

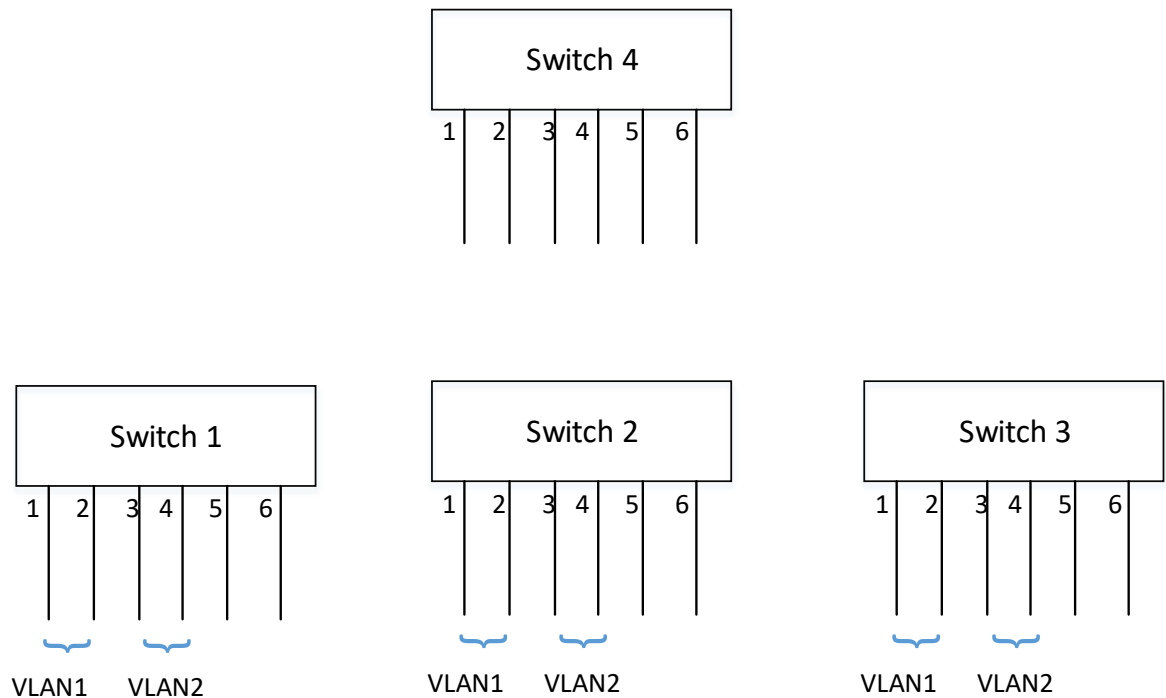
City University of Hong Kong
Department of Electrical Engineering

EE3009 Data Communications and Networking

Assignment 2

Due Date: 16 October 2020

1. Suppose two nodes start to transmit at the same time a packet of length L over a broadcast channel of rate R . Denote the propagation delay between the two nodes as d_{prop} . Will there be a collision if $d_{prop} < \frac{L}{R}$? Why or why not?
[2 marks]
2. Referring to the following figure, ports 1 through 4 in switches 1, 2 and 3 provide port-based VLAN connectivity to stations attached to these ports.
 - a. A network administrator needs to interconnect the other ports and configure the switches so that stations of the same VLAN connected to different switches can communicate. Show the configuration (to which VLAN a port is assigned) and connection.
[2 marks]
 - b. Repeat part a) if VLAN trunking is used.



[3 marks]

3. Consider four stations that are all attached to two different bus cables. The stations exchange fixed-size packets of length 1 sec. Time is divided into slots of 1 sec. When a station has a packet to transmit, the station chooses either bus with equal probability and transmits at the beginning of the next slot with probability p . Find the value of p that maximizes the rate at which packets are successfully transmitted. [8 marks]
4. A channel using Aloha has three stations on a bus with end-to-end propagation delay τ . Station A is located at one end of the bus, and stations B and C are together located at the other end of the bus. Frames arrive at the three stations and are ready to be transmitted at stations A, B, and C at the respective times $\tau_A = 0$, $\tau_B = \tau/2$, and $\tau_C = 3\tau/2$. Frames require transmission times of 4τ . The timeout value is 2τ . Draw a figure, with time as the horizontal axis, to show the transmission activity of each of the three stations. [5 marks]