# Part III: ATM

*Introduction to*
*Asynchronous Transfer Mode*

# Brief Introduction to
# Asynchronous Transfer Mode

- Historical Background
- Objectives
- Basic Concepts
- ATM Architecture
- Network Interfaces Interoperability
- Features & Benefits

A short ATM tutorial can be found at:

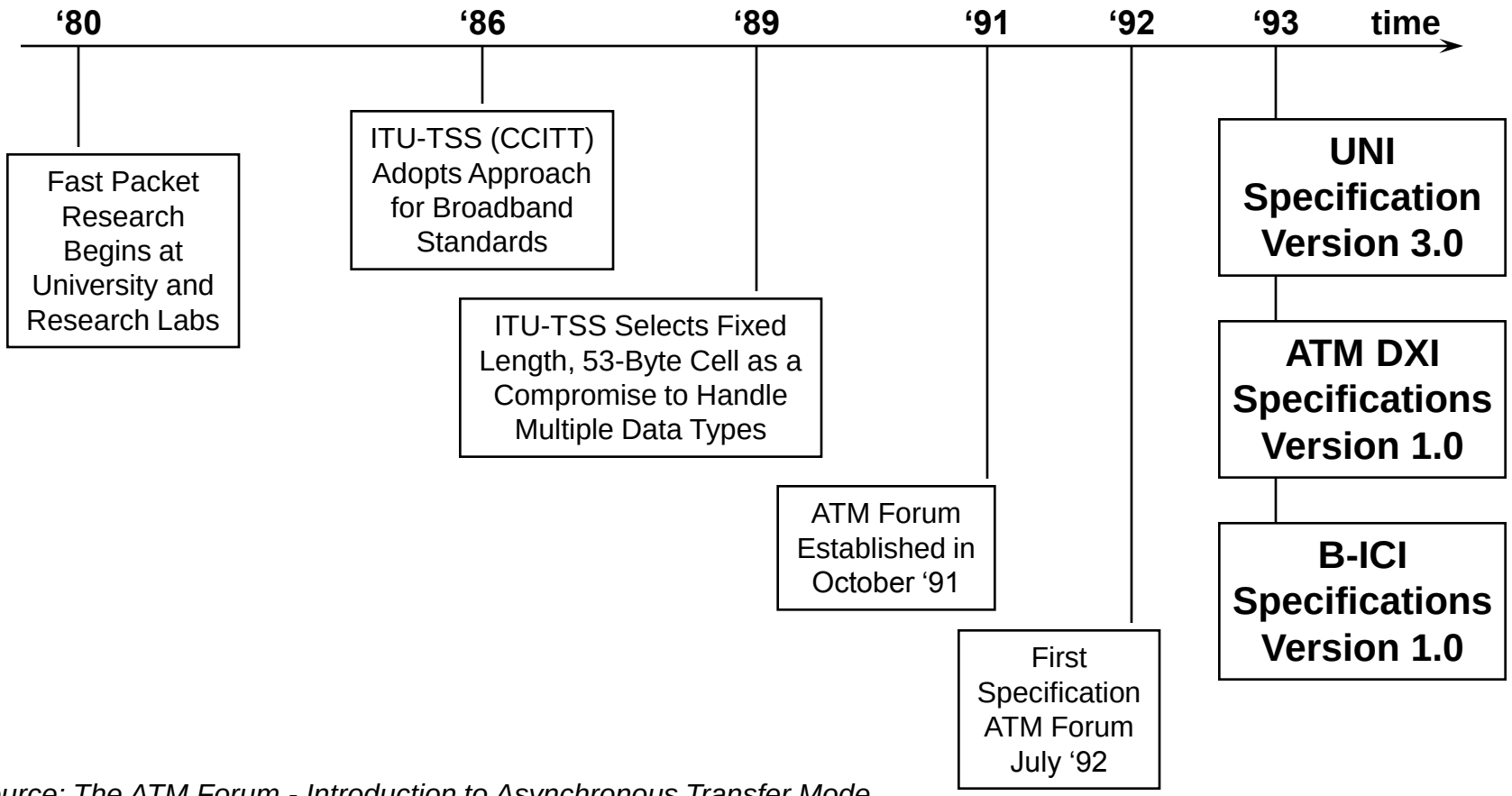
**http://www.atmforum.com/atmforum/library/notes1.html**

ATM Glossary:

**http://www.atmforum.com/atmforum/library/glossary/glosspage.html**

*Source: The ATM Forum - Introduction to Asynchronous Transfer Mode*

# ATM History




*Source: The ATM Forum - Introduction to Asynchronous Transfer Mode*

# ATM Groups

- I. Physical
- II. Signaling
- III. Traffic Management
- IV. Private NNI
- V. LAN Emulation
- VI. Service Aspect & Application
- VII. Network Management
- VIII. B-ICI
- IX. DXI (done)

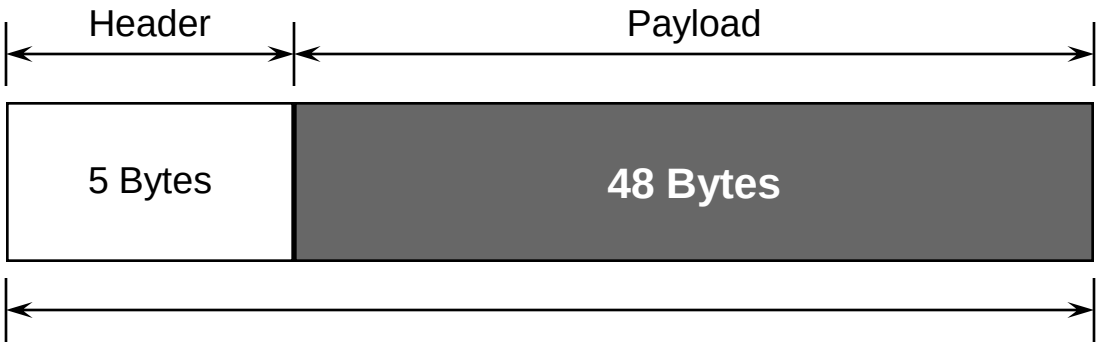
# Objectives of ATM

- Accommodation of mixed media traffic
  - Support for telephony, video, audio, data traffic
- Simplified network infrastructure
  - Same technology used both in the LAN and in the WAN
- Scalability & Flexibility

# ATM Basic Concepts

- Cell Based
  - Data is divided into fixed-size “cells” (short packets)
- Switch Based
  - No multiple access
  - Nodes are connected to switches through dedicated point-to-point links
  - Switch establishes connections between the nodes
- Negotiated Quality of Service
  - Node has to specify traffic characteristics when establishing the connection
  - Node can request Quality of Service from switch

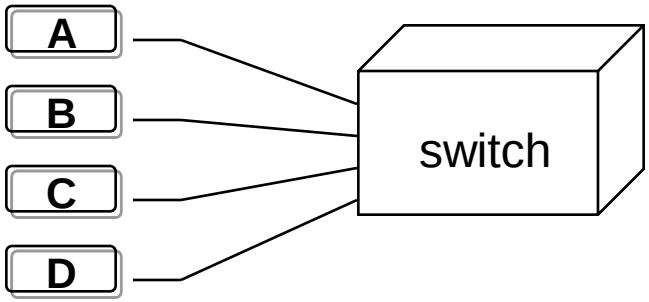
# The ATM Cell




- Small Size
  - 5 Byte Header
  - 48 Byte Payload
- Fixed Size
- Header contains virtual circuit information
- Payload can be voice, video or other data types

# Advantages of Switching

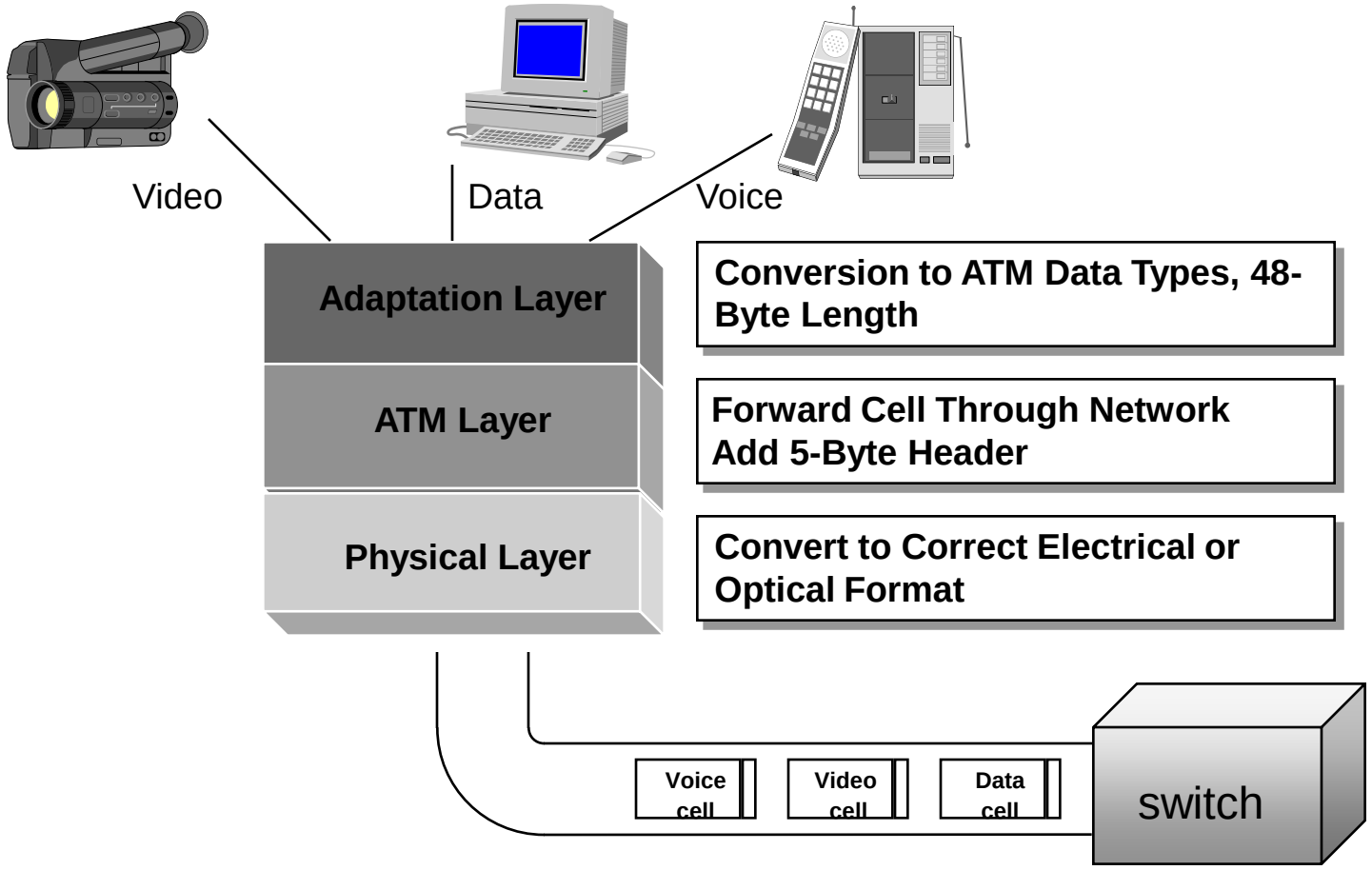
- Concurrent Switching
  - Dedicated bandwidth
  - Diversity of access speeds
  - Easily scalable



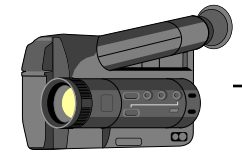
# Negotiated Quality of Service

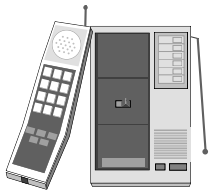
- End-to-End Connections (Virtual Circuit - VC)
  - All cells in a VC follow the same path and are delivered in order
- Traffic Contract
  - User Traffic Parameters
    - Peak Cell Rate
    - Average Cell Rate
    - Maximum Burst Length
  - Quality of Service
    - Delay
    - Cell Loss
  - Contract: if the connection is accepted, the network guarantees the quality of service parameters as long as the user abides by the stated traffic parameters.

# ATM Architecture

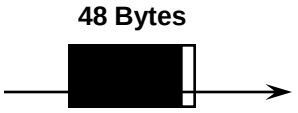


# ATM Adaptation Layer (AAL)



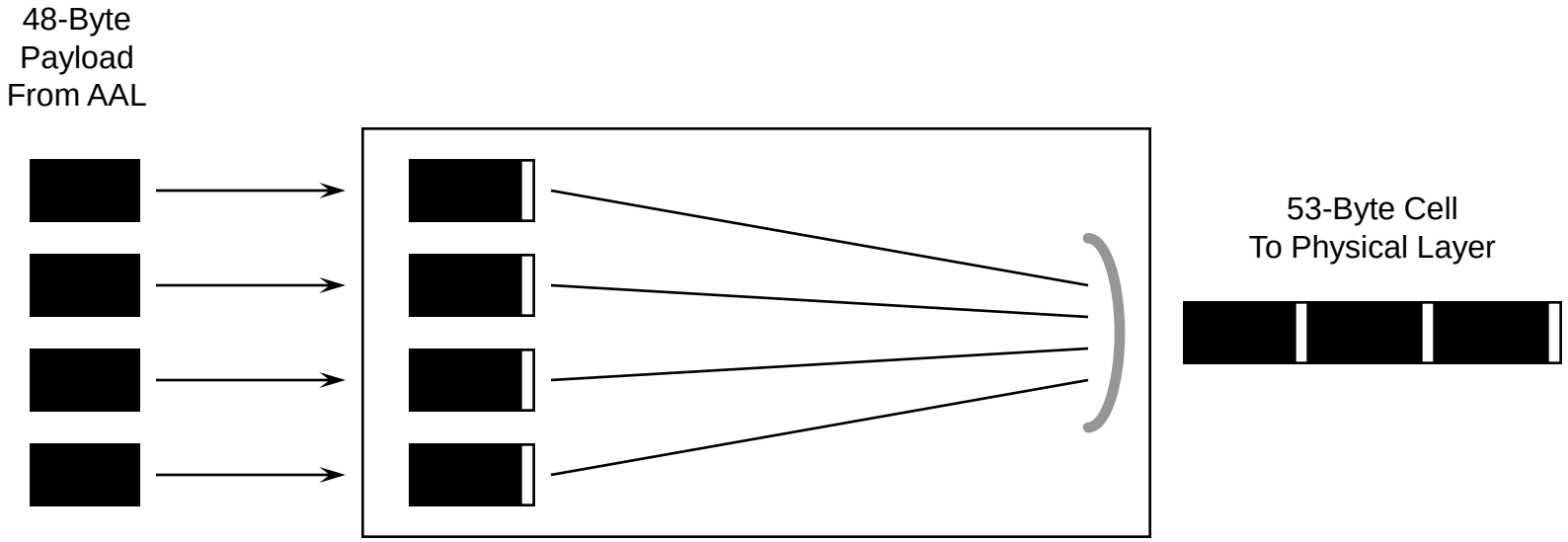


| AAL | Types |
|---|---|
| 1 | **Circuit Emulation**<br>• Constant Bit Rate (CBR)<br>• Time Sensitive |
| 2 | **Video/Audio**<br>• Variable Bit Rate (VBR)<br>• Time Sensitive |
| 3/4 | **Data Transfer**<br>• Variable Bit Rate<br>• Time Insensitive |
| 5 | **Lower Overhead AAL for Data**<br>• Variable Bit Rate<br>• Time Insensitive |



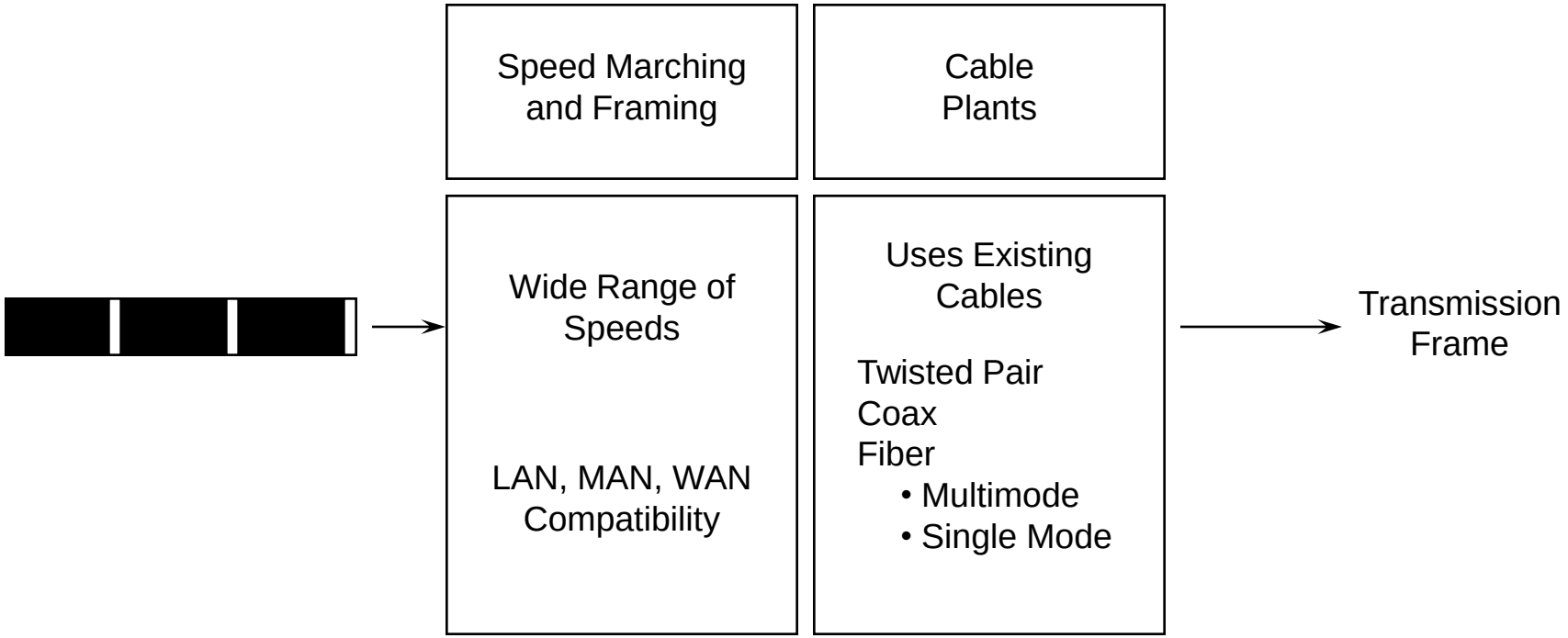

- Provides Mapping of Applications to ATM Service of the Same Type
- Segments/Reassembles into 48 Byte Payloads
- Hands 48 Byte Payloads to ATM Layer

# ATM Layer

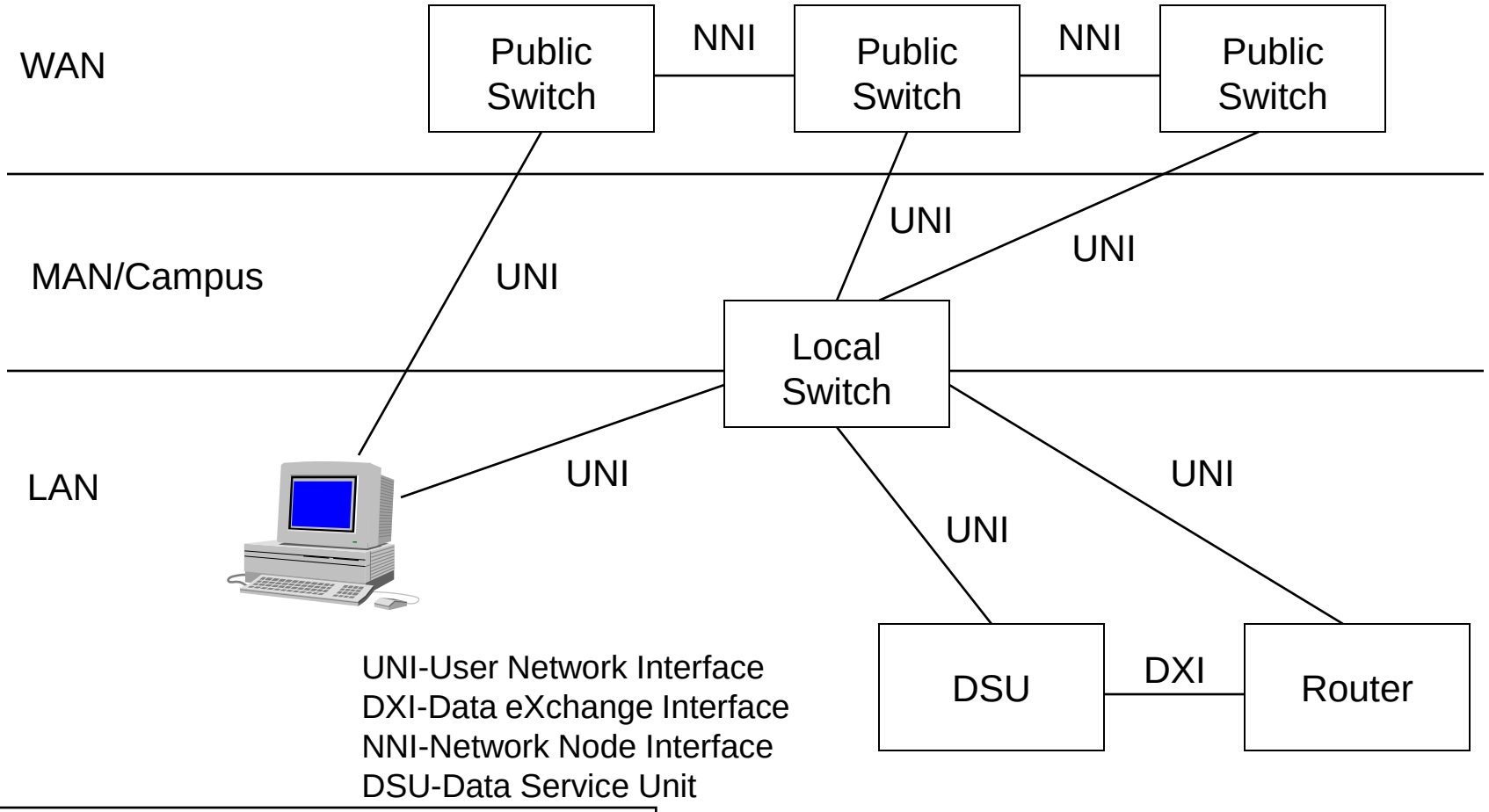



- Adds/removes header To 48 byte payload
- Header contains connection identifier
- Multiplexes 48 byte payloads into virtual connections
- Guarantees sequential delivery within a virtual connection

# Physical Layer



# ATM Network Interfaces



# ATM Features And Benefits

## ATM Features

- Supports current and future high-bandwidth applications and protocols
- Increased end-to-end bandwidth
- Switch based, connection oriented
- Small, fixed length cell
- Independent of physical interface
- Interoperability with conventional technology
- Seamless integration of LAN / MAN / WAN
- Supported by standards and industry forums

## ATM Benefits

- Long architectural lifetime
- Dedicated and deterministic bandwidth
- One network for all traffic
- Supports new applications
- Supports current cable plant
- Migration occurs at user's pace
- Simplified networking and architecture
- "*Better multivendor compatibility*"