

**SE331: Introduction to Computer Networks**  
**Semester 1 5785**  
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**Recitation 6**  
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## Switching Techniques and Wireless

### 1 Weighted Datagram Networks

For the network given in Figure 1, give the datagram forwarding table for each node. The links are labeled with relative costs; your tables should forward each packet via the lowest-cost path to its destination.

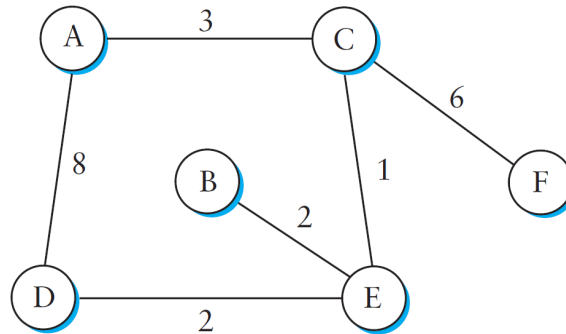


Figure 1: Network for weighted datagram network question

## 2 Virtual Circuit Routing

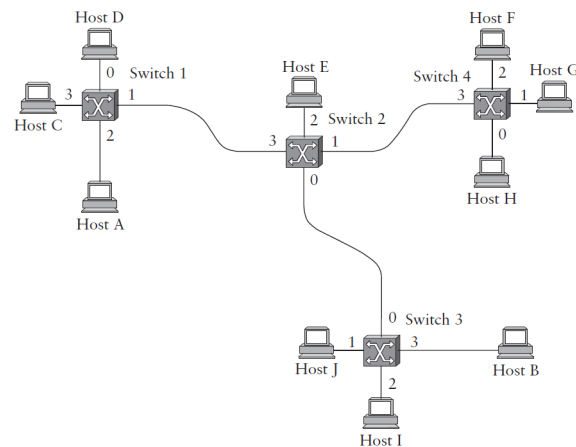


Figure 2: Example Network

Using the example network given in Figure 2, give the virtual circuit tables for all the switches after each of the following connections is established. Assume that the sequence of connections is cumulative; that is, the first connection is still up when the second connection is established, and so on. Also assume that the VCI assignment always picks the lowest unused VCI on each link, starting with 0.

- Host D connects to host H.
- Host B connects to host G.
- Host F connects to host A.
- Host H connects to host C.
- Host I connects to host E.
- Host H connects to host J.

## 3 Wireless Networks Association

This question is based on the PCAP file (`Wireshark_802.11.pcap`) which is found on Moodle. Use Wireshark on your home computer or in one of the computer labs to answer the following questions based on the capture file.

- Three wireless networks are sending beacon frames in the trace. Write down the following information for each wireless network:
  - SSID (network ID)
  - The transmitter address (MAC address of the wireless access point (AP))
  - The beacon interval (in seconds)

You can ignore the malformed packets in the trace (they are shown with a black background).

**Hint:** Use the filter expression `wlan.fc.type_subtype == 0x08` to help.

- At time 46.595317 there is a *Clear to Send* frame. Write down the following information about the frame:

- (a) The MAC address of the wireless node who received the approval to send.
- (b) The duration of the message to be sent (in microseconds)
- (c) Consider what happens as the host gives up (sometime after  $t = 63.0$ ) trying to associate with one AP and tries instead to associate with another AP. An *association request* frame is sent from the host to the second AP and a corresponding *association response* from the AP to the host is sent. Answer the following questions:
  - (a) At what time is the successful *association request* from the host to the second AP?
  - (b) At what time is the corresponding *association response*?
  - (c) What transmission rates is the host willing to use?
  - (d) What transmission rates is the AP willing to use?

**Hint** You can use the filter expression `wlan.fc.type_subtype == 1 || wlan.fc.type_subtype == 0` to display only the request and response frames.

**Hint** To find out the supported rates, you will need to look into the “tagged parameters” fields of the of the 802.11 wireless LAN management frame.

- (d) Consider the first *probe request* and the soonest subsequent *probe response* pair which occurs after  $t = 2.0$  seconds in the trace. Answer the following questions about the frames:
  - (a) **When** was the request frame sent? **When** was the response frame sent?
  - (b) **Who** is the sender of the request frame (MAC Address)? **Who** is the receiver of the request frame (MAC Address)?
  - (c) **Who** is the sender of the response frame (MAC address)? **Who** is the receiver of the response frame (MAC Address)?
  - (d) What is the BSS ID for the request frame (MAC Address)? What is the BSS ID for the response frame (MAC Address)?
  - (e) What SSID was the request packet looking for? What was the SSID from the response?
  - (f) What is the **purpose** of the request frame?
  - (g) What is the **purpose** of the response frame?