# Network Topology Design and Configuration for Villanueva Computer Shop

### A Company Proposal

Presented to the  
**College of Information Technology Dagupan City**  
**PHINMA University of Pangasinan**  
Dagupan City

In Partial Fulfillment of the Requirement in the Subject  
**ITE 359 - Networking 2 GROUP - 7**

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## I. Introduction

### Background of the Study

Villanueva Computer Shop is a small local business offering internet café services, computer rentals, and printing/scanning.  
It operates 10 customer computers, 3 staff computers, and a shared network printer. The shop’s network previously used a flat design, leading to slow connections and poor management.

### Purpose of the Network Design Activity

The purpose of this activity is to design and implement a secure, efficient, and scalable network topology for Villanueva Computer Shop using Cisco Packet Tracer.  
The network design applies VLAN segmentation, DHCP, ACLs, NAT, Syslog, and NTP to simulate a real-world small business setup.

### Scope and Limitations

**Scope:**  
- Simulation of routers, switches, PCs, and a server using Cisco Packet Tracer.  
- Configuration of VLANs, DHCP, NAT, ACLs, Syslog, and NTP.  
- Demonstration of connectivity and logical segmentation across departments.

**Limitations:**  
- Implementation is limited to simulation; no real hardware testing or budgeting included.

## III. Interview Process

**Method of Interview:** Simulated Interview (assumed roles of owner and IT support staff).

**Participants:**  
- Owner of Villanueva Computer Shop  
- IT Staff (simulated role by project group)

**Sample Questions & Responses:**  
- **Current networking issues:** Slow internet, no VLAN, manual IP conflicts.  
- **Users:** 2 groups – Staff (3) and Customers (10).  
- **Services needed:** Internet, file sharing, and security.  
- **Security concerns:** Restrict customer access to staff files.  
- **Scalability:** Possible expansion to 20 PCs and server.

**Key Findings:**  
- No VLAN segmentation yet.  
- Need for DHCP to reduce manual configuration.  
- ACLs required for security.  
- NAT needed for internet.  
- Scalability important for future.

## IV. Proposed Network Topology

### Diagram

*(To be shown in the actual report presentation.)*

### Explanation of Design

* **ISP Router:** Simulates external internet connection.
* **Main Router (ISR4331):** Handles inter-VLAN routing, NAT, and ACLs.
* **Central Switch:** Core switch connecting VLANs 10, 20, 30.
* **Admin/Staff Switch (VLAN 10):** Connects staff PCs and server.
* **Customer Switch (VLAN 20):** Connects 10 customer PCs.
* **Printer (VLAN 30):** Shared printer for staff.
* **Main Server:** Provides DHCP, Syslog, NTP, and HTTP services.

## V. Configuration Details

### VLANs and Inter-VLAN Routing

| VLAN | NAME |
| --- | --- |
| 10 | ADMIN |
| 20 | CUSTOMER |
| 30 | PRINTER |

### DHCP Setup

* DHCP hosted on Main Server (192.168.10.10)
* Router configured with ip helper-address

### ACL Implementation

Customer Access Control (BLOCK\_CUSTOMERS):

ip access-list extended BLOCK\_CUSTOMERS  
 permit ip any any  
 permit icmp 192.168.20.0 0.0.0.255 192.168.10.0 0.0.0.255 echo-reply  
 permit icmp 192.168.20.0 0.0.0.255 192.168.30.0 0.0.0.255 echo-reply  
 deny ip 192.168.20.0 0.0.0.255 192.168.10.0 0.0.0.255  
 deny ip 192.168.20.0 0.0.0.255 192.168.30.0 0.0.0.255

Printer Access Control (PRINTER\_ACCESS):

ip access-list extended PRINTER\_ACCESS  
 permit ip 192.168.10.0 0.0.0.255 192.168.30.0 0.0.0.255  
 deny ip any 192.168.30.0 0.0.0.255  
 permit ip any any

### NAT Configuration

ip nat inside source list 1 interface GigabitEthernet0/0/0 overload  
access-list 1 permit 192.168.0.0 0.0.255.255

### Syslog and NTP Setup

logging 192.168.10.10  
ntp server 192.168.10.10

## VI. Problems & Challenges

### Interview Findings (Group Perspective)

* No VLAN segmentation
* Manual IP assignment
* Poor security control

### Design & Configuration Issues

* DHCP conflicts
* ACL blocked all traffic initially
* NAT required debugging

### Troubleshooting Applied

* Verified interfaces with show ip int brief
* Used ping and tracert
* Reapplied ACLs with correct rules

## VII. Recommendations

* Implement VLANs strictly to separate staff and customers.
* Regularly update router and switch configurations.
* Use Syslog for monitoring.
* Plan scalability with new VLANs and IP ranges.

## VIII. Conclusion

This project provided hands-on experience in implementing VLANs, DHCP, ACLs, and NAT in a simulated environment.  
The group successfully created a secure, organized, and scalable network for Villanueva Computer Shop.  
It emphasized the importance of systematic planning, troubleshooting, and documentation in achieving reliable network performance.