



ENTERPRISE NETWORK DESIGN

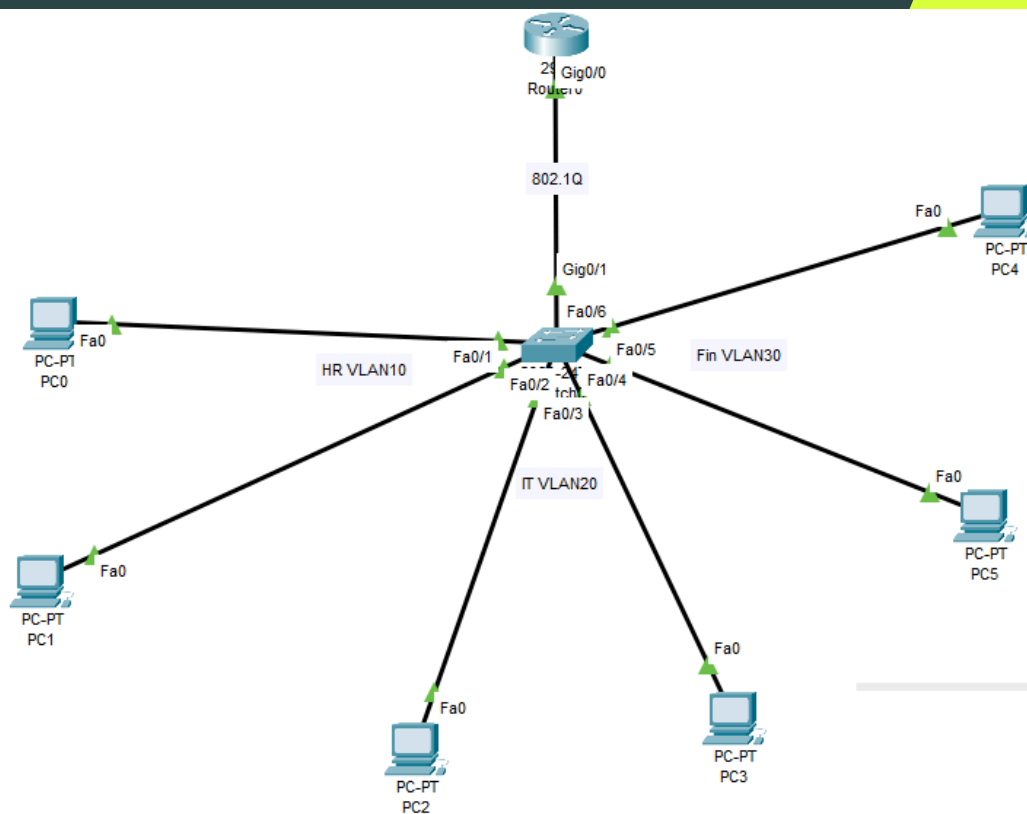
CATEGORY
NETWORKING

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ENVIRONMENT
CISCO PACKET TRACER





PROJECT SUMMARY

This project demonstrates the design and implementation of a segmented enterprise network using Virtual LANs (VLANs) to isolate departments and improve network efficiency and security. Inter-VLAN communication is enabled using Router-on-a-Stick (802.1Q trunking), allowing controlled communication between departments while reducing broadcast traffic.

The network follows enterprise-style planning with structured IP addressing, clear VLAN separation, and verification through systematic testing.

BUSINESS SCENARIO

An organization requires logical separation between departments (HR, IT, and Finance) while still allowing controlled inter-department communication.

To meet this requirement, VLAN segmentation is implemented on the access switch, and a single router interface is used to route traffic between VLANs efficiently.

NETWORK DESIGN OVERVIEW

VLAN STRUCTURE

- VLAN 10 – HR
- VLAN 20 – IT
- VLAN 30 – Finance

DEVICES USED

- Cisco Layer-2 Switch (2960)
- Cisco Router (Router-on-a-Stick)
- End hosts assigned per department

IP ADDRESSING PLAN

VLAN	Department	Network
10	HR	192.168.10.0
20	IT	192.168.20.0
30	FINANCE	192.168.30.0

KEY CONFIGURATION TASKS

SWITCH CONFIGURATION

- Created and named VLANs (10, 20, 30)
- Assigned access ports to appropriate VLANs
- Configured 802.1Q trunk port toward the router
- Verified VLAN membership and trunk status



Testing & Verification

- VLAN membership verification using show vlan brief
- Trunk verification using show interfaces trunk
- Router sub-interface verification using show ip interface brief
- Routing verification using show ip route

ROUTER CONFIGURATION

- Configured router sub-interfaces per VLAN
- Enabled 802.1Q encapsulation
- Assigned gateway IP addresses for each VLAN
- Verified interface and routing status

Note: All tests confirmed correct VLAN segmentation and inter-VLAN connectivity.

TROUBLESHOOTING & LESSONS LEARNED

During testing, initial gateway and inter-VLAN pings failed because switch access ports were still assigned to VLAN 1. The issue was resolved by correctly assigning access ports to their respective VLANs and enabling trunking on the switch-to-router link.

This reinforced the importance of:

- Proper access port assignment
- Verifying Layer-2 configuration before troubleshooting Layer-3 issues

ARTIFACTS INCLUDED

- Cisco Packet Tracer .pkt file
- Network topology diagram
- Switch and router configuration screenshots
- Inter-VLAN ping verification screenshots

SKILLS DEMONSTRATED

- VLAN design and implementation
- Router-on-a-Stick inter-VLAN routing
- IP addressing and subnet planning
- Layer-2 and Layer-3 troubleshooting
- Enterprise-style network documentation

PORTFOLIO NOTE

This project reflects a real-world enterprise LAN design scenario and demonstrates foundational networking skills aligned with Cisco Certified Network Associate

THANK YOU

.... This project demonstrates the successful implementation
.... of VLAN-based network segmentation and inter-VLAN
.... routing using Router-on-a-Stick. It strengthened my
.... practical understanding of VLANs, 802.1Q trunking, IP
.... addressing, and structured troubleshooting in an
.... enterprise-style network.
....
.... Thank you for taking the time to review this project. It
.... represents part of my ongoing hands-on learning in
.... networking and cybersecurity.

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