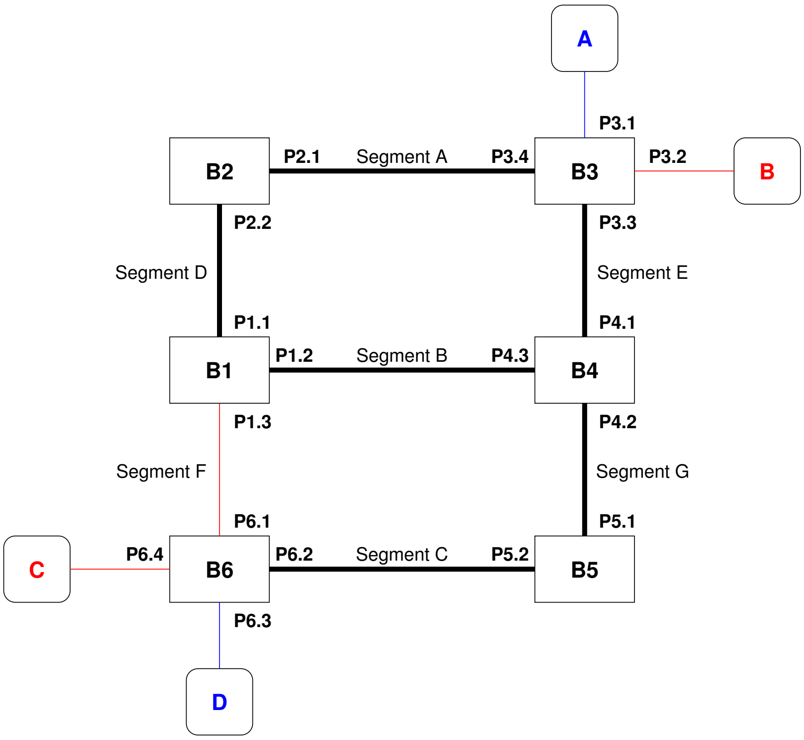
Computer Networks
Jacobs University Bremen
Dr. Jürgen Schönwälder

Course: 320301
Date: 2016-09-23
Due: 2016-09-30

Problem Sheet #2

Problem 2.1: *bridges and virtual local area networks* (2+1+2+1 = 6 points)

Consider the network topology shown below. The stations $A - D$ are connected to the bridged local area network consisting of the transparent bridges $B1 - B6$. The local area network uses VLANs and it is capable to compute spanning trees for each VLAN independently. The stations A and D are connected to the blue VLAN while the stations B and C are connected to the red VLAN. Segment F can only carry red traffic while all other segments are configured as VLAN trunks (they can carry any VLAN tagged packets).



Assume that the delay and cost on all segments is the same and that all systems use the same default priorities.

a) Compute the spanning tree for the red VLAN. Show the results obtained after each step of the spanning tree algorithm. (If there is a tie, use the bridge/port with the lower ID.) List the ports that will be blocked.

b) Which segments carry frames between B and C?

c) Compute the spanning tree for the blue VLAN. Show the results obtained after each step of the spanning tree algorithm. (If there is a tie, use the bridge/port with the lower ID.) List the ports that will be blocked.

d) Which segments carry frames between A and D?

Problem 2.2: *IP addresses and network prefixes* (1+1+1+1 = 4 points)

Assume that you have been assigned the 203.0.113.0/24 network prefix that needs to be further divided into subnets.

a) Define the length of the longest possible network prefix that allows the creation of 20 hosts on each subnet.

b) What is the maximum number of hosts that can be assigned to each subnet? What is the maximum number of such subnets that can be defined?

c) Specify the subnets of 203.0.113.0/24 in dotted-decimal prefix notation.

d) List the range of host addresses that can be assigned in the second subnet. What is the broadcast address used in the third subnet?