

Information and Communication Technologies (ICT)





Grant Agreement Number: 216366

Project Acronym: Euro-NF

Project Title: Anticipating the Network of the Future

From Theory to Design

Funding Scheme : Network of Excellence

Start Date of Project: 01 January, 2008

Duration: 42 months (originally 36)

Deliverable Number: D.SEA.6.3.3

Version Number: 1.0

Title of Deliverable:

Supporting synthesis document for the

workshop 2011 on traffic and congestion

control

Contractual Due Date : May, 2011

Actual Date of Completion : April, 2011

Workpackage contributing to the Deliverable : SEA 6.3 – Open Workshop on Traffic and

Congestion Control

Lead Contractor for this Deliverable : CERTH (partner 14)

Editor(s): Vasilis Sourlas, Paris Flegkas and

Leandros Tassiulas

Nature of the Deliverable : $(R/P/D/O)^*$

Dissemination Level : (PU, PP, RE, CO)** PU

*Nature: R-report, P-prototype, D-demonstrator, O-other

**Dissemination: PU-public, PP-restricted to programme, RE- restricted to a group, CO-confidential

Project URL: http://www.euronf.org

CONTENTS

| 1 | GENERAL INFORMATION | 3 |
|-----|--|----|
| 2 | MAIN OBJECTIVES | 3 |
| 3 | SCIENTIFIC CONTENT AND PROGRAMME | 3 |
| 4 | SPONSORS | 7 |
| 5 | SCIENTIFIC COMMITTEE | 7 |
| 6 | ORGANISING COMMITTEE | 7 |
| 7 | NUMBER AND LIST OF PARTICIPANTS | 7 |
| 7.1 | Number of Participants | 7 |
| 7.2 | List of Participants | 7 |
| 8 | COMPREHENSIVE SUMMARY FOCUSING ON THE MAJOR OUTCOMES | 9 |
| 9 | OVERALL QUALITATIVE ASSESSMENT | 9 |
| 10 | FINANCIAL ASPECTS | 10 |
| ΑI | PPENDIX 1: CALL FOR PARTICIPATION | 11 |
| Αŀ | PPENDIX 2: MATERIAL FOR DISSEMINATION | 13 |

1 GENERAL INFORMATION

Workpackage Number: SEA 6.3

Full name of the event: Euro-NF International Workshop on Traffic and Congestion Control

8 April 2011

for the Future Internet 2011 Date: 31 March – 01 April 2011

Place: Volos, Greece

Web site of the event: http://www.inf.uth.gr/euronf-tccfi/

Partner in charge of the organization: CEntre for Research and Technology Hellas (CERTH,

partner 14)

Chairman: Leandros Tassiulas

2 MAIN OBJECTIVES

This workshop, organized every year, covers the broad subject of traffic control and congestion control in the future Internet. These are common themes and objectives of the joint research activities JRA 2 on quantitative methods for traffic engineering taking account new technology, new usages and new networking paradigms and architectures.

The workshop proposes to work towards a sound understanding of the key networking mechanisms of congestion control, traffic management and traffic engineering. This year's workshop is organized in the context of both the evolving IP network and the emerging proposals for the architecture of the future Internet.

The workshop is to highlight key issues, appraise current understanding on these subjects and highlight those areas in need of further research. The workshop is intended to provide a forum for talks on early research including work which will appear in final form in relevant international conferences and journals.

3 SCIENTIFIC CONTENT AND PROGRAMME

The workshop comprised 18 reviewed presentations (out of the 20 accepted papers) grouped in six sessions:

- Future Networks and Service Architectures,
- Peer to Peer and Overlay Networking,
- Optical Networks,
- Traffic Management and Prediction,
- Wireless Networks,
- ISP Games and Regulations.

Two invited speakers, one from outside Euro-NF and one from the Euro-NF consortium were invited on subjects covering autonomic management and information centric networking:

- George Pavlou (University College London, U.K.): Autonomic Management for the Emerging Internet: Current State and Key Challenges;
- George C. Polyzos (Athens University of Economics and Business, Greece): Information-Centric Networking and the PSI (Pub/Sub Internet) Architecture.

The detailed program was the following:

Thursday, March 31

| 9.00 -9.30 | Registration |
|---------------|--|
| 9.30 -9.45 | Opening |
| 9.45 -10.45 | Invited Talk: |
| | Autonomic Management for the Emerging Internet: Current State and Key Challenges |
| | George Pavlou (University College London) |
| 10.45 – 11.15 | Coffee Break |
| 11.15 – 12.45 | Session 1: Future Network and Service Architectures |
| | Chair: Iordanis Koutsopoulos |
| | Towards an implementation of an information-centric network |
| | George A. Parisis (University of Cambridge, United Kingdom); Dirk Trossen (University of Cambridge, United Kingdom) |
| | In-Network Service Selection and Composition Based on User and Network Context |
| | Alberto J. Gonzalez (Technical University of Catalonia, Spain); Ramon Martin de Pozuelo (La Salle - Universitat Ramon Llull, Spain); Francesc Pinyol (Ramon Llull University, Spain); Jesus A. Alcober (Technical University of Catalonia, Spain) |
| | Modeling virtualized infrastructures under security constraints |
| | Muhammad Ali (University of Passau Germany, Germany); Hermann de Meer (University of Passau, Germany) |
| - | Bundled services, agents, marketplaces: Technology for the future internet |
| 12.45 – 14.15 | John Leaney (University of Technology, Sydney, Australia); Haydn Mearns (University of Technology, Sydney, Australia); Artem Parakhine (University of Technology, Sydney, Australia) Lunch |
| 14.15 – 15.30 | Session 2: Peer to peer and overlay networking |
| | Chair: Dimitris Katsaros |
| | Hose Rate Control for P2P Streaming Systems |
| | Emilio Leonardi (Politecnico di Torino, Italy); Marco Mellia (Politecnico di Torino, Italy); Stefano Traverso (Politecnico di Torino, Italy); Michela Meo (Politecnico di Torino, Italy) |
| | Peer-to-peer streaming experiments based on Chord overlay |
| | Ilkka Norros (VTT Technical Research Centre of Finland, Finland); Vesa Pehkonen (VTT Technical Research Centre of Finland, Finland); Hannu Reittu (VTT Technical Research Centre of Finland, Finland) |

| | Development of Connection-Oriented Point-to-Point Communication Protocols using Python |
|--------------|---|
| | Mugurel Ionut Andreica (Politehnica University of Bucharest, Romania); Nicolae Tapus (Politehnica University of Bucharest, Romania) |
| 15.30 –15.45 | Coffee Break |
| 15.45 –17.00 | Session 3: Optical Networks |
| | Chair: Petros Lampas |
| | 60GHz Radio-over-Fiber networks: Optical-Wireless Convergence through Medium-Transparent MAC protocols |
| | George Kalfas (Technical University of Catalonia, Spain); Nikos Pleros (Aristotle University of Thessaloniki, Greece); Kostas Tsagkaris (University of Piraeus, Greece); Christos Verikoukis (Telecommunications Technological Centre of Catalonia, Spain) |
| | Enabling Optical Network Virtualization |
| | Emmanouel Varvarigos (University of Patras, Greece); Kostas Christodoulopoulos (University of Patras, Greece) |
| | A Prediction Extension for Half Cycling Dynamic Bandwidth Allocation on EPON |
| | Özgür Can Turna (Istanbul University, Turkey); M. Ali Aydin (Istanbul University, Turkey); Tulin Atmaca (IT/Telecom & Management Sud Paris, France); A. Halim Zaim (Istanbul Commerce University, Turkey) |
| 18:00 | Social event |
| | Trip to Makrinitsa and dinner at Portaria(villages of Mount Pelion) |

Friday, April 1

| 9.00-10.00 | Invited Talk: | | |
|---------------|---|--|--|
| | Information-Centric Networking and the PSI (Pub/Sub Internet) Architecture | | |
| | George C. Polyzos (Athens University of Economics and Business) | | |
| 10.00 – 11.45 | Session 4: Traffic Management and Prediction | | |
| | Chair: Paris Flegkas | | |
| | A Machine Learning Approach to Throughput Prediction in Multi-hop Wireless Networks | | |
| | Manolis Ploumidis (University of Crete, Greece); Vasilios Siris (ICS-FORTH / Athens University of Economics and Business, Greece); Apostolos Traganitis (ICS-FORTH, Greece) | | |
| 10.30 – 10.45 | Coffee Break | | |
| | Towards a Unified Framework for Transport and Network Traffic Management | | |
| | João Taveira Araújo (University College London, United Kingdom); George Pavlou (University College London, United Kingdom); Miguel Rio (UCL, United Kingdom) | | |

| | Compressible traffic features? |
|---------------|---|
| | Atef Abdelkefi (Q2S, Norwegian University of Science and Technology, Norway) |
| | Boosting statistical application identification by flow correlation |
| 11.45 -12:45 | Mohamad Jaber (INRIA Sophia-Antipolis Projet PLANETE, France); Roberto Cascella (INRIA, France); Chadi Barakat (INRIA Sophia Antipolis, France) Session 5: Wireless Networks |
| | Chair: Georgios Paschos |
| | Cross Layer Multicast Rate Adaptation in Wireless Networks |
| | Emmanouil G. Spanakis (Institute of Computer Science, FORTH, Greece); Apostolos Traganitis (ICS-FORTH, Greece); Anthony Ephremides (University of Maryland at College Park, USA) |
| | Provision for the Deployment of a WiMAX Solution |
| | Christos Papathanasiou (University of Thessaly, Greece); Nikos Dimitriou (University of Athens, Greece); Theodoros Samios (Technological Institution of Piraeus, Greece) |
| | Short Term Wireless Channel State Prediction Using Markov Models and Supervised Learning |
| | Manolis Ploumidis (University of Crete, Greece); Nikolaos Pappas (University of Crete / ICS-FORTH, Greece); Vasilios Siris (ICS-FORTH / Athens University of Economics and Business, Greece); Apostolos Traganitis (ICS-FORTH, Greece) |
| 12.45 – 14.15 | Lunch |
| 14.15 – 15.30 | Session 6: ISP Games and Regulations |
| | Chair: Dimitris Syrivelis |
| | A Game-theoretic Framework for ISPs' Interactions in the Context of Economic Traffic Management |
| | Ioanna Papafili (Athens University of Economics and Business, Greece); Sergios Soursos (Intracom Telecom, Greece); George Stamoulis (Athens University of Economics and Business, Greece) The Future of Internet Regulation: Current Trends, a |
| | Dangerous Precedent and the Role of Internet Users |
| | Nikolaos Koumartzis (Aristotle University of Thessaloniki, Greece); Andreas Veglis (Aristotle University of Thessaloniki, Greece) |
| | Games Between Competing ISPs Employing Different Pricing Schemes |
| | Alexandros Kostopoulos (Athens University of Economics and Business, Greece); Antonis Dimakis (Athens University of Economics and Business, Greece); Costas Courcoubetis (Athens University of Economics and Business, Greece) |

4 SPONSORS

None

5 SCIENTIFIC COMMITTEE

| Partner Number | Partner Acronym | Contributor Name | Contributor e-mail address |
|-------------------|-----------------|-------------------------------|----------------------------------|
| 14 | CERTH | Leandros Tassiulas (G. chair) | <u>leandros@uth.gr</u> |
| 12 | UNI PASSAU | Hermann De Meer (TPC chair) | demeer@fmi.uni-passau.de |
| 14 | CERTH | Paris Flegkas (TPC chair) | pflegkas@uth.gr |
| 08 | FT | Patrick Brown | patrick.brown@orange-ftgroup.com |
| 16 | POLITO | Claudio Casetti | casetti@polito.it |
| 17 | POLIMI | Matteo Cesana | cesana@elet.polimi.it |
| 14 | CERTH | Leonidas Georgiadis | leonid@eng.auth.gr |
| 05 | VTT | Petteri Mannersalo | petteri.mannersalo@vtt.fi |
| 13 | AUEB | George Polyzos | polyzos@aueb.gr |
| 20 | IT | Rui Valadas | rui.valadas@eurongi.org |

6 ORGANISING COMMITTEE

| Partner Number Partner Acronym | | Contributor Name | Contributor e-mail address | |
|--------------------------------|-------|-------------------|----------------------------|--|
| 14 | CERTH | Vasilis Sourlas | vsourlas@inf.uth.gr | |
| 14 | CERTH | Christina Madelou | madelou@iti.gr | |

7 NUMBER AND LIST OF PARTICIPANTS

7.1 Number of Participants

- Euro-NF Members: 29

- External Participants: 18

7.2 List of Participants

| Partner Number | Partner Acronym | Participant Name | Participant e-mail address |
|-------------------|-----------------|------------------------|----------------------------|
| 01 | GET | Özgür Can Turna | ozgur.turna@it-sudparis.eu |
| 05 | VTT | Hannu Reittu | Hannu.Reittu@vtt.fi |
| 07 | INRIA | Mohamad Jaber | mohamad.jaber@inria.fr |
| 12 | UNI PASSAU | Muhammad Ali | muhammad.ali@uni-passau.de |
| 13 | AUEB | George C. Polyzos | polyzos@aueb.gr |
| 13 | AUEB | Alexandros Kostopoulos | alexkosto@aueb.gr |
| 13 | AUEB | Ioanna Papafili | iopapafi@aueb.gr |

| 1.4 | CEDTH | T 1 70 ' 1 | 1 1 6 4 | |
|----------|-----------------------|------------------------|---------------------------------|--|
| 14 | CERTH | Leandros Tassiulas | leandros@uth.gr | |
| 14 | CERTH | Vasilis Sourlas | vsourlas@uth.gr | |
| 14 | CERTH | Paris Flegkas | pflegkas@uth.gr | |
| 14 | CERTH | Lazaros Gkatzikis | lagatzik@inf.uth.gr | |
| 14 | CERTH | Iordanis Koutsopolos | jordan@uth.gr | |
| 14 | CERTH | Georgios Paschos | gpasxos@gmail.com | |
| 14 | CERTH | Dimitris Syrivelis | jsyr@inf.uth.gr | |
| 14 | CERTH | Anna Satsiou | satsioua@gmail.com | |
| 14 | CERTH | Dimitris Zisiadis | dimitris@uth.gr | |
| 14 | CERTH | Filippos Koravos | filippos@inf.uth.gr | |
| 14 | CERTH | Spyros Kopsidas | spyros@inf.uth.gr | |
| 14 | CERTH | Kostas Katsalis | kkatsalis@inf.uth.gr | |
| 14 | CERTH | Nikos Giallelis | | |
| 14 | CERTH | Stratos Keranidis | | |
| 14 | CERTH | Kostas Stathopoulos | kstathop@uth.gr | |
| 14 | CERTH | Panos Georgatsos | | |
| 14 | CERTH | Kostas Choumas | | |
| 14 | CERTH | Christos Papathanasiou | cpapa@inf.uth.gr | |
| 16 | POLITO | Stefano Traverso | stefano.traverso@polito.it | |
| 27 | NTNU | Atef Abdelkefi | atef@q2s.ntnu.no | |
| 31 | UPC | Alberto J. Gonzales | alberto.jose.gonzalez@upc.edu | |
| 31 | UPC | George Kalfas | george.kalfas@estudiant.upc.edu | |
| External | U. Namur, Belgium | Antoine Roly | aro@info.fundp.ac.be | |
| External | U. Crete, Greece | Nikolaos Pappas | npapas@ics.forth.gr | |
| External | U. Crete, Greece | Emmanouil Ploumidis | ploumid@ics.forth.gr | |
| External | U. Crete, Greece | Emmanouil Spanakis | spanakis@ics.forth.gr | |
| External | U. Cambridge, U.K. | George Parisis | george.parissis@gmail.com | |
| External | TEI Lamia, Greece | Petros Lampsas | plam@teilam.gr | |
| External | U. Patras, Greece | Emmanouil Varvarigos | manos@ceid.upatras.gr | |
| External | U. Bucharest, Romania | Mugurel Ionut Andreica | mugurel.andreica@cs.pub.ro | |
| External | U. Thessaly, Greece | Kostas Poularakis | kopoular@uth.gr | |
| External | U. Thessaly, Greece | Dimitrios Katsaros | dkatsar@inf.uth.gr | |
| External | U. Thessaly, Greece | Dimitrios Chatzopoulos | | |
| External | U. Thessaly, Greece | Georgios Kyriakou | | |
| External | U. Thessaly, Greece | Kostas Mpessas | karavago@gmail.com | |
| External | U. Thessaly, Greece | Thanasis Barekas | | |
| External | U. Thessaly, Greece | Leandros Maglaras | maglaras@inf.uth.gr | |
| External | U. Thessaly, Greece | Apostolos Apostolaras | apaposto@inf.uth.gr | |
| External | U. Thessaly, Greece | Nikolaos Tziritas | | |
| External | U. Thessaly, Greece | Antonis Tzounis | | |
| | J , | | 1 | |

9

Deliverable N°: D.SEA.6.3.3

8 COMPREHENSIVE SUMMARY FOCUSING ON THE MAJOR OUTCOMES

There was no discussion planned at this workshop beyond the regular presentations in the sessions, the invited talks, and the questions to the speakers. This is inline with the objective of the workshop.

As expressed in the description of the objectives of workpackage SEA 6.3, the workshop was an open event aimed at providing an open forum to present very recent work produced in Euro-NF concerning topics covered in JRA 2.

The outcome of such a workshop is the discovery by the participants of new problems, new results, new angles of attack of problems, new points of view concerning certain issues. A second more medium term outcome is the generation of new research themes or new collaborations between participants. Moreover several EU projects had the change to disseminate their work through the presented papers, including projects TARIFA, GreenNet, SmoothIT and Trilogy. Furthermore, through their two keynote talks, Prof. George Pavlou and Prof. George Polyzos disseminate the work of the PURSUIT and COMET EU projects respectively.

Furthermore members from CERTH and UPC had the chance to discuss various issues in autonomic network management that could lead in future collaboration. Also members from CERTH and AUEB discussed various issues on content centric networking, exploiting their work in the PURSUIT project.

9 OVERALL QUALITATIVE ASSESSMENT

To evaluate how efficient the workshop was to attain these objectives is subjective. Nonetheless from the participants comments and the personal opinion of the organizers the invited talks were quite interesting and presented different aspects of the autonomic management for the emerging Internet as well as the Information Centric Networking which is considered a promising future network architecture that solves many challenges of the current Internet and is appropriate for designing distributed systems due to its loose-coupled and asynchronous communication.

Questions were asked about how well the content centric networking will scale in the Internet and which are the benefits from such an approach. Both the keynote speakers are working in that new Internet architecture through different EU projects and are rather optimistic for the future and the deployment of the content centric networking.

Most reviewed talks were well prepared and presented. The talks had a good average level. Many talks were on the emerging content centric future Internet technology as well as in traffic control. Particularly many talks included (non exhaustive) performance limits for P2P file sharing and P2P streaming, ISP aided content distribution, optical network virtualization, implementation of Information Centric network etc.

Also the participants were asked to fill a survey to have their feedback concerning the workshop. They were asked to rate different criteria on a scale from 1 (bad) to 5 (excellent). The average rate per criteria is Good (close to 4) for all criteria:

| | General | Content | Time for talks and discussion | Pre- workshop org. | Local and on-site org. | Coffee breaks, lunch | Social Event |
|--------------|---------|---------|-------------------------------|--------------------------|------------------------|----------------------------|-----------------|
| Avg. Rate | 4,4 | 4,1 | 4,8 | 4.2 | 4,1 | 4,5 | 4,9 |

The workshop received contributions from very diverse institutions around Europe. Particularly contributions were received from 15 different institutions spread in 9 EU countries. Participants' countries were far less balanced but still covered many countries which is quite a good point. As expected for such a workshop, out of the 47 participants 36 were from Greece the receiving country, 2 from Spain, 2 from U.K, 2 from France and one from Finland, Belgium, Germany, Italy and Romania.

10 FINANCIAL ASPECTS

- Revenues: 0, no fees charged on the external participants

- Expenses:

| Invited speakers (travel and accommodation) | 1 220 € |
|---|---------|
| Coffee breaks | 987 € |
| Lunches | 1 410 € |
| Social event (tour & dinner) | 2 820 € |
| Welcome reception | 1 880 € |
| EDAS | 98 € |
| Total | 8 415 € |

APPENDIX 1: CALL FOR PARTICIPATION

Euro-NF International Workshop on Traffic and Congestion Control for the Future Internet

(31 March – 1 April 2011, Volos, Greece)

Call for Papers

The exponential growth of the Internet and the unanticipated popularity of applications and services have resulted in a growing expectation for possible paradigm changes ranging from evolutionary approaches to clean-slate Internet architectures. New requirements for traffic and congestion control have emerged from novel approaches including content-centric and service-oriented architectures, energy-efficient wired and wireless network technologies. The International Workshop on Traffic and Congestion Control for the Future Internet, organized by the Euro-NF Network of Excellence, aims at bringing together researchers from all over the world and provide an open forum of discussion about recent research trends in the area of traffic and congestion control for the Future Internet.

Topics of interest include, but are not limited to:

- Novel Internet Architectures
- Traffic Management and Congestion Control
- Resource Management and Traffic Engineering
- Pricing and SLAs
- Cross-layer optimisation in wireless networks
- End-to-end OoS
- Autonomic Network Management
- Adaptive load-sensitive routing
- Routing and traffic management in a multi-provider context

- Reliable and efficient communication in self-organized networks
- Measurements and traffic awareness
- Caching and Replication Mechanisms
- Network Coding
- Design of optimal highly dependable networks
- P2P file sharing and streaming
- Operation and management of overlay networks
- Anomaly detection and problem diagnosis
- Interoperability and management of sensor and adhoc networks

Submission

Authors are invited to submit extended abstracts of 1 to 2 pages describing the substance of the presentation they wish to make at the workshop. The presentations can be on original results or of a more tutorial nature. Authors of accepted proposals will be required to supply a copy of their slides which, together with the abstracts, will constitute the workshop proceedings. The workshop is intended to provide a forum for talks on early research including work which will appear in final form in relevant international conferences and journals.

Dissemination level: PU 11

Important dates

Submission: 21 February 2011Notification: 10 March 2011

• Camera ready and Registration: 20 March 2011

Committee and Contacts

General Chair

Leandros Tassiulas, CERTH, Greece

TPC Co-Chairs

Paris Flegkas, CERTH, Greece Hermann De Meer, Uni Passau, Germany

Publication Chair and Local Arrangements

Vasilis Sourlas, CERTH, Greece

TPC Members

Patrick Brown, FT, France Claudio Casetti, Polito, Italy Matteo Cesana, Polimi, Italy Leonidas Georgiadis, AUTH, Greece Petteri Mannersalo, VTT, Finland George Polyzos, AUEB, Greece Rui Valadas, Uni Aveiro, Portugal

Web site

http://www.inf.uth.gr/euronf-tccfi/

Project FP7 ICT N° 216366 – Euro-NF 8 April 2011

Deliverable N°: D.SEA.6.3.3

APPENDIX 2: MATERIAL FOR DISSEMINATION

1) Proceedings:

No proceedings were printed. The accepted papers are enclosed in the following pages. They are also publicly available on the workshop website at: http://www.inf.uth.gr/euronf-tccfi/images/stories/euro-nf tccfi papers.pdf and on the site of the project at: http://euronf.enst.fr/p_en_Events_nfcalendar_calen11_600.html

2) Slides from the presentations:

They are equally enclosed hereafter, and are also available on the workshop web site at: http://www.inf.uth.gr/euronf-tccfi/images/stories/euronf-tccfi-presentations.pdf as well as on the site of the project (same link as above)

Dissemination level: PU 13

Euro-NF International Workshop on Traffic and Congestion Control for the Future Internet

31 March – 1 April, 2011

Volos, Greece

