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Network Architectures: Internet Routing

Seminarvorbesprechung

Technische Universität Berlin
Intelligent Networks / Intelligente Netze (FG INET)

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Overview

- Seminar overview
- Timeline
- Topics
- Contact

Seminar Overview

- 2 SWS / 3 LP
- Exam: talk and paper
- Prerequisites:
  - profound knowledge in computer networks and cryptology
  - good English for reading scientific papers

Seminar Content

- Recent findings and scientific insights concerning Internet routing
  - E.g. Improvements of routing algorithms
  - Wireless mesh networks
  - Overlay Networks
  - Secure routing
  - Topology detection
  - ...

Intention of the seminar

- practice to work original literature
- practice of professional/scientific talks
- occupation with a small, definite and recent matter

Seminar Certificate

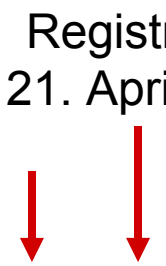
To receive the seminar certificate we require

- a successful presentation/talk
- a seminar paper accepted by us
- continuous attendance and active participation and contribution
  - in the group meetings as well as during the presentations

Timeline

Timeline: Register

- Registration until 21. April 2009 (12:00)
  - Provide personal data
  - Select topics
- Via web
  - https://www.net.t-labs.tu-berlin.de/teaching/ss09/IR_seminar/anmeldung/



Timeline: Topic Choices

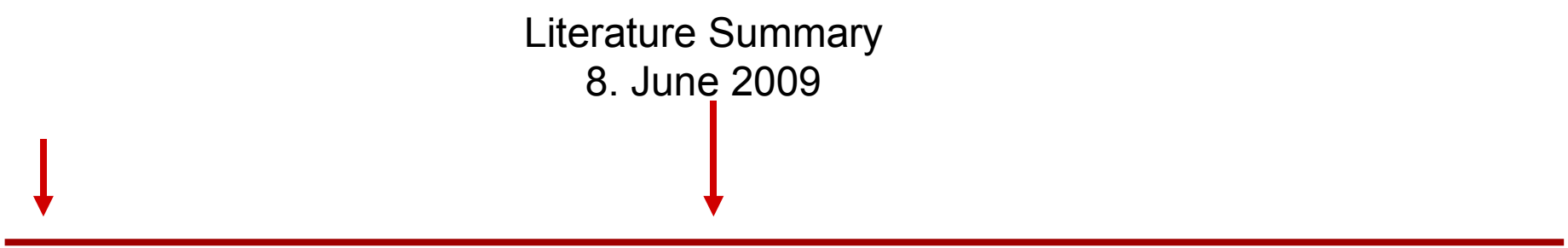
- Announcement of assigned topics until 24. April
  - Topic <-> student matching
  - Via web or email

Timeline: Topic Elaboration

- Elaborate the topic
  - Search for additional literature
  - Read and understand it
- Meeting of every participant with his supervisor subsequently

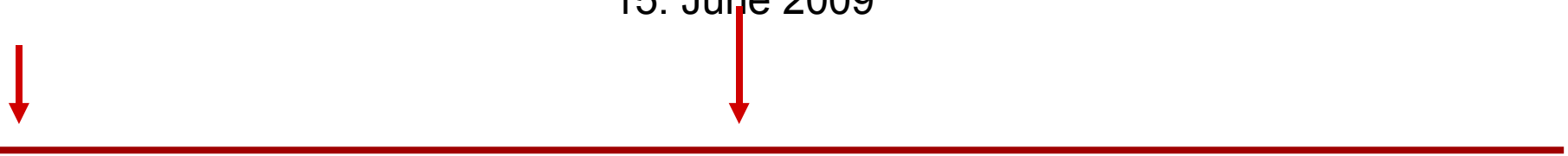
Timeline: Literature Summary

- Summarise literature in a seminar paper
  - 10 pages
  - Guidelines for writing can be found on our web site
  - Until 8. June



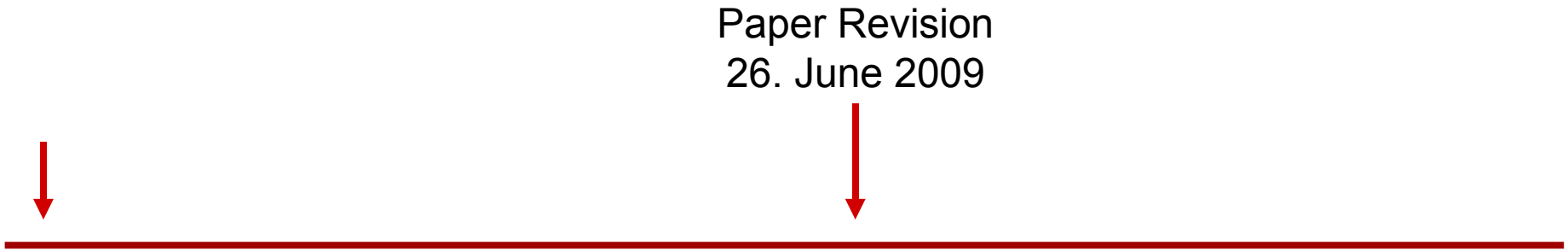
Timeline: Peer Review

- Read and correct the seminar paper of other participants in the group
  - Guidelines are linked on the seminar web page
- Subsequently: exchange comments in a group meeting (attendance is mandatory!)



Timeline: Paper Revision

- Incorporate results of the group meeting in seminar paper



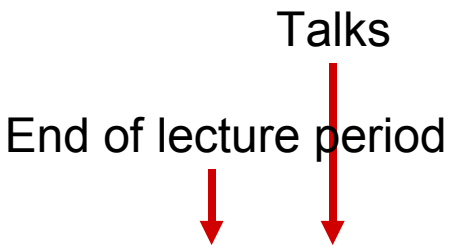
Timeline: Slides

- Start to prepare slides after June 26th

- Meet with supervisor and discuss slides
  - Incoporate comments of supervisor in slides and send the final version unil July 13th

Timeline: Talks

- Talks will be after the lecture period (Vorlesungszeit)
  - Blockseminar: 2-3 days
  - Present the paper
    - 45 min incl. discussion per talk



Timing in General

- Dates are fix!
- Organise yourself
  - Appointments with your supervisor
  - Group discussions
  - ...
- Discuss schedule in advance
  - Vacation is no excuse!

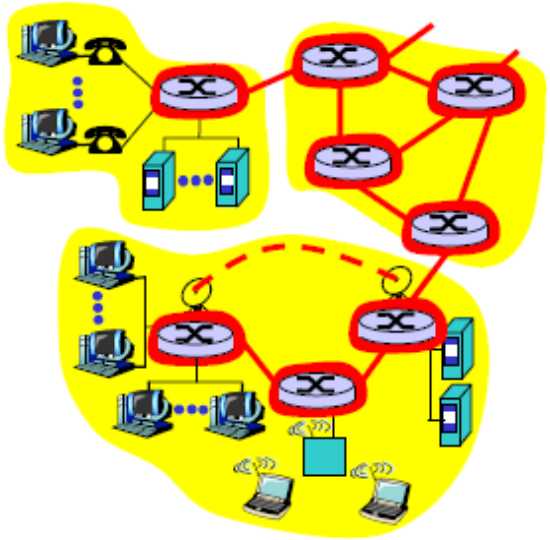
Topics

- 23 pre-defined topics
  - Can be found on the seminar page
- Additional topics can be suggested
  - But may be rejected
  - Details later on

(AS level)
Internet Routing

Topic 1

- „Building an AS-topology model that captures route diversity”
  - Model AS-level topology of the Internet
  - Predict routing changes



Topic 10

- „Compact Routing on Internet-Like Graphs”
  - Theoretical work
  - Aiming to understand why the Internet topology evolved as it is instead of simply modelling it

Topic 2

- „BGP routing policies in ISP networks”
  - Adminstrators typically assign policies to links between ASes
  - What are the problems of operators?
  - How do their policies look like?
  - How are they implemented?

Topic 3

- „Interdomain traffic engineering with BGP”
  - Traffic engineering used to better control the flow of packets inside an IP network
  - What are characteristics of interdomain traffic?
  - How can BGP be used to realise traffic engineering for interdomain traffic?

Topic 4

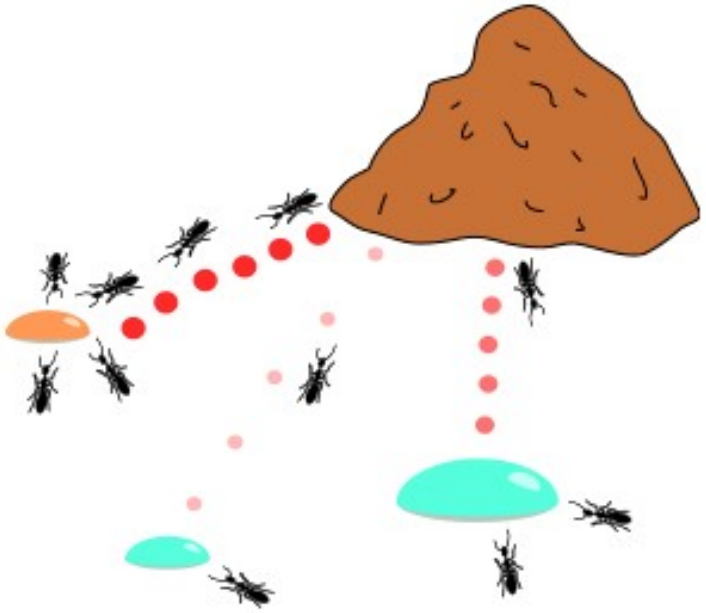
- „Metarouting“
  - Shortage of routing protocols that meet the needs of network engineers
  - -> Describe routing protocols using a high-level and declarative language
    - Metarouting interpreter
    - Easier to build and describe new protocols

Topic 6

- „HLP: A Next-generation Interdomain Routing Protocol”
  - Alternative to BGP
    - Better scalability, isolation and convergence properties

Topic 7 & 8:

- „Analytical and Numerical Investigation of Ant Behavior Under Crowded Conditions”
- „Ant colonies for Adaptive Routing in Packet-switched Communications Networks”
  - Bionic: transfer biological ideas to engineering



Topic 11

- „APT: A Practical Tunneling Architecture for Routing Scalability”
  - Routing table has seen a rapid increase in size and dynamics in recent years
    - Typically from a small number of edge sides
    - Causes stability problems
  - Propose a solution to improve routing scalability

Topic 22

- „Avoiding transient Loops during IGP Convergence in IP Networks”
  - Routing tables must be updated in case of link failures
  - Those updates may introduce transient loops
  - How can those loops be avoided?

Wirless Routing

Topic 12

- „Ariadne: A Secure On-Demand Routing Protocol for Ad Hoc Networks”
  - Ad hoc network is a group of wireless mobile computers (or nodes), in which individual nodes cooperate by forwarding packets for each other
  - Present attacks against routing in ad hoc networks

Topic 13

- „Incentive-Compatible Opportunistic Routing for Wireless Networks”
  - Unpredictable and lossy wirless channel
  - Transmission opportunities need to be taken whenever they emerge
  - Routing schema in wirless networks
    - Departs from less effective deterministic routing

Topic 15

- „Link Positions Matter: A Noncommutative Routing Metric for Wireless Mesh Networks”
  - New routing metric
  - Minimize link-layer transmissions to increase throughput

System Design

Topic 22

- „Designing Extensible IP Router Software”
  - Most problems in current routing infrastructure are caused by software problems
  - How can the software design be optimised to optimise the routing infrastructure itself?

Topic 24

- „OpenFlow: Enabling Innovation in Campus Networks”
  - Switching vs. routing

Topic 14 & 16

- „Power Awareness in Network Design and Routing”
  - Power and associated heat management challenges in today's routers
- “Unified Energy-Efficient Routing for Multi-Hop Wireless Network”

Topic 18 & 19

- „An Analysis of the Skype Peer-to-Peer Internet Telephony Protocol”
- „A Measurement-based Study of the Skype Peer-to-Peer VoIP Performance”

Routing Security

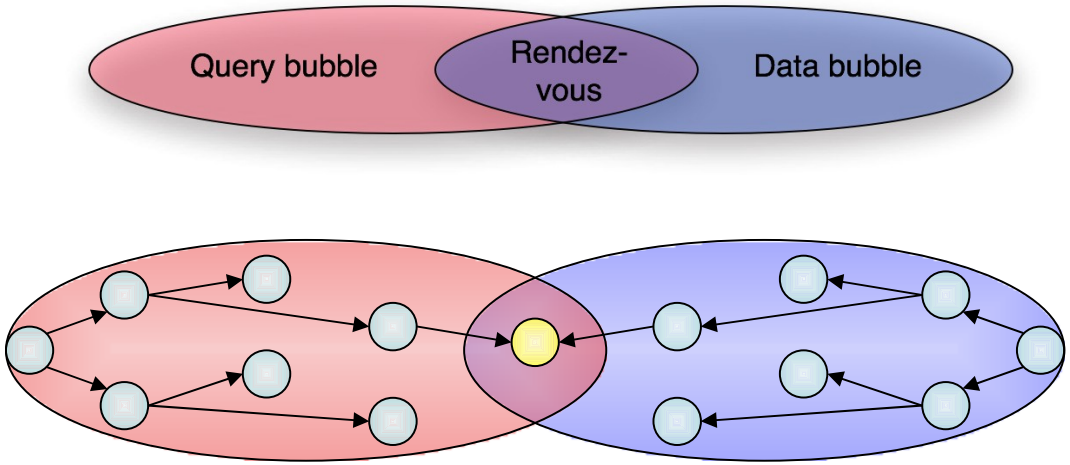
Topic 20

- „A Light-Weight Distributed Scheme for Detecting IP Prefix Hijacks in Real-Time”
  - Send spam emails
  - Launch DDoS attacks
  - Man-in-the-middle attacks
  - ...
  - How to detect IP prefix hijacks?

Overlay Networks

Topic 5: P2P

- „BubbleStorm: Resilient, Probabilistic, and Exhaustive Peer-to-Peer Search”
  - Routing in (unstructured) P2P networks



Topic 21: Virtual Networks

- „In VINI Veritas: Realistic and Controlled Network Experimentation”
  - Virtual network infrastructure
  - Evaluate protocols in a realistic setting while still be able to have some control

Suggesting Additional Topics

- You can suggest own topics
  - No guarantee for accepting those!
- Some requirements on papers for the seminar:
  - Scientificly relevant
  - Good quality paper
    - See next slide howto find those
  - Self-contained description in one paper or set of papers

Howto Find Topics

- Related Conferences / Workshops
  - ACM SIGCOMM
    - http://www.sigcomm.org/learn/sigcomm-conference/sigcomm-conference
  - ACM CoNEXT
    - http://conferences.sigcomm.org/co-next/
  - ReArch 2008
    - http://conferences.sigcomm.org/co-next/2008/rearch_technicalprogram.html
  - ACM MobiCom (Wireless)
    - http://www.sigmobile.org/mobicom/

Mailing List

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Teaching at FG INET

- Lectures (Vorlesungen)
- Seminars (Seminare)
- Lab course (Praktika)
- Projects (Projekte)
- Theses (Diplom/Master/Bachelor)
- PGT: Project Group Meeting

Contact

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