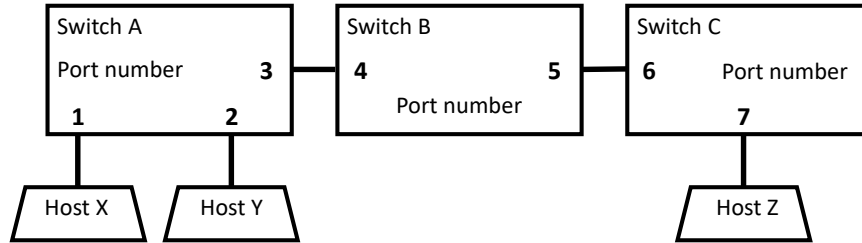


4 Computer Networking (awm22)

(a) Consider the layer-2 switch topology shown below.



Assuming all switches start with empty switch-forwarding tables; Host X (with physical address X) sends a packet destined for Host Z. Enumerate in the style below, all packets sent across the network until the message arrives at Host Z. You may assume packet-processing, latency and transmission time are negligible. Additionally, indicate packets transmitted simultaneously. [5 marks]

Time Step	Sent		Frame	
	by Device	on Link	Source	Destination
0	X	X-A1	X	Z
⋮	⋮	⋮	⋮	⋮
?	C	C7-Z	X	Z

(b) Enumerate in the style below, the forwarding table of Switch B at the end of Part (a).

Destination	Port
⋮	⋮

[2 marks]

(c) Consider a layer-2 network consisting of $S+1$ switches, S directly attached to H hosts. Each host runs V virtual machines, each with a single address. S switches are connected using a star topology with a single switch C at the centre. Each host exchanges data with a selected and stable subset of other hosts.

Estimate the worst case number of entries in the forwarding table for any typical switch S and the number of entries in the forwarding table for switch C .

[3 marks]

(d) Users of this cluster of machines complain of occasional misbehaviour attributed to network timeouts and network slowdown.

Outline two plausible chains of events causing the problem. Describe two appropriate, cost-effective, strategies for overcoming the issues faced by the users. You may assume the switches are state-of-the-art and buying more hosts is not the answer. [10 marks]