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Computing and Communication in 2010's

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Business from technology



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- WIRELESS COMMUNICATION TECHNIQUES
- COMPUTING ARCHITECTURES AND IMPLEMENTATION

§ INTRODUCTION TO SEMINAR AGENDA

WIRELESS COMMUNICATION TRENDS

- § The main tasks of a communication system will be to provide a cost efficient platform for smart space applications and delivery of entertainment and information to users.
- § During the next 10 years, the number of wireless devices is increasing from the current one device/person to about 1000 devices/person
- § People, all their things, and nearly all things in their smart living and working environments will communicate with each other
- § Number of terrestrial mobile subscribers and wireless Internet connections are increasing
- § Multiple concurrent and diversified applications and use scenarios
- § Several coexisting and co-operating access networks
- § An increased number of product variations and still shorter product life cycles
- § Increasing emphasis on green values, the climate change and increasing energy costs

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R&D CHALLENGES, WIRELESS COMMUNICATION

- § Management and utilization of large amount of coexisting and co-operating wireless devices and networks
- § Increased performance, usability, autonomy and embedded low cost solutions
 - optimization of different type access technologies for particular use scenarios
 - adaptive and flexible allocation of data rates to users
 - high average aggregate throughput per area and low latencies
 - high and uniform capacity in the most of the network coverage area
 - low complexity
- § Improved efficiency in the use of radio and network resources
 - particularly spectral and energy efficiency
- § Smooth ubiquitous connectivity for users and devices
 - smart environment services and applications are based on locality

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R&D CHALLENGES, COMPUTING

- § New applications, use scenarios and high data rate communications requires increased computing capacity and flexibility
- § Parallel computers and parallel programs for high performance computing
 - the fundamental limits of sequential computing in terms of clock speed have been reached.
- § Parallel programming paradigms
 - architectural support for easy-to-use and easy-to-migrate parallel computing paradigms
- § More modular and specialised architectures
 - complexity management and energy efficiency
- § Simple computers that have wireless communication capabilities
 - ubiquitous devices and systems
- § Platform and computing architecture design methodologies and tools
 - raising the abstraction level of design

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VTT'S SOLUTIONS, WIRELESS COMMUNICATION

- § Cognitive communication techniques; radio and network resource sensing and flexible management
- § Cooperative communication techniques in different OSI layers
- § Network system architectures beyond the classical cellular approach; mesh networks, distributed antenna systems, radio over fibre, relay and multi-hop based concepts
- § Interference management
- § Flexible and adaptive access schemes, especially multi-carrier and ultra wideband techniques
- § Exploitation of available diversities in time/space/frequency/code domains
- § Joint optimization of RF and baseband parts, management and compensation of nonlinearities
- § Joint optimization of transceiver algorithms and transmission protocols
- § Solutions for specific systems; 3G evolution, LTE, IMT-A, Wimax, microwave links, WLAN's, sensor networks

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VTT'S SOLUTIONS, COMPUTING PLATFORMS

- § Heterogeneous multicore, complex memory organisations and reconfiguration based platforms
- § Embedded multicore and parallel processors
- § General-purpose computing architectures realising advanced parallel computing paradigms
- § Easy-to-use and low-overhead parallel languages and compiling tools.
- § Parallel processing based systems and application SW
- § Open source components based SW platforms, virtual computing platforms
- § Open interfaces inside subsystems, services and applications
- § Interoperability in component, service and information level
- § System co-modelling, evaluation and synthesis
- § Dynamically reconfigurable electronics

SEMINAR AGENDA

- 08.45 Opening words** Kyösti Rautiola, Technology Manager, VTT
- 09.00 Invited keynote speech: Embedding Intelligence**
Ian Phillips, Prof., Principal Staff Engineer, ARM Ltd, UK
- 09.45 Future mobile communication systems - Implications on digital implementation** Aarne Mämmelä, Research Professor, VTT
- 10.15 Coffee break**
- 10.30 Smart environment scenarios – Technologies and platforms**
JuhaPekka Soininen, Research Professor, VTT
- 11.00 Massively parallel computing – Heterogeneous/homogeneous and programming applications** Martti Forsell, Chief Research Scientist, VTT
- 11.30 System level modelling and exploration – Managing application and platform complexity** Kari Tiensyrjä, Team Leader, VTT
- 12.00 Closing**