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Title:	Perform to simulate VLANs on the switch/router using Cisco packet tracer/GNS3.
Date of Performance:	
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Aim: Perform to simulate VLANs on the switch/router using Cisco packet tracer/GNS3.

Objective: Developing the understanding of VLANs on the switch/router.

Theory:

Virtual Local Area Networks (VLANs) are essential for segmenting networks, improving security, and enhancing performance within an organization. VLANs allow network administrators to partition a physical network into multiple, logical networks, enabling better management of broadcast domains and more efficient use of network resources. Tools like Cisco Packet Tracer and GNS3 are invaluable for simulating VLAN configurations, providing a hands-on environment to practice and understand VLAN implementation on switches and routers.

Understanding VLANs

VLANs enable the segmentation of a physical network into separate logical networks, each with its own broadcast domain. This segmentation isolates traffic, reduces broadcast traffic, and enhances security by limiting the scope of network communications. VLANs are identified by unique VLAN IDs, and devices within the same VLAN can communicate as if they were on the same physical network, even if they are connected to different switches.

Tools for Simulation

Cisco Packet Tracer: Cisco Packet Tracer is a network simulation tool developed by Cisco Systems. It is widely used in educational settings for learning networking concepts and practicing configurations in a virtual environment. It provides an intuitive interface for creating and managing network topologies.

GNS3 (Graphical Network Simulator-3): GNS3 is an open-source network software emulator that allows for the simulation of complex network environments using real Cisco IOS images. It is more powerful than Packet Tracer and is suitable for professional network engineers preparing for advanced certifications and real-world network design.

Setting Up VLANs Using Cisco Packet Tracer

1. Create a New Project:

- Open Cisco Packet Tracer and start a new project.
- Add switches and routers to the workspace.

2. Design the Network Topology:

- Connect the devices using appropriate network cables.
- Plan the VLAN structure, deciding which ports on the switches will be assigned to which VLANs.

3. Configure VLANs on Switches:

- Access each switch and define the VLANs with unique IDs.
- Assign ports to the VLANs based on your network design.
- Ensure trunk ports are configured to allow VLAN traffic between switches.

4. Configure Inter-VLAN Routing:

- Use a router or a Layer 3 switch to enable communication between VLANs.
- Set up sub-interfaces on the router, each associated with a VLAN ID and IP address.

5. Verify Configuration:

- Use tools within Packet Tracer to test connectivity within and between VLANs.
- Ensure that devices within the same VLAN can communicate and that inter-VLAN routing is functioning correctly. **Setting Up VLANs Using GNS3**

1. Create a New Project:

- Open GNS3 and start a new project.
- Add switches, routers, and other necessary devices to the workspace.

2. Design the Network Topology:

- Connect the devices using virtual network cables.
- Plan the VLAN structure and the distribution of VLANs across switch ports.

3. Import Cisco IOS Images:

- Use real Cisco IOS images to ensure a realistic simulation environment.
- Assign these images to the virtual devices in your topology.

4. Configure VLANs on Switches:

- Access each switch's command-line interface (CLI) and define the VLANs.
- Assign ports to the VLANs according to your network design.
- Configure trunk ports to carry VLAN traffic between switches.

5. Configure Inter-VLAN Routing:

- Use a router or a Layer 3 switch for inter-VLAN routing.
- Configure sub-interfaces on the router, each linked to a VLAN and assigned an IP address.
- Ensure routing protocols or static routes are in place to facilitate inter-VLAN communication.

6. Verify Configuration:

- Use ping and other diagnostic tools to test connectivity within and between VLANs.
- Ensure devices within the same VLAN can communicate and verify that inter-VLAN routing is working properly.

Practical Applications and Benefits

1. Network Segmentation:

- VLANs enable the logical segmentation of a network, allowing for better organization and management.
- This segmentation improves security by isolating sensitive data and reducing the risk of unauthorized access.

2. Performance Optimization:

- By reducing the size of broadcast domains, VLANs decrease network congestion and improve overall performance.
- VLANs allow for more efficient use of bandwidth and network resources.

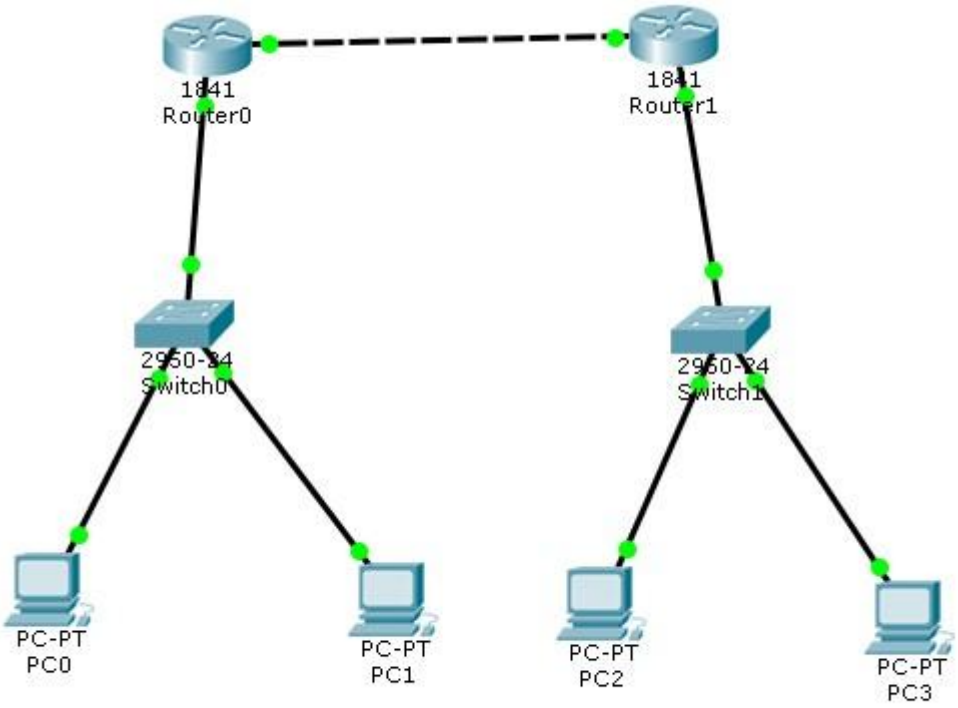
3. Simplified Management:

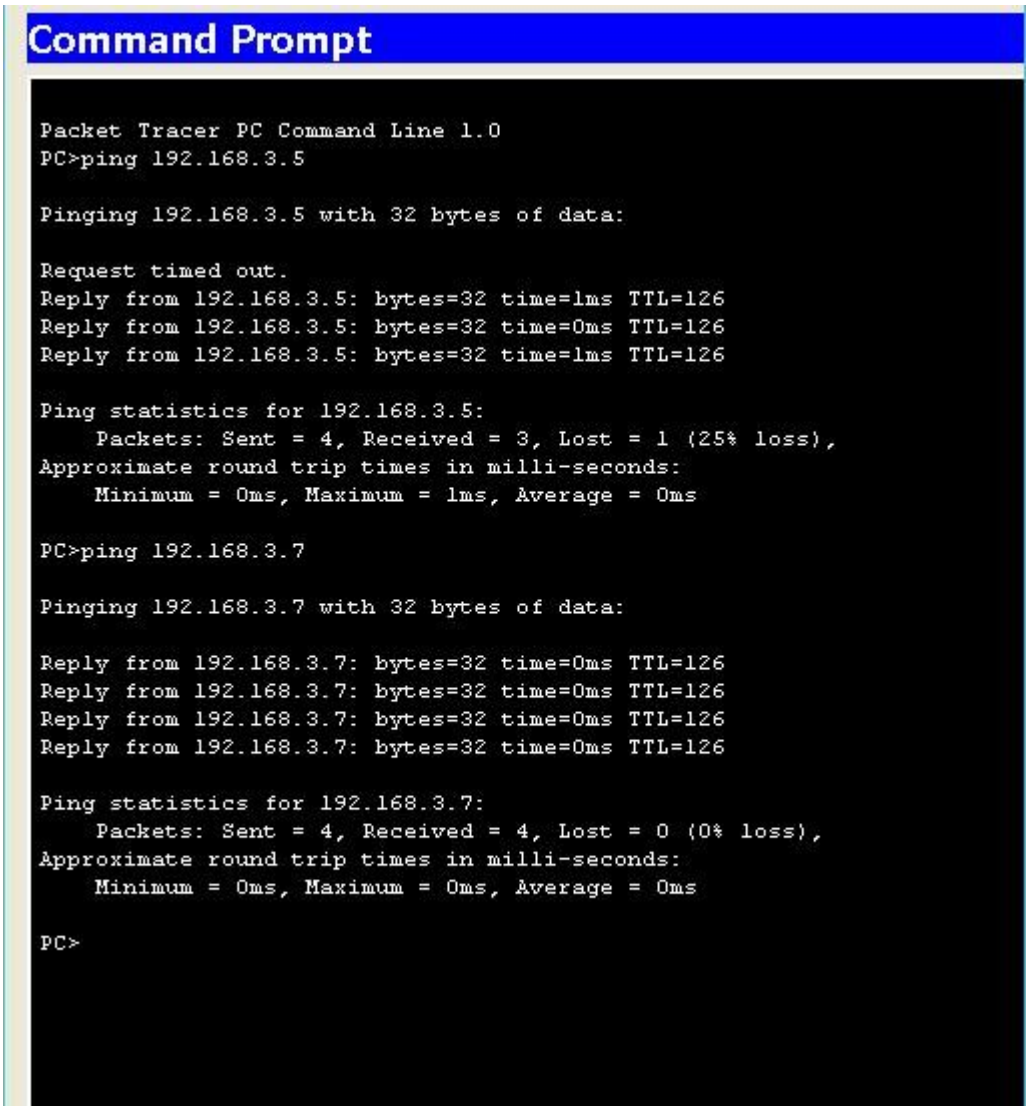
- VLANs simplify network management by grouping devices with similar requirements.
- This logical grouping makes it easier to apply policies, manage traffic, and troubleshoot issues.

4. Enhanced Security:

- VLANs provide a layer of security by isolating traffic between different parts of the network.
- They help prevent broadcast storms and mitigate potential threats by containing them within specific VLANs.

Output:





Conclusion

Simulating VLANs using Cisco Packet Tracer and GNS3 provides an invaluable hands-on experience for both novice and experienced network engineers. These tools offer a realistic environment to study and experiment with VLAN configurations, ensuring that users can design, configure, and troubleshoot VLANs effectively. By mastering VLANs in these simulated environments, network professionals can enhance their skills and better prepare for real-world networking challenges, leading to more efficient, secure, and manageable network infrastructures.