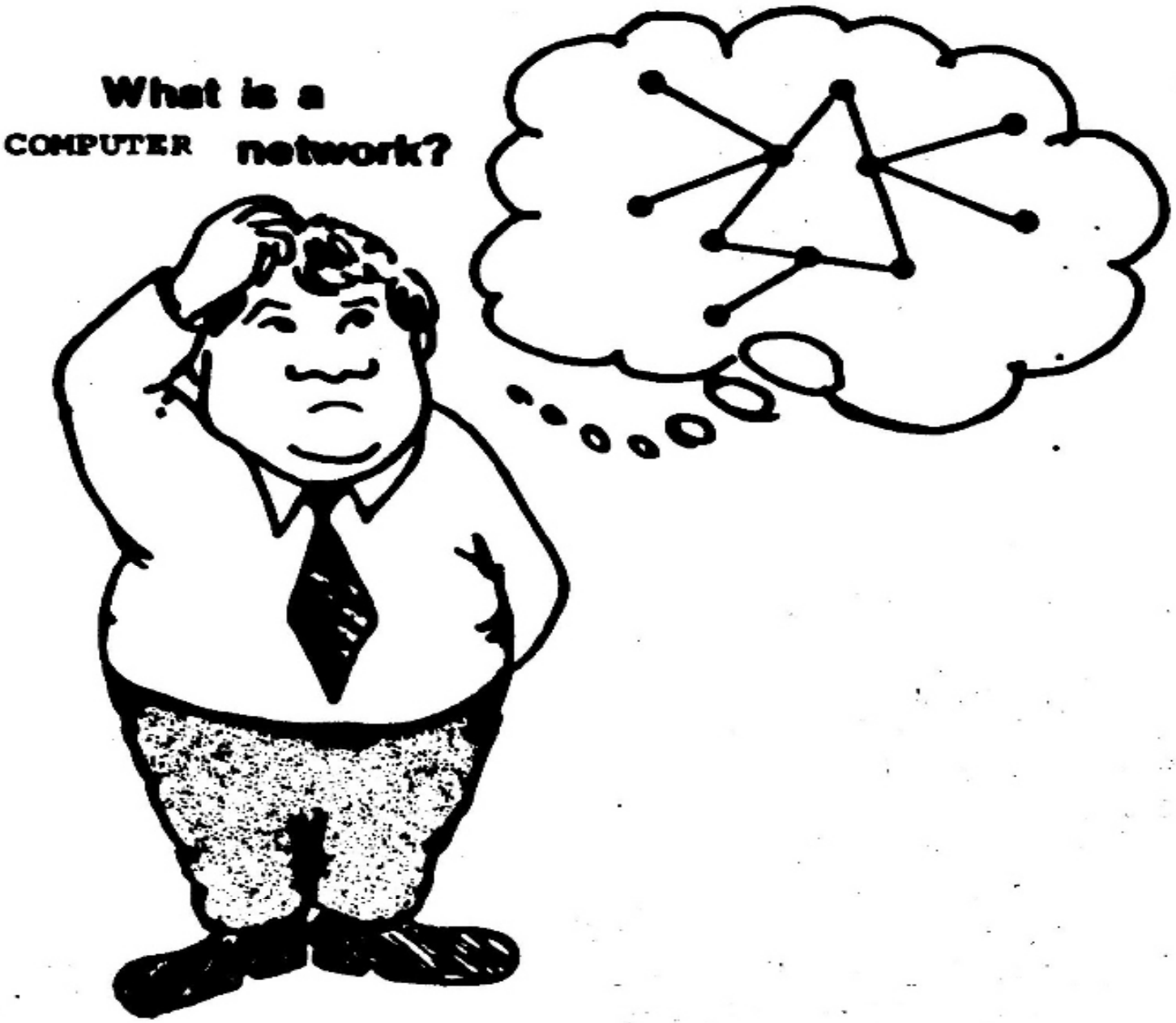

What is a
COMPUTER network?

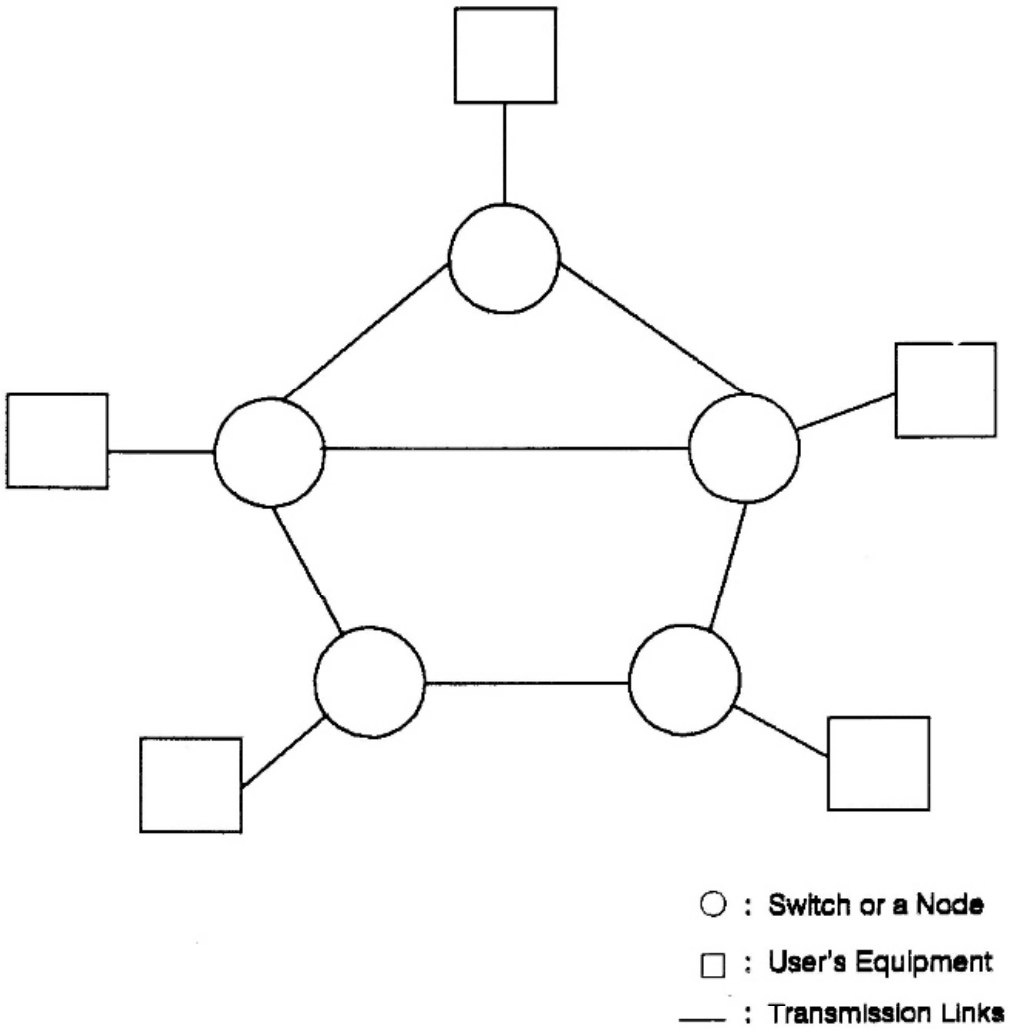
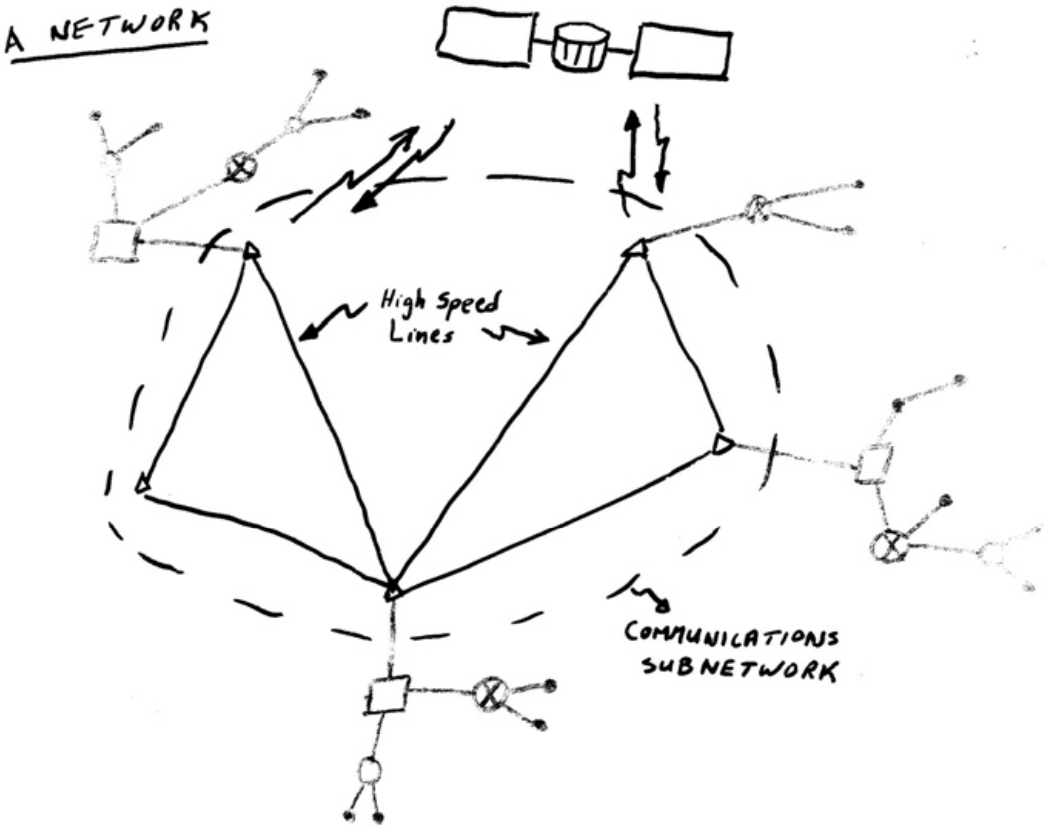


FIG.1-3 A Communication Network

A NETWORK



(DTE: DATA TERMINAL EQUIPEMENT)

□ : HOST COMPUTER

○ : MULTIPLEXER

⊗ : CONCENTRATOR

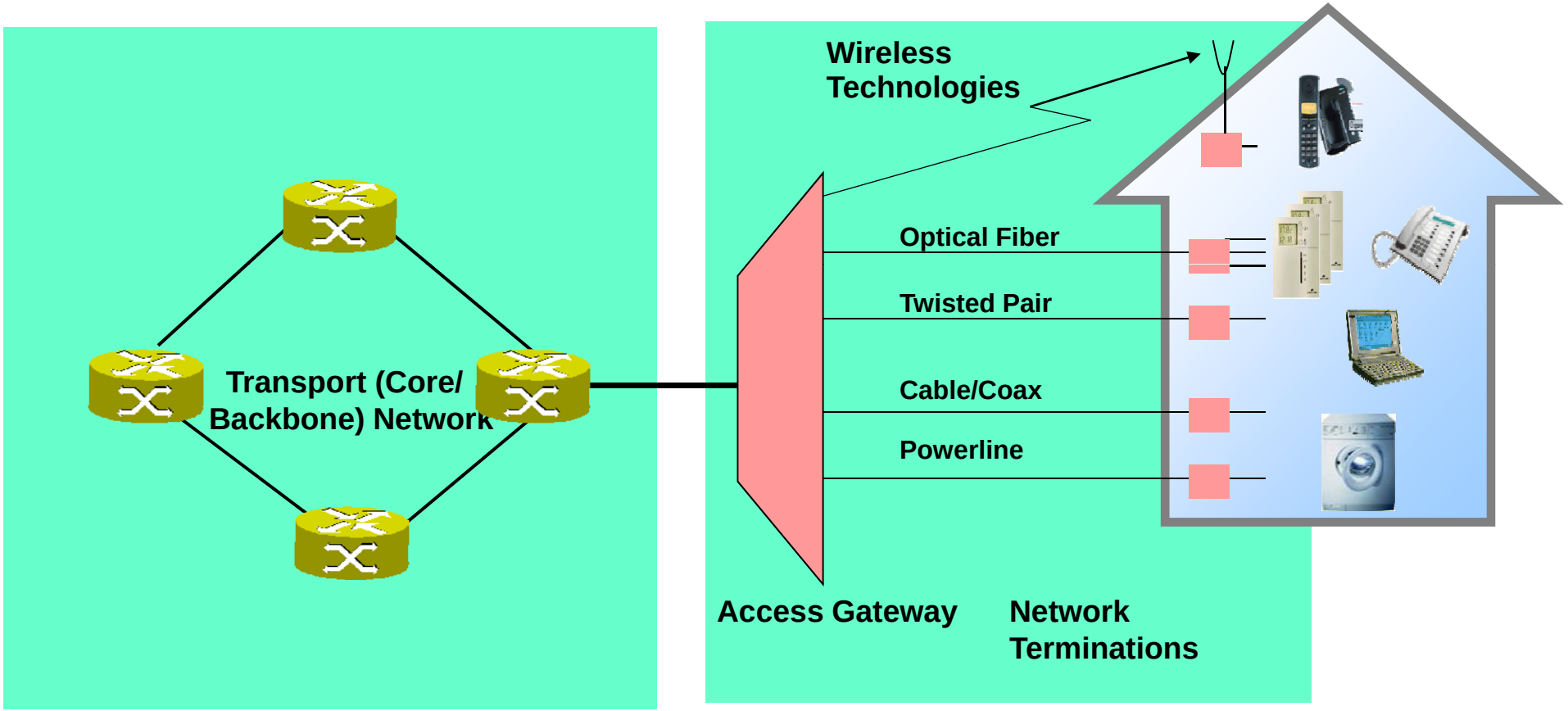
● : TERMINAL (DTE)

△ : SWITCH NODE

{ DCE : DATA CIR[illegible]IT - Terminating Equi[illegible]

Evolution of transport technologies

Public Network Principles



Switching/ Routing → Transmission → Access Network

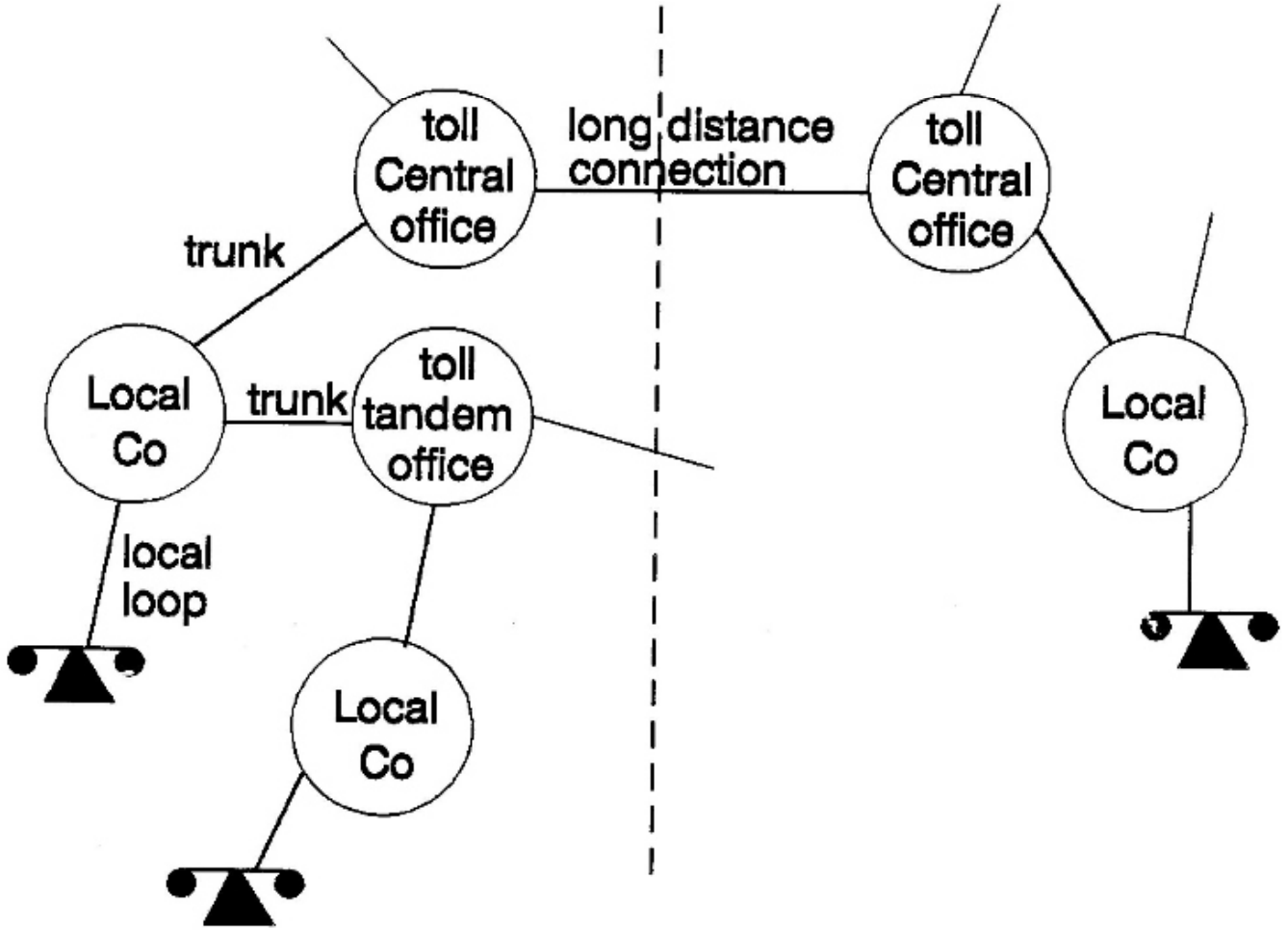


Fig 1.9 Basic Elements of a Telephone Network

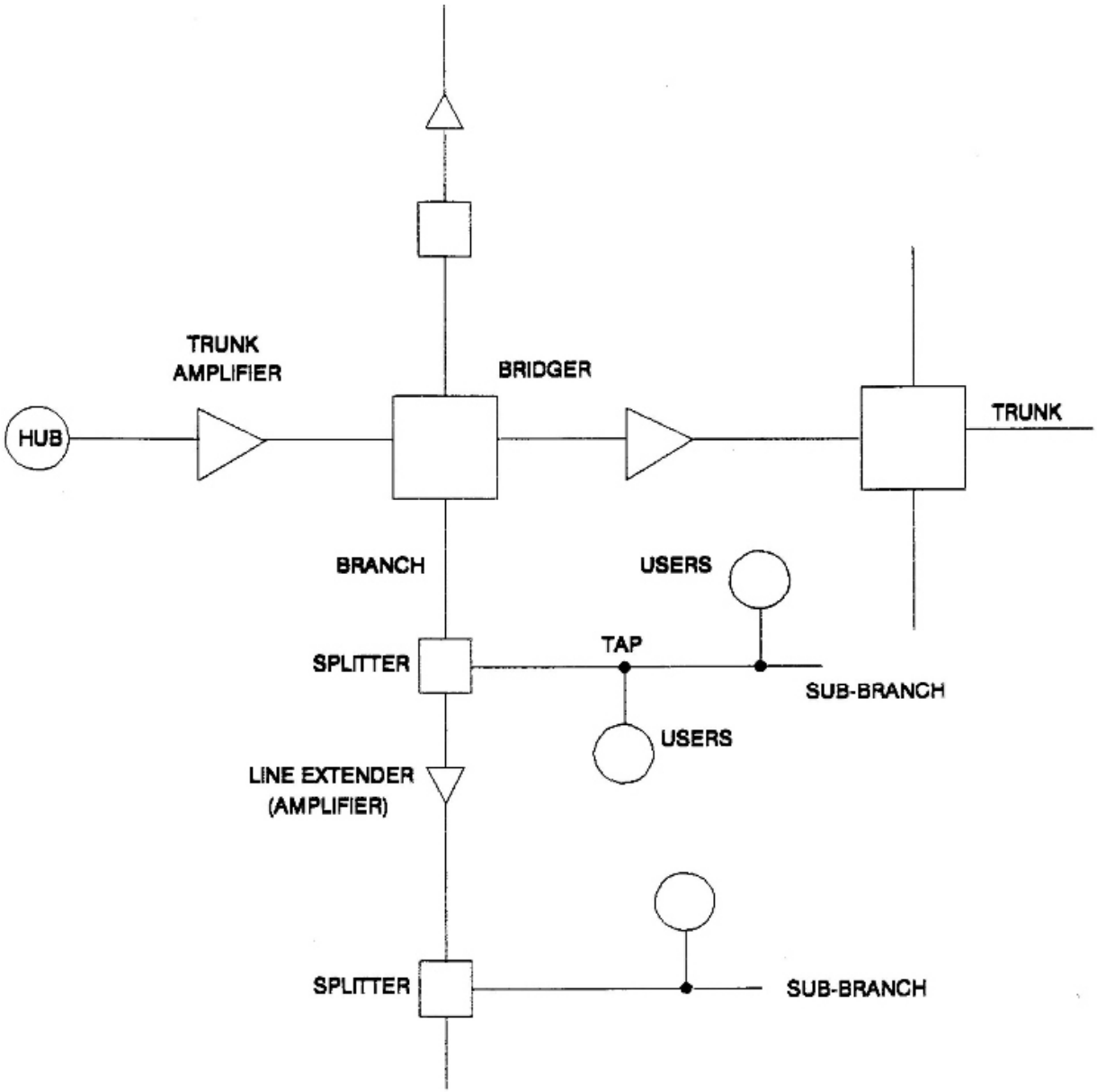
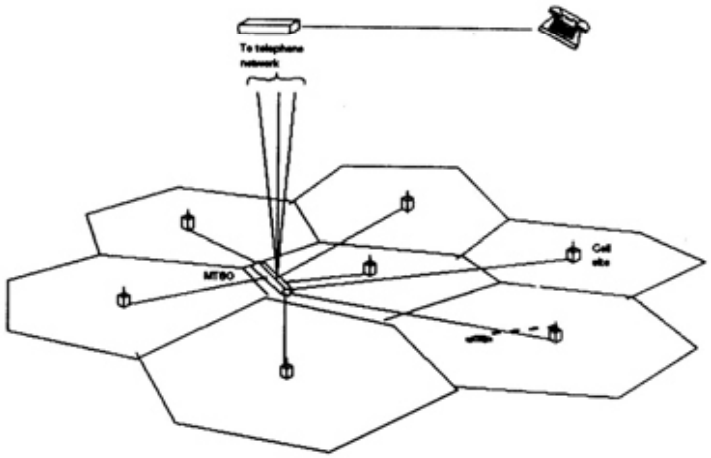


Fig. 1.14 Single-Trunk CATV Layout



The AMPS system with cell sites located at the center of each cell

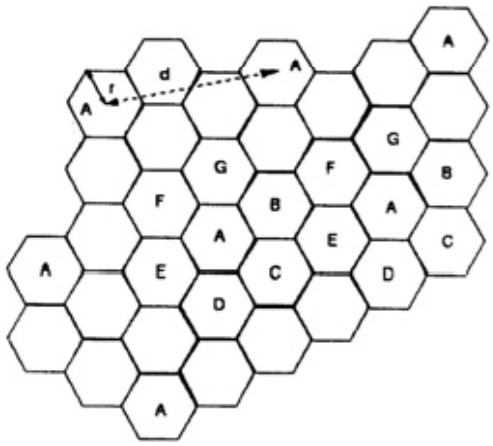
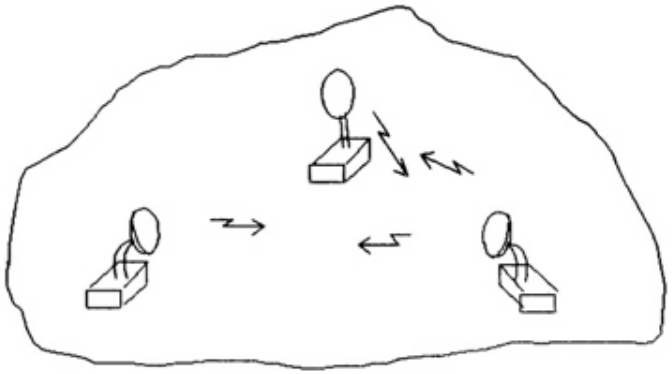
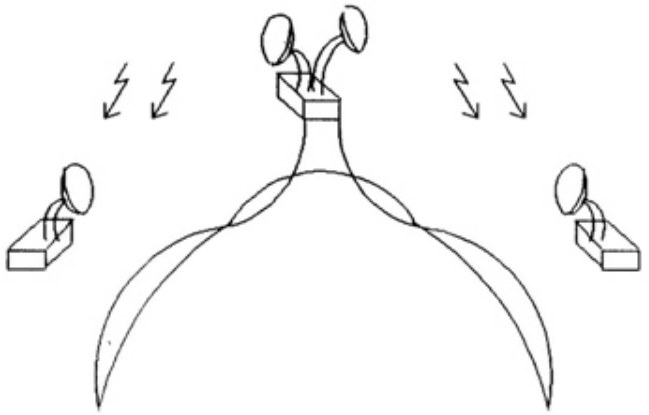


Fig. 1-12 Frequency reuse pattern among cells

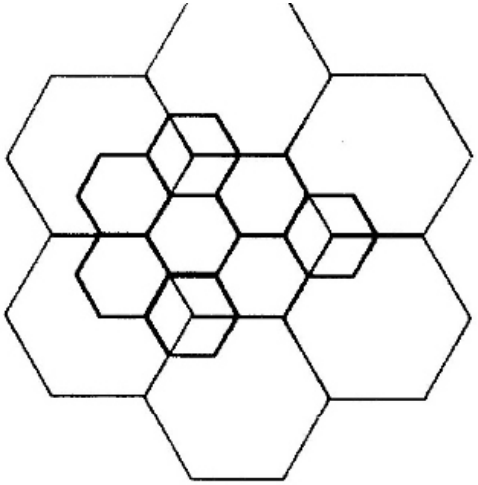


Single - Hop

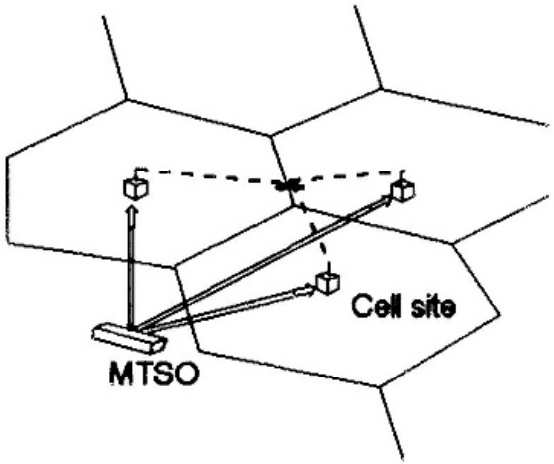


Multi - Hop

Fig. 1.10 Packet Radio - Based Networks



A mixture of small cells in the center city and large cells in the outskirts can coexist within a single system



Signal measurements from adjacent cell sites provide the MTSO with the information necessary to hand off a mobile when another cell site can better serve the mobile

Fig. 1.13 Cell Splitting

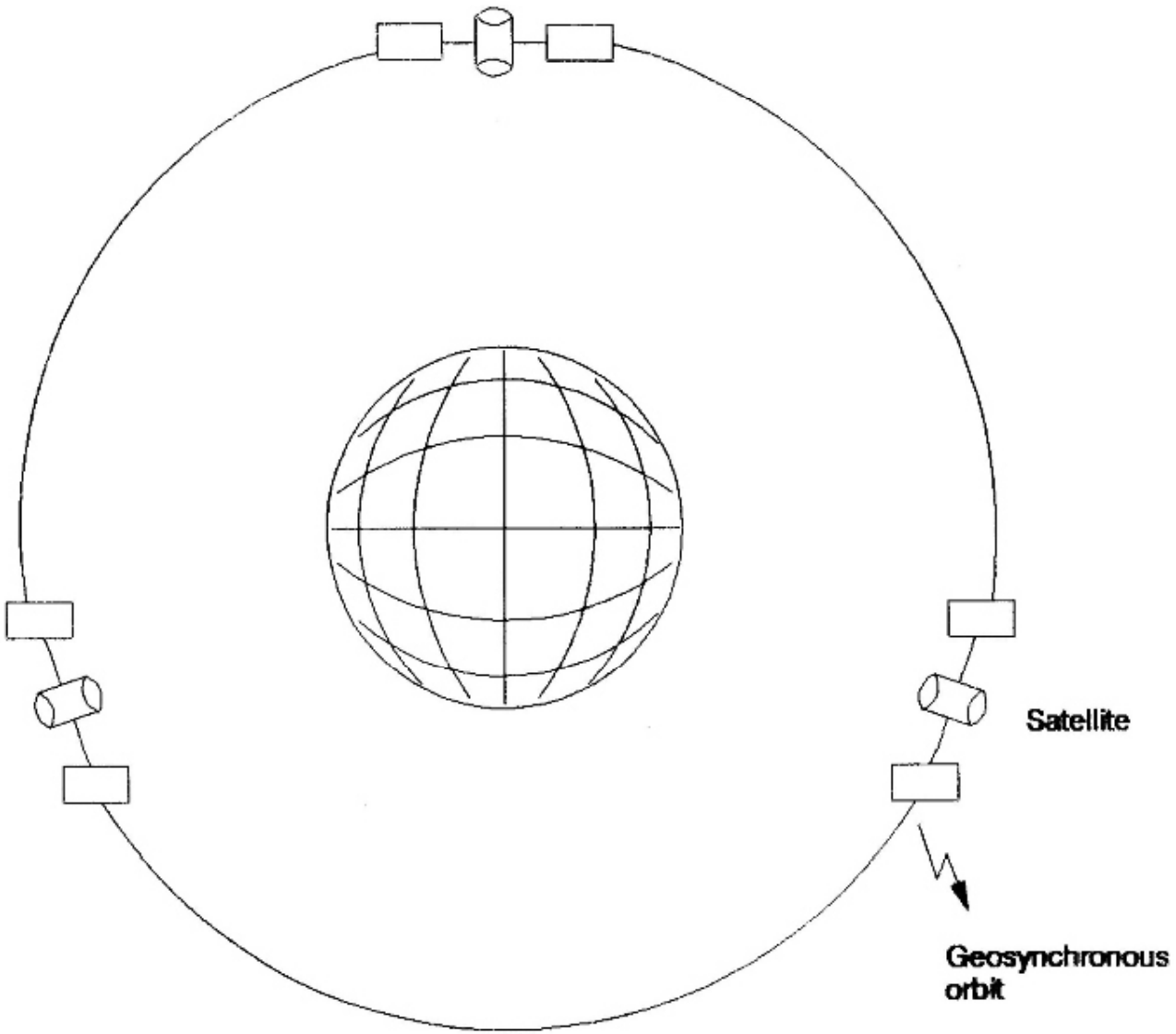


Fig. 1.11 Satellite Worldwide Coverage

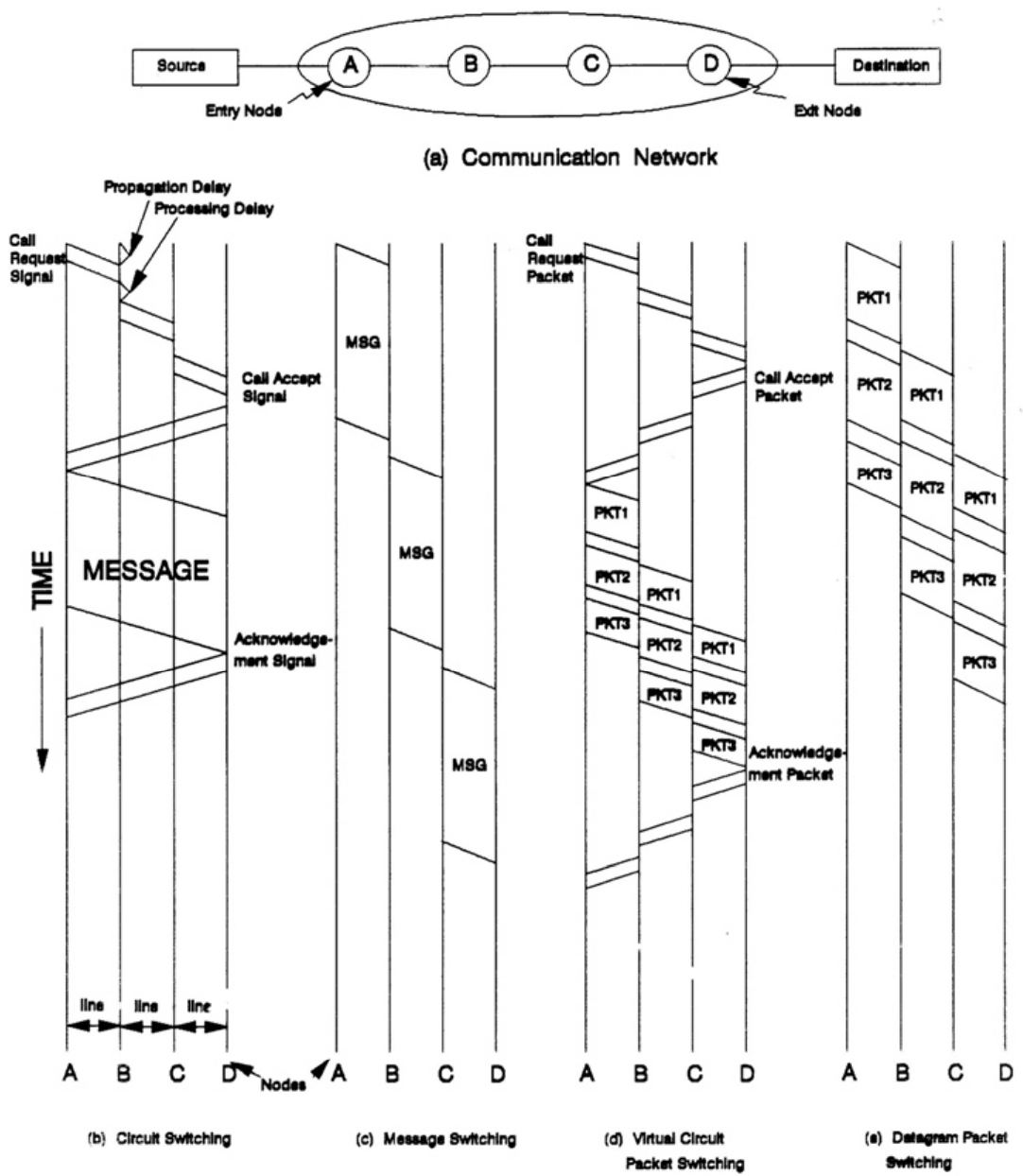
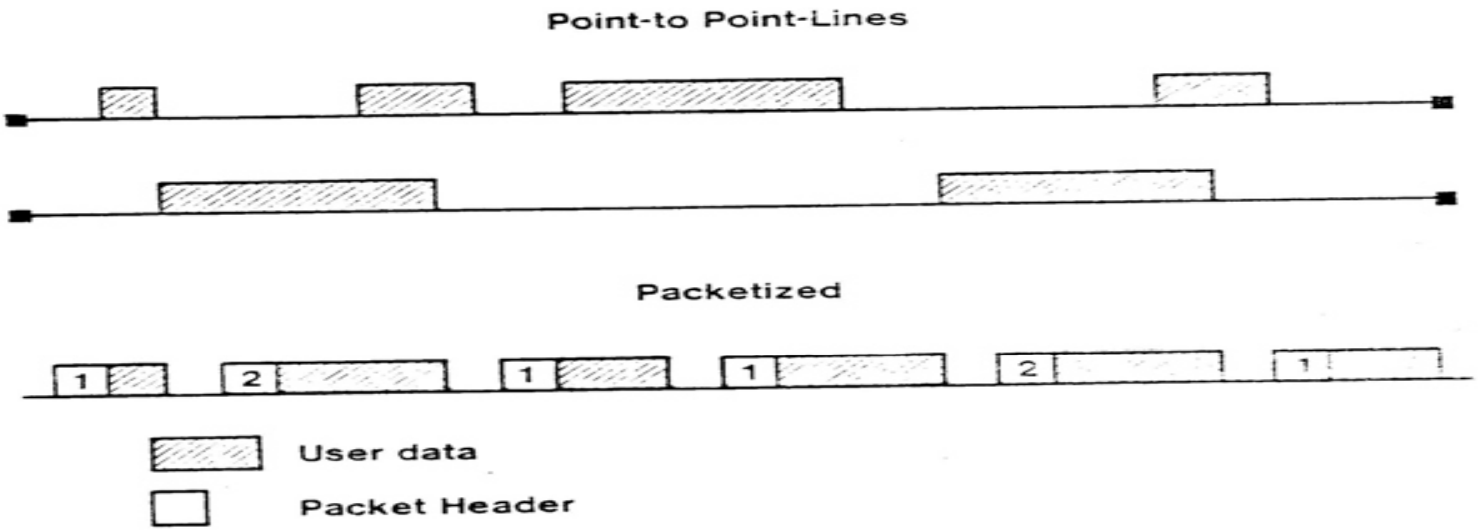


FIG.1-5 Comparison Between Circuit Switching, Message Switching and Packet Switching

USER DATA TRANSMISSION



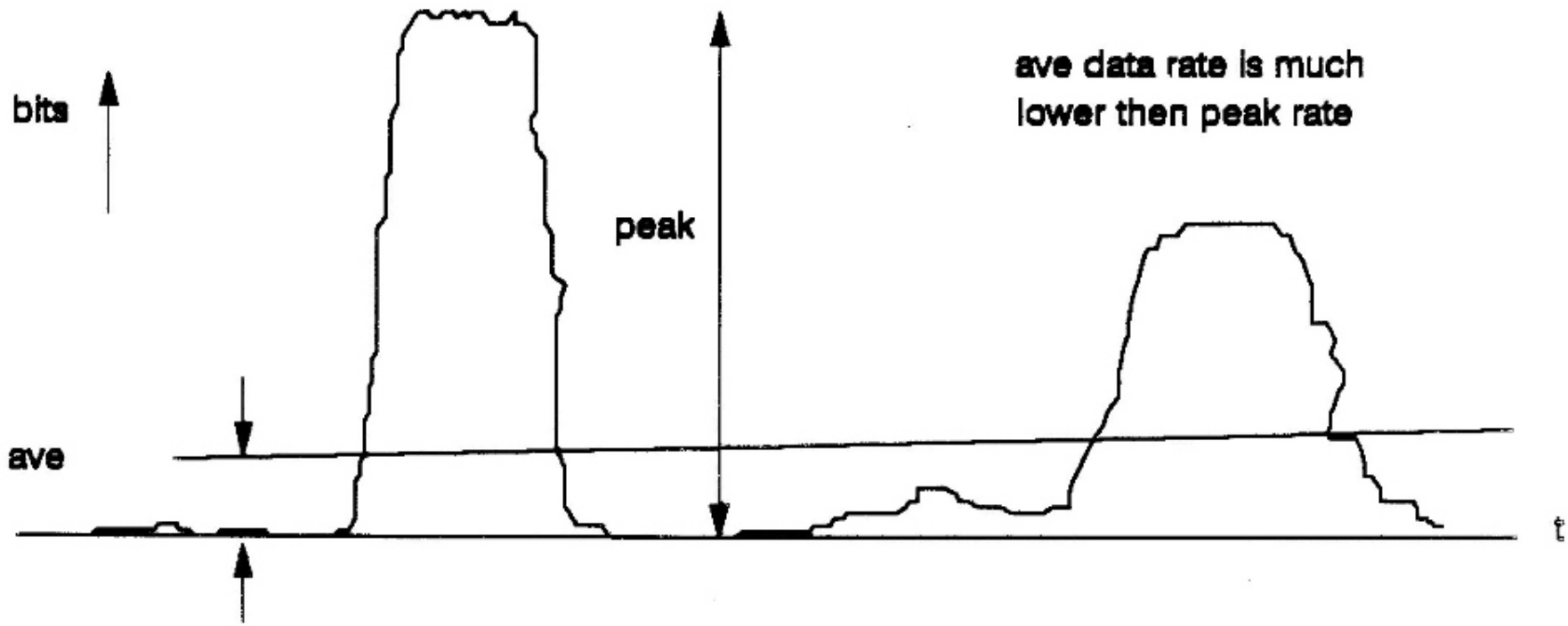
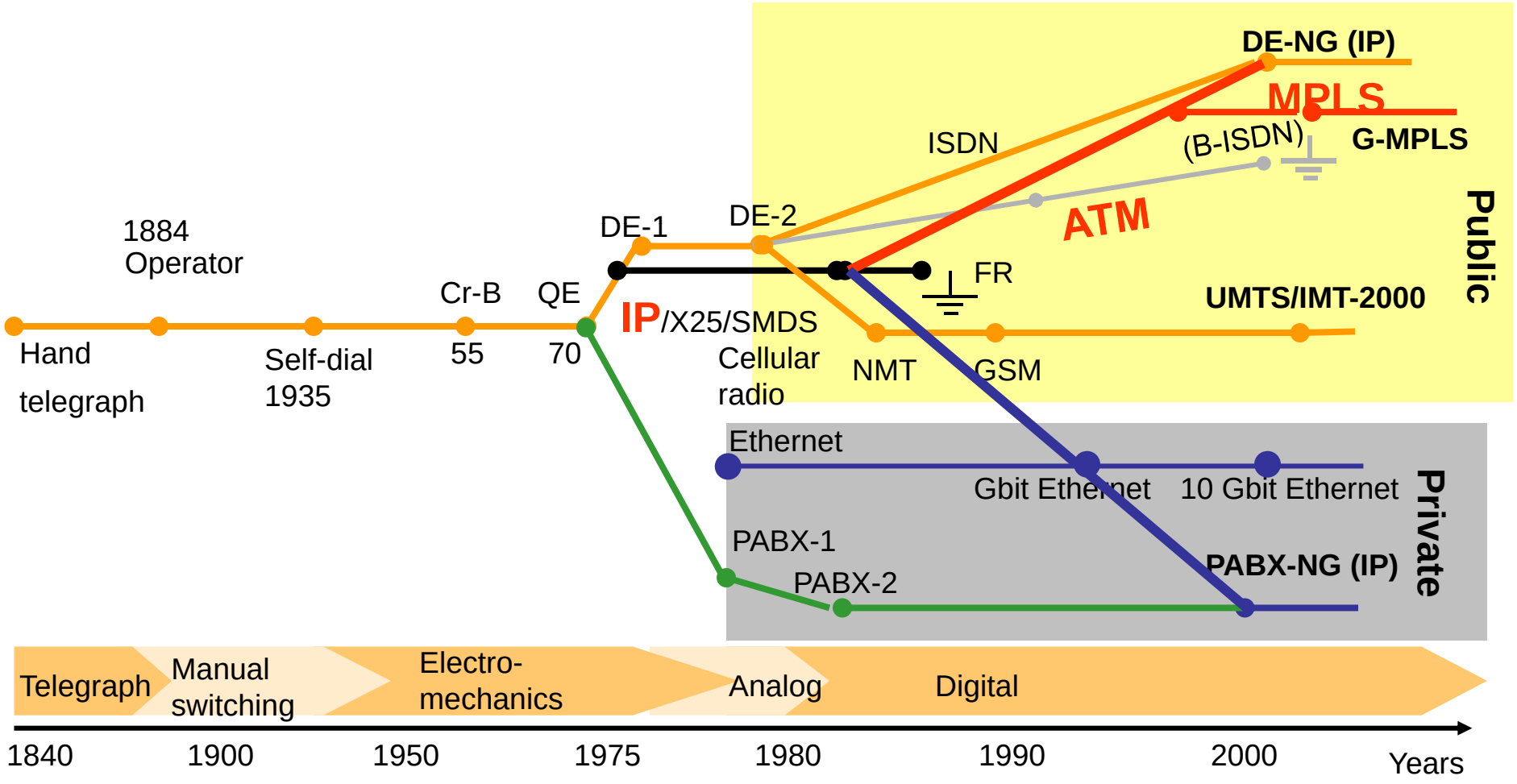


FIG.1-4 Bursty data

Evolution of switching technologies



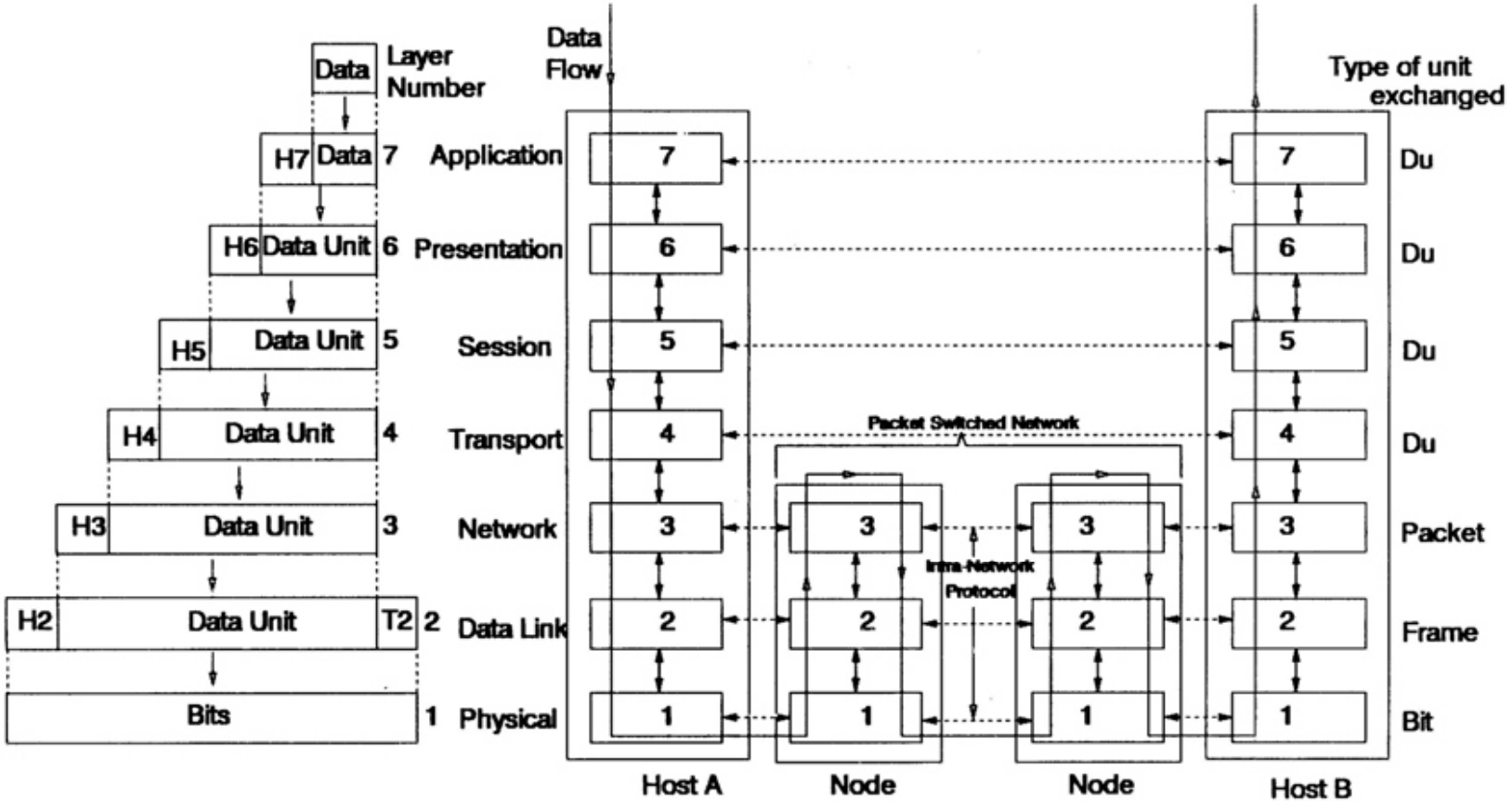
Switching Technologies - Summary

- Driving forces (mid of 80th) - Common platform for different types of traffic
- ISDN is not suitable (N-ISDN - low bit rates, circuit switching)
- ATM will not become as the most important switching technology since 2000s
- Main competitors (Performance/Price)

  # Ethernet (LANs)

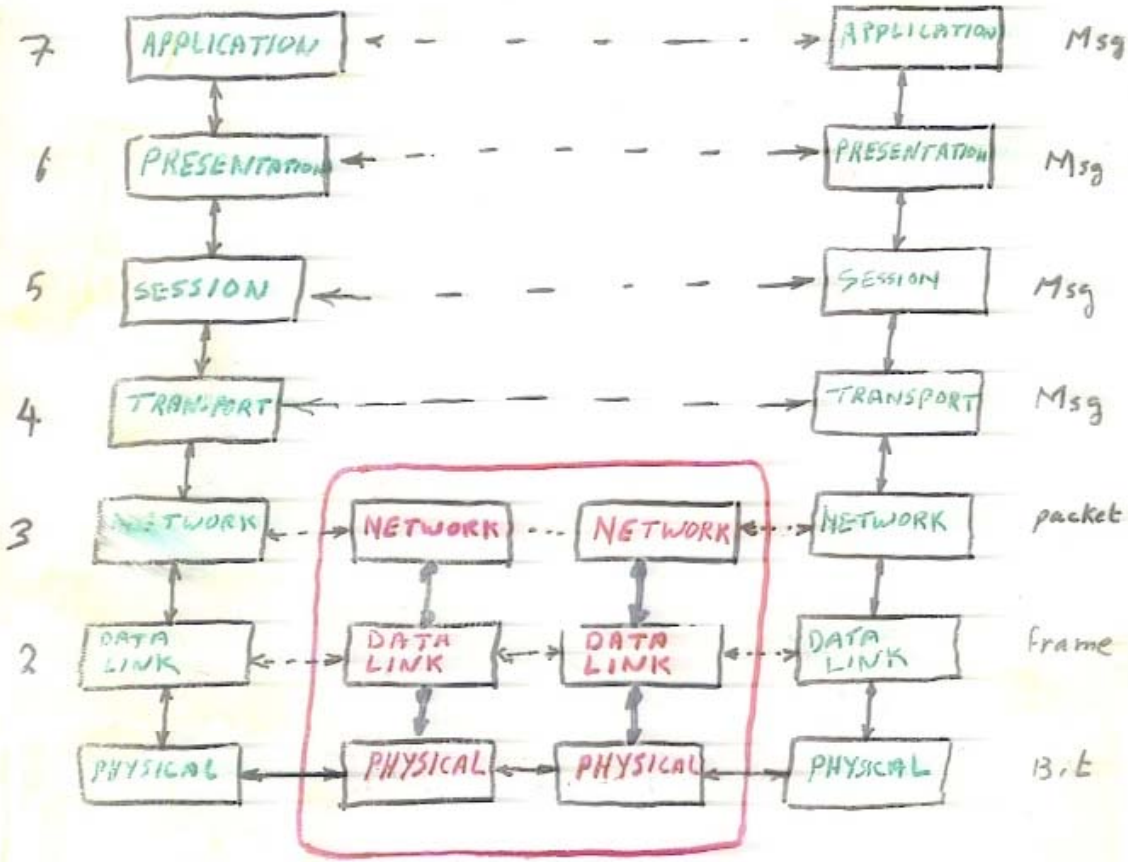
  # xDSL (Access)

  # IP/MPLS (Backbones)



Du : Data Unit
Hi : Layer i Header (i=1,2,...,7)

Fig 1.7 OSI Reference Model Architecture



Open system ~~Model~~ Interconnection (OSI) model
(7-layer model)

ISO MODEL FOR NETWORK ARCHITECTURE

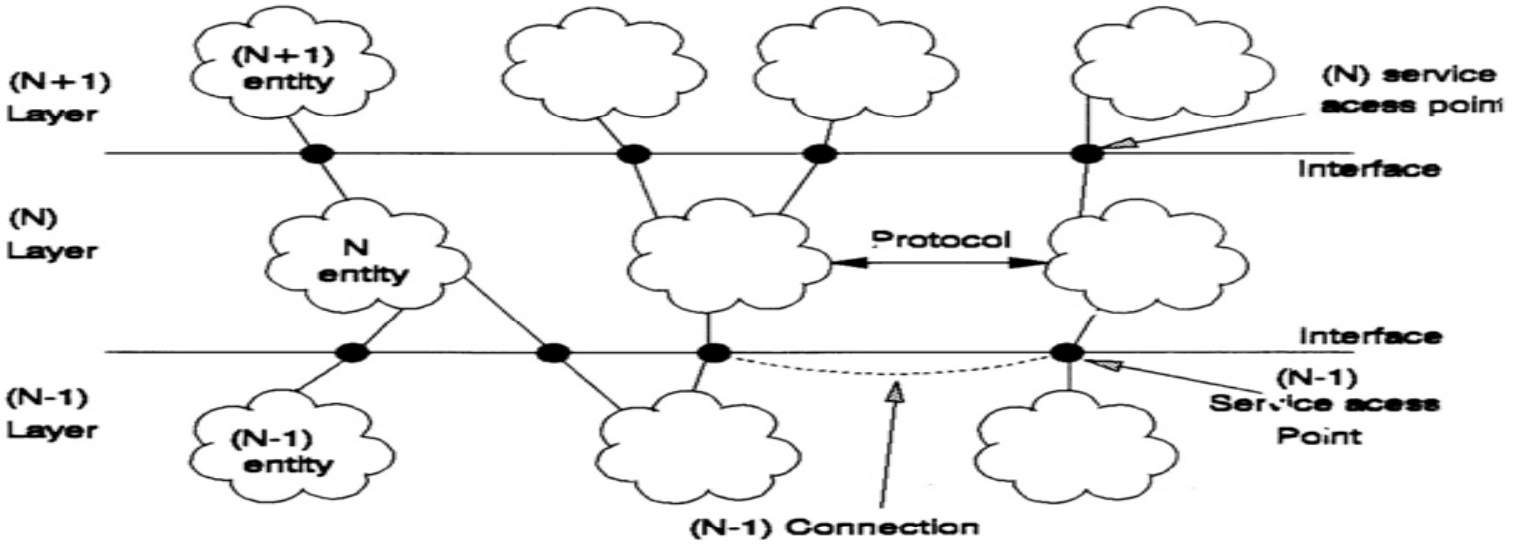
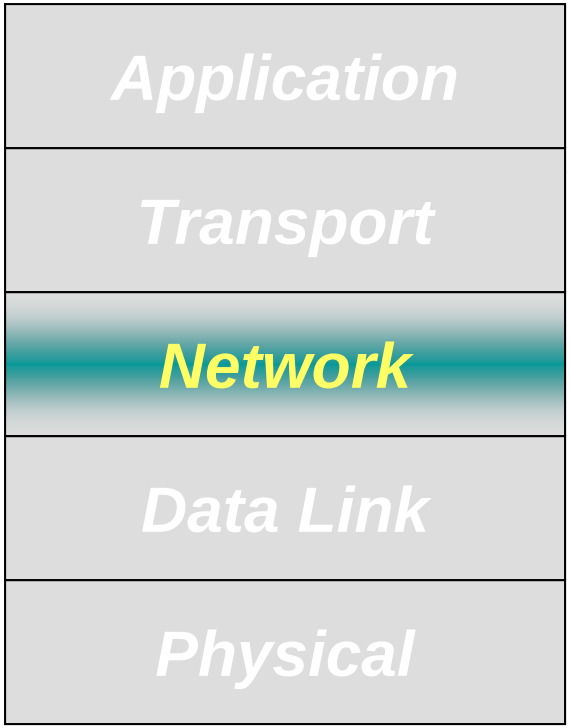


Fig 1.6 Concept of Layering

IP and the IETF Model



- ***Network Layer (Layer 3)***

IP

- ***End-to-End Addressing/Delivery***
- ***"Best Effort" Service***

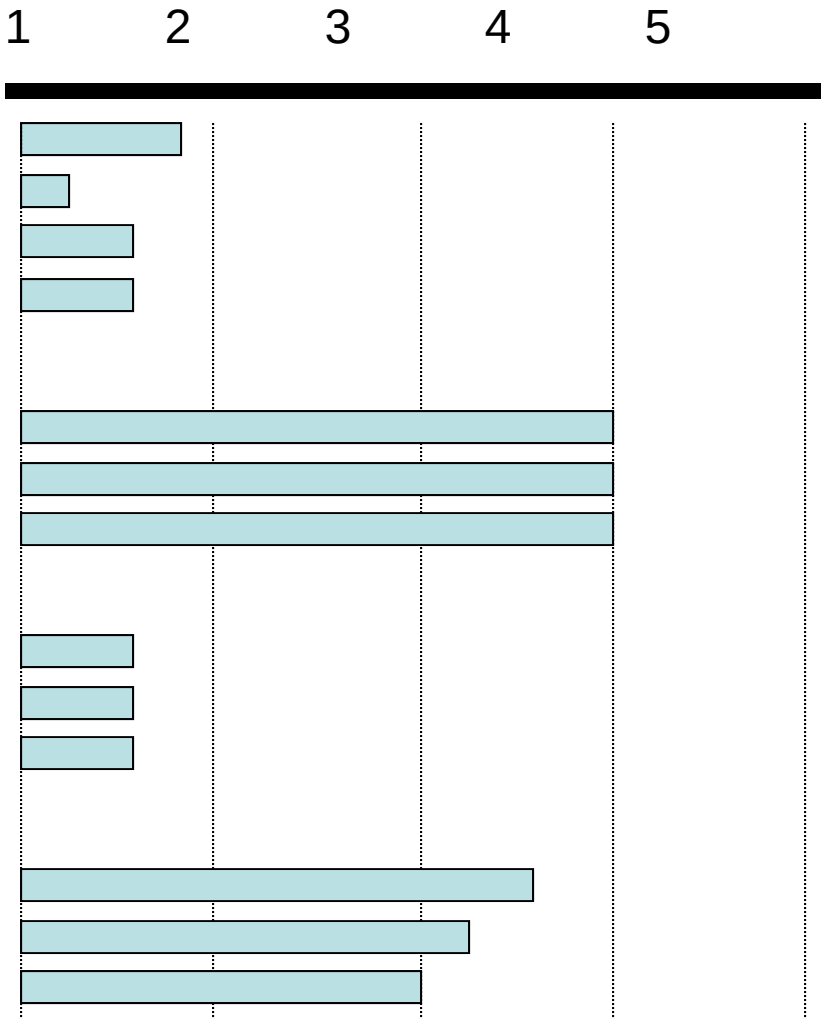
Putting IP to work

Voice
- Delay
- Delay Variation
- Loss

Data
- Delay
- Delay Variation
- Loss

Video
- Delay
- Delay Variation
- Loss

Multimedia
- Delay
- Delay Variation
- Loss



IP’s Role in the network’s segment

Premise

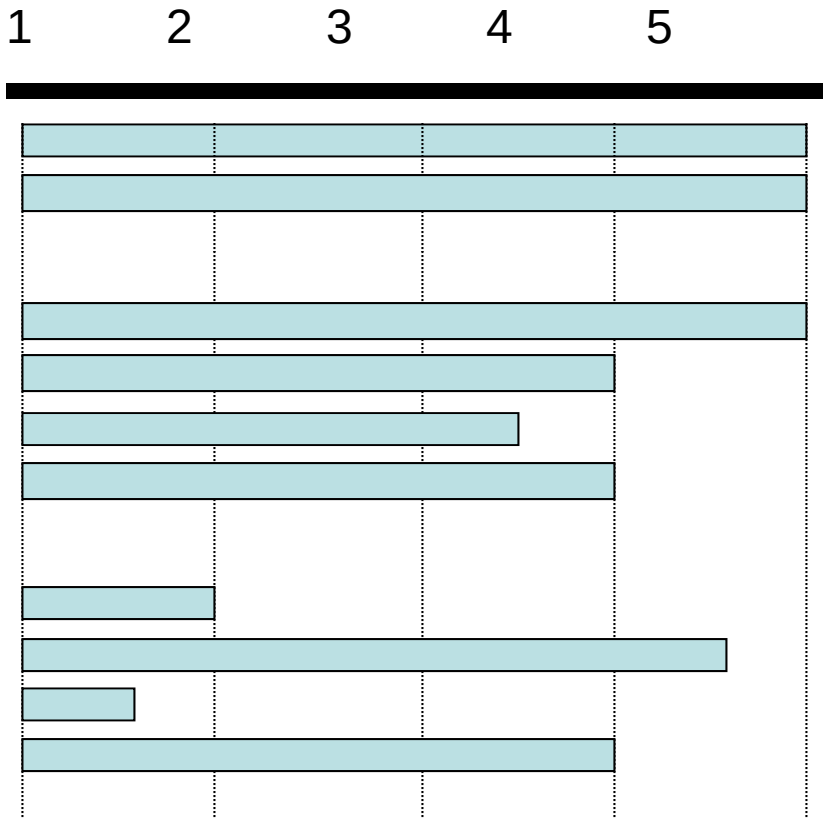
- LAN/Desktop
- Campus Backbone

Access

- Low Speed (56/64)
- Medium Speed (E1)
- High Speed (>E1 to SDH)
- Integrated Access

Backbone

- Voice
- Data
- Video
- Multimedia



Why use IP?

- ***Wide acceptance***
  - **Internet popularity**
  - **Global reach**
- ***IP Standards***
  - **Mature standards**
  - **Interoperability**

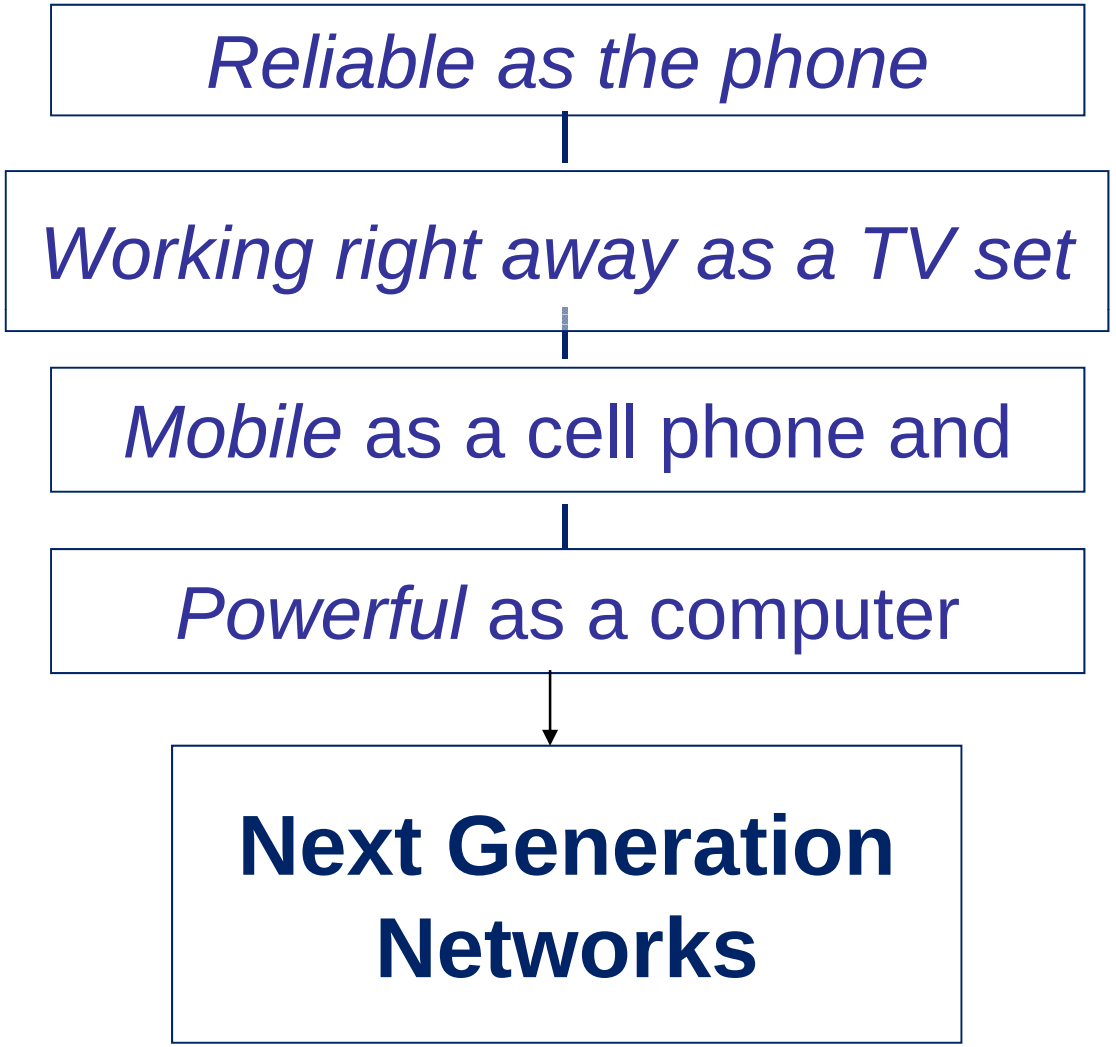
IP Protocol characteristics

- **Simple protocol**
- **Good general purpose protocol**
- **“Best Effort” Protocol**

IP summary

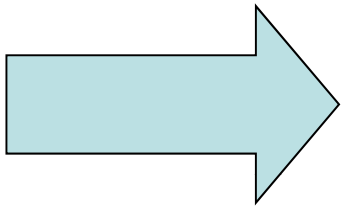
Globally popular
Originally developed for data
Mature standards
Interoperability
“Best Effort” Protocol
Voice over IP gaining popularity

We need a better Internet



Main directions of improvement

1. Scalability
2. Security
3. Quality of service
4. Mobility



IPv6