

NIS Network Proposal Final Project

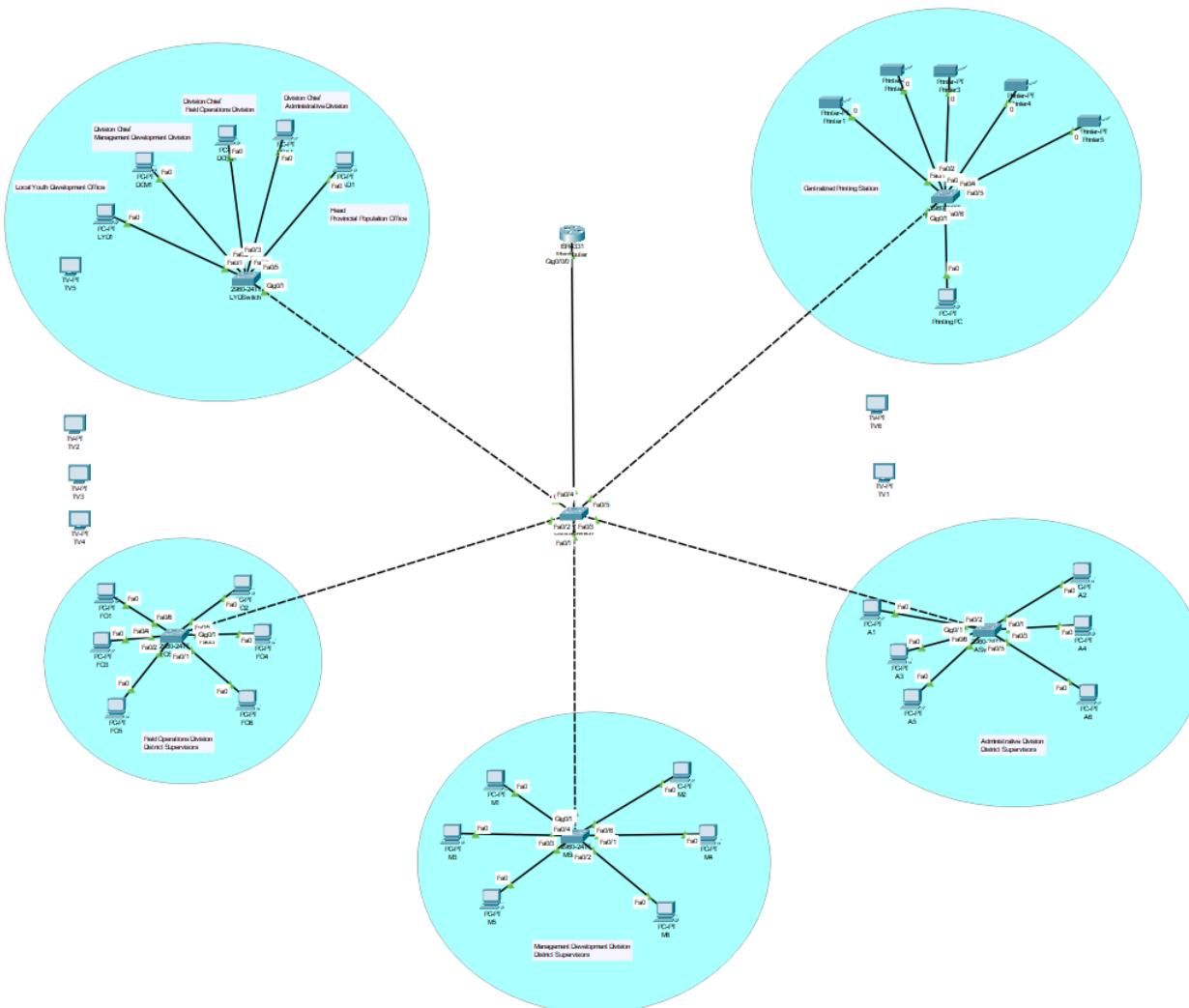
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Problem Statement:

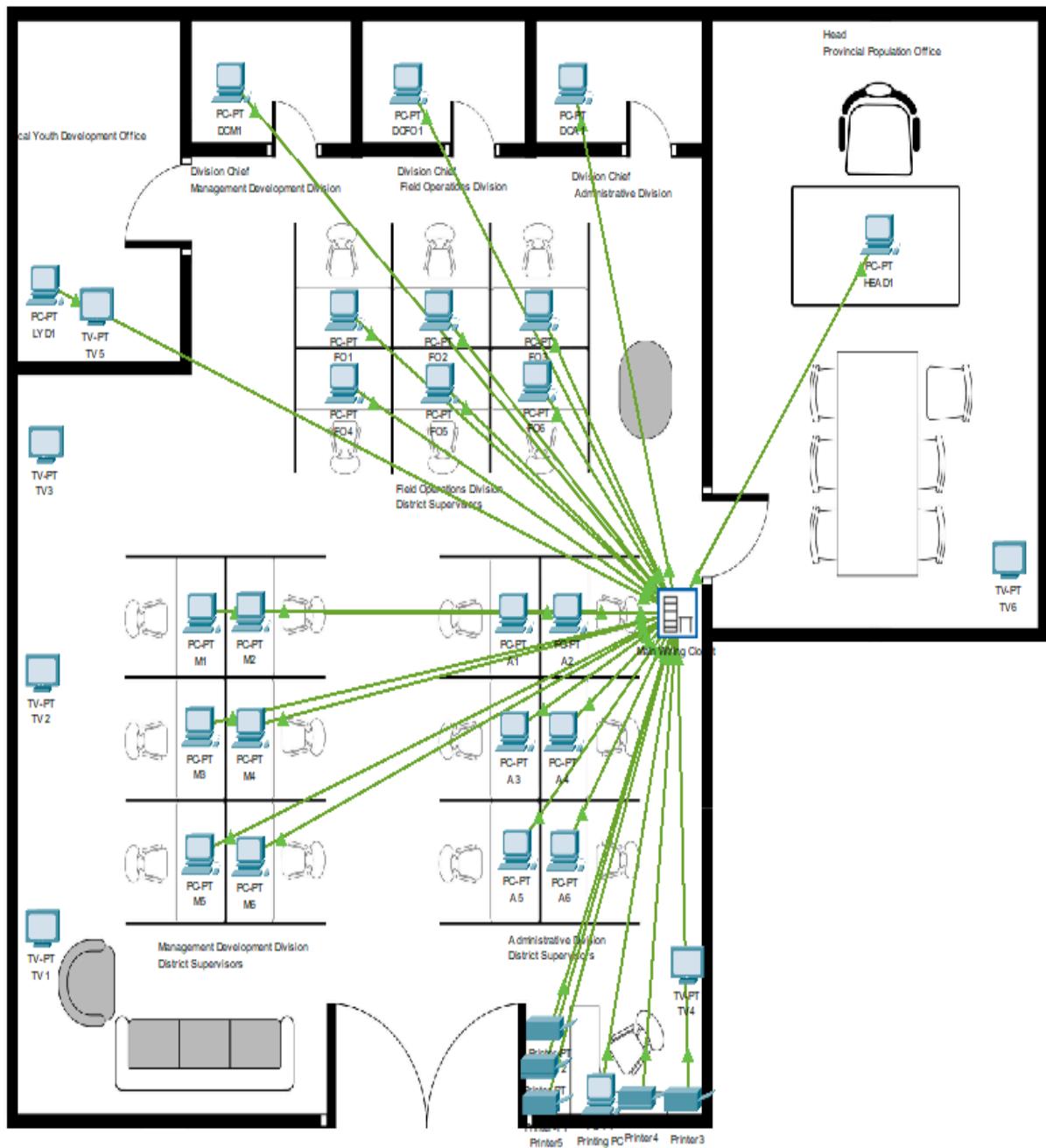
Scenario: The Iloilo Provincial Capitol's Population office network consists of 23 computers, 6 televisions used for presentations, and 5 printers distributed across different workstations. Currently, there is no network implementation in place, and employees use manual data sharing methods such as flash drives, resulting in inefficiencies and delays. Each department operates its own printer, resulting in higher operational costs.

Task:

1. Design a Network Topology: a. Logical Topology



b. Physical Topology



2. IP Address Assignment: Assign appropriate IP addresses to the devices.

a. Ip Addressing Table

Department	Device	Assigned IP
Field Operations Division District Supervisors	FO1	192.168.1.2
	FO2	192.168.1.3
	FO3	192.168.1.4
	FO4	192.168.1.5
	FO5	192.168.1.6
	FO6	192.168.1.7
Management Development Division District Supervisors	M1	192.168.1.34
	M2	192.168.1.35
	M3	192.168.1.36
	M4	192.168.1.37
	M5	192.168.1.38
	M6	192.168.1.39
Administrative Division District Supervisors	A1	192.168.1.66
	A2	192.168.1.67
	A3	192.168.1.68
	A4	192.168.1.69
	A5	192.168.1.70
	A6	192.168.1.71
Local Youth Development Office	LYD1	192.168.1.99
Division Chief Management Development Division	DCM1	192.168.1.100
Division Chief Field Operations Division	DCFO1	192.168.1.101
Division Chief Administrative Division	DCA1	192.168.1.102
Head Provincial Population Office	HEAD1	192.168.1.103
Centralized Printing Station	Printing PC	192.168.1.130
Printers	Printer1	192.168.1.131
	Printer2	192.168.1.132
	Printer3	192.168.1.133
	Printer4	192.168.1.134
	Printer5	192.168.1.135
	PrinterX	192.168.1.136 - 192.168.1.158

b. Subnetting Table

Department	Subnet	Subnet Mask	Network Address	Usable IP Range	Broadcast Address	Number of Usable IPs
Field Operations Division District Supervisors	192.168.1.0/27	255.255.255.224	192.168.1.0	192.168.1.1 - 192.168.1.30	192.168.1.31	30
Management Development Division District Supervisors	192.168.1.32/27	255.255.255.224	192.168.1.32	192.168.1.33 - 192.168.1.62	192.168.1.63	30
Administrative Division District Supervisors	192.168.1.64/27	255.255.255.224	192.168.1.64	192.168.1.65 - 192.168.1.94	192.168.1.95	30
Local Youth Development Office	192.168.1.96/27	255.255.255.224	192.168.1.96	192.168.1.97 - 192.168.1.126	192.168.1.127	30
Division Chief Management Development Division	192.168.1.96/27	255.255.255.224	192.168.1.96	192.168.1.97 - 192.168.1.126	192.168.1.127	30
Division Chief Field Operations Division	192.168.1.96/27	255.255.255.224	192.168.1.96	192.168.1.97 - 192.168.1.126	192.168.1.127	30
Division Chief Administrative Division	192.168.1.96/27	255.255.255.224	192.168.1.96	192.168.1.97 - 192.168.1.126	192.168.1.127	30
Head Provincial Population Office	192.168.1.96/27	255.255.255.224	192.168.1.96	192.168.1.97 - 192.168.1.126	192.168.1.127	30
Centralized Printing Station	192.168.1.128/27	255.255.255.224	192.168.1.128	192.168.1.129 - 192.168.1.158	192.168.1.159	30

c. Vlan Table

VLAN ID	VLAN Name	Default Gateway	Devices (PCs)
10	Field Operations Division District Supervisors	192.168.1.1	6 PCs in Field Operations Division
20	Management Development Division District Supervisors	192.168.1.33	6 PCs in Management Development Division
30	Administrative Division District Supervisors	192.168.1.65	6 PCs in Administrative Division
			1 PC in Local Youth Development Office
			1 PC in Division Chief Management Development Division
40	Heads	192.168.1.98	1 PC in Division Chief Field Operations Division
			1 PC in Division Chief Administrative Division
			1 PC in Head Provincial Population Office
50	PC Printing VLAN	192.168.1.129	1 Printing PC managing all printers

3. Network Testing: Test the network connectivity between devices, ping screenshots below.

```
Pinging 192.168.1.34 with 32 bytes of data:

Reply from 192.168.1.34: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.1.34:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

```
Pinging 192.168.1.66 with 32 bytes of data:

Reply from 192.168.1.66: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.1.66:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

```
Pinging 192.168.1.130 with 32 bytes of data:

Reply from 192.168.1.130: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.1.130:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

● 4. Proposed Implementation

To address these issues, we proposed to implement a network for the Population Office. The proposed setup will include a structured Local Area Network (LAN) to connect all devices and facilitate seamless communication and data sharing. Additionally, the printers will be combined into a centralized printing station to reduce operational costs. **Router-on-stick** and **Inter-vlan** configurations were utilized in the design process of this network proposal.

The implementation of the network design begins with the configuration of VLANs for each department, followed by the establishment of inter-VLAN routing. The router is configured with subinterfaces for each VLAN, ensuring that each department has its own subnet and can communicate with devices in other VLANs. The router's subinterfaces are configured with the respective IP addresses as gateways for each VLAN. Each departmental switch is configured to carry the correct VLAN tag using the **dot1Q encapsulation** method, and switch ports are assigned to their corresponding VLANs based on the department. The central switch connects all departmental switches and the router, providing connectivity between the departments. The PCs in each department are assigned IP addresses from their respective subnets, and the printing PC is placed in a separate **PC Printing VLAN**, allowing it to manage print jobs from all departments. A **default gateway** is configured on each PC pointing to the router's IP address for their respective VLANs. The printing PC is configured with a static IP and is set up to manage all print requests across the network. After configuring VLANs and IP addresses, inter-department communication is tested, and routing between VLANs is verified through the router's routing capabilities. Finally, the network is validated by ensuring that all departments can access the central printing station and that devices within the same department can communicate with each other.

This network design will improve workflow efficiency and enhance collaboration for future needs.

Packet Tracer Output: Google drive link for packet tracer file download.

<https://drive.google.com/file/d/11M52eXJJqnJ1V1vtyfYjPjjDXtztV3S6/view?usp=sharing>

Documentation:

