Data Communications and Networks

CS461: Computer Networks and Communications

HiLCoE - School of Computer Science and Technology

Lecture 1

Contents

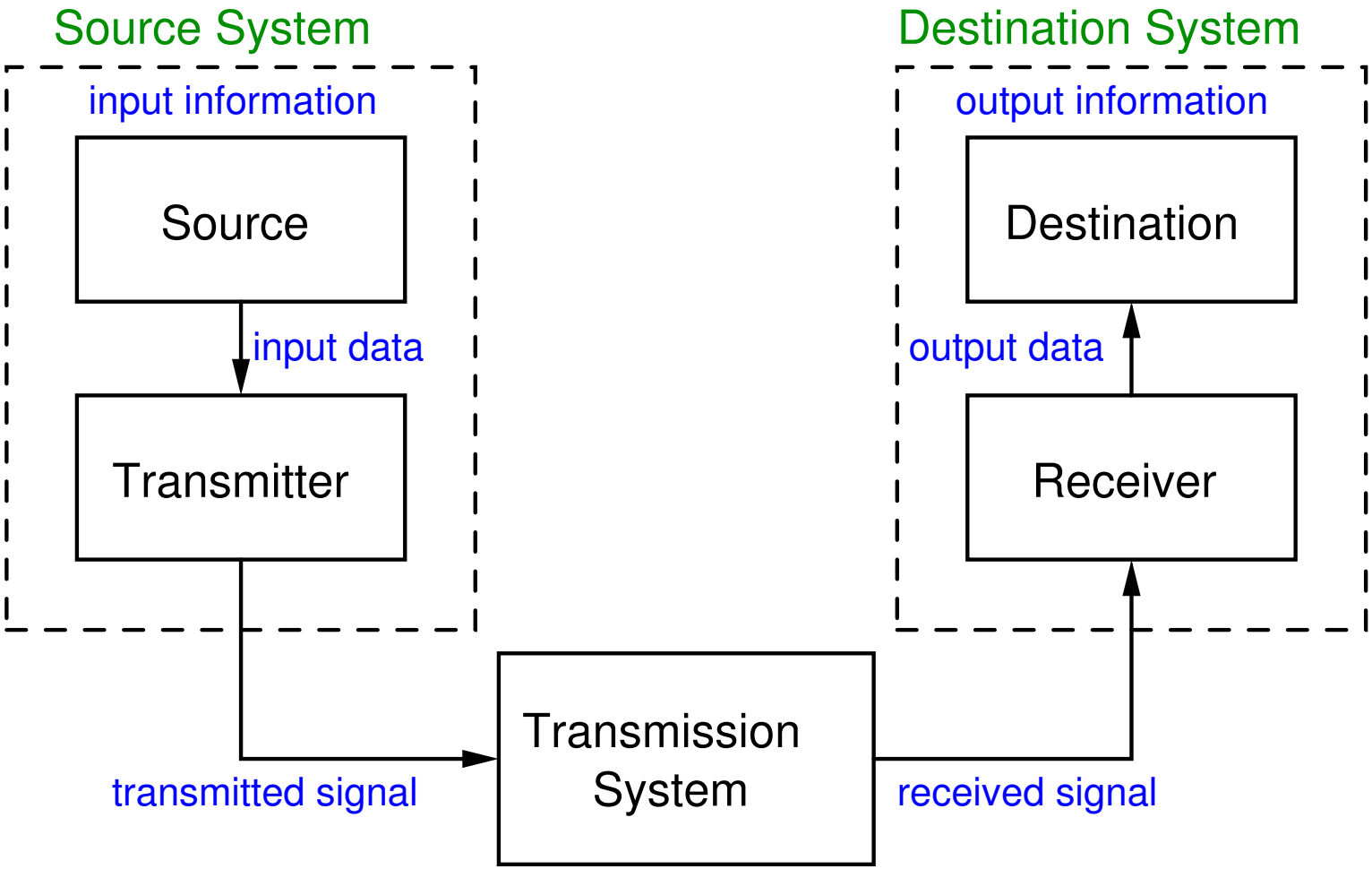
Communication Systems

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Contents

Communication Systems

A Model of Communication Systems



A Model of Communication Systems

Aim: transfer information from source to destination

Source: Device that generates data to be transmitted

Transmitter: Converts data from source into transmittable signals

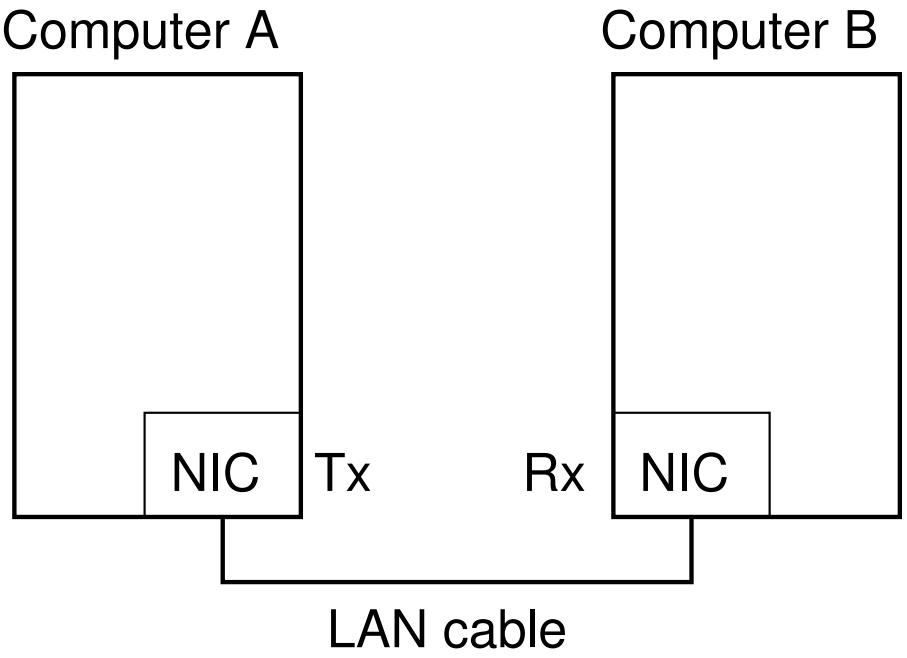
Transmission system: Carries data from source to destination

- Maybe simple as a single link/cable
- Or a complex network, e.g. the Internet

Receiver: Converts received signal into data

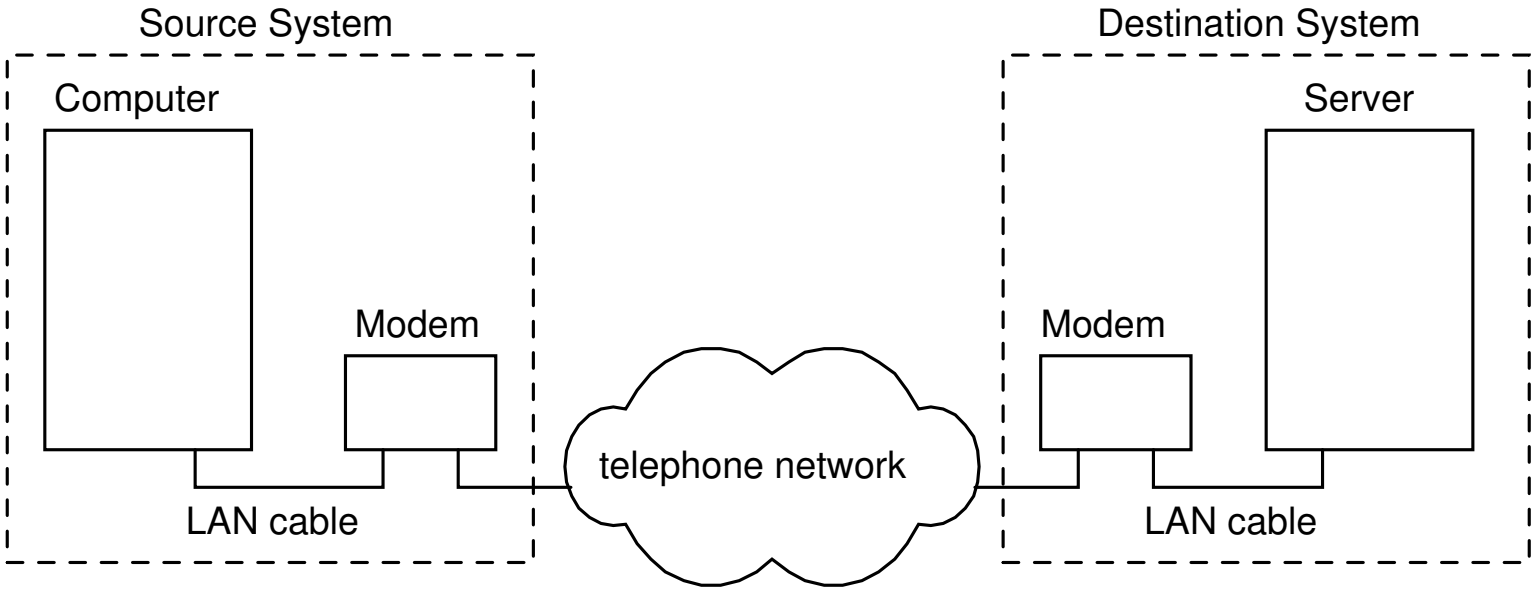
Destination: Takes and uses incoming data

Example: Computer to Computer



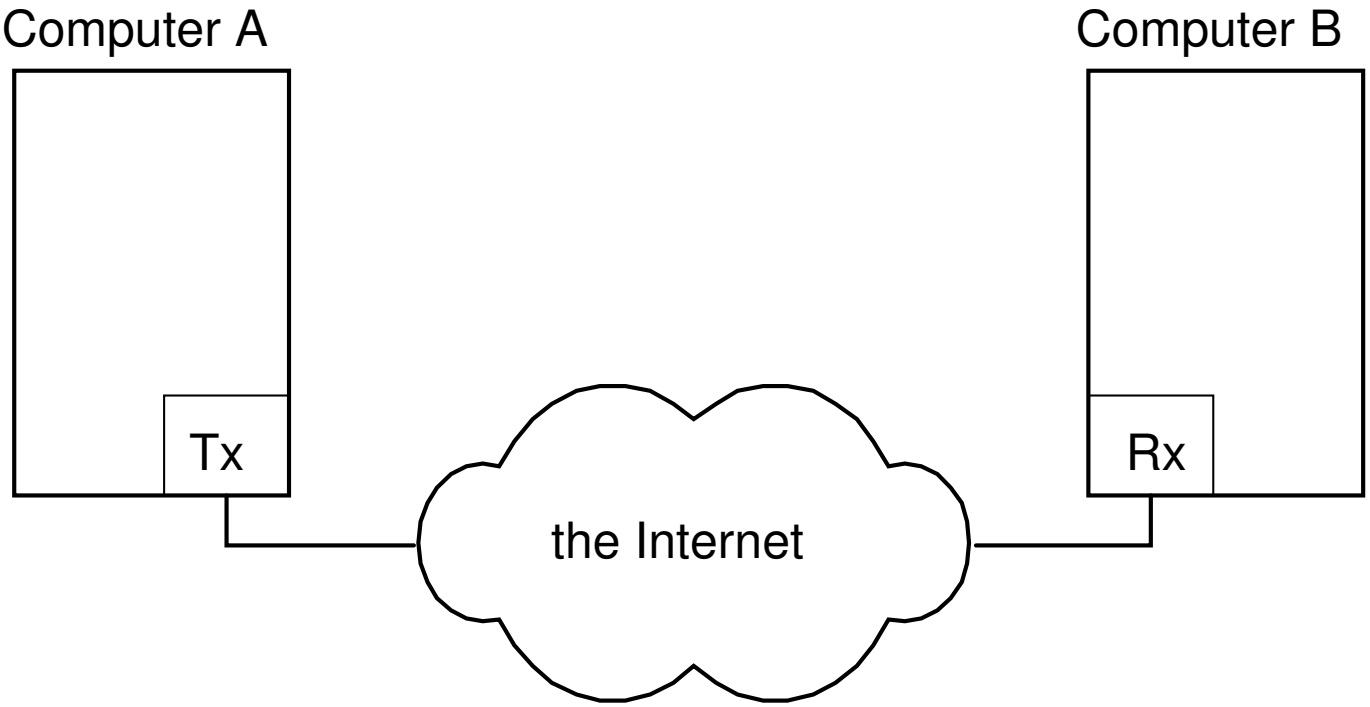
- Transmitter (Tx) is built into source computer (Network Interface Card)
- Recevier (Rx) is built into destination computer
- Transmission system is single link between two computers

Example: Old Dialup Connection



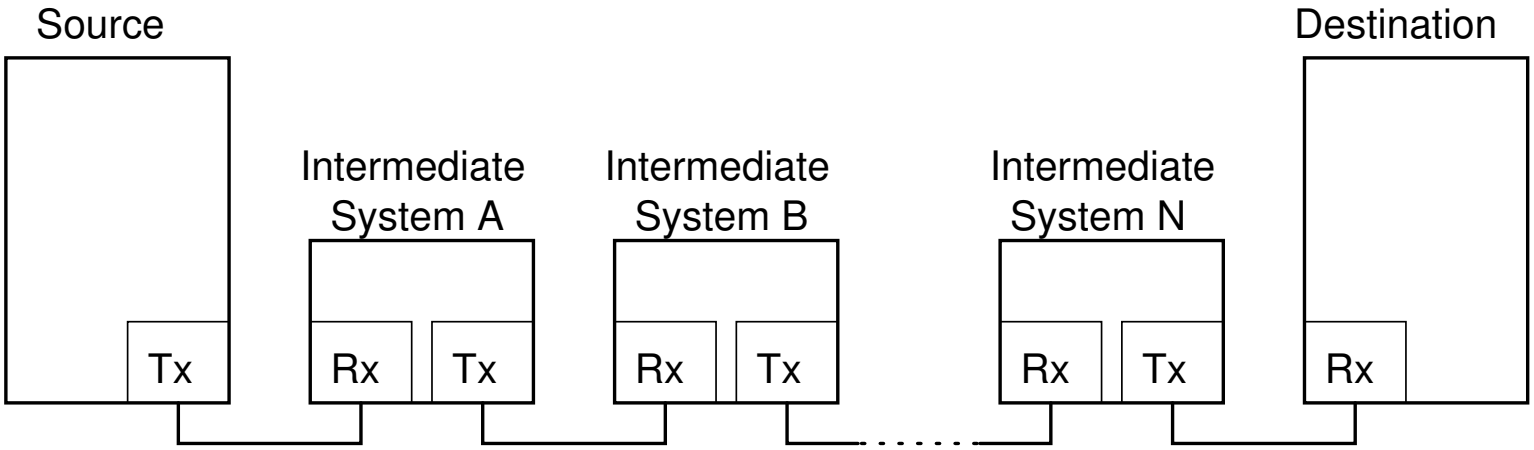
- Source and transmitter are separate devices (similar at destination)
- Transmission system is telephone network

Example: Communications via the Internet



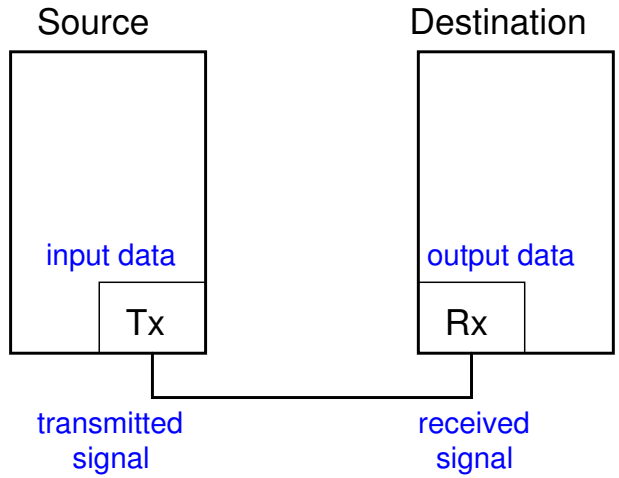
- Source and transmitter may support different technologies
- Transmission system is the Internet

General Model for Communications via a Network



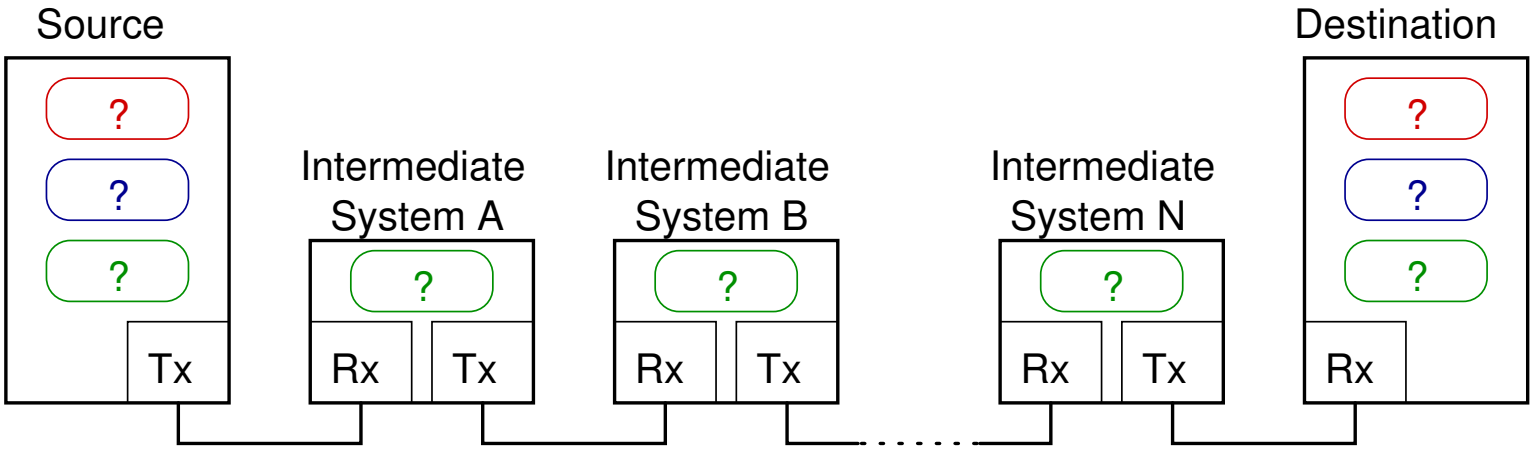
- Source system generates data
- Intermediate systems receive signal from previous system and then transmit to next system
- Destination system receives and processes the data
- Source and destination are connected via multiple transmission systems (or links) to form a network

Challenges with Link Communications



- How to convert information into transmittable signals?
- What are the characteristics of signals?
- What transmission media to use?
- How to efficiently encode data as signals?
- How to know who is at other end?
- How to deal with errors?
- How to share media amongst two or more transmitters?

Challenges with Networked Communications



- How do intermediate systems receive/send data?
- How to select which intermediate systems to send via?
- What happens if failures within intermediate systems?
- How to create applications without knowing the details of underlying network and technologies?