

# Research Group for Telecommunication Networks



SIP

Quality of Service

Peer-to-Peer

Protocols

Application Server

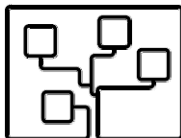
Systems

Services

Networks

Smart Grid

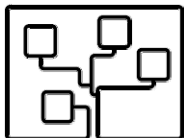
Fachhochschule Frankfurt am Main –  
University of Applied Sciences



# Research Group for Telecommunication Networks

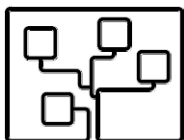


- **Prof. Dr.-Ing. Ulrich Trick**
- **Dipl.-Ing. (FH) Frank Weber**
- **Dipl.-Ing. (FH) Armin Lehmann**
- **M.Sc. Dipl. Inf. (FH) Thomas Eichelmann**
- **Dipl.-Ing. (FH) Patrick Ruhrig**
- **M.Sc. B.Sc. Inf. Patrick Wacht**
- **M.Sc. B.Sc. Inf. Michael Steinheimer**
  
- **approx. 8 students**



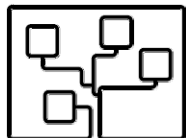
# Activities

- **R&D projects with the focus „Next Generation Networks“**
- **New: Smart Grid and Smart Home**
- **Diplom, Bachelor and Master theses**
- **Advanced Training Seminars**
- **Courses, Laboratory Workshops**
- **Open house, Girl´s Day**

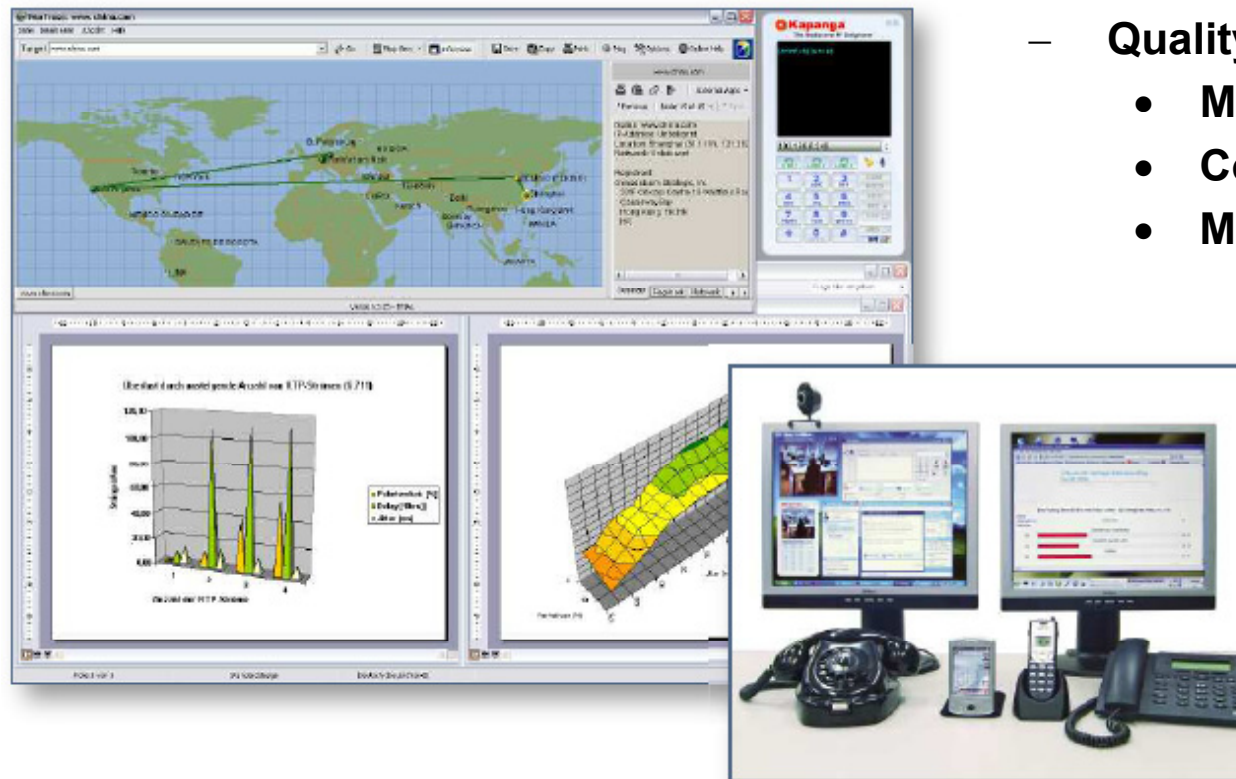


# Subjects

- **Modelling, optimization and migration of networks**
- **Session Initiation Protocol (SIP)**
- **Quality of Service (QoS) in SIP/IP networks**
- **Future communication services and Application Servers**
- **Peer-to-Peer communication with Multimedia over IP**
- **NGN-systems and architectures**
- **Smart Grid and Smart Home**



# Current Focuses



## – Quality of service in NGN-IP networks

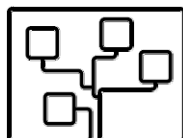
- Measuring
- Controlling
- Monitoring

## – NGN-systems and networks

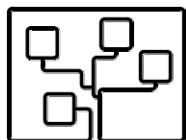
- Network elements
- Network architectures
- Unified Communications
- IPv6
- Test network

## – Services in future telecommunication networks

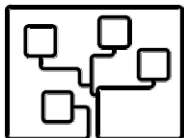
- Requirements, ideas
- Value added services
- Application Server, Service Delivery Platform
- Services for Smart Grid and Smart Home



- **Future telecommunication infrastructure**; 07/2002-03/2003 (Univ. of Applied Sciences)
- **Optimization of heterogeneous, packet switched telecommunication networks**; 10/2003-04/2005 (BMBF)
- **Development of a concept for a new telecommunication network**; 01/2005-03/2005 (company project)
- **Emergency call with Voice over IP**; 05/2005-01/2006 (company project)
- **Requirements for Carrier Class VoIP networks**; 08/2005-01/2006 (company project)
- **Anti-spam and Click-to-Dial with Voice over IP**; 08/2005-02/2006 (company project)
- **Complete integration of IP networks for multi-media communication (Next Generation Network)**; 09/2005-12/2005 (Univ. of Applied Sciences)
- **High Quality Audio VoIP technology for broadcasting stations**; 10/2005-03/2006 (company project)
- **Conceptual Study for the monitoring of Quality of Service with VoIP (Voice over IP) in an NGN (Next Generation Network)**; 03/2006-11/2006 (company project)
- **Services in NGN**; 10/2006-04/2007 (company project)
- **Services and architectures in future telecommunication networks (DazTel)**; 11/2005-04/2008 (University of Applied Sciences)

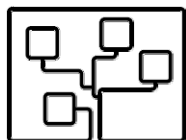


- **Improvement of Quality of Service across networks with SIP-based VoIP communication (QoSSIP); 10/2005-04/2008 (BMBF)**
- **Multimedia over IP and security; 11/2007-05/2008 (company project)**
- **Provisioning and Developing of Value-added Services in NGN; 02/2009-03/2009 (company project)**
- **NGN Core technology; 10/2008-10/2009 (company project)**
- **IMS- or P2P-based provisioning and development of services for customer-specific communication processes (TeamCom); 05/2007-05/2010 (BMBF)**
- **Unified Communications System; 04/2008-08/2010 (company project)**



# Current Research and Development Projects

- **Test-controlled evolution and automated provisioning of communication services** (ComGeneration); 07/2009-06/2012 (BMBF)
- **SIP-Routing Infrastructure for Audio over IP**; 04/2011-12/2011 (company project)
- **Easy-Service Creation for Home and Energy Management (e-SCHEMA)**; 10/2011-09/2014 (BMBF)



# Current Publications

- More than 59 publications in the last 8 years with the subjects
  - NGN
  - Voice/Multimedia over IP
  - Emergency call
  - Mobility
  - Peer-to-Peer communication
  - Services and Application Server
  - Network modelling
  - Network migration
- NGN book:  
**SIP, TCP/IP und Telekommunikationsnetze. 4. Auflage. Oldenbourg, Juli 2009**

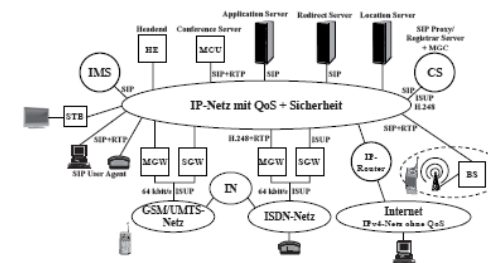


Ulrich Trick | Frank Weber

## SIP, TCP/IP und Telekommunikationsnetze

Next Generation Networks und VoIP – konkret

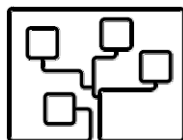
4. Auflage



Mit CD-ROM

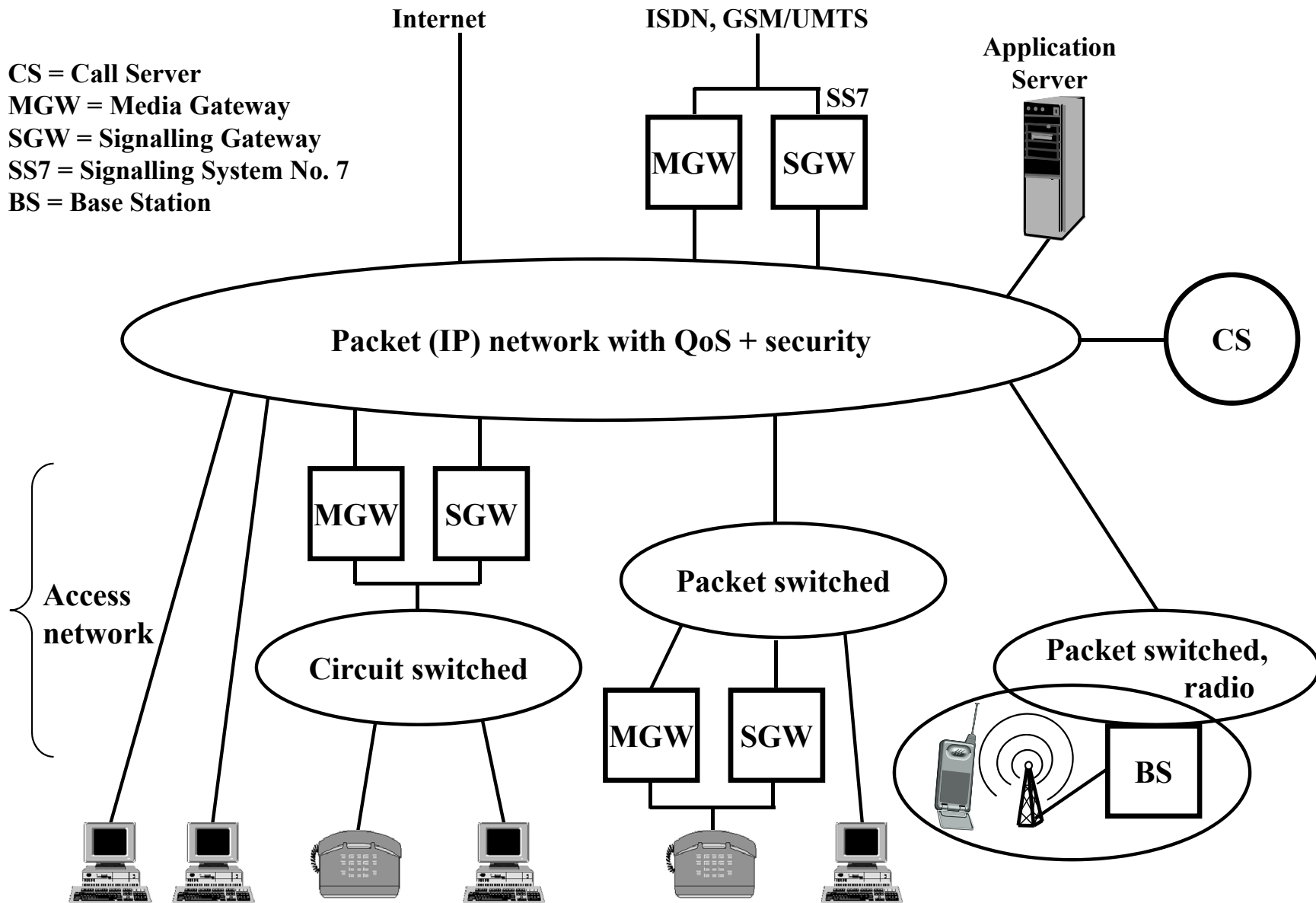
Oldenbourg

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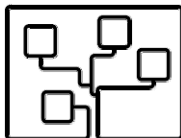


# Laboratory for Telecommunication Networks with NGN

**CS = Call Server**  
**MGW = Media Gateway**  
**SGW = Signalling Gateway**  
**SS7 = Signalling System No. 7**  
**BS = Base Station**

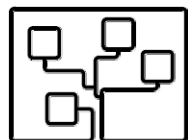


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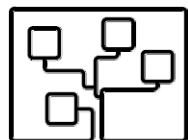
# Equipment of the NGN Laboratory @ FH Frankfurt

- **Multimedia over IP infrastructure with Call Servers, Gateways, Session Border Controller etc., with focus on SIP**
- **IP networks, WLANs, HW-IP-Router, Linux-based IP-Router, fiber optical cabling**
- **ISDN networks**
- **MoIP (Multimedia over IP), SIP, H.323, MGCP**
- **SER (SIP Express Router)/Kamailio as Call Server and SIP Application Server**
- **Mobicents as SIP Application Server**
- **Net-Net 3800 (Acme Packet) as Session Border Controller**
- **Asterisk as Session Border Controller and Gateway**
- **CMS-3000 (Radisys), Asterisk and SEMS (SIP Express Media Server) as Media Server**
- **Server for Text to Speech and speech recognition (e.g. Loquendo)**
- **Hard- (snom) and Soft-IP-phones**
- **Protocol analysis and simulation (e.g. Tektronix, Wireshark)**
- **M-Bus, EnOcean, ZigBee, KNX, Z-Wave devices**



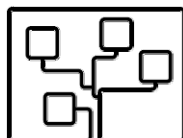
# Advanced Training Seminars

- **Next Generation Networks, Voice over IP and SIP, 2 days**
- **NGN, SIP and Value Added Services, 3 days**
- **Quality of Service (QoS) in IP Networks/NGN, 1,5 days**
- **At the University of Applied Sciences Frankfurt and inhouse with companies**
- **Since October 2004:  
18 seminars at the Univ. of Applied Sciences Frankfurt  
22 inhouse with companies**



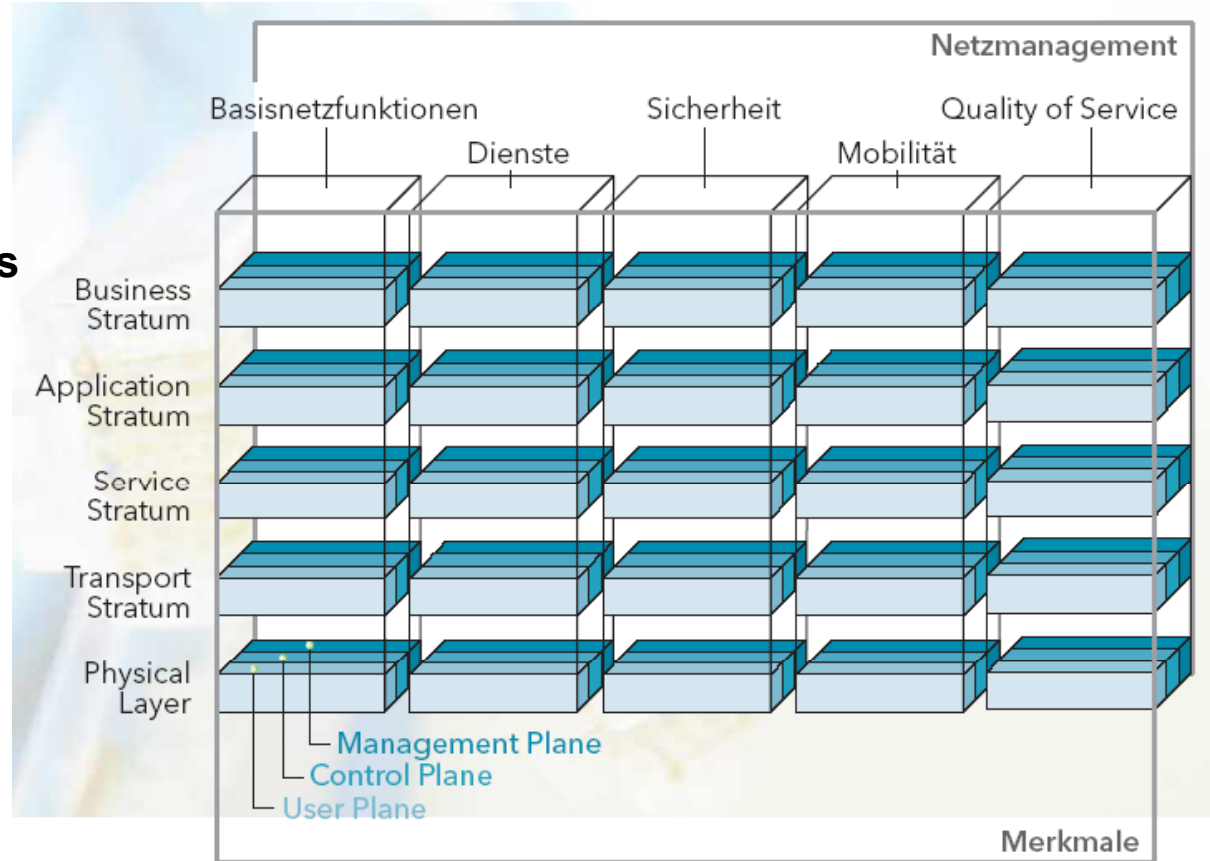
# References for seminars

<b>Arcor, ARD.ZDF medien akademie, Ascom</b>	<b>Bayerischer Rundfunk, BCC, BT, Bundesamt für Sicherheit in der Informationstechnik, Bundesnetzagentur</b>	<b>Connection 42</b>
<b>DB Systems, DB Telematik, Detecon International, Deutsche Flugsicherung, Deutsche Telekom, Devolo, Dolphin Telecom</b>	<b>e.dis, e.discom, Ericsson, EWE, EWE TEL</b>	<b>France Telecom Mobile Satellite Communications</b>
<b>HanseNet, HFO Telecom,</b>	<b>Innovations Software Technology, Keymile, komro</b>	<b>Marconi, M-net, Mucke &amp; Novak</b>
<b>NetCologne, Next ID</b>	<b>osnatel</b>	<b>Pfalzkom, Philips Business Communications</b>
<b>Quante Netzwerke, Quintessenz Beratung</b>	<b>R-KOM, Robert Bosch</b>	<b>SRG SSR idée suisse, Swisscom, SWU TeleNet</b>
<b>T-Com, T-Home, T-Systems, tekit Consult, Teleos, Teliko, Tieto, TransTel Communications</b>	<b>Vodafone</b>	<b>Wilhelm Sihm Jr.</b>



# Possible areas of Cooperation

- Research and Development for Companies
- Conceptual Studies
- Workshops
- Advanced training seminars



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