EuroView 2010: "Visions of Future Generation Networks"

Report of the 10th Würzburg Workshop on IP: Joint ITG, ITC, Euro-NF Event

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ABSTRACT

On August 2nd – 3rd, 2010, the EuroView 2010 workshop on "Visions of Future Generation Networks" was held at the University of Würzburg. The event was sponsored by the European Network of Excellence Euro-NF [1], the German Information Technology Society ITG [2], and the International Teletraffic Congress ITC [3]. EuroView 2010 brought together Internet and network technology researchers, network providers, as well as equipment and device manufacturers. In 2010, the focus was on "Future Internet Design and Experimental Facilities" and on current efforts towards a Future Internet. Special sessions were organized reflecting the latest results of selected testbed expert groups as well as current and future national and international collaborative projects: (1) the German G-Lab project [4] offering a national platform for Future Internet studies, (2) the Future Internet Activities in the European Framework FP7 organized by Max Lemke, and (3) the GENI project [5] in US organized by Aaron Falk. A keynote talk was given by Lawrence Landweber on the challenges and paradigms emerging in the Future (Inter)Network.

Categories and Subject Descriptors

C.2 [**Computer Communication Networks**]: Internetworking, Miscellaneous; C.2.1 [**Network Architecture and Design**]: Wireless communication; C.2.2 [**Network Protocols**]: Routing protocols; C.2.3 [**Network Operations**]: Network Management, Network monitoring; C.2.5 [**Local and Wide-Area Networks**]: Internet

General Terms

Design, Experimentation, Measurement, Management

Keywords

Future Internet, Prototypes and Testbeds, Cloud Computing, Virtualization, Federation, Protocols and Interfaces, Routing, Security, Data Plane and Control Plane

1. INTRODUCTION

The workshop's tradition and intention is to foster the communication among researchers from industry, universities, and other research institutes. To that end, technical talks about current research, invited sessions, and invited talks by outstanding experts were presented. In particular, Max Lemke (European Commission, Belgium) organized a session on Future Internet Activities in FP7 and Aaron Falk (Lead System Engineer for GENI, US) on the Global Environment for Network Innovations (GENI) project in US. A keynote talk on "The Future (Inter)Network - Challenges and Paradigms" was given by Lawrence Landweber (University of Wisconsin, US).

The workshop is the continuation of a series of successful events previously held in Würzburg. The workshop series originated in 2000 and is supported since then by the German Information Technology Society [2]. Since 2006, the workshop series focuses on "Visions of Future Generation Networks" and is called EuroView which is financially sponsored by the Network of Excellence Euro-NF [1] within European Union Framework Programme 7. EuroView 2010 was co-located with the official G-Lab [4] status meeting. The International Teletraffic Congress (ITC) [3] was technically sponsoring EuroView 2010. Euro-NF's main target is to integrate the research effort of the project partners to be a source of innovation and a think tank on possible scientific, technological and socio-economic trajectories towards the network of the future. One of the topics within ITG is related to System Architecture and Traffic Engineering including traffic management or modeling and performance analysis of the Internet and Internet applications. ITC represents a wide community of researchers and practitioners focusing on the modeling, design and performance of communication systems, networks and services.

In the following, we summarize the topics presented at EuroView 2010 in Section 2. Then the technical program and the discussions during the workshop are outlined in Section 3. The slides and abstracts from the presentation, the poster session, and the demo session can be found on the EuroView 2010 homepage at `http://www.euroview2010.com`. The main observations and key findings of EuroView 2010 are briefly summarized in Section 4, before the quality of the workshop is evaluated in Section 5 by means of a user survey handed out to all participants of the workshop. The detailed results from the user survey are also online available at the EuroView 2010 homepage. Finally, an outlook to the next EuroView 2011 workshop is given in Section 6.

2. TOPICS PRESENTED

The workshop was arranged as a two-day event covering of vast range of topics relevant to Future Generation Networks. In order to stimulate discussions on Future Internet applications, future wireline and wireless Internet architectures, and experimental facilities, several speakers and sessions were invited. In particular, the results from the GENI project [5] and the G-Lab project [4] were presented in various talks. Both projects follow an experimental driven research in dedicated experimental facilities in order to investigate Future Internet technologies and the interplay between new technologies and the requirements of emerging applications. Issues on testbeds and prototypes, like federation of testbeds, were discussed in the first session. In the second session, on-going research of the GENI project was presented on virtualization, the OpenFlow technology, and aspects of cloud computing. The general challenges of the Future Internet coming along with newly adopted paradigms in the Internet were discussed during the keynote talk by Lawrence Landweber. A discussion on architectures of Future Networks and the convergence of the Internet and telecommunications followed in the third session. The implementation of new protocols and interfaces for future networks was addressed in the fourth session. The second day started with the fifth session on routing and security, before the activities in Europe within the framework FP7 were presented in the sixth session. A promising approach to overcome drawbacks of the current Internet was presented in the seventh session on virtualization. Finally, aspects of wireless and mobile services for future networks were derived in the eighth session. In addition, a demo session showing the current implementation status of research within the G-Lab facilities took place. The poster session was available throughout the workshop and covered a variety of topics like application layer multicast, security issues or standardization.

3. TECHNICAL PROGRAM

The EuroView 2010 workshop opened with an introduction by Prof. Tran-Gia giving an overview on the history of the EuroView event taking place for the tenth time this year and its increasing popularity. As well, he gave a short presentation on the inter-disciplinary Internet Research Center (IRC), founded at the University of Wrzburg, which combines research activities of computer scientists with scientists from law and psychology. This year's EuroView was again strongly influenced by the G-Lab project. Hence, a summary on the timeline and development of the G-Lab project (phase 1 and phase 2), its structure, interworking of partners, and a memorandum of understanding for federation with several research initiatives was given.

The technical discussion started with a keynote talk by Prof. Dr. Lawrence Landweber (University of Wisconsin, US) on "The Future (Inter)Network - Challenges and Paradigms". He covered the status of today's Internet and reported on general technology trends regarding access and transmission technology, like "wireless 5G until 2020?". A critical statement on privacy in today's Internet and social network companies "privacy - already lost? (cf. Orwell's novel "1984")" and "how will social networks affect the society?" as well as security problems were considered. The keynote concluded with visions on "the known world - 2020", "the less known world - 2020", and "the future world - 2030". A final conclusion was that new paradigms cannot be predicted, and paradigm shifts need time.

Session 1: Prototypes and Testbeds

The first session covered "Prototypes and Testbeds" and was chaired by Prof. Lehnert (Technical University of Dresden). In this session, the way from traditional theoretical research on networks towards testbed-based research was drawn and stated where this is necessary. Different testbed characteristics (various trade-offs, e.g. using original software vs. need for abstraction/adaptation) were compared and problems of testbeds (high cost factor, limited number of testbeds) were stated. The importance of integration of simulated networks, virtual links for the real testbeds was discussed. Furthermore, the federation of different testbeds was a focus to reduce cost (e.g. sharing resources, scale experimentation). In this context, the FIRE project's federation with PlanetLab was presented, as well as an abstract formal definition of federation was given. Also Teagle, a pan-European laboratory project, and its architecture were presented.

Session 2: GENI

The second session was dedicated to the GENI project which was organized by Aaron Falk, being the Engineering Architect and Lead System Engineer for the GENI Project Office (GPO). He presented GENI's conceptual design and how it is intended to be used. Another focus of this talk was on prototypes to provide access to real users and wide-area networks. The Geni Meso-scale prototypes Openflow, WiMax, ShadowNet, and Openflow backbones were mentioned. Further talks on the GENI project covered the provisioning of End-to-End Virtualization in GENI, sensor networks as an integral part of the Internet, and data intensive experiments. Another focus in the GENI session was cloud computing. The relation of applications and the cloud was discussed: cheap and easy to deploy apps in the cloud, while apps drive the platform. The prediction was made that telcos will deploy the "Dispersed Cloud". The Dispersed Cloud provides application builders with the abstractions of elastic computation and storage, but it relies more heavily on edge nodes and mid-sized clusters than on large data centers. In this session, "Federation as a Service: An Architecture for the InterCloud", i.e. the interconnection of different clouds was presented. The GENI standard for control frameworks was considered for a slice-based facility interface which is already supported by Planetlab, orca.

Session 3: Architectures and Convergence

The third session dealt with Architectures and Convergence and was chaired by Prof. Tutschku (University of Vienna). Regarding architectures, different homing architectures and strategies, their costs and benefits were presented. Furthermore, security enhancements in IPv6 Communications were discussed. The clean slate approaches were depicted to deal with the increasing interdependencies in the architecture of the current Internet. It was stated that a future architecture should integrate long term flexibility, as well as short term flexibility. The other focus of this session covered Convergence of Internet and Telecommunications. It was discussed that such a convergence means to support QoS for Internet service delivery and that a fair business model is necessary for this purpose. It was proposed that from the providers

view, a Walled Garden approach could be feasible.

Session 4: New Protocols and Interfaces

In the fourth and last session of day 1, which was chaired by Dr. Kellerer (Docomo, Munich), New Protocols and Interfaces were discussed. The protocols part focused on the transport layer. It was discussed how the Internet's Transport Layer can be improved and made more application friendly, as well as how the Internet could benefit from a protocol-independent API for transport services. Interfaces regarding control and management plane aspects were presented, like a single Interface for Automated Interdomain Path Provisioning, e.g. to distribute movies in cinema scales across several domains. Furthermore, a Property and Requirement-based Application Interface for Future Networks was discussed for a future heterogeneous Internet scenario.

Session 5: Routing and Security

On Tuesday, August 3rd, the second and last day of this year's EuroView took place with four different sessions, as well as the demo and poster session. The day started with the fifth session which was chaired by Tanja Zseby (Fraunhofer) and covered Routing and Security. An overview on Naming, Addressing, and Programming in Multicast was given. The G-Lab phase 2 project Forwarding on Gates (FoG) was explained. While IP routing is a hop-by-hop routing, lookups per router, based on routing tables, in FoG it is Zone-by-zone (clustering into zones), lookups per zone, based on routing services. Practical details were shown in the demo Session. With the HiiMap project, an architecture for locator-identifier split was presented. It is a two-tier locator (local part LTA, global part guid) and its mapping system is realized using DHTs. It was discussed "How to name identifiers (user friendly)", e.g. identifier for content/persons (store special subinformation in the identifier) as well as a search strategy to find the identifier; using an n-gram based search mechanism if search for the user id did not match. In a related context, a Testbed-based Analysis of the Incorrect Lookup Routing Attack on the Pastry DHT was presented. In the project G-Lab-DEEP, the Security in a Cross-Layer Composition Architecture was addressed. To this end, a VoIP scenario with composition functionality was presented in the demo session.

Session 6: Future Internet Activities in FP7

In the sixth session, chaired by Dr. Max Lemke (European Commission), Future Internet Activities in FP7 were presented. The European Research Strategy towards the Future Internet was presented as a comprehensive EU Approach which is split into CIP/ICT PSP, FP7/PPP, FP7, and FI PPP which differ in the funding and realization periods and the aimed funded audience. In this context, An Overview on FIRE and its Approaches towards Federation and Collaboration was given, presenting a Comprehensive list of FIRE projects and their collaboration efforts. The EU showed its strong interest in funding OpenFlow in Europe. A definition of OpenFlow was given as a standardized interface between switch controller and hardware (control and forwarding/processing). The OpenFlow related projects OFELIA, SPARC, and CHANGE were introduced. An Overview of two Wireless Sensor Network Testbed Projects, namely Wisebed STREP and Sensei IP, and their Extension were presented. The benefits of virtual testbeds were outline and the complementary nature of the two projects, but both are essential components of a comprehensive "Internet of Things".

Session 7: Virtualization

The seventh session covered Virtualization and was chaired by Prof. Bauschert (University of Chemnitz). The session focused on challenges in and benefits of virtual networks. During the session a broad field was discussed, including the selection of Communication Services in a Service Oriented Network Architecture and why/whether this is required; Quality-of-Service Signaling for Virtual Networks to dynamically setup virtual links on demand; and Service Characterization for Virtual Routers. The G-Lab phase 2 projects COMCON: Use Cases for Virtual Future Networks (network virtualization, partitioning and aggregating resources) and Ener-G: A Generic Approach for Modeling Energy Consumption (Distribute applications such that energy consumption is minimized, energy based accounting) were presented including first results.

Session 8: Wireless and Mobile Services

The eighth and last session covered Wireless and Mobile Services and was chaired by Peter Domschitz (ALU). Application- and Context-Aware Radio Resource Management for Future Wireless Networks was discussed which gets necessary due to different access technologies (UMTS, LTE, WiMAX) and to allow context awareness, evaluate users position, sensors, etc. In this session, different approaches from IETF Mobility Solutions to the 3GPP All IP Network were presented. Finally, the Current Status and Future Plans of the G-Lab phase 2 project "Real-World G-Lab" was presented which covers protocols, algorithms and services to overcome problems like routing, energy efficiency, monitoring and searching.

The abstracts from the presentation, the poster session, and the demo session as well as the slides from the presentations can be found on the EuroView 2010 homepage at `http://www.euroview2010.com`.

4. MAIN OBSERVATIONS AND FINDINGS

The major problems of the current Internet and main observations are summarized in the following. This covers the main missing technical concepts and approaches and the conclusions observed from this. The main findings of the workshop in terms of key technologies and key approaches, based on relevant use cases for the Future Internet, are then highlighted.

Problems. Several questions and problems in today's Internet were discussed during EuroView 2010:

- Concerning privacy in today's Internet and social network companies: "Is privacy in the Internet already lost?"
- Impact of the Internet on the society: "How will social networks affect the society?"
- Security problems in the Internet.

Missing. Missing technical concepts and approaches in the current Internet are among others

- security mechanisms e.g. to save the privacy of Internet users,

- support for Quality of Service and Quality of Experience,
- flexibility to realize new innovations (a) long-term flexibility to support evolution of networks, (b) short-term flexibility support of mobility in the Internet,
- transport protocols do not match application requirements nor infrastructure capabilities.

Observations. Some main observations were highlighted and conclusions derived accordingly.

- New paradigms cannot be predicted and paradigm shifts need time.
- Interdisciplinary Internet research is required which combines research activities of computer scientists and engineers with scientists from law, psychology and social sciences.
- For networking research, a shift from traditional theoretical research towards testbed-based research is required which includes (a) integration of simulated networks and virtual networks, (b) federation of testbeds, (c) access to real users and wide-area networks, (d) provisioning of end-to-end virtualization, (e) sensor networks as an integral part of the Internet, (f) data intensive experiments.
- Cloud computing is one of the current major technologies. (a) It allows cheap and easy deployment of apps in the cloud, while apps drive the platform. (b) Telcos will deploy the "Dispersed Cloud" which provides application builders with the abstractions of elastic computation and storage, but it relies more heavily on edge nodes and mid-sized clusters than on large data centers. (c) The interconnection of different clouds has to be managed.
- Convergence of Internet and telecommunications means to support QoS for Internet service delivery which requires a fair business model; from the provider's view, a walled garden approach could be feasible.
- Move applications not data as a new paradigm in the Internet. (a) (Without fundamental changes) networks will not be able to support predicted increase in traffic. (b) Therefore, move today's network / computing paradigm from app centric (centralized) towards network-aware media centric (distributed).

Findings. Key technologies and key approaches for the Future Internet are enumerated in the following derived from relevant use cases.

- Network virtualization and programmability of Internet elements. (a) OpenFlow as a standardized interface between switch controller and hardware, (b) control plane for resource reservation in virtual networks, e.g. QoS signaling to dynamically setup virtual links on demand, (c) specification of interfaces and protocols for building block interaction, (d) mechanisms for isolation of virtual networks on the same physical substrate, (e) monitor and control for QoE-aware networks.
- Service-oriented architectures and service composition, e.g. (a) security in a cross-layer composition architecture, (b) as enabler for the convergence of the Internet with cellular systems.
- New routing schemes or transport concepts, e.g. (a) architecture for locator-identifier split, (b) naming, addressing, and programming in Multicast, (c) "Forwarding on Gates": chained function blocks with edge-based forwarding, using gates as faade for functions.
- Wireless access optimization, e.g. (a) application- and context-aware radio resource management includes evaluation of users' positions, sensors, etc. as well as various access technologies, (b) plethora of sensor equipped embedded devices will be connected to Internet.
- Energy efficiency & monitoring of energy consumption.
- New interfaces and protocols, e.g. (a) multipath protocol mechanisms, (b) protocol-independent API for transport services in the Internet, (c) property and Requirement-based Application Interface for Future Networks, (d) single interface for automated inter-domain path provisioning.

5. OVERALL QUALITATIVE ASSESSMENT OF THE WORKSHOP

The number of participants at the EuroView event over the last years shows that the workshop has gained and maintained a good standing in the Future Internet research community (84 participants in 2006; 84 in 2007; 100 in 2008; 99 in 2009; 156 in 2010). In fact, 100% of the participants, who answered this question in the user survey, claimed to visit future EuroView events. One driver for this development is that the participants get first-hand information of ongoing research work - a long time before such work is published in conferences or journals. Another successor is that the Future Internet research is moved forward. The participants see that different topics in Future Internet research get a more clear focus and take shape now. The format of the workshop has proven to be successfully in providing such first-hand information from key people and initiatives, like GENI, G-Lab, various FP7 projects as well as from the European Commission itself. This is in particular an enabler for industry people to participate in such a workshop. Therefore, beside outstanding keynote speakers, some sessions focusing on particular topics will also be invited in the EuroView2011.

The following topics are of interest to be included additionally / more strongly in EuroView2011 according to the participants' comments (in alphabetical order):

- Cognitive radio
- Cyber-physical systems
- Datacenters
- Economic aspects of the Internet
- High-speed routers/switches
- Infrastructure-less communication in large scale catastrophe scenarios
- Internet of Things
- Nodal multilayer integration
- Ontology for network services
- OpenFlow
- Smart Grid topics
- Use cases for federation
- Wireless Multi-Hop Networks
- Wireless Sensor Networks (6LoWPAN)

The demo session was highly interesting for the participants to see the currently achieved progress in the realization of Future Internet technologies. In addition, the demo session allowed for detailed discussions among the participants and to clarify questions in much more detail. In fu-

ture workshops, it is recommended to organize again such a demo session and even allocate more time for the demos and the resulting discussions. According to the user survey, we observe that the demo session (20%) and the GENI session (20%) were the most interesting sessions for most of the participants. More details are given below.

The user survey contained four different sections on 1) the quality of the workshop, 2) the organization of the workshop, 3) the personal outcome and impressions, and 4) proposals for improvement. The opinion rating scale is: 5=Excellent, 4=Good, 3=Fair, 2=Bad, 1=Very bad. In the following, the mean opinion scores of the participants are presented:

- General rating of the workshop: 3.79
- Content rating whether the topics are of interest for the participant: 3.53
- Relevance of topics for the Future Internet: 3.69
- Most interesting sessions: 1. GENI Session (20%) 2. Demo Session and Poster Session (20%) 3. Routing and Security (14%) 4. Future Internet Activities in FP7 (11%) 5. Wireless and Mobile Services (11%)
- Most interesting talks: 1. Michael Welzl: "How to Truly Improve the Internet's Transport Layer" (25.0%) 2. Eleni Palkopoulou: "Rethinking Homing Architectures" (11.1%)
- Most interesting demos: 1. A QoE-Aware P2P Streaming System based on Scalable Video Coding (22%) 2. A Demonstrator for Cross-Layer Composition (19%) 3. Improvements to LISP Mobile Node Including NAT Traversal (19%)
- Organization of workshop: pre-workshop organization (4.27), local and on-site organization (4.12), refreshments (4.00), social event (4.37), proceedings (3.86)
- Workshop inspired new ideas: 3.14
- Workshop inspired joint projects, development or joint publications: 3.30
- Mix between academia and industry: 3.71 (more partners from industry, network operators are desired)

According to the user survey, the audience is also interested in representatives from industry, like Cisco, Juniper, Google, etc. since they de-facto define the Future Internet. It is recommended to invite such representatives accordingly for future EuroView events. The personal outcome of the participants was the following according to the user survey: (a) social networking, personal contacts, get in touch with German community / GENI people; (b) practical hints and new ideas, update on recent developments; (c) different opinions on own ideas, discussions about viewpoints of Future Internet; (d) topics of interest: routing, virtualization, service composition issues, test labs; (e) projects of interest: GENI, G-Lab, overview on FP7 projects. Detailed results from the user survey are online at `http://www.euroview2010.com`.

6. OUTLOOK TO EUROVIEW 2011

Future Internet services and applications including the Internet of Things and the Internet of Services have increasing demands in certain dimensions, like security, reliability, quality of service, etc. Future Internet research is a holistic approach covering the networking technology, the service and the application subject. In particular, the requirements of the Internet of Services and the Internet of Things have to be fulfilled by adequate concepts, like network virtualization or service-oriented architectures. To cope with these demands, new architectures and protocols need to be developed on the conceptual level and tested in an experimental facility. The International federation of experimental platforms through different physical networks is an important matter regarding research towards the Future Internet. Testbed infrastructure federations enable large-scale or heterogeneous cross-domain experiments and also allow cross-layer experimentation.

To this end, various speakers and sessions from these research domains have been invited for EuroView 2011. We are happy to announce that Robert Kahn, an Internet pioneer who invented the Transmission Control Protocol and the Internet Protocol along with Vinton G. Cerf, will give a keynote talk at EuroView 2011. Furthermore, a keynote talk on "Networking paradigm for Information Universe" will be given by Prof. Dr. Yanghee Choi (Chair of the Future Internet Forum of Korea) and an invited talk on "The Future Internet Research Plan in Korea" by Prof. Dr. Younghee Lee. The following invited sessions are confirmed: 1. German G-Lab project, 2. Future Internet Activities in FP7 (organized by Dr. Rüdiger Martin, EC), 3. GENI Update: Ramping Up Experiments and Future Plans (organized by Mark Berman, GPO/BBN). Details can be found at `http://www.euroview2011.com/`.

7. ACKNOWLEDGMENTS

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8. REFERENCES

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APPENDIX

A. WORKSHOP PROGRAM

Monday, August 2nd, 2010

Keynote Larry Landweber: *The Future (Inter)Network - Challenges and Paradigms*

Session 1 Prototypes and Testbeds (chair: Ralf Lehnert)

Sebastian Wahle, Thomas Magedanz: *Generic Resource Federation - Mechanisms and Prototypes Serving the FIRE and FI PPP Visions*

Mesut Günes, Oliver Hahm, Kaspar Schleiser: *The DES-Framework: Extending a Wireless Multi-Hop Testbed by Virtualization and Simulation*

Yang Chen, Xiaoming Fu, Tianyin Xu: *Improving Prediction Accuracy of Matrix Factorization Based Network Coordinate Systems*

Session 2 GENI (organized by Aaron Falk)

Aaron Falk: *GENI - Global Environment for Network Innovations*

Michael Zink: *On-Demand Research Networks: End-to-End Virtualization in GENI*

Guru Parulkar: *Reinvent Internet Network Substrate with OpenFlow/Software Defined Networks*

Andy Bavier: *Dispersing the Cloud*

Rick McGeer: *Federation as a Service: An Architecture for the InterCloud*

Session 3 Architectures and Convergence (chair: Kurt Tutschku)

Bangnan Xu: *Convergence of Internet and Telecommunications*

Eleni Palkopoulou, Thomas Bauschert, Dominic A. Schupke: *Rethinking Homing Architectures*

Kazuyuki Nishida, Shingo Ata, Masayuki Murata, Hiroshi Kitamura: *An Unified Multiplex Communication Architecture for Simple Security Enhancements in IPv6 Communications*

Thomas Magedanz, Sebastian Wahle: *FIRE Facility Infrastructure Provisioning - A Cross-Layer and Cross-Domain Approach*

Abbas Ali Siddiqui, Daniel Günther, Paul Müller, Christian Henke, Thomas Magedanz: *Mediation between Service and Network Composition*

Session 4 New Protocols and Interfaces (chair: Wolfgang Kellerer)

Michael Welzl: *How to Truly Improve the Internet's Transport Layer*

Mayutan Arumaithurai, Fabian Glaser, Xiaoming Fu, Kadangode K. Ramakrishnan: *NF-TCP: Network Friendly TCP*

Bernhard Lichtinger: *Single Interface for Automated Inter-domain Path Provisioning*

Helge Backhaus: *Towards a Property and Requirement-based Application Interface for Future Networks*

Tuesday, August 3rd, 2010

Session 5 Routing and Security (chair: Tanja Zseby)

Matthias Wählisch, Thomas C. Schmidt, Sebastian Meiling: *On Naming, Addressing, and Programming in Multicast*

Florian Liers, Thomas Volkert, Andreas Mitschele-Thiel: *On Routing with Forwarding on Gates*

Christoph Spleiß, Oliver Hanka: *A Naming Scheme for Identifiers in HiiMap*

Christian Gottron, Andre König, Ralf Steinmetz: *A Testbed-based Analysis of the Incorrect Lookup Routing Attack on the Pastry DHT*

Martin Becke, Dirk Hoffstadt, Erwin Rathgeb, Konrad Campowsky, Christian Henke, Julius Müller, Thomas Magedanz, Carsten Schmoll, Tanja Zseby, Abbas Ali Siddiqui, Paul Müller: *Addressing Security in a Cross-Layer Composition Architecture*

Session 6 Future Internet Activities in FP7 (organized by Max Lemke)

Max Lemke: *The European Research Strategy towards the Future Internet*

Jerker Wilander: *An Overview on FIRE and its Approaches towards Federation and Collaboration*

Hagen Woesner: *OpenFlow in Europe*

Geoffrey Coulson An Overview of two Wireless Sensor Network Testbed Projects and their Extension into the Future

Session 7 Virtualization (chair: Marco Hoffmann)

Rahamatullah Khondoker, Bernd Reuther, Paul Müller: *Selecting Communication Services in a Service Oriented Network Architecture*

Roland Bless, Martin Röhricht: *Quality-of-Service Signaling for Virtual Networks*

Wolfgang Kellerer, Dan Jurca, Ashiq Khan, Jörg Widmer, Daniel Schlosser, Michael Jarschel, Tobias Hossfeld, Marco Hoffmann, Klaus Hoffmann, Hans-Jochen Morper, Andreas Kirstädter, Sebastian Meier, Stefan Köhler, Matthias Schmid: *COMCON: Use Cases for Virtual Future Networks*

Zdravko Bozakov: *Service Characterization for Virtual Routers*

Gergö Lovasz, Florian Niedermeier, Hermann de Meer, Michel Steichen, Bernd Reuther, Paul Müller: *Ener-G: A Generic Approach for Modeling Energy Consumption*

Session 8 Wireless and Mobile Services (chair: Peter Domschitz)

Peter Domschitz, Markus Bauer, Jürgen Sienel, Marcus Kessler: *Move Applications not Data - A new Paradigm for the Future Internet*

Barbara Staehle, Florian Wamser, Rastin Pries, Dirk Staehle, Christian Mannweiler, Andreas Klein, Jörg Schneider, Hans D. Schotten: *Application- and Context-Aware Radio Resource Management for Future Wireless Networks*

Patrick Stupar, Krishna Pandit, Wolfgang Granzow: *Applicability of IETF Mobility Solutions to the 3GPP All IP Network*

Daniel Bimschas, Stefan Fischer, Dennis Pfisterer, Richard Mietz, Kay Römer, Sandor Fekete, Alexander Kröller, Max Pagel, Mesut Günes, Oliver Hahm, Kaspar Schleiser, Horst Hellbrück, Torsten Teubler: *Sync: Towards Congestion Control based on Emergent Behavior*

Demo Session (organized by Rastin Pries)

Matthias Hartmann, David Hock, Michael Höfling, Tim Neubert, Michael Menth: *FIRMS: Demonstration of a Mapping System for Loc/ID Split Internet Routing in G-Lab*

Florian Liers, Thomas Volkert, Andreas Mitschele-Thiel: *Demonstrating Forwarding on Gates with First Applications*

Osama Abboud, Konstantin Pussep, Ralf Steinmetz, Thomas Zinner, Simon Oechsner, Tobias Hossfeld, Phuoc Tran-Gia: *A QoE-Aware P2P Streaming System based on Scalable Video Coding*

Martin Becke, Dirk Hoffstadt, Irfan Simsek, Erwin Rathgeb, Konrad Campowsky, Christian Henke, Julius Müller, Thomas Magedanz, Carsten Schmoll, Tanja Zseby, Abbas Ali Siddiqui, Paul Müller: *A Demonstrator for Cross-Layer Composition*

Florian Wamser, Barbara Staehle, Rastin Pries, David Stezenbach, Sebastian Deschner, Dirk Staehle: *YouTube QoE-Aware Gateway Selection in Future Wireless Networks*

Dominik Charousset, Sebastian Meiling, Thomas C. Schmidt, Matthias Wählisch: *Hybrid Adaptive Mobile Multicast: Communicating via HAMcast Middleware*

Dominik Klein, Matthias Hartmann, Michael Höfling, Michael Menth: *Improvements to LISP Mobile Node Including NAT Traversal*

Christian Gottron, Daniel Seither, Andre König, Ralf Steinmetz: *A Testbed-based Visualization of Misbehavior in Peer-to-Peer System*

Michael Scharf, Thomas-Rolf Banniza: *An Initial Prototype of Multi-Connection TCP Transport*