

CS 31006: Computer Networks

Department of Computer Science
and Engineering



INDIAN INSTITUTE OF TECHNOLOGY
KHARAGPUR

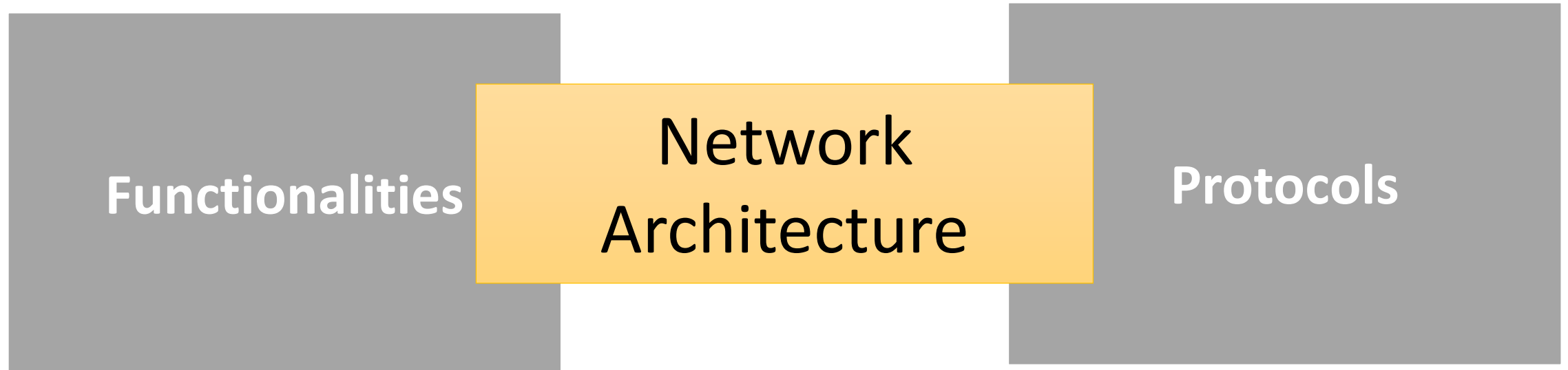


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sandipc@cse.iitkgp.ac.in

Objectives of the Course

- Understand how two computers in the Internet talk to each other
- Go through the basic functionalities of the computer networks
- Learn how to program the network
- Learn the future of the computer network – Do we need any further changes in the design?



So, What is Network Architecture?

- A way to visualize how two remote computers talk to each other



Network Protocol Stack



So, What is Network Architecture?



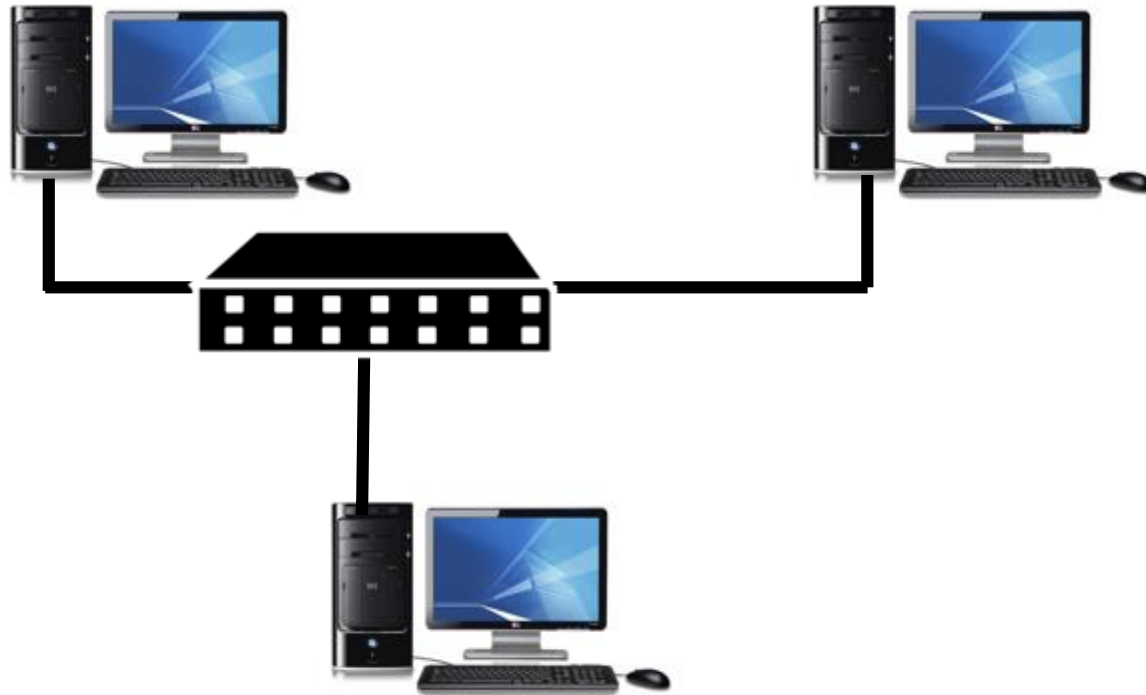
So, What is Network Architecture?



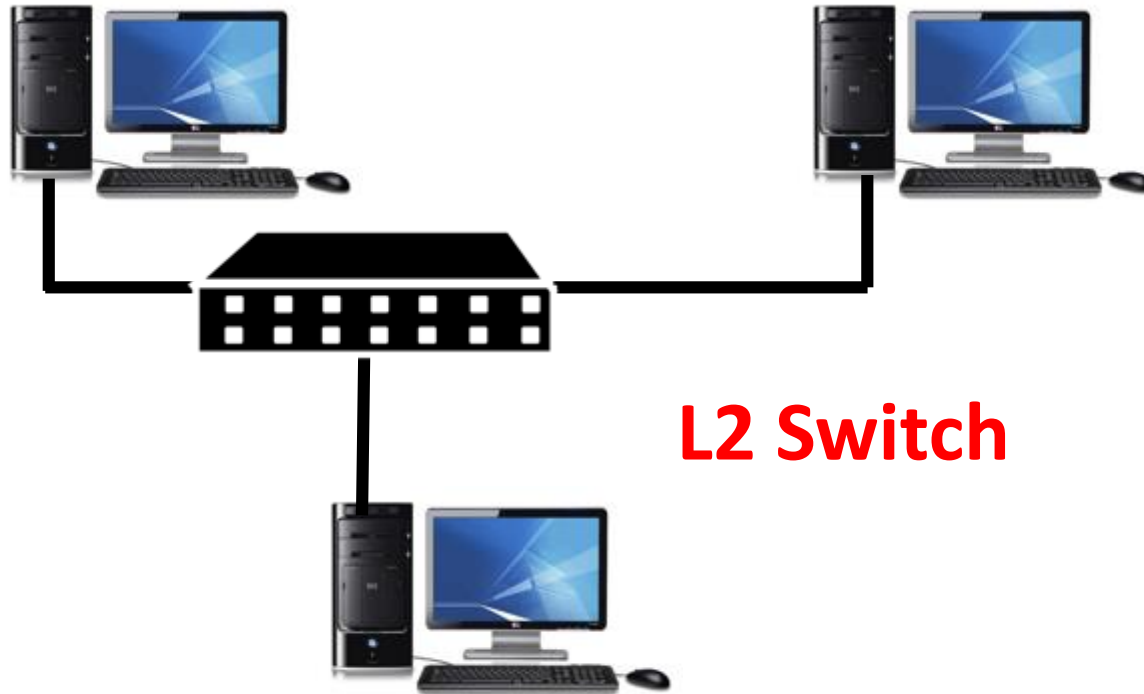
Requirement: Convert digital data to analog signal and vice versa

Physical

So, What is Network Architecture?



So, What is Network Architecture?



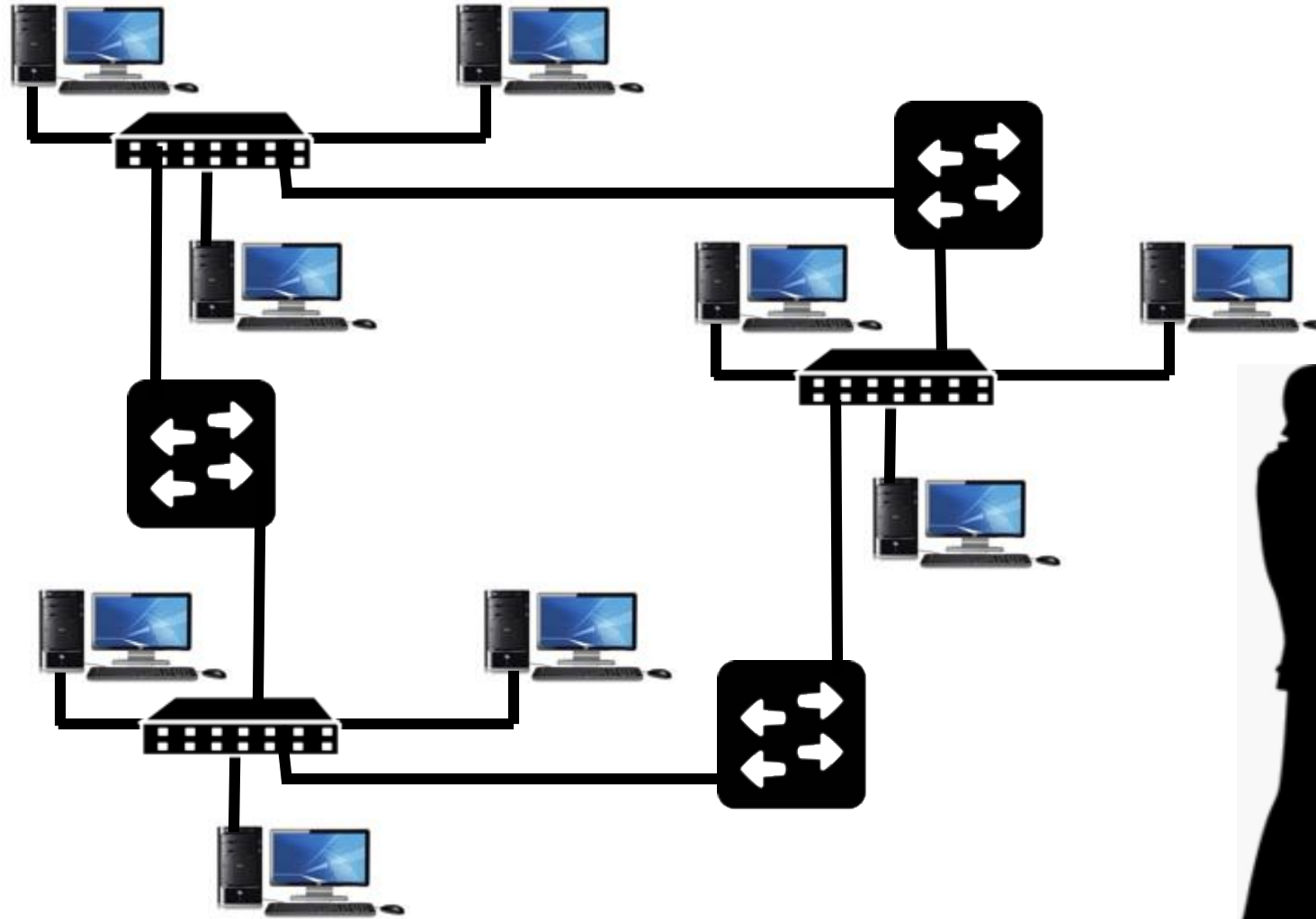
L2 Switch

Requirement: Ensure proper scheduling in media access

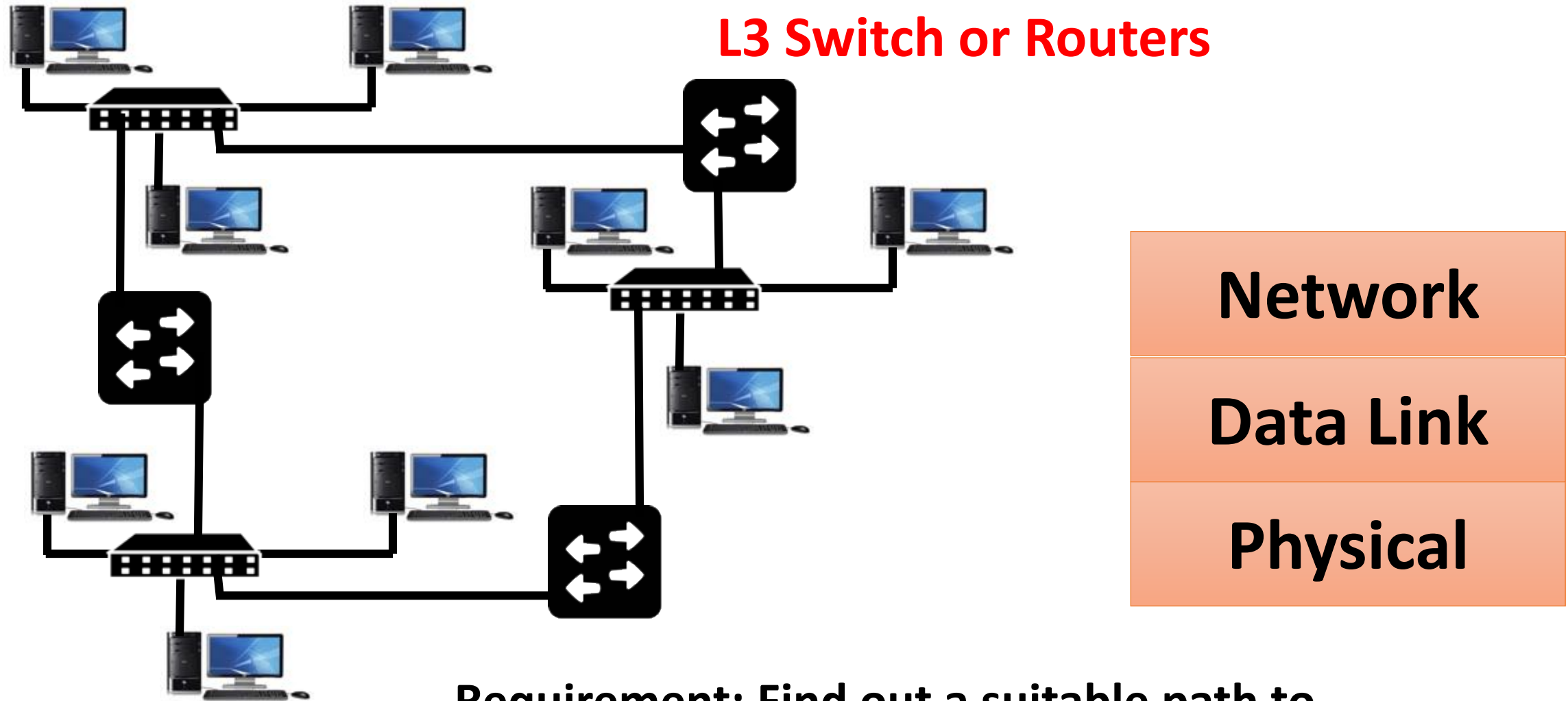
Data Link

Physical

So, What is Network Architecture?

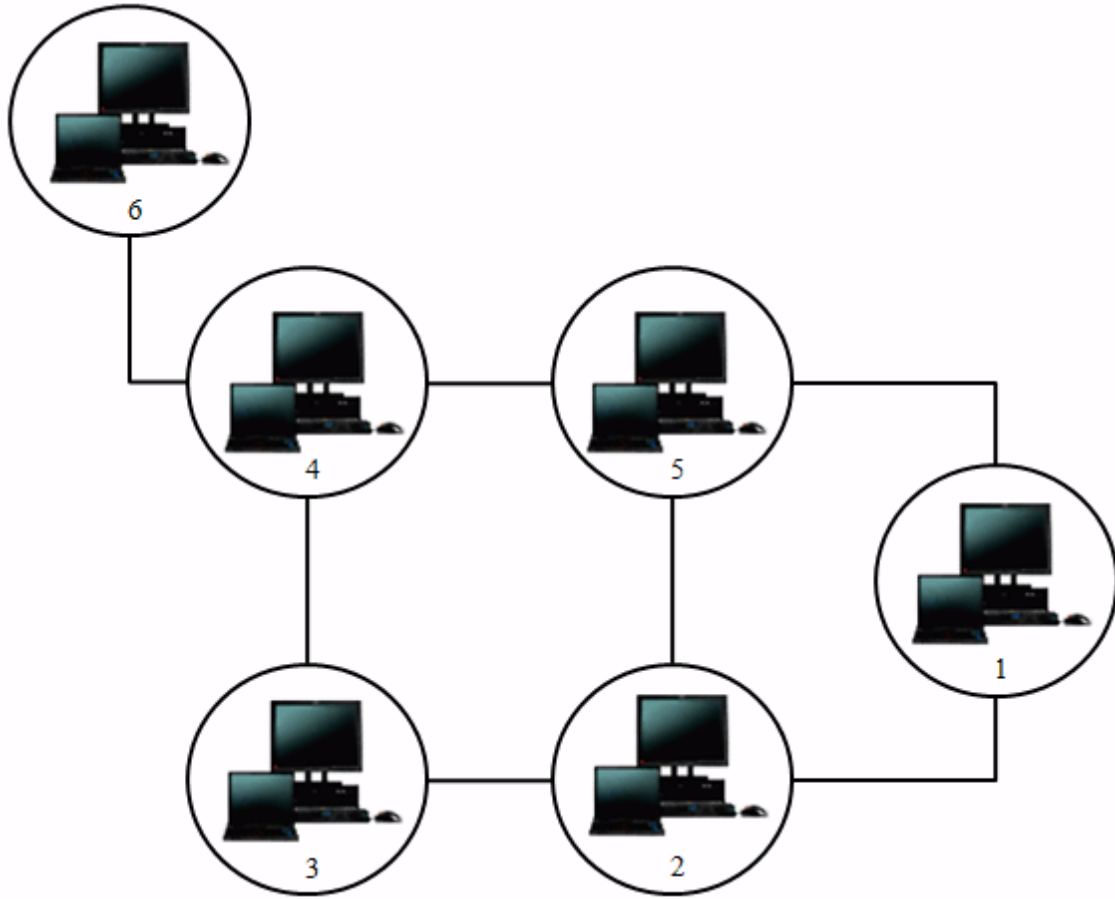


So, What is Network Architecture?

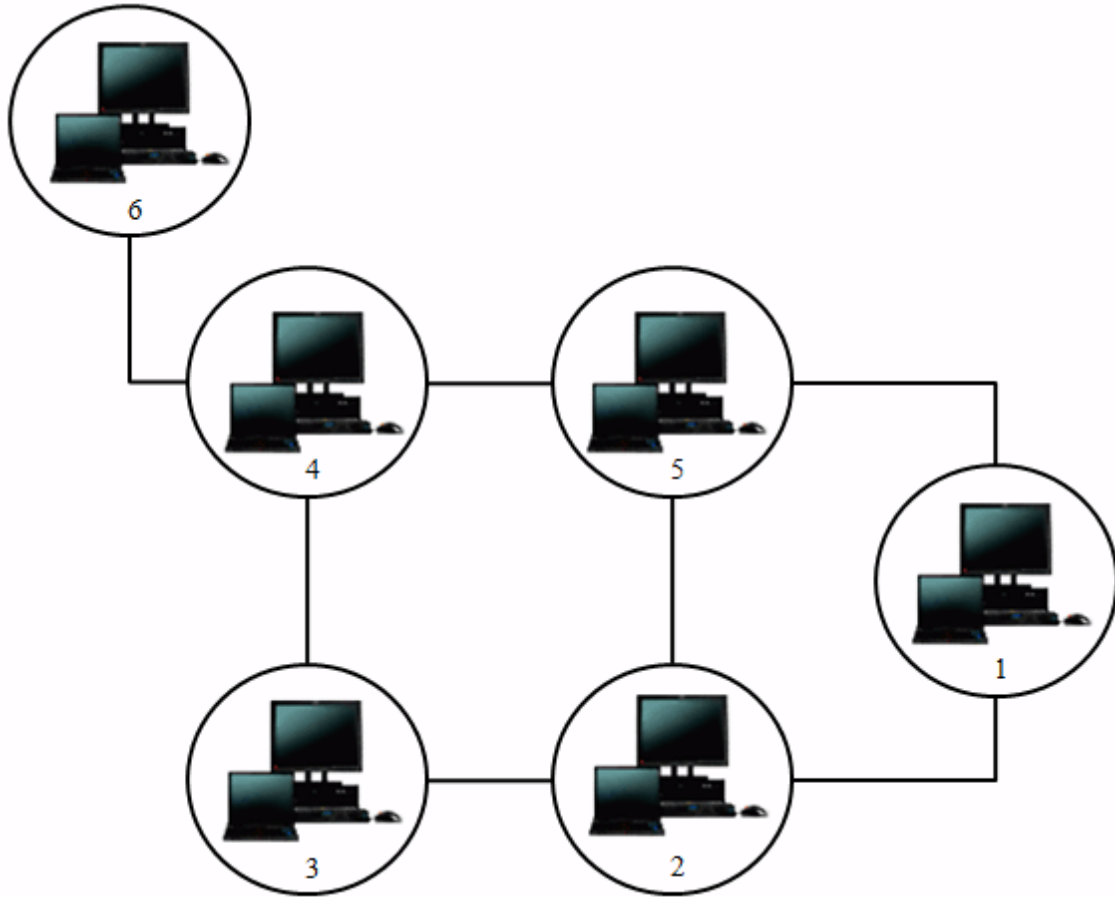


Requirement: Find out a suitable path to forward data

So, What is Network Architecture?



So, What is Network Architecture?



Transport

Network

Data Link

Physical

Requirement: End to end traffic control in the network

So, What is Network Architecture?



Network Protocol Stack



Application

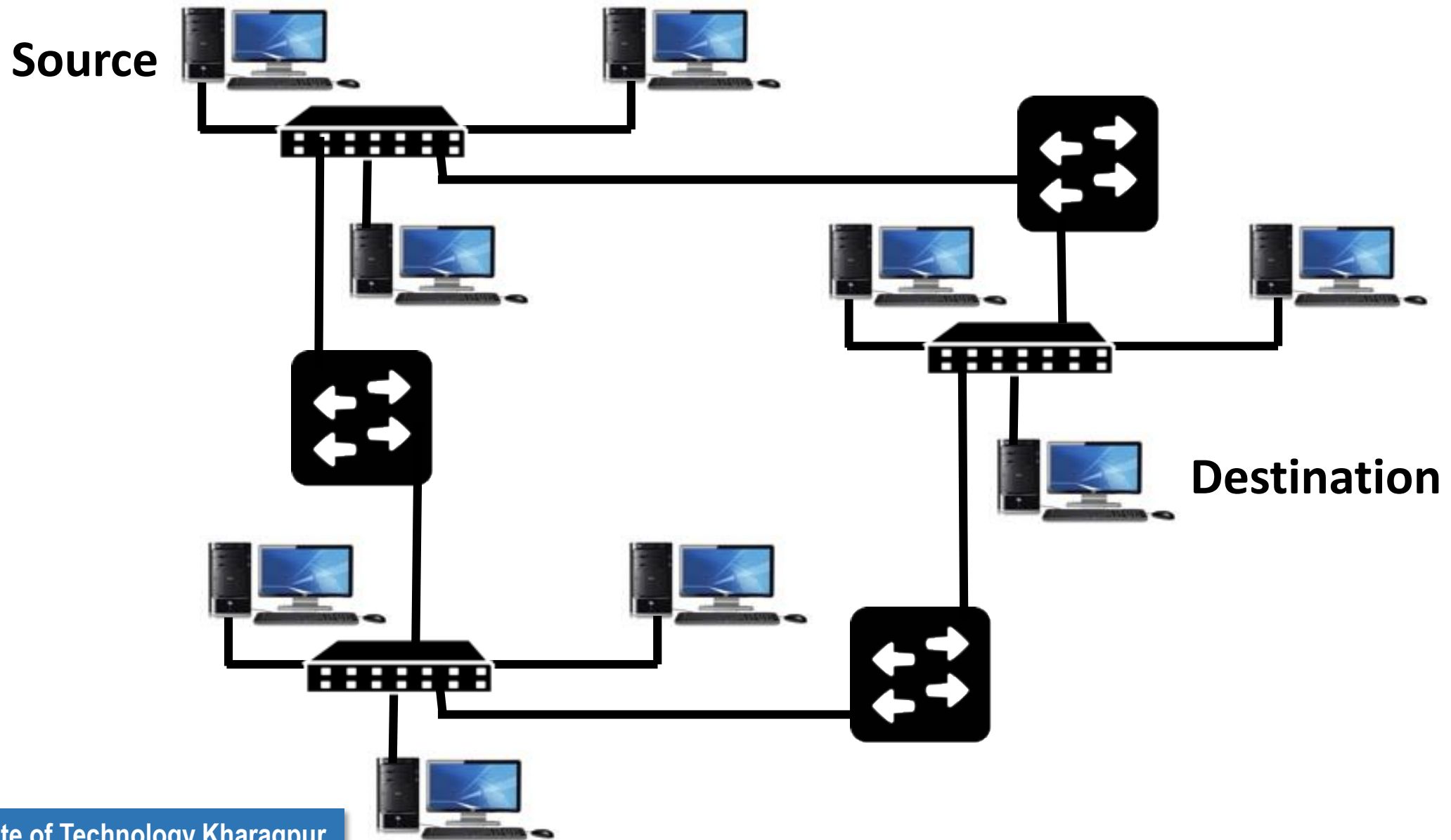
Transport

Network

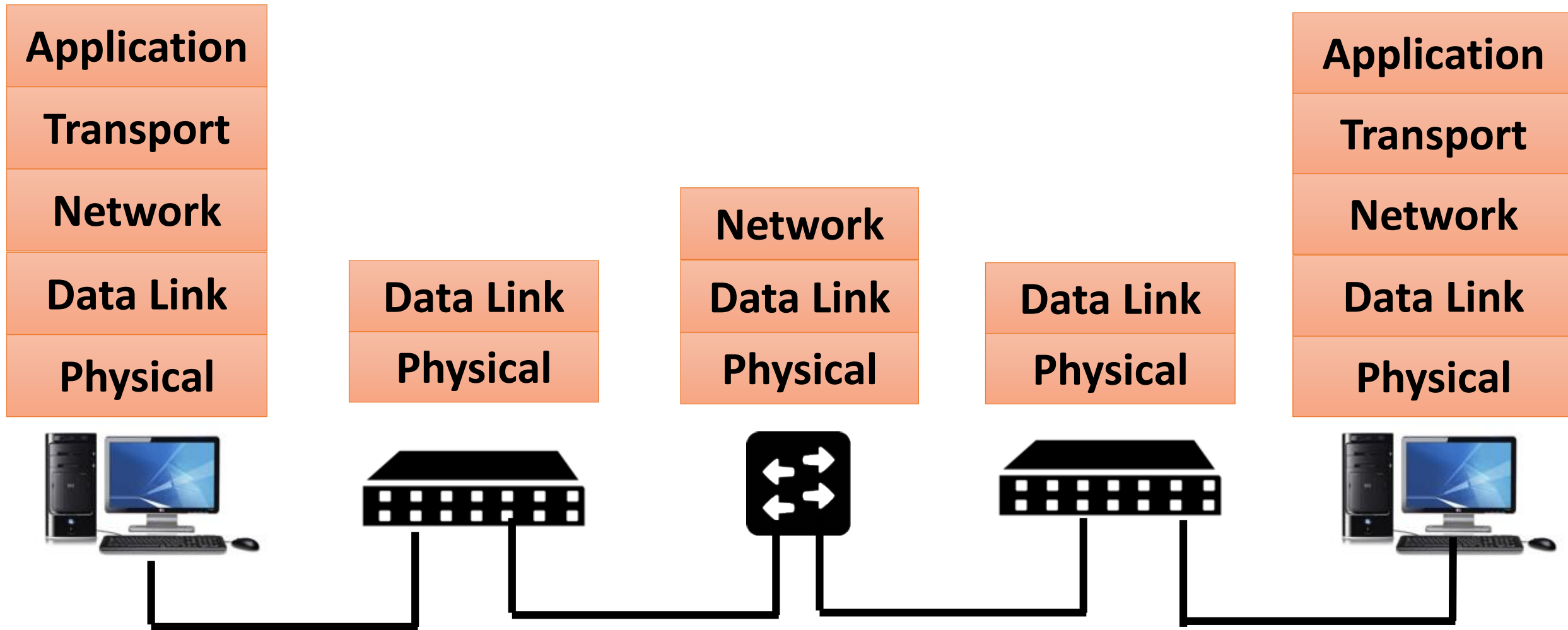
Data Link

Physical

Data Transfer between Two Remote Machines



Data Transfer between Two Remote Machines



Protocols at Different Layers

Application

HTTP, FTP, SMTP

Transport

TCP, UDP, RTP

Network

IPv4, IPv6, MPLS

Data Link

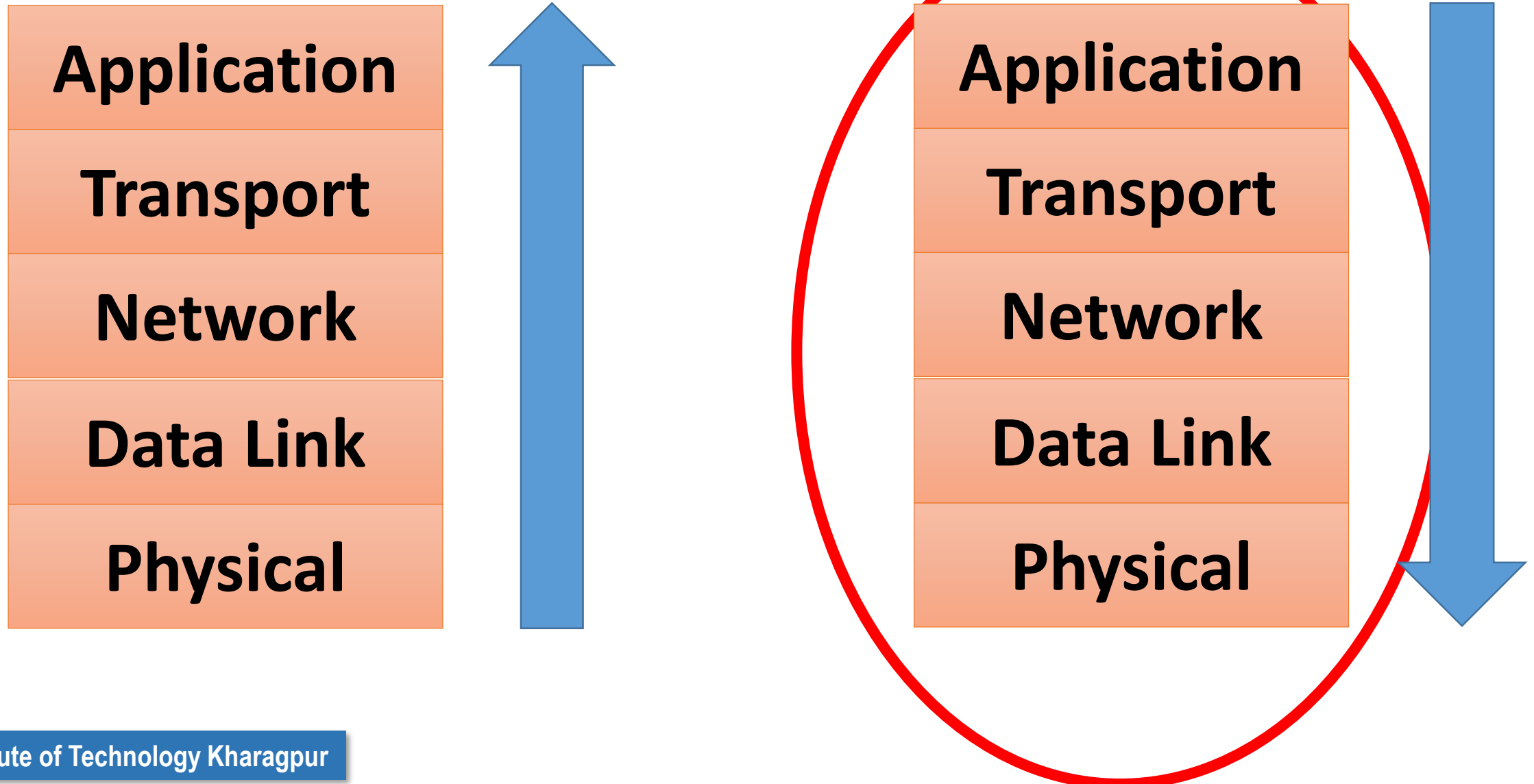
Ethernet, WiFi, Bluetooth, UMTS, LTE

Physical

Network Management and Control – Cross Layer Protocols

Application	HTTP, FTP, SMTP	DNS
Transport	TCP, UDP, RTP	SNMP
Network	IPv4, IPv6, MPLS	ARP, DHCP
Data Link	Ethernet, WiFi, Bluetooth, UMTS, LTE	
Physical		

Two Ways to Learn Computer Networks



Books to Follow ...

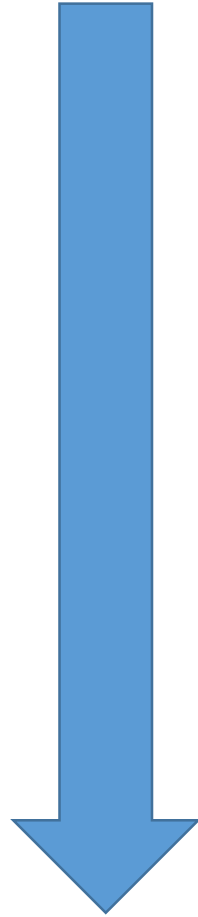
Application

Transport

Network

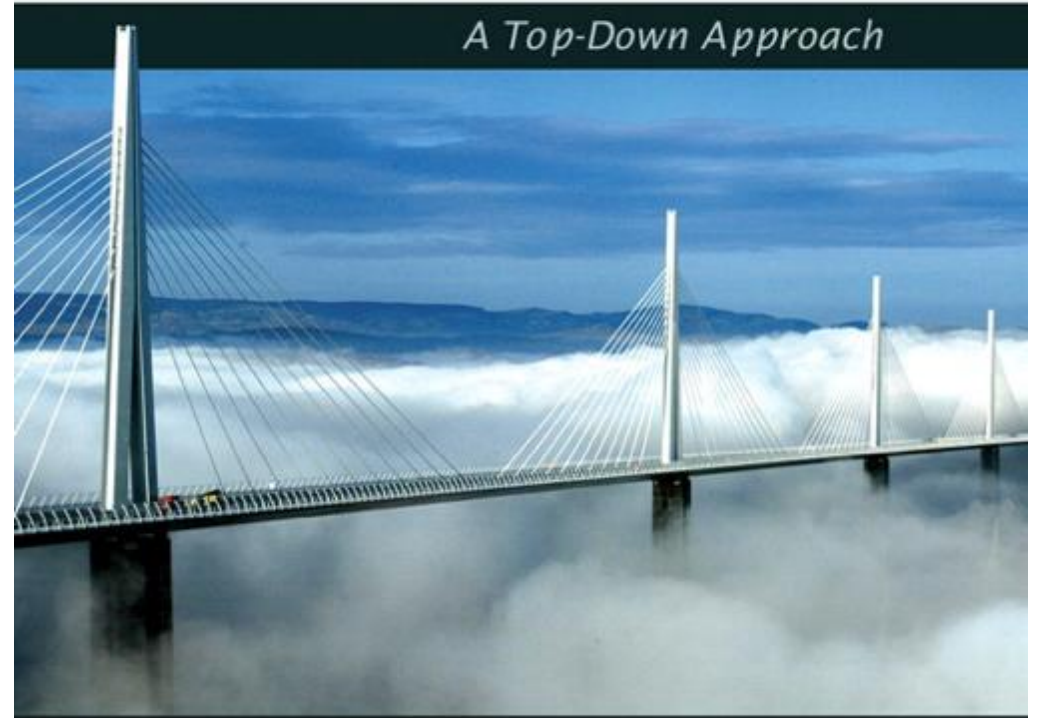
Data Link

Physical



COMPUTER NETWORKING FIFTH EDITION

A Top-Down Approach



KUROSE • ROSS

Books to Follow ...

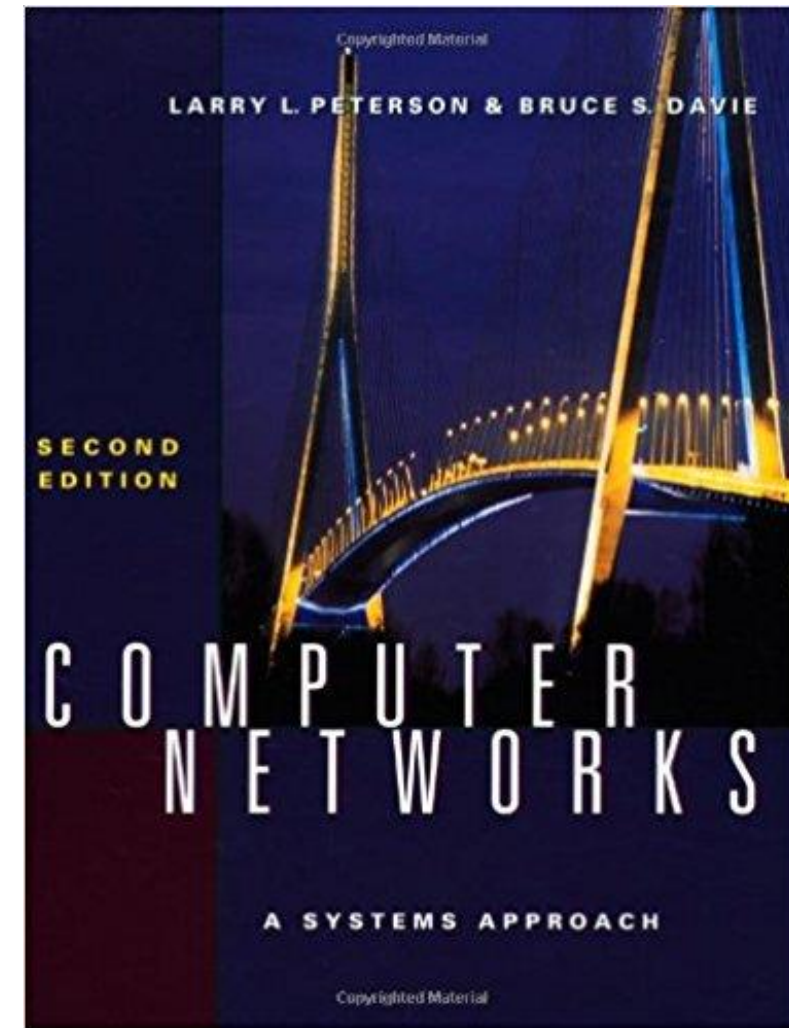
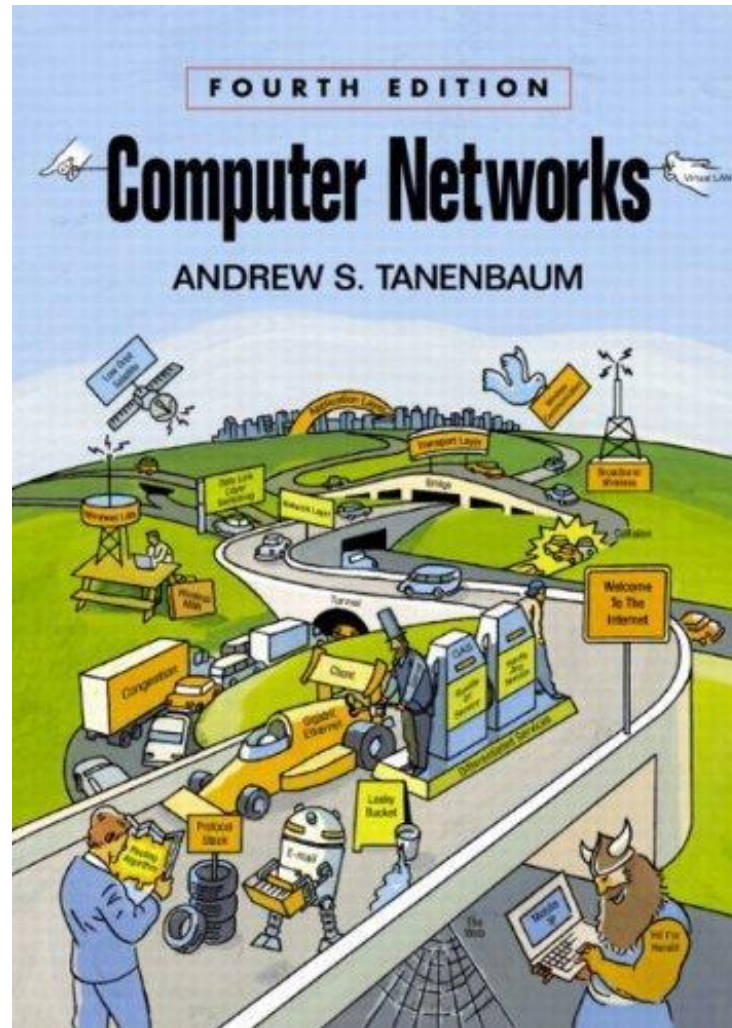
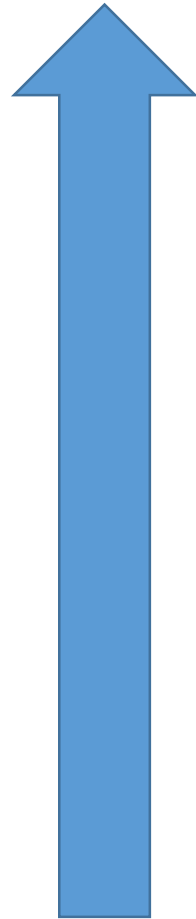
Application

Transport

Network

Data Link

Physical



Books to Follow (Online Books)...

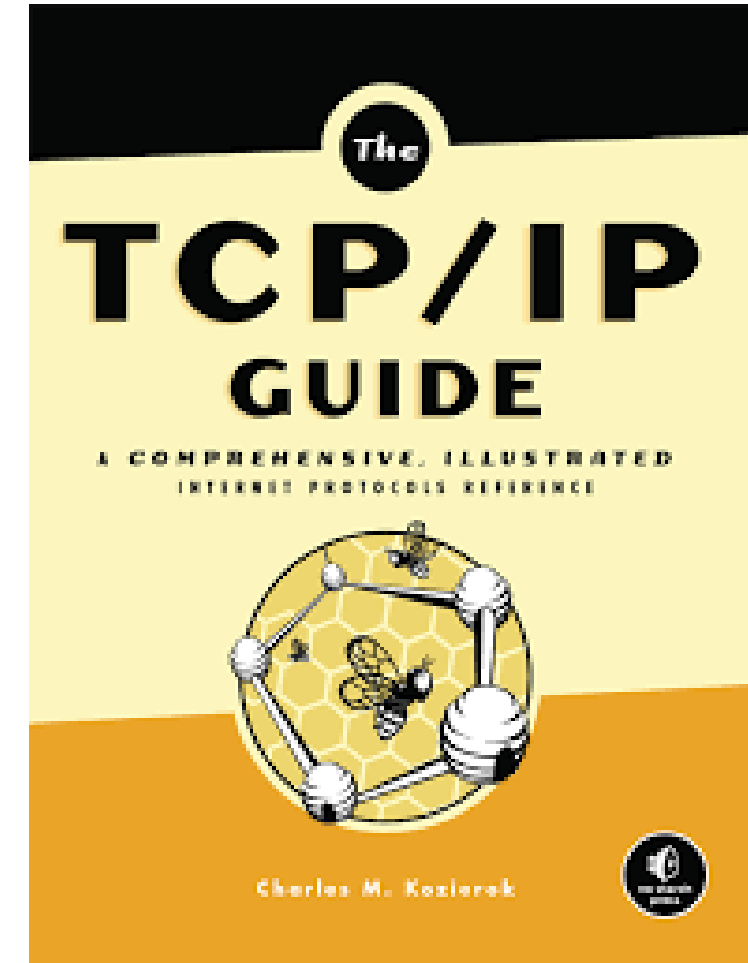
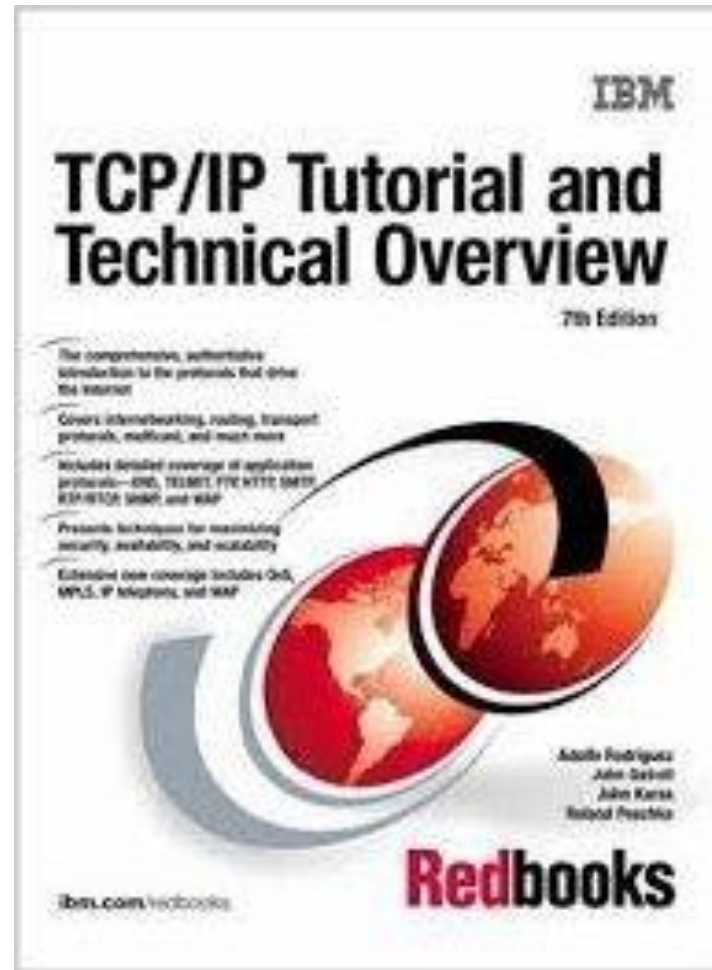
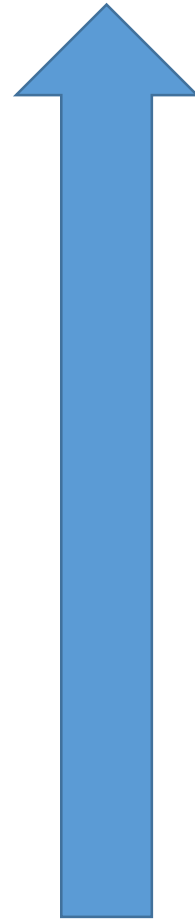
Application

Transport

Network

Data Link

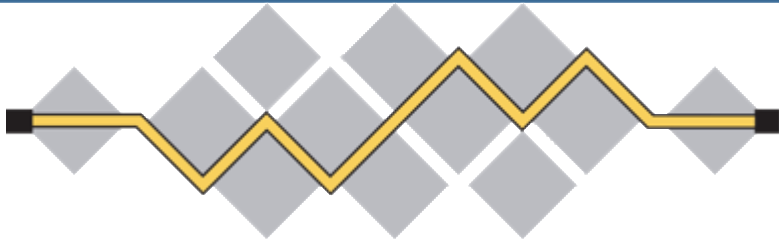
Physical



<http://www.redbooks.ibm.com/abstracts/gg243376.html>

<http://www.tcpipguide.com/>

Internet Resources



IETF®

Request for Comments (RFC)

Memos in the **Requests for Comments (RFC)** document series contain technical and organizational notes about the Internet. They cover many aspects of computer networking, including protocols, procedures, programs, and concepts, as well as meeting notes, opinions, and sometimes humor. Below are links to RFCs, as available from ietf.org and from rfc-editor.org. Note that there is a brief time period when the two sites will be out of sync. When in doubt, the RFC Editor site is the authoritative source page.

RFCs associated with an active IETF Working Group can also be accessed from the Working Group's web page via [IETF Working Groups](#).

IETF Repository Retrieval

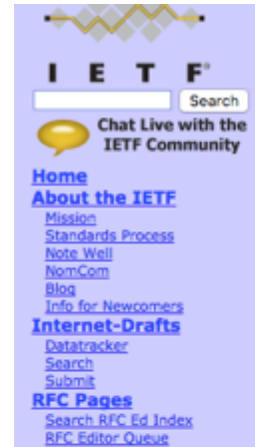
- Advanced search options are available at [IETF Datatracker](#) and the [RFC Search Page](#).
- A text index of RFCs is available on the IETF web site here: [RFC Index \(Text\)](#).
- To go directly to a text version of an RFC, type <https://www.ietf.org/rfc/rfcNNNN.txt> into the location field of your browser, where NNNN is the RFC number.

RFC Editor Repository Retrieval

- [RFC Search Page](#)
- RFC Index ([HTML](#) | [TXT](#) | [XML](#))
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- [RFC Editor Queue](#)

RFC Errata

Published RFCs never change. Although every published RFC has been submitted to careful proofreading by the RFC Editor



The Internet Engineering Task Force (IETF®)

The goal of the IETF is to make the Internet work better.

The mission of the IETF is to make the Internet work better by producing high quality, relevant technical documents that influence the way people design, use, and manage the Internet. Newcomers to the IETF should [start here](#).

News

- [IETF 104 in Prague!](#)
- [IETF Blog](#)
- [IETF Daily Dose](#)

Next Meeting: IETF 101 London

[IETF 101 - March 17-23, 2018](#)

- [Register](#)
- [Important Dates](#)
- [Wiki](#)
- [Agenda](#)
- [Meeting Materials](#)
- [Remote Participation](#)
- [Hackathon](#) (open to public)



Recent Meeting: IETF 100 - Singapore

e tool realizing the requirements 6778 is now in use:

- [IETF 100 Information](#)
- [IETF 100 Proceedings](#)

[ETF email archives](#)

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Course Evaluations

- Two class tests
 - Average: 20%
- Mid semester Examination: 30%
- End-semester Examination: 50%

Sections

- Section - 1
 - Odd roll numbers
 - Class Room: NC 241
 - Primary Teacher: Prof. Rajat Subhra Chakraborty
- Section - 2
 - Even roll numbers
 - Class Room: NC 242
 - Primary Teacher: Prof. Sandip Chakraborty

Other Course Related Information

- Course Website:
https://cse.iitkgp.ac.in/~sandipc/Courses/CS_31006_Spring_2020.html
- All course materials will be posted in the website
- We'll set up a Piazza group – please use the group for any discussions
- Attendance: Institute policy will be followed – deregistration for low attendance
- Make the class live – no question is a stupid question !!!