Cisco Packet Tracer Spring 2024

Due by 25th March 2024

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Read the project file to determine what devices to use for specific sections. This is an individual project. Mail your .pkt file to all TAs (Canvas Inbox) and submit the final report on Canvas. Please do not Copy paste anything. Doing only configuration is not enough, understand the technology as you'll be tested on that in viva.

FUNCTIONAL REQUIREMENT

Design and implement a multi-location, inter-networking strategy for a small and stable organization. This organization currently has 5 locations. Corporate headquarters are in Boston and Mumbai. The company is located at 3 other locations, which are New York, London, and Germany. Design your network considering the following constraints/requirements.

- Every office should have the 50 usable Ips
- Subnet the 192.168.0.0/16 network to distribute the IPs to all locations
- Boston and Mumbai offices have Finance, HR and Technical departments
- Other offices have HR and Technical departments
- All the IP addresses inside departments (PCs) should be assigned by DHCP server
- All the DHCP servers should be in Technical department

- Finance shouldn't be accessed by any other departments, but Finance can access all other departments. (This filtering should be applied to all packets not just ICMP echo request/ ICMP reply) 10 Points
- Finance departments can access each other
- All other departments should be able to access each other within the same department
- Each Departments will have 2 user computers and multiple servers based on your design
- Each router should have a hostname (Example Router-1 in Boston will have hostname BOR1)
- Configure a DNS server in Boston Office. This server should be able to resolve domain names of all the routers (Example Ping BOR1. This should ping Boston Router-1) 5 Points

PROJECT DESIGN

High level diagram consisting of basic network infrastructure

- For the core, don't waste any IPs.

  There should not be any OSPF DR/BDR 2 Points
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- Mention routers, switches, access points, servers, and workstations
- Consider geographical locations while designing your network
- Use OSPF as the routing protocol. There are 5 offices, implement the area concept of OSPF and configure every office in separate area for example: Boston - Area 1, Mumbai - Area 2, London - Area 3, New York - Area 4 and Germany - Area 5 and Backbone network as Area 0 (Backbone = Area connecting to all 5 sites)
- Set the router ID manually in each OSPF routers
- Implement HSRP for Boston and Mumbai office. Change the Hello timer to 2 sec, hold timer to 6 sec

- Implement VLAN's. Only those VLANs that are used in the Networks should be allowed on the trunk port/s
- Implement Rapid STP and switch redundancy for Germany, London, and New York office
- Enable Port fast and BPDU guard on all the ports that are connected to the host machine

NETWORK OPTIMIZATION

Assign yourself a realistic budget and try to optimize your network according to your Costing

- Detailed Network Architecture along with all devices
- Individual office network architecture with IP addressing
- Routing & Switching protocols implemented in each office and across the organization
- Security & Redundancy plan

BONUS

- Defend MAC flooding attack
- Each router should be able to SSH to all routers in the network using the hostname
- Configure EtherChannel with LACP as the protocol on NY
- Configure VPN tunnel between 2 HQs Boston & Mumbai (Use Router ISR4321)
- Configure EIGRP on these 2 routers
- Advertise Loopback inside EIGRP

GUIDE FOR REPORT

You may want to mention the following topics on your report, it's only an example, you can also mention something else that you think it's important.

1. PROJECT DESIGN
    - High Level Diagram
2. NETWORK OPTIMIZATION
    - Detailed Network Architecture
    - Individual Office Network (Headquarter)
    - Assignment of IP address
3. TAKEAWAY QUESTIONS
    1. Routing Protocol OSPF: Explain the following
    2. Which one is better Routing protocol RIP or OSPF? Why?
    3. Explain why do we use the area concept in OSPF?
    4. Why do we configure the backbone network as area 0?
    5. What are the different types of messages exchanged in OSPF?
    6. Security and Redundancy plan
    7. How does STP avoid looping? Explain its working in detail
    8. Difference between STP, PVSTP and MSTP
4. TEST PLAN FOR THE NETWORK (* Important, 10% Marks)

1. Write down the detailed steps on how to test those functions below. Screenshot of your test results are required.
2. Test VLAN
3. Test routing protocol
4. Test security plan
5. Test redundancy plan