CS3200: Computer Networks

Lecture 1

IIT Palakkad

24 Jul, 2019

Course Details

Title	:	Computer Networks
Code	:	CS3200
Category	:	PMT
Credits	:	3-0-0-3
Hours per week	:	3 lecture hours
Offering	:	S7
Faculty	:	Albert Sunny
Department	:	CSE

Course Materials

Textbooks

1. James F Kurose and Keith W Ross. **Computer Networking: A Top-Down Approach Featuring the Internet**, Pearson publication.

2. Andrew S. Tanenbaum and David J Wetherall, **Computer Networks**, Pearson publication.

Reference

1. Behrouz A. Forouzan and Sophia Chung Fegan, **Data Communication and Networking**, Huga Media, 2007.

Why study this course?

- Today's Internet is arguably the largest engineered system ever created by mankind, with hundreds of millions of connected devices and communication links.
- Given that the Internet is so large with many diverse components and uses, is it possible to understanding how it works?
- Are there guiding principles and structure that can provide a foundation for understanding such an amazingly large and complex system?
- This course aims to provide an introduction to the dynamic field of computer networking, giving you the principles and practical insights.

Evaluation Criteria

Attendance	:	$\geq 85\%$
Scribing lecture notes (due in one week)	:	5%
Weekly quizzes	:	20%
Mid-term I	:	15%
Mid-term II	:	15%
Final exam	:	45%
Min pass marks	:	35/100

What is the Internet?

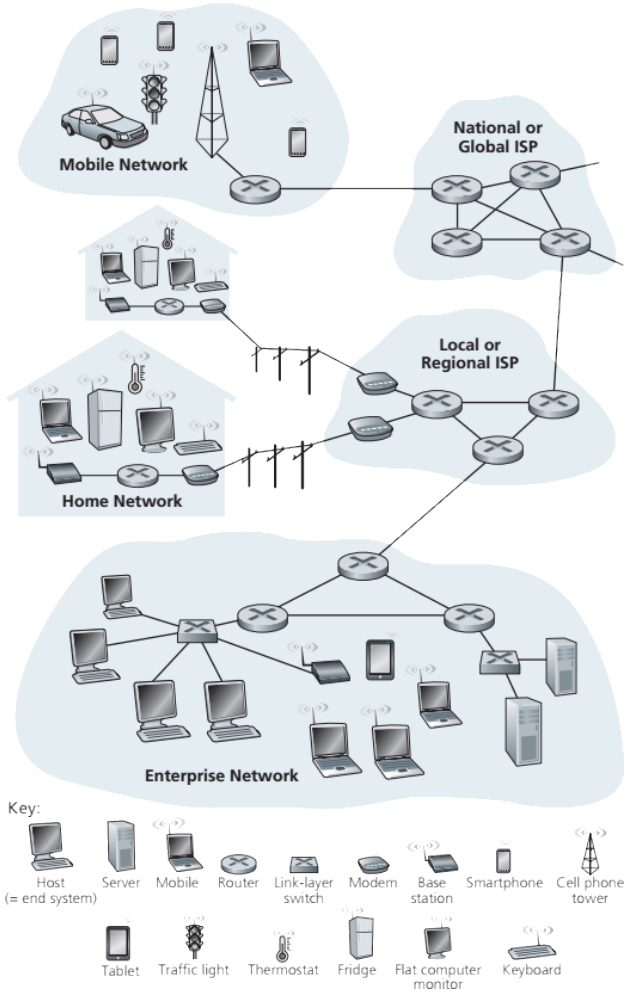

Figure: [Kurose and Ross] Some pieces of the internet.

What is a protocol?

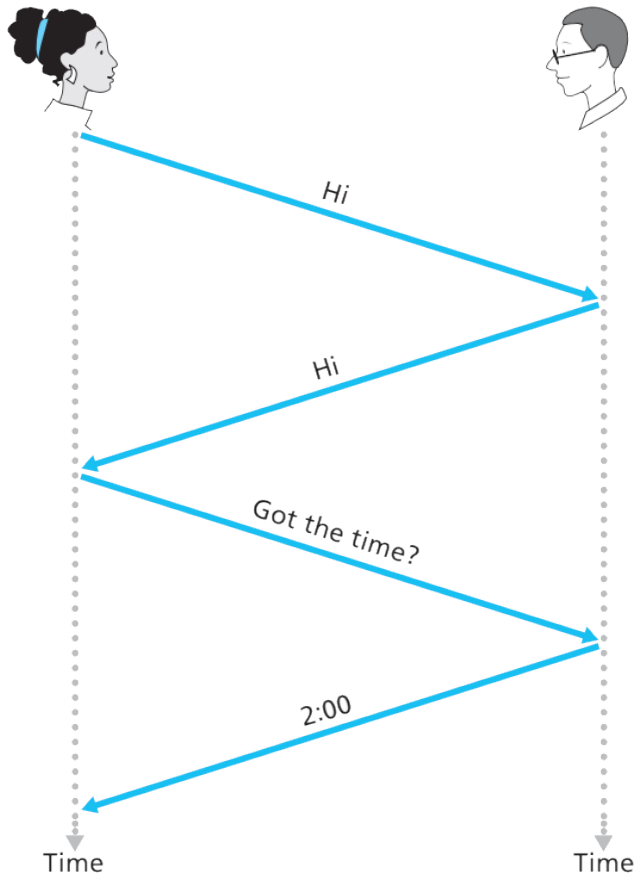

Figure: [Kurose and Ross] A human protocol.

What is a protocol?

A **protocol** defines the format and the order of messages exchanged between two or more communicating entities, as well as the actions taken on the transmission and/or receipt of a message or other event.

- A network protocol is similar to a human protocol, except that the entities exchanging messages and taking actions are hardware or software components of some device.
- Mastering the field of computer networking is equivalent to understanding the what, why, and how of networking protocols.

Packet Switching

- End systems exchange messages with each other.
- Long messages into smaller chunks of data known as packets.
- Between source and destination, each packet travels through communication links and packet switches
- Packets are transmitted over each communication link at a rate equal to the full transmission rate of the link. So, if a source end system or a packet switch is sending a packet of L bits over a link with transmission rate R bits/sec, then the time to transmit the packet is L/R seconds.

Packet Switching

Store-and-forward transmission means that the packet switch must receive the entire packet before it can begin to transmit the first bit of the packet onto the outbound link.

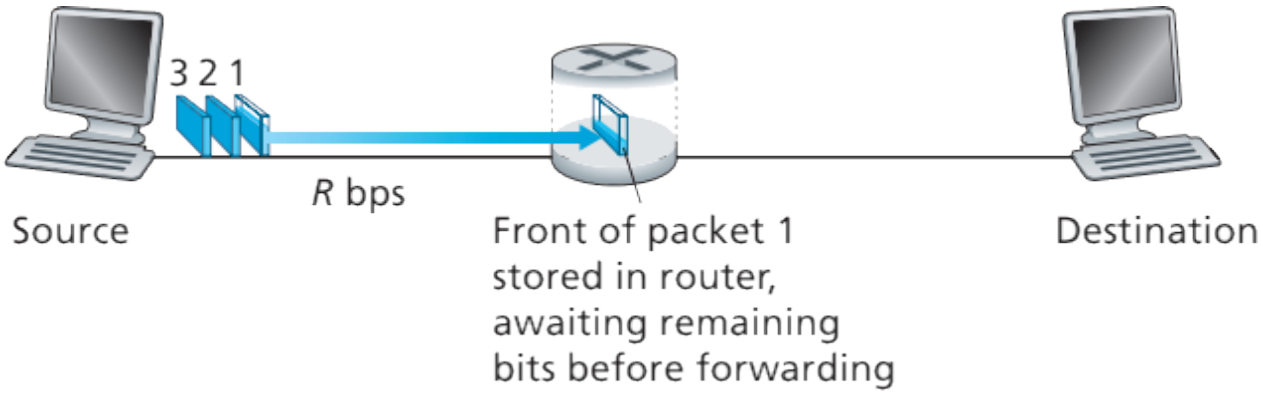

Figure: [Kurose and Ross] Store-and-forward packet switching.

Circuit Switching

Resources needed along a path (buffers, link transmission rate) to provide for communication between the end systems are reserved for the duration of the communication session between the end systems.

A circuit in a link is implemented with either frequency-division multiplexing (FDM) or time-division multiplexing (TDM).

Circuit Switching is basically used for real time applications

Which is better: packet switching or circuit switching?

Delay in Packet-Switched Networks

- **Processing Delay** The time required to examine the packet's header and determine where to direct the packet is part of the processing delay. The processing delay can also include other factors, such as the time needed to check for bit-level errors in the packet.
- **Queuing Delay** At the queue, the packet experiences a queuing delay as it waits to be transmitted onto the link.
- **Transmission Delay** This is the amount of time required to push (that is, transmit) all of the packet's bits into the link.
- **Propagation Delay** The required for a the packet to propagation the link.