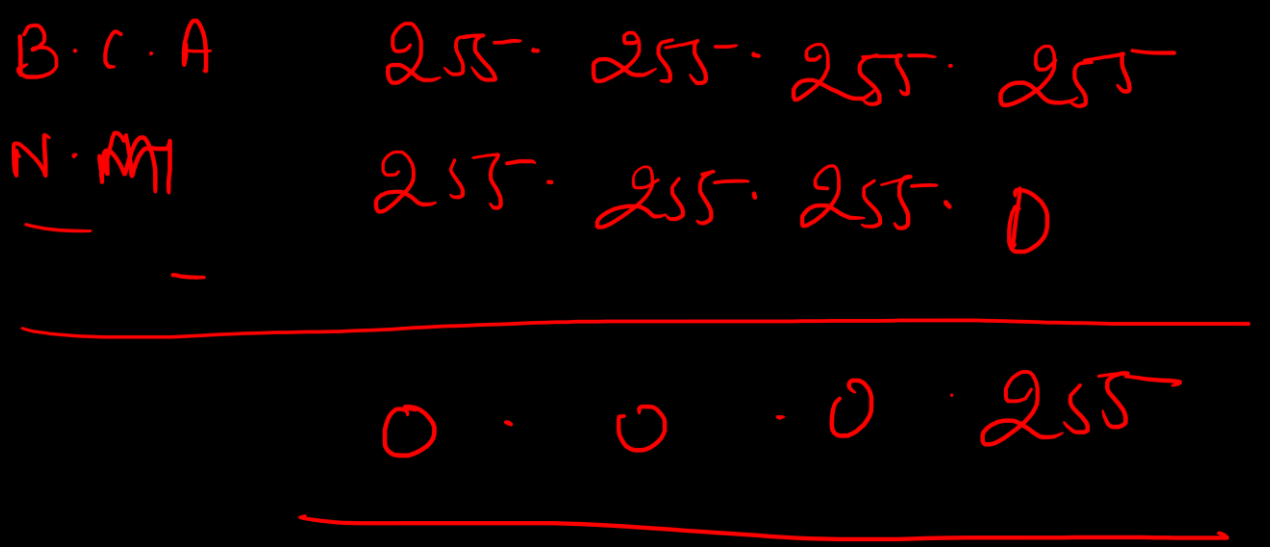
VLANs over Access Links example



NAT/PAT Configuration



Get the Wild-card Mask easily…



All the configuration files of the Workshop

1-Building Design.pkt	Cisco Packet Tracer	111 KB
2-Placement of Devices Naming.pkt	Cisco Packet Tracer	112 KB
3-Connecting the devices.pkt	Cisco Packet Tracer	129 KB
4-Assign IP addresses.pkt	Cisco Packet Tracer	140 KB
5-Assign IP addresses, routing, DHCP co...	Cisco Packet Tracer	140 KB
6-1 VLAN Config .pkt	Cisco Packet Tracer	143 KB
6-VLAN Config .pkt	Cisco Packet Tracer	145 KB
7-PortSecurity Config .pkt	Cisco Packet Tracer	145 KB
8-NAT-PAT Config .pkt	Cisco Packet Tracer	146 KB
NAT-PAT config.txt	Text Document	1 KB
VLAN Config Template.txt	Text Document	1 KB

Get more resources AT:

- https://luminisindia.com/
- https://luminisindia.com/cybersecurity-prism
- https://luminisindia.com/about-meena
- Join the Challenge at **Cybersecurity & Networking Challenge**
  - https://www.facebook.com/groups/2491009536191353 1
- Facebook Page: https://www.facebook.com/cybersec.prism
- Instagram: https://www.instagram.com/meena.cyber.warrior/
- Linkedin Profile: https://www.linkedin.com/in/meena1/
- YouTube Channel: https://www.youtube.com/@cybersecurityforever8214
- About ME Video: https://www.youtube.com/watch?v=T66K3K5Y2tI
- Hear My Podcast: https://anchor.fm/meena-r