

## PREFACE

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This report is intended to inform our former students, diploma workers and graduate students of the chair, co-operating industrial companies, and other interested organizations about current and completed work and events at the chair of Communication Networks (ComNets). It covers the areas where we are active by abstracts describing recently finished, ongoing and newly to start projects. Moreover, information about names of supporting organizations, personnel staff at the chair, and our teaching responsibilities is provided.

The summer semester 1999 had its special attraction for me: for this time the senate of the RWTH Aachen, resp. the rector had approved one research term to me. Some people falsely say “research free term”, but this is wrong, because one is not exempted from the research, only from the teachings (so far a substitute is found). In fact, one must justify a research term in writing with the planned research projects and write a report at the end.

Naturally, the lectures and examinations continue.

- “Applied Computer Science 3”, which is an obligatory lecture for students in the basic studies, was given by Univ. Professor (Salzburg) Dr. C.H. Rokitansky.
- The obligatory lecture in the graduate studies “Communication Networks and Traffic Theory II” was given by Mrs. Dr. C. Goerg PD.

The care of the diploma workers of the department of ComNets, which is running in the form of two-month interim reports (with lecture and discussion with me), also continued, because it concerns important preparatory work for the current research projects. Altogether 48 diploma workers were active and 96 interim reports delivered in this time. Thus, the research term did not elapse completely without any teaching related functions. Also besides some oral exams that were to be made, there was to regularly offer the student’s consulting hour, etc. . . .

Most of the time I was to be found in the office.

My principal reason for applying for the research term was to give me sufficient time around to create new research projects and to organize their financing guarantee. Because projects like **SAMBA**, **STAR**, **A1**, and

**ATM*mobil*** together with related subcontracts were running out in autumn 1999 and spring 2000, I had to look for nourishing more than 15 assistants for the future. I achieved this target.

## New Research Projects

Mid of June 1999 was the deadline for research requests in the **5. Framework Programme of the Commission of the European Community (CEC) for the IST** (Information Society Technology) programme. We had taken part in 11 consortia, resp. had started up the consortia. Only 8 came so far to finish and deliver a proposal to the CEC in time. Today we know that four projects were successful (50.0 %, a good ratio), with budgets partially drastically shortened in relation to the total request. In detail, these projects are:

- BRAIN (Broadband Radio Access to IP Networks),
- DRIVE (Dynamic Radio for IP services in Vehicular Environments),
- VIRTUOUS (VIRTUal hOme Umts on Satellite),
- DELTA (DSRC Electronics implementation for Transportation and Automotive applications).

This will ensure the financing for approximately 7 research fellows within the next 2 to 3 years.

Further we are participating in a number of COST projects (European Co-Operation in the Field of Scientific and Technical Research), namely

- COST 255 “Radiowave Propagation Modelling for new SATCOM Services at Ku-Band and above” as a member of the Management Committee, delegated by the Federal Minister for Education and Research,
- COST 256 “Modellierung und Simulationsumgebung für satellitengestützte/terrestrische Netzwerke” as a member of the Management Committee, delegated by the Federal Minister for Education and Research,
- COST 259 “Wireless flexible Personalised Communications”.

Besides that I intensively have prepared the establishment of new research projects by the German federal Ministry for Education and Research (BMBF) in the areas of **Mobile Communication and Internet**. The topics are about

- mobile access techniques with sufficient bit rate to access the Internet,
- mobile Internet access with location-specific services, which become possible due to the knowledge of the network operator of the type of the mobile terminal as well as its current location during roaming.

My suggestion to recover the foreseeable weaknesses of UMTS concerning the support of highly mobile asymmetrical Internet services by advancement of the standard raised resonance after initial doubts of the industrial companies taking part now and influenced the naming of the new BMBF research project **UMTSplus** among other things.

The suggestion was to check whether by combination of digital broadcast services (DAB or in particular DVB-T) with dialog services of UMTS a surface covering mobile Internet service would be possible to realize, that uses frequency bands of the V-band (at 800 MHz) concerning digital distributed communication, whilst the UMTS component is operated either in its home spectrum or in unused channels of the V-band. Such a suggestion requires flexibility of mobile terminals and base stations concerning the operation of standardized transmitter/receiver (transceiver) in alternate bands. **UMTSplus** has now two subtasks, where we are involved since April 1999 with 2 research fellows:

- COMCAR (COMmunications in Cars And Railways),
- SORBAS (SOftware Radio Based Access System).

A software-defined transceiver must be flexible concerning the functions below the layer 1 of the ISO/OSI reference model and additionally also flexibly concerning the protocol stack of the radio interface at layers 1–3. Our contribution concerns the second aspect.

The topic of future wireless and mobile radio networks is the subject of a longer term running project **Multifunk** with 6 research fellows.

As a follow-up BMBF research project to **ATMmobil** I have proposed the so-called “**Self-organizing Radio Networks**” and encountered large interest. Today we have been granted a BMBF contract to research this starting from May 2000.

New at the chair is an increased emphasis on **TETRA/TETRAPOL** systems, which brought us in substantial funding from the Minister of the Interior of the state of NRW.

## 30 Years Chair of Communication Networks

Since the establishment of the chair in 1971 where it was called “General Electrical Engineering and Data Communications” 19 years have passed under the directive of Prof. Dr.-Ing. Friedrich Schreiber. In 1990 the chair was renamed to Communication Networks when Prof. Walke took over the responsibilities for lecturing and research. Altogether this establishment will reach an age of 30 years in 2001. It is planned to have a colloquium to celebrate this birthday in April 2001.

## Supporting Organizations

85% of the scientific research personnel is funded by third parties. Research projects, currently, are granted by

- Deutsche Forschungsgemeinschaft, DFG,
- IST (Information Society Technologies) Programme of the European Commission,
- German communications industry,
- Federal Ministry of Research and Development,
- Ministry of Research and Development of North-Rhine Westphalia,
- others.

## Changes of the Scientific Staff

In the temporal order the following changes took place:

31.07.99: Mr. **Dipl.-Ing. (FH) Steffen Wagner** (system administration) left for a new job into a computing centre in the proximity of his future residence.

01.08.99: transfer of Mr. **Dr.-Ing. Reinhold Gebhardt** (permanent staff) to our chair and establishment of the new working area **Software for Distributed Systems**.

01.11.99: Mrs. **Dr. Carmelita Goerg PD** decided from the two calls to take over a professorship at Kiel University (Computer Science), resp. Bremen University (Electrical Engineering), to shift her future's sphere of activity to Bremen and to represent the subject of **Communications Networks** there. Mrs. Prof. Dr. Goerg will co-operate further closely with Com-

Nets by continuing to give her lectures **Stochastic Simulation I and II** and by common work on various research projects.

Altogether at present 39 research fellows are working at ComNets.

**Dr.-Ing. H. Schumacher** of IBM Deutschland who has been lecturing for more than 10 years the subject “Local Area Networks for Industrial Applications” has been awarded the title Professor by the Minister of Education and Science of the State of North-Rhine Westphalia.

### ComNets Graduates and Friends Association (CGFA)

The CGFA was founded in 1998 and has raised much attention by our graduates and substantial support from industrial companies. Currently we count 8 corporative and 66 private person members. The most interesting opportunities offered by the CGFA to industry is the access to our Diploma Theses, the exclusive advertising of open positions at ComNets and the practical training agency that brings together students and companies to do the industrial 18 weeks internship in the graduate studies requested as part of the curriculum of Electrical & Information Engineering.

### Book Projects

In the summer of 1998, the two volumes textbook “**Mobilfunknetze und ihre Protokolle**” appeared and are currently going into the 2. edition. In summer 1999, the contentwise already substantially extended English-language version of this book “**Mobile Radio Networks**” appeared with Wiley&Sons. Both books caused so far a very good resonance and contribute substantially to raise the reputation of the chair and its staff owing to the fact that in many sections research fellows of ComNets are co-authors. Besides that many assistants published scientific contributions on international conferences, see *Cha. 6, p. 243*.

### Office Space Situation

“The position was never as bad as today”, I would like to quote Adenauer. This is why plans of moving parts of the chair to locations in the Lochnerstraße were made. Additionally, mid of 2000, we will get some extra room in the central tract at the 3rd floor of the “Verfügungszentrum” by the faculty

of Electrical & Information Engineering. Then the space question hopefully will relax again.

## Developments in the Faculty

After two-year preliminary work and innumerable discussions with involved parties during my time as a dean (October 1996–September 1998), in April 1999 the senate of the RWTH Aachen agreed on renaming the department of electrical engineering in “**Elektrotechnik und Informationstechnik**” (Electrical and Information Engineering, E&I).

Starting from the winter term 1998/99 all the newly registered students of Electrical and Information Engineering will study in accordance with the new curriculum regulations (DPO’98).

The bilingual diploma certificate now is handed out since November 1999.

## European Wireless and 4. ITG-Fachtagung “Mobile Kommunikation”

During October 6–8, 1999, I served as a Chairman of the programme committee of the ITG conference in Munich and decided to go this year together with the **European Microwave Week** and chair the **European Wireless ’99**. From the 83 presented papers, 14 came from ComNets; not all our submitted contributions have been accepted for presentation.

## Content of the Report

This annual report dedicates to each of our projects a separate section, where the contributing research assistants have summarized the objectives, technical approach and results of their ongoing work. Although these projects in most cases have been initiated and are closely supervised by myself and/or the group leaders at the chair, I have decided not to appear by name on top of the project work descriptions. Quick readers might prefer to get an overview by reading *Cha. 3, p. 13*, where all our research fields and ongoing projects are listed together.

## Obituary to Prof. Friedrich Schreiber

Finally I would like to put a special focus on the obituary to my predecessor **Prof. Friedrich Schreiber** who deceased in the beginning of this year. Up to the end, he was working on his favourite research topic of which we have overtaken an abstract within this annual report.

Aachen, June 2000

B. Walke

