COMPUTER COMMUNICATION NETWORKS (UE22EC351A)

Department of Electronics and Communication Engineering

COMPUTER COMMUNICATION NETWORKS

UNIT 1: INTERNET ARCHITECTURE AND APPLICATIONS – Class 1 – Internet: Introduction, Terminology

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UNIT 1: INTERNET ARCHITECTURE AND APPLICATIONS – Class 1 – Internet: Introduction, Terminology – Text book reference – Section 1.1 – Pages 32 - 39

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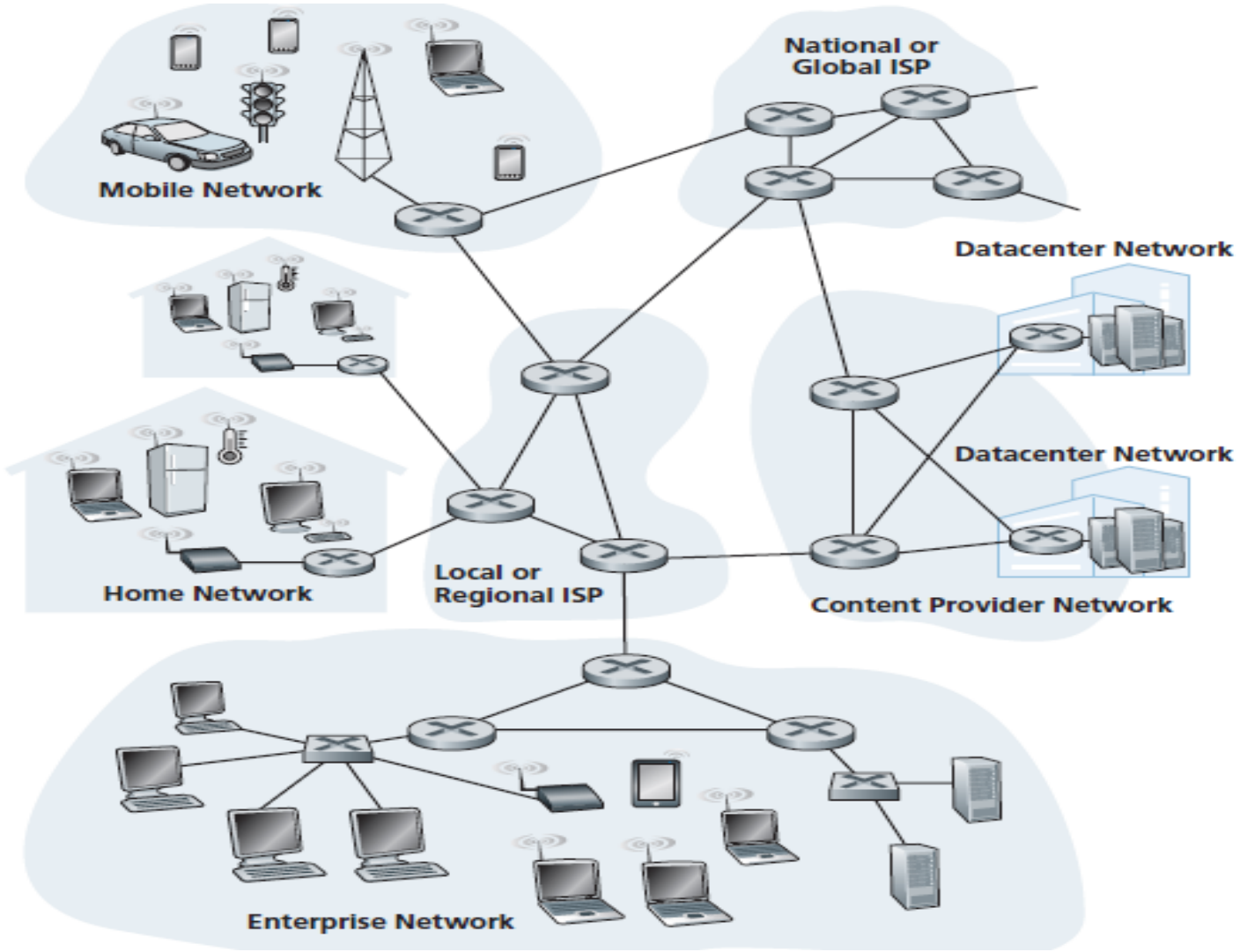
Class 1 - Introduction

- What is a computer network?
  - It is like a graph consisting of **end-systems or hosts** connected to one another via **communication links** and some **packet switches**.
  - End-systems or hosts run applications which generate or receive data in the form of packets (i.e., collection of bits)
  - A sequence of packet switches and communication links is called **route** or **path**
  - A computer network is usually administered by one entity which configures and maintains the operation
  - Examples of computer networks include home networks, enterprise networks, mobile networks, etc.
  - Hosts connect to the internet via ISPs

Class 1 - Introduction

- What is internet?
  - **Internet is a computer network that interconnects billions of computing devices throughout the world.**
  - **Internet is an interconnected architecture that provides services to distributed applications.**
- How did it come about?
  - History of the internet: DARPA, ARPANET, Packet switched networks, killer applications, TCP/IP, Ethernet, DNS, NSFNET program, IANA, ICANN, RFC, IETF and IESG, IAB

Class 1 - INTERNET - VISUALIZATION



Class 1 - Introduction

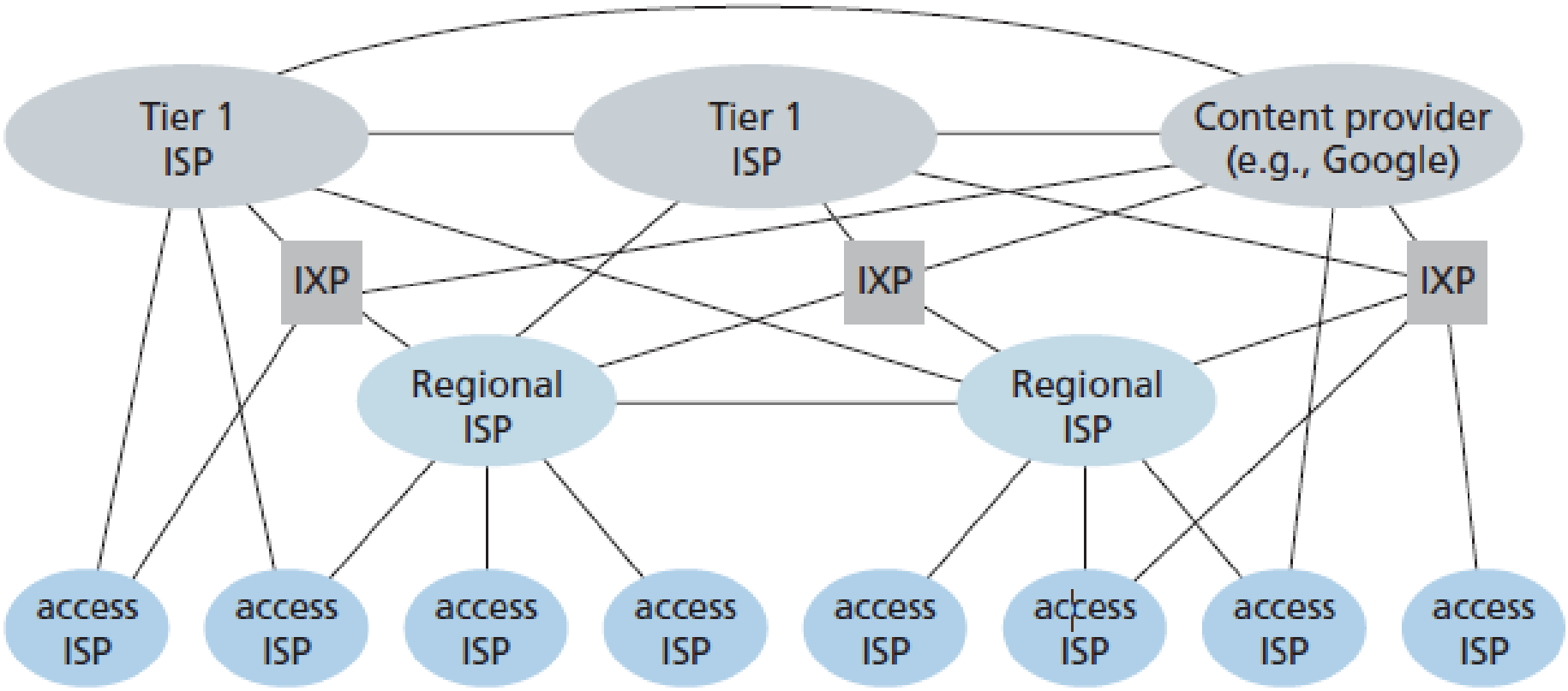
- Notable inventions and inventors
- World wide web: Tim Berners Lee, MIT laboratory 1989-90
- Email: Ray Tomlinson, BBN 1972
- DNS: Paul Mockapetris, USC 1982
- RFC: Stephen Crocker, UCLA 1969
- Packet switching: Leonard Kleinrock, UCLA 1961
- TCP/IP: Bob Khan and Vincent Cerf, DARPA and SRI 1972-73
- Ethernet: Bob Metcalfe, Xerox PARC 1973

Class 1 - Introduction

- Who owns/controls the internet?
  - **ISP (Internet Service Provider)** is a business entity or company which provides internet access to the end-systems in return for a subscription fee
  - The place where end-systems connect to an ISP is referred to as ***point-of-presence* (PoP)**.
  - The number of PoPs (typically in 1000s) held by an ISP tells about its outreach in the internet.
  - PoP consists of routers, link layer switches, MPLS and communication links.
  - ISP examples: Telecom operators, Cable TV operators, Fiber (optic) operators

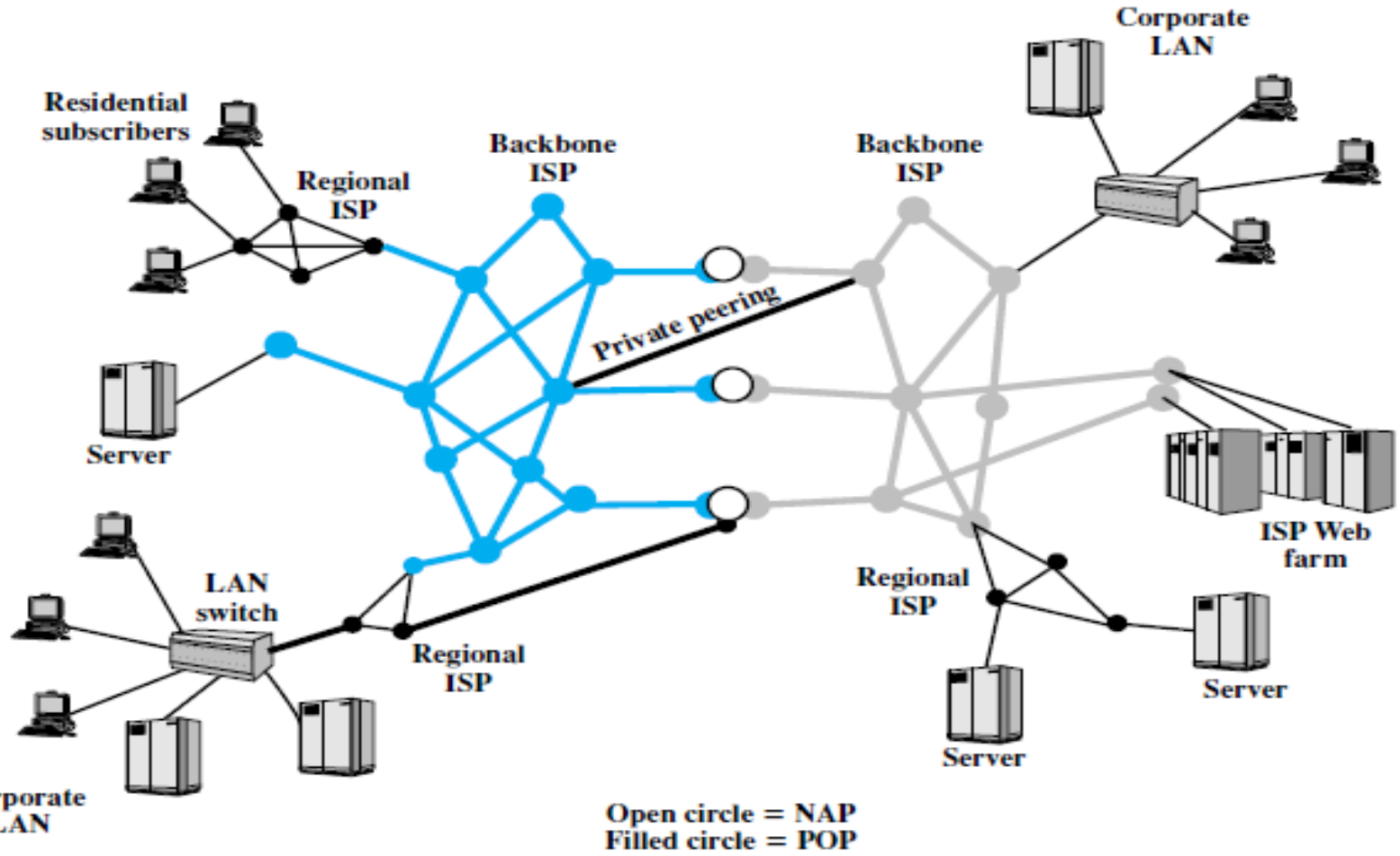
Class 1 - Introduction

- ISP Hierarchy



Class 1 - Introduction

- ISP hierarchy (contd.)



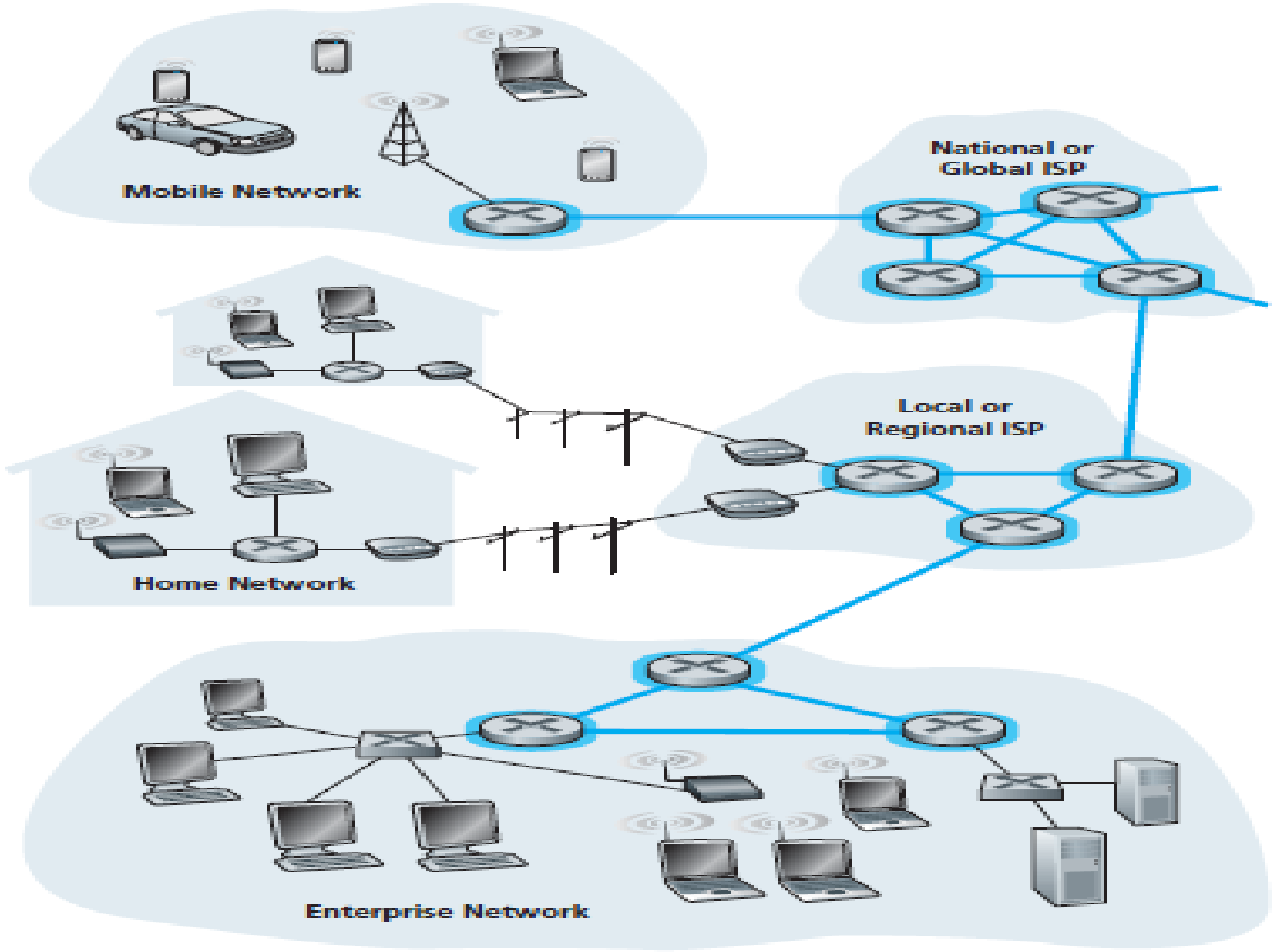
Class 1 - Introduction

- Revenue generation is as follows:
  - End users pay access ISPs
  - Access ISPs pay to regional ISPs
  - Regional ISPs pay to Tier 1 ISPs
  - Tier 1 ISPs may have several bilateral agreements to share resources such as bandwidth and routers
  - Besides, content service providers can enter into bilateral agreements with an ISP at any stage
  - ISPs which perform peering or multi-homing share some of their revenue based on equipment and resource utilization

Class 1 - Introduction

- How does the internet provide services for distributed applications (i.e., programs written in Java, C, etc.)?
  - **Distributed** means that applications run independently on the hosts or end systems
  - Messages are exchanged by the hosts using the **internet socket interfaces** of their respective applications
  - **Protocols** define the format and the order of messages exchanged between two or more hosts
  - Protocols also define the actions taken on the transmission and/or receipt of a message or other event
  - **Services** (e.g., reliability, guaranteed rate) are provided by hardware or software associated with the devices

Class 1 - Classification by topography and functionality



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