ATM Reference Model

ATM REFERENCE MODEL:

The ATM architecture uses a logical model to describe the functionality that it supports. ATM functionality corresponds to the physical layer and part of the data link layer of the OSI reference model.

The ATM reference model is composed of the following planes, which span all layers:

- **Control** - This plane is responsible for generating and managing signaling requests.

- **User** - This plane is responsible for managing the transfer of data.

- **Management** - This plane contains two components:

  - Layer management manages layer-specific functions, such as the detection of failures and protocol problems.
  - Plane management manages and coordinates functions related to the complete system.
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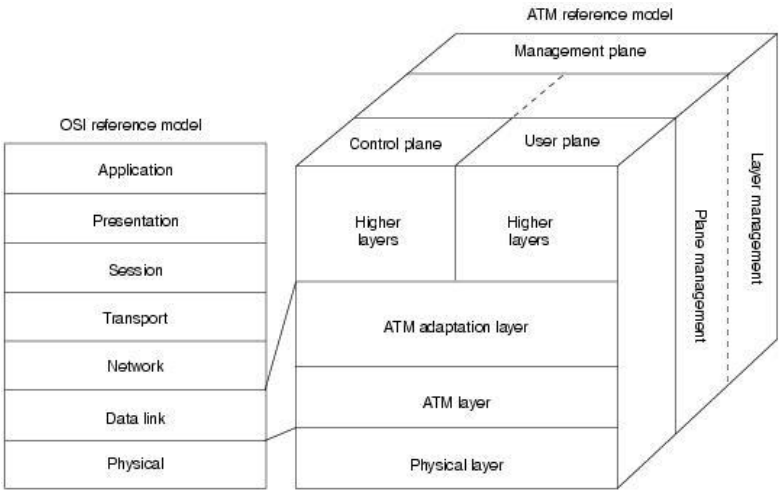
The ATM reference model is composed of the following ATM layers:

- **Physical layer** - Analogous to the physical layer of the OSI reference model, the ATM physical layer manages the medium-dependent transmission.
- **ATM layer** - Combined with the ATM adaptation layer, the ATM layer is roughly analogous to the data link layer of the OSI reference model. The ATM layer is responsible for the simultaneous sharing of virtual circuits over a physical link (cell multiplexing) and passing cells through the ATM network (cell relay). To do this, it uses the VPI and VCI information in the header of each ATM cell.
- **ATM adaptation layer (AAL)** - Combined with the ATM layer, the AAL is roughly analogous to the data link layer of the OSI model. The AAL is responsible for isolating higher-layer protocols from the details of the ATM processes. The adaptation layer prepares user data for conversion into cells and segments the data into 48-byte cell payloads.

Finally, the higher layers residing above the AAL accept user data, arrange it into packets, and hand it to the AAL.

Figure: The ATM Reference Model Relates to the Lowest Two Layers of the OSI Reference Model



ATM PHYSICAL LAYER:

The ATM physical layer has four functions: Cells are converted into a bitstream, the transmission and receipt of bits on the physical medium are controlled, ATM cell boundaries are tracked, and cells are packaged into the appropriate types of frames for the physical medium.

The ATM physical layer is divided into two parts: the physical medium-dependent (PMD) sublayer and the transmission convergence (TC) sublayer.

The PMD sublayer provides two key functions. First, it synchronizes transmission and reception by sending and receiving a continuous flow of bits with associated timing information. Second, it specifies the physical media for the physical medium used, including connector types and cable Examples of physical medium standards for ATM include Synchronous Digital Hierarchy/Synchronous Optical Network (SDH/SONET).

The TC sublayer has four functions: cell delineation, header error control (HEC) sequence generation and verification, cell-rate decoupling, and transmission frame adaptation. The cell delineation function maintains ATM cell boundaries, allowing devices to locate cells within a stream of bits. HEC sequence generation and verification generates and checks the header error control code to ensure valid data. Cell-rate decoupling maintains synchronization and inserts or suppresses idle (unassigned) ATM cells to adapt the rate of valid ATM cells to the payload capacity of the transmission system. Transmission frame adaptation packages ATM cells into frames acceptable to the particular physical layer implementation.

ATM ADAPTATION LAYER- AAL 1

AAL1, a connection-oriented service, is suitable for handling constant bit rate sources (CBR), such as voice and videoconferencing. ATM transports CBR traffic using circuit-emulation services. Circuit-emulation service also accommodates the attachment of equipment currently using leased lines to an ATM backbone network. AAL1 requires timing synchronization between the source and the destination. For this reason, AAL1 depends on a medium, such as SONET, that supports clocking.

ATM ADAPTATION LAYER- AAL 2

Another traffic type has timing requirements like CBR but tends to be bursty in nature. This is called variable bit rate (VBR) traffic. This typically includes services characterized as packetized voice or video that do not have a constant data transmission speed but that do have requirements similar to constant bit rate services. AAL2 is suitable for VBR traffic. The AAL2 process uses 44 bytes of the cell payload for user data and reserves 4 bytes of the payload to support the AAL2 processes.

ATM ADAPTATION LAYER- AAL ¾

AAL3/4 supports both connection-oriented and connectionless data. It was designed for network service providers and is closely aligned with Switched Multimegabit Data Service (SMDS). AAL3/4 is used to transmit SMDS packets over an ATM network.

ATM ADAPTATION LAYER- AAL5

AAL5 is the primary AAL for data and supports both connection-oriented and connectionless data. It is used to transfer most non-SMDS data, such as classical IP over ATM and LAN Emulation (LANE). AAL5 also is known as the simple and efficient adaptation layer (SEAL) because the SAR sublayer simply accepts the CS-PDU and segments it into 48-octet SAR-PDUs without reserving any bytes in each cell.

Source: http://datacombasic.blogspot.in/search/label/ATM%20Reference%20Model