Network Communication Technology

Chapter 20
Asynchronous Transfer Mode (ATM)

ATM Network

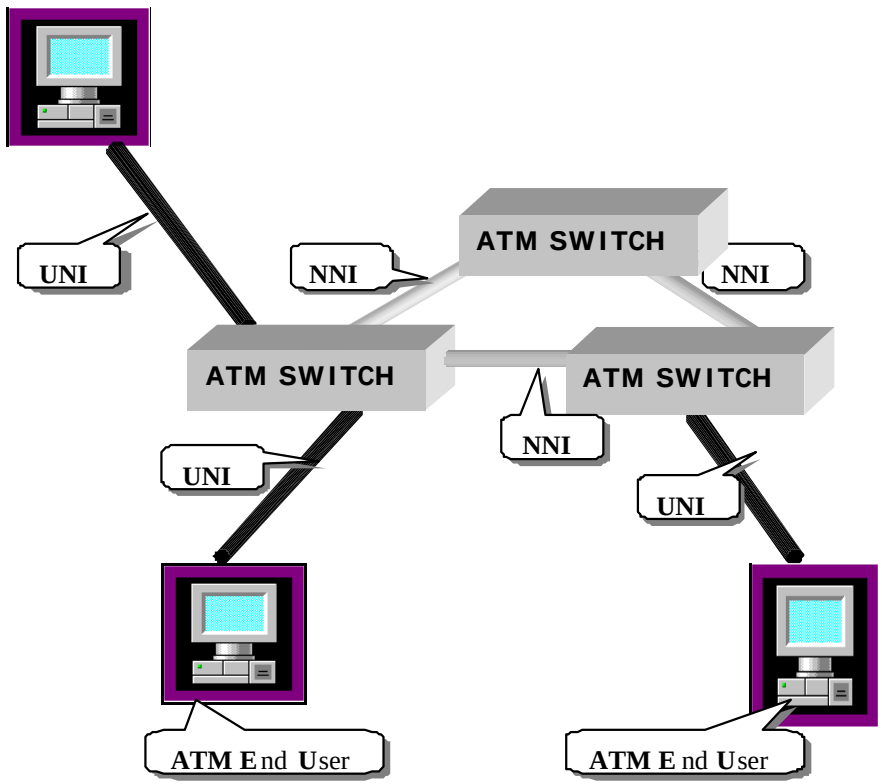


Figure 20.1

ATM Cell

- Fixed size cell (53 Bytes)
- Telephony Standard – Intended as a universal, shared bandwidth service
- Typically 155 Mbit/sec (OC-3, STS-3) user interface with low latency

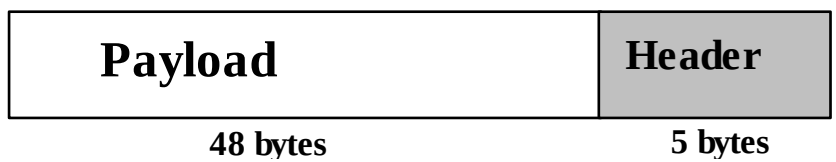


Figure 20.2

ATM Connections

- Virtual Path Identifier (VPI)
  - High-level route identifier
- Virtual Channel Identifier (VCI)
  - Sub-route identifier
- Connections
  - PVC
    Permanent Virtual Connection
  - SVC (normal)
    Switched Virtual Connection

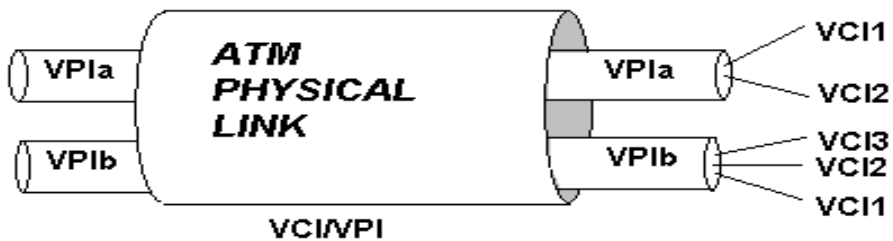


Figure 20.3

A Railroad Model

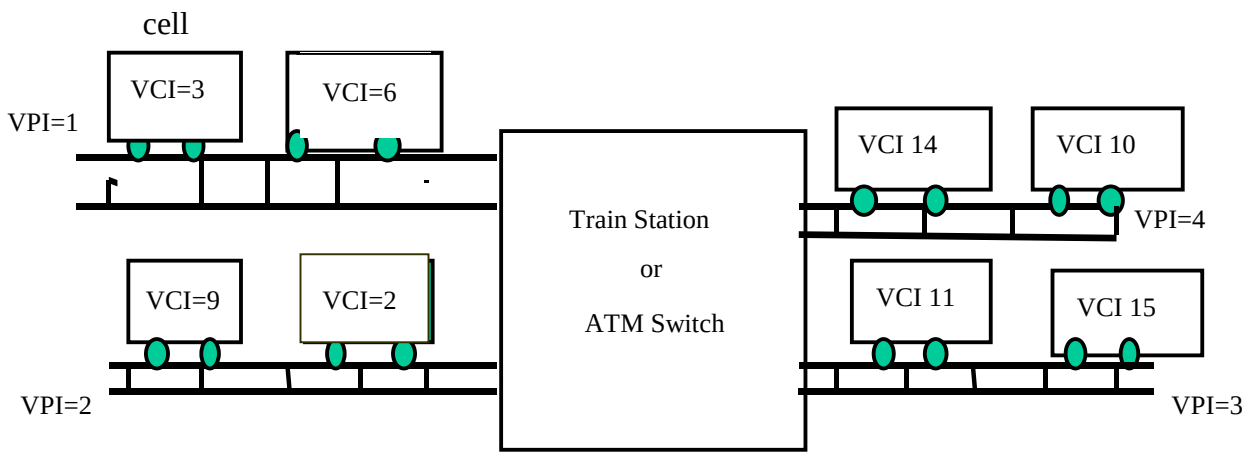


Figure 20.4

ATM Switch

- Fast
  - Simple HW
  - Fixed cell size
- Flexible BW sharing
  - Small cells
  - Low latency

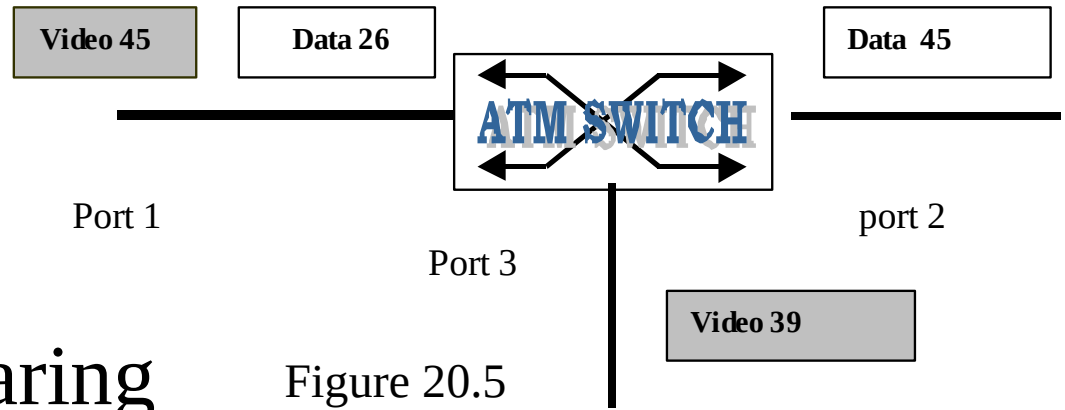


Figure 20.5

Input		Output	
Port	VPI/VCI	Port	VPI/VCI
1	1/26	2	2/45
1	1/45	3	3/39

Table 20.1: Routing Table

ATM Switch Architecture

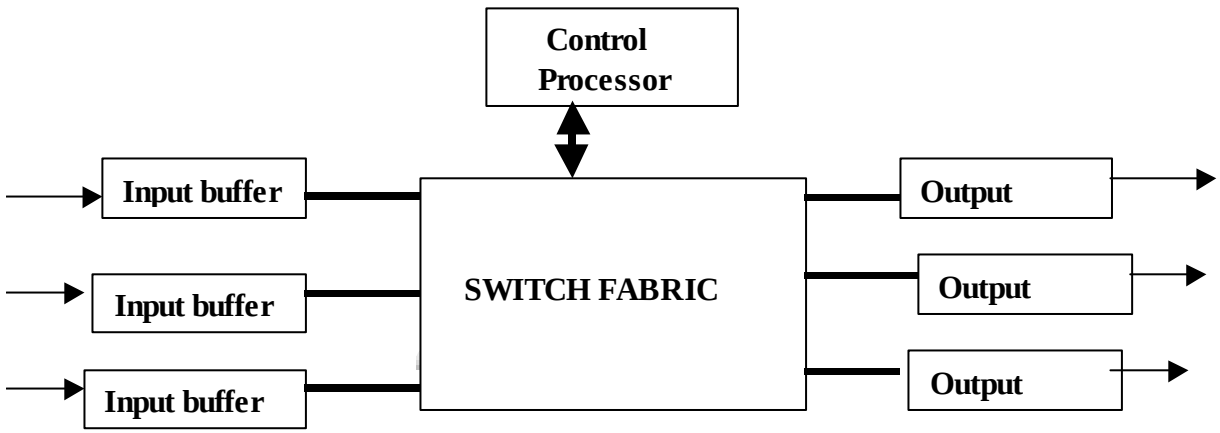


Figure 20.6

ATM Connection Setup

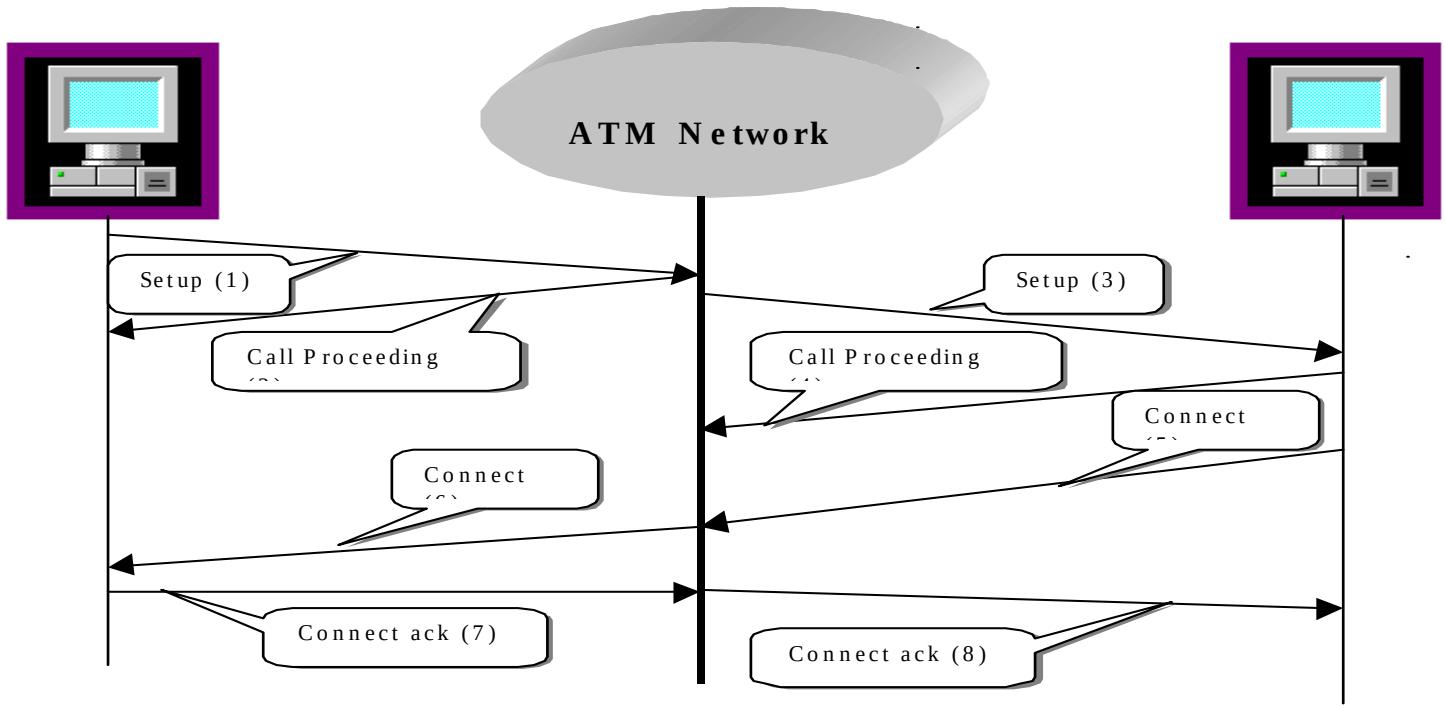


Figure 20.7

ATM Cell Formats

- User Network Interface (UNI)
  - Generic Flow Control: Not currently in use
  - VPI/VCI: Identify the next destination of the cell (which switch)
  - Payload Type: Data/control, congestion, terminating
  - Congestion Loss Priority: High/low, determines QoS
  - Header Error Control: Weak CRC on header only
- Network-to-Network Interface (NNI)

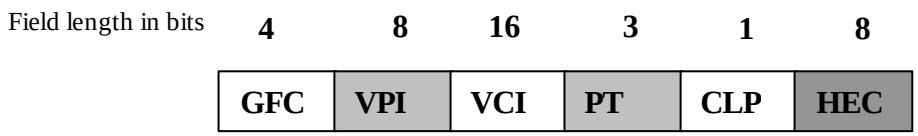


Figure 20.9:
UNI Cell Header

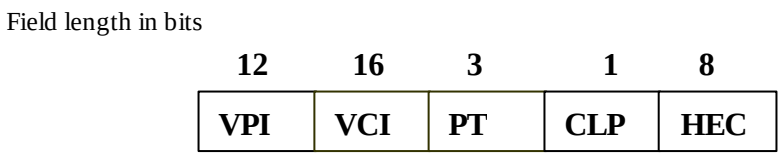


Figure 20.10:
NNI Cell Header

ATM Layered Architecture

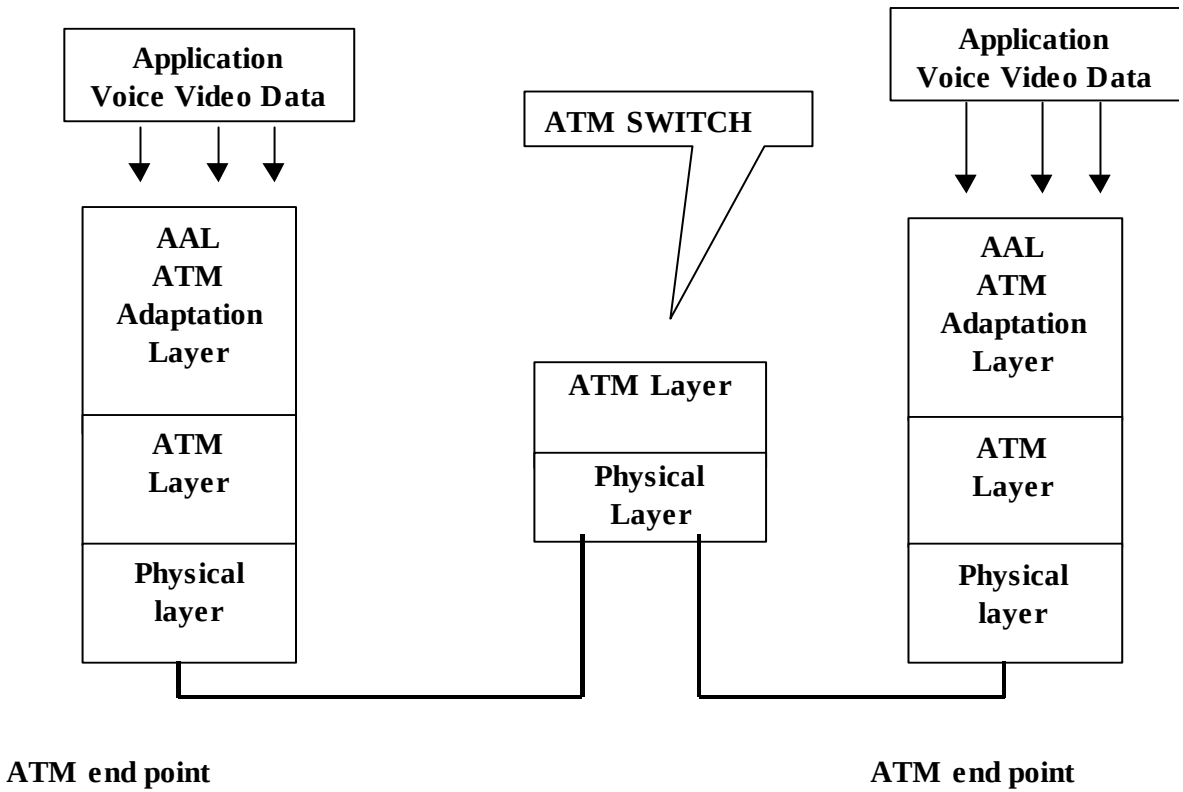


Figure 20.11

ATM Adaptation Layer 1 (AAL1)

Constant bit rate traffic

i.e.

64 Kb Telephony

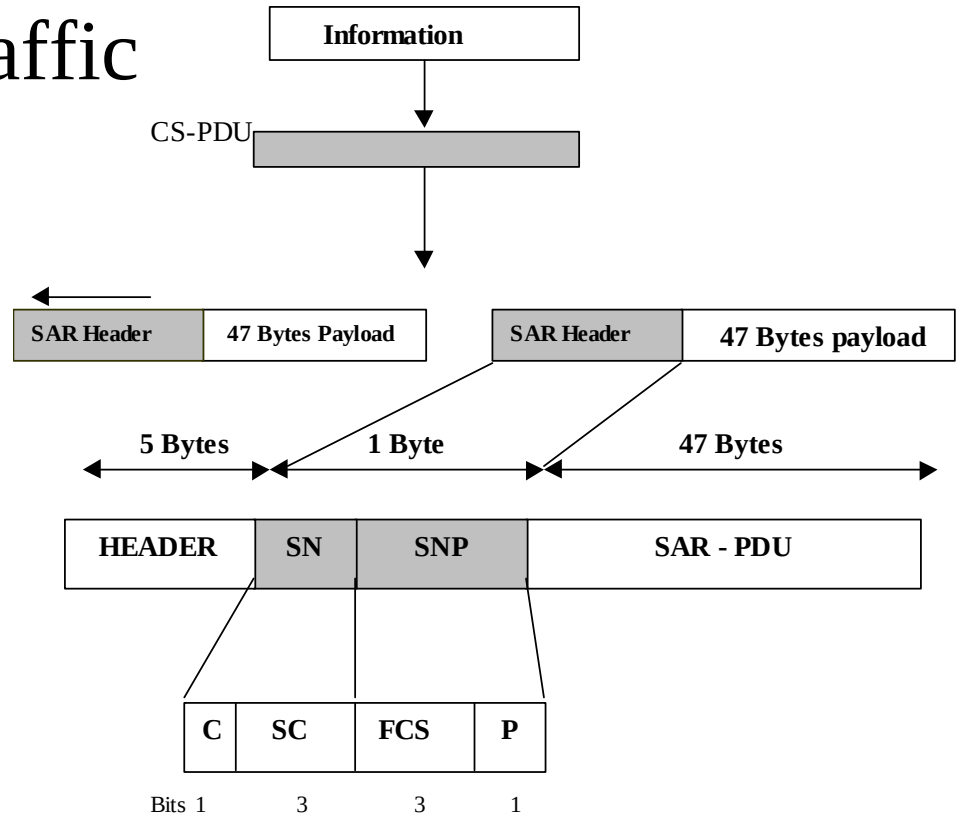


Figure 20.12

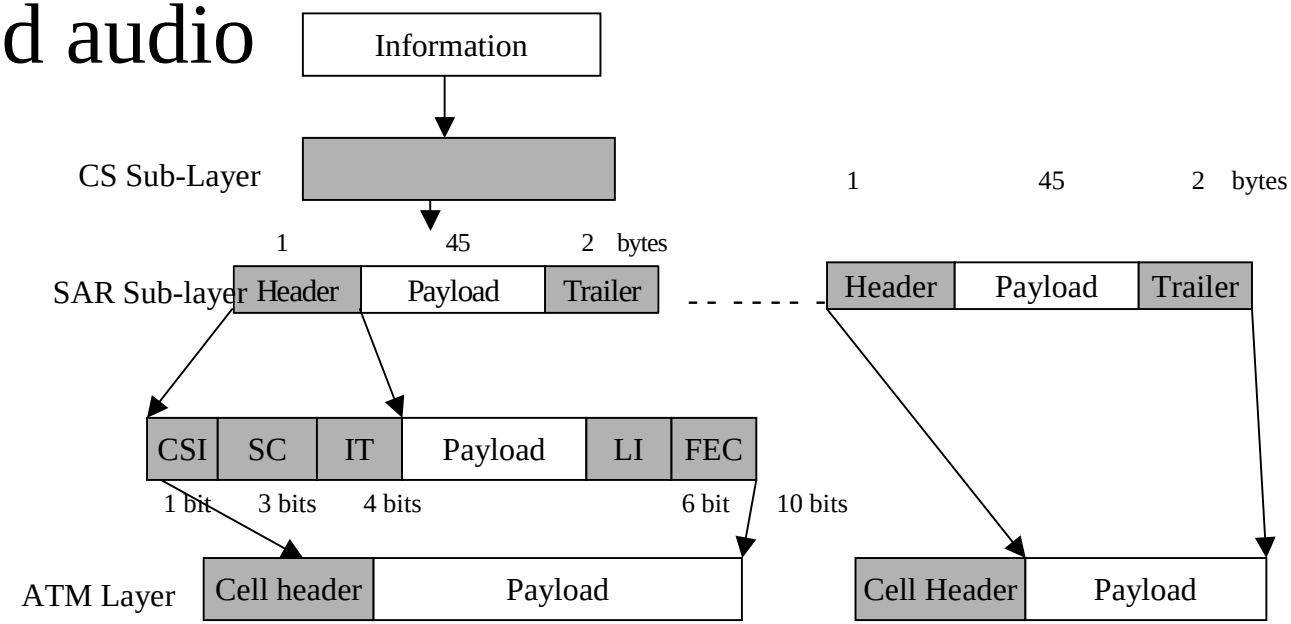
ATM Adaptation Layer 2 (AAL2)

Variable bit rate traffic

i.e.

Compressed audio

Figure 20.13



ATM Adaptation Layer 3/4 (AAL3/4)

- Variable Frame length
- Error control
- Variable delay

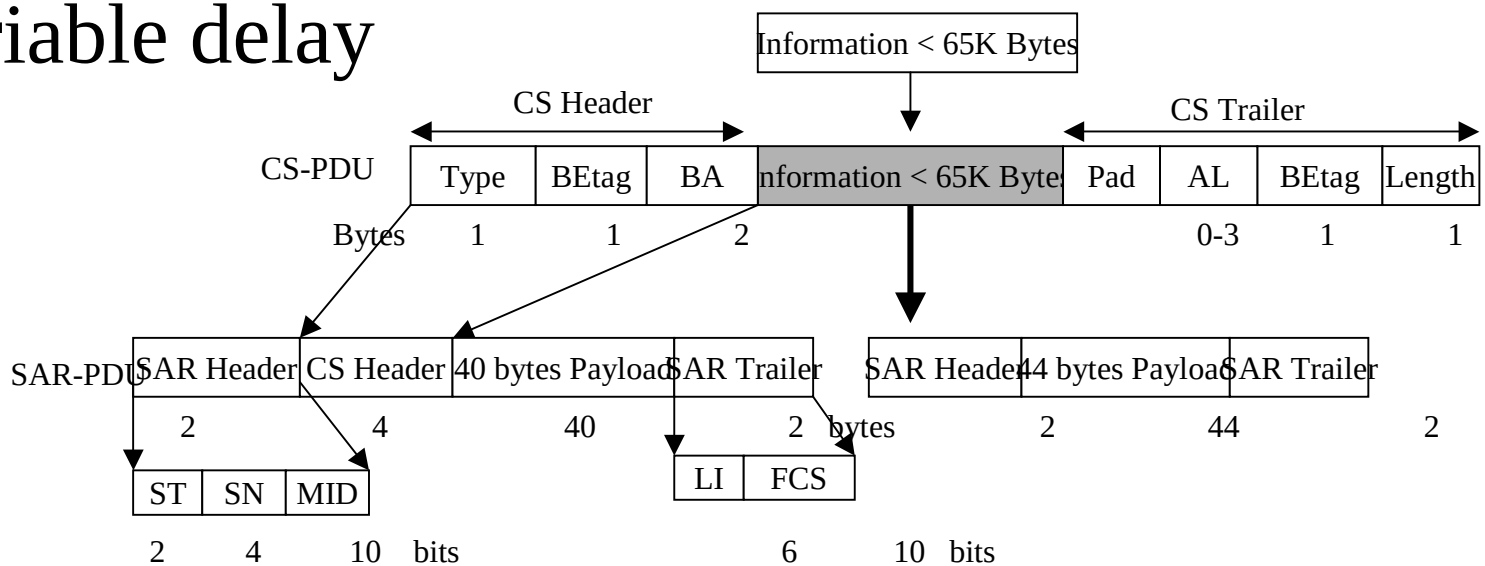


Figure 20.14

ATM Adaptation Layer 5 (AAL5)

- Efficient LAN emulation
- Control info in the last cell

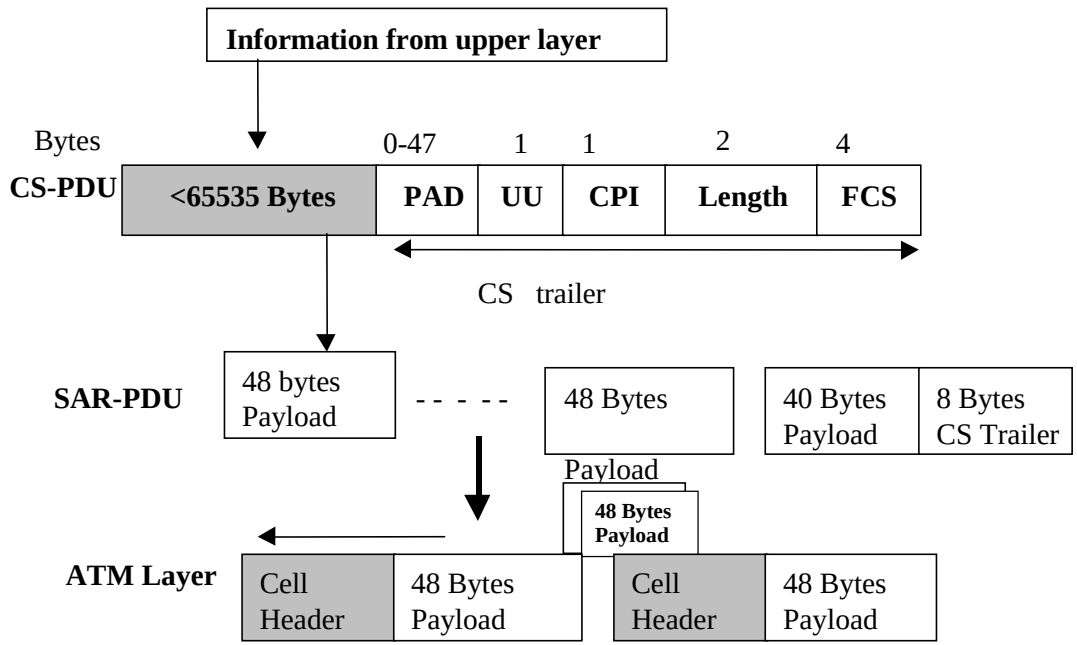


Figure 20.14

ATM vs. Gigabit Ethernet

- ATM
  - Supports real-time
  - Offers QoS support
  - Good as a WAN
- Gigabit Ethernet
  - QoS add-on (802.1Q) supports priority delivery
  - Low cost
  - Replaced ATM in LAN backbones, also used for short haul WAN connectivity