# Hub,Router,Bridge etc

**Nur E Alam**

**Lecturer,CSE,VU**

# Interconnecting LANs

<u>Q:</u> Why not just one big LAN?

- Limited amount of supportable traffic: on single LAN, all stations must share bandwidth

- limited length: 802.3 (Ethernet) specifies maximum cable length

- large "collision domain" (can collide with many stations)

- limited number of stations: 802.5 (token ring) have token passing delays at each station

# Hubs

- Physical Layer devices: essentially repeaters operating at bit levels: repeat received bits on one interface to all other interfaces

- Hubs can be arranged in a hierarchy (or multi-tier design), with backbone hub at its top
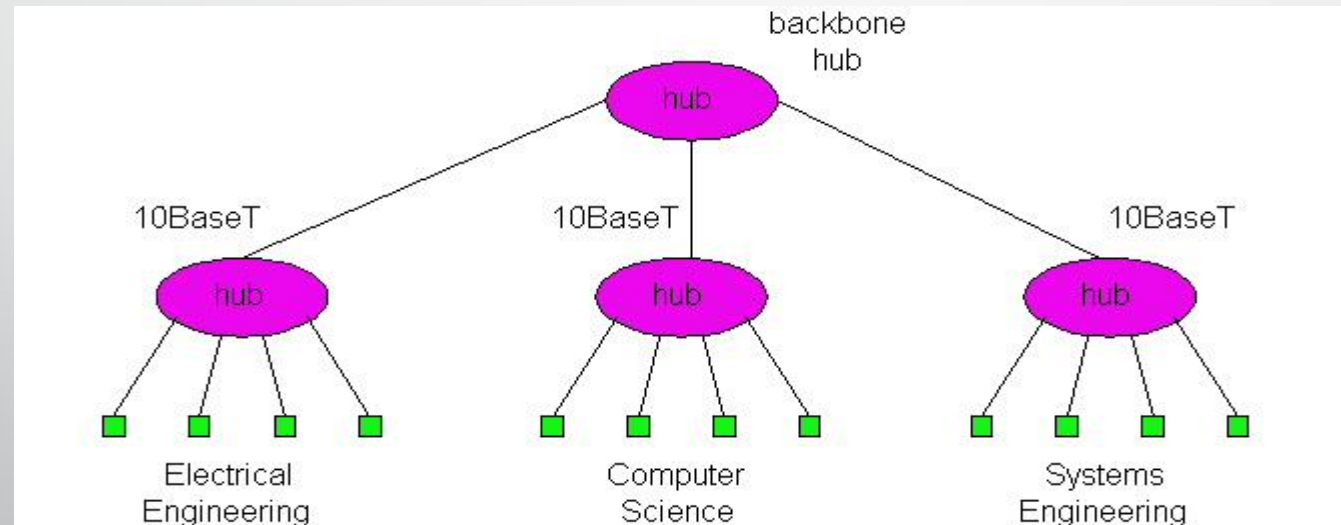
# Hubs (more)

- Each connected LAN referred to as LAN **segment**

- Hubs <span style="color:red">do not isolate</span> collision domains: node may collide with any node residing at any segment in LAN

- Hub Advantages:

  - simple, inexpensive device

  - Multi-tier provides graceful degradation: portions of the LAN continue to operate if one hub malfunctions

  - extends maximum distance between node pairs (100m per Hub)

# Hub limitations

- single collision domain results in no increase in max throughput

  - multi-tier throughput same as single segment throughput

- individual LAN restrictions pose limits on number of nodes in same collision domain and on total allowed geographical coverage

- cannot connect different Ethernet types (e.g., 10BaseT and 100baseT) Why?

# Bridges

- Link Layer devices: operate on Ethernet frames, examining frame header and selectively forwarding frame based on its destination

- Bridge isolates collision domains since it buffers frames

- When frame is to be forwarded on segment, bridge uses CSMA/CD to access segment and transmit

# Bridges (more)

- Bridge advantages:

  - Isolates collision domains resulting in higher total max throughput, and does not limit the number of nodes nor geographical coverage

  - Can connect different type Ethernet since it is a store and forward device

  - Transparent: no need for any change to hosts LAN adapters

# Bridges vs. Routers

- both store-and-forward devices
  - routers: network layer devices (examine network layer headers)
  - bridges are Link Layer devices
- routers maintain routing tables, implement routing algorithms
- bridges maintain filtering tables, implement filtering, learning and spanning tree algorithms
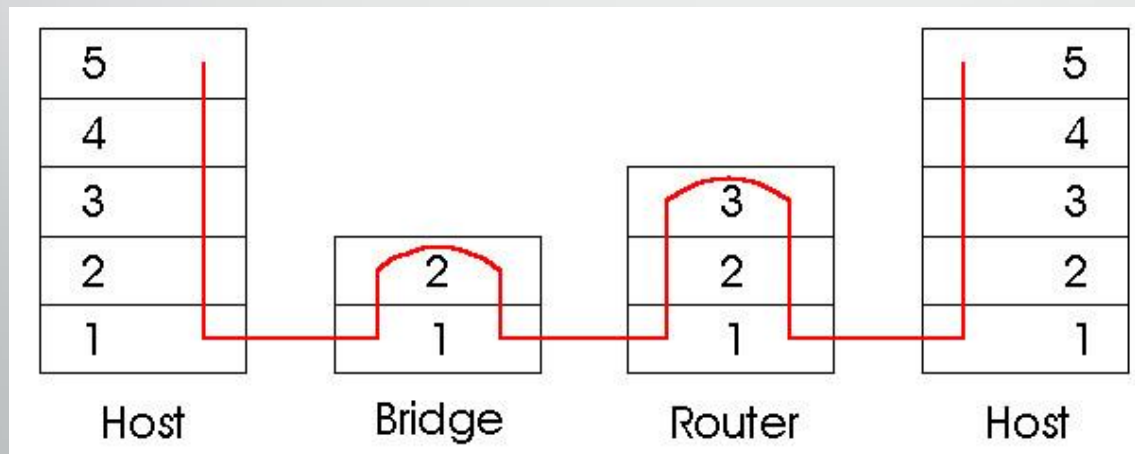
# Routers vs. Bridges

Bridges + and -

+ Bridge operation is simpler requiring less processing

- Topologies are restricted with bridges: a spanning tree must be built to avoid cycles

- Bridges do not offer protection from broadcast storms (endless broadcasting by a host will be forwarded by a bridge)

# Routers vs. Bridges

<span style="color:red">Routers + and -</span>

\+ arbitrary topologies can be supported, cycling is limited by TTL counters (and good routing protocols)

\+ provide firewall protection against broadcast storms

\- require IP address configuration (not plug and play)

\- require higher processing

- bridges do well in small (few hundred hosts) while routers used in large networks (thousands of hosts)

# Wimax vs Wifi

- What is the difference between Wimax and wifi ?

# Static vs Dynamic Routing

- There are two basic methods of building a [routing table](): Static Routing and Dynamic Routing

- A static routing table is created, maintained, and updated by a network administrator, manually. A static route to every network must be configured on every router for full connectivity. This provides a granular level of control over routing and is completely manageable on smaller networks. It also allows for simple routing and network segmentation tasks such as inter-virtual local area network (VLAN) routing. This enables network segmentation to isolate certain broadcast domains, while still allowing connectivity between those subnets. Static routing can also be used for a default gateway, or "router of last resort" to tell packets without routing information "that router will give you directions on how to get where you want to go."

- However, static routing is not fault-tolerant, as any change to the routing infrastructure (such as a link going down, or a new network added) requires manual intervention. Routers operating in a purely static environment cannot seamlessly choose a better route if a link becomes unavailable. Because no information is intelligently shared between routers, some Layer 2 network switches, along with Layer 3 routers, can support static routing. Simply stated, static routing is great for networks that don't change.

- If you are building a larger or more fluid network, dynamic routing allows routers on the network to make intelligent decisions on which path is best to get data to a subnet/destination. A dynamic routing table is created, maintained, and updated by a routing protocol running on the router. Intelligent routing protocols are capable of dynamically choosing a different (or better) path when there is a change to the routing infrastructure.

# What is the difference between routed and routing protocol ?

- A routed protocol is a protocol by which data can be routed. Routed protocol are IP, AppleTalk, and IPX. In this kind of protocols we require an addressing scheme and subnetting. Addressing scheme will be used to determine the network to which a host belongs and to identifying that host on that particular network. All hosts on an internetwork are using the services of a routed protocol. That means routers, servers, and workstations to. The only two routed protocols that are in use today are IP and IPX but IPX is dropped from Cisco in exams and is not in use much these days. If you are studying routed protocols the best advice is to focus on IP routed protocol.

- A routing protocol is different and is only used between routers. It makes possible for routers to build and maintain routing tables. There are three classes of routing protocols- 1)distance vector, 2)link state,3)hybrid

- OSPF is one of two link state protocols, the other one is IS-IS. EIGRP is the only hybrid protocol but in normal literature you will see that EIGRP is distance vector routing protocol.

# CSMA/CD vs CSMA/CA

- Difference between CSMA/CD and CSMA/CA /

If you want to shine like sun first you have to burn like it

Adolf Hitler