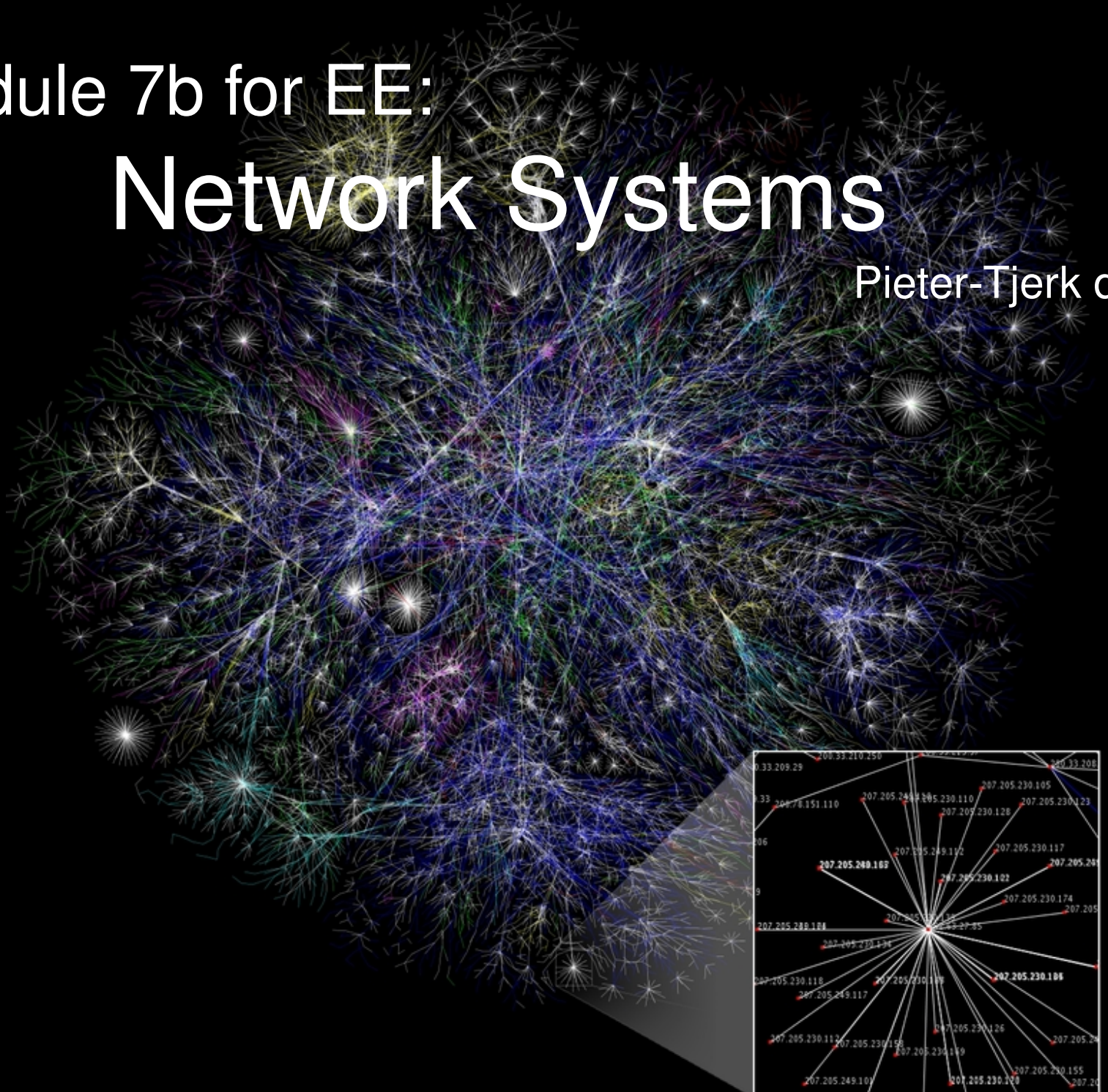
Module 7b for EE:

Network Systems

Pieter-Tjerk de Boer



What are network systems?

Network system = any system consisting of a large number of **communicating computers**.

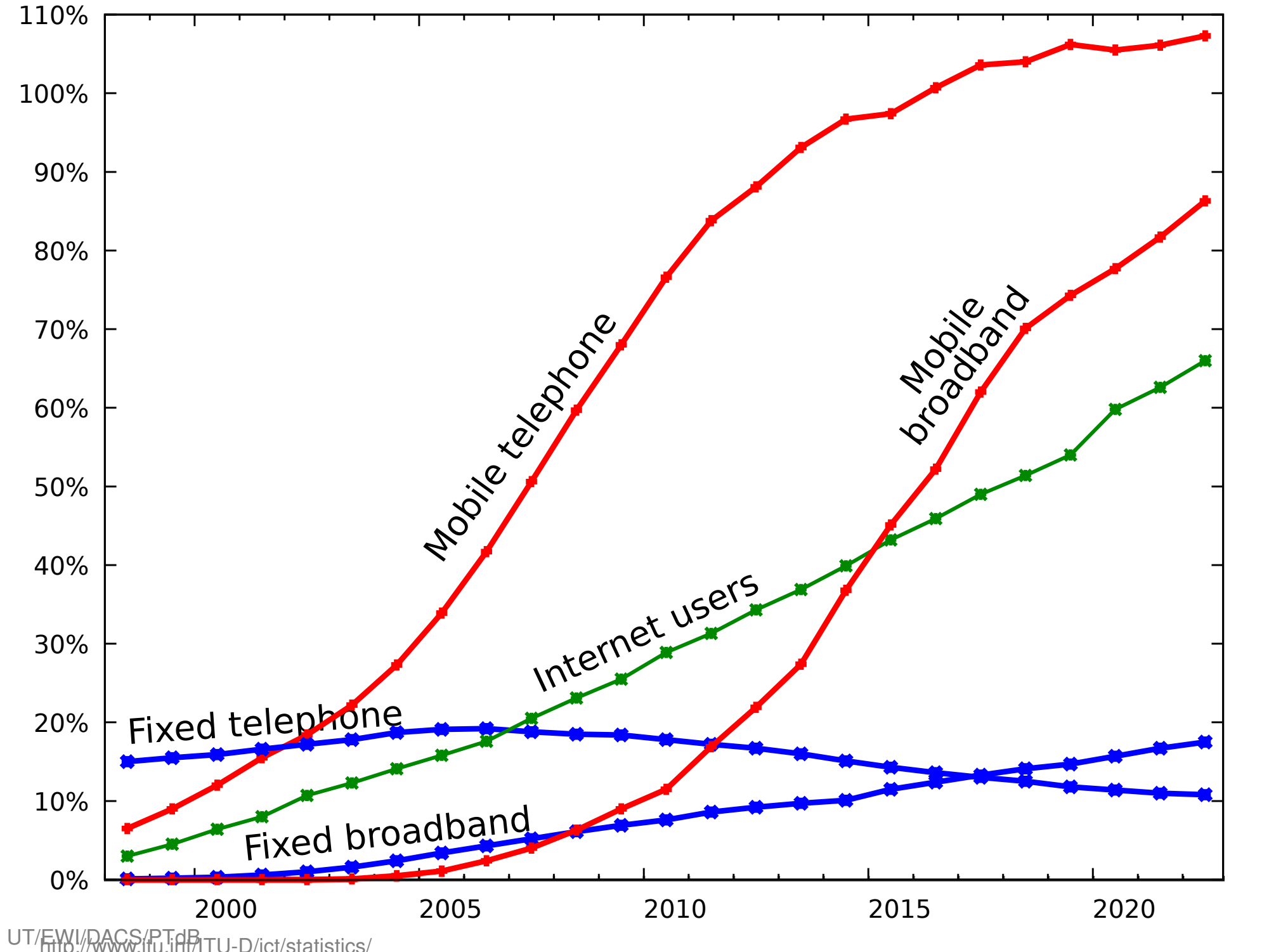
Examples:

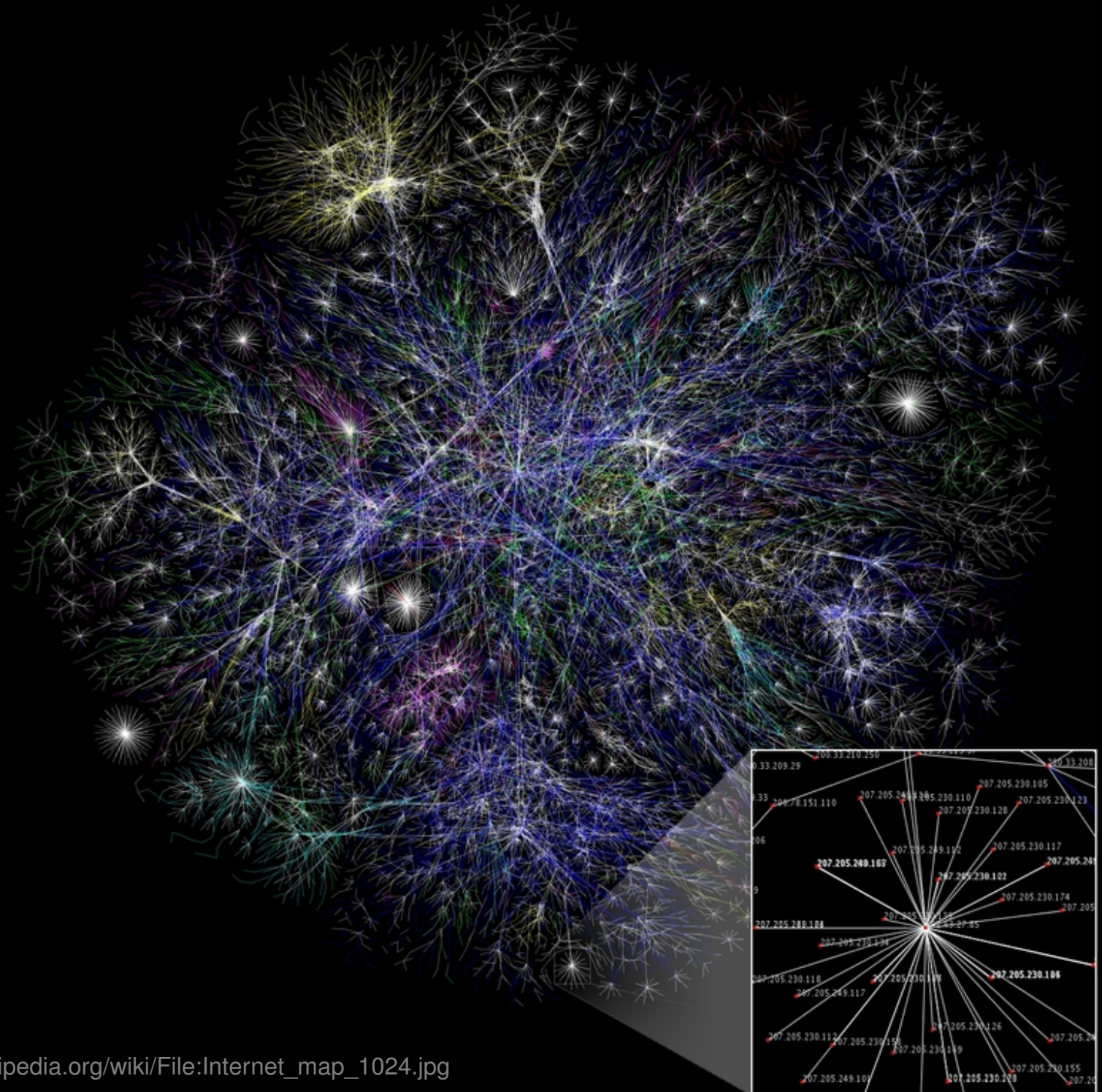
- The Internet
- Any of the Internet's sub-networks
- The mobile telephone network
- Sensor networks
- Networks connecting cars to improve traffic (near future)
- Internet-of-Things
- ...

Shared module

Network systems are at the boundary between EE and CS.

$\Rightarrow$ This module is shared with CS (1st year).





http://en.wikipedia.org/wiki/File:Internet_map_1024.jpg

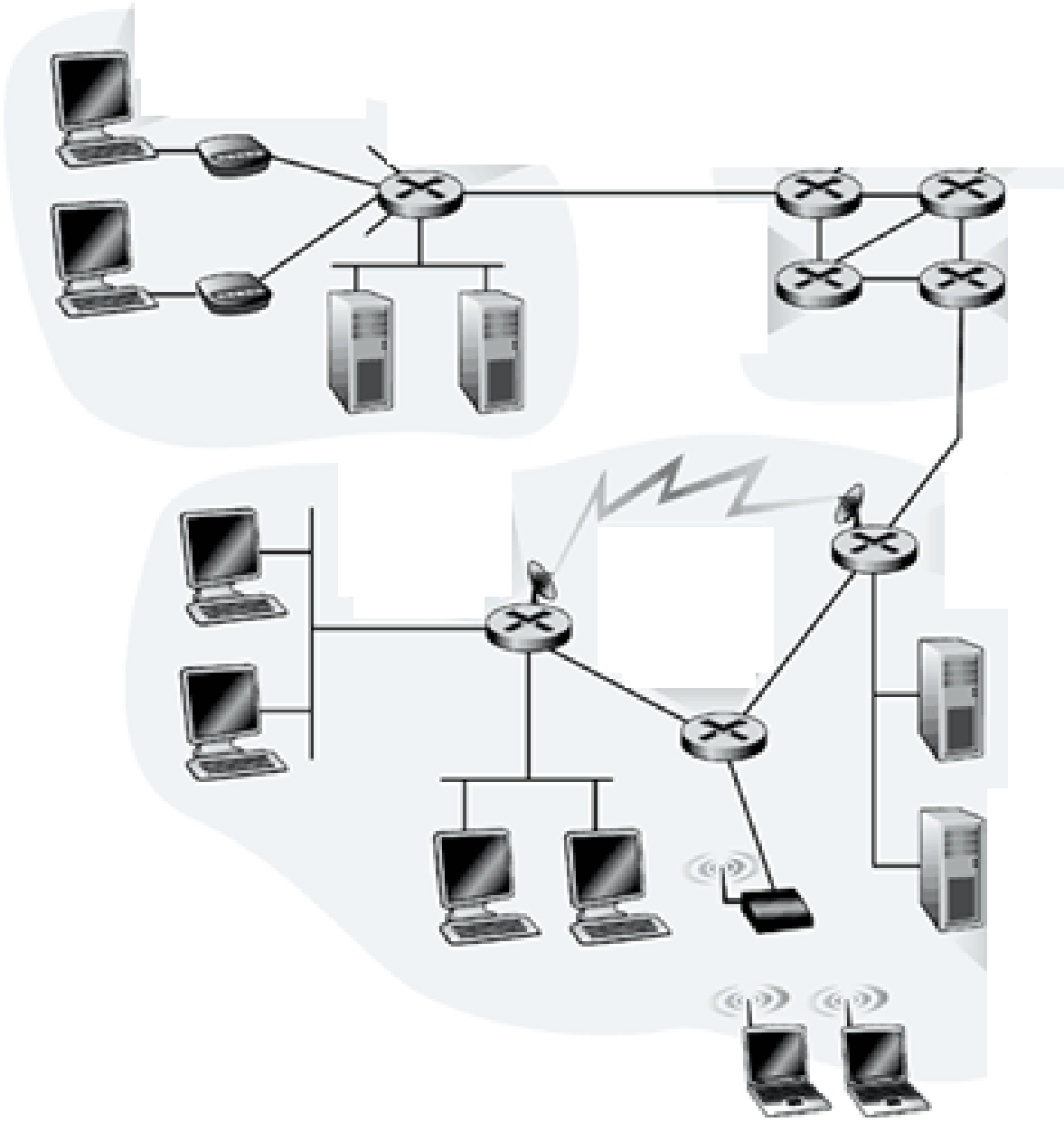


Image from Kurose&Ross' Computer Networking slides

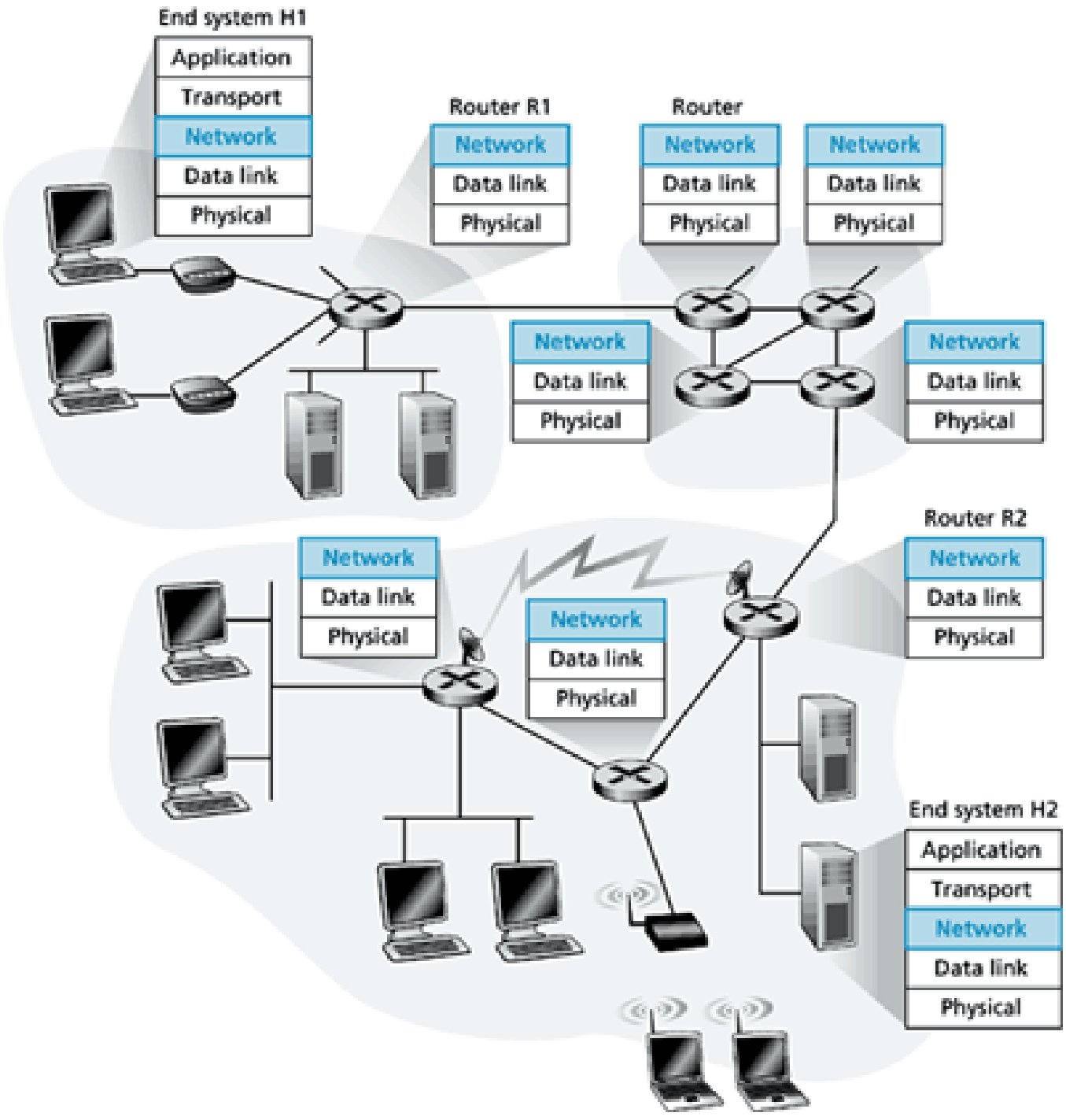


Image from Kurose&Ross' Computer Networking slides

Physical layer:

signals
bit error correction
propagation

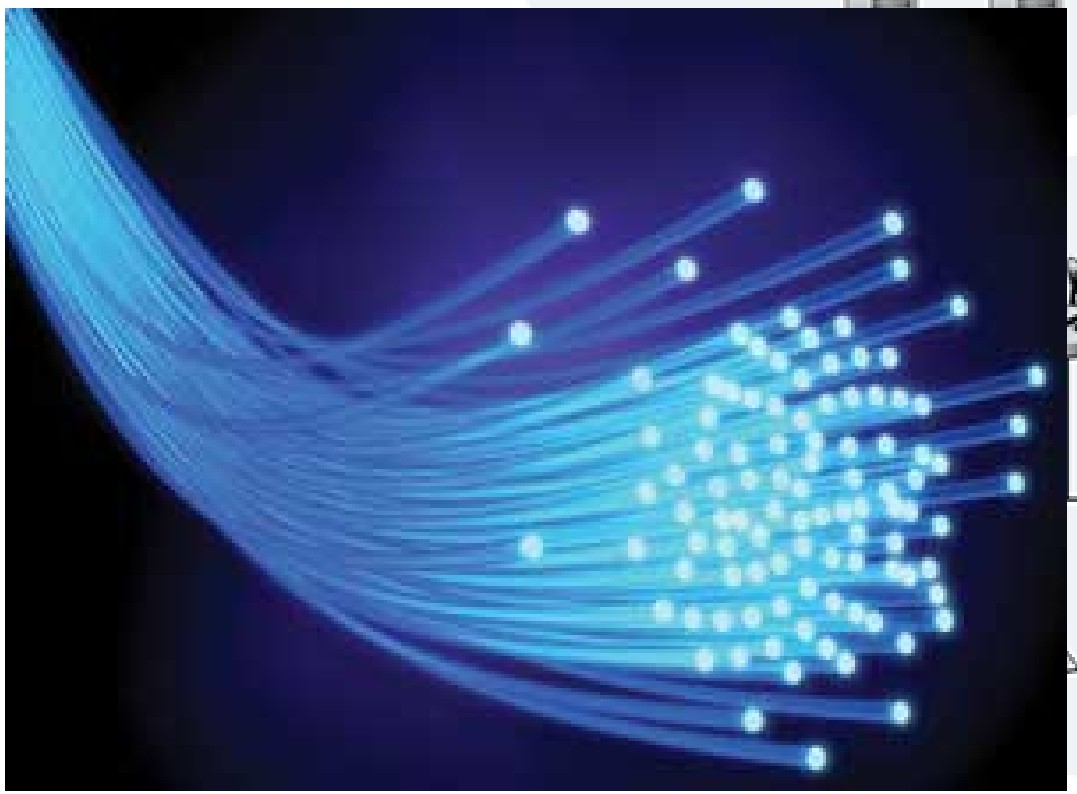


Image from http://www.photonics.com/images/Web/Articles/2012/2/1/Optical_Figure0.jpg

Link layer:

sharing a medium

retransmission algor.

Image from http://www.libelium.com/libelium-images/generico2/meshlium_waspmote-475.png

Network layer:

addressing

routing

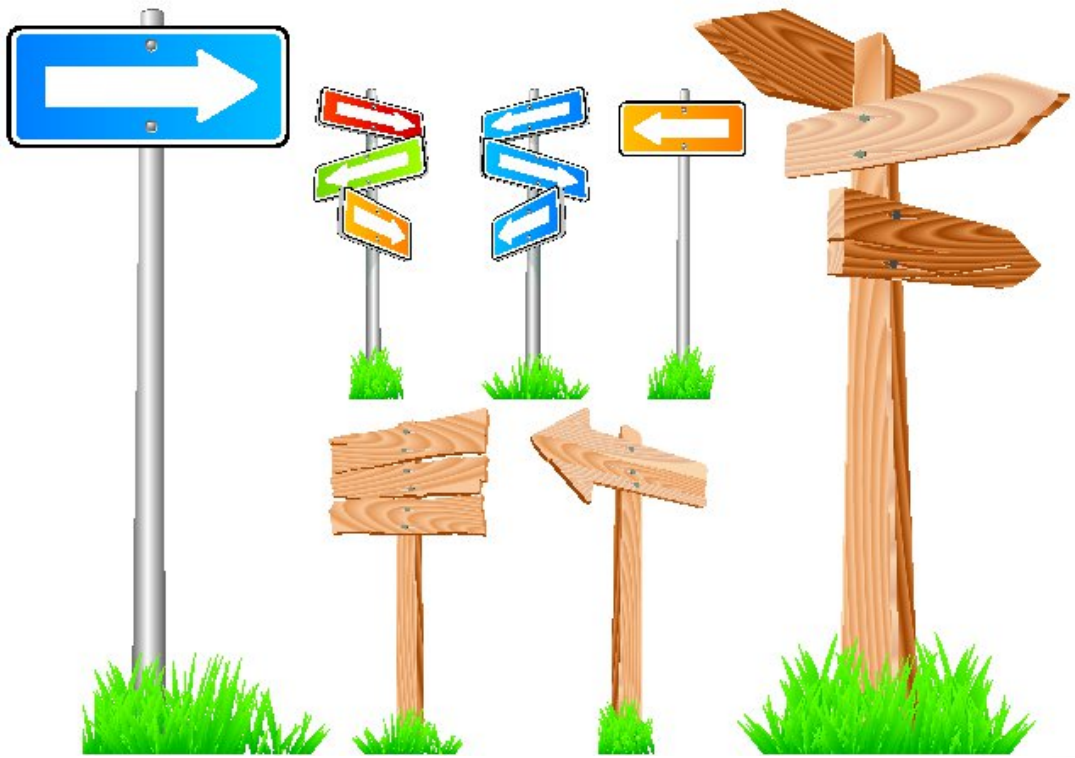


Image from http://www.gfi.com/blog/wp-content/uploads/2010/12/fax-routing.jpg

Transport layer:

flow control
congestion control
retransmission algor.

Image from http://www.aib-insurance.co.uk/wp-content/uploads/2013/11/Truck-Insurance.jpg

Application layer:

email
web
peer2peer
real-time audio/video

Image from https://qassurance.files.wordpress.com/2008/09/www21.jpg?w=480

protocol design
monitoring
performance
security

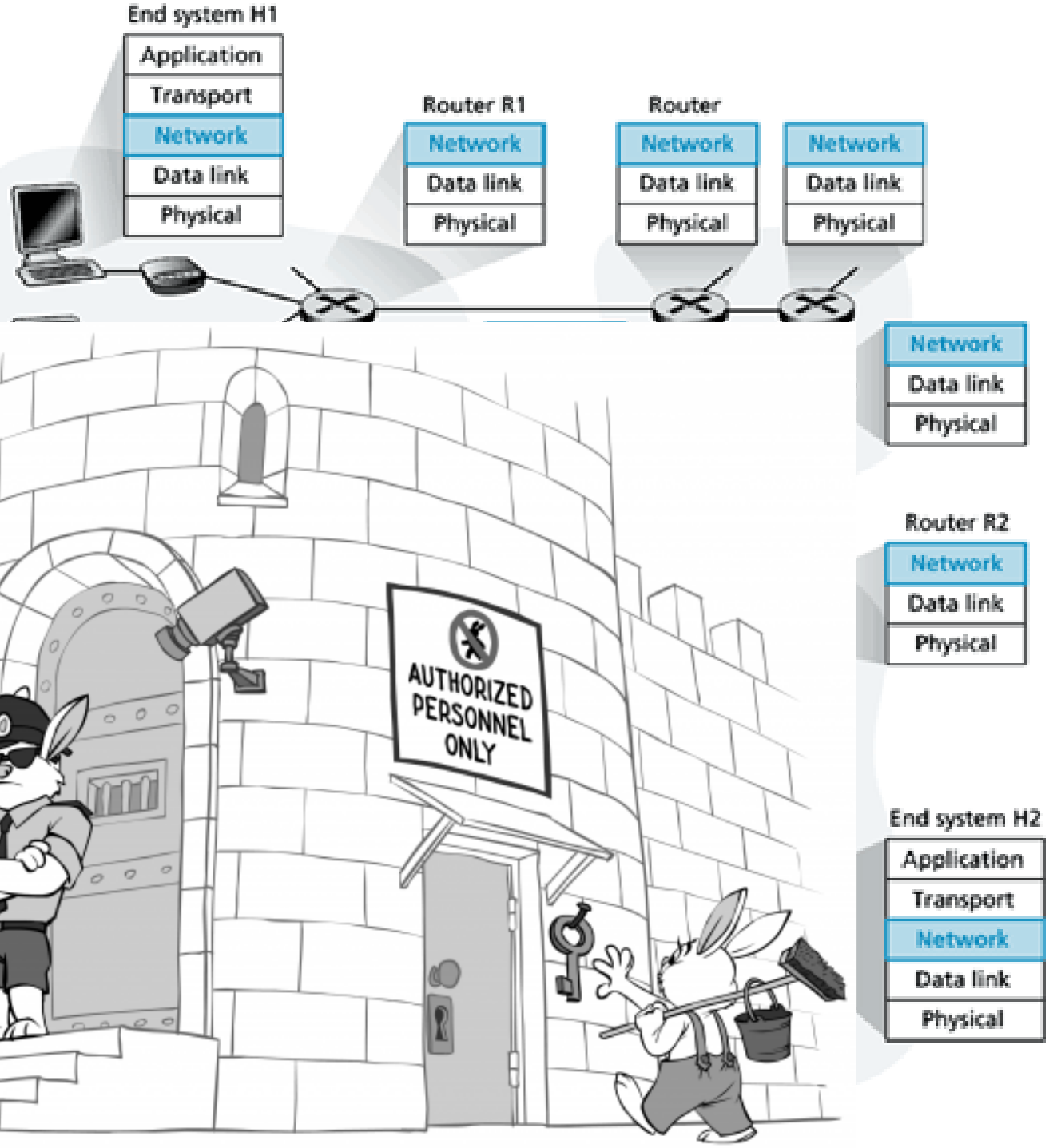
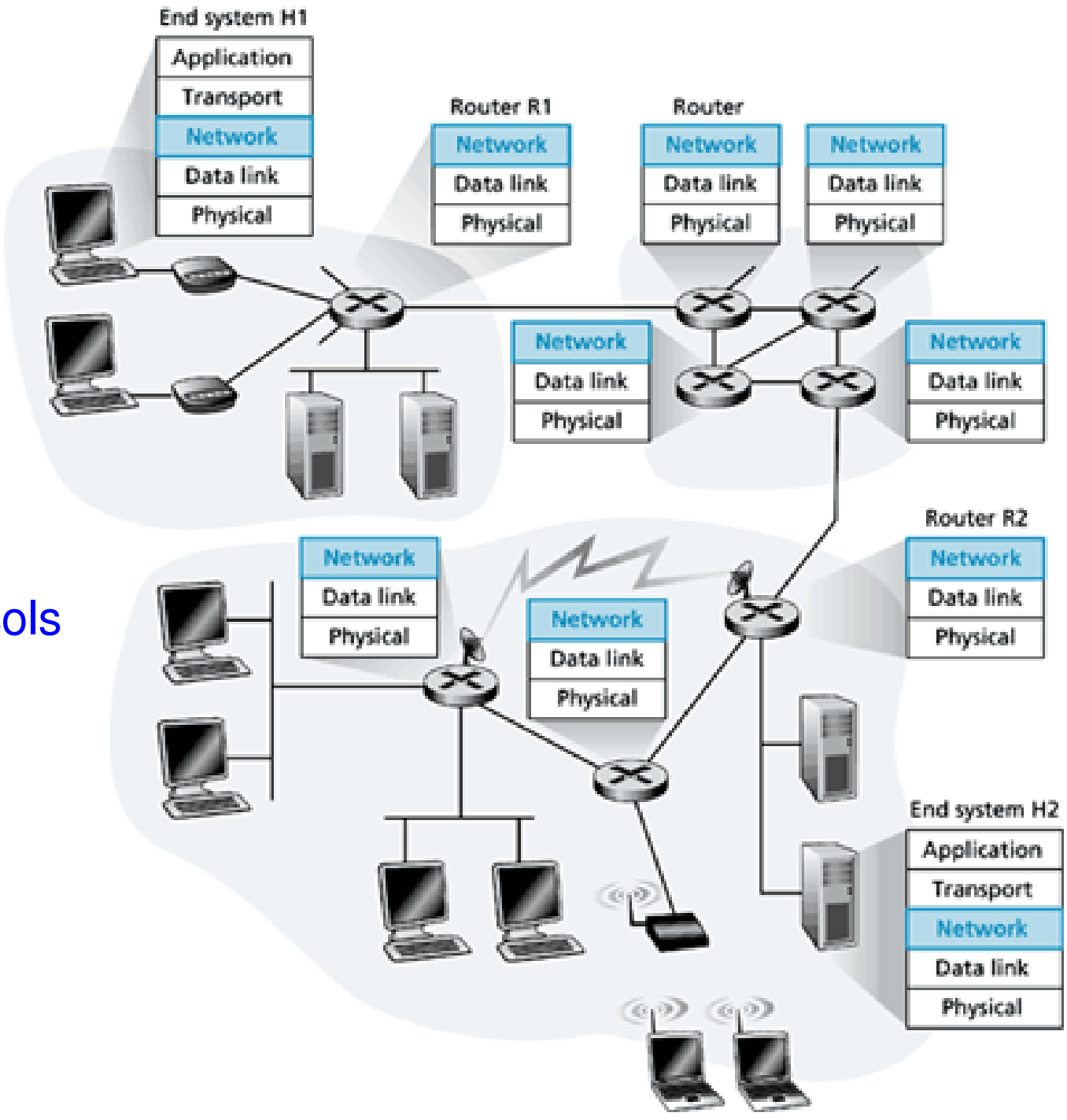


Image from http://ithare.com/wp-content/uploads/BB_part45_v1-640x465.png

basic principles
and
key internet protocols



Programming in C++

Only for EE students: (CS students do math)

- object-oriented programming
- algorithms
- datastructures

Module structure / activities

- 8 weeks, each typically consisting of:
  - 3 theory sessions (lecture/tutorial)
  - 1 observation session (Wireshark)
  - 1 “challenge”: solve a problem in 1 day
  - self-study
  - 0.375 tests (3 tests in the course of 8 weeks)
  - programming (some lectures + much practice)
- 1.5 weeks of final project: designing and implementing a communication system

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Network Systems

Questions? Ask now or mail me: p.t.deboer@utwente.nl