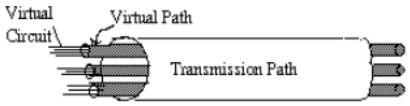
What is an ATM in the Computer Network?

ATM stands for Asynchronous transfer mode. It is a switching technique used by telecommunication networks that uses asynchronous time-division multiplexing to encode data into small, fixed-sized cells. ATMs can be used for efficient data transfer over highspeed data networks. ATM provides real-time and non-real-time services.

In ATM networks, end stations attach to the network using dedicated full duplex connections. The ATM networks are constructed using switches, and switches are interconnected using dedicated physical connections. Before any data transfers can begin, end-to-end connections must be established. Multiple connections can and do exist on a single physical interface. Sending stations transmit data by segmenting Protocol Data Units (PDUs) into 53-byte cells. Payload stays in the form of cells during network transport. Receiving stations reassemble cells into PDUs. The connections are identified using a virtual path identifier (VPI) and a virtual channel identifier (VCI). The VPI field occupies one byte in the ATM cell five-byte header; whereas, the VCI field

occupies two bytes in the ATM cell five-byte header. Basically, a VPI:VCI pair identifies the source of the ATM cell. The function of the ATM switch is to recognize the source of the cell, determine the next hop, and output the cell to a port. The VPI:VCI changes on a hop-by-hop basis. Thus, VPI:VCI values are not universal. Each virtual circuit is described as a concatenation of VPI:VCI values across the network.

Figure 4: Virtual paths and virtual circuits in a transmission path.



The PTI field defines the type of payload the cell contains in accordance with the values given in Figure 5. Here the cell types are user supplied, but the congestion information is network supplied. In other words, a cell sent with PTI 000 might arrive with 010 to warn the destination of problems underway.

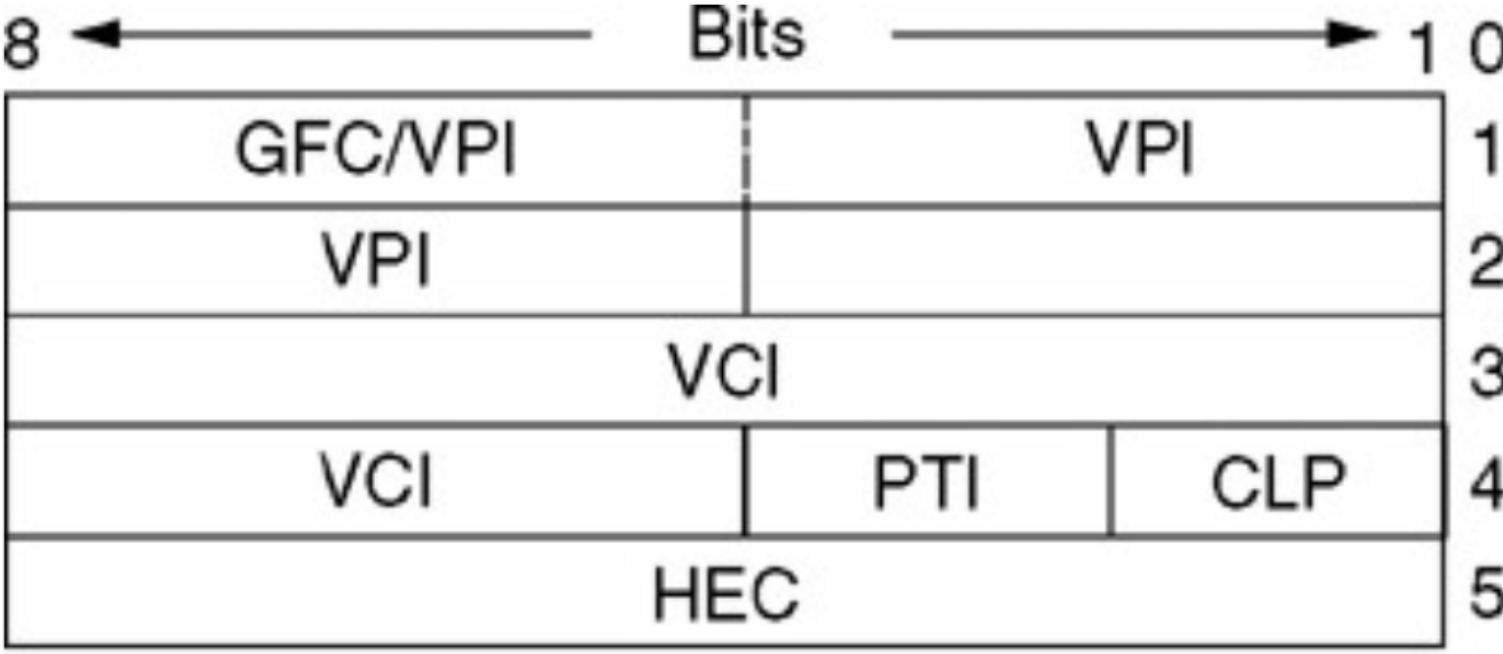
Figure 5: Values of the PTI fields

Payload Type	Meaning
000	User data cell, no congestion, cell type 0
001	User data cell, no congestion, cell type 1
010	User data cell, congestion experienced, cell type 0
011	User data cell, congestion experienced, cell type 1
100	Maintenance information between adjacent switches
101	Maintenance info between source and destination
110	Resource management cell
111	Reserved for future function

The CLP bit can be set by the host to differentiate between high-priority traffic and low-priority traffic. If congestion occurs and cells must be discarded, switches first attempt to discard cells with CLP set to 1 before throwing out any set to 0.

The HEC is the checksum over the header. The header comes with 48 bytes of payload.

The GFC field is present only in cells between a host and network. It is overwritten by the first switch it reaches, so it does not have end-to-end significance and is not delivered to the destination. The network ignores the GFC field.



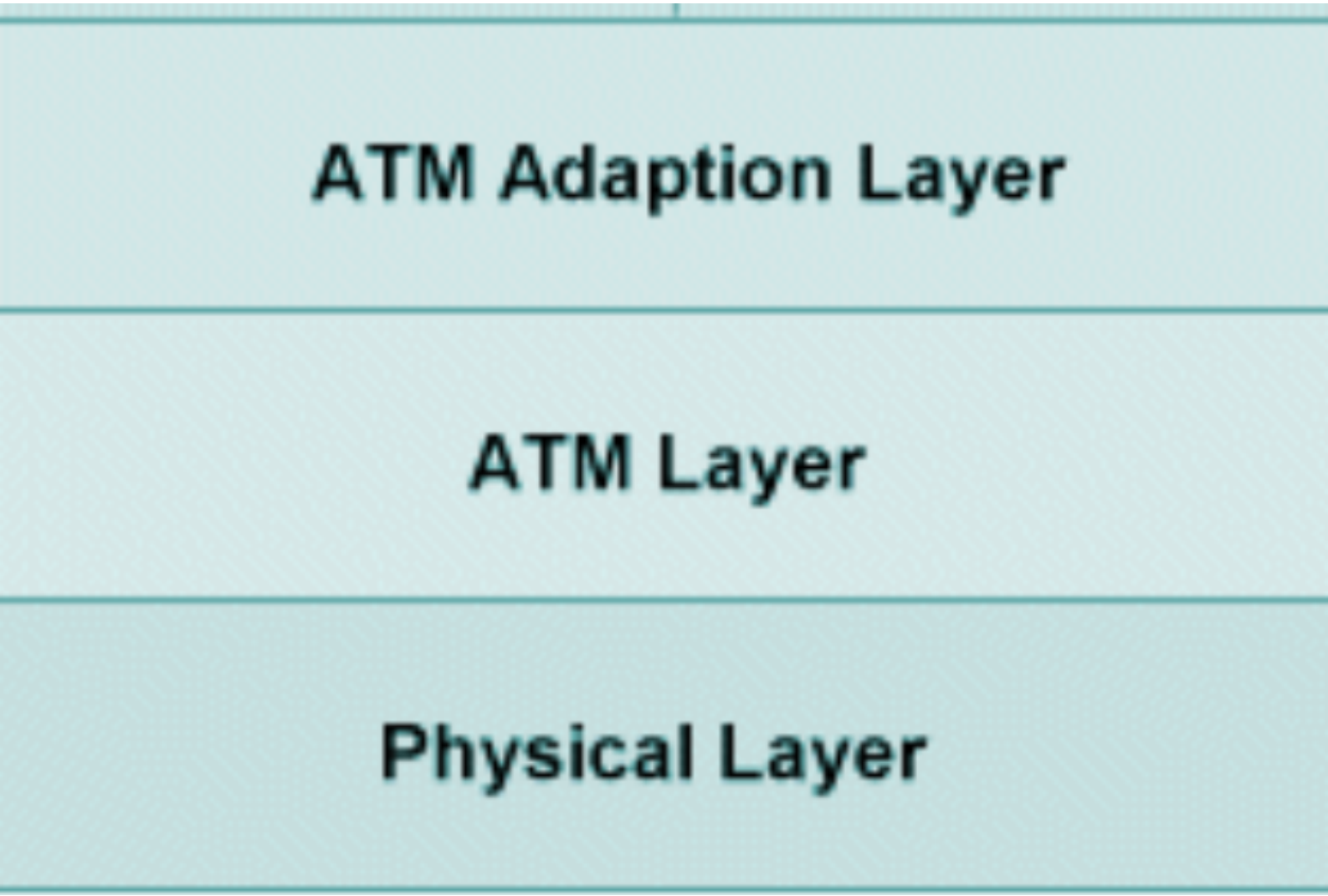
GFC Generic Flow Control
VPI Virtual Path Identifier
VCI Virtual Circuit Identifier
PTI Payload Type Identifier
CLP Cell Loss Priority
HEC Header Error Check

ATM reference model comprises of three layers

- **Physical Layer –** This layer corresponds to physical layer of OSI model. At this layer, the cells are converted into bit streams and transmitted over the physical medium.

- **ATM Layer –**This layer is comparable to data link layer of OSI model. It accepts the 48 byte segments from the upper layer, adds a 5 byte header to each segment and converts into 53 byte cells.

- **ATM Adaptation Layer (AAL)** –This layer corresponds to network layer of OSI model. It provides facilities to the existing packet switched networks to connect to ATM network and use its services. It accepts the data and converts them into fixed sized segments.


ATM Adaption Layer
ATM Layer
Physical Layer