Internet

Technology and Applications

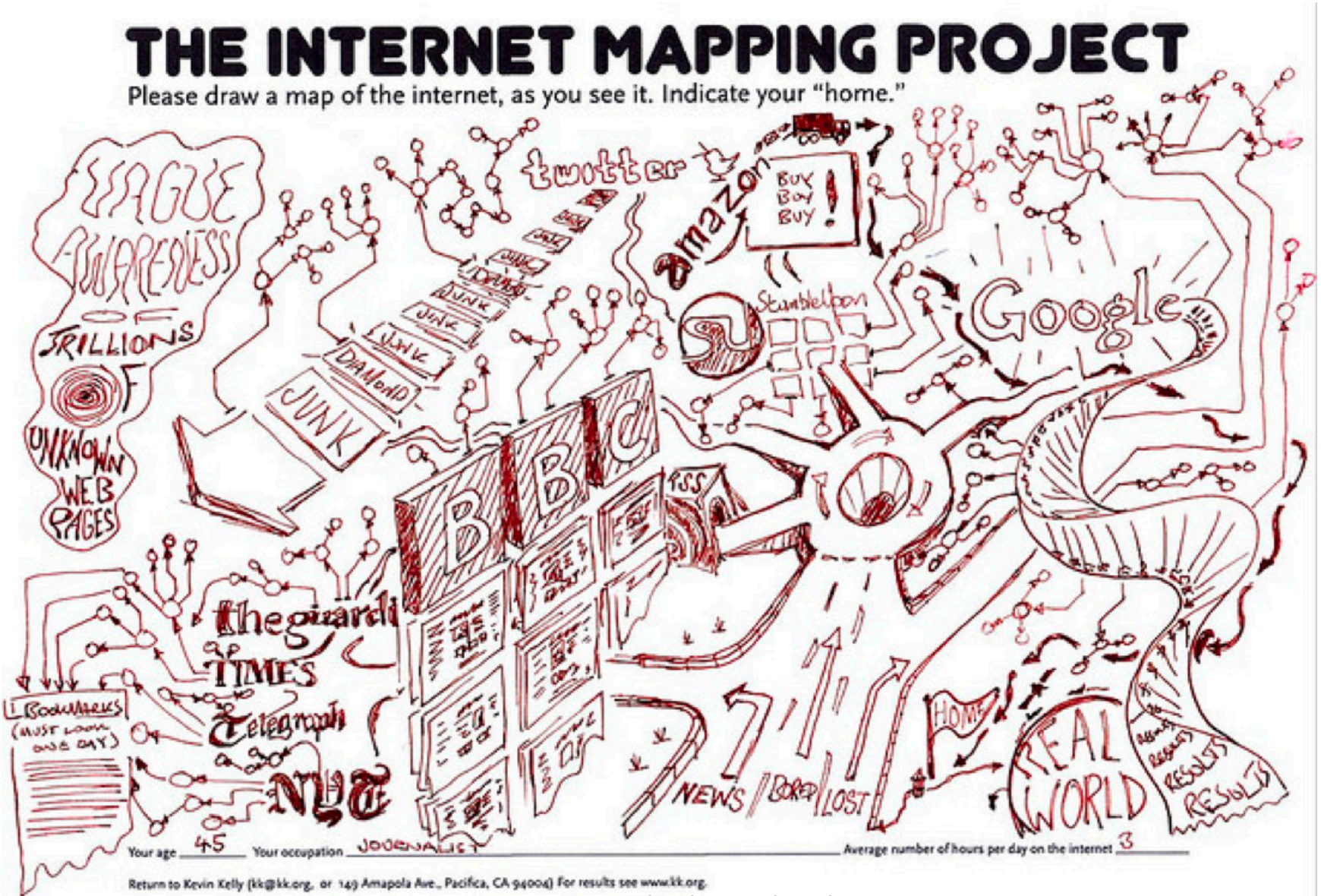
- EITF25 -

Kaan Bür, 2015

kaan.bur@eit.lth.se

Room E:3130 (Monday, Friday)

What is Internet?



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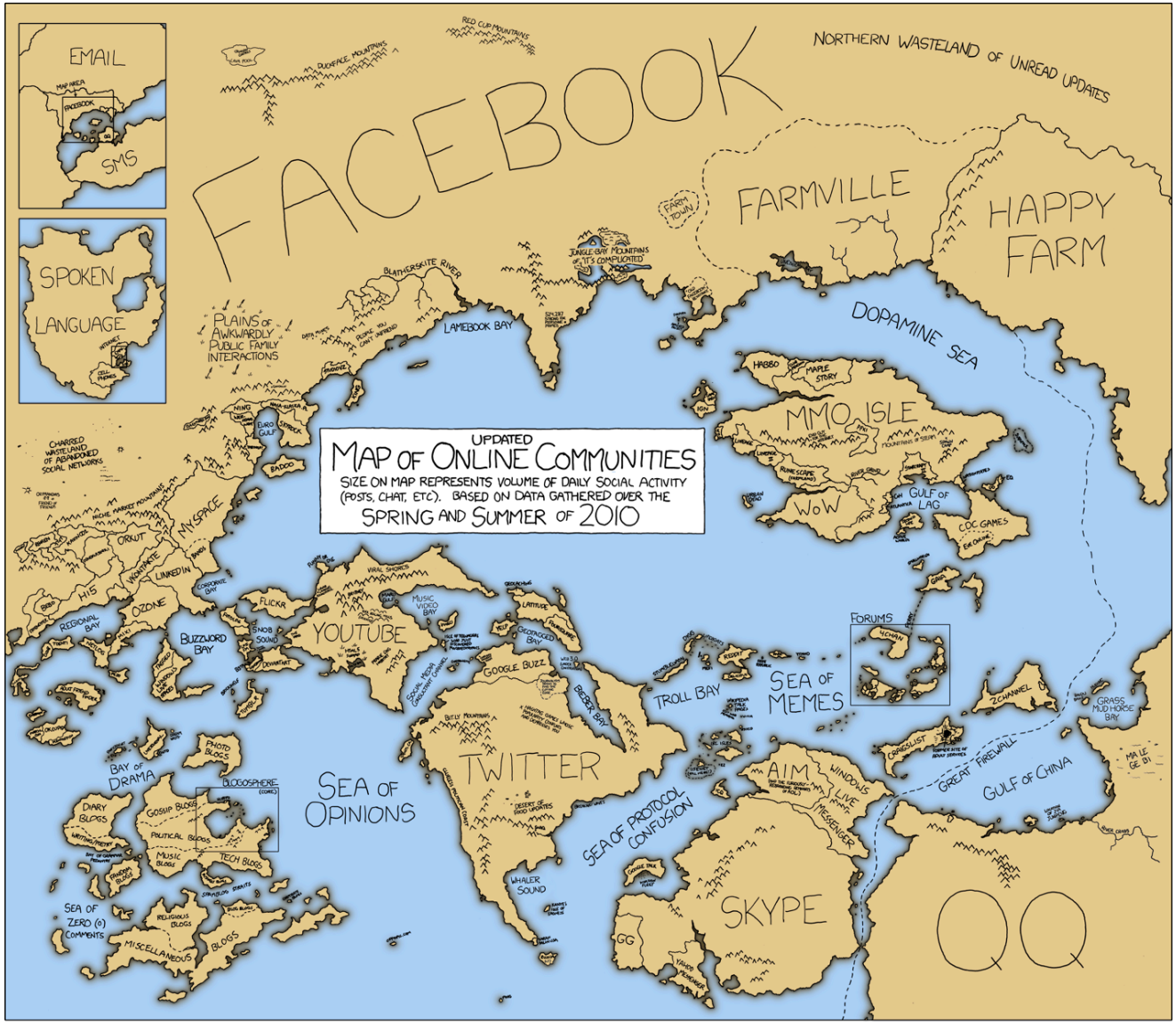
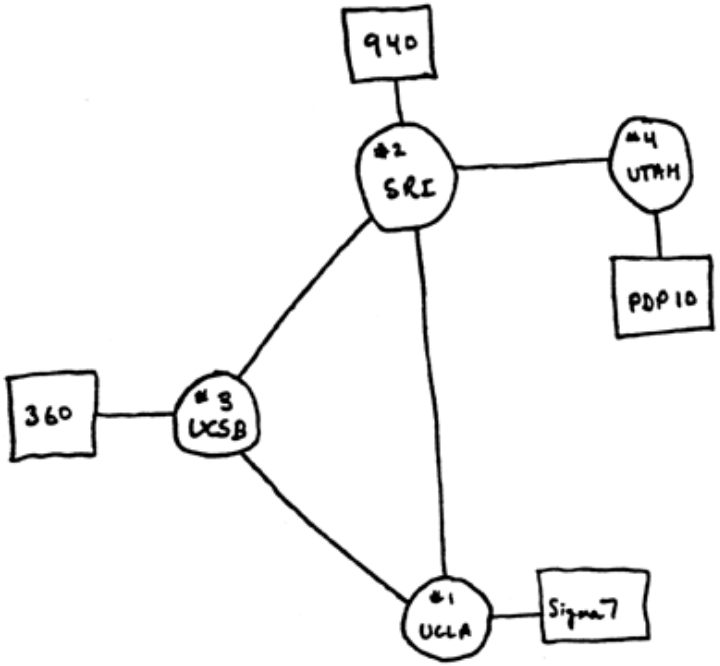


http://xkcd.com/

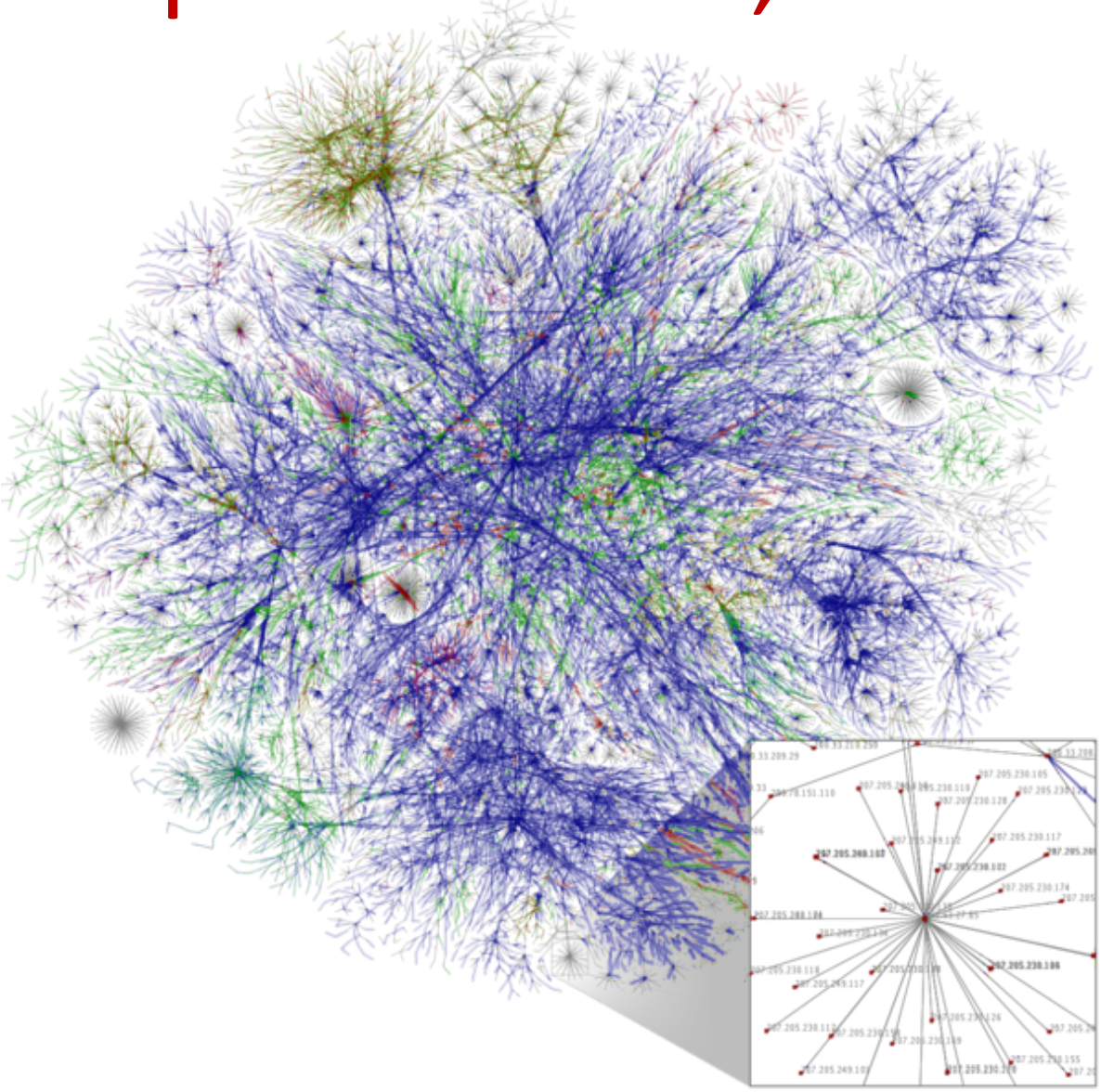
Internet begins…

- 1969 ARPANET
  - Advanced Research Projects Agency Network
  - First packet switched network



- UCLA
  - University of California, Los Angeles
- SRI
  - Stanford Research Institute
- UCSB
  - University of California, Santa Barbara
- UTAH
  - University of Utah

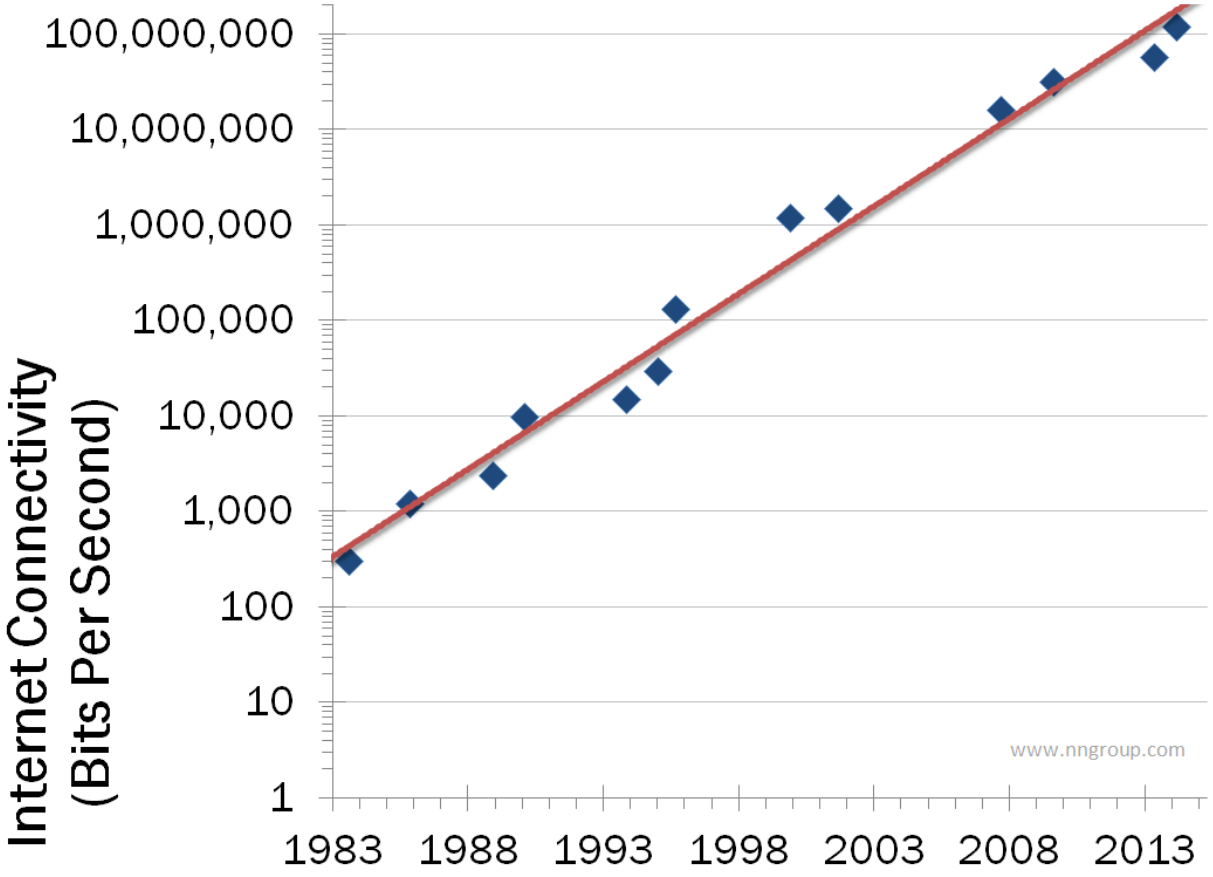
Map of Internet, 2003



Source: Wikimedia commons

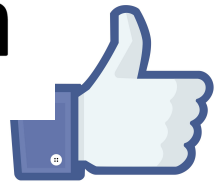
Nielsen's law

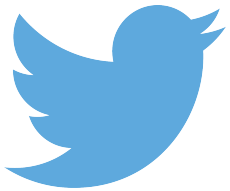
- The end-user connectivity grows with 50% every year.



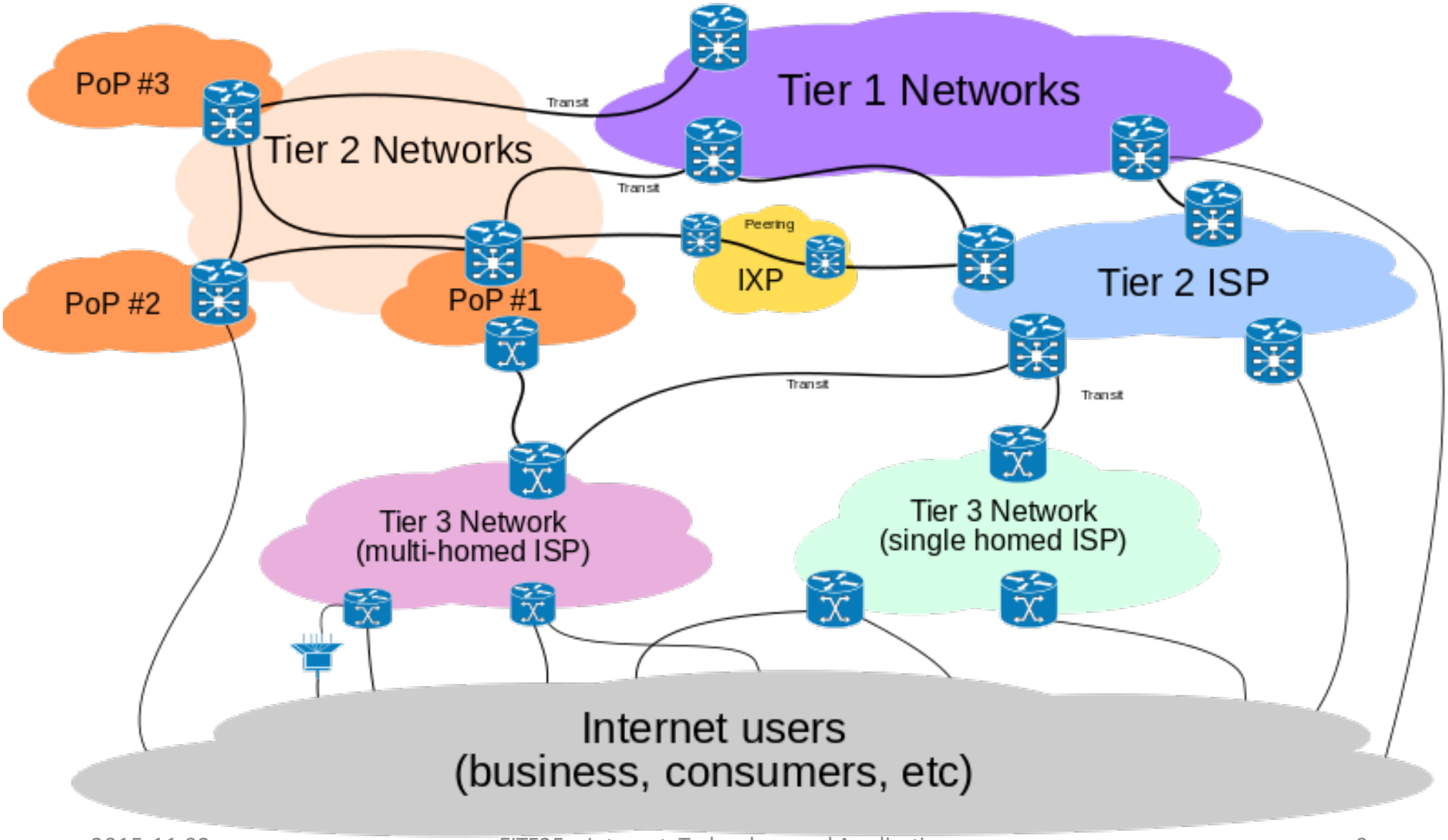
WHAT IS INTERNET?

Internet – users' view





Internet – engineers' view

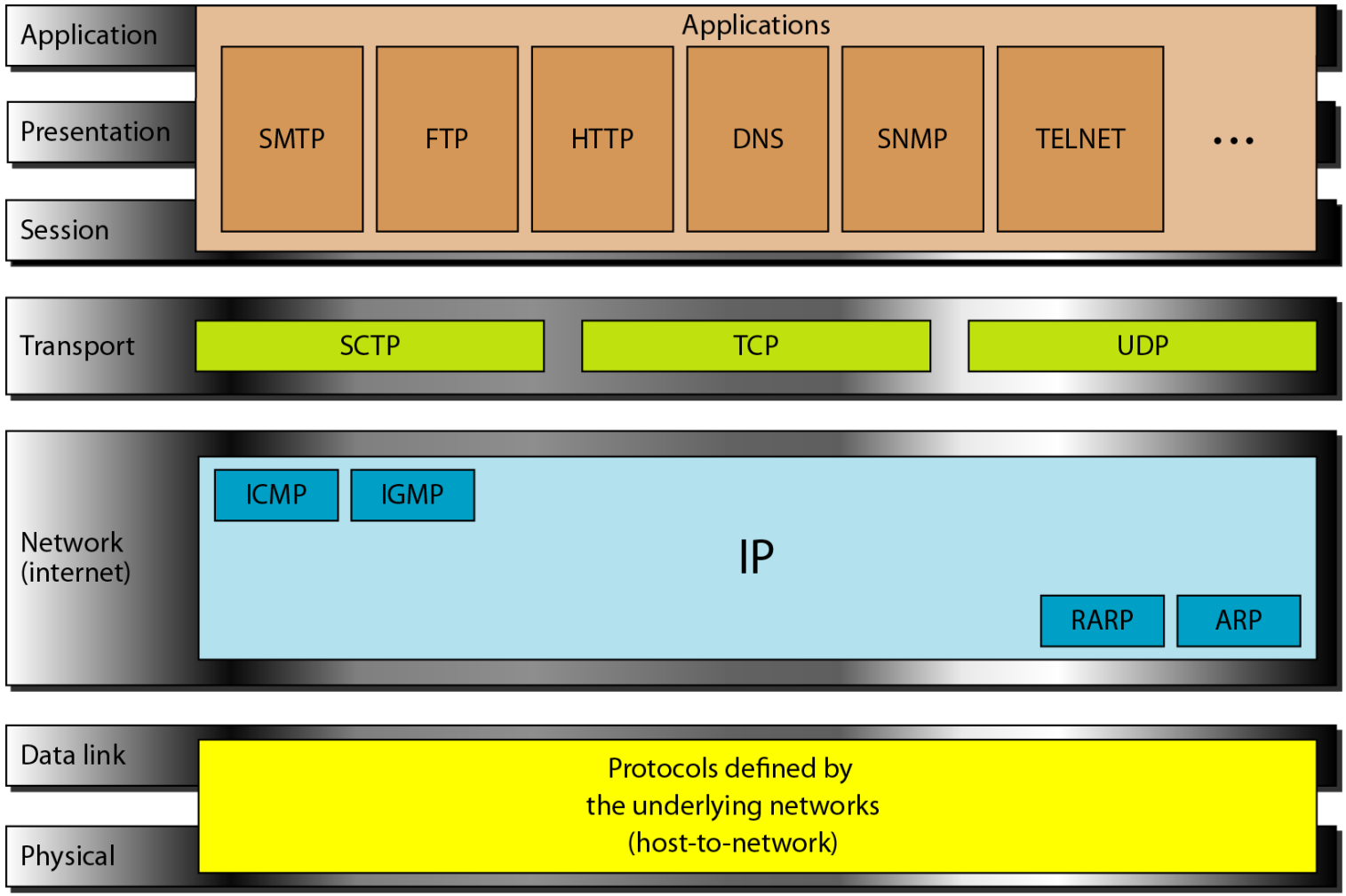


Source: Wikimedia commons

Purpose of this course

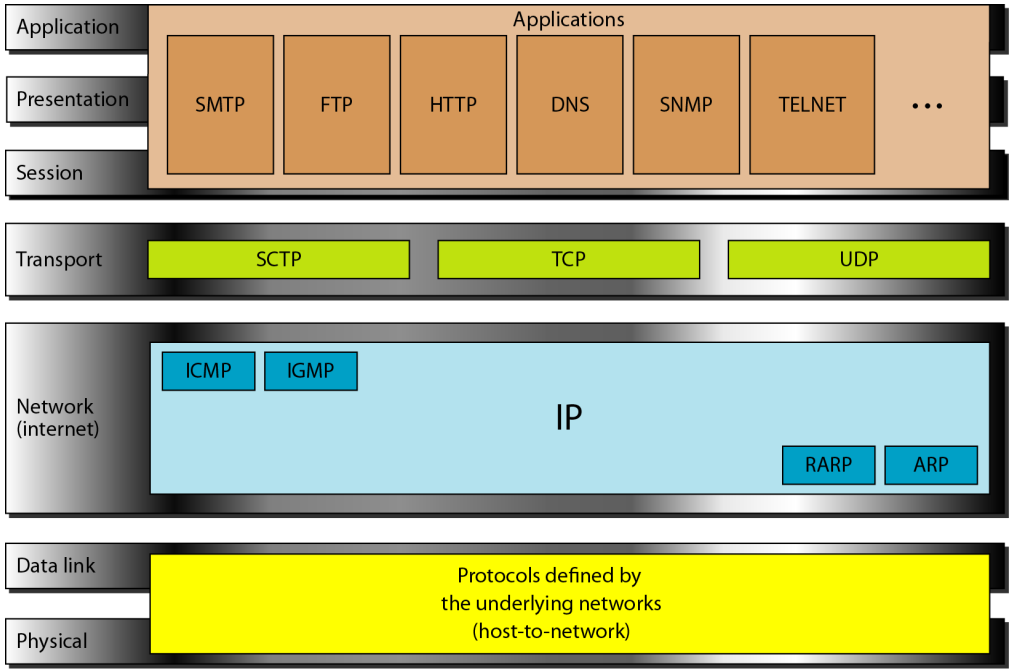
How do we get there?

- Internet Protocol Suite = TCP/IP model



A bottom-up approach

- Principles of digital communications
  - From electrical signals to bits to packets
- Using the physical infrastructure
  - Network access
- Finding your way
  - Addressing, routing
- Making use of it all
  - Applications



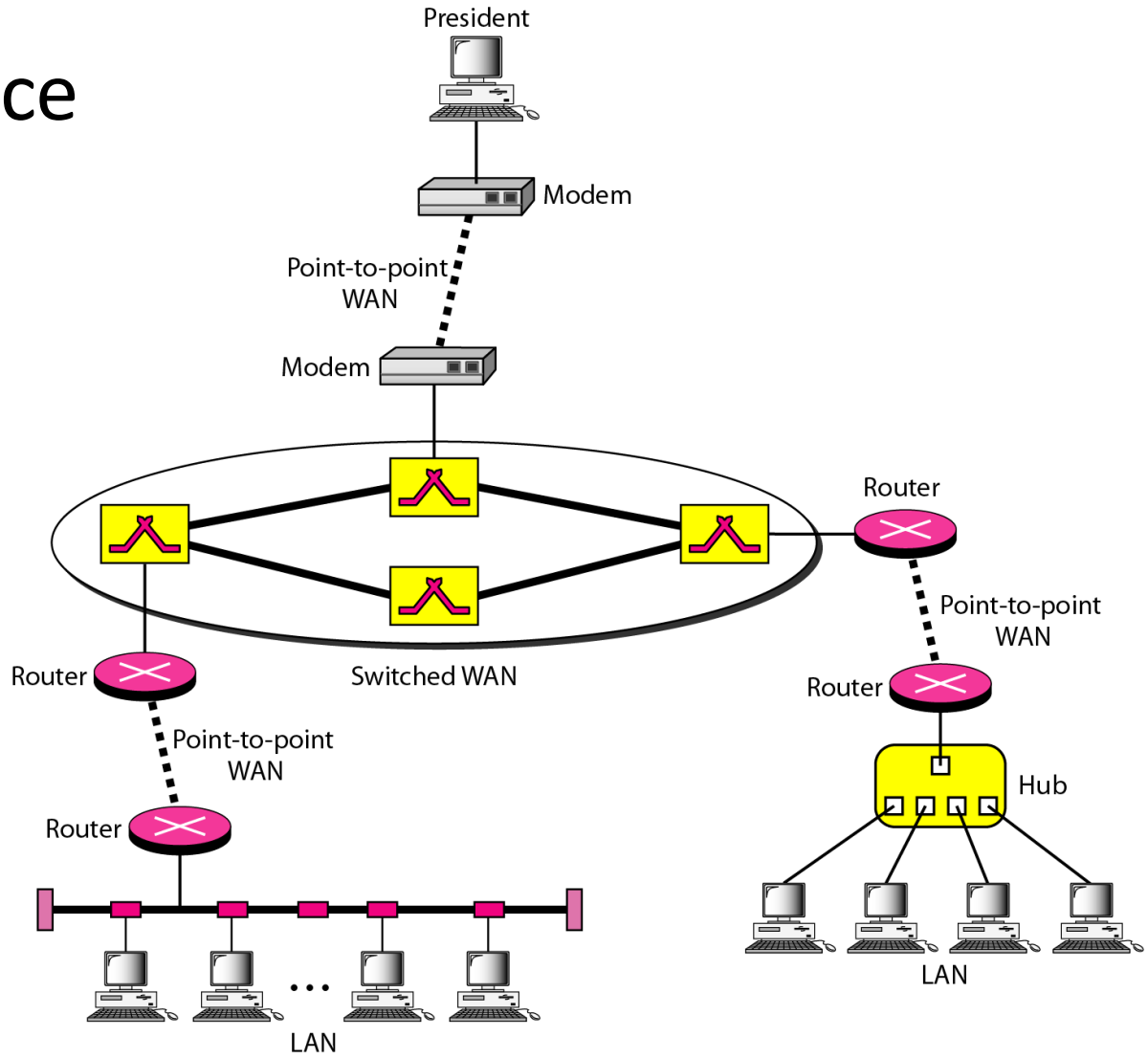
Today's lecture

Data Communications and Internet
- An Introduction -

- Introduction
- Network models *[2.1-4][F2.1-3][K7.1]*

Network engineering

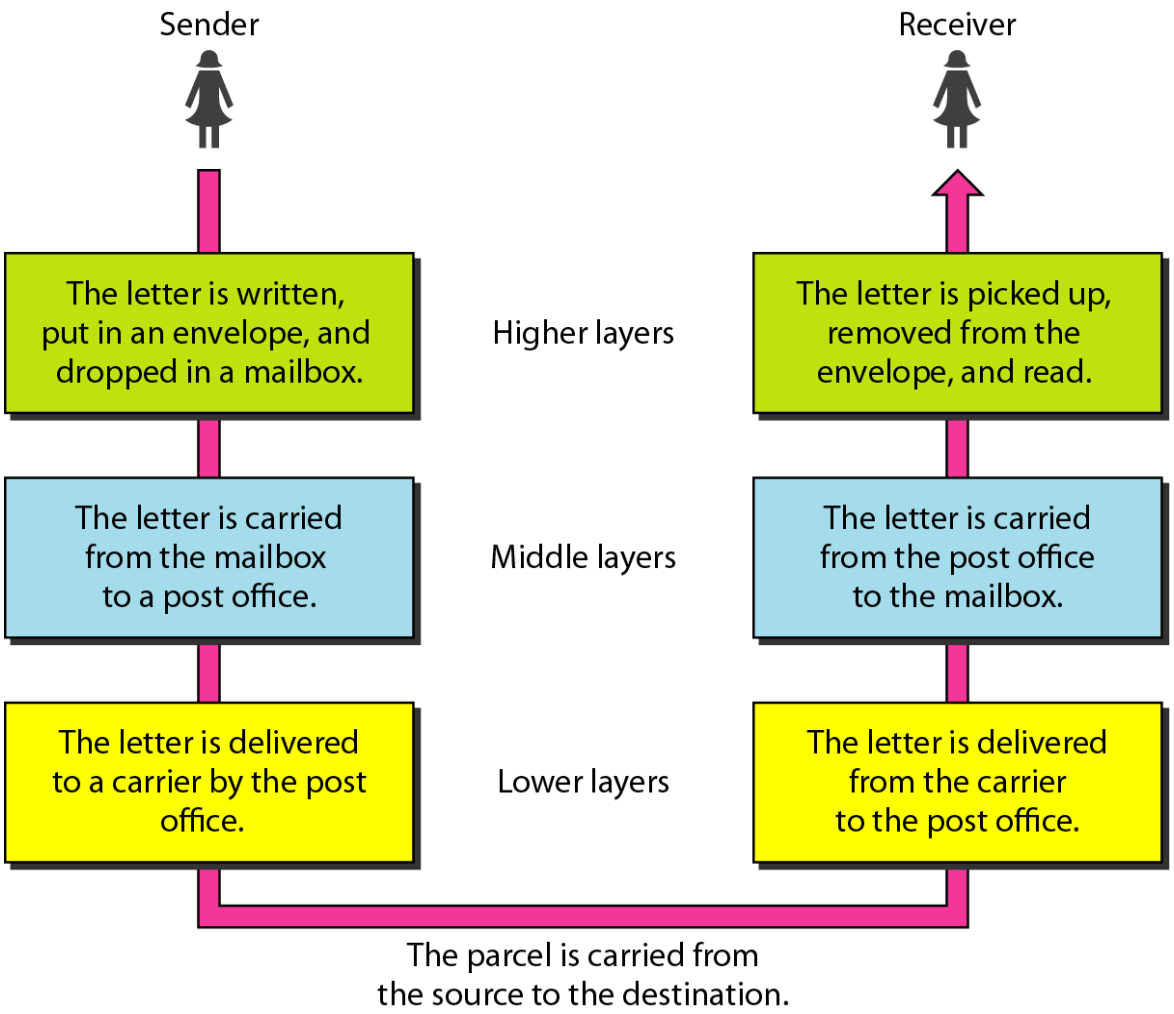
- High performance
  - Reliability
  - Throughput
  - Speed
  - Security



Network models

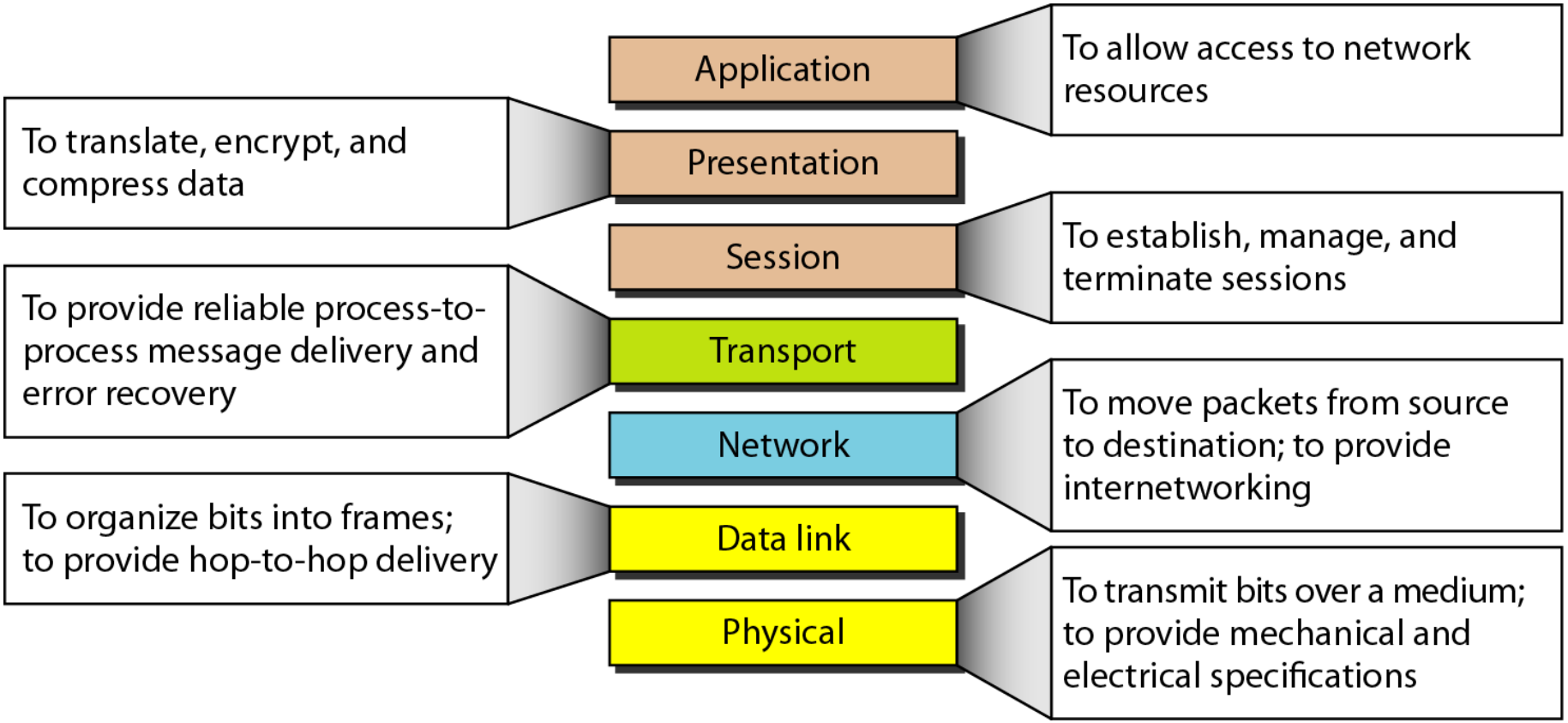
- Why?
  - Too complicated
  - Divide and conquer
- Layered architecture
  - Hierarchy
  - Specialisation
  - Simplification

Layer concept

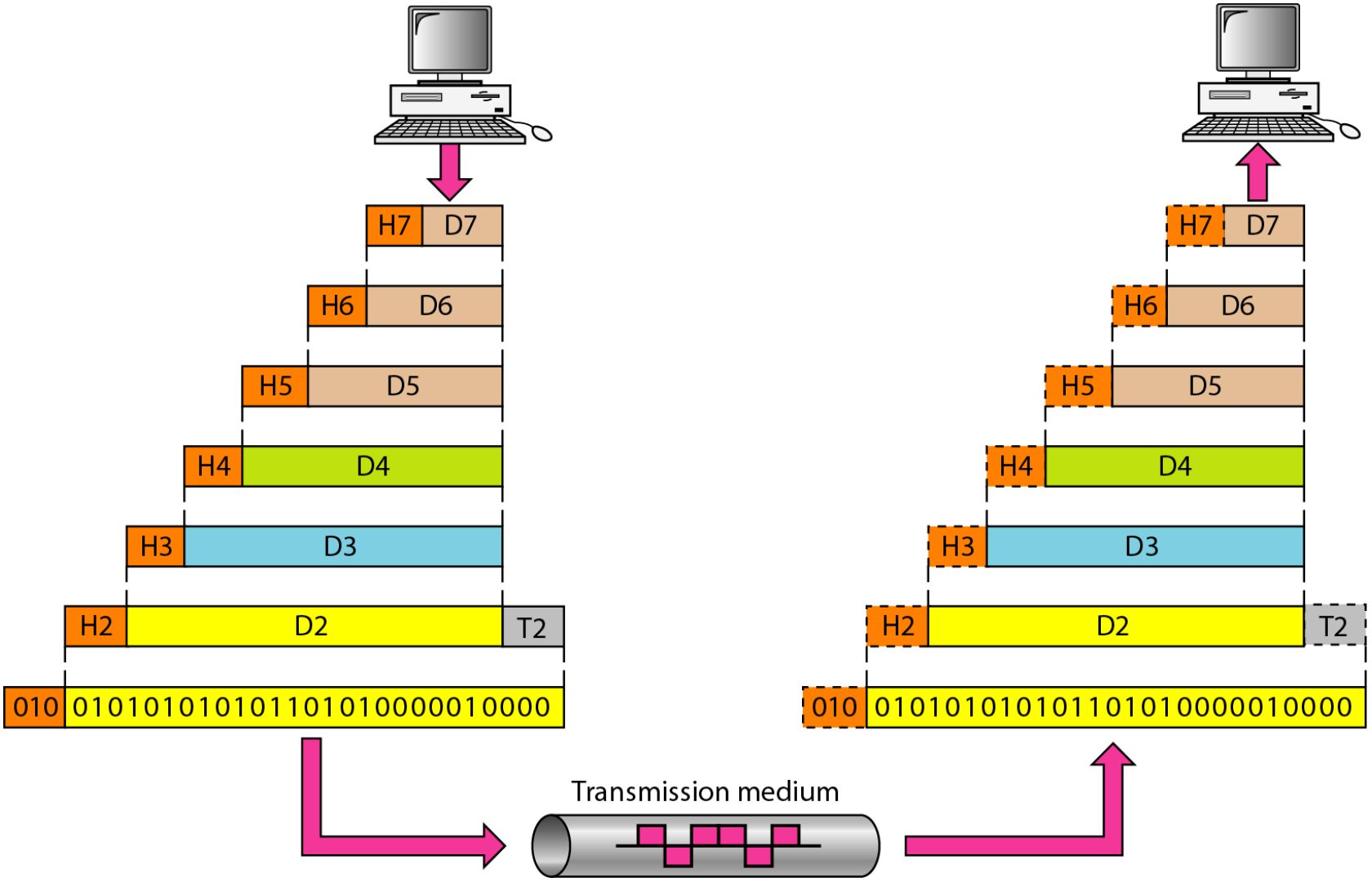


OSI model "Open Systems Interconnection"

- Developed by ISO, 1970~

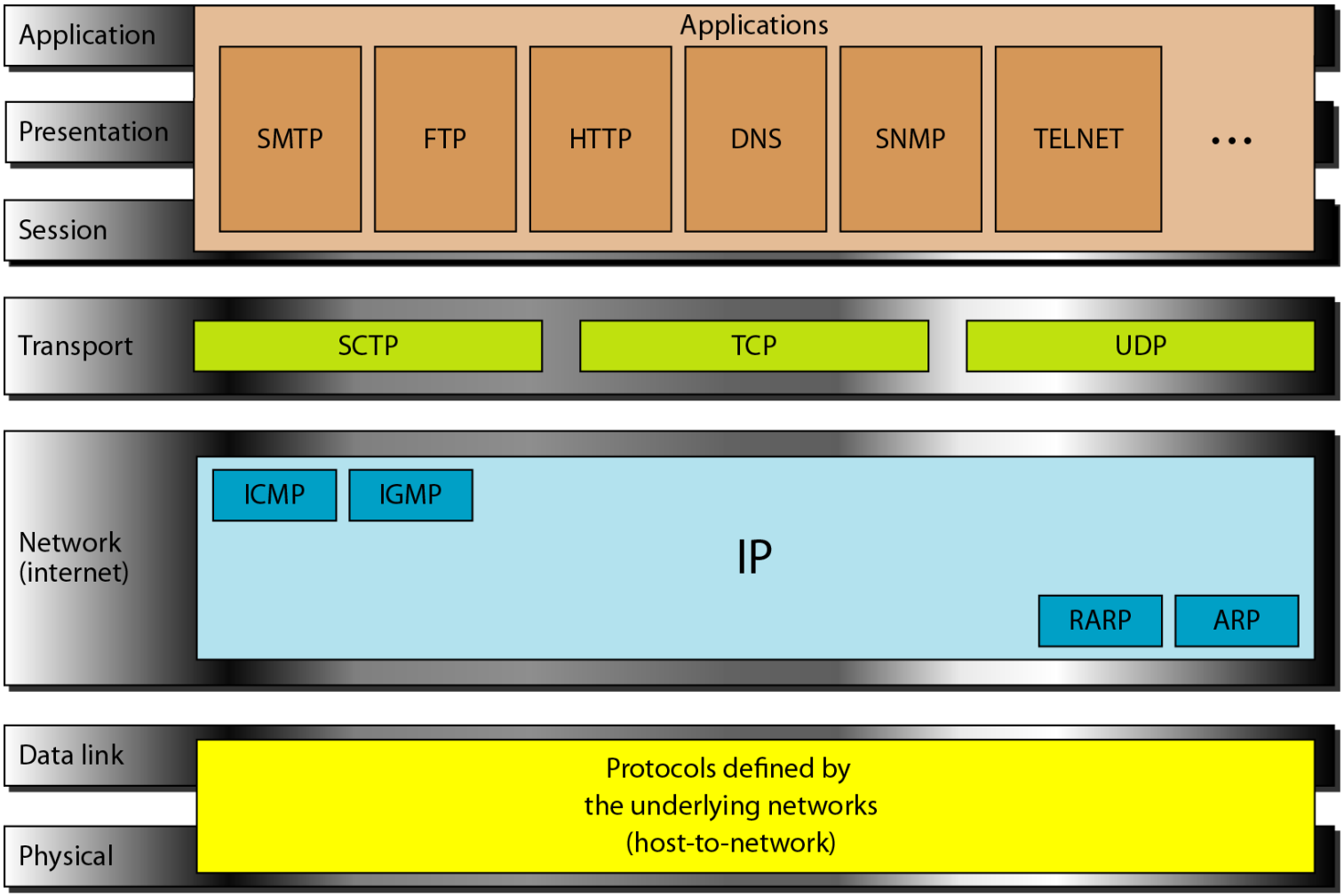


Encapsulation

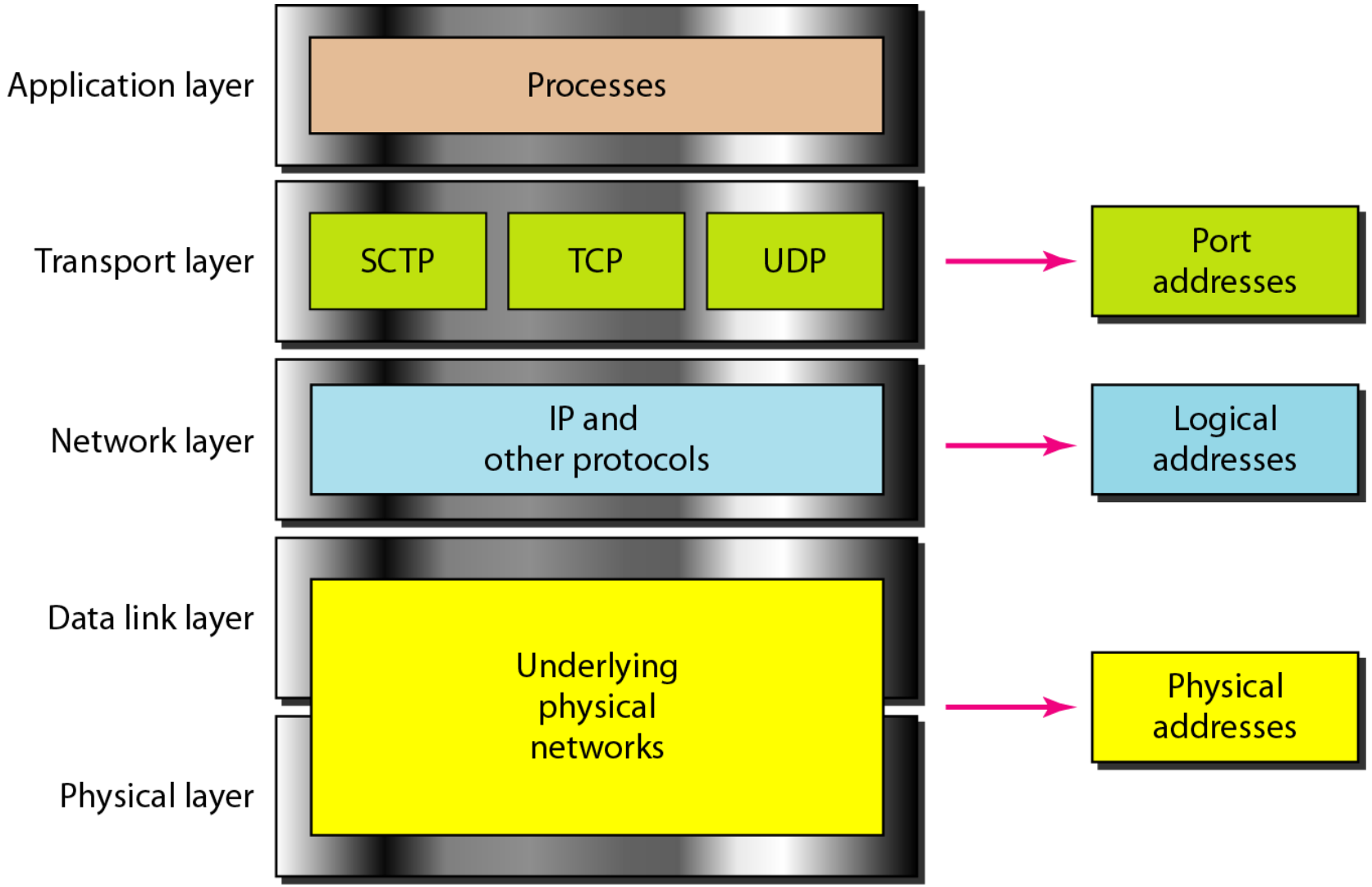


TCP/IP model

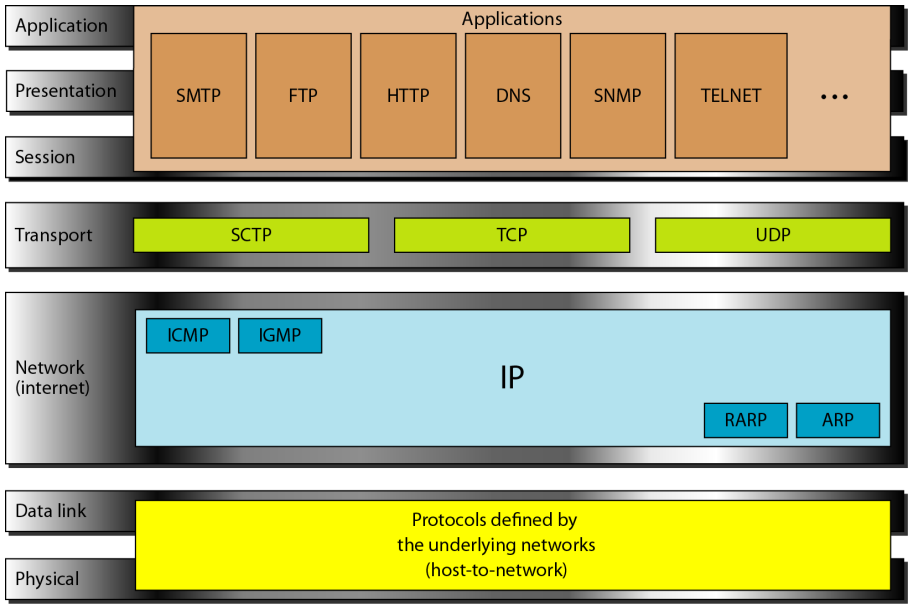
- Developed by DARPA, 1970~



Addressing in TCP/IP



See you in 15’ :)


Application
Presentation
Session
Applications
SMTP
FTP
HTTP
DNS
SNMP
TELNET
...
Transport
SCTP
TCP
UDP
Network
(internet)
ICMP
IGMP
IP
RARP
ARP
Data link
Physical
Protocols defined by
the underlying networks
(host-to-network)

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Internet – Technology and Applications

http://www.eit.lth.se/course/eitf25

- Mandatory alternative for I_{3D} students
- Optional for BME_4, F_4, Pi_4 students
- 6 credits
- Level G2 (basic)

Course Objectives

- Understanding data communications
- Understanding the basics of Internet
- Practice with networks and protocols
- Critical judgement of theory and praxis

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Intended Learning Outcomes

1. *Knowledge and understanding*:
   a) **Explain** the basics of how computers communicate; **apply** their knowledge into given topologies;
   b) **Explain** how the Internet protocol suite operates; **describe** the functions of various protocols;
   c) **Explain** how Internet applications work; **be aware of** the security risks associated with these.

Intended Learning Outcomes

2. *Skills and abilities*:
   a) **Use** Internet applications;
   b) **Design and code** basic web pages;
   c) **Use** network analysis tools and **analyse** communication protocols.

Intended Learning Outcomes

3. *Critical judgement and evaluation*:
   - **a)** **Formulate** the relation between the various Internet protocols;
   - **b)** **Evaluate** the suitability of an Internet protocol for supporting a given application type;
   - **c)** **Make** simple security judgements.

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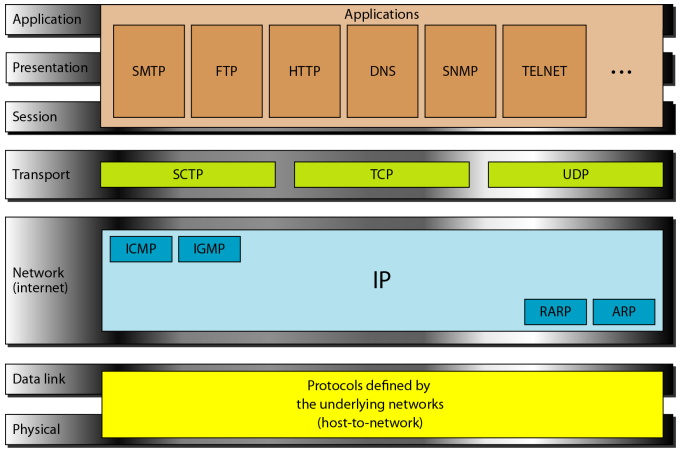
Assessment

	Intended Learning Outcomes	Activities	Assessment Tasks
Knowledge and Understanding	Explain the basics of how computers communicate; apply what they learned into given topologies	Student reading, Lectures, Exercise sessions	Individual work in online quizzes and final take-home exam
	Explain how the Internet protocol suite operates; describe the functions of its various protocols		
	Explain how Internet applications work; be aware of the security risks associated with these		
Skills and Abilities	Use network analysis tools and analyse communication protocols	Laboratory projects 1, 2	Project reports 1, 2
	Design and code basic web pages	Laboratory project 3	Project report 3
Critical Judgement	Formulate the relation between the various Internet protocols	Final take-home exam	Individual work in final take-home exam
	Evaluate the suitability of an Internet protocol for supporting a given application type		

Mon	Tue	Wed	Thu	Fri
				Lecture 1
Lecture 2	Exercise			

Course Structure

- 1 intro + 10 lectures
- 5 exercise sessions
- **3 laboratory projects**
- **2 hand-in problem sets**
- **1 final take-home exam**



Lectures

- L01: Physical layer
- L02: Flow control
- L03: Network access
- L04: Network layer
- L05: Routing
- L06: Transport layer
- L07: Security
- L08: Application layer
- L09: Mobile Internet
- L10: User applications

Exercise Sessions

- One per each pair of lectures
  - L01+L02 → E01 etc.
- Coding, multiplexing, error and flow control
- IEEE 802.x, IP, TCP, UDP
- Routing, networking

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Laboratory Projects w. 49-50-51

- Groups of two – online registration (Sign up)
- PPP Lab
  - **To do: Read docs, prepare, then book lab time!**
- Networking Lab
  - Uses WIRESHARK, see http://www.wireshark.org
- WWW Lab

Hand-in Problem Sets
&
Take-home Final Exam

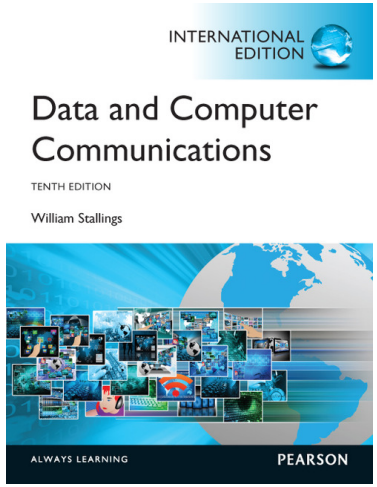
- Same rules apply as in a written test
  - Individual work **(no groups)**
  - Original answers **(no copying)**

Workload Distribution

6 credits	160 h
Lectures and exercises	30 h
Hand-in problems & take-home exam	16 h
PPP lab (~4 days)	32 h
Networking lab (~2 days)	16 h
WWW lab (~2 days)	16 h
Self study time	**50 h**

Literature (1)

- Data and Computer Communications
  - William Stallings
  - 10th ed, Pearson



Literature (2)

- Data Communications and Networking
  - Behrouz A. Forouzan
  - 5th ed, McGraw-Hill

Literature (3)

- Datakommunikation och nätverk
  - M. Kihl, J.A. Andersson
  - Studentlitteratur, upplaga 1:2
  - Facit till övningsuppgifter

Staff

Course head:	Stefan Höst
Lecturer:	Kaan Bür
Exercise guide:	William Tärneberg
Lab guide:	?

Final Remarks

- Elect two course representatives
  - Give them feedback
- Course evaluation
  - Help us to improve the course
- Recommended follow-up course
  - ETSF10 Internet Protocols

Most Important

Plan ahead your time!

ENJOY THE COURSE!

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Today's Programme

- **Survey** on subject familiarity
  - with previous exam in ETSF052 "Computer Communications"

- Note that ETSF052 exams are 5 hour long, and no help (e.g. books or Internet) is allowed.