

WIRELESS COMMUNICATION SYSTEMS

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The group focuses on studying future wireless communications system concepts, networking technologies and related transceiver techniques. The group consists of the Centre for Wireless Communications (CWC) at the University of Oulu, and the Communication Platforms Centre at VTT, Technical Research Centre of Finland.

The Centre for Wireless Communications (CWC)

The Centre for Wireless Communications (CWC) operates as a research programme within the Telecommunication Laboratory at the University of Oulu. The mission of CWC is to conduct world-class research, train world-class graduates, create new technology and support industry.

CWC's fundamental research serves as the basis for developing the necessary competencies that can be divided into future broadband transmission and radio access network techniques, wireless system planning, communication signal processing algorithms and architectures for wireless networks, sensor networks, channel modelling and measurements, as well as radio frequency technologies. CWC's applied research activities are divided into three major areas. Future broadband wireless solutions include areas such as next generation mobile cellular systems and evolution versions of wireless access. Short range communications solutions are applied, for example, to eWellness, industrial automation and environmental measurements. Research is also conducted on next generation wireless solutions for defence, security, crisis management and public safety.

CWC, with a staff of 110, has an annual budget of approximately 5.3 million Euros, consisting of external funding received for research projects. The broad variety of CWC's customers include Nokia Siemens Networks, Nokia, the Finnish Funding Agency for Technology and Innovation, the European Commission, the European Defence Agency, the European Space Agency, the Finnish Defence Forces, and Elektrobit.

Through its extensive co-operation network covering the most important academic institutions and companies around the world, CWC attracts high-level professors, researchers and students. CWC's researcher training is organised under the CWC International Doctoral Study Programme with a curriculum that also benefits national industry.

The Communication Platforms Centre

The Communication Platforms Centre is a part of the ICT Cluster at VTT. It provides research and development services for telecommunication networks and their core technologies; transmission methods and platform implementation technologies. Transmission methods competencies

cover radio interfaces, digital signal processing in different types of communication platforms - terminals and network equipment for mobile communication, wireless local area networks (WLAN), personal area networks (WPAN), wireless body area networks (WBAN) and broadcast systems and microwave links - and performance modelling and optimization of radio links and networks. Important areas of research include cognitive networks and digital compensation of nonlinear analog parts of the system. Correspondingly, platform implementation technology competencies cover computing architectures, digital electronics and digital signal processing (DSP), and system software. Our experience is partly based on a strong contribution to the research and development of the 2nd, 3rd, and 4th generation mobile communication systems. In 2008, our centre employed 44 people, 6 of whom come from abroad. The whole ICT Cluster employs 492 persons in ten centres.

Personnel

professors & doctors	22
graduate students	68
others	38
total	128

Doctoral Theses

Kunnari E (2008) Multirate MC-CDMA. Performance analysis in stochastically modeled correlated fading channels, with an application to OFDM-UWB. Acta Universitatis Ouluensis C 299. (CWC)

Mäkelä J-P (2008) Effects of handoff algorithms on the performance of multimedia wireless networks. Acta Universitatis Ouluensis C 301. (CWC)

Nissilä M (2008) Iterative receivers for digital communications via variational inference and estimation. Acta Universitatis Ouluensis C 289. (VTT)

Prokkola J (2008) Enhancing the performance of ad hoc networking by lower layer design. Acta Universitatis Ouluensis C 310. (CWC)

Rabbachin A (2008) Low complexity UWB receivers with ranging capabilities. Acta Universitatis Ouluensis C 298. (CWC)

Stoica L (2008) Non-coherent energy detection transceivers for ultra wideband impulse radio systems. Acta Universitatis Ouluensis C 292. (CWC)

Tölli A (2008) Resource management in cooperative MIMO-OFDM cellular systems. Acta Universitatis Ouluensis C 296. (CWC)