

Introduction to Networks

A **computer network** is two or more computers (often called hosts) connected by a communication channel for the purposes of sharing information and resources.

A **communication channel** is simply the pathway over which the data travels. For example copper wire, fibre optic cable or wireless transmission.

A **host** is usually either a

- ▶ workstation (client), or
- ▶ server.

Generally, data may be transmitted between hosts as a collection of bytes called a **packet**. Networks which transmit data in this way are called **packet-switched** networks.

Network Classifications

There are many different ways to categorise networks. Two common classifications are:

- ▶ transmission technology,
- ▶ scale.

Transmission technology

- ▶ **Broadcast networks** have a single communication channel along which packets are sent. Packets are received by all hosts on the network, but only retained by the host to which it is addressed.
- ▶ In **point-to-point networks** there are communication channels between pairs of hosts. A packet may therefore have to visit one or more intermediate host before reaching its destination.

Scale

Several examples of networks of varying sizes.

Personal Area Networks (PANs):

- ▶ Networks for the devices belonging to, or in close proximity to, a single person.
- ▶ Only a few metres in range.
- ▶ Eg: Mobile phone and wireless headset.

Local Area Networks (LANs):

- ▶ Occupy a single building or area, up to several kilometres.
- ▶ Usually privately owned.
- ▶ Eg: Student computer network at ANU.

Metropolitan Area Networks (MANs):

- ▶ A city-wide network.
- ▶ Usually privately owned.

Wide Area Networks (WANs):

- ▶ Spans a large geographical area - often countries or continents.
- ▶ Usually not owned by any single organisation.
- ▶ Comprise multiple networks connected by **routers**.
- ▶ Eg: the Internet.

The Internet

The Internet is a publicly accessible network of many interconnected networks. It is not owned or controlled by anyone. It is the largest WAN on earth.

History

ARPANET

- ▶ Decentralised network built by the US DoD.
- ▶ Grew from 4 computers into a network that spanned the US.
- ▶ Access to ARPANET required a research contract with the DoD.

NFSNET

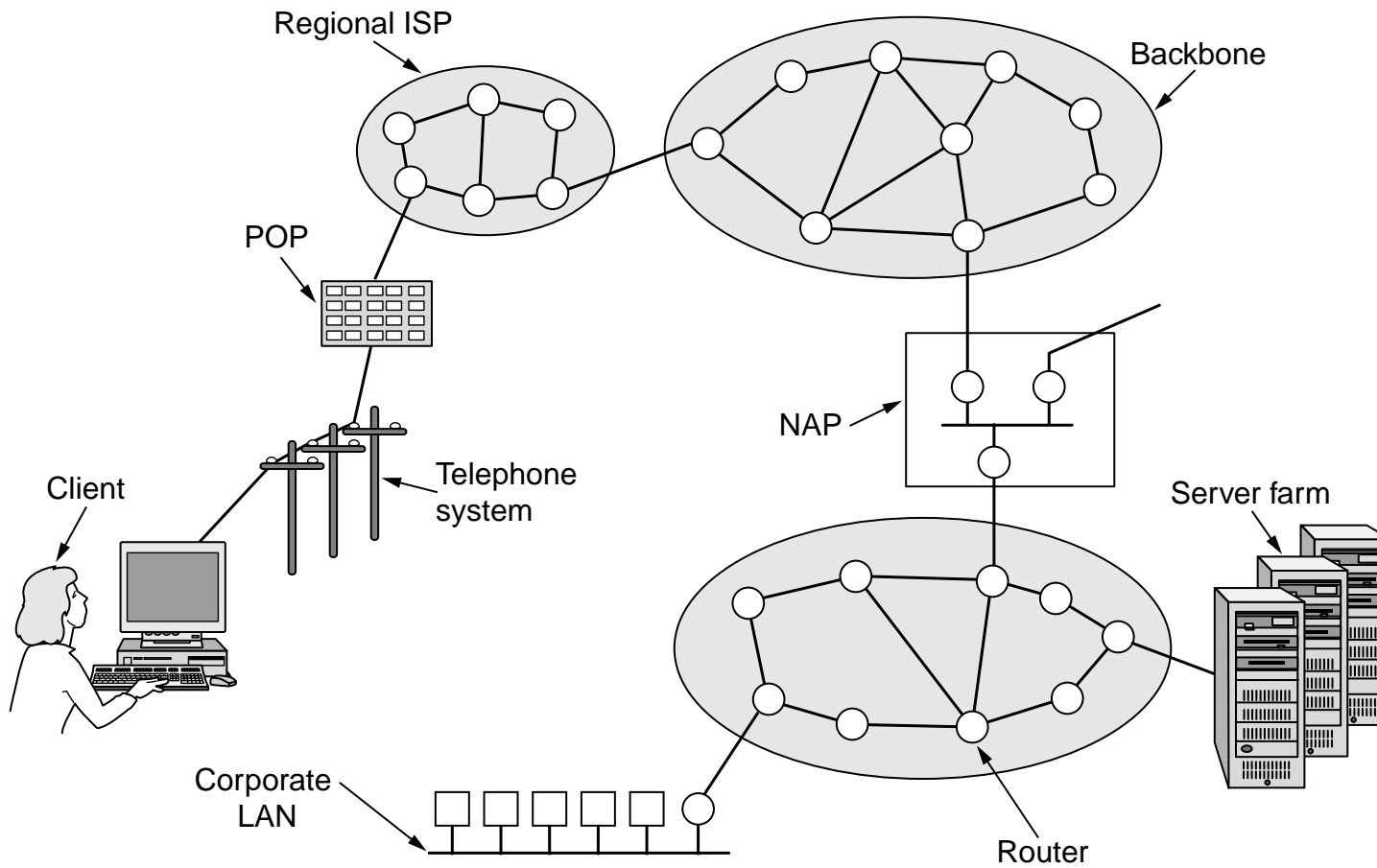
- ▶ Designed by the NSF to be open to all university research groups.
- ▶ Eventually bought out by AOL.

Usage

Some common usages of the Internet:

- ▶ **E-mail** - sending and receiving electronic mail.
- ▶ **Newsgroups** - specialised forums for users with a common interest.
- ▶ **Remote access** - logging into computers remotely using applications such as telnet, rlogin and SSH.
- ▶ **File sharing** - transferring/copying files using email and FTP.
- ▶ **Streaming media** - broadcast of audio and video streams.
- ▶ **World Wide Web (WWW)** - a system of interlinked documents (web pages).

Architecture



Tanenbaum Figure 1-29. Overview of the Internet

References:

- ▶ Tanenbaum, Chapter 1.

Coming Lectures:

- ▶ Network reference models.
- ▶ Network protocols.