

Universidade de Aveiro
Mestrado Integrado em Engenharia de Computadores e Telemática
Segundo Teste Teórico de Recurso de Fundamentos de Redes
Segunda Parte do Exame Teórico de Recurso de Fundamentos de Redes
9 de janeiro de 2020

Duration: 1h30m. Without consultation. Carefully justify all answers.

Considering the attached corporate network where:

- The company network has an Internet connection through Router 1, provided by the ISP.
- Connections between all Layer 2 switches and between Layer 2 switches and Layer 3 switches are made using trunk / inter-switch connections;
- Connections between Routers, between Layer 3 Switches, and between Layer 3 Switches and Routers are made using Layer 3 (routing) connections;
- All switches (Layer 2 and Layer 3) have Spanning Tree active.
- Next to each switch is the Spanning-Tree priority (2 bytes in hex) and its MAC address.
- Next to each port of each switch is the switch port number and in parentheses the spanning-tree cost of that port.
- All Layer 3 interfaces have IPv4 and IPv6 addresses configured.
- RIPv2 and RIPv6 protocols are active on all company networks (does not include ISP connection);
- Internet Router 1 is announcing (by RIPv2 and RIPv6) a default route and has NAT / PAT properly configured;
- All interfaces have a RIPv6 cost of 1.

1. Write the Switch Layer 3A IPv4 routing table. (3.0 points)
2. If you switch off Switch Layer 3 A interface F0/1, how many paths are in the Switch Layer 3A IPv4 routing table for network 10.21.0.0/24 and how much they cost. (1.5 points)
3. If you switch off Switch Layer 3 A interface F0/1, how many paths are in the Switch Layer 3A IPv6 routing table to VLAN 21 and how much they cost. (1.5 points)
4. Using only the RIPv6 protocol, propose a solution so that IPv6 traffic from the Internet (arriving at Router 1) to LAN B is routed preferentially through Router 3, and only if something on that path fails the traffic must be routed via Layer 3A switch? Justify (1.5 points)
5. Assume that the company wants to acquire the Enterprise2020.com domain and has a DNS server, an email server, and an HTTP server with 3 associated names (WebMail, Webpage, and Cloud) on an IPv4 and IPv6 network. Explain from a system manager's perspective the steps to take to deploy the DNS service on the corporate server for the new domain and present a generic DNS zone configuration (with the necessary records). (4.0 points).
6. An application on a terminal on VLAN 22 opened a TCP session to a LAN 21 terminal with an initial Sequence Number of 5000 using TCP Reno.
 - a) If LAN 22 terminal initial congestion window is 10 MSS, MSS is 1400 bytes, and VLAN 21 terminal receiver window is 20000 bytes, how many packets 1000 bytes can be sent (from VLAN 22 terminal to VLAN 21 terminal) shortly after TCP session establishment, before receiving acknowledgments from other terminal? (1.5 points)
 - b) At a certain point in the TCP connection the LAN 22 terminal congestion window is equal to 20000 bytes, the VLAN 21 terminal reception window is 15000 bytes, and 4000 bytes sent by the VLAN 22 terminal have not yet received acknowledgments, how many packets of 1000 bytes of data can currently be sent from VLAN terminal 22? (1.5 points)
 - c) In the above TCP session, and assuming successful termination, if the acknowledgment number of the last packet sent by the VLAN 21 terminal is 100000, how many data bytes were sent from the VLAN 22 terminal? (1.0 points)
7. In a client-server application that uses TCP sockets explain the importance of using threads to handle new clients and / or data reception. (1.5 points)

8. An HTTP server (Apache2) has sent a large number of HTTP messages with the 404 response within a short period of time, indicate if this reveals a problem with the network / service and provide a solution to it. (1.5 points)
9. Explain how you can identify in a corporate network which channel / frequency is best to use in a wireless network. (1.5 points)

SW Layer 3 A

vlan 1: 10.1.0.1/24

