DEPARTAMENTO DE ELETRÓNICA, TELECOMUNICAÇÕES E INFORMÁTICA

MESTRADO INTEGRADO EM ENG. DE COMPUTADORES E TELEMÁTICA
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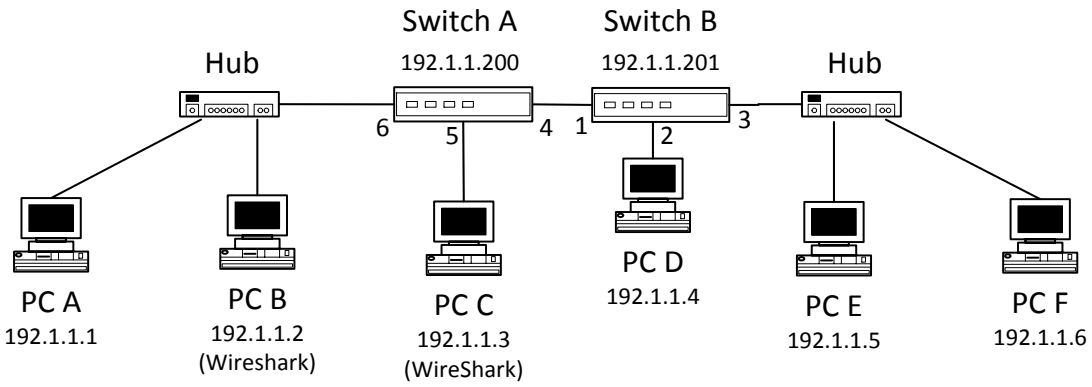
FUNDAMENTOS DE REDES

LABORATORY GUIDE NO. 1

STUDENTS SELF-EVALUATION TEST

1. Consider the following network. The figure shows the assigned IP addresses to all network elements (with the netmask 255.255.255.0). The figure also indicates the number of the ports used on switches. Both PC B and PC C have WireShark permanently capturing all packets.



The current MAC address table of Switch A is:

VID	VLAN Name	MAC Address	Port	Type
1	default	00-0A-F4-3B-80-A5	6	Dynamic
1	default	00-0A-F4-3B-80-B0	4	Dynamic
1	default	00-0A-F4-42-CC-34	6	Dynamic
1	default	00-0A-F4-45-2D-23	4	Dynamic
1	default	00-0A-F4-45-2E-A7	5	Dynamic
1	default	00-0A-F4-46-2F-B5	4	Dynamic
1	default	00-1C-F0-A8-BD-C4	CPU	Self
1	default	00-1C-F0-A9-12-F3	4	Dynamic

The current MAC address table of Switch B is:

VID	VLAN Name	MAC Address	Port	Type
1	default	00-0A-F4-3B-80-A5	1	Dynamic
1	default	00-0A-F4-3B-80-B0	3	Dynamic
1	default	00-0A-F4-42-CC-34	1	Dynamic
1	default	00-0A-F4-45-2D-23	3	Dynamic
1	default	00-0A-F4-45-2E-A7	1	Dynamic
1	default	00-0A-F4-46-2F-B5	2	Dynamic
1	default	00-1C-F0-A8-BD-C4	1	Dynamic
1	default	00-1C-F0-A9-12-F3	CPU	Self

In a run of a ping command on PC A to PC F, one of the ICMP packets captured on PC B was:

```
⊞ Frame 4: 118 bytes on wire (944 bits), 118 bytes captured (944 bits)
⊞ Ethernet II, Src: 00:0a:f4:3b:80:b0 (00:0a:f4:3b:80:b0), Dst: 00:0a:f4:3b:80:a5
⊟ 802.1Q Virtual LAN, PRI: 0, CFI: 0, ID: 3
    000. .... .... .... = Priority: Best Effort (default) (0)
    ...0 .... .... .... = CFI: Canonical (0)
    .... 0000 0000 0011 = ID: 3
    Type: IP (0x0800)
⊟ Internet Protocol Version 4, Src: 192.1.1.6 (192.1.1.6), Dst: 192.1.1.1 (192.1.1
    Version: 4
    Header length: 20 bytes
  ⊞ Differentiated Services Field: 0x00 (DSCP 0x00: Default; ECN: 0x00: Not-ECT (N
    Total Length: 100
    Identification: 0x0006 (6)
  ⊞ Flags: 0x00
    Fragment offset: 0
    Time to live: 255
    Protocol: ICMP (1)
  ⊞ Header checksum: 0x3989 [correct]
    Source: 192.1.1.6 (192.1.1.6)
    Destination: 192.1.1.1 (192.1.1.1)
⊞ Internet Control Message Protocol
```

1.1. With the provided information, indicate and justify the Ethernet addresses of all switches and all PCs.

1.2. What type of ICMP packet is the one shown above? Justify.

1.3. Indicate how many collision domains are in this network and which interfaces belong to each collision domain.

2. Consider the previous network. On each of the following experiments (2.1, 2.2, 2.3 and 2.4), consider an initial state where all MAC address tables and all ARP tables are empty (remember that both PC B and PC C have WireShark permanently capturing all packets). Assume that the execution of a ping command generates 5 ICMP Echo Request messages both on PCs and on switches. For each of the following experiments, indicate which packets are captured on PC B and on PC C:

   2.1. Running a ping command on PC D to the address 192.1.1.3.

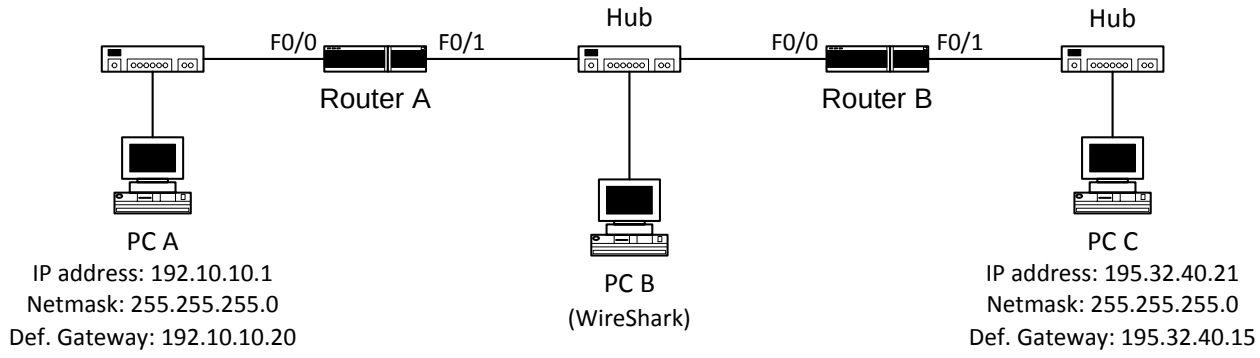
   2.2. Running a ping command on PC A to the address 192.1.1.200.

   2.3. Running a ping command on PC F to the address 192.1.1.4.

   2.4. Running a ping command on Switch A to the address 192.1.1.10.

3. Starting on the initial state (where all MAC address tables and all ARP tables are empty), consider that experiments 2.1, 2.2, 2.3 and 2.4 were all run. Indicate and justify the resulting MAC address table of Switch A.

4. Consider the network shown in the following figure. The figure shows all IP addressing information of PC A and PC C and the name of the interfaces used on the routers. Routers are running RIP protocol. PC B is used only to capture packets through WireShark.



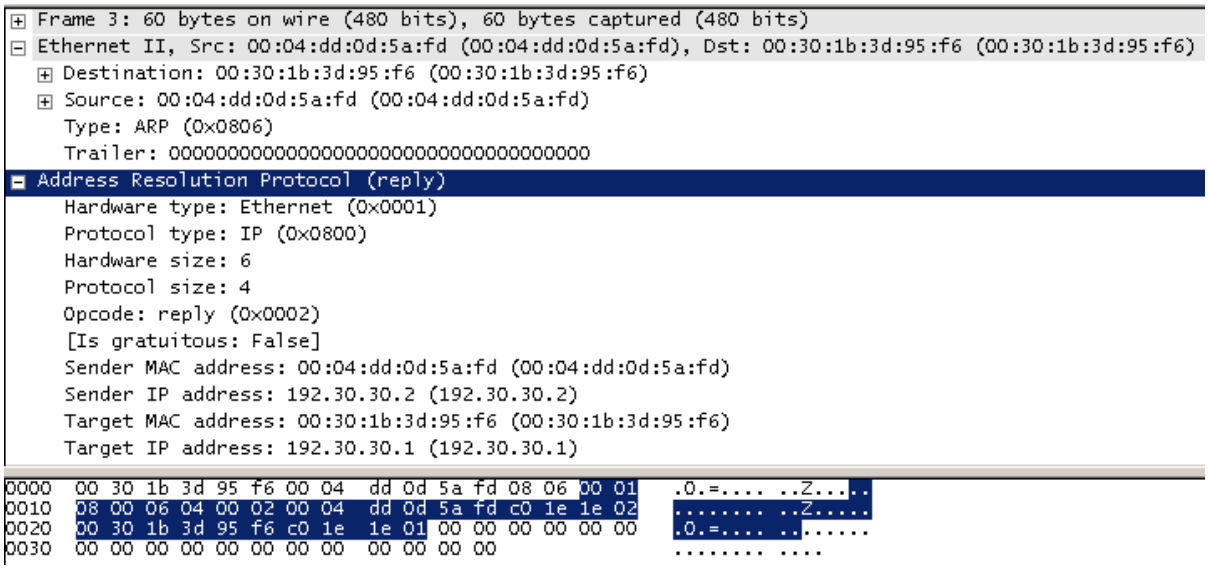
The current IP routing table of Router A is:

```
C    192.10.10.0/24 is directly connected, FastEthernet0/0
C    192.30.30.0/24 is directly connected, FastEthernet0/1
R    195.32.40.0/24 [120/1] via 192.30.30.2, 00:00:05, FastEthernet0/1
```

The current IP routing table of Router B is:

```
R    192.10.10.0/24 [120/1] via 192.30.30.1, 00:00:12, FastEthernet0/0
C    192.30.30.0/24 is directly connected, FastEthernet0/0
C    195.32.40.0/24 is directly connected, FastEthernet0/1
```

In a run of a ping command on PC A to PC C, one of the packets captured on PC B was:



4.1. With the provided information, indicate and justify the IP addresses of all router interfaces.

4.2. What type of packet is the one shown above? Give an explanation for the reason why this packet was captured.

4.3. Indicate how many collision domains are in this network and which interfaces belong to each collision domain.

4.4. Indicate how many broadcast domains are in this network and which interfaces belong to each broadcast domain.

5. Consider the previous network. Assume that the execution of a ping command generates 5 ICMP Echo Request messages both on PCs and on routers. Assume also that the ARP tables of all PCs and all routers are complete. On each of the following experiments, indicate which ARP and ICMP packets are captured on PC B (for the ICMP packets, indicate the IP origin and destination addresses):

5.1. Running a ping command on PC A to the address 192.10.10.20.

5.2. Running a ping command on PC A to the address 192.30.30.1.

5.3. Running a ping command on PC A to the address 192.30.30.10.

5.4. Running a ping command on PC A to the address 192.30.30.2.

5.5. Running a ping command on PC A to the address of PC C.

5.6. Running a ping command on Router A to the address of PC C.

6. Consider the previous network. Consider that you run ping commands on PC A. For each of the following alternatives, indicate a possible ping command whose run generates the following answers:

6.1. `Reply from 192.30.30.2: TTL expired in transit.`

6.2. `Reply from 192.10.10.20: Destination host unreachable.`

6.3. `Request timed out.`