

Course

NGN - Next Generation Networks

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^ General information

Long name	Next Generation Networks
Approving CModule	NGN MaCSN , NGN MaTIN
Responsible	Prof. Dr. Andreas Grebe Professor Fakultät IME
Level	Master
Semester in the year	summer semester
Duration	Semester
Hours in self-study	78
ECTS	5
Professors	Prof. Dr. Andreas Grebe Professor Fakultät IME
Requirements	Bachelor-level knowledge of protocols and layer models, Internet protocols (UDP, TCP, IP, HTTP, FTP), IP addressing (IPv4, IPv6), routing techniques (IP routing, functionality of a router, routing protocols, RIP, OSPF), transmission systems and layer 2 protocols, Ethernet. Understanding distributed systems and applications, sockets and client/server programming, request-response patterns, publish-subscribe patterns.
Language	English
Separate final exam	Yes

Final exam

Details

In a final examination (oral, optionally written), the students demonstrate their competences in summary form. The examination comprises the following sections, in which six taxonomy levels are included (reproducing, understanding, applying, analysing, synthesising, and evaluating).

- 1.) A good understanding of basic terminology, concepts and techniques.
- 2.) Application of planning and evaluation techniques.
- 3.) Evaluation of proposed solutions for correctness, identification of errors in statements or given networks.

Minimum standard

Achievement of the individual minimum score per exam, typically 50% of maximum score.

Exam Type

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^ Lecture / Exercises

Learning goals

Knowledge

Achieve basic understanding and implementation knowledge on Next Generation Network (NGN) definition by ITU-T, IP Multimedia Subsystem by 3GPP, and ETSI, and Next Generation Internet (NGI) definition by IETF, ITU-T standards, Multimedia Services in NGN, VoIP, Video-over-IP, RTP encapsulation, Service Signaling, SIP protocol, SIP Digest Authentication, SDP service description and capabilities, SIP servers, Session Border Controller (SBC), SIP Gateway Technologies, SIP routing, NAT Gateways, NAT solution, SRR, STUN, TURN, IMS in mobile networks, IMS in fixed-line networks, VoIP in enterprise networks. IMS in virtualized core network.

Skills

Students evaluate requirements for NGN services and plan, implement and analyze NGN services based on SIP signalling or alternative signalling protocols. They are competent in functional analysis and troubleshooting by deep packet inspection (DPI) protocol analysis. They evaluate the performance of NGN services in terms of timing, throughput, latency and delays, jitter, robustness in case of packet errors, and security aspects.

Expenditure classroom teaching

Type	Attendance (h/Wk.)
Lecture	2
Exercises (whole course)	1
Exercises (shared course)	0
Tutorial (voluntary)	0

Separate exam

none

^ Practical training

Learning goals

Knowledge

Naming, structuring and classifying concepts and technologies for NGNs or NGIs. Demonstrate network analysis techniques and tools, know methods for NGN services and network planning.

Skills

Working on a small project in a tiny team (2-3 team members) on actual technologies in the area of NGN services and NGI services.

Set-up an NGN/NGI environment and NGN service, including planning, implementation and evaluation of security aspects and protocol analysis plus performance evaluation.

The results are reviewed during the course period, summarised in a report and presented to the class. Individual project proposals by students are welcome.

Expenditure classroom teaching

Type	Attendance (h/Wk.)
Practical training	1
Tutorial (voluntary)	0

Separate exam

Exam Type

working on practical scenarion (e.g. in a lab)

Details

Several lab appointments with different tasks are to be attended, to solve a lab project.

The following tasks are to be completed:

Independent solution of the planned tasks and milestone presentation.

Preparation of a final report.

Final presentation of the results.

Minimum standard

Successful participation in all lab dates.

Successful implementation of the lab project.