Computer Networks
Class Notes

Harsh Karamchandani

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1. Ethernet Topology

a. Bus
b. Star
c. Switched
d. Self-learning switch
e. Multiple Self-learning switch:

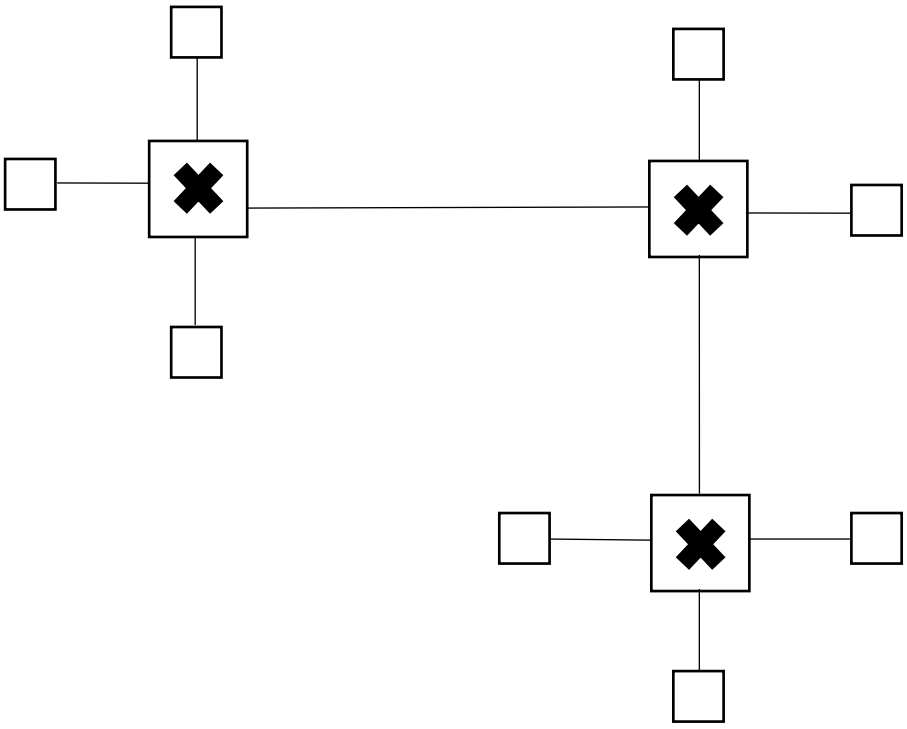

Fig. 1: Multiple switch network

Drawback: This topology cannot be used in large networks due to the need of too many broadcasts initially to to fill the switch table at all switches.

2. Switching Approaches

In a network there is a path between every two nodes which consists of a series of "hops." To make use of these hops and send the frames of data from one node to another, the switches use two general approaches:

a. Datagram/Connectionless Approach:

This is the approach we have already studied in the previous class. In this approach, the node just sends the data frame without taking into the consideration the path that it is going to take to reach the destination. It just adds the destination MAC address as part of the frame which has a corresponding interface number in the Switch Table. The Switch reconstructs this frame and send it to the corresponding interface.

b. Connection Oriented/ Vitual Circuit Approach:

In this approach two frames will establish a connection before sending frame. For this purpose, a Virtual Circuit Indentifier Table is maintained by the Switches which keeps track of a path from every node to every other node in the network once a connection between those two nodes is established. To see how it works take a look at Fig. 2.

Assumption: Every node knows the MAC address of every other node.
Every Switch maintains a VCI tables with four columns:
IVCI: Incoming VCI
II: Incoming Interface
OVCI: Outgoing VCI
OI: Outgoing Interface

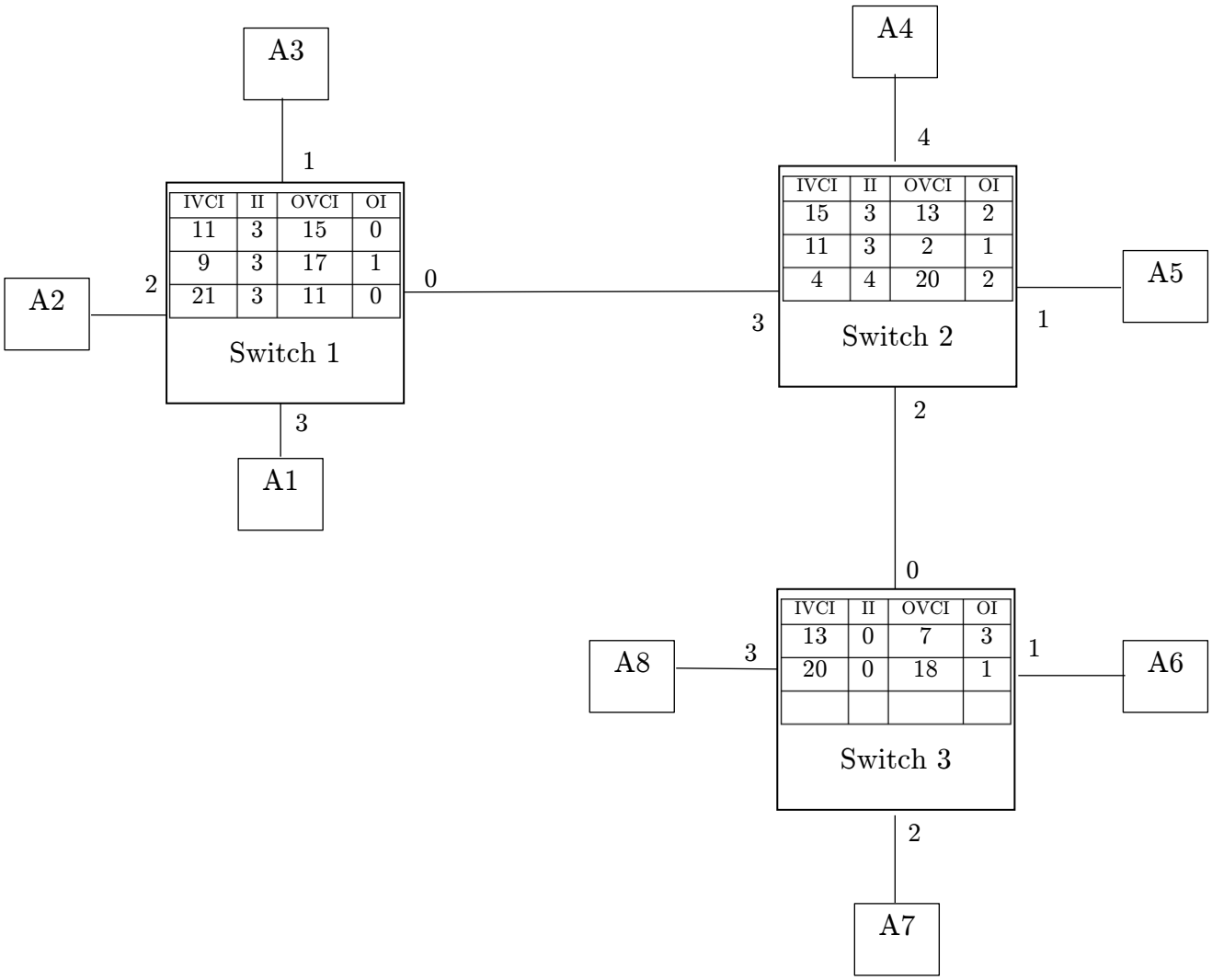

Fig. 2: Virtual Circuit Diagram for a Network with three switches

As seen in Fig 2, every switch has a VCI table. In the first method we are going to see, **the Network Administrator hard codes all the VCI tables of switches and nodes**. Every node also maintains a table which stores the VCI for every other node in the network. Each node sends this VCI as part of the Ethernet frame. Let's take an example: a from has to be sent from A1 to A8.

Step 1: Node A1 adds VCI = 11 to the Ethernet frame

Step 2: Switch S1 receives frame from interface 3 and it reconstructs the frame to obtain the VCI = 13. It compares it with all IVCI, II pairs to find the right entry. It identifies the orresponding OVCI, OI as 15,0 respectively. Frame is transmitted out from interface 0.

Step 3: Switch S2 receives frame with IVCI 15 from its interface 3 connected to interface 0 of S1. It compares it with all IVCI, II pairs to find the right entry. It identifies the orresponding OVCI, OI as 13,2 respectively. Frame is transmitted out from interface 2.

Step 4: Switch S3 receives frame with IVCI 13 from its interface 0 connected to interface 2 of S1. It compares it with all IVCI, II pairs to find the right entry. It identifies the orresponding OVCI, OI as 7,3 respectively. Frame is transmitted out from interface 3 and received by node A8 with VCI 7. From its own table it knows that the message has come from node A1.