



BITS Pilani
Hyderabad Campus

Computer Networks: Introduction

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Why study Computer Networks?



- To learn how computer networks work (protocols, architecture, and applications)
- To build a foundation for courses like distributed systems (grid/p2p/cloud), wireless networks, mobile computing, network security, network programming, network management etc.)

Syllabus



- Physical Media: The Bandwidth Limited Signals, Maximum Data Rate of a Channel.
- Application Layer: HTTP, SMTP, DNS etc., a little socket programming.
- Transport Layer: TCP (Principles of Reliable Data Transfer : Go-Back-N, and Selective Repeat), UDP.
- Network Layer: Addressing and Routing in the Internet.
- Data Link Layer: Error detection, Multiple access, etc.
- Wireless Networks: Wi-Fi: 802.11, Cellular access.
- Mobile Networks: Mobility management, Mobile IP.
- Network Security: Overview of Cryptography, Key Exchange, Authentication, and Perimeter Security.

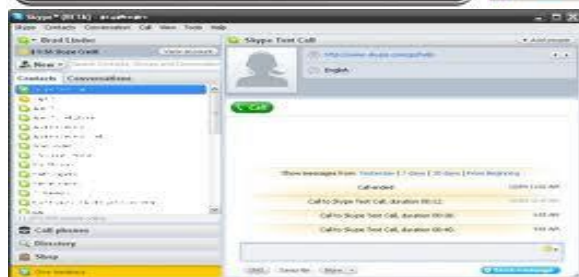
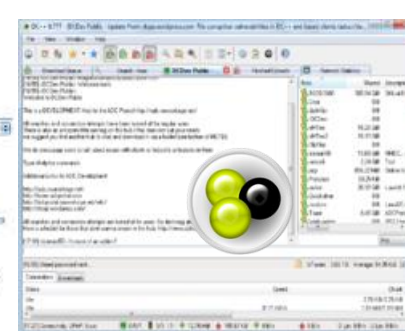
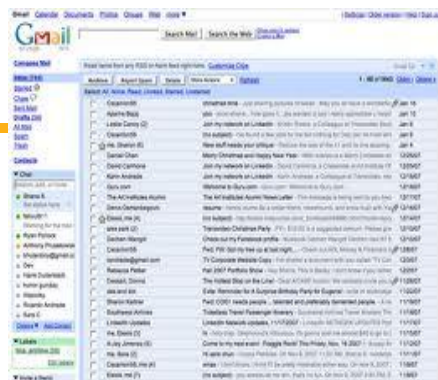
- Capturing packets using **Wireshark** and analyzing various protocols like TCP, UDP, ICMP, HTTP etc.
- Developing a Client/Server application using **Unix** Sockets API.
- **NetSim**: To investigate how a LAN performance is affected by various parameter values.
- To design a WAN and analyze the concepts of link utilization, Quality of Services etc.
- Study How TCP controls congestion in the network?
- Study how loss varies as the buffer size of Routers is increased
- Study the concept of shortest path in OSPF by varying the Link weight.

Uses of Computer Networks

innovate

achieve

lead



Network Components



Links



Fibers



Coaxial Cable

Interfaces

Ethernet card



Wireless card



Switches/routers

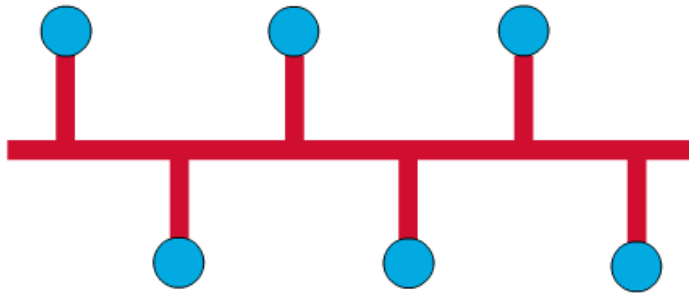
Large router



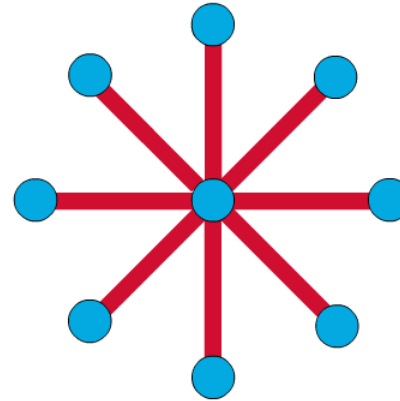
Switch



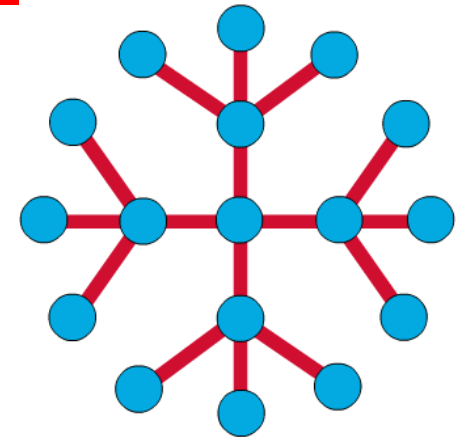
Network Topologies



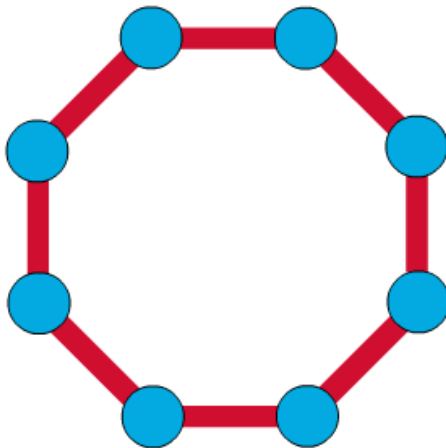
Bus



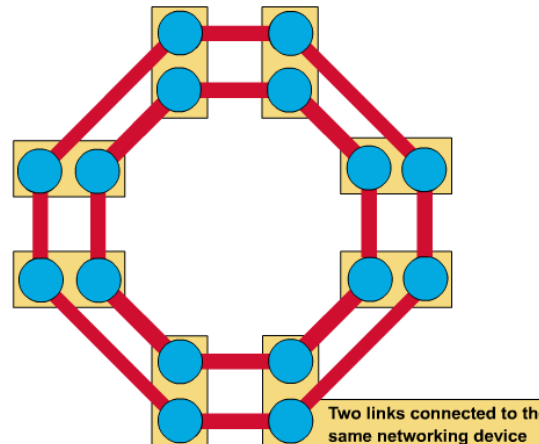
Star



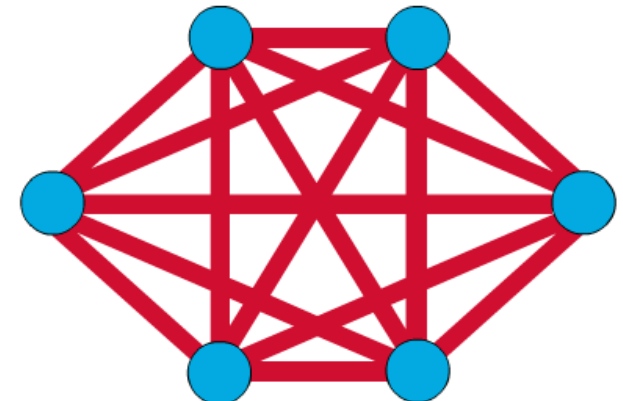
Tree



Single ring

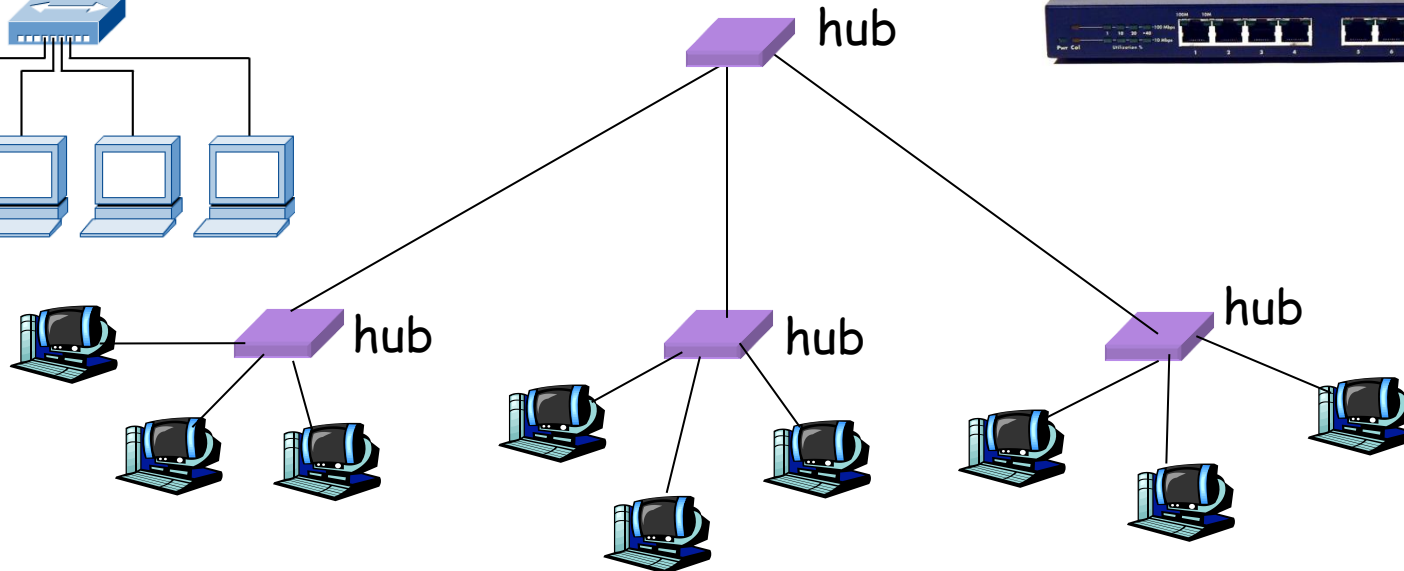
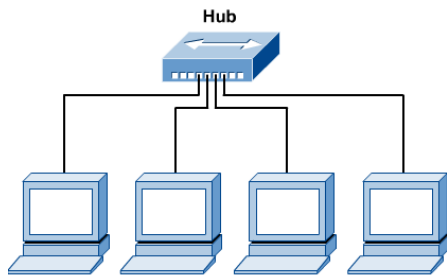
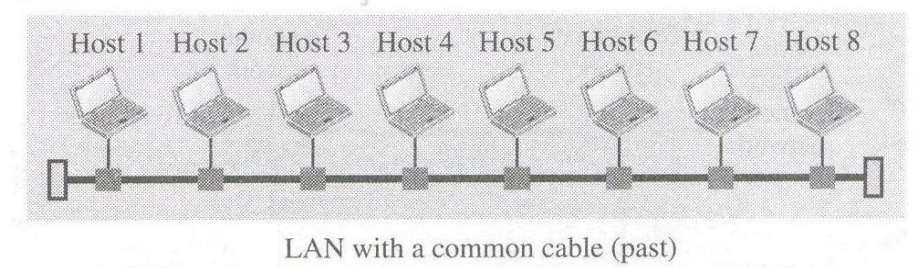
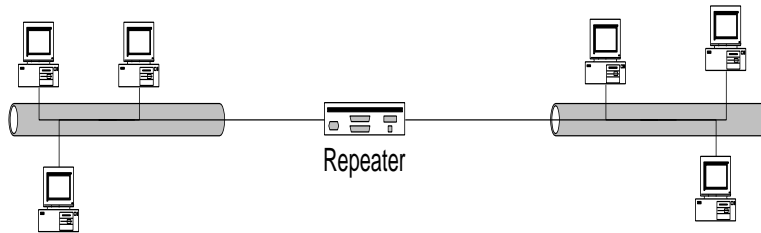


Dual ring

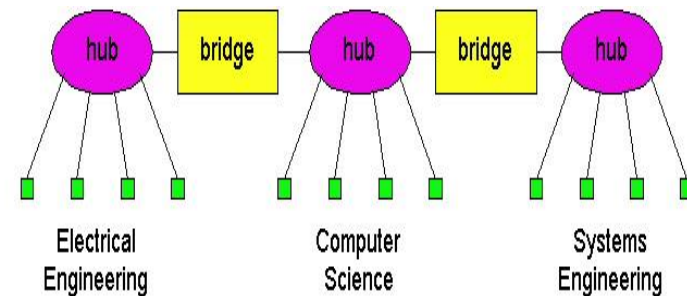
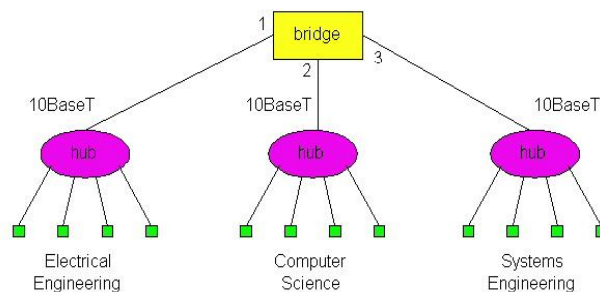
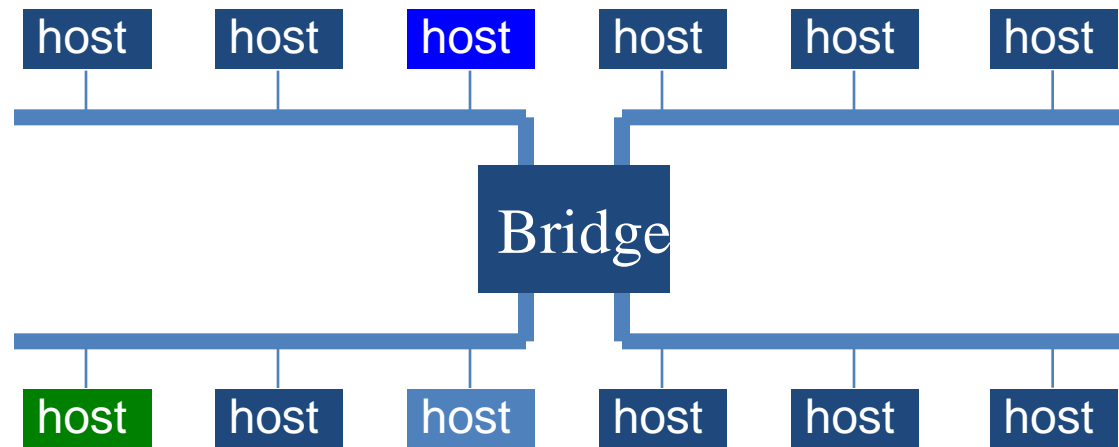


Mesh

Physical Layer components



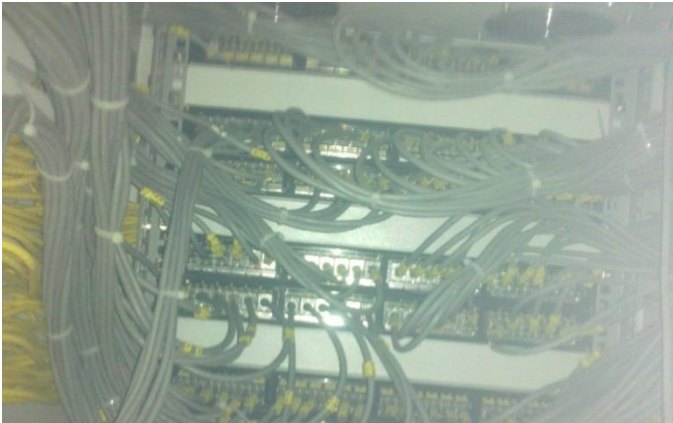
Link layer components



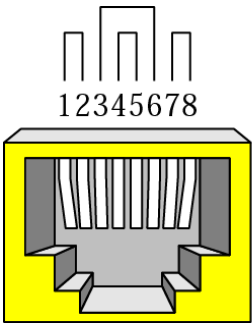
Structured Cabling Infrastructure



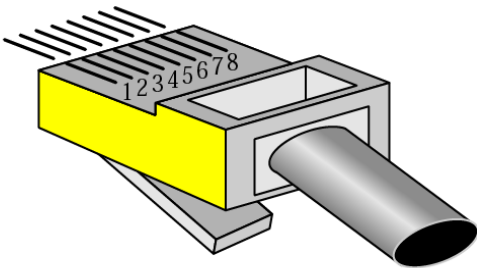
I/O and Faceplates



Patch Panels



RJ-45 Female



RJ-45 Male

UTP connectors



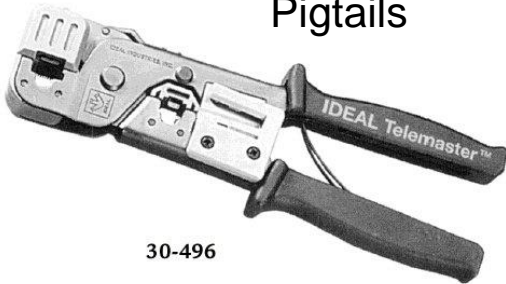
Wire testers



Patch cord



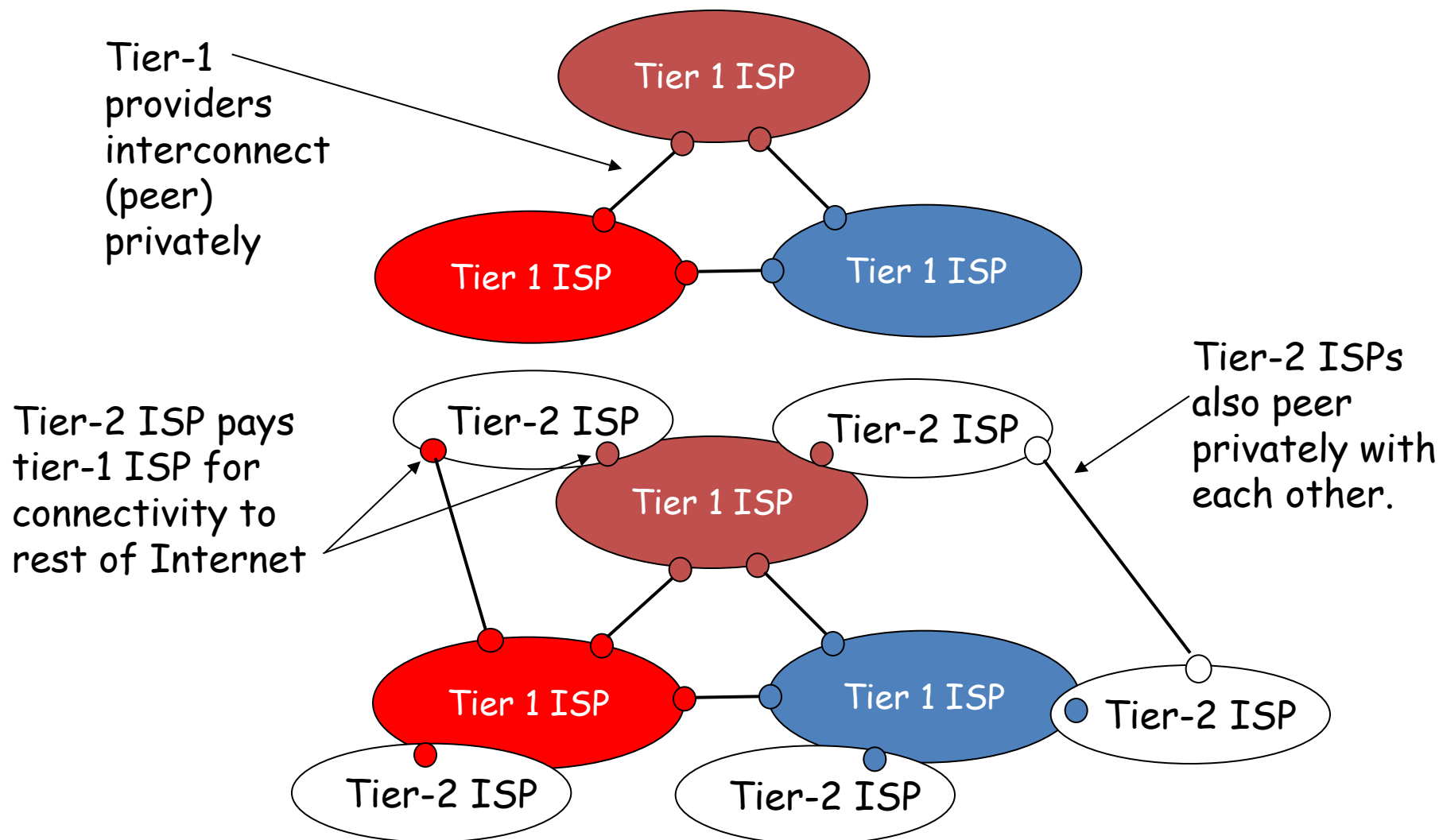
Pigtails



30-496

Crimping tool

Internet Structure

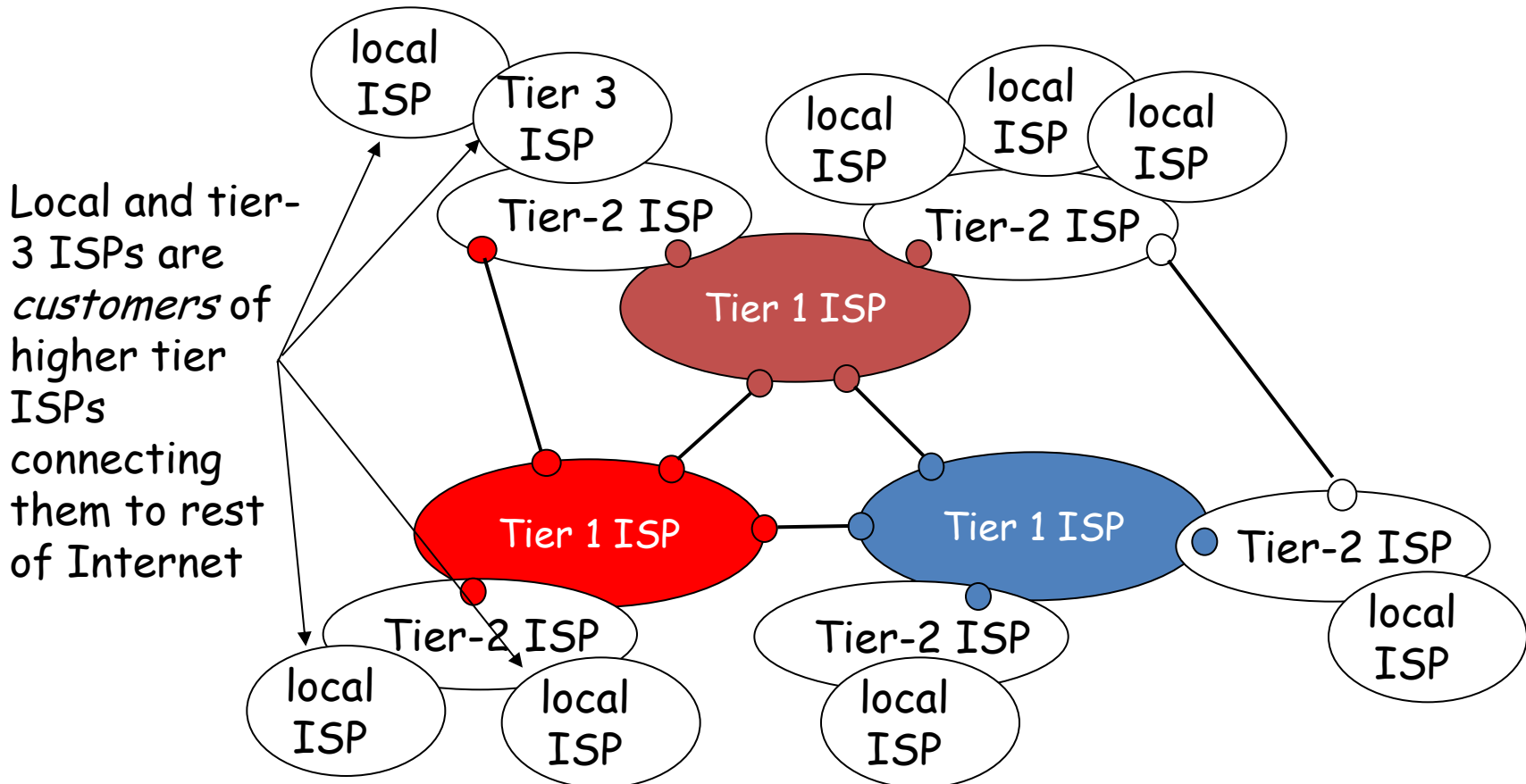


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“Tier-3” ISPs and local ISPs

- last hop (“access”) network (closest to end systems)



Continued...

- a packet passes through many networks!

