

Wireless Lab (WiSe 2016/17)

Lecture 0: Organization

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Contact & Discussions via ISIS:
Course ID 8501

http://www.inet.tu-berlin.de/menue/teaching0/ws201617/wl_1617/

Outline

- General Information
- Organization
- Course Contents and Structure
- Prerequisites

About us: FG INET

□ FG INET

- Internet Network Architectures group
- Located in MAR on the 4th floor

□ Lecturer:

Anja Feldmann

□ Tutors:

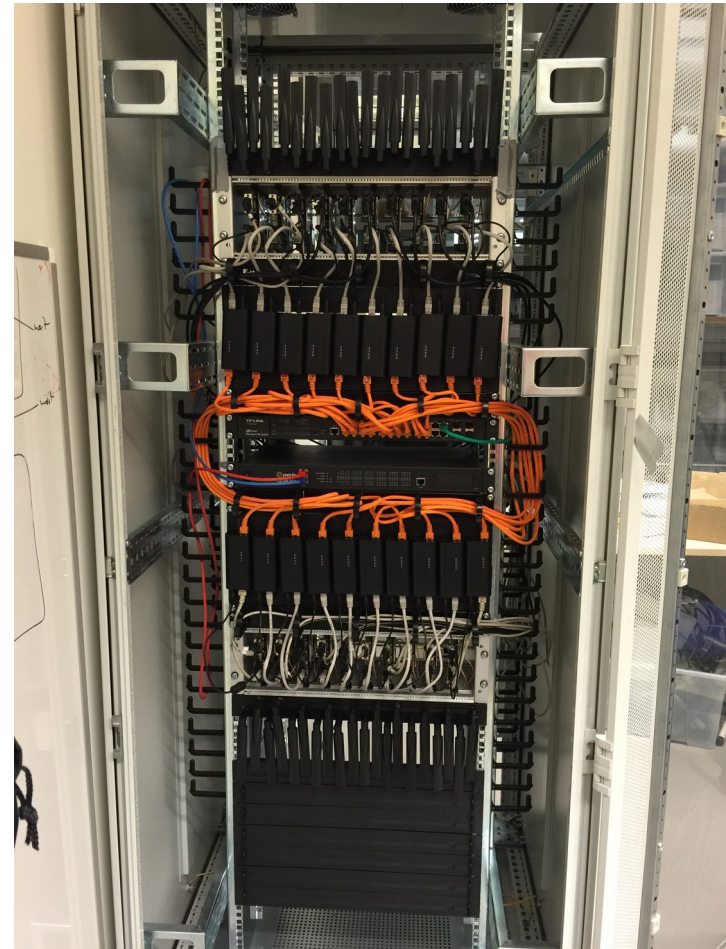
- Theresa Enghardt
- Apoorv Shukla
- Mirko Palmer

About us: BOWL

- ❑ **Berlin Open Wireless Lab (BOWL) at FG INET**
- ❑ **Indoor Testbed**
 - 20 nodes
 - On the 4th floor of MAR
 - For smaller or not-ready-to-be-tested-outside experiments

About us: BOWL

- ❑ **Berlin Open Wireless Lab (BOWL) at FG INET**
- ❑ **Teaching Testbed**
 - 20 nodes
 - On the 4th floor of MAR
 - Embedded x86 boards
 - Running OpenWRT



About this course

- ❑ Wireless != Wired
- ❑ **IEEE 802.11** (“Wi-Fi”) at different layers
- ❑ Not only theoretical, but **practical knowledge**
- ❑ **Hands-on** assignments
- ❑ You will:
 - Configure Access Points (APs) and clients
 - Examine wireless traffic
 - Measure and evaluate performance
 - Study underlying protocols

Expected take-aways

- ❑ Deeper understanding of IEEE 802.11
- ❑ Challenges associated with operating Wireless networks
- ❑ Hands-on experience
- ❑ Measurement of real systems and analysis

About this course: Structure

☐ **Tutorials** – **Highly recommended**

- Thursdays 16-18, MAR 0.017
- Around 11 lectures + Q&A throughout the semester
- Assignments are handed out at the time of the tutorial

☐ **Assignments** – **Compulsory**

- 10 in total
- Duration of 1-2 weeks
- Solved in teams of 2

☐ **Oral Exam and Debriefings** – **Compulsory**

- Describe or demonstrate your solutions
- Answer questions

☐ **There are no certificates just for attending the lectures.**

General Information: Module

❑ **Module:** MINF-KT-NA/ML.W17

- “Network Architectures – WirelessLab”
- **9 ECTS** points = 270 hours of work
- Please register in QISPOS **by November 8th.**

❑ **Grading (Portfolioprüfung)**

- 10 assignments in total
- Assignments **01 and 02** together: **Oral exam** on **November 09th/10th**
 - Done **individually**
 - **12/100** of total grade
- Assignments **03 to 10**: **Worksheets** and **Debriefings**
 - Done **in teams of 2** but graded individually
 - **11 points each = 88/100** of total grade

Assignments

- ❑ 10 worksheets
- ❑ Handed out on Thursdays in the Tutorials
- ❑ Deadline: **Wednesday night at 11.55 pm**, 1 or 2 weeks later. No late submissions.
- ❑ Expected workload: **20 hours per worksheet** (+-)
After all, this course is 9 ECTS = 270 hours.
- ❑ Worksheet 01 and 02 **are not graded**, but we ask for their contents in the **oral exam**
- ❑ Worksheets 03 to 10 **are graded** after the **debriefing** in the week after the deadline

Assignments

❑ Example **general questions**:

- How does a wireless station connect to an AP?
- What is RTS/CTS? Why is it needed?
- What effects do PHY and MAC have on higher layers?

❑ Answer these questions by **practical experiments** on the testbed

- Configure an AP and a client
- Generate traffic between them
- Measure the performance
- Evaluate the results
- Write a report on it

Collaboration

- ❑ You solve assignments in **groups of 2**
- ❑ You **must collaborate** with your group partner
- ❑ Each student is **graded individually**
- ❑ You may distribute tasks, but **know** what the other one has done – **You** may have to explain it in the debriefing
- ❑ Each team completes the assignments **independently** from the other groups – No plagiarism, please!

Communication

- ISIS course: ID **8501** (on **ISIS**)
 - News forum for announcements from us
 - Discussion forum for any questions you have
 - Tutorial Slides
 - Assignment worksheets
 - Upload your solutions
- **Please use the forums on ISIS for contacting us.**

Course Content: Tentative Outline

- ❑ **Tools Of The Trade** (Assignments 1-4)
 - Tools for measurement and analysis
 - Statistics and performance evaluation
 - Configuring an Access Point, TCP performance
- ❑ **IEEE 802.11** protocol (Assignments 4-7)
 - Lower MAC functionalities (RTS/CTS)
 - Active/Passive measurement
 - Physical properties: Signal Strength, Carrier Sensing
 - Linux rate control

Course Content: Tentative Outline

□ Further Topics (Assignments 8-10)

- Wireless (In-)Security
- Upper MAC (4-way handshake)
- TCP
- Current research in our group

Prerequisites

☐ Required:

- **Networking knowledge** from these courses, or equivalent:
 - Network Protocols and Architectures (by Prof. Feldmann)
 - Telekommunikationsnetze (by Prof. Wolisz)
- Knowledge of **Linux and the command line**
- **Shell scripting**
- **English** language for written assignment reports, debriefings

☐ Highly desirable:

- Practical networking skills
- Programming/systems experience

Reading

- ❑ Tutorial handouts and reading list in assignments
- ❑ HowTos on the Internet
- ❑ Scientific Papers
- ❑ Book list, also found on the course website
 - Schiller: Mobile Communications. Addison-Wesley, 2003.
 - Rappaport: Wireless Communications: Principles and Practice. Prentice Hall, 2002.
 - Kurose and Ross: Computer Networking: A Top-Down Approach. Addison-Wesley, 3rd edition, 2007.
 - **We will NOT follow these books**, they are only for your information

So...

☐ Now, you have an idea about the course.

☐ Time to think:

Are you going to take the course?

- Do you have the time? (**~20 hours per worksheet**)
- Can you make the commitment?
- Do you have the prerequisites?
 - There is a **small quiz** to **help you evaluate** if you have the knowledge.
 - **Not graded**, of course!

And now...

- ❑ **Please decide if you want to take this course**
 - Take your time to think about it.
 - Keep in mind that it's a **major time commitment** during the semester.
 - On the other hand, there is no exam at the end.
- ❑ We have hardware for **8 groups at most**.

If you decide to take the course:

- ❑ Join the **ISIS course**
- ❑ Find a **group partner** by next week – or we will assign one at random.
- ❑ **Register** for the module on QISPOS **by November 8th.**
 - Oral exam on November 09th/10th
 - Assignments and debriefings from November 10th on

See you next week 😊