Cybersecurity Essentials: Networking
Midterm Project

VLAN Network Design

Project Overview:

This project aims to design a network using Cisco Packet Tracer. You are tasked with designing a network for a growing company, TechSolutions Inc., which needs to implement VLANs to improve network efficiency and security.

The company has four departments: HR, Finance, Sales, and IT.

Each department requires its own VLAN to segregate traffic and enhance performance.

Project Submission:

Your project will be due on December 16th (12/16/2024). Students are given a week to complete this project.

There will be a Teams assignment created that you will use to submit your project. You can upload the required files directly to Teams and then submit your project.

The required items can be seen below.

Project Objectives:

1. Design the network structure.
2. Configure the components of the network.
3. Implement a VLAN.
4. Test the VLAN segmentations through the end device's command line.
5. Document the entire process for reproducibility and future reference.

Project Tasks:

1. **Network Design and Layout:**
    a. **Create the Network Diagram:**
        i. **Components:**
            1. **3 Switches:** To handle VLAN configurations and connect multiple devices.
            2. **12 PCs:** Representing each department (HR, Finance, Sales, and IT).
        ii. **Design the Layout:**
            1. Connect the PCs to the switch.
            2. Assign appropriate VLANs to each switch port based on the department of each PC.
        iii. **Define IP Addressing:**
            1. Assign a unique subnet to each VLAN to facilitate internal communication within departments. For example:
                a. **VLAN 10 (HR)**
                b. **VLAN 20 (Finance)**
                c. **VLAN 30 (Sales)**
                d. **VLAN 40 (IT)**
2. **VLAN Configuration in Cisco Packet Tracer:**
    a. **Configure VLANs on the Switch:**
        i. Create VLANs for each department (HR, Finance, Sales, and IT).
        ii. Assign each switch port to the corresponding VLAN based on the connected PC.
    b. **Verify Configuration:**
        i. Test connectivity within each VLAN by pinging between PCs in the same VLAN.
        ii. Ensure proper VLAN isolation by confirming that PCs in different VLANs cannot communicate with each other.
3. **Documentation and Justification:**
    a. **Write a Report:**

i. **Network Layout:** Include a screenshot of your network diagram from Cisco Packet Tracer.
ii. **Configuration Details:** Provide details of the VLAN setup and IP addressing.
iii. **Justification:** Write a few paragraphs explaining why you chose this network layout. Discuss how VLANs improve network efficiency and security for TechSolutions Inc. by reducing broadcast traffic and isolating departmental communications.

Items for Submission:

1. Network Diagram in Cisco Packet Tracer
2. Report with Justification and Test Results

Rubric:

If you do not score a 12 or higher for your project based on the rubric below you will have the opportunity to make changes to your project and resubmit it.

	0 Points - Missing	1 Point - Does Not Meet Expectations	2 Points - Meets Expectations	3 Points - Exceeds Expectations	Points Awarded
Network Topology	No network diagram or structure provided.	Incomplete or poorly designed network topology, missing key components or connections.	Clear network topology with all required components (switch, PCs) correctly connected.	Exceptionally well-designed network topology, with advanced features like labels and organized structure.	
IP Configuration	No IP addressing or subnets assigned.	IP addressing is incorrect or incomplete; subnets do not facilitate communication properly.	Correct IP addressing and subnetting for each VLAN, enabling proper internal communication.	Excellent IP configuration, including subnetting for scalability and future expansion considerations.	
VLAN Implementation	No VLANs configured on	VLANs configured incorrectly or not	VLANs configured correctly for each	VLANs implemented	

	the switch.	assigned properly to switch ports or PCs.	department, assigned to the correct switch ports and PCs.	efficiently, with thoughtful use of best practices (e.g., trunk ports, scalability).	
Testing and Validation	No testing or validation of the VLANs.	VLAN testing performed, but some connectivity issues remain (e.g., incorrect isolation).	Successful VLAN testing, with pings between devices confirming proper segmentation and isolation.	Extensive testing, including extra validation (e.g., inter-VLAN routing) with well-documented results.	
Documentation	No documentation or report provided.	The report is incomplete, missing network justification or configuration details.	Clear and complete report, including network diagram, configuration details, and justification.	Highly detailed report with thorough explanation of design choices, security improvements, and efficiency.	
				Score	