Network Algorithms

Chapter 0
Preamble

- Who are we?
- The topics of “Algorithmic Aspects of Communication Networks”
- Resources

Who are we?

- Fachgebiet „Telematik/Rechnernetze“
  - Prof. Dr.-Ing. Günter Schäfer
    guenter.schaefer@tu-ilmenau.de
  - M. Sc. Raphael Zimmer
    raphael.zimmer@tu-ilmenau.de
  - Web page: https://www.tu-ilmenau.de/telematik



Main Research Topics

- In general: architectures and protocols of communication systems
  - Structure, design, performance evaluation, implementation, …
  - For all types of communication: computer networks, voice communication, data & multimedia content, technical communication (control devices)
  - Special focus on security issues
- More specifically:
  - Security requirements of communication services
    - Authenticity, integrity, confidentiality of peer entities and exchanged data
  - Security aspects of protocol mechanisms
    - What side “security relevant” side-effects are introduced by specific mechanisms?
  - How to protect communication infrastructures
    - Main issue: How to ensure availability of systems and offered services?





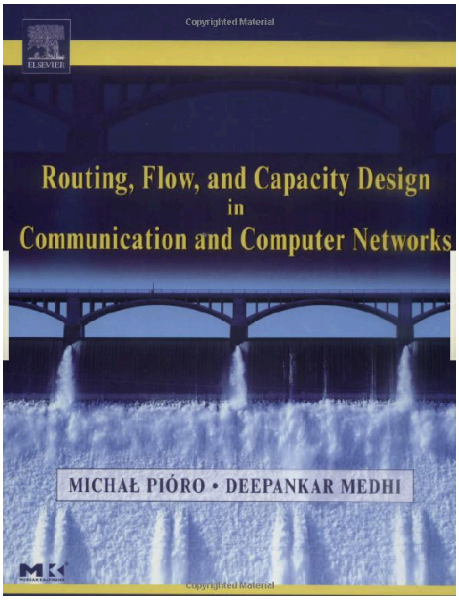


Topics of “Network Algorithms”

- Special course on optimization aspects in communications
- Prior attendance of courses Telematics 1 and 2 (Bachelor Informatik) highly recommended:
  - Basics of getting information through a network (with focus on the Internet)
  - Protocol layers 1 to 4
  - Internet application layer
  - Advanced topics like multimedia communications, QoS, performance, etc.
- *Network Algorithms* will cover the following topics:
  - Main question: How to organize data transport so that the network can handle the offered (legitimate) load?
    - Basics of packet oriented communication networks
    - Forwarding and routing
    - Network design
    - Monitoring and handling load
    - Failure resistance

Resources

- Slides are/will be available on the web site
- Main text for this course
  - Michal Pioro, Deepankar Medhi. *Routing, Flow, and Capacity Design in Communication and Computer Networks.* The Morgan Kaufmann Series in Networking, Elsevier, 2004.



- There will be no dedicated script
  - Secondary literature is sometimes beneficial (and will be cited)
- One additional source:
  - Thomas Erlebach. *Algorithmen für Kommunikationsnetze.* Script