Researcher (Ph.D. Student) positions in the Department of Communications and Networking

Department of Communications and Networking is the biggest research and university education unit in Finland within the area of telecommunications. The Department consists of 9 professors, a staff of 90 persons and an annual turnover of 5 M€. Annually, approximately 80 M.Sc´s and half a dozen D.Sc.'s graduate from the department.

Activity of the department is multi-disciplinary covering communications, networking, Internet technology, network economics, user oriented design and teletraffic theory.

Present emphasis in the research is on the design and analysis of future Internet, and future wireless technologies and systems. Among the Finnish university units, the department is the most active and visible unit in Internet standardization.

The department is responsible for the communications engineering degree program including 7 major subjects. Additionally, the department organizes the international Master's programme from which over 80 M.Sc´s have graduated.

Come to us to learn new technology!

We can offer you a front row seat box seat to study and do research the on state-of-the-art newest communication systems and networks in our youthful and dynamic working environment and an opportunity to study for Ph.D. degree.

Prospective candidates are asked to send applications (cover letter + CV + OREK) not later than 11.3.2008 via email to the address hakemus@netlab.tkk.fi. Job salary is based on UPJ (salary system of universities) and is starting from 2047 €/month depending on your credits, studying success and work experience.

For more information about the jobs please contact the professors which are mentioned in the work titles.

1) Radio transceivers for future wireless systems (Professor Olav Tirkkonen, olav.tirkkonen@tkk.fi , 09-451 2367)

Radio transceivers for future wireless systems will cover multiple bands and radio access technologies, leading to demands on high flexibility together with strict limits on cost-efficiency. To address these conflicting requirements, understanding on the effects of RF impairments on the design of the digital base band is needed. A position for a Ph.D. student in a project concentrating on these issues is open in the Department of Communications and Networking. The problem will be addressed in a cross-disciplinary manner ranging from analog circuit theory to signal processing and communication theory. The tools to be used are mathematical analysis and matlab simulations.

A successful candidate should hold a Master Degree in:
- Radio Communications or
- Communication Systems or
- Mathematical Methods in Telecommunications or
- Radio Science and Engineering or
- Signal processing or
- Electronics and applications (Microelectronics, circuit design)

The requirements to candidates are:
- confidence in mathematical modeling
- basic understanding of RF technologies, baseband processing and wireless communication system design

The supervisor of the work will be professor Olav Tirkkonen, and the instructor Ph.D. Natalia Ermolova. The work will be performed in an environment of national and international collaboration, with a possibility for extended research visits abroad.

2) Network Economics of Mobile Services (professor Heikki Hämmäinen, heikki.hammainen@tkk.fi, 09-451 6144)

Mobile Internet services adoption is a core research area for the Finnish telecom cluster. A better understanding of the adoption dynamics can be reached via analysis of detailed usage data collected from user devices and network. Analyzing large complex data sets requires skilful application of latest statistical methods and data mining approaches. The objective of this Ph.D. project is to analyze user-centric data covering all mobile usage and to link the data to the user choices between services. A possible metric for this modeling is the "value of time" which is taken as hypothesis for explaining user choices. We are looking for cross-domain expertise in mathematics, networking technology, and economics.

The requirements to a candidate are:
- good basis in statistics and mathematical modeling
- some engineering knowledge on mobile Internet technologies
- some economics knowledge on utility theory

The supervisor of the work will be professor Heikki Hämmäinen. The work will be performed in an environment of national and international collaboration, with a possibility for research visits abroad, especially in the US and Japan.

3) Wireless sensor network platform (professor Riku Jäntti, riku.jantti@tkk.fi, 09-451 2353)

Currently, many wireless sensor motes are available in the market and sensor networks have been successfully demonstrated in various monitoring applications including healthcare, surveillance and industrial measurement applications. Nevertheless, the systems are not yet mature: they are difficult to use and have only the very basic functionalities and thus significant engineering effort is needed to tailor the sensor network for each specific application. The department of Communications and Networking has research projects, in which the objective is to develop a secure and reliable reconfigurable real-time wireless sensor network platform that helps in bridging the gap between the ambient intelligence vision and the existing sensor network solutions. We are currently looking an expert in wireless short range communications to join in our research team.

The requirements to candidates are:
- good programming skills (C, C++)
- good knowledge in wireless communications, especially PHY and MAC layers
- basic understanding of embedded systems
- confidence in mathematical modeling

Prior experience with NS-2 network simulation tools is considered as a merit.

The supervisor of the work will be professor Riku Jäntti. The work will be performed in an environment of national and international collaboration, with a possibility for extended research visits abroad.

4) Software design for sensor networks (professor Jukka Manner, jukka.manner@tkk.fi, 09-451 2481)

Sensor networks are a very interesting and timely research area, in particular their applicability to real-life problems. A downside of the current state-of-the-art, in view of the industry, is the very diverse offering of various software and hardware platforms, typically targeted to specific use cases. Department is starting a new research project in this area. Our focus is on the software design for sensor networks, and in particular the networking stack.

The applicant should be very familiar with the C-language and have an understanding of networking, embedded systems and operating systems. The supervisor of the work will be professor Jukka Manner.

The work is part of a joint project with professor Riku Jäntti (see the open position 3).

5) Future Internet
(A: researcher Visa Holopainen, visa@netlab.tkk.fi, 09-451 2425)
(B: researcher Olli-Pekka Lamminen, olli-pekka@netlab.tkk.fi, 09-451 6094)

As Internet has expanded beyond its original usage domain, it has become evident that IP networks suffer from numerous problems, such as routing scalability, mobility management, firewalls, DoS attacks, spam etc. These problems have brought upon a new research avenue that seeks to remove IP entirely from the Internet. Our goal is to replace IP routers by Ethernet switches in the future Internet.

A) Traffic Engineering in the Internet has received a lot of attention recently. Currently the dominant network layer technologies in the Internet are IP and MPLS. There are many commercial Traffic Engineering solutions available, as well as one open-source equivalent (TOTEM toolbox). The objective of this work is to study the interaction possibilities of TOTEM and an Ethernet-network. In the first phase the goal is to study the ability of TOTEM to calculate routes for network's switches.
Requirements:
- Courage and willingness to tackle difficult problems,
- Programming skills.

B) We are researching a new Ethernet-based architecture for operator core networks and as the basis of next generation IP free Internet. This research opens new avenues on both design and implementation side. We are now looking for a committed PhD student to help us develop our vision and assist us building this new architecture from ground up. We search people capable of abstract thought, skilled in programming, and able to conceptualise networks as whole.