Course Name: A Level (2nd Sem) Subject: DCN

Topic: Asynchronous Transfer Mode (ATM) Date: 15-06-20

Asynchronous Transfer Mode (ATM):

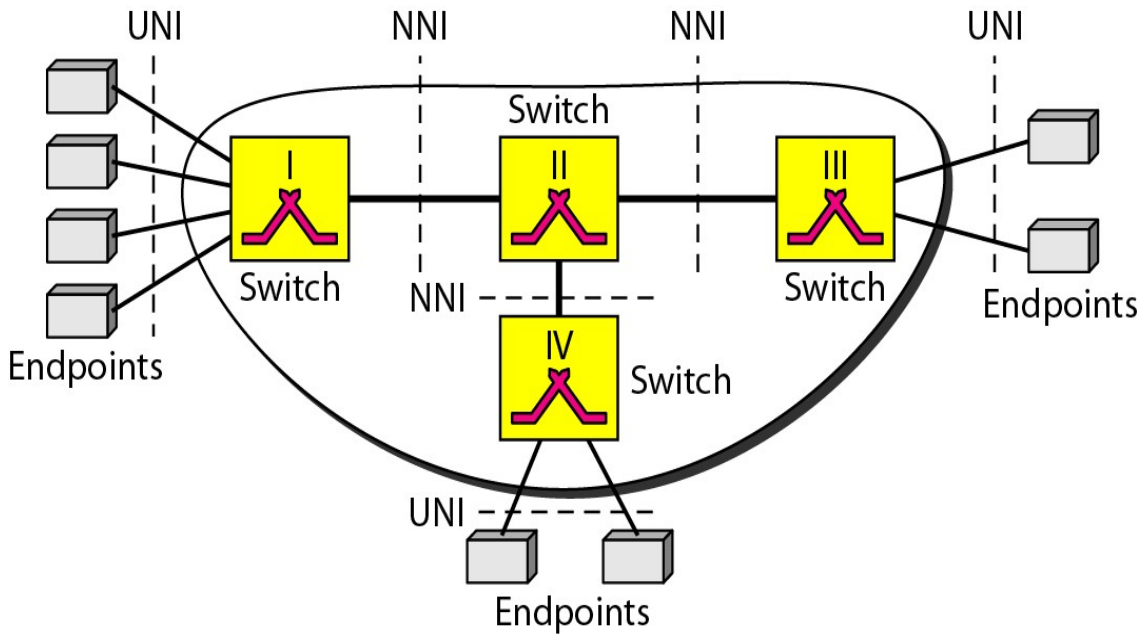
Asynchronous Transfer Mode (ATM) is the cell relay protocol designed by the ATM Forum and adopted by the ITU-T. The combination of ATM and SONET will allow high-speed interconnection of all the world's networks. In fact, ATM can be thought of as the "highway" of the information superhighway.

ATM uses asynchronous time-division multiplexing-that is why it is called Asynchronous Transfer Mode-to multiplex cells corning from different channels. It uses fixed-size slots (size of a cell).

Architecture:

ATM is a cell-switched network. The user access devices, called the endpoints, are connected through a user-to-network interface (UNI) to the switches inside the network. The switches are connected through network-to-network interfaces (NNIs).

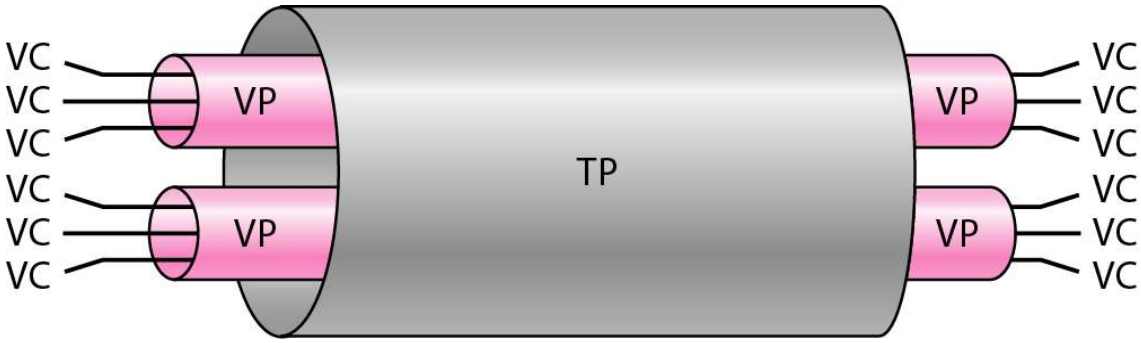
Figure shows an example of an ATM network.



Virtual Connection

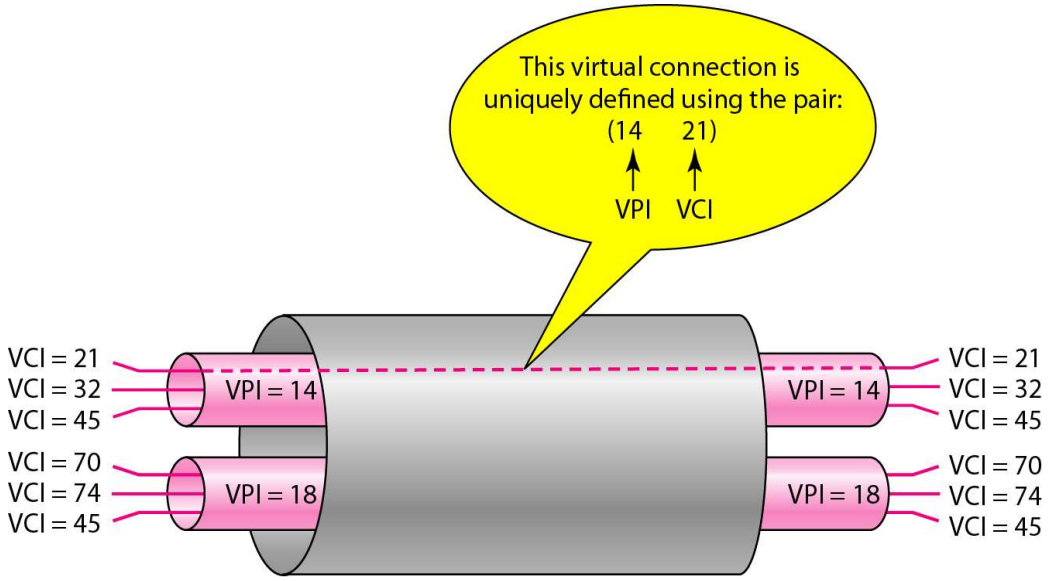
- Connection between two endpoints is accomplished through **transmission paths (TPs)**, **virtual paths (VPs)**, and **virtual circuits (VCs)**.
- A **transmission path (TP)** is the physical connection (wire, cable, satellite, and so on) between an endpoint and a switch or between two switches. A transmission path is divided into several virtual paths.

- A **virtual path (VP)** provides a connection or a set of connections between two switches.
- Cell networks are based on **virtual circuits (VCs)**. All cells belonging to a single message follow the same virtual circuit and remain in their original order until they reach their destination.
- Figure shows the relationship between a transmission path (a physical connection), virtual paths (a combination of virtual circuits that are bundled together because parts of their paths are the same), and virtual circuits that logically connect two points.

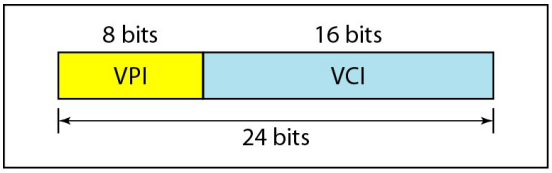


Identifiers:

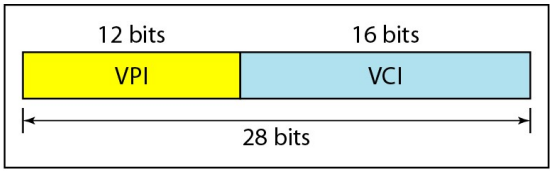
- In a virtual circuit network, to route data from one endpoint to another, the virtual connections need to be identified. For this purpose, the designers of ATM created a hierarchical identifier with two levels: a **Virtual Path Identifier (VPI)** and a **Virtual-Circuit Identifier (VCI)**.
- The VPI defines the specific VP, and the VCI defines a particular VC inside the VP. The VPI is the same for all virtual connections that are bundled (logically) into one VP.
- Figure shows the VPIs and VCIs for a transmission path.



- The lengths of the VPIs for UNIs and NNIs are different. In a UNI, the VPI is 8 bits, whereas in an NNI, the VPI is 12 bits. The length of the VCI is the same in both interfaces (16 bits). We therefore can say that a virtual connection is identified by 24 bits in a UNI and by 28 bits in an NNI.



a. VPI and VCI in a UNI



b. VPI and VCI in an NNI

- The whole idea behind dividing a virtual circuit identifier into two parts is to allow hierarchical routing. Most of the switches in a typical ATM network are routed using VPIs. The switches at the boundaries of the network, those that interact directly with the endpoint devices, use both VPIs and VCIs.

Exercises:

A. How does an NNI differ from a UNI?

B. What is the relationship between TPs, VPs, and VCs?

C. What are the virtual Identifiers used to route data from one endpoint to another?