

**AOT
LAB**

Agent and Object Technology Lab
Dipartimento di Ingegneria dell'Informazione
Università degli Studi di Parma



Computer Network

Introduction

Prof. Agostino Poggi

◆ Theory

- Data Transmission
- Packet Transmission
- Internetworking
- Networks for Embedded Systems
- Network Programming in Java

◆ Practice

- Network Programming in Java
- Software Project

- ◆ B. A. Forouzan. Data Communications and Networking, Fourth Edition, Mc Graw Hill, 2007

- ◆ B. A. Forouzan. Reti di calcolatori e Internet. Mc Graw Hill, 2008

- ◆ My Home Page: <http://www.ce.unipr.it/people/poggi>
- ◆ JAVA: <http://java.sun.com>
- ◆ IEEE: <http://www.ieee.org>
- ◆ Embedded System: <http://www.embedded.com>

- ◆ Three parts:
 - A theory test after the teaching period
 - Optional Lab attendance
 - A software project

- ◆ The project can be combined with:
 - Software engineering practical part
 - Lab internship
 - Final thesis

- ◆ Can be performed alone or with a colleague
- ◆ Can be got from April 2009 to February 2010
- ◆ Two kinds of project
 - Software evaluation
 - Computer Network [+ Software Engineering]
 - Software development
 - Computer Network + [Software Engineering | Lab Internship | Thesis | ...]

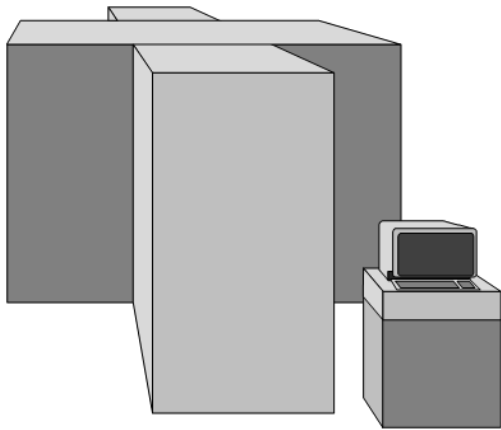
- ◆ The experimentation of the software
- ◆ The development of a very simple application
- ◆ The writing of a report composed of:
 - Software description
 - Main features
 - Requirements
 - How to install and use
 - Application manual
 - Application description
 - Requirements
 - How to install and use

- ◆ The development of a software library, tool or application
 - The code of the software must be commented by using the standard notations and tools (e.g., Javadoc for Java code)

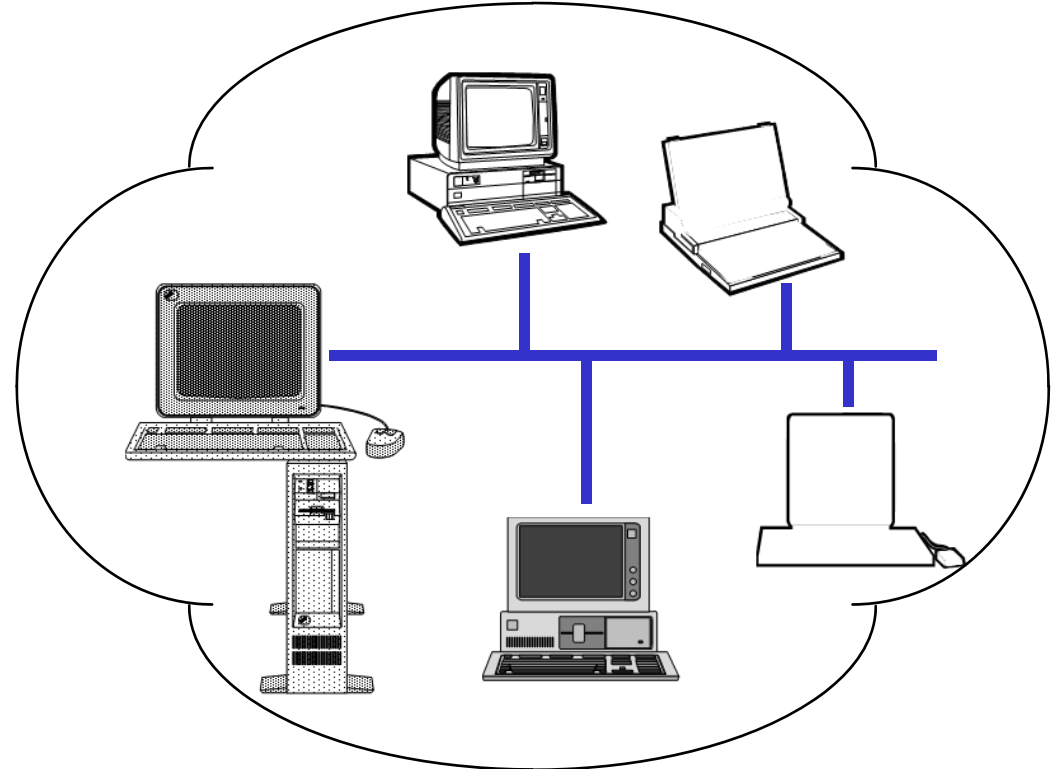
- ◆ The writing of a report composed of:
 - Software description
 - Main features
 - Requirements
 - Design documentation
 - How to install and use

- ◆ Office:
Palazzina 1 – Sede Scientifica Ingegneria
Parco Area delle Scienze 181A
- ◆ Phone number: 0521 90 5728
- ◆ Fax number: 0521 90 5723
- ◆ Email: agostino.poggi@unipr.it

- ◆ Office:
Palazzina 1 – Sede Scientifica Ingegneria
Parco Area delle Scienze 181A
- ◆ Phone number: 0521 90 5708
- ◆ Fax number: 0521 90 5723
- ◆ Email: michele.tomaiuolo@unipr.it



Mainframe



PC & WS & Network

- ◆ Information access
 - Remote files (FTP, P2P)
 - Remote Web pages (Web browser)
- ◆ Resource sharing
 - Printers
 - Hard disks
 - CPU (remote login)
- ◆ Remote interaction
 - Off-line
 - email
 - On-line
 - Among cooperative application programs
 - Among humans
 - Among both programs and humans

- ◆ Transmission hardware

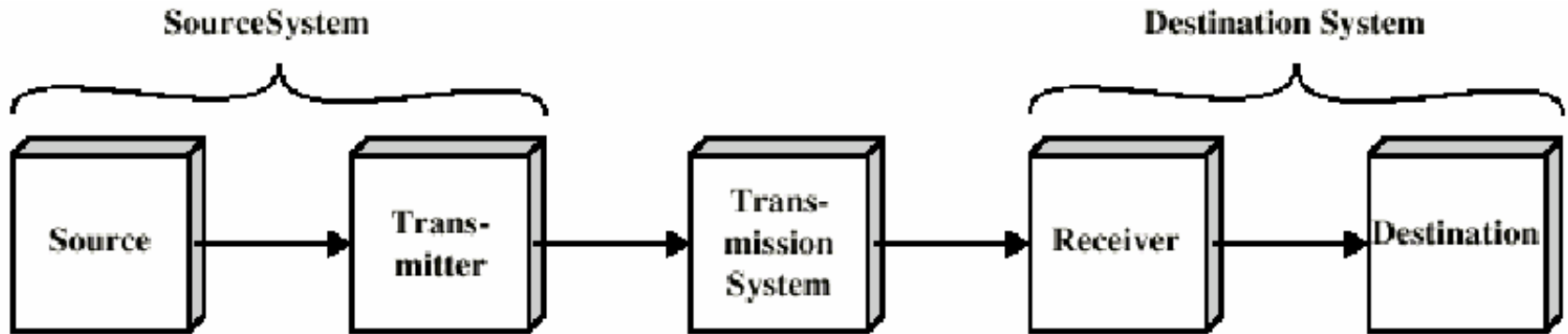
- ◆ Special purpose hardware devices
 - Interconnects transmission hardware
 - Control transmission
 - Run protocol software

- ◆ Protocol software
 - Encodes and formats data
 - Detects and corrects errors

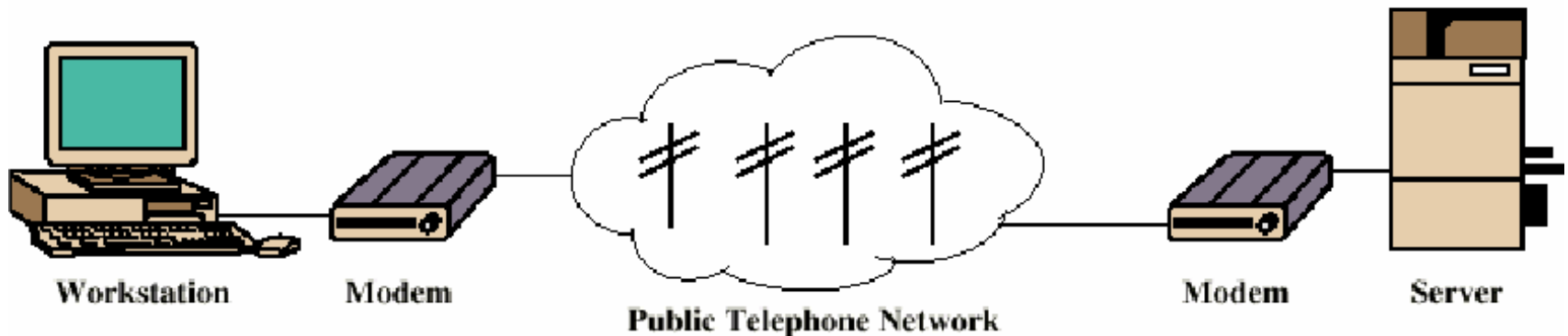
- ◆ Provides communication from one application to another that is
 - Reliable
 - Fair
 - Efficient

- ◆ Automatically detects and corrects
 - Data corruption
 - Data loss
 - Duplication
 - Out-of-order delivery

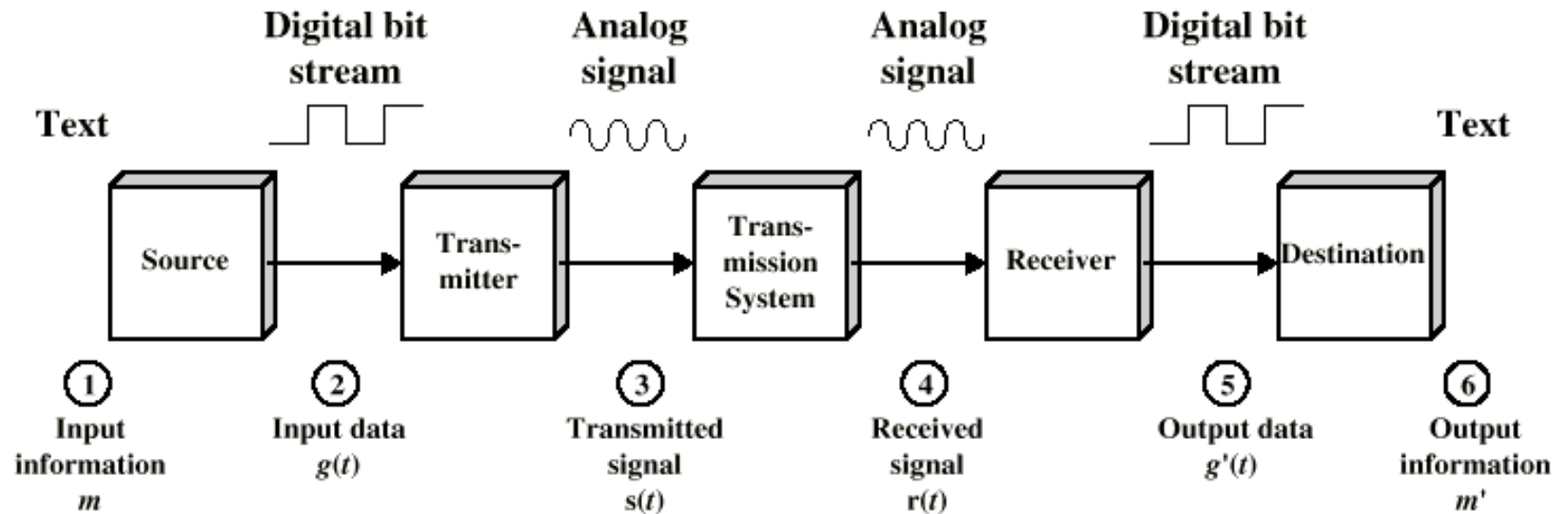
- ◆ Automatically finds optimal path from source to destination

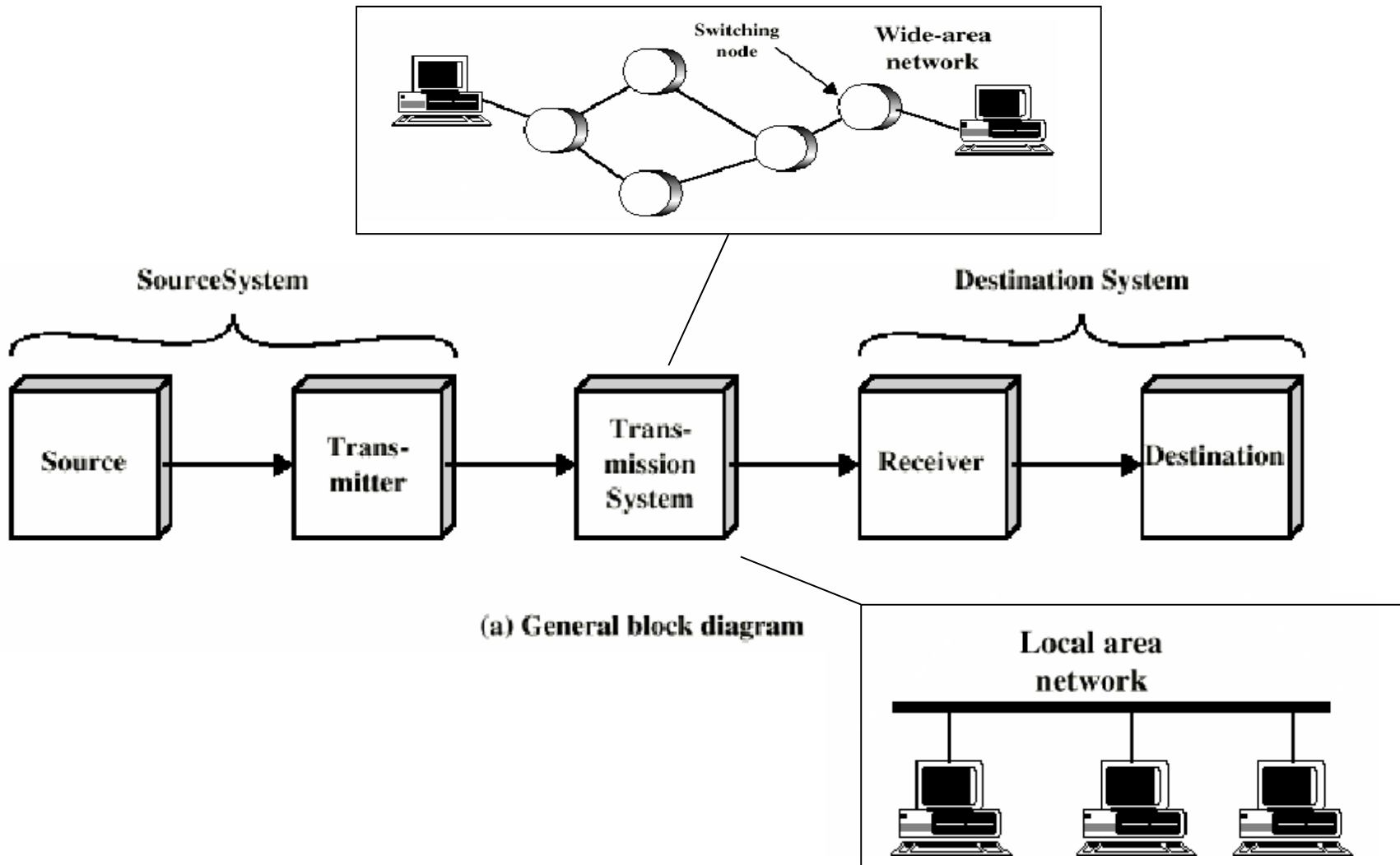


(a) General block diagram

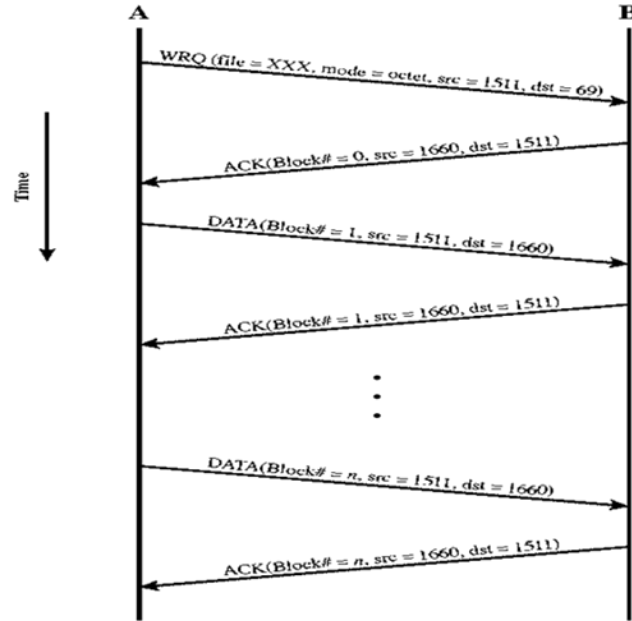


(b) Example





- ◆ Required to allow for interoperability between equipment
- ◆ Advantages
 - Ensures a large market for equipment and software
 - Allows products from different vendors to communicate
- ◆ Disadvantages
 - Freeze technology
 - May be multiple standards for the same thing



- ◆ International Telecommunication Union (ITU) which develops worldwide standards for telecommunication technologies
- ◆ Consultative Committee for International Telegraph and Telephone (CCITT) is responsible for development of Communication standards
- ◆ Institute of Electrical and Electronic Engineers (IEEE)
- ◆ International Standardization Organization (ISO) is responsible for a wide range of standards including networking standards

- ◆ American National Standards Institute (ANSI) approves U.S. standards and develops U.S. positions in international standards organizations
- ◆ Internet Architecture Board (IA) groups internetwork researchers who discuss issues pertinent to Internet architecture
- ◆ Internet Engineering Task Force (IETF) consists of over 80 working groups responsible for developing Internet standards