

Hermes Partnership workshop on Future Networks  
May 18-19, 2011  
University of Cantabria, Santander, Spain,

**Abstract:**

**Jasper Goseling: The Potential of Network Coding in Wireless Communications**

Current networking technology is based on the principle that information is transported in a network by forwarding packets. The concept of network coding is based on the observation that it can be useful to do additional processing at intermediate nodes and combine different packets. This implies that data from different connections is longer kept independent but mixed together.

Network coding has the potential to increase data rates, decrease energy consumption, reduce delay, increase robustness, provide security, etc. This talk introduces the concept of network coding and discusses potential applications in wireless communications; in particular the potential to improve energy efficiency. Moreover, we discuss some of the challenges that will need to be met when implementing network coding.

**Abstract:**

**Djamal Zeglache: Networks and Clouds Federation - Challenges and Opportunities**

This talk will focus on cloud networking, interoperability challenges in cloud computing and cloud services as of today and the ensuing challenges for cloud or data centers networking and more generally for cloud federation and inter-cloud cooperation and interactions.

The required architectural framework in terms of software, platform and infrastructure offered as a services will be particularly targeted with emphasis on required interfaces and APIs and emerging de facto standards and open source communities and cloud organizations/forums/bodies.

The talk will address provisioning, instantiation, deployment, migration and portability in addition to security and management challenges. These system functions assume that storage, computing and networking services have to be jointly described, acquired, optimised and managed. The role of virtualisation and cloud application aware networking is part of the talk as well as notion of mobile cloud that remains rather unexplored today.

**Abstract:**

**Josep Paradells Aspas: Going from Wireless Sensor Networks to clean slate Future Internet**

The evolution to the Future Internet can follow different visions (media, users, ...) but there is one, the based on constrained devices such wireless sensor and actuator networks, that may become the leader. This vision represents a new approach to the others already recognised. The design of the Future Internet it is not done expecting no restrictions from the technology and later downgrading the performance once implemented. It is done for the large majority of users (objects in the Future Internet) and optimised for this type of devices. In this way the optimum performance is going to be achieved where it is much needed.

According to these ideas it has been developed a new network architecture that uses a clean slate approach to Internet but reusing much of the ideas already available in the area of wireless sensor networks. For example key aspects such self configuring, scalability, separation of locator and identifiers and protocol modularity are reused. The new architecture, called TARIFA, is already implemented in a small platform and being ported to a Linux one.

The proposed talk will describe the requirements assumed for developing a new clean slate architecture and the main objectives. The proposed solution will be presented and compared with others that follow a clean slate principle.

**Abstract:**

**Jesús Bernat: M2M communications**

Machine-to-Machine (M2M) has moved from a promising term to an everyday reality. The huge amount of machines that are being deployed nowadays have converted M2M from a business opportunity to a market fact. However, the expected growth can be jeopardized by different factors: the vertical solutions that bring to market fragmentation, lack of consensus to push for standard solutions, etc. Trying to cope

with the hype of M2M, not just enterprises, but research and standardization communities are also aligning their efforts.

In this presentation we will first introduce the scope and potential market; then we will review the standardization activities, mainly the ETSI TC M2M; and finally we will show how the research activities are pushing the current M2M communications to become the basis of the Future Future Internet of Things. Following a parallel approach as occurred in the Internet, being initially a network of interconnect computers and becoming today a network of social and global knowledge, the Internet of Things is expected to start in the M2M communications becoming a future "Smart Planet" of interconnected intelligent objects.

**Abstract:**

**Dimitri Kténas: Energy Efficient Cellular Networks**

Worldwide mobile broadband communications networks are increasingly contributing to global energy consumption. Transmitted data volume alone is growing by a factor of 10 every five years, while power consumption of ICT is currently rising at 16-20 percent per year. In this talk, we tackle the important issue of energy saving by enhancing the energy efficiency of mobile broadband systems thereby reducing CO<sub>2</sub> emissions. We first provide a holistic system view aiming at ensuring that any proposed solutions to improve energy efficiency do not degrade the energy efficiency or performance on any other part of the system. Indeed a unified approach capitalizing on the promise of joint optimizations in order to improve the Energy Efficiency (EE) of the whole communication system is still missing. Joint optimizations are represented by cross layer optimizations that take component and node architectures as well as radio interface technologies and network architecture into account. The holistic optimization methodology is composed of three major investigation axes: definition of an energy efficient optimization methodology framework, design of green networks, and design of green radios. Within the last item, we will put the focus on innovative radio transmission techniques and Energy-Efficient radio resource management (RRM) algorithms. Up to now, these algorithms have been designed to maximize system capacity, while overcoming the mismatch between requested quality of service (QoS) and limited network resources, assuming a full system load. But because system load in mobile systems is intrinsically dynamic, traditional RRM schemes are not optimally efficient at different operating conditions. In this presentation, we will investigate the design of energy-efficient scheduling algorithms that meet the QoS constraints of heterogeneous populations of user equipment inside the cellular network. The EE RRM schemes will be also enlarged to two-tier cellular networks. The femtocell deployment in 3GPP/LTE sets indeed new challenges to EE and RRM. Traditional schemes are mainly designed for classical cellular networks while the ad hoc nature of femtocells notably limits the complexity of possible algorithms. Thus, efficient RRM schemes are essential for limiting the interference impact on end-user performance. In this talk we will provide some hints on how enhancing the energy efficiency of the overall cellular network while improving both macrocell and femtocell throughput.