317959

Mobile Opportunistic Traffic Offloading

D6.4 – Workshop report

SEVENTH FRAMEWORK
PROGRAMME

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Table of Contents

Report of the ACM CHANTS 2014 Workshop

Offloading is nowadays considered one of the most important topics of research in the area of opportunistic networks. Initially conceived as a natural extension of the conventional Mobile Ad Hoc Networking (MANET) paradigm, in the years they have been generated a lot of interesting research results about how to enable message dissemination without support of pre-existing networking infrastructures, studies on human mobility models, solutions to create data-centric mobile networks. Recently, they also found applications in everyday settings, for which they were not initially conceived, and offloading is one of the most important such cases (in addition to, e.g. mobile cloud computing, and opportunistic and participatory sensing). This is made possible by several elements that are maturing only now: (i) the availability of enabling technologies in mobile devices, such as WiFi direct in Android and D2D communication in latest LTE releases; (ii) the perception that even new 4G cellular technologies, alone, will not be able to cope with the data traffic demand of future mobile networking scenarios; (iii) the practical and flexible angle from which opportunistic networks have been conceived since the beginning, that lend them to be used in heterogeneous networking environments such as that of offloading.

Among the several events looking at opportunistic networks, ACM CHANTS (Workshop on Challenged Networks, http://acm-chants.org) is one of the most well established and recognised in the research community. Now in its 9th edition under the name CHANTS, it actually runs since 10 years, considering the first edition, named WDTN (Workshop on Delay-Tolerant Networks). It has been always co-located with prestigious venues, including ACM SIGCOMM and ACM MOBICOM. Statistics show that, despite its long-lasting history, CHANTS has always be able to attract a significant number of submissions and attendees, being an incubator for novel ideas and a forum for stimulating discussion. These were the reasons why we have targeted CHANTS as a primary venue for organising a MOTO workshop in 2014. Our proposal was accepted by the CHANTS Steering Committee. ACM CHANTS 2014 was co-located with ACM MOBICOM, and was held on September 7th, 2014. This gave us the opportunity to discuss MOTO topics in one of the most relevant audiences worldwide, as ACM MOBICOM (and its co-located workshops) is the flagship ACM conference on mobile communications. Furthermore, the fact that this year MOBICOM was organised in the USA, provided CHANTS 2014 the opportunity to disseminate results and views of the MOTO project also within the US research community.

In response to the call for papers (see the Appendix), we received a total of 37 submissions from Asia, Europe, and the United States, well distributed across the various workshop topics. This matched the highest number of submissions in the CHANTS history, and confirms that after several years CHANTS continues to be a reference forum by the community of researchers working in this field. After the review phase, the Technical Program Committee accepted 10 submissions as full papers, and 5 more as concise contributions. We also accepted 3 demo submissions. The MOTO project was well represented both in the Technical and Organisation Program Committees, and in the workshop program. Andrea Passarella (CNR) was co-chair of the workshop, and Elisabetta Biondi (CNR) was Publicity Co-Chair. Moreover, Chiara Boldrini and Marco Conti (CNR), Vania Conan (TCS), and Marcelo Dias de Amorim (UPMC) were members of the Technical Program Committee.

The workshop was very well attended, with about 30 people constantly participating to the paper presentations and the following discussions. The program was opened by a keynote talk, and was then organized in four papers' presentation sessions, and one demonstration session. In total 15 papers and 6 demos were presented. The keynote talk was given by Prof. Giovanni Pau (UPMC), and was entitled "Will ICN ride Challenged Network Environments?". The topic is very hot at the moment and of greatest interest for MOTO. The talk analysed the possible synergies between the emerging information-centric networking paradigm (ICN) and that of challenged networks. ICN is one of the most promising architectural solutions for data-centric communications, which is

basically the reference communication paradigm also in MOTO. Therefore, the talk provided interesting insights on how ICN paradigms can be integrated in opportunistic networks and therefore in the MOTO framework. The first session, entitled "New scenarios and deployment issues for challenged networks", presented papers dealing with novel directions and practical applications in the area of opportunistic networks. Specifically, it was discussed how to leverage also mobile devices not running opportunistic stacks to increase the density of opportunistic networks, thus helping their adoption in realistic scenarios. Furthermore, the use of opportunistic networking concepts in the area of IoT was also discussed. The second session, entitled "Challenged networking solutions for heterogeneous networks", discussed how to use opportunistic networking solutions in heterogeneous networks. Two of the MOTO papers presented at the workshop (see below for details) have been presented in this section. Another paper (not coming from MOTO) also discussed heterogeneous networks where traffic is offloaded from cellular to opportunistic networks. Therefore, it is fair to say that offloading with opportunistic networks was considered as the most important type of heterogeneous networking environment in this year's CHANTS edition. The third session ("Mechanisms for challenged networks") featured papers presenting novel solutions for key mechanisms in opportunistic networks, including building mobile applications through Web solutions in opportunistic networking environments, building mobile nodes groups in an efficient way (as opposed to conventional WiFi direct approaches), how to efficiently compress headers. In addition, an interesting study of the limits of Sybil attacks in opportunistic networks was also presented. Finally, the last session included concise contributions, i.e. a series of papers presenting work in progress solutions (from novel uses of opportunistic networks in interplanetary environments, to their use in deep sea networks).

The MOTO project was very visible in this year's CHANTS. The project was mentioned in the website and in all the calls (call for papers, call for participation) as supporting the workshop. We want to make clear that no MOTO money was used for the workshop, other than costs related to people travelling to attend it, and the PM effort of the organisation. As mentioned already, MOTO participants were involved in top roles in the workshop (up to the role of co-chair). Moreover, MOTO presented two full papers and one demo paper at the conference. It is worth stressing that these papers underwent a regular review process as all the other papers submitted to the workshop. The two MOTO full papers have been selected in the pool of the 10 full papers presented at the workshop, i.e. with a 27% acceptance rate. The MOTO full papers presented at the workshop are:

"Flooding data in a cell: Is cellular multicast better than device-to-device communications?" by Filippo Rebecchi, Marcelo Dias de Amorim and Vania Conan (UPMC and TCS)

"Adaptive Data Offloading in Opportunistic Networks through an Actor-Critic Learning Method", by Lorenzo Valerio, Raffaele Bruno and Andrea Passarella (CNR).

The first paper discussed the integration of multicast and D2D mechanisms in offloading networks, and its key results are presented in D3.3.1. The second one discusses how to control the offloading process through a learning mechanism, and is presented in D4.1.1.

The demo paper presented is:

"Opportunistic communications to alleviate cellular infrastructures", by Farid Benbadis, Filippo Rebecchi, Florian Cosnier, MaDeo Sammarco, Marcelo Dias de Amorim and Vania Conan (UPMC and TCS)

This demonstration presented lively the implementation of the MOTO offloading architecture described in D2.2.1. It is worth mentioning that the demonstration (and the MOTO booth) was particularly well attended, and actually it was necessary to stop the conversations in order to be able to continue with the planned programme of the workshop.

In addition, MOTO dissemination material was brought and distributed both the day of the workshop and all days of the ACM MOBICOM conference.

All in all, we can conclude that ACM CHANTS 2014 was the right choice in the strategy to advertise the MOTO results and present the MOTO approach to the research community. The workshop was the ideal venue due to its scientific standing (and that of the co-location conference). MOTO topics were well visible in the call for papers, which attracted the highest number of submissions in the workshop's history. The workshop was well attended, and offloading approaches discussed extensively. MOTO results have been at the core of these discussions, and were further presented during the demonstration session. Finally, MOTO participants have benefited also from discussions concerning future directions of opportunistic networks, as the MOTO framework is directly applicable to most of them too.

The workshop organisation team, the call for papers and the detailed program are attached as appendices to this document.

Appendix

This Appendix presents the workshop organisation team, the call for papers and the detailed program of ACM CHANTS 2014.

CHANTS 2014 Workshop Organization

Workshop Co-Chairs: Mario Gerla *(UCLA, USA)*
Andrea Passarella *(IIT-CNR, Italy)*

Program Committee: Mostafa Ammar *(Georgia Institute of Technology, USA)*
Aruna Balasubramanian *(University of Washington, USA)*
Fehmi Ben Abdesslem *(SICS Swedish ICT, Sweden)*
Chiara Boldrini *(IIT-CNR, Italy)*
Scott Burleigh *(Jet Propulsion Laboratory, California Institute of Technology, USA)*
Guohong Cao *(Penn State University, USA)*
Vania Conan *(Thales Communications & Security, France)*
Marco Conti *(IIT-CNR, Italy)*
Marcelo Dias de Amorim *(CNRS and UPMC, France)*
Roberto Di Pietro *(Roma Tre University of Rome, Italy)*
Do Young Eun *(North Carolina State University, USA)*
Stephen Farrell *(Trinity College Dublin, Ireland)*
Ahmed Helmy *(University of Florida, USA)*
Tristan Henderson *(University of St Andrews, UK)*
Pan Hui *(Deutsche Telekom Laboratories/Hong Kong Univ. of Science and Technology, Hong Kong)*
Karin Anna Hummel *(ETH Zurich, Switzerland)*
Mohan Kumar *(Rochester Institute of Technology, USA)*
Kyunghan Lee, *(UNIST Ulsan National Institute of Science and Technology, Korea)*
Uichin Lee *(KAIST-KSE, Korea Advanced Institute of Science and Technology, Korea)*
Anders Lindgren *(SICS Swedish ICT, Sweden)*
Giovanni Neglia *(INRIA Sophia-Antipolis, France)*
Melek Onen *(EURECOM, France)*
Joerg Ott *(Aalto University, Finland)*
Elena Pagani *(University of Milan, Italy)*
Andreea Hossmann-Picu *(ETH Zurich, Switzerland)*
Thrasyvoulos Spyropoulos *(EURECOM, France)*
Stavros Toumpis *(Athens University of Economics and Business, Greece)*
Eiko Yoneki *(University of Cambridge, UK)*

Steering Committee: Kevin Almeroth *(UC-Santa Barbara, USA)*
Mostafa Ammar *(Georgia Tech, USA)*
Christophe Diot *(Technicolor, France)*
Deborah Estrin *(UC-Los Angeles, USA)*
Kevin Fall *(Carnegie Mellon University, USA)*
Joerg Ott *(Aalto University, Finland)*
James Scott *(Microsoft Research Cambridge, UK)*

Publicity Co-Chairs: Elisabetta Biondi *(IIT-CNR, Italy)*
Yong Li *(Tsinghua University, China)*
Sungwon Yang *(UCLA, USA)*

Web Chair: Fehmi Ben Abdesslem *(SICS Swedish ICT, Sweden)*

Home	Committee	Program	Travel Information	Submission	Registration

Supported by the FP7 EU MOTO Project
http://www.fp7-moto.eu

Ninth ACM MobiCom Workshop on Challenged Networks

Challenged networks comprise those situations where communication is desired, but traditional Internet architectures fail to provide it effectively. Such networks may be characterized by intermittent connectivity, a heterogeneous mix of nodes, nodal churn, and widely varying network conditions. Traditional examples of challenged networks include inter-planetary networks, sensor and wildlife monitoring networks, underwater networks, rural and remote areas, and military battlefields. Recently, challenged networking has also found applications in everyday settings, for which they were not initially conceived, such as opportunistic networking supporting data-centric communications, traffic offloading from cellular networks, mobile cloud computing, opportunistic and participatory sensing. Inter-disciplinary approaches to challenged networking protocols are also successfully explored, exploiting, for example, findings in the area of social networking. The availability of enabling technologies in mobile devices, such as WiFi direct in Android and D2D communication in latest LTE releases, will further push towards practical developments of challenged networking solutions.

This workshop builds on the success of the eight **previous CHANTS workshops**, and **WDTN 2005**, to stimulate research on the most novel and challenging topics of challenged network research. CHANTS provides an ideal venue for researchers and engineers to present cutting-edge work and results, as research papers or demos, in the following topics:

- Delay/disruption-tolerant networks (DTNs)
- Opportunistic communication and computing
- Architecture, design, and implementation of communication systems for challenged networks
- Modeling, analysis and characterization of challenged networks and protocols
- Network coding in challenged networks
- Information Centric and Content-Centric Networking in challenged networks
- Security/trust/privacy concerns and solutions in challenged networks
- Case studies involving real challenged network solutions in various stages of development or use
- Applications of challenged networks in disrupted scenarios (e.g. disaster relief and emergency management) and in daily use (e.g., vehicular networks, mobile social networking, censorship evasion, crowdsourcing, sensor networks)
- Green and energy-efficient communication using challenged networks
- Real-world mobility trace collection, analysis, and modeling for challenged environments
- Network science methods for challenged networks
- Mobile data offloading via challenged networks
- Test and simulation tools for evaluating challenged network systems
- Configuration, management, and monitoring of challenged networks
- Challenged networking techniques for mobile cloud
- Challenged networking techniques for participatory and opportunistic sensing

Selected papers will be forward-looking, will describe their relationship to existing work, and will have impact and implications for ongoing or future research. We aim to have a highly interactive workshop, also including demos, which have been an integral part of CHANTS. Paper authors who can also run a demo of their work will be encouraged to do so. In exceptional cases, where live demos are simply not practical to present, poster or video presentations of practical results are acceptable. For more information, please check out other sections of this website or write to the workshop co-chairs at chants2014[at]iit[dot]cnr[dot]it.

Full paper submission guidelines

Papers should neither have been published elsewhere nor being currently under review by another conference or journal. All submitted papers will be carefully evaluated based on their originality, significance, technical soundness, and clarity of expression. Submissions must be in English, no longer than 6 pages with 10 point font and in PDF format, and use the **ACM templates**. All fonts must be embedded within the PDF and be Type 1 (scalable).

Papers will be reviewed single blind.

Demo proposals submission guidelines

Technical demonstrations showing innovative and original practical solutions in the above mentioned topics are solicited, showing working prototypes stimulating discussion among the attendees. Demo proposals (to be published as part of the proceedings) must not be longer than 3 pages plus 1 page description of the precise setup and requirements (the 1-page setup description will not be published in the proceedings). Manuscripts should be submitted following the exact same format as for full papers, except for the page limit.

Editorial follow-ups

Extended versions of the selected workshop papers will be considered for possible fast track publication on the Computer Communications Journal (Elsevier), in a special section on Challenged Networks.

Important dates

Full paper abstract registration deadline: ~~1 June 2014~~ 11 June 2014
Full paper submission deadline: ~~8 June 2014~~ 15 June 2014
Authors notification: **13 July 2014**
Camera Ready: **20 July 2014**
Workshop: **7 September 2014**

Download this CFP: **CHANTS14_cfp.txt**

Queries about this website to **Fehmi Ben Abdesslem**

Maui, Hawaii, 7 September 2014
The Ninth ACM Workshop on Challenged Networks
Technical Program

08:20 – 08:30 Welcome

08:30 – 09:15 Keynote Talk

Prof. Giovanni Pau, LIP6-UPMC, France
Title: Will ICN ride Challenged Network Environments?

09:15 – 10:00 New scenarios and deployment issues for challenged networks

Enhancing Opportunistic Networks with Legacy Nodes
Marcin Nagy, Teemu Kärkkäinen and Jörg Ott

Opportunistic Interaction in the Challenged Internet of Things
Hanno Wirtz, Jan Rüth, Martin Serror, Jó Ágila Bitsch Link and Klaus Wehrle

10:00 – 10:30 Coffee Break

10:30 – 12:00 Challenged networking solutions for heterogeneous networks

Mind the Gap: Modelling Video Delivery Under Expected Periods of Disconnection
Argyrios Tasiopoulos, Ioannis Psaras and George Pavlou

Flooding data in a cell: Is cellular multicast better than device-to-device communications?
Filippo Rebecchi, Marcelo Dias de Amorim and Vania Conan

A message ferrying approach to low-cost backhaul in cellular networks
Sayed A. Hoseini, Azade Fotouhi, Mahbub Hassan, Chun T. Chou and Mostafa Ammar

Adaptive Data Offloading in Opportunistic Networks through an Actor-Critic Learning Method
Lorenzo Valerio, Raffaele Bruno and Andrea Passarella

12:00 – 13:30 Lunch Break

13:30 – 15:00 Mechanisms for challenged networks

Stalk Me if You Can – The Anatomy of Sybil Attacks in Opportunistic Networks
Sacha Trifunovic and Andreea Hossmann-Picu

Dynamic framework for building highly-localized Mobile Web DTN applications
Kartik Sankaran, Akkihebbal L. Ananda, Mun Choon Chan and Li-Shiuan Peh

Bundle Protocol Header Compression
Martin Wegner, Wolf-Bastian Pöttner and Lars Wolf

WD2: An Improved WiFi-Direct Group Formation Protocol
Hongxu Zhang, Yufeng Wang and Chiu Tan

15:00 – 15:30 Coffee Break

15:30 – 16:10 Demonstrations

RasPiNET: Decentralised Communication and Sensing Platform with Satellite Connectivity
Eiko Yoneki

Opportunistic communications to alleviate cellular infrastructures
Farid Benbadis, Filippo Rebecchi, Florian Cosnier, Matteo Sammarco, Marcelo Dias de Amorim and Vania Conan

Wireless IP mesh on Android for firemen monitoring
Ana Aguiar, Eduardo Soares, Pedro Brandao, Tiago Magalhães, José Maria Fernandes and Ilídio Oliveira

Application-Transparent Deployment of DTN via SmartNet
Lance Alt, Geoffrey Xie and Justin Rohrer

Demo: Enhancing Opportunistic Networks with Legacy Nodes
Teemu Kärkkäinen, Marcin Nagy and Jörg Ott

Mobile Opportunistic System for Experience Sharing (MOSES) in Indoor Exhibitions
Fehmi Ben Abdesslem and Anders Lindgren

16:10 – 17:50 Concise contributions

Congestion Control in Disruption-Tolerant Networks: a Comparative Study for Interplanetary Networking Applications
Aloizio Silva, Scott Burleigh, Celso Hirata and Katia Obraczka

Hot Spot Selection in Rural Access Nanosatellite Networks
Marco Cello, Mario Marchese and Fabio Patrone

Revisiting Pitfalls of DTN Datasets Statistical Analysis
Gwilherm Baudic, Tanguy Perennou and Emmanuel Lochin

On Efficient Data Collection with Delay Minimization in Deep Sea
Jie Wu and Huanyang Zheng

Shared Content Editing in Opportunistic Networks
Teemu Kärkkäinen and Jörg Ott

17:50 – 18:00 Closing remarks

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