

Title: Telecommunication protocols (programme VSP)

Lecturer: Prof. Dr. Drago Hercog

Aim of the course:

To understand the principles and methods of message transfer in a telecommunication system, the meaning of telecommunication services and protocols, as well as protocol stacks, protocol specification and design. To acquire an overview of some important communication protocols.

Required (pre)knowledge:

Basics of physics, basics of computer science and programming, basics of communication networks.

Contents:

Basics: telecommunication service (service user, service provider, service specification, service access point, service primitives); telecommunication protocol (protocol as service implementation, protocol entities, protocol as a language, protocol specification); communication messages (service data unit, protocol data unit, payload and overhead); protocol stack (principles, OSI, TCP/IP, ATM, SS7, communication planes).

Specification of communication systems and protocols: structure specification; abstract and concrete syntax of messages; functionality specification; (extended) finite state machine; SDL.

Communication protocols and communication traffic: protocol efficiency; efficiency of protocol stack.

Protocol tasks: message structure; connection management (two-way handshake, three-way handshake, resolution of collisions, negotiation); error detection and correction; automatic repeat request protocols (sliding window protocols, stop-and-wait, go-back-N, selective-repeat); flow/congestion control (need for control, flow vs. congestion control, congestion avoidance, congestion recovery, control methods); message segmentation.

Protocol examples: LAPB/LAPD, TCP, IP, some application-layer protocols...

Selected references:

1. Stallings, W., Data and Computer Communications, 9th Ed., Pearson Prentice Hall, Upper Saddle River, N.J., 2011
2. Sharp, R., Principles of Protocol Design, Prentice-Hall, New York, N.Y., 1994
3. Doldi, L., Validation of Communication Systems with SDL, Wiley, Chichester, 2003