



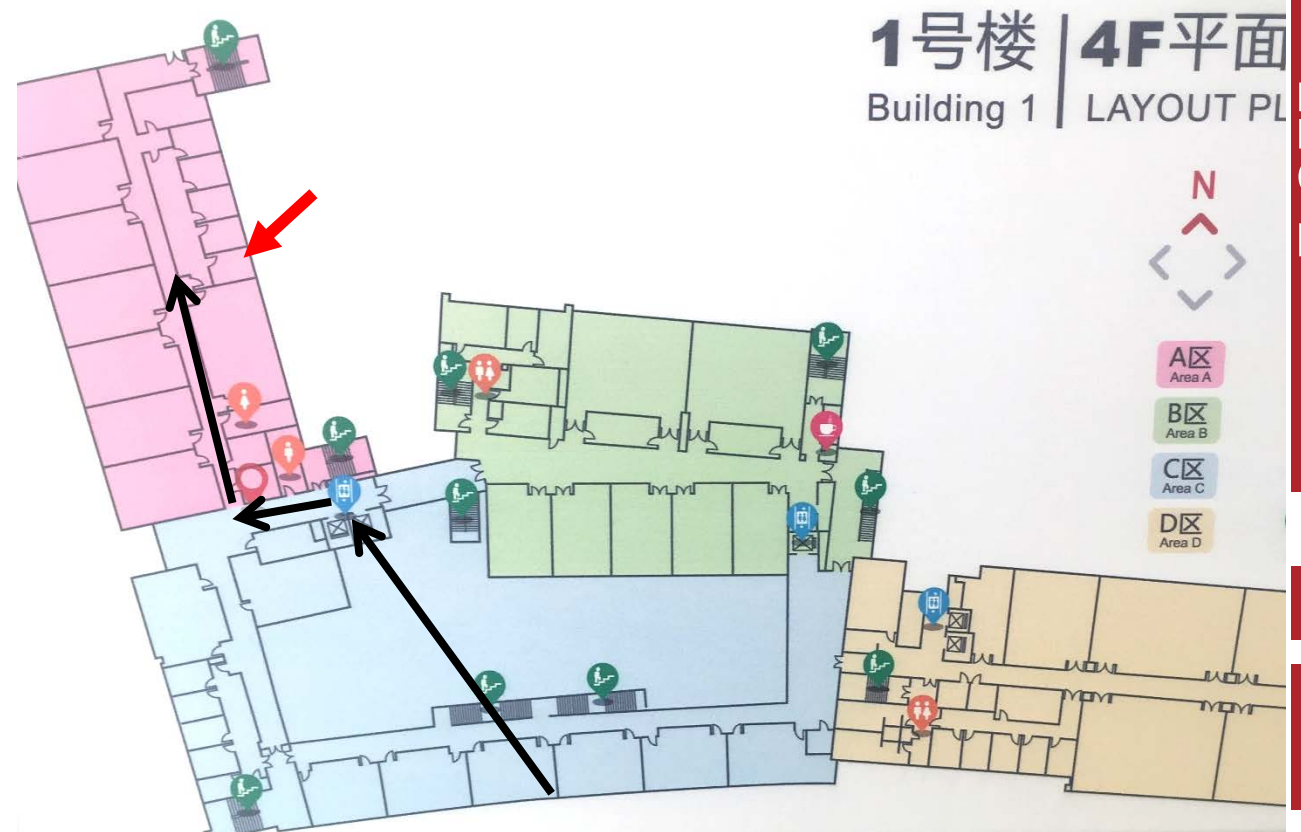
CS120: Computer Networks

Lecture 1. Course Introduction 1

Zhice Yang

General Information

- Instructor:
 - Zhice Yang (杨智策),
www.yangzhice.com
- Office hours:
 - Wednesday 2:30 p.m. – 4:30 p.m.
 - yangzhc@shanghaitech.edu.cn
 - 2068 5362
 - Office 1A-404E



General Information (cont.)

- TAs:
 - Yihui Yan (严亦晖)
 - yanyh@shanghaitech.edu.cn
 - Yueli Yan (严悦励)
 - yanyl@shanghaitech.edu.cn
 - Guanhua Zhao (赵冠华)
 - zhaogh@shanghaitech.edu.cn
 - Si Liao (廖思)
 - liaosi@shanghaitech.edu.cn
- Wechat
 - Q&A
 - Urgent Notifications
- Blackboard (互动教学平台)
 - Notifications
 - Course Materials
 - Homework Submission

Wechat QR Code

General Information (cont.)

- Textbook
 - Computer Networks: A System Approach 5th
 - by Larry Peterson, Bruce Davie
 - <http://product.dangdang.com/22722782.html> (English Version)
- References
 - Computer Networking: A Top-Down Approach 7th
 - by James Kurose, Keith Ross
 - <https://item.jd.com/12392810.html>

Grading

- **No Cheating !**
 - Once confirmed. Fail the course
- 20% Homework
 - Four Homework Assignments (5% each)
- 35% Final Exam
 - No Midterm
- 45% Course Project
 - Group: ≤ 2 students
 - email TA (liaosi@shanghaitech.edu.cn) your group members before Sep. 26
 - 40% for four subprojects (about 10% each)
 - Submit your project (code) to Blackboard
 - Ask TAs to check and grade your project before submitting your code
 - 5% if you finish all the four subprojects
 - “finish” means: obtain 60% points of the compulsory parts
 - Reference code of **project 1 and 2** is provided after the due
 - Programming language: No restrictions (Java is suggested)
 - Estimated coding overhead (3000 lines)
 - You can use any open-source code (should be explicitly acknowledged with reference link)
 - Project checking is scheduled in weekend
 - Can only use the sound cards provided (or sampling rate $\leq 48000\text{Hz}$)
- Up to 30% Bonus Score
 - For finishing optional parts of Course Project
- Delayed Submissions
 - $-10\% * N$, N is the delayed time in unit of day ($N \leq 10$)
 - -5% for the first 0 – 12 Hours
 - -10 % for the first 12 – 24 Hours

START PROJECT EARLY



Week	Time		Time	
1	Sep. 14	Course Introduction 1	Sep. 16	Course Introduction 2
2	Sep. 21		Sep. 23	Physical Layer
3	Sep. 28	<u>Discussion: Audio Interface</u>	Sep. 30	Framing & Error Detection
4	Oct. 5		Oct. 7	Reliable Transmission
5	Oct. 12	Multiple Access 1	Oct. 14	Multiple Access 2
6	Oct. 19	Switching	Oct. 21	IP address
7	Oct. 26	RIP and OSPF	Oct. 28	BGP
8	Nov. 2	NAT and Router Design	Nov. 4	SDN
9	Nov. 9	<u>Discussion: Network Simulator</u>	Nov. 11	Mobile Routing
10	Nov. 16	TCP 1	Nov. 18	TCP 2
11	Nov. 23	Congestion Control 1	Nov. 25	Congestion Control 2
12	Nov. 30	Other Topics in TCP	Dec. 2	Data Presentation & Compression
13	Dec. 7	DNS	Dec. 9	HTTP & SMTP
14	Dec. 14	FTP & P2P	Dec. 16	Network Security 1
15	Dec. 21	Network Security 2	Dec. 23	
16	Dec. 28		Jan. 6	
18	Dec. 18		Dec. 20	

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Withdraw Policy

- According to University's Policies

What is a Computer Network



Internet

Information
Sharing



Microsoft®
Outlook® Web App

Security ([show explanation](#))

- ☒ This is a public or shared computer
- ☐ This is a private computer

☐ Use the light version of Outlook Web App

User name:

Password:

[Sign in](#)

Connected to Microsoft Exchange
© 2010 Microsoft Corporation. All rights reserved.

Email



Device to Device Connections



Wireless Connections

The Purpose of This Course is

- NOT to teach how to
 - Write network apps
 - Configure network devices



App Store



Google™ play

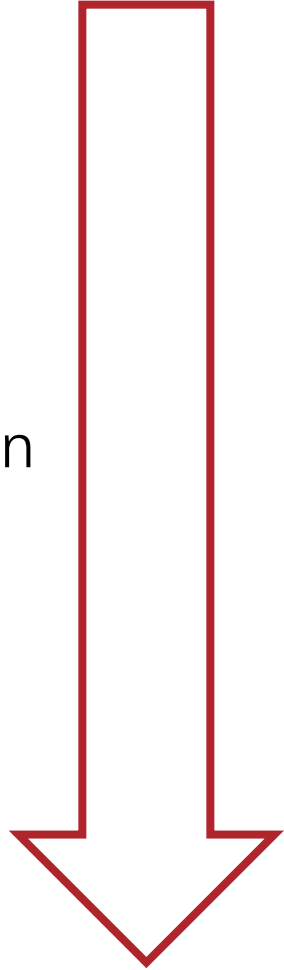


The Purpose of This Course is

to Build a Computer Network

to understand how real computer networks work

Top-Down



Bottom-Up



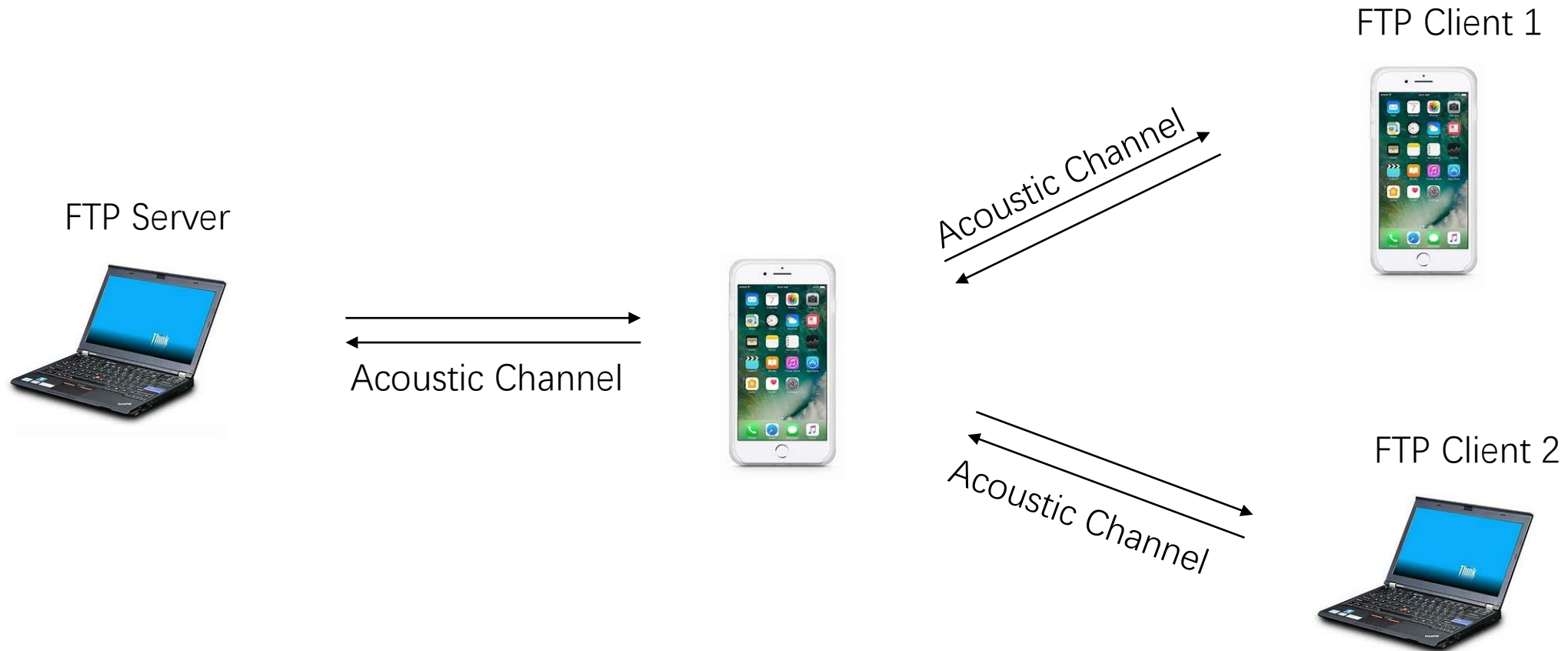
Build a HTTP Service from Ground up ?

- A Real Network Like Internet is too Complicated to Build
 - Implement an http server (Apache, Nginx...)
 - Implement an http browser (Chrome, IE...)
 - Implement a TCP/IP stack (net/core, socket...)
 - Implement a link layer driver (ath9k, e1000...)
 - Implement a modem chip (ar9285, Intel i210...)

No one can do this in one semester...

About our Project

- Acoustic Toy Network (ATNet)



Subproject 1

- Acoustic Connection
 - Node to node connection through speakers and microphones

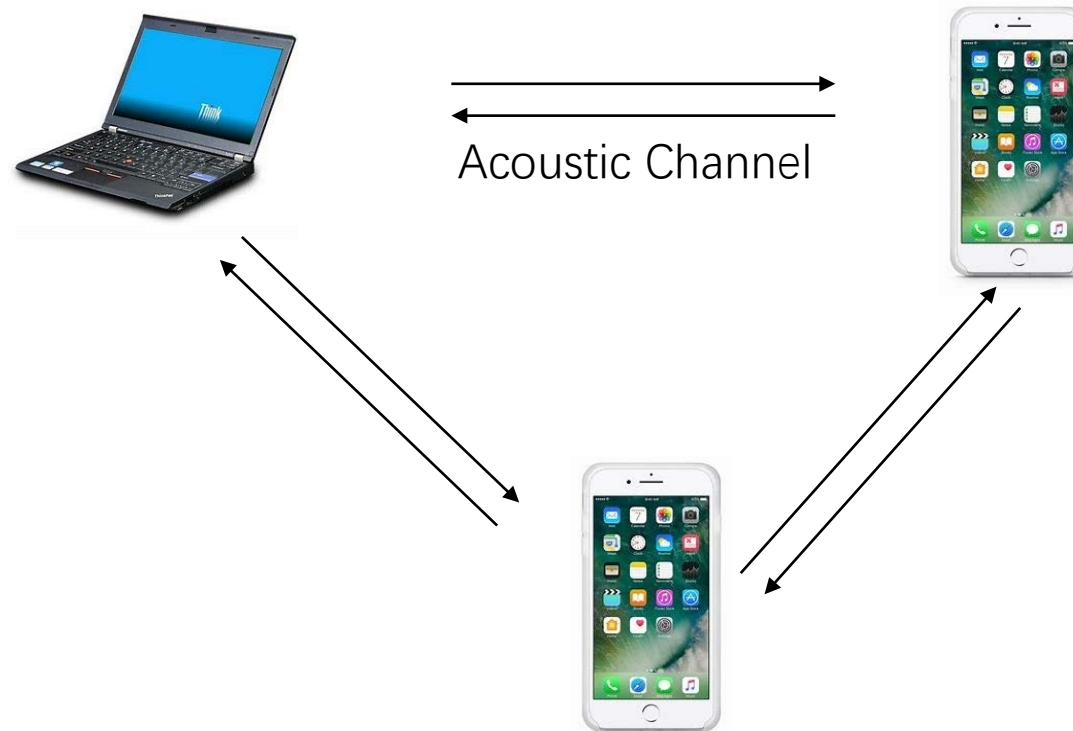


↔
Acoustic Channel



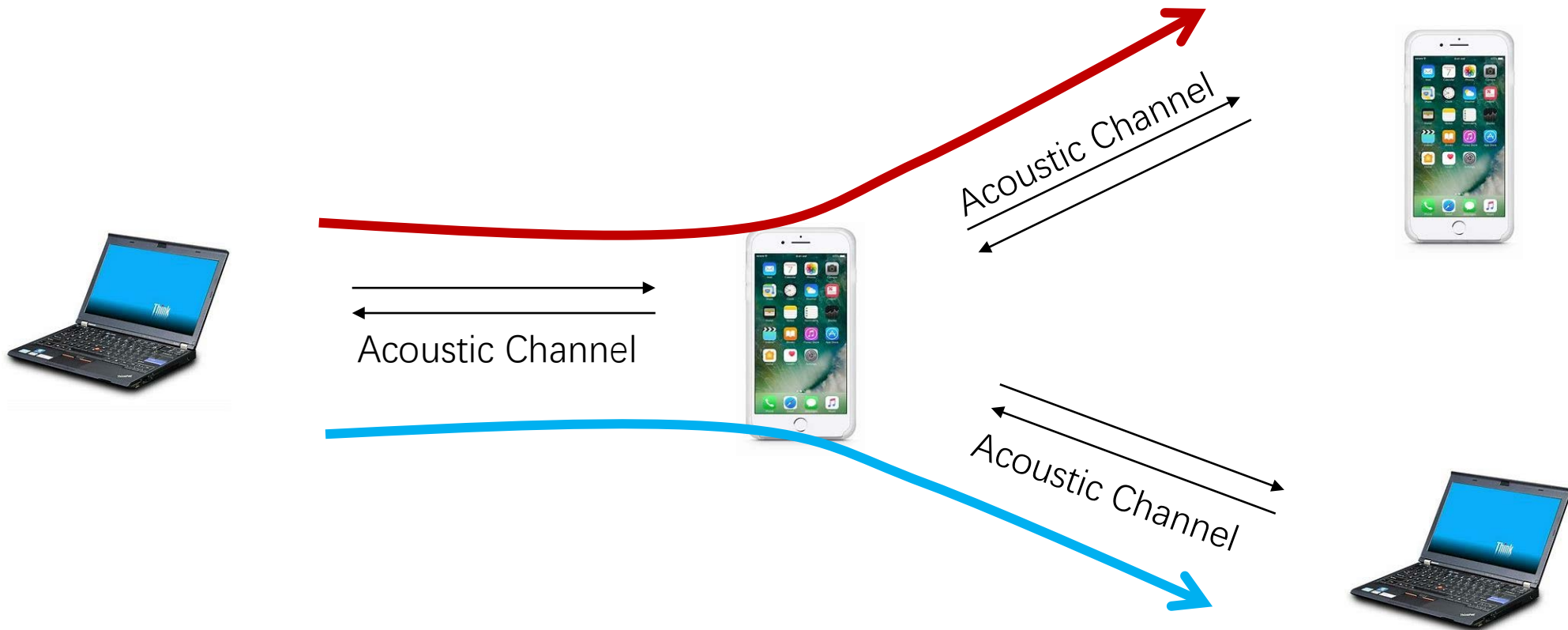
Subproject 2

- Multiple Access
 - Efficiently handle the access of multiple nodes



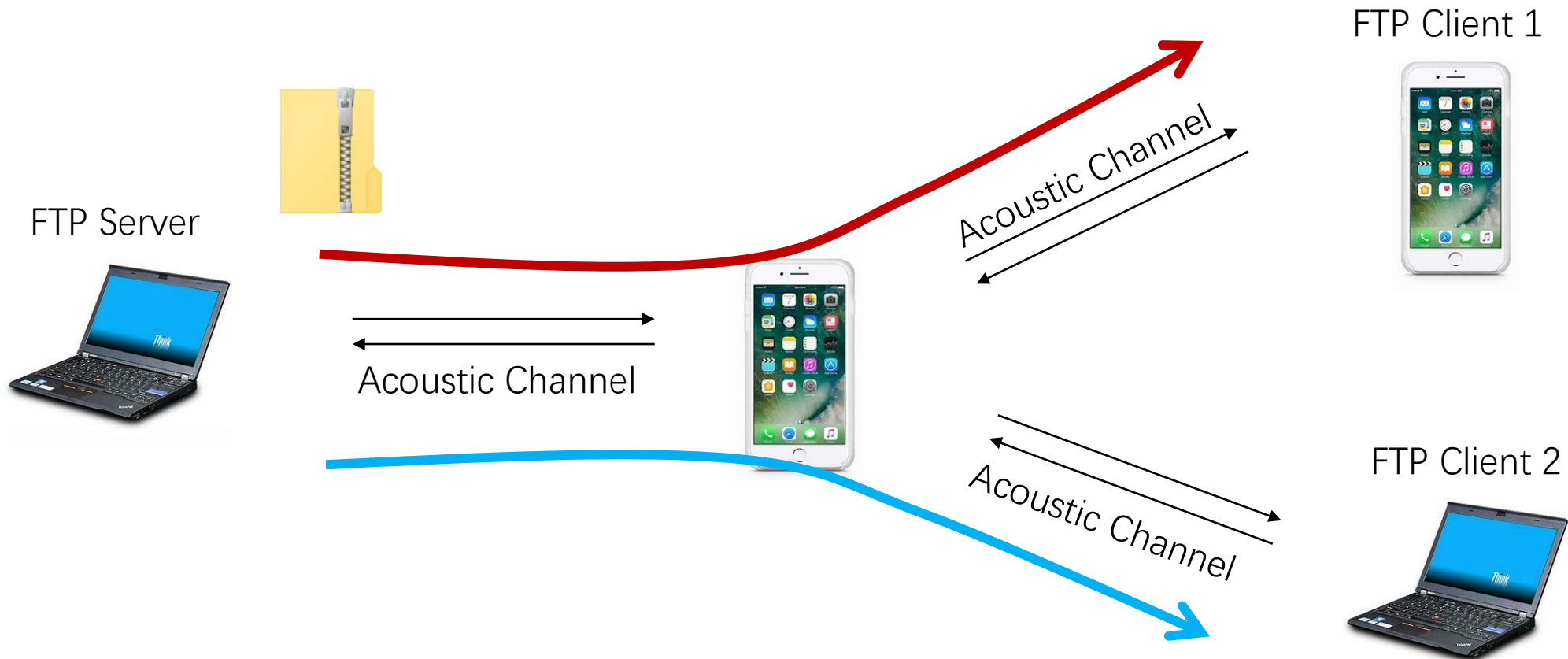
Subproject 3

- NAT/Router
 - Implement a network gateway



Subproject 4

- Reliable Delivery and Network Application
 - eg: FTP



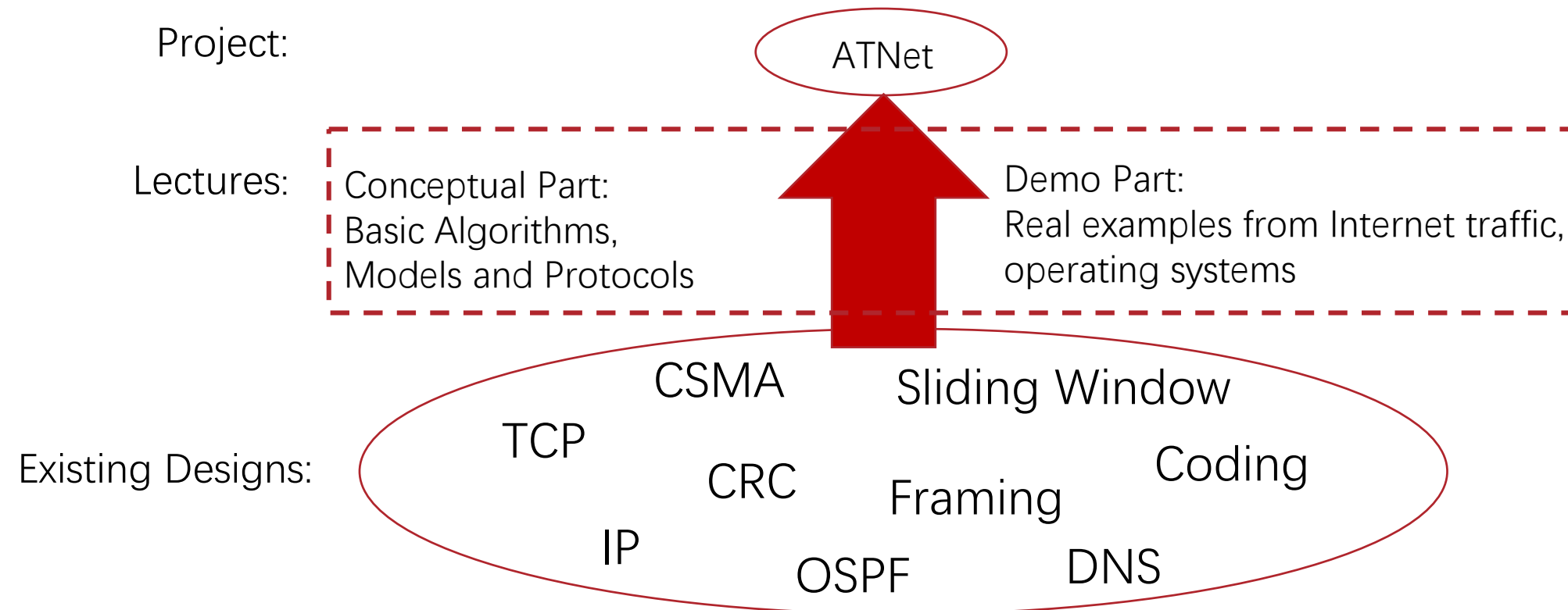
About the Project

- Building the Acoustic Toy Network (ATNet)
 - Basic Communication
 - Reliability
 - Resource Sharing
 - Scalability
 - etc...

Still Very Challenging ...

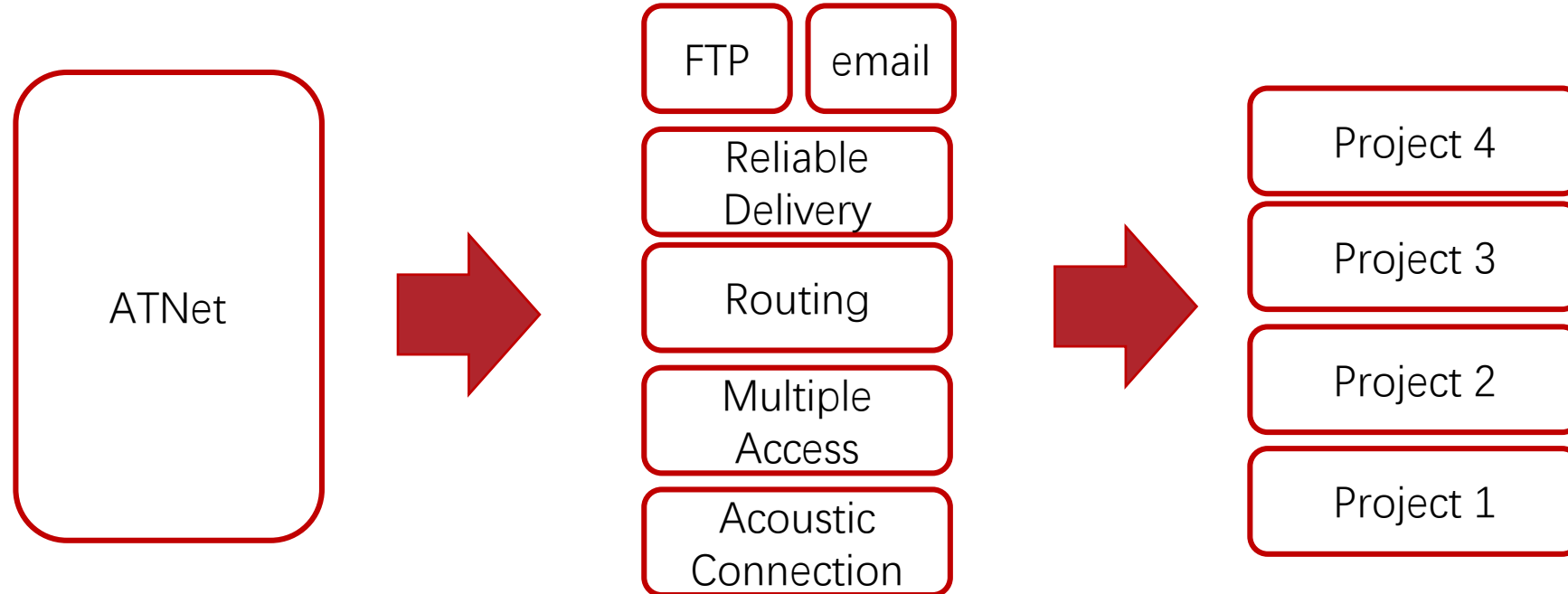
Shoulders of Giants

- We introduce and borrow existing designs from state-of-the-art network technologies (especially the Internet)



The Concept of Network Layering

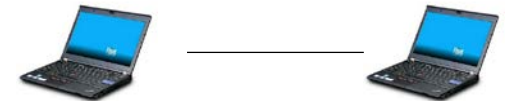
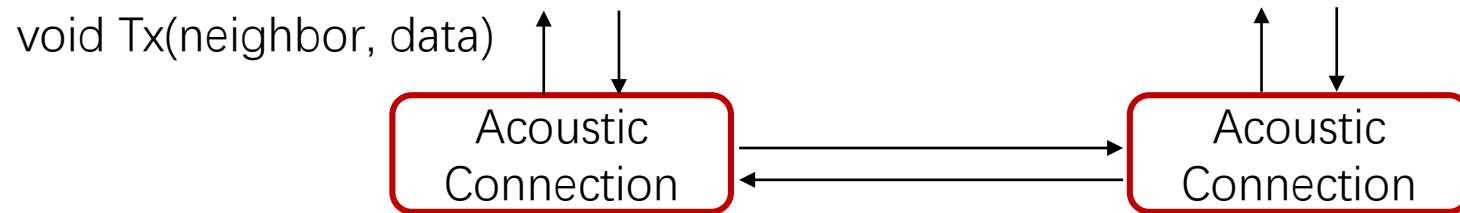
- Benefit
 - Modular Design



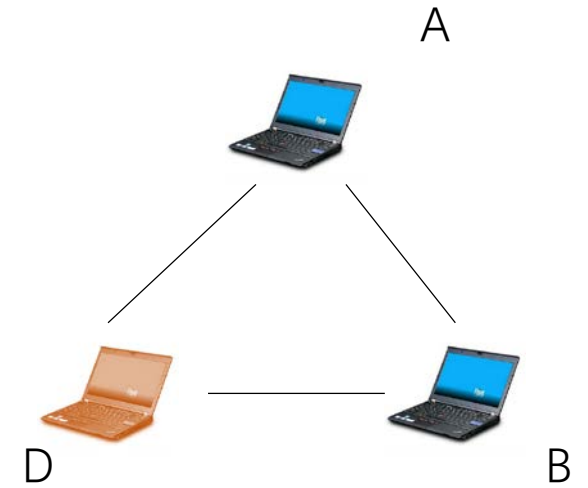
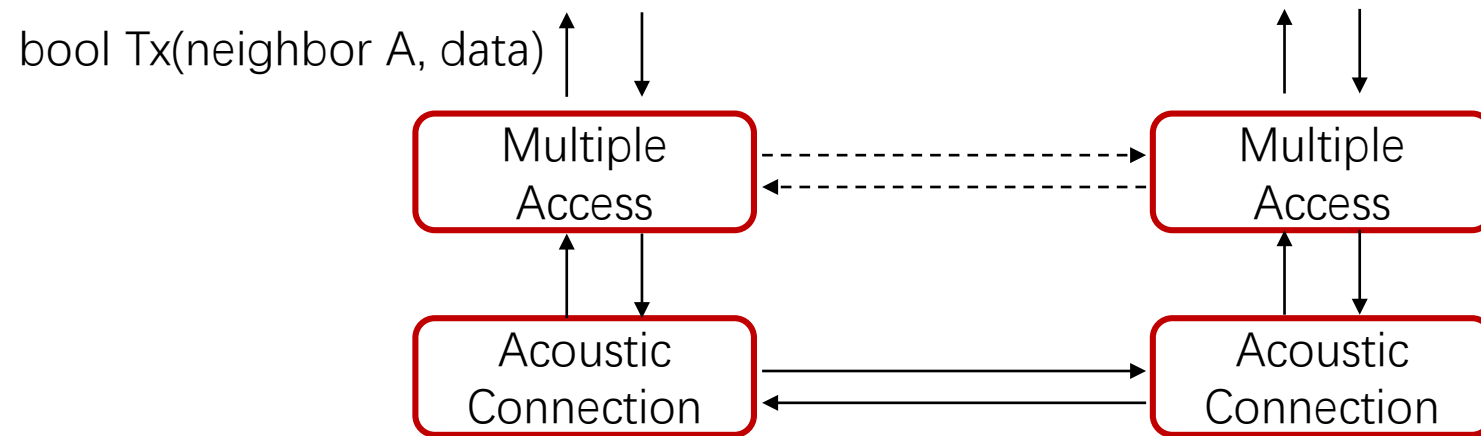
How Layering Works ?

- Through Protocols
 - One or more protocols implement the functionality of a certain layer
 - A protocol defines a communication service
 - Service Interface
 - Peer to peer Interface

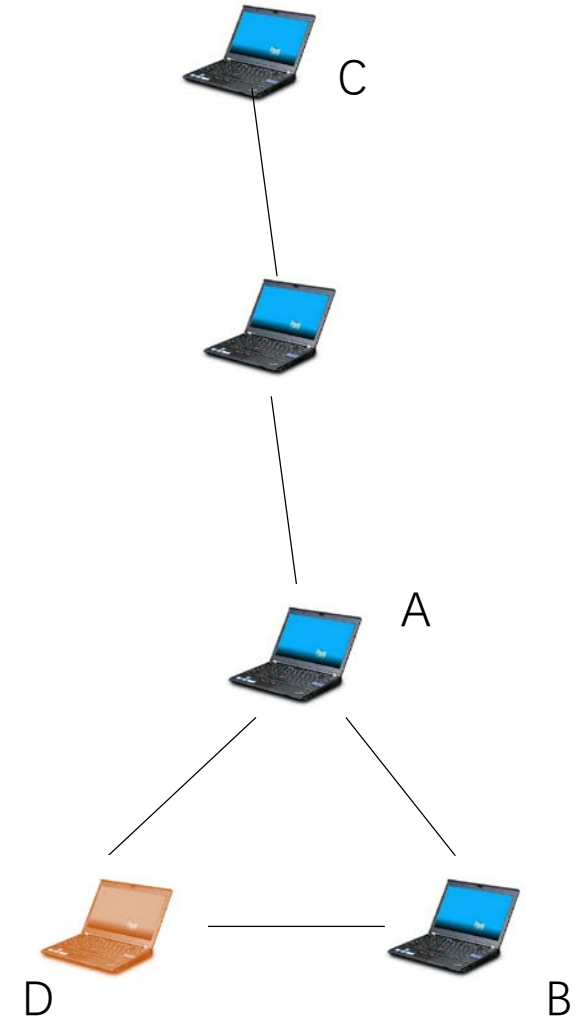
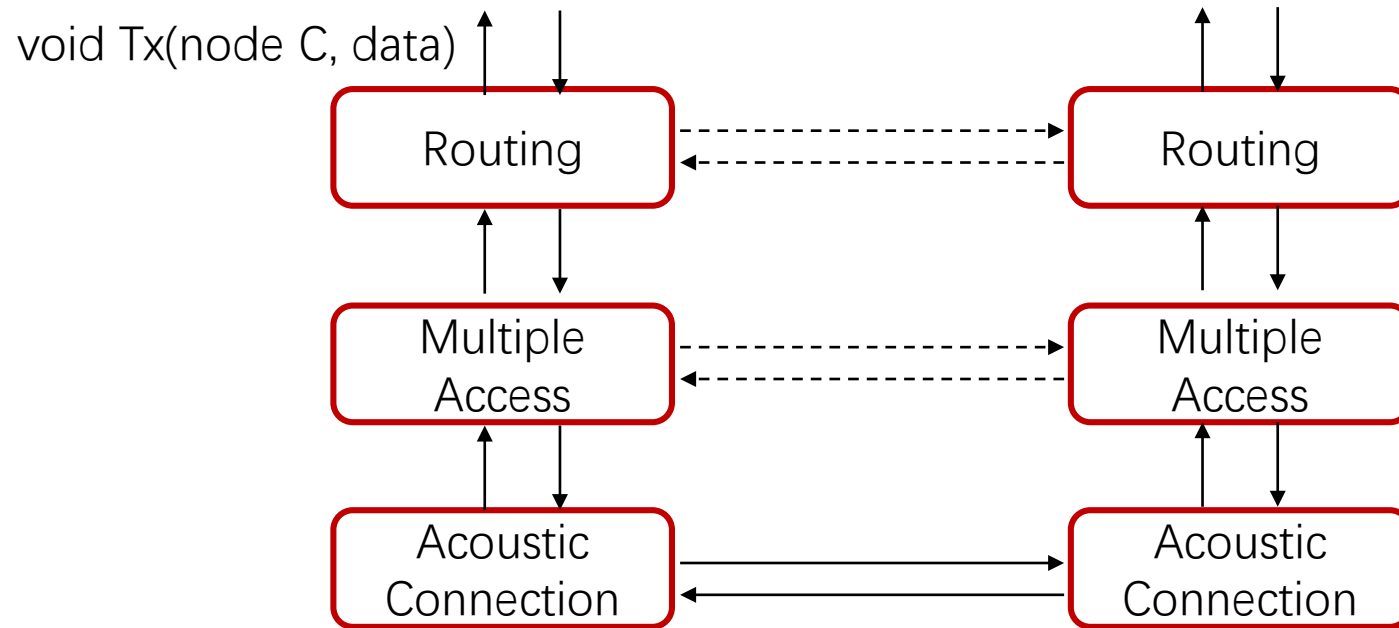
How Laying Works ?



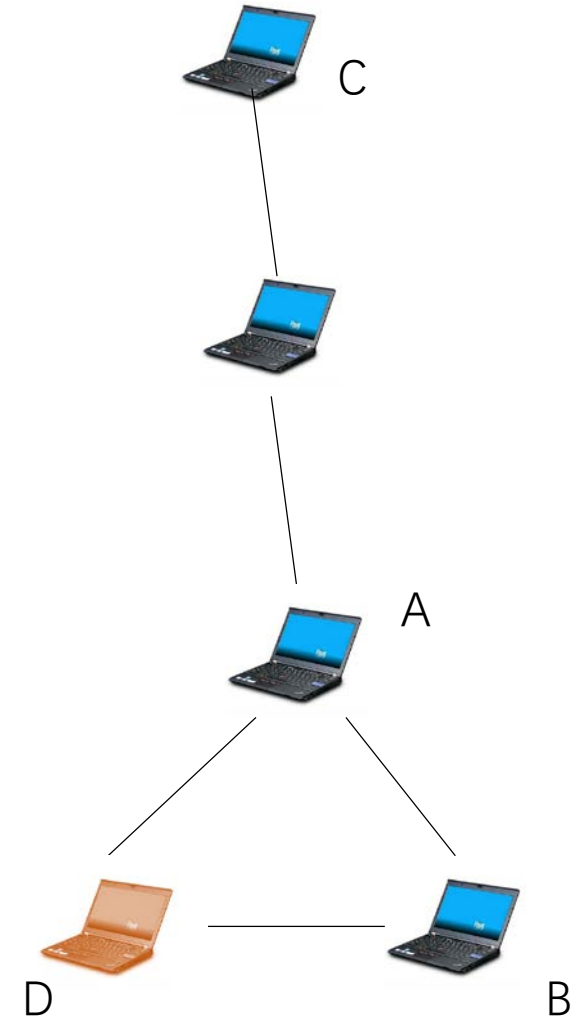
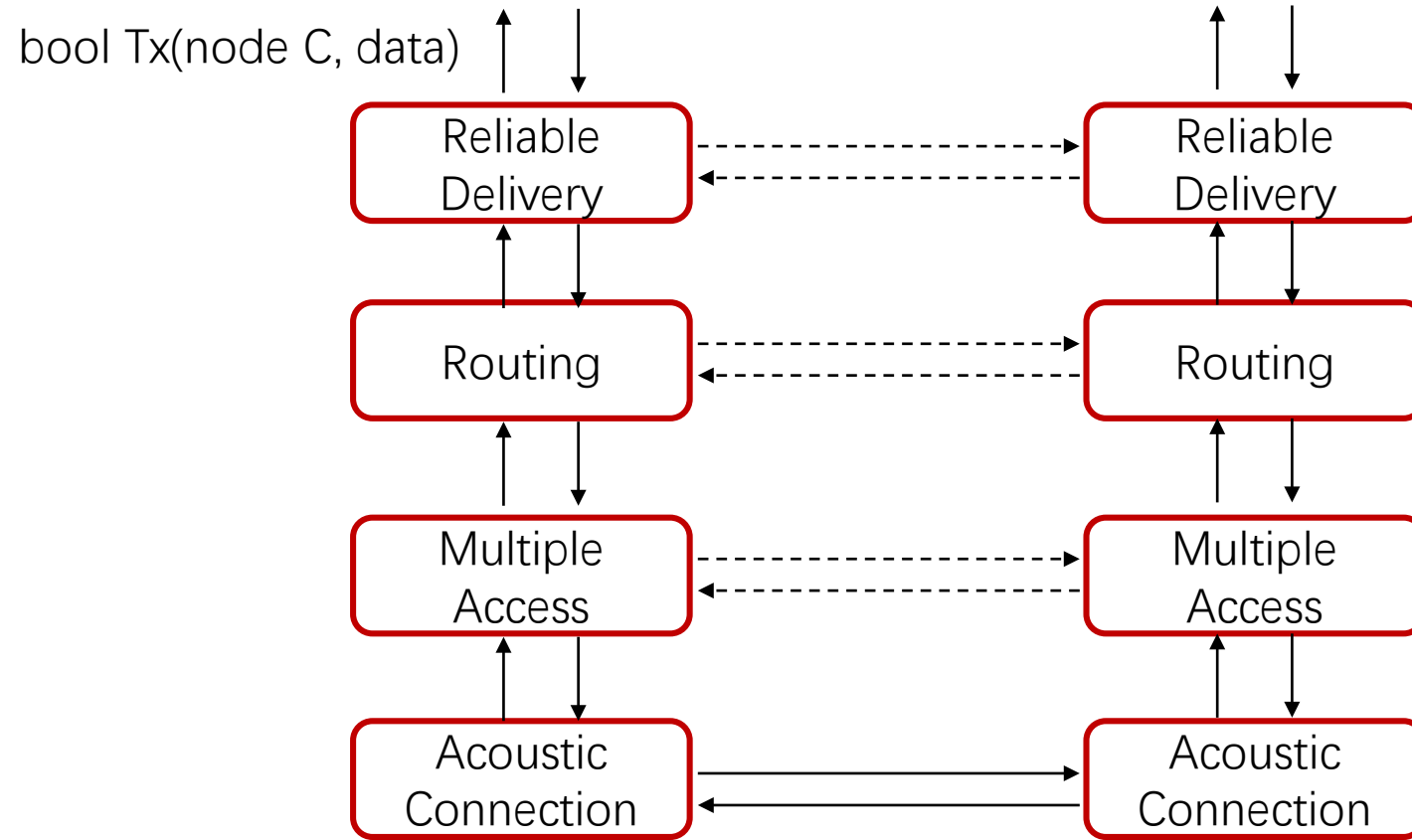
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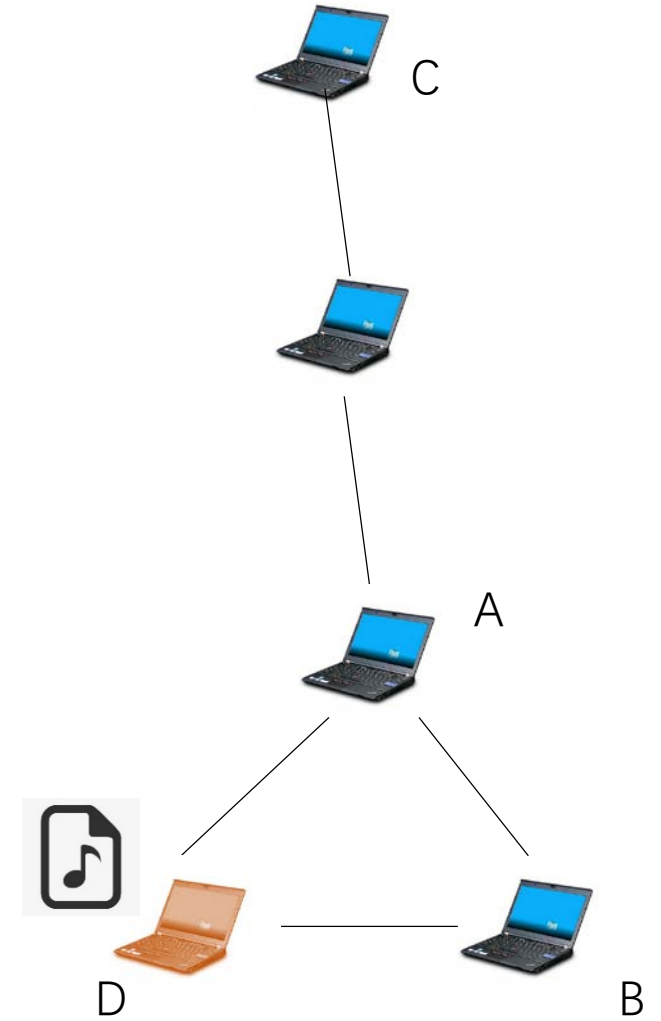
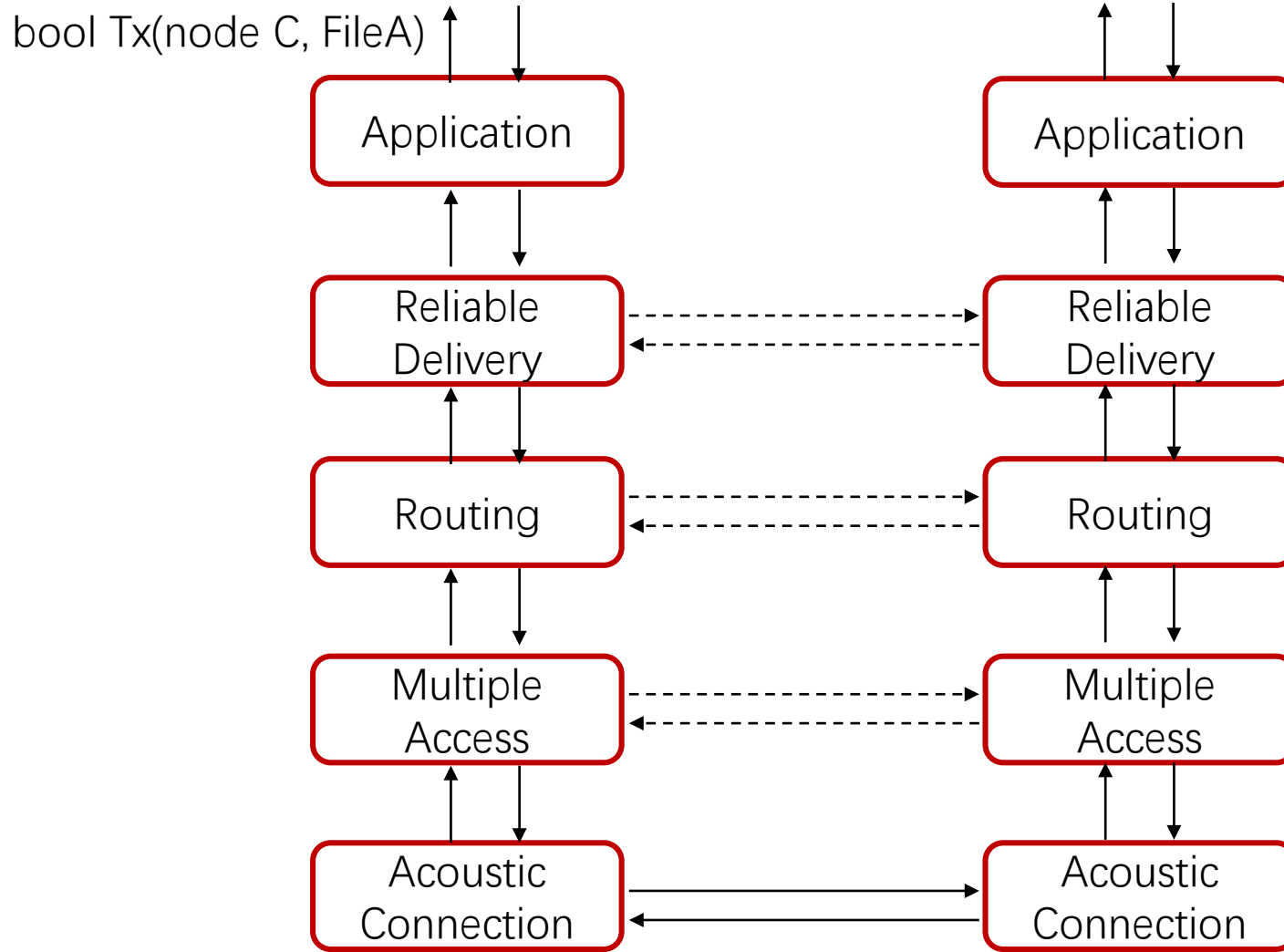
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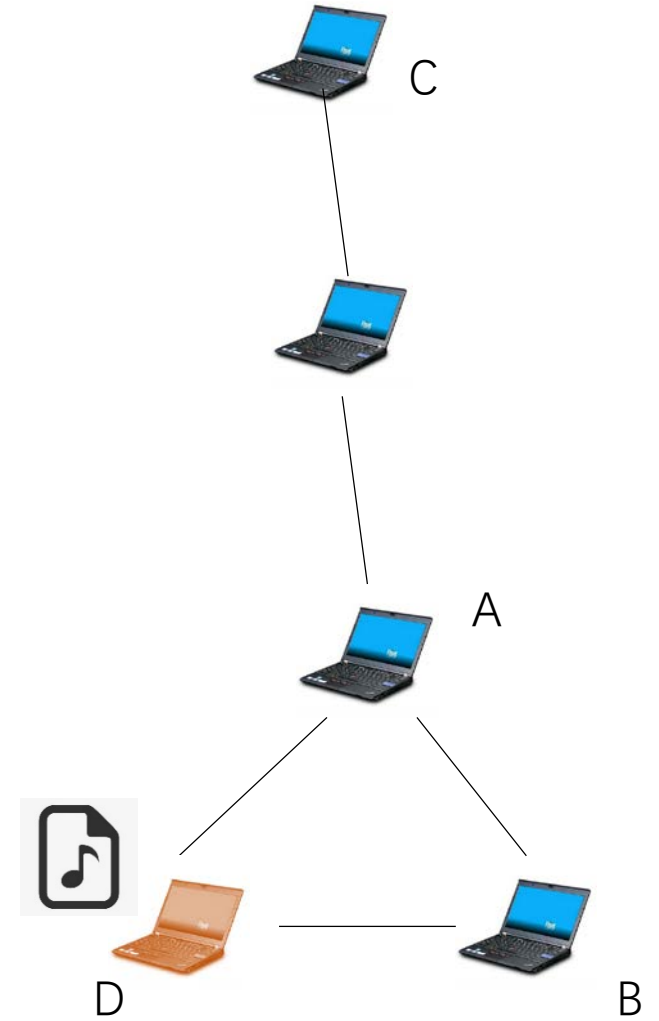
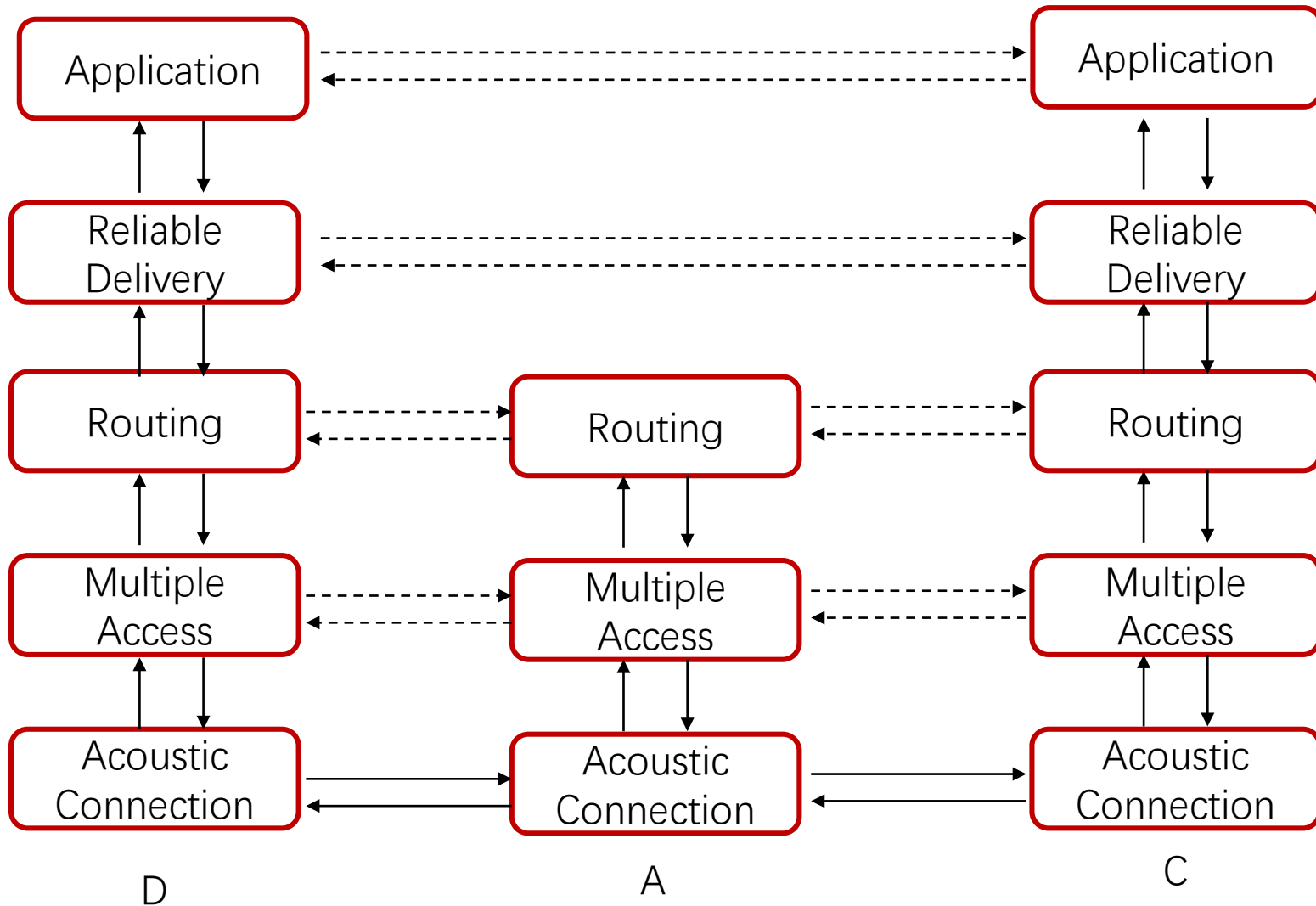
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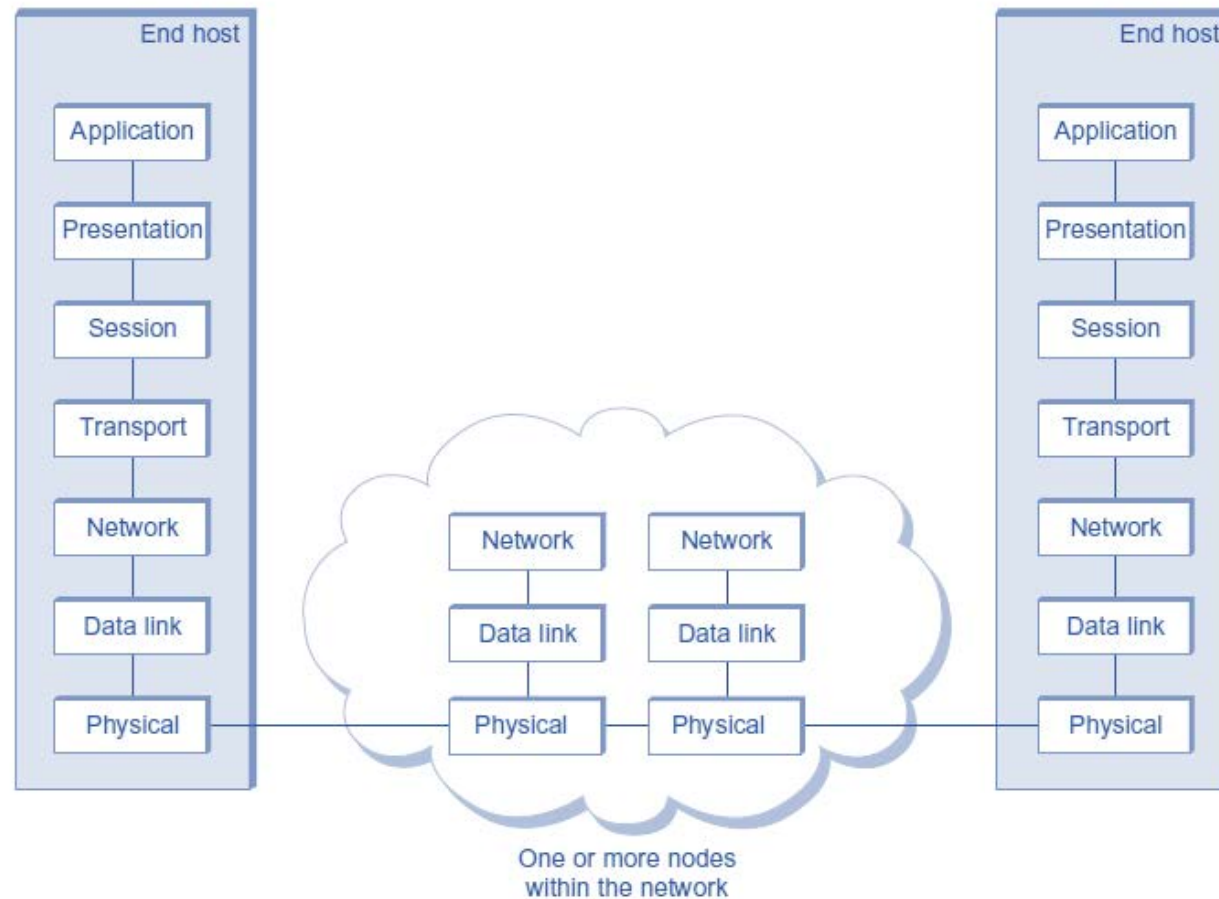


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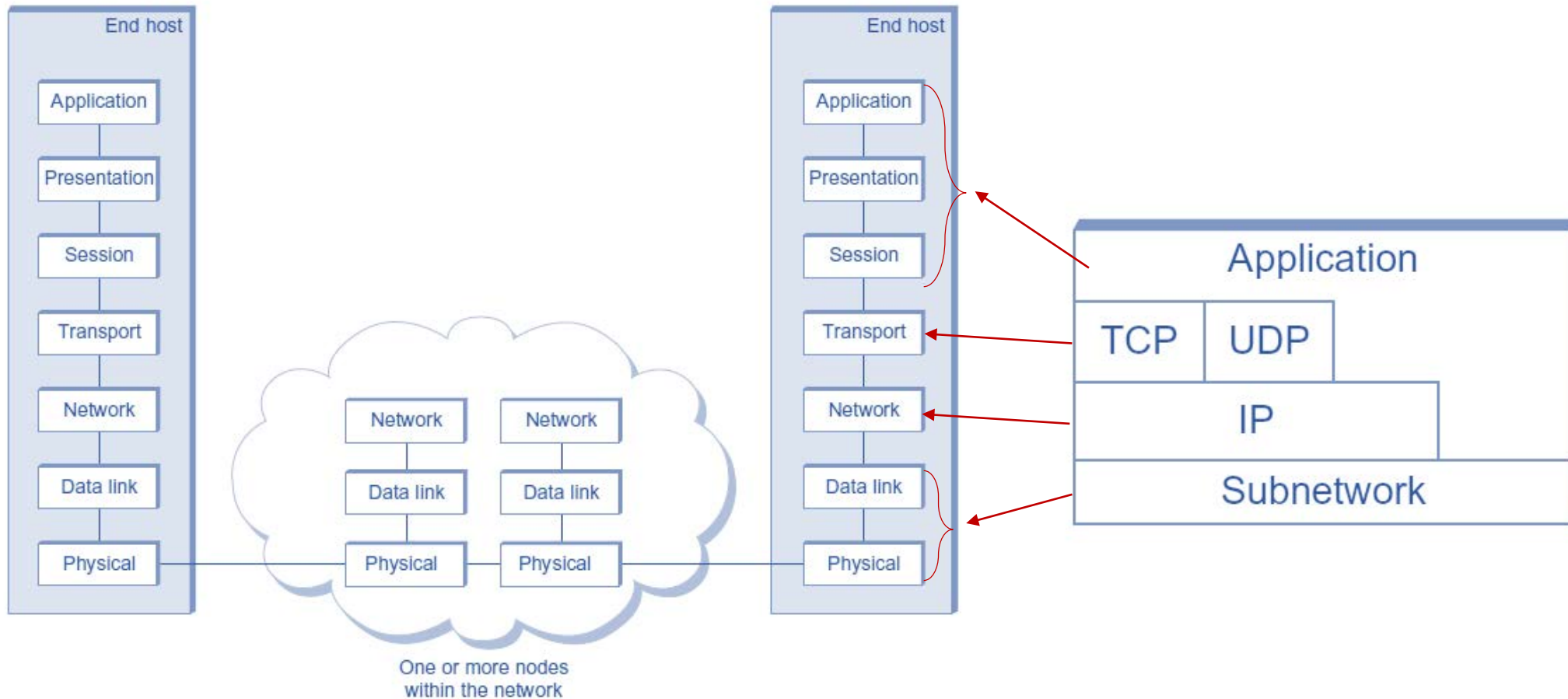


Canonical Layer Model

- OSI 7 Layer Model



Layering of the Real Internet



Layering of the Real Internet

