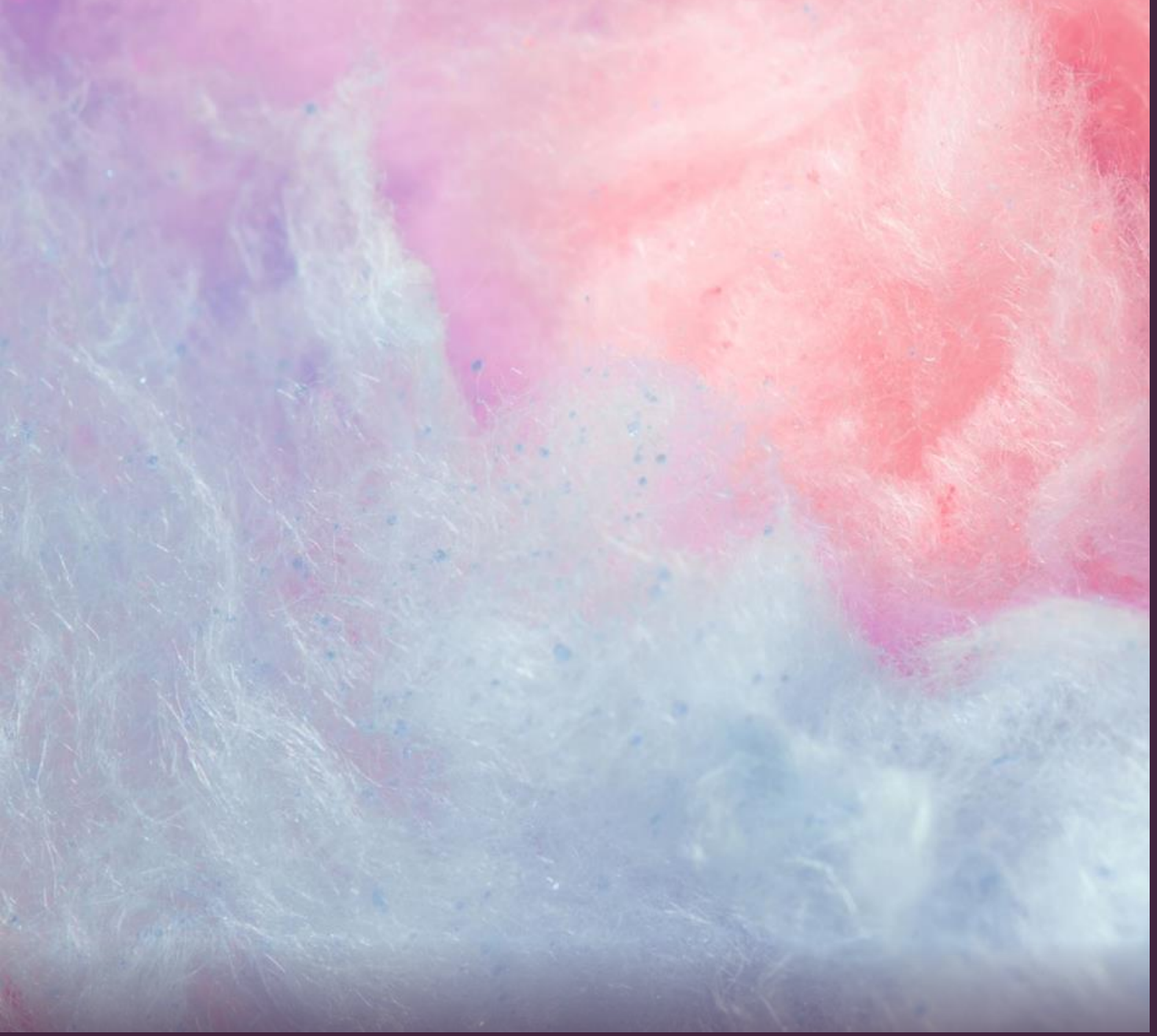


Computer Networks

Dr. Amrit Pal

SCOPE, VIT Chennai

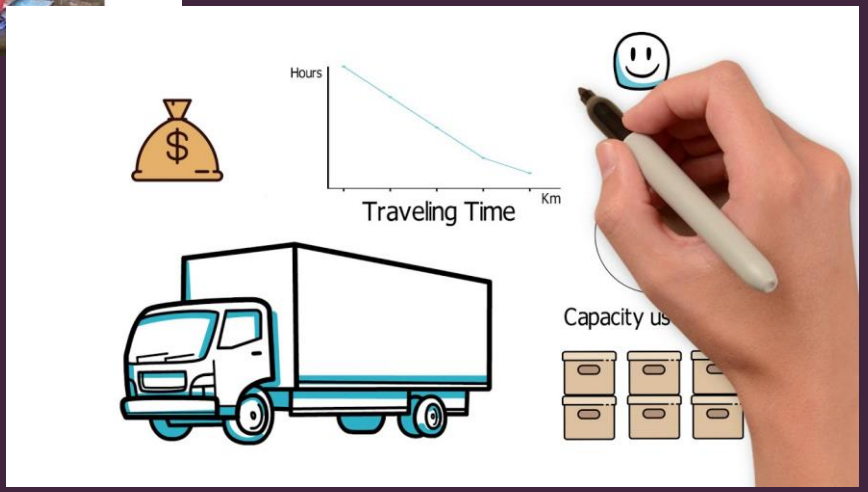
I welcome you all to this course

What you will be able to understand

- Module 1: Overview of Computer and Communication Networks
- Module 2: Physical Layer
- Module 3. Data link layer
- Module 4: Network Layer
- Module 5: Routing Algorithms
- Module 6: Transport Layer
- Module 7: Application Layer
- Module 8: Recent Trends in Network Security

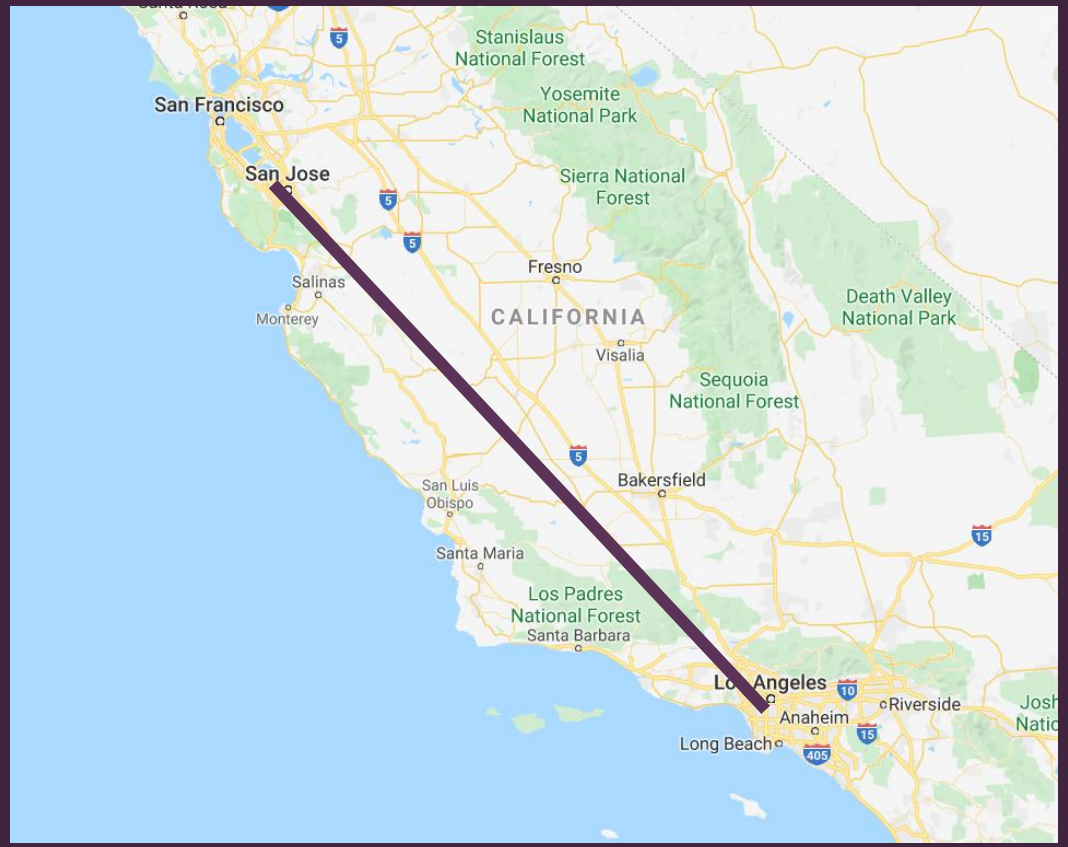
What you we will understand

- **A Naive idea**



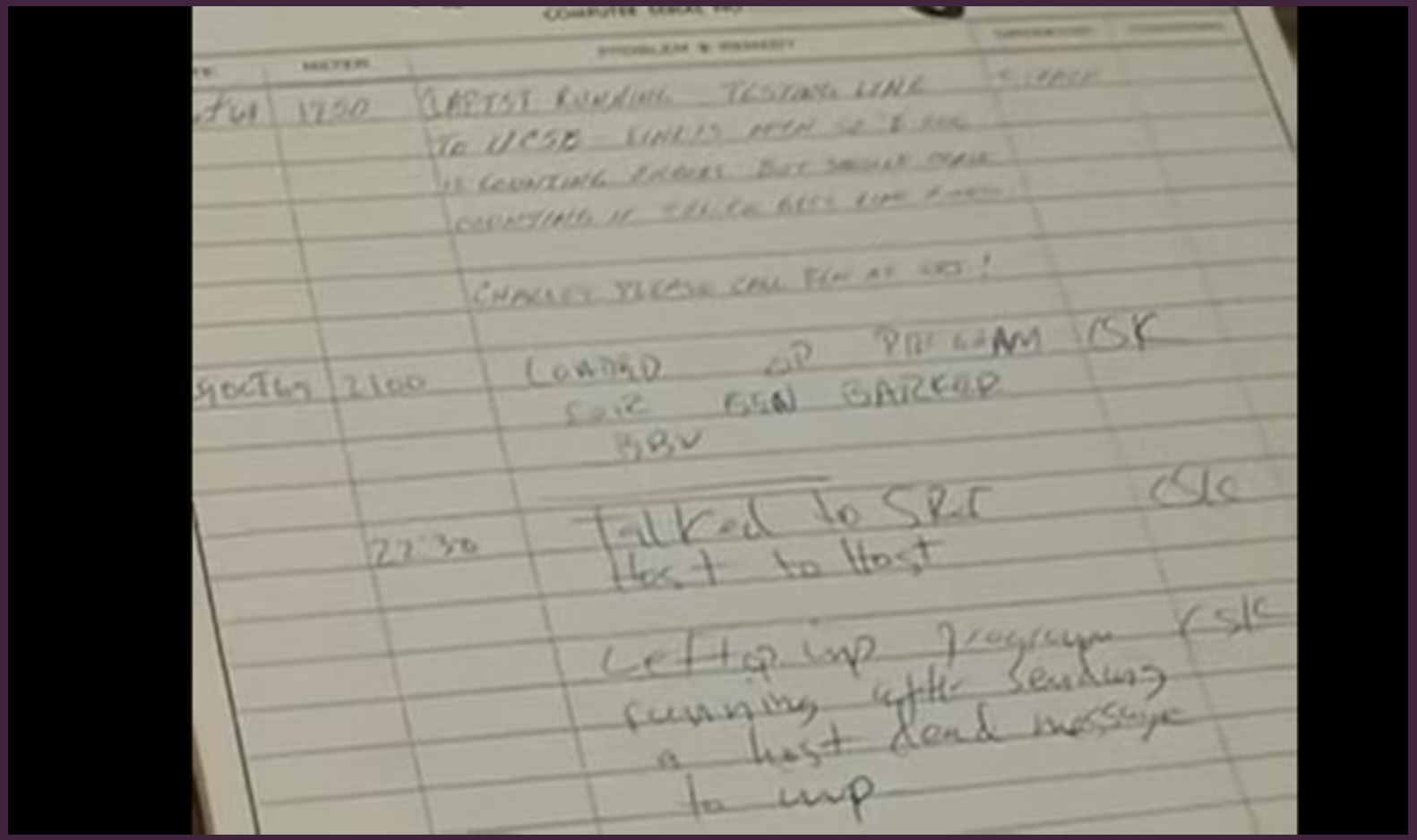
History

- **Information Flow in Large Communication Nets, 1961, Leonard Kleinrock**
- **UCLA and SRI (Standford Research Institute), were connected, officially starting ARPANET** (Advanced Research Projects Agency Network) **in 1969**



History

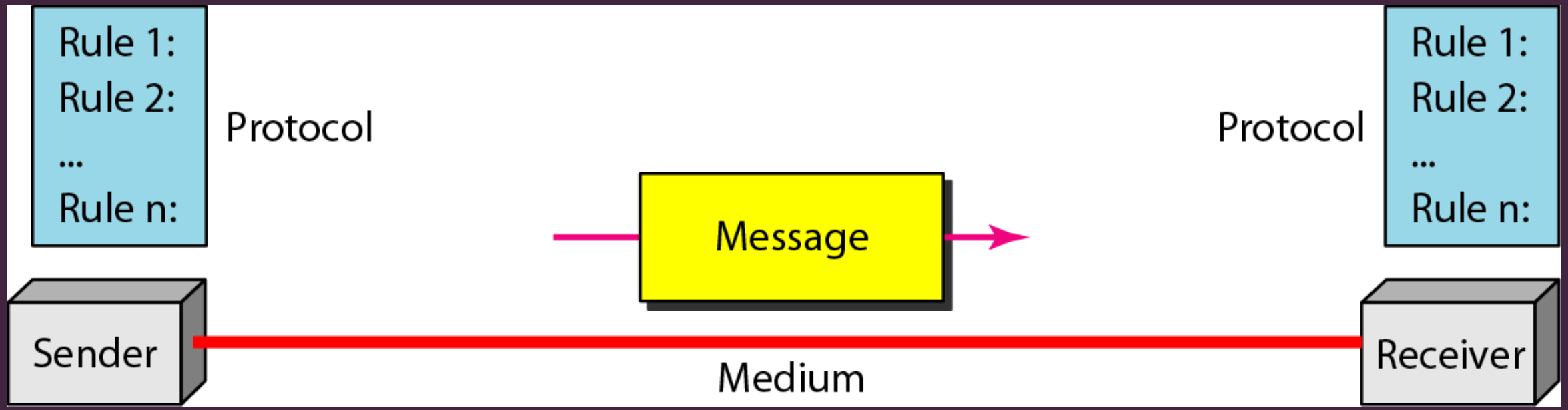
- **LOGIN**
- **“LO”**



Data Communication

- Data Exchange
- Transmission Medium
- **Delivery**
- **Accuracy**
- **Timeliness**
- **Jitter**

Components of Data Communication



Forouzan, Behrouz A. "Data Communication and Networking." (2002).

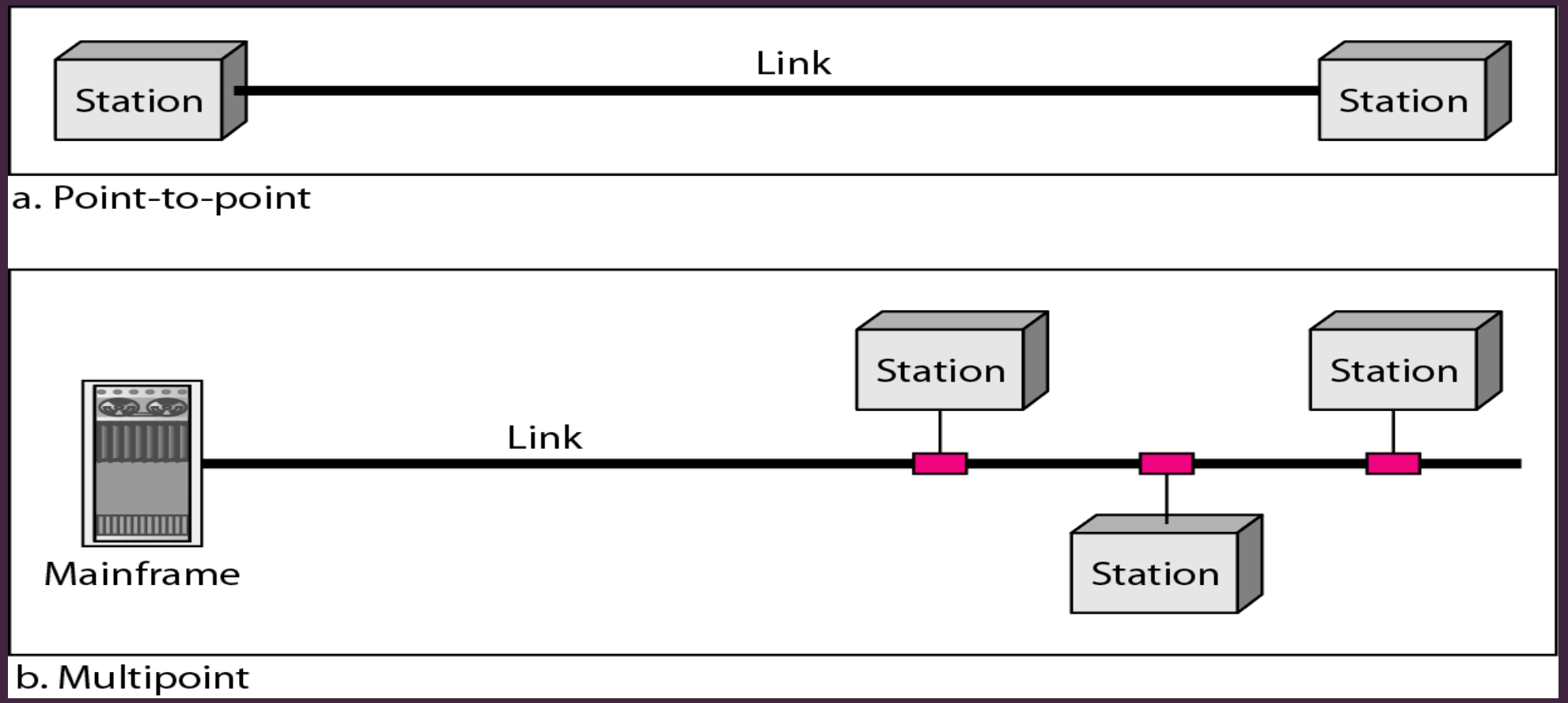
Network

- set of devices connected by communication links.
- computer, printer, or any other device capable of sending and/or receiving data generated by other nodes on the network.

Network Criteria

- Performance
- Reliability
- Security

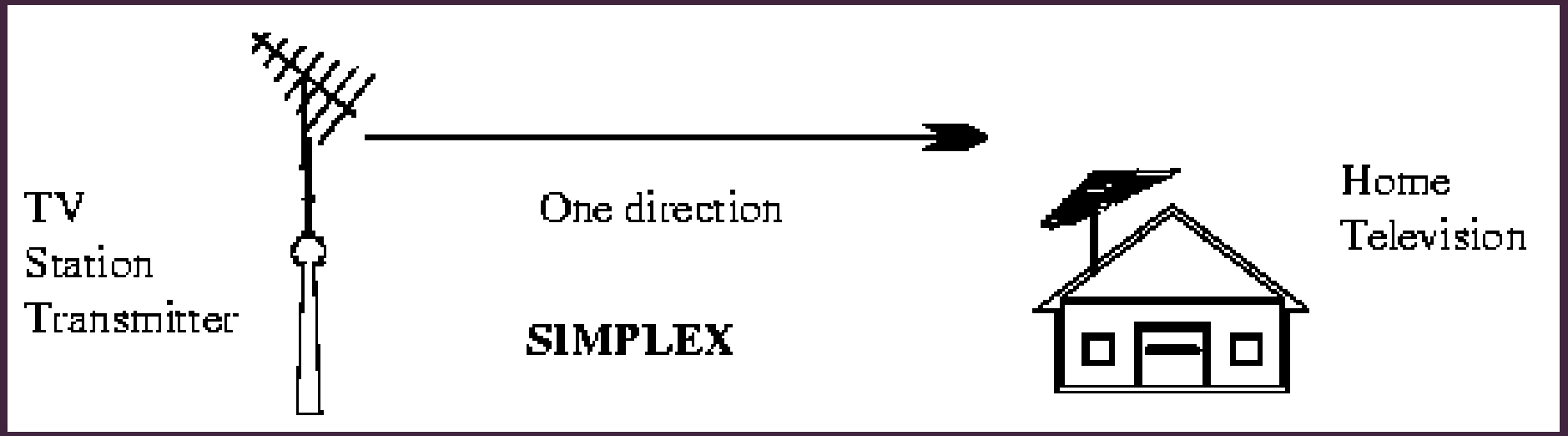
Line Configuration



Source: Data Communications and Networking – Behrouz A. Forouzan

Data Flow

- *Simplex:* Data flows in only one direction
- E.g. Radio and Television broadcasts. They go from the TV station to your home television.



Data flow -Continued

- *Half duplex:* Data flows in both directions but only one direction at a time on the data communication line.
- Ex. Conversation on walkie-talkies

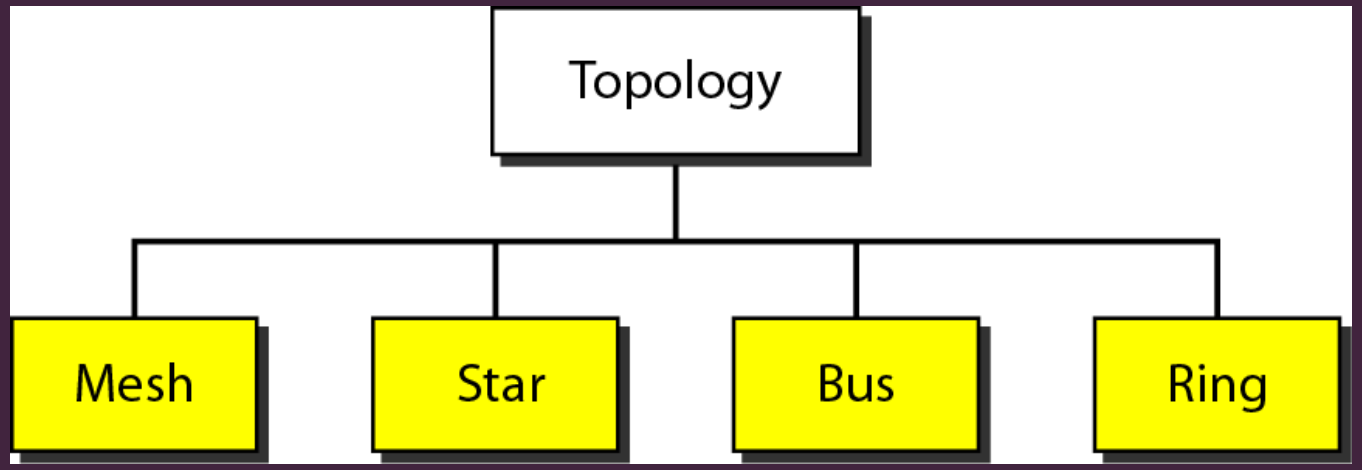
Data flow -Continued

- *Full duplex:* Data flows in both directions simultaneously at the same time.
- Ex. Phone communication

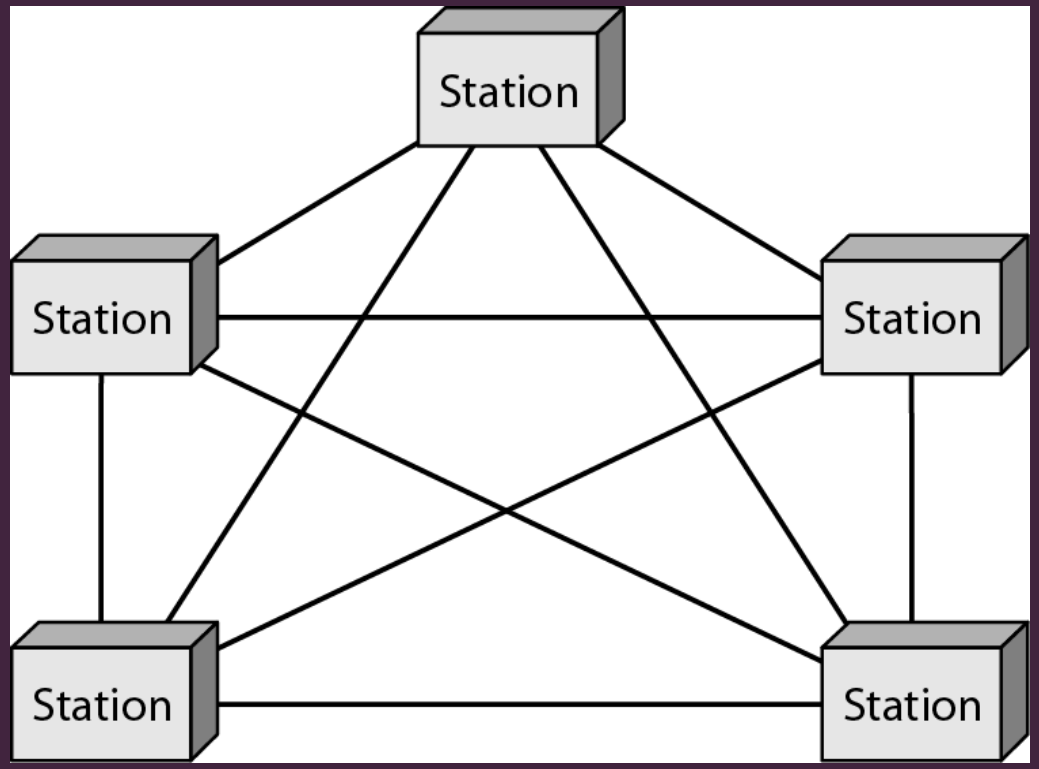
Books

Text Book:		
Title of the book	**Author(s)**	**Publisher**
Computer Networks: A Systems Approach	**Larry Peterson and Bruce Davie**	**5th Ed, The Morgan Kaufmann Series, Elsevier, 2011**
Computer Networking: A Top-Down Approach Featuring the Internet	**J.F.Kurose and K.W.Ross**	**6th Ed., Pearson Education,2012**
Reference Books		
Title of the book	**Author(s)**	**Publisher**
Data Communications and Networking	**Behrouz A. Forouzan**	**McGraw Hill Education, 5th Ed., 2012**
TCP/IP Protocol Suite,	**Behrouz A. Forouzan,**	**McGraw-Hill Education, 4 Ed., 2009**
Data and Computer Communications	**William Stallings,**	**Pearson Education,10th Ed,2013.**

Network Topology

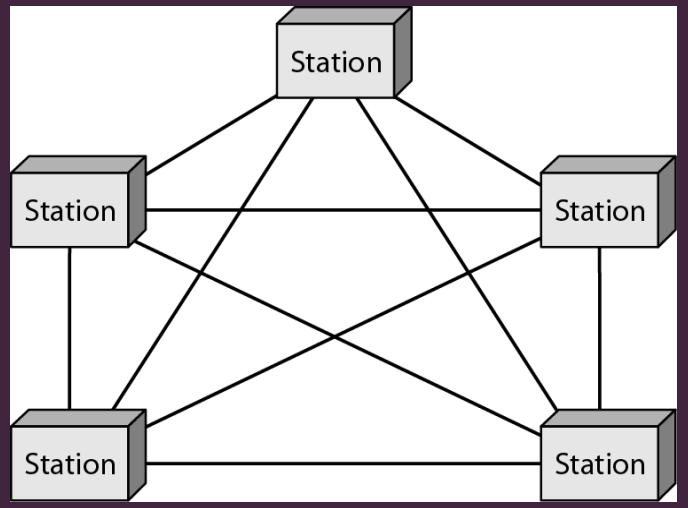


Mesh Topology



Mesh Topology

- Every device has a dedicated point-to-point link to every other device
- n(n-1)/2 physical channels to link n devices.
- n-1 I/O ports.



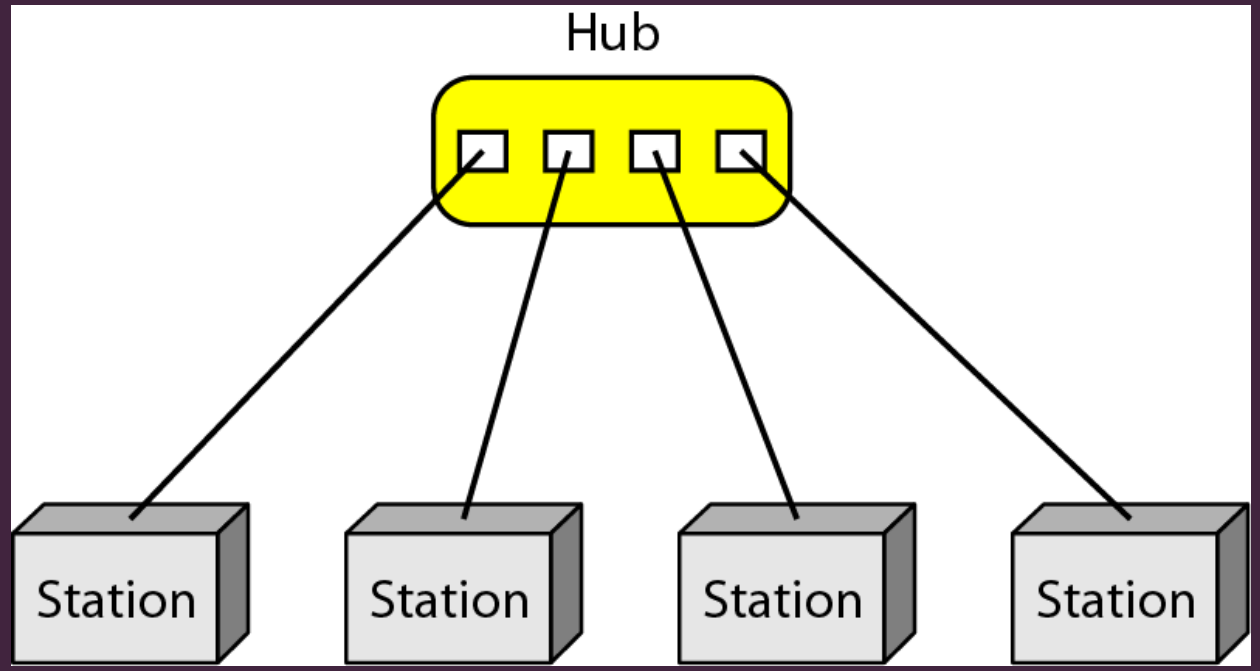
Advantages

- No traffic issues
- Robust
- Privacy and security.
- Easy Fault identification and fault isolation

Disadvantages

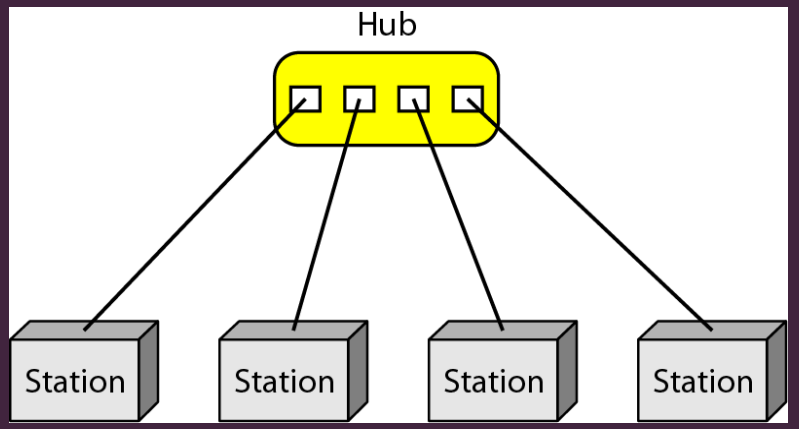
- Requires more number of cables and I/O ports
- Wiring occupies more space
- Hardware expensive

Star Topology



Star Topology

- Central Controller
- Two point to point links Transmission/Reception
- Broadcasting device
- Frame switching device



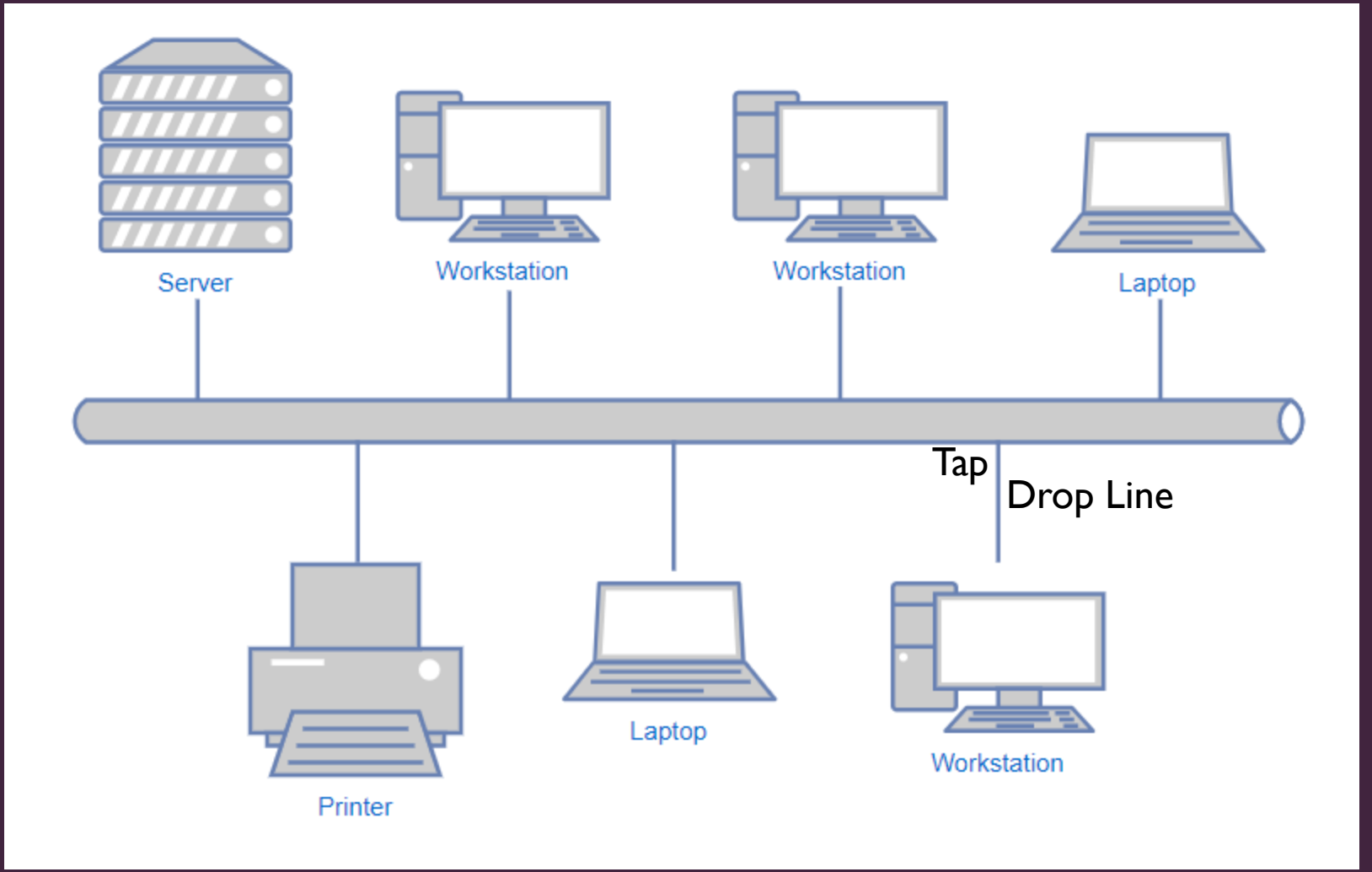
Advantages

- Less expensive and less cabling
- Installation and configuration are easy
- Robust and Easy fault identification
- No disruptions

Disadvantages

- Large Topology
- Dependency

Bus Topology



Bus Topology

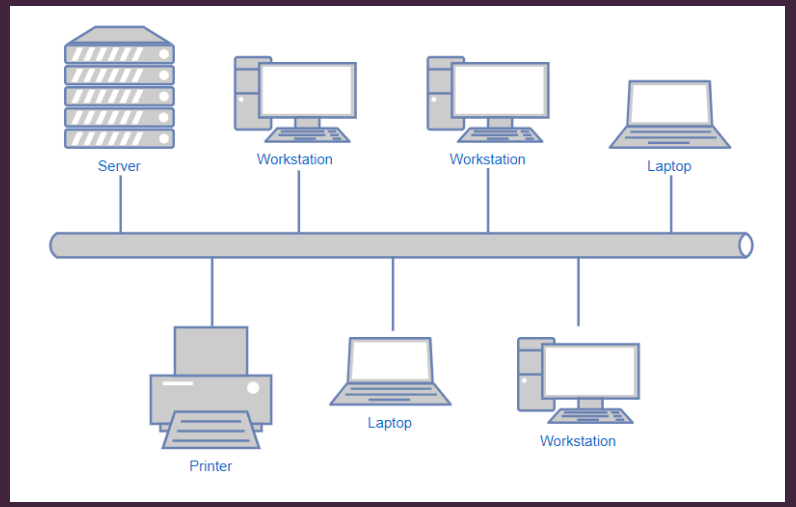
- All stations are attach directly to a linear transmission medium through appropriate hardware interfacing known as a **tap.**
- **Backbone** Cable
- Data Flow - Full duplex
- Terminator

Advantages

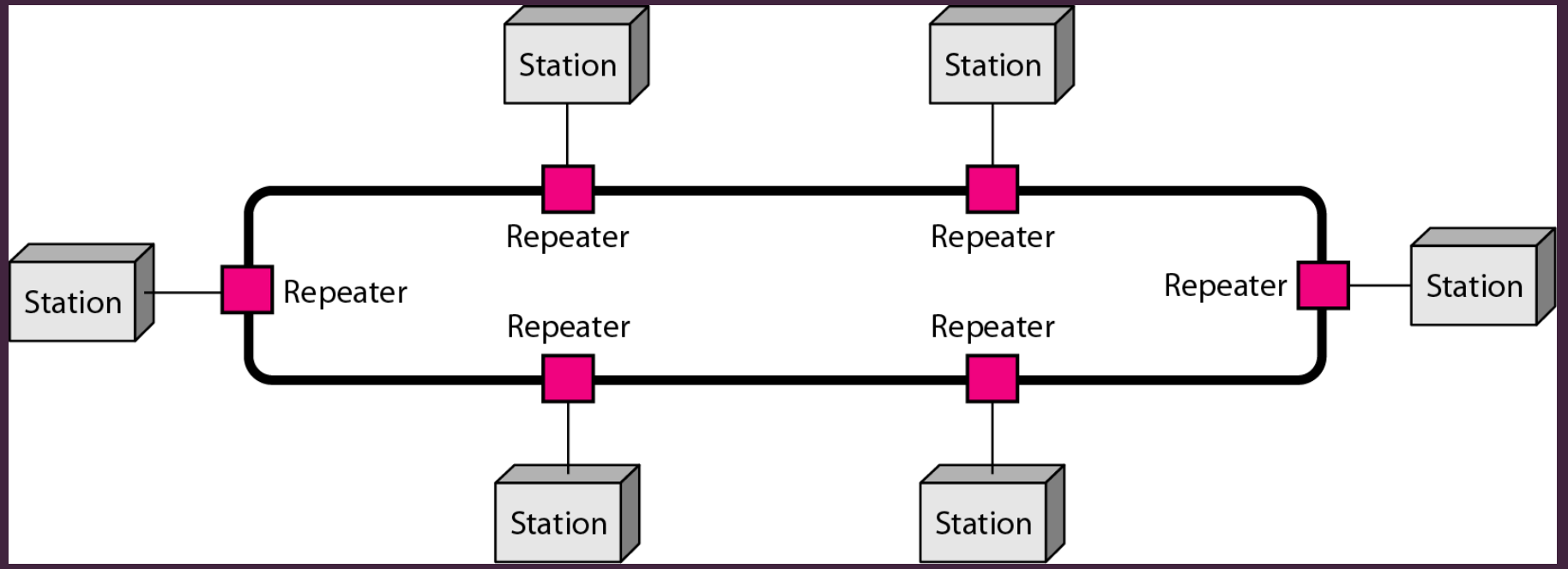
- Ease of installation
- Less cabling

Disadvantages

- Difficult reconfiguration and fault isolation
- Difficult to add new devices
- If backbone cable fails, it can stops all transmission.

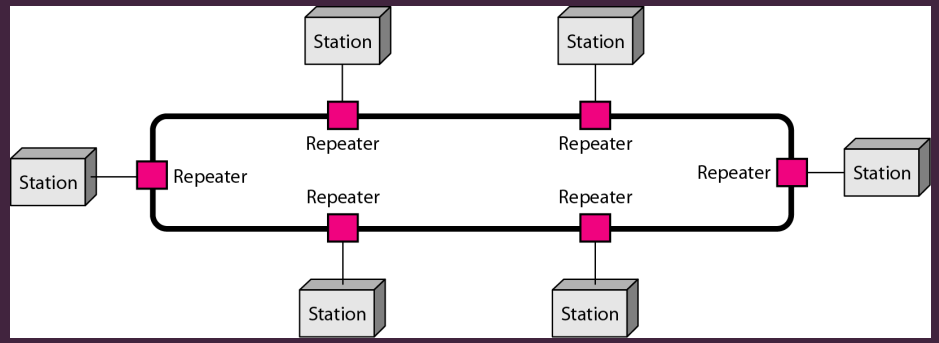


Ring Topology



Ring Topology

- Repeaters
- Point-to-point links
- Closed loop
- Uni-directional Link



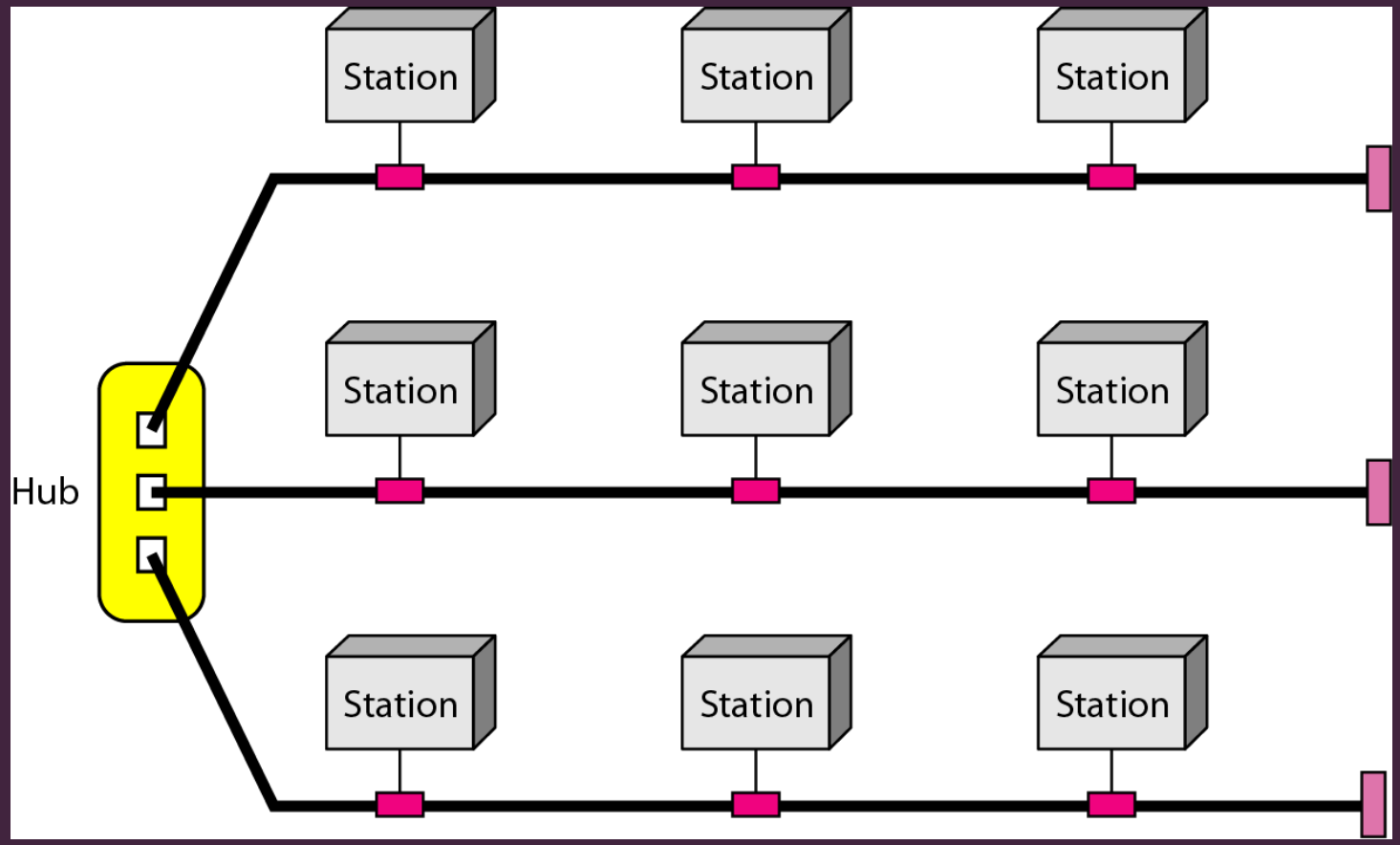
Advantages

- Easy to install and reconfigure
- Easy fault identification

Disadvantages

- Unidirectional traffic
- Network fails even if single link break exists

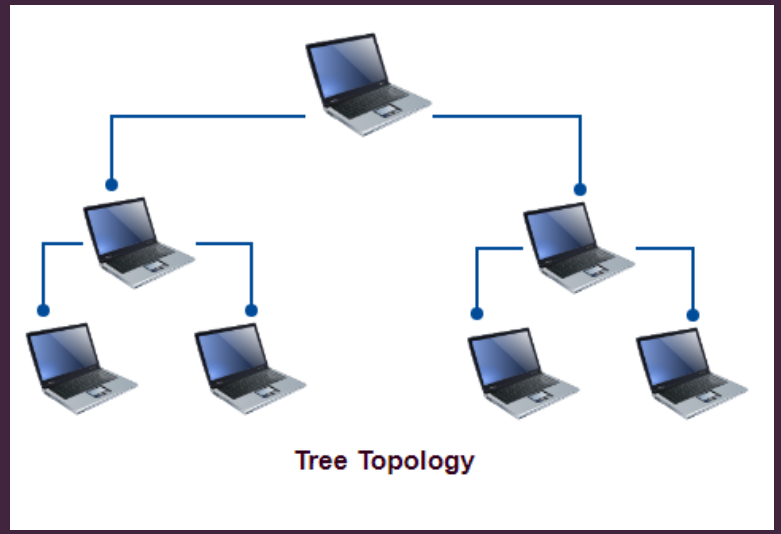
Hybrid Topology

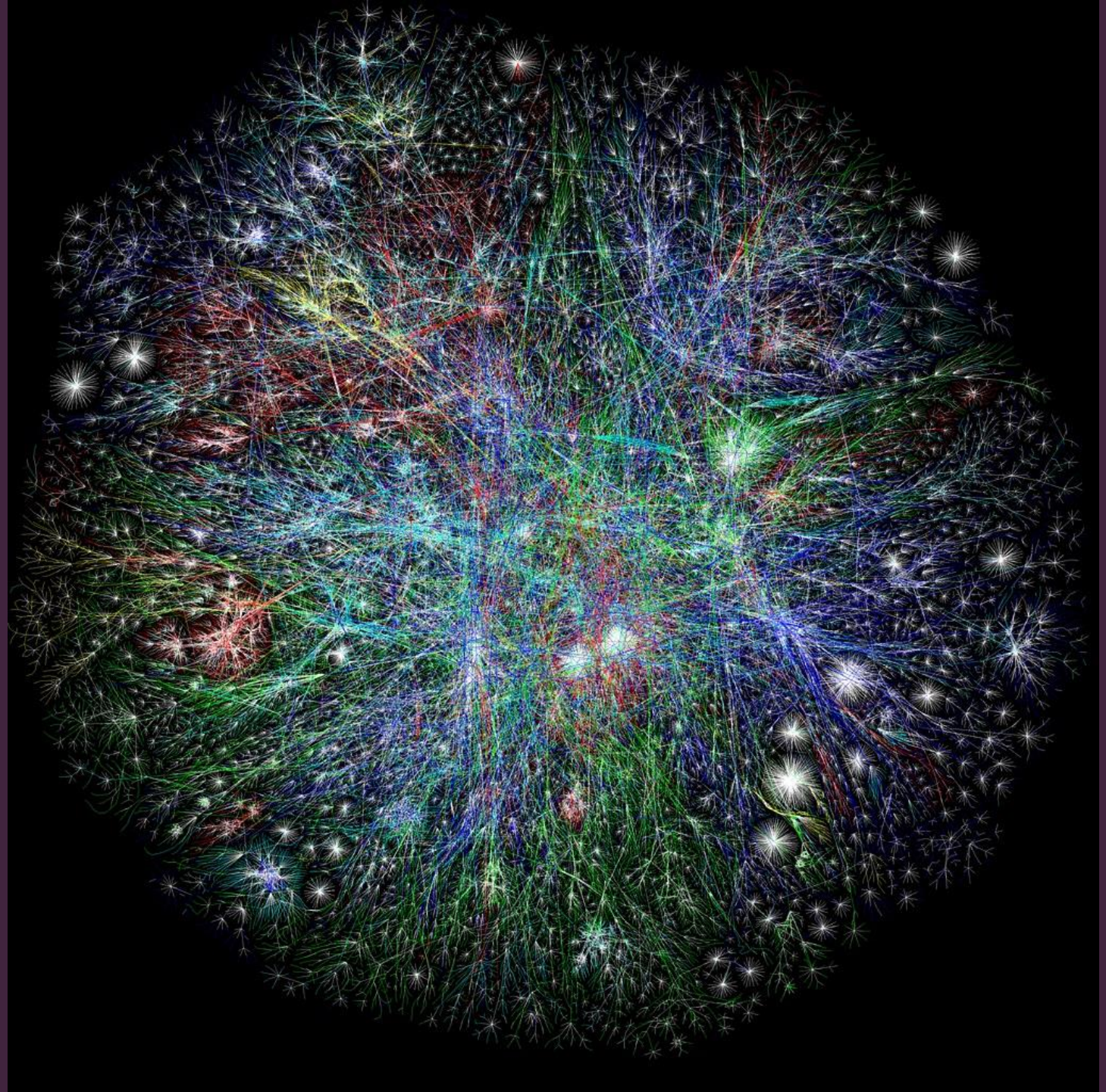


Tree Topology

Computers are connected like the branches of a tree.

Similar?



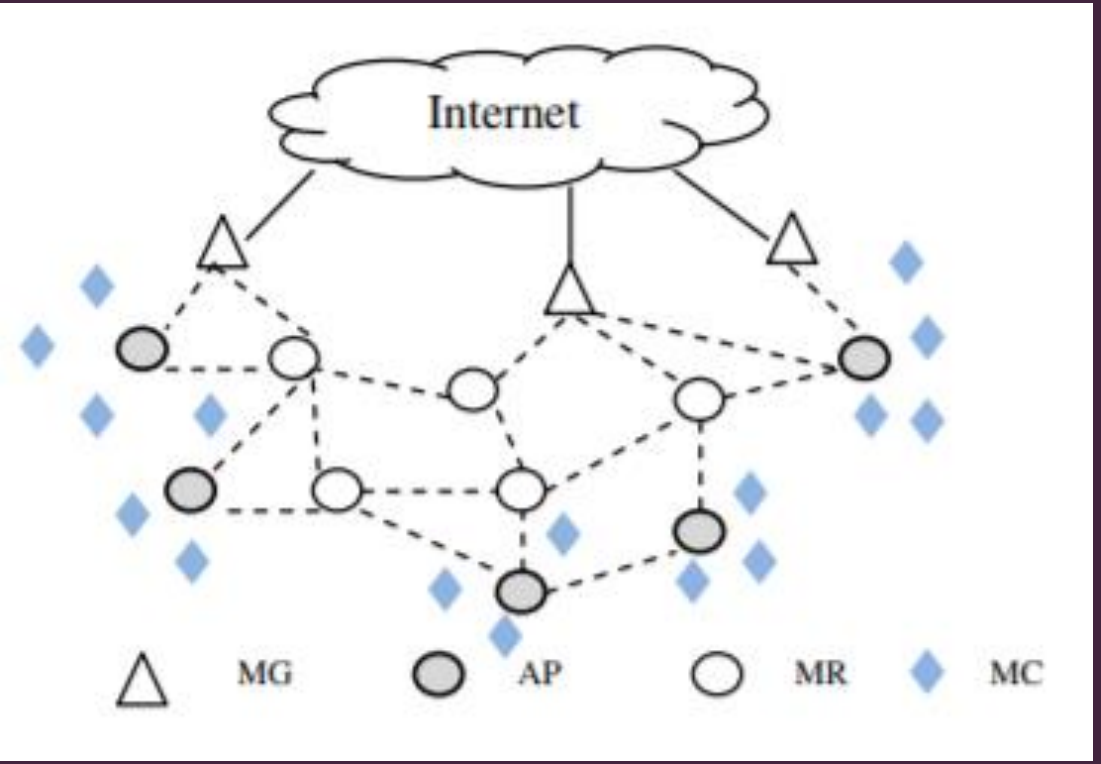


Let us try

- What do you say about the topologies?
- How many number of cables required in each topology?
- Design a hybrid topology with a star backbone and four ring networks.
- What do you think about topology in a computer lab?
- Design a topology for establishing a network in your street.
- https://online.visual-paradigm.com/app/diagrams/#diagram:proj=0&type=NetworkDiagram&gallery=/repository/d233500d-cd59-4c3b-a3be-81e032398680.xml&name=Star%20Network%20Template

Wireless Mesh Network

- Mesh Gateway (MG)
- Access Points (APs)
- Mesh Routers (MRs)
- Mesh Clients (MCs)



New Words

- Gateway
- Router
- Node
- Hub
- Mesh
- Star (Not in the sky)
- Bus (Not on the road)
- Ring
- Topology
- Tree
- Point to Point
- Multipoint Network
- Wireless

What you can explore

- Facebook Fabric
- https://engineering.fb.com/production-engineering/introducing-data-center-fabric-the-next-generation-facebook-data-center-network/