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SEVENTH FRAMEWORK PROGRAMME

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NEWCOM#

Network of Excellence in Wireless Communications#

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WP3.6 – The NEWCOM# Portal and related Web Presence Tools

D36.4
Third report on Web Tools Usage

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Abstract:	This report shows the usage of NEWCOM#'s web tools by partners and researchers, and the 'rest of the world' (occasional visitors, outside research community, etc.). The website is well-indexed and linked, and its usage is typical for a site of its size, purpose and target. The report also comments on the recommendations made in D36.2 to increase the performance of the tools and to help the Network in its promotion and sustainability. The number of average visits/month moved from 756 to 1127 during the third year, and the percentage of new visitors increased from 64% to 70%.
Keywords:	Website, portal, mailing list, videoconference, repository, report

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0.1	September 22, 2015	First draft
0.2	September 23, 2015	Inclusion of contributions from CTTC and PUT
0.3	November 11, 2015	Internal review made by the Track Leader
1.0	November 23, 2015	Final Version

Executive Summary

This document shows and presents the usage of the set of web tools implemented: all the screenshots were made on October 31, 2015, and then collected and published in this document.

The deliverable starts by shortly summarising the features of Joomla (previously described in D36.2), the platform selected for the development of the web portal.

In the second part, the deliverable shows the usage of every web tool in terms of statistics, graphics and diagrams. In particular, great emphasis is given to the web tool, the geographical origin of visits, and other data useful to analyse the impact of the project on the rest of the world. In the conclusions, we also report on some comments regarding the attempts made during Y3 to improve the project visibility, based on the recommendations concerning D36.2.

The document shows that all web related tools permitted fruitful cooperation among scientists and facilitated the dissemination of project results. . The number of average visits/month moved from 756 to 1127 during the third year showing an increased networking.

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List of Acronyms

CMS: Content Management System
CSS: Cascading Style Sheets
EU: European Union
EURACON: European Association of Communications and Networking
EuWIn: European Laboratory of Wireless Communications for the Future Internet
HTML: Hypertext Markup Language
JPA: Joint Program of Activities
N#: NEWCOM#
NEWCOM#: NetworkofExcellence inWirelessCommunications#
NoE: Network of Excellence
PHP: Hypertext Preprocessor
WP: Work Package

Glossary

Joomla

For more detailed information about Joomla ,its features and extensions, please refer to the Joomla website at theURLhttp://www.joomla.org.

A good general User Manual for Joomla3.0 content creators and managers is available at http://docs.joomla.org/Main_Page.

SpecificsupportforPloneisavailableat http://forum.joomla.org.

Scopia Desktop

Scopia, within the computer networking and telecommunications fields, is a series of unified communications products that provide meet-me, videoconferencing and online collaboration. Scopia products include the Scopia XT Telepresence, Scopia XT5000 Room System, Scopia XT4200 Room System, Scopia XT Meeting Center Room System, Scopia Firewall Traversal, Multipoint control units, Gateways, Scopia Control, Scopia Desktop Video Conferencing, and Scopia Mobile HD Video Conferencing. The Scopia products are sold by Avaya.

For more detailed information about Scopia Desktop, please refer to the Scopia website at the URL http://www.radvision.com.

Remository

Remository is a Joomla component. The latest version adds the ability to play audio/video files as well as download them. Remository supports the secure hosting of local or remote files for download by site visitors. Files can be uploaded by users, and locally hosted files can be stored in either the database or the file system.

Customised versions and professional support are available by arrangement.

This Joomla extension can be downloaded directly from the Joomla website.

1. Introduction

This document describes the status of the web portal and of the set of other web tools at the end of the third year of NoE's life span(M36). The main body is made of statistics on the logdata about the access and the usage of the website, for the period November 2014 – October 2015.

The focus is on traffic data, in terms of number of visitors, number of page views, and on traffic sources.

The overall aim of this report is to understand where and how the website and the other tools can be improved or modified, to contribute to better fulfil their objectives.

This report is structured as follows:

- Section 1 contains a brief description of the report itself and its objectives.
- Section 2 contains a short description of every web tool.
- Section 3 contains the report about the usage of the web tools.
- Section 4 contains conclusions.
- Section 5 gives references.
- Sections 6, 7 and 8 contain annexes.

2. Web Tools

2.1 Portal

The website is available at http://www.newcom-project.eu.

The online version of the portal is based on Joomla 2.5.9. Joomla is an Open Source Management System (*cms*) for publishing content on the web. It is written in PHP.

Along with Joomla, additional plugins and components are installed to build the portal. The most important are:

- *Remository*: File repository. Allows the organisation of files into folders. Files can be uploaded or downloaded by the sites' visitors, subject to configured constraints.
- *Akeeba Backup Core*: Contains the necessary features for complete Backup, restoration and site migration.
- *Extplorer*: File manager that allows copy and paste files and directories from Joomla
- *Gcalendar*: Allows integration between Joomla and Google Calendar.
- *NotifyArticleSubmit*: This extension allows sending notification emails when a user adds/modifies selected articles on the Joomla website.

During the reporting period, no changes were made to the portal structure. Only the contents have been regularly updated, based on the occurrence of events (delivery of documents, organisation of schools, etc.).

2.2 Newsletters

Following the previous years, as well as fulfilling the commitments from the DoW, each release of NEWCOM# newsletter is published every three months in two different electronic forms, i.e. as pdf file and as flipbook content of the N# portal. In the last reporting period in the project lifetime five issues of the newsletter have been delivered to the recipients registered to the dedicated mailing list.

Figure 2-1. The content of the newsletter area.

2.2.2 Eighth Issue

The first issue in the last reporting period was released in December 2014, and contained 8 pages. Again, as agreed at the beginning of the project, the editorial for each issue is prepared by separate person from NEWCOM#. In this issue the introduction to the eighth release has been provided by prof. Claude Oestges. After the editorial the readers can enjoy two interviews with the N# researchers: the first one was with dr. Lila Boukhatem from University of Paris-Sud, and the second – with prof. Filippo Giannetti from University of Pisa. After that the report from the scientific visit of Paolo Del Fiorentino in Ghent was provided. The “HOT research topics” section contained the contribution by prof. Shlomo Shamai on “Information Theory with Implications on Current and Future Communications Technology”. Last page contained an interesting relation from the participation of the N# project at Researchers Night in Pisa.

2.2.3 Ninth Issue

The ninth release has been delivered to the readers in March 2015, and had 11 pages. It was started with the introductory party by Dr. Miquel Payaro, followed by the detailed questionnaire results, very important and informative for the N# community. There were two interviews – with prof. Gerhard Fetweiss from TU Dresden, and Prof. Ana Perez-Neira from UPC. After that the relation from the mobility grant by Danilo Abrignani was provided, and the interesting essay was included, which was delivered by prof. Marco Luise, where he presented his vision or dream for 5G systems. In this issue we also included the detailed presentation of the associated partners, as well as the first invitation to the final N# event in Barcelona.

2.2.4 Tenth Issue

After two months from the ninth release, the next one has been circulated in May 2015. It contained 5 pages, started by the editorial provided by prof. Davide Dardari. The "HOT research topic" on "A Perspective on Virtual Radio Access Networks" has been provided by Sina Khatibi from INOV in Portugal. This section was followed by the news from WP2.2 (again, by prof. Davide Dardari), and by the report from the mobility grant by Najeeb Ul Hassan. On the last page the call-for-papers to the N# special issue in Wireless Personal Communications (Springer) has been provided.

2.2.5 Eleventh Issue

The eleventh issue of the N# newsletter has been released in the vacation time, exactly on July 2015. This pre-final issue consisted of 9 pages, and was opened by the introduction provided by prof. Luc Vandendorpe. It was then followed by the "HOT research topic" section, where the contribution on "Leveraging on context-aware Capabilities for operating 5G heterogeneous networks" by Jordi Perez-Romero and Anna Umbert from UPC, Spain was included. There was also an interview with prof. Yves Louet from CentraleSupélec in France. This release of the bulletin was finished with the rich "dissemination" section, where a set of call for papers and invitations to the N# organized events was provided.

2.2.5 Twelfth Issue

The last issue of the bulletin has been intentionally released after the final N# event in Barcelona (October/November 2015). It had 8 pages, and was opened with the farewell by prof. Marco Luise and photo-relation from the N# award ceremony. After that the newsletter readers can enjoy the relation from the N# event in Barcelona provided by Dr. Carles Anton, CTTC. Pages 4 and 5 contained the interviews with Prof. Roberto Verdone (University of Bologna, Italy) and prof. Luis Correia (University of Lisbon, Portugal). The last three pages presented news from three WPs, i.e. WP13 by Dr. Andreas Zalonis, WP21 by dr. Miquel Payaro, and WP22 by Prof. Davide Dardari.

2.2.5 N# Logbook

Following the tradition from the previous edition of the network of excellence, the merged collection of all newsletters has been created and published in form of logbook on the N# web-page.

2.3 LinkedIn

There are no activities to report in this section

2.4 Mail Reflector

The Mailman software is used as the mail reflector for the project. Mailman allows managing electronic mail discussion and e-newsletter lists. Mailman is mainly written in the Python programing language, and distributed under the GNU General Public License.

During the reporting period, 22 mailing lists are defined for the project. No new features were implemented in Mailman during this period.

2.5 Scopia Desktop

Videoconference solution is Radvision'sScopia Desktop system is used during the project. Scopia Desktop is a web-based Video Conferencing tool, compatible with both Windows and Mac systems. Along with the Video/audioconferencing capabilities, it offers chat services and Real-time desktop sharing (presentations).

During the reporting period, no new features were implemented for the Videoconference tool.

3. Usage statistics

3.1 Portal

3.1.1 Introduction

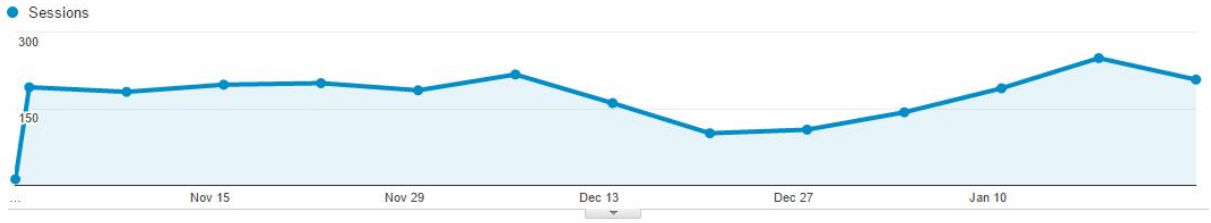
The statistics of the portal were obtained from the logs of the webserver that hosts the portal using Google analytics. Google analytics is a web server log file analysis program that produces detailed and configurable usage reports in HTML format for viewing with a standard web browser. All statistics of Y3 were taken on October 31st. To better understand the terms of the report, you can consult Annex 1.

3.1.2 Usage summary graph

Figure 3-1 shows the site during the period November 1st 2014 - October 31st 2015 for **newcom-project.eu**.

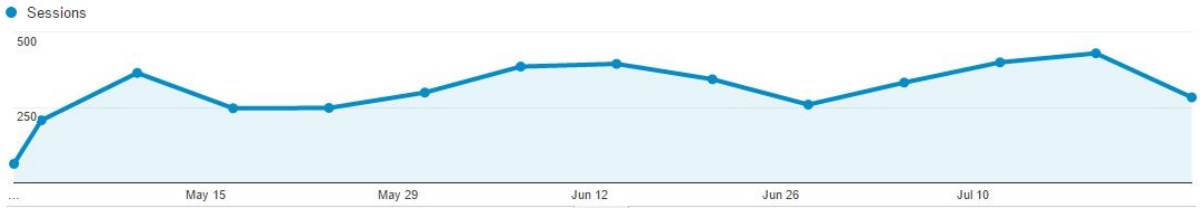
Fig. 3-1 Number of sessions during the third year.

November 1st 2014 – January 31st2015

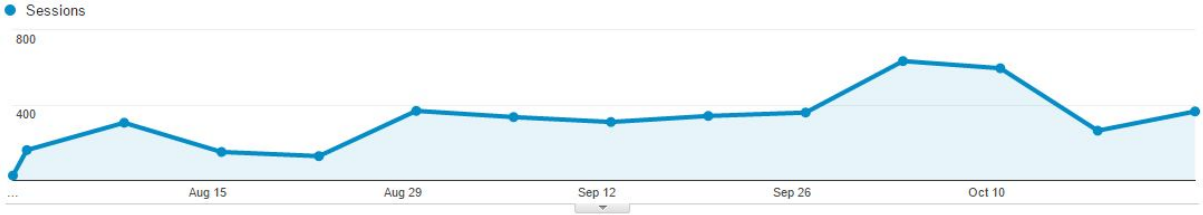


February 1st 2015 – April 30th2015

May1st 2015– July 31st2015



Aug1st 2015– October 31st2015



The data confirm a trend on the usage of the portal rather constant with some peaks during/before the project events (e.g. the Track1-Track2 large event organised in Athens in January 2015, EUCNC 2015 organised in Paris at the end of June and Final Event In Barcelona in October 2015).

3.1.3 New Users acquisition

The following figures allow a discussion on new users acquisition during last year.

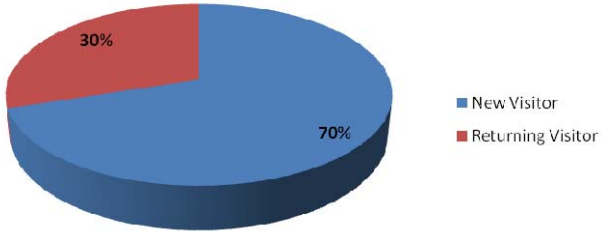


Figure 3-2 Percentage of sessions for new visitors and returning visitors during the period November 1st 2014- October 31st2015

During the third year, the percentage of new visitors has further increased than the percentage of returning visitors. However, the percentage of returning visitors remains relevant confirming a continuing interest from the NoE partners.

The following figure shows the percentage of new users between November 1st 2014 - October 31st 2015 for **newcom-project.eu**.

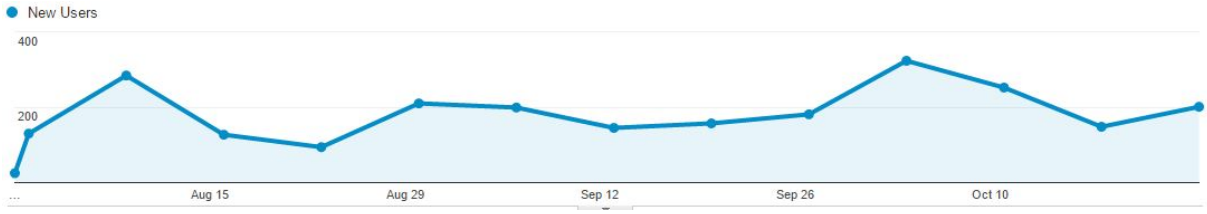
Figure 3-3 Number of new users during the third year.

November 1st 2014- January 31st 2015

February 1st 2015 – April 30th 2015

May1st 2015 – July 31st 2015

Aug 1st 2015 – October 31st 2015



In a similar way, the new users acquisition confirms a constant trend with peaks in the period of organised events.

The following figures show the average session duration for new users and returning users. Data confirm during the third year the growing interest of returning users about portal contents. Instead the interest of the new visitors during the third year is slightly lower.

Figure 3-4 Average Session Duration (sec.) period Nov. 1st 2014 – Oct. 31st 2015

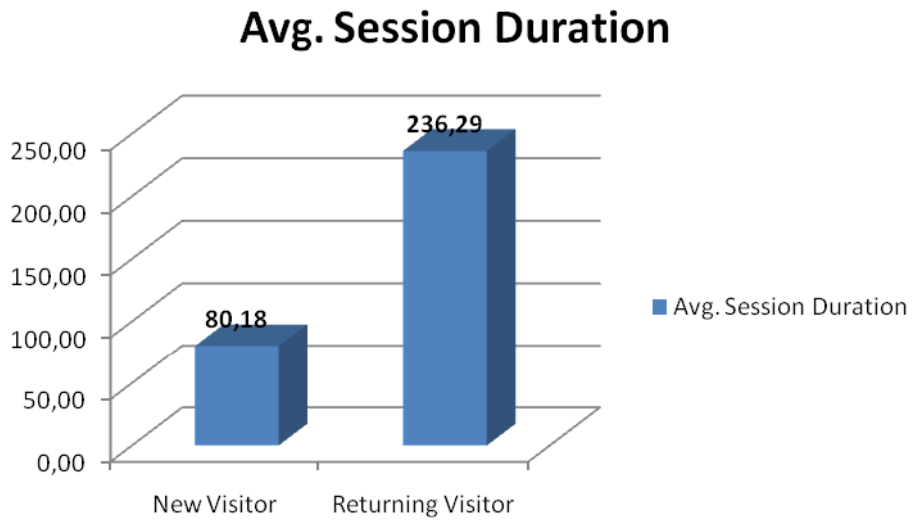
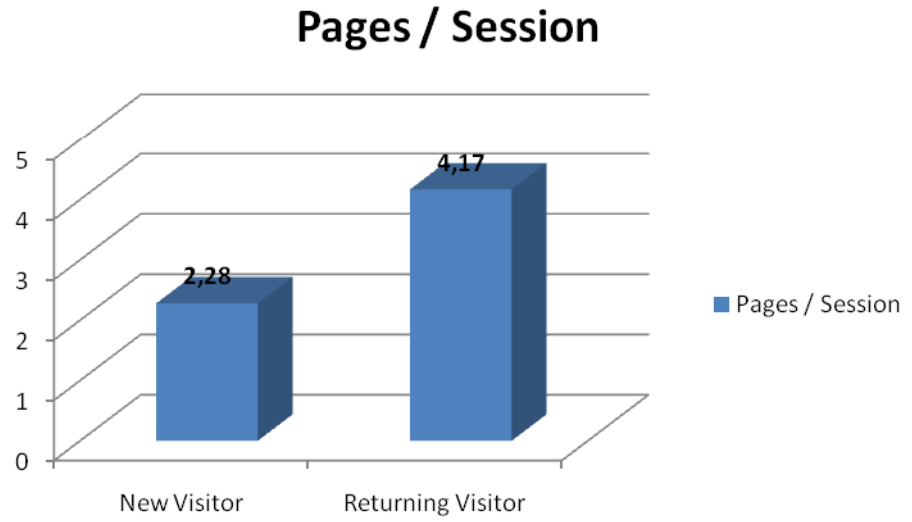


Figure 3-5 Pages visited for session for new visitors and returning visitors period November 1st 2014 - October 31st 2015



3.1.4 Usage by age and gender

The following figures show usage of the portal by age and gender.

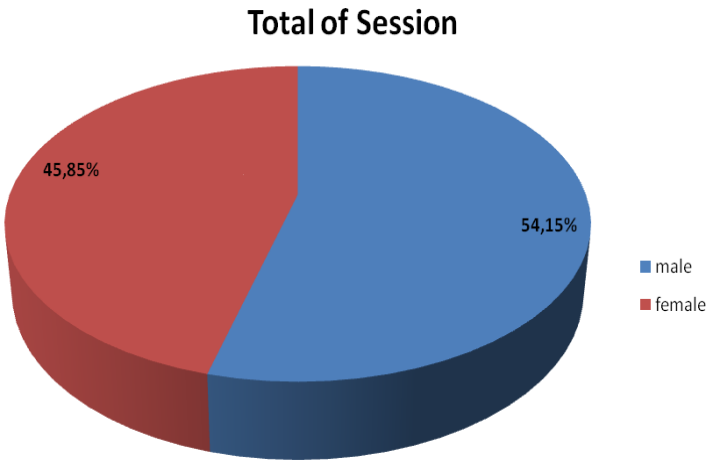


Figure 3-6 Percentage of sessions by gender.

As shown by the Figure 3-7 a balanced usage of the portal **newcom-project.eu** between males and females is found. The percentages of sessions by gender and by age during the second and the third year are the same.

We can see that the main interest about the portal **newcom-project.eu** is concentrated in the young people (18-24 years) and the next age group (25-34). A significant percentage of usage is reported also for the others two next age group (35-44), (45-54).

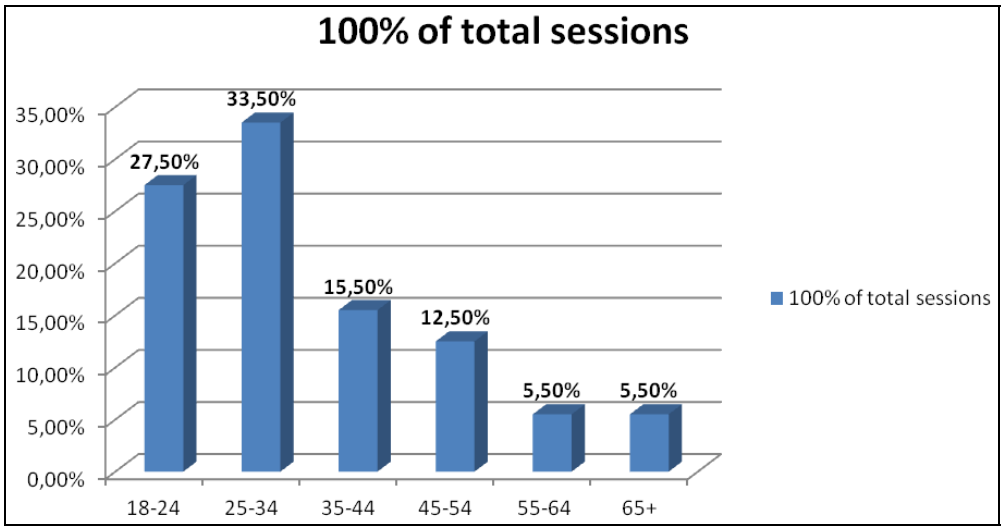


Figure 3-7 Percentage of sessions by age.

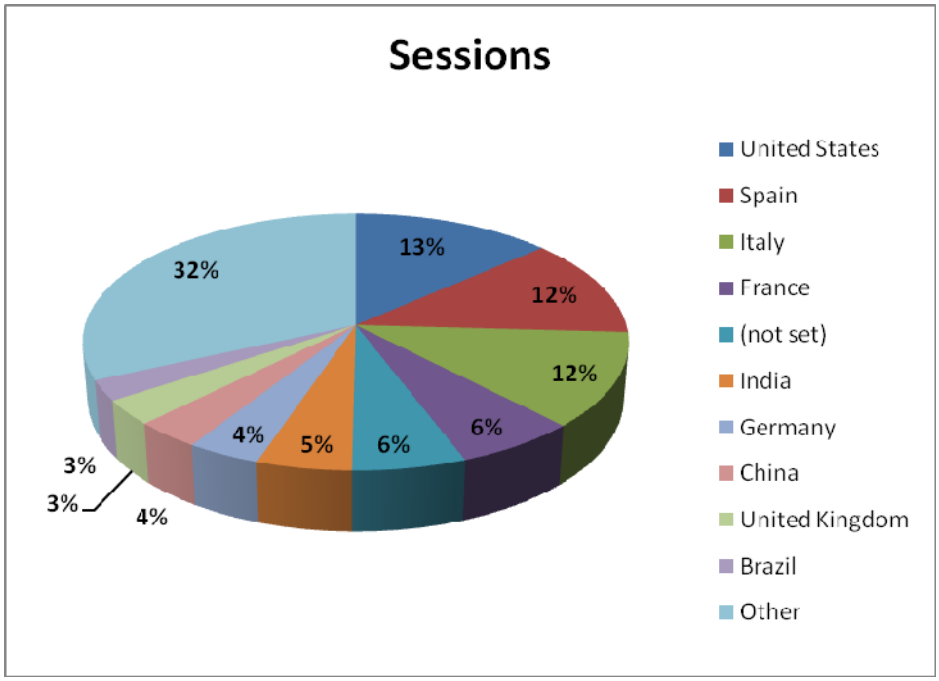
3.1.5 Usage by location

We can have an idea of the usage of the portal by location. In the next pages we can see usage by location for all countries and for the list of countries involved in the project.

Table 3-1 Number of sessions by country (all countries) November 1st 2014 - October 31st 2015

Country/ Tedrritory	Sessions
United States	1830
Spain	1690
Italy	1624
France	874
(not set)	810
India	678
Germany	525
China	470
United Kingdom	429
Brazil	351
Other	4324

Figure 3-8: Percentage of sessions by country (all countries) Nov. 1st 2014 – Oct. 31st 2015



Data of Tables 3-1 and Figures 3-8 confirm a relevant percentage of portal usage from the countries having partners of the project. At the same time data confirm also the interest from non EU-countries (China, India, United States) that in some case grew over the previous year.

The figure 3-9 shows almost the same percentages of last year. As expected, that in both year NoE countries that are more active on the portal are Italy, Spain and France, since their scientific communities are more involved in Newcom# .

Figure 3-9: Percentage of sessions by country (NoE countries) Nov. 1st 2014 – Oct. 31st 2015

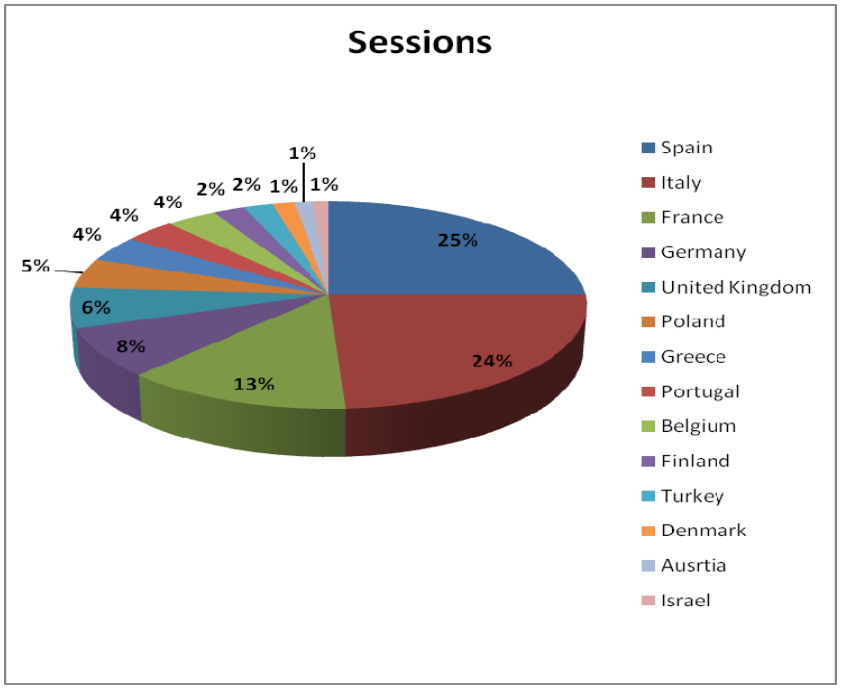


Figure 3-10: Percentage of new users by country (all countries) period November 1st 2014 - October 31st 2015

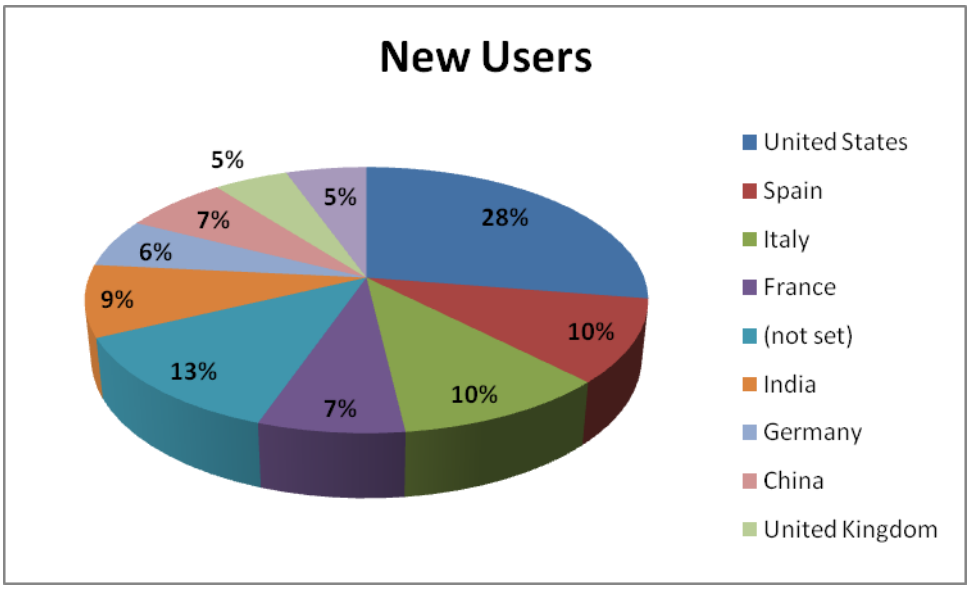


Figure 3-11: Percentage of new users by country (NoE countries) period November 1st 2014 - October 31st 2015

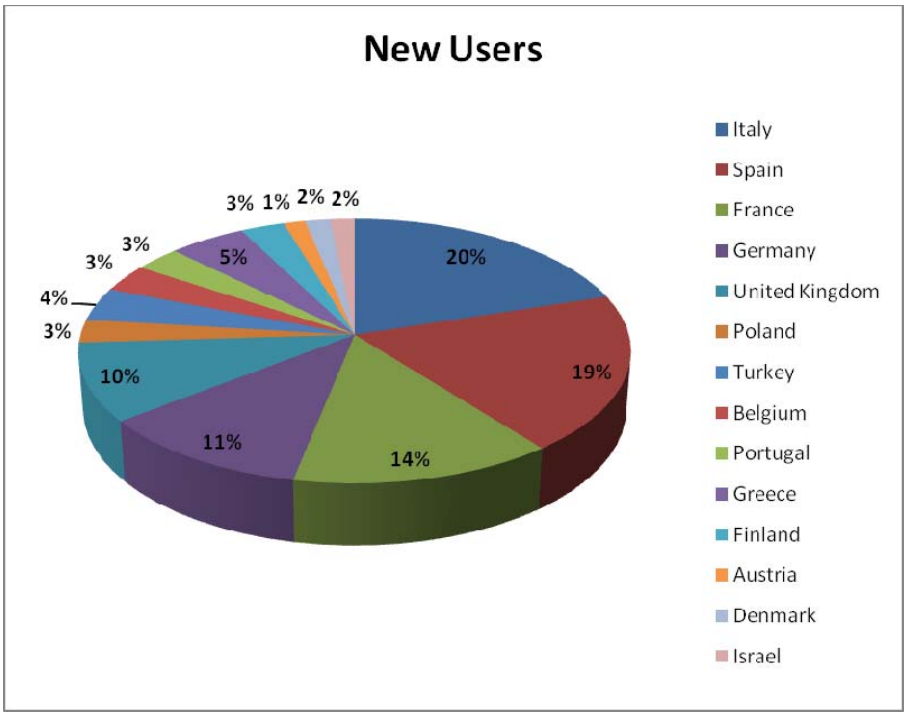


Figure 3-12: Average Session Duration (sec.) by country (all countries) period November 1st 2014 - October 31st 2015

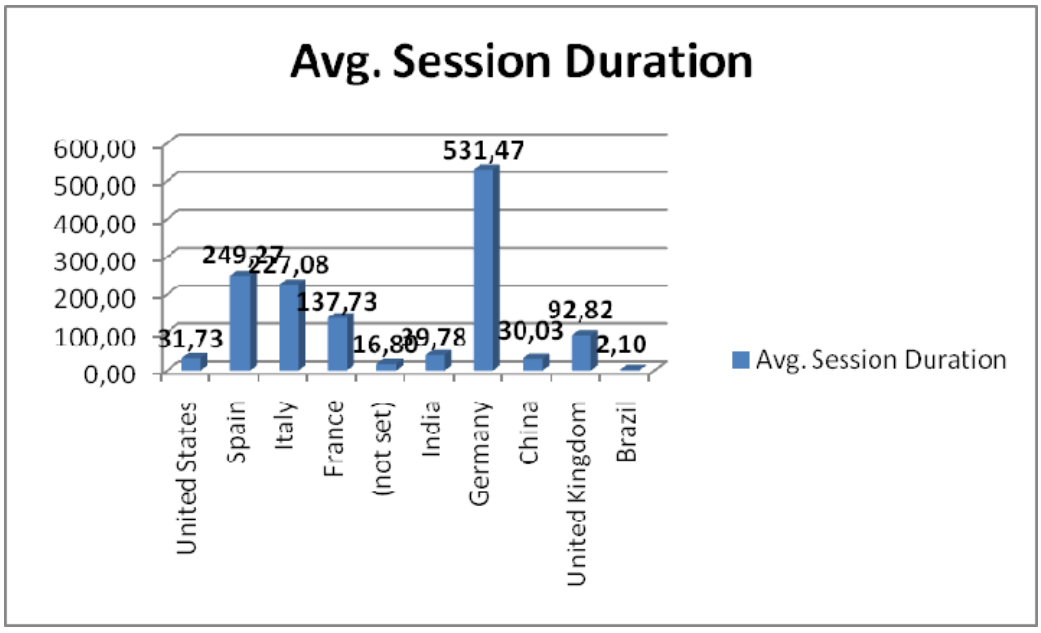
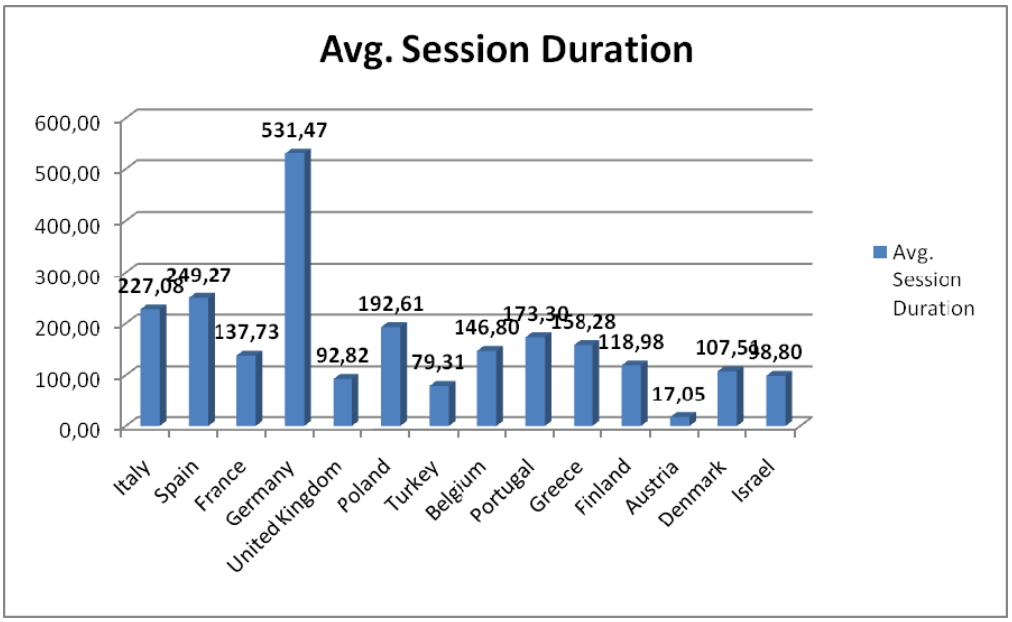


Figure 3-13: Average Session Duration (sec.) by country (NoE Countries) period November 1st 2014 - October 31st 2015



As expected, the average session duration data are higher in the NoE partners of the project.

3.1.6 Number of pages per visit

In Figure 3.14 we can see the average number of pages per visit by country. We can see that the average for the portal is larger for NoE countries (ex. Germany, Italy, Spain, Poland).

Figure 3-14 Pages visited per session by country (all countries) period November 1st 2014 - October 31st 2015

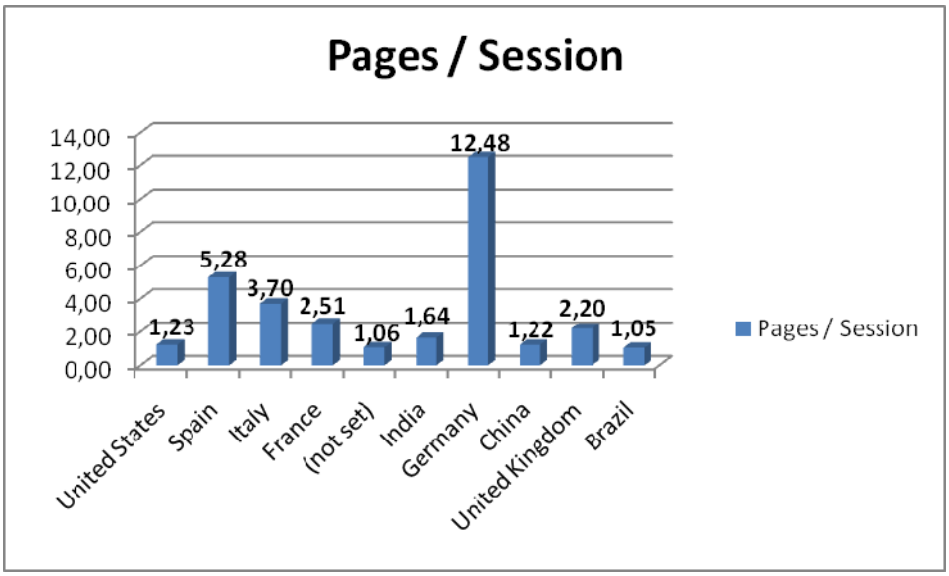
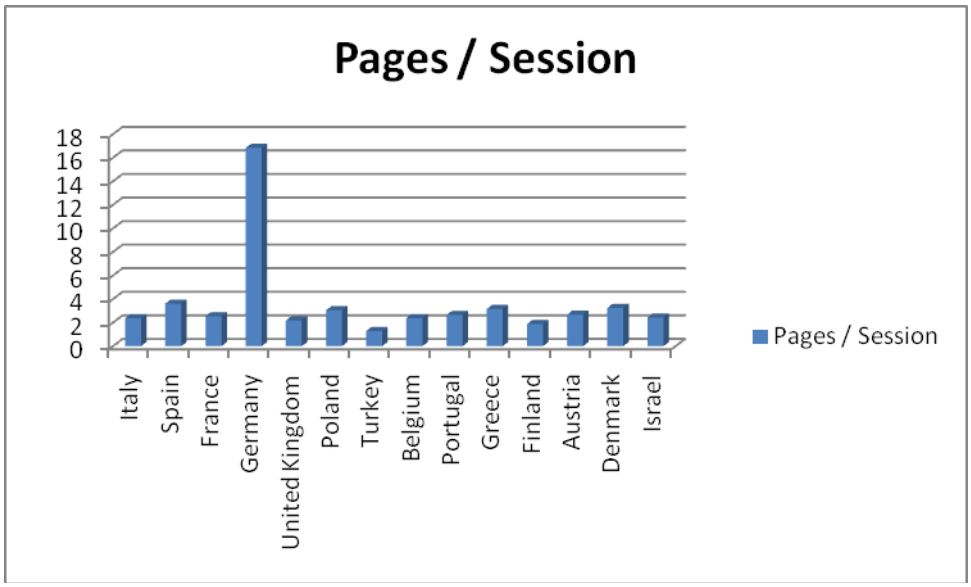


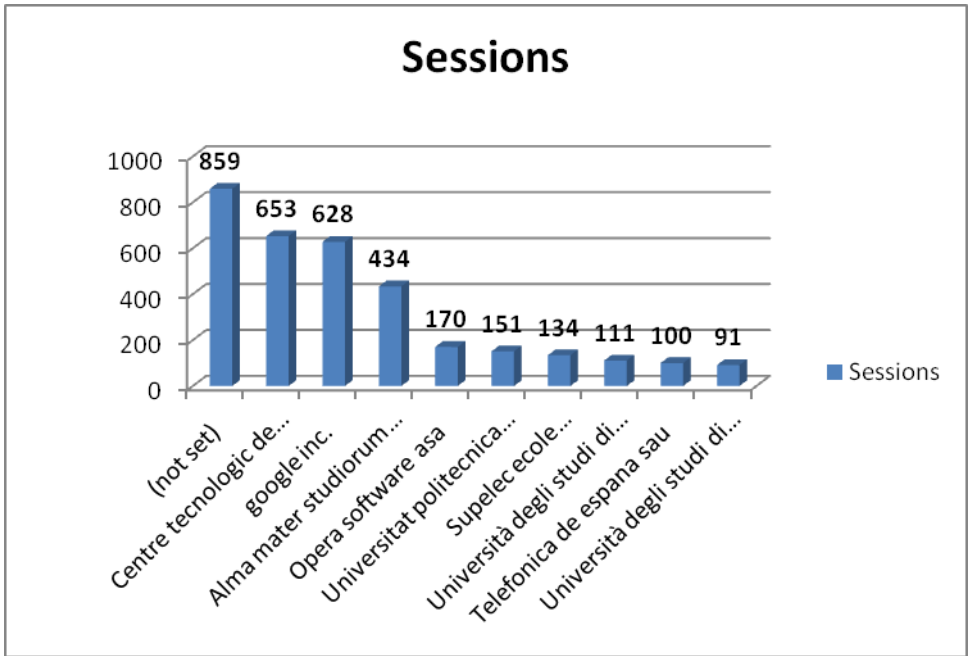
Figure 3-15 Pages visited per session by country (NoE Countries) period Oct 2014-Sep 2015



3.1.7 Usage by Partner

The following Figure shows the data related to the portal usage for NoE institutions.

Figure 3-16 Number of Sessions per NoE Institution.



3.2 Newsletters

As in the previous year, we have collected the visits of the newsletter section in Table 3.2 The month-by-month access information are gathered for the whole project duration in order to show high popularity of this part of this dissemination plan. As planned, every new issue of the N# newsletter was released in the quarter manner, and each one can be consulted either in the pdf or online (flipbook) version.

Let is note that the content of each newsletter if attached to this document in form of an annex (see Annex 3 for details). It is worth mentioning that the final release of the newsletter has been intentionally released after the final N# event in Barcelona (October/November 2015).
Let us also mention that the merged collection of all newsletter releases has been created in form of a N# logbook.

Table 3-2 – Newsletter downloads.

	Aug 2014	Sept 2014	Oct 2014	Nov 2014	Dec 2014	Jan 2015	Feb 2015	Mar 2015	Apr 2015	May 2015	Jun 2015	Jul 2015	Aug 2015	Sept 2015	TOTAL
Issue 1, Feb 2013															
pdf version	2	269	2	4	1	3	25	5	1	7	10	2	29	10	370
Online Version	22	27	32	23	15	25	24	22	21	28	21	23	37	32	352
Issue 2, Jun 2013															
pdf version	2	1	2	1	0	3	14	3	1	3	3	0	0	3	36
Online Version	22	25	27	18	17	24	23	21	19	24	21	28	38	34	341
Issue 3, Oct 2013															
pdf version	1	3	2	162	0	3	35	6	1	3	3	0	0	4	223
Online Version	23	24	29	17	19	24	21	22	20	28	26	26	38	34	351
Issue 4, Feb 2014															
pdf version	2	5	2	4	0	3	3	1	1	5	3	0	0	4	33
Online Version	25	24	26	19	17	21	27	20	19	27	29	29	38	35	356
Issue 5, May 2014															
pdf version	1	3	4	91	0	23	6	1	1	3	23	0	0	2	158
Online Version	28	43	38	36	18	23	27	21	19	28	23	30	39	35	408
Issue 6, Jul 2014															
pdf version	119	61	40	56	0	26	3	1	1	3	26	0	26	26	388
Online Version	23	37	31	14	20	24	24	23	19	27	20	24	37	35	358
Issue 7, Sep 2014															
pdf version		49	90	74	0	34	24	1	1	3	34	0	0	34	344
Online Version		2	28	21	17	22	25	21	21	29	23	25	37	34	305
Issue 8, Dec 2014															
pdf version					1	45	30	20	1	3	1	0	0	19	120
Online Version					9	28	29	26	28	23	21	28	42	35	269
Issue 9, Mar 2015															
pdf version								1	50	116	27	24	24	1	243
Online Version								20	27	27	23	31	45	32	205
Issue 10, May 2015															
pdf version										3	6	1	25	1	36
Online Version										3	25	26	37	29	120
Issue 11, Jul 2014															
pdf version												1	4	5	10
Online Version												0	0	0	0

3.3 LinkedIn

There is no activities in this section.

3.4 Mail Reflector

Table 3-3 shows the number of messages sent for the top-14 mailing list of the project month by month. Only the lists that had some activity are shown.

Table 3-3– Messages sent month by month for the project mailing lists.

	Aug 14	Sept 14	Oct 14	Nov 14	Dec 14	Jan 15	Feb 15	Mar 15	Apr 15	May 15	Jun 15	Jul 15	Aug 15	Sept 15	TOTAL
Admin_contacts	2	2	4	1	0	0	0	0	2	14	3	4	4	1	**37**
All_newcom	5	11	16	7	13	12	5	7	5	8	6	5	6	5	**111**
Executive_board	1	21	21	16	16	44	36	34	16	15	18	9	2	10	**259**
Project_office	17	92	174	278	133	150	154	61	20	137	69	58	19	43	**1405**
Positioning	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Sci_contacts	0	6	10	1	0	0	1	1	1	16	4	4	4	2	**50**
Newsletter	1	2	1	1	2	0	1	1	1	3	2	2	0	2	**19**
Wp11	0	1	0	0	0	5	1	0	2	0	1	1	0	1	**12**
Wp13	0	1	4	2	0	3	0	0	0	1	1	2	1	0	**15**
Wp21	0	1	3	1	1	5	0	1	1		2	3	1	1	**20**
Wp22	0	2	0	1	0	0	0	0	0	0	0	0	0	0	**3**
Wp23	0	1	1	1	0	0	0	0	0	0	0	0	0	0	**3**
Wp31	0	1	0	0	0	0	0	0	0	0	0	1	0	0	**2**
Wp35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Wpleaders	2	13	10	4	2	0	2	2	1	2	0	1	1	1	**41**

3.5 Scopia Desktop

Table 3-4 shows all the Web Conference meetings that took place, along with the date of the meeting, the subject and the duration.

Table 3-4: Web conference meetings for the NEWCOM# project

ID de reunión virtual	Tema	Hora de inicio	Duración
6000	Newcom# Management	GMT+01:00 18/09/2014 14:10	57 Minutes
6000	Newcom# Management	GMT+01:00 24/10/2014 08:16	295 Minutes
6000	Newcom# Management	GMT+01:00 06/11/2014 16:01	295 Minutes
6000	Newcom# Management	GMT+01:00 11/11/2014 12:03	40 Minutes
6000	Newcom# Management	GMT+01:00 19/11/2014 09:05	12 Minutes
6000	Newcom# Management	GMT+01:00 17/12/2014 14:59	57 Minutes
6000	Newcom# Management	GMT+01:00 13/01/2015 14:28	295 Minutes

Starting on Jan 2015, all virtual Project Office Meetings, EB meetings and General Assemblies were held via Webex.

4. Conclusions

This report shows how NEWCOM#'s web tools have been used by partners and researchers to promote the networking activities within the NoE itself and the 'rest of the world'.

While some tools have not received significant attention from researchers (e.g. the LinkedIn group), despite efforts made to emphasize their potentialities, others have been used extensively and have served the NoE in accomplishing it goals: for instance, the website and the newsletters were considered as successful instruments by the NEWCOM# researchers.

The last release of the Newsletter was delivered at the end of the project, and there is currently no commitment to keep delivering Newsletters after completion of the NoE. On the opposite, the website will be kept available. Moreover, the EuWIn website, which is part of it, will be maintained and updated in the future, owing to the intention of EuWIn to survive after the NoE's end.

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6. Annex 1

Main Headings

- **Hits**: represents the total number of requests made to the server during the given time period (month, day, hour etc..). Due to the pre-treatment of the logs, only hits to the articles on the portal are accounted. That's why the number of hits is nearly the same as that of the number of visited pages.

- **Files:** represent the total number of hits (requests) that actually resulted in something being sent back to the user. Not all hits will send data, such as 404-Not Found requests and requests for pages that are already in the browsers cache.

- **Sites:** is the number of unique IP addresses/hostnames that made requests to the server. Care should be taken when using this metric for anything other than that. Many users can appear to come from a single site, and they can also appear to come from many IP addresses so it should be used simply as a rough gauge as to the number of visitors to your server.

- **Visits:** occur when some remote site makes a request for a page on your server for the first time. As long as the same site keeps making requests within a given timeout period, they will all be considered part of the same Visit. If the site makes a request to your server, and the length of time since the last request is greater than the specified timeout period (default is 30 minutes), a new Visit is started and counted and the sequence repeats. Since only pages will trigger a visit, remote sites that link to graphic and other non- page URLs will not be counted in the visit totals, thereby reducing the number of false visits.

- **Pages:** are those URLs that would be considered the actual page being requested, and not all of the individual items that make it up (such as graphics and audio clips). Some people call this metric page views or page impressions, and defaults to any URL that has an extension of .htm, .html or .cgi.

- A **KByte** (KB) is 1024 bytes (1 Kilobyte). Used to show the amount of data that was transfered between the server and the remote machine, based on the data found in the server log.

Common Definitions

A **Site** is a remote machine that makes requests to your server, and is based on the remote machines IP Address/Hostname.

URL - Uniform Resource Locator. All requests made to a web server need to request something. A URL is that something, and represents an object somewhere on your server, that is accessible to the remote user, or results in an error (ie: 404 - Not found). URLs can be of any type (HTML, Audio, Graphics, etc...).

Countries are determined based on the top level domain of the requesting site. This is somewhat questionable however, as there is no longer strong enforcement of domains as there was in the past. A .COM domain may reside in the US, or somewhere else. An .IL domain may actually be in Isreal, however it may also be located in the US or elsewhere. The most common domains seen are .COM (US Commercial), .NET (Network), .ORG

(Non-profit Organisation) and .EDU (Educational). A large percentage may also be shown as Unresolved/Unknown, as a fairly large percentage of dialup and other customer access points do not resolve to a name and are left as an IP address.

Response Codes are defined as part of the HTTP/1.1 protocol. These codes are generated by the web server and indicate the completion status of each request made to it.

7. Annex 2

December 2014 Issue no 8

http://www.newcom-project.eu/

NEWCOM# - third year

It is a true pleasure to open this 8th issue of the NEWCOM# Newsletter.

As you probably realized through the volume of exchanged emails, NEWCOM# achieved its second year a few weeks ago. Now that all reports are duly written, allow me to come back to these first two years. As leader of WP3.1, I would specifically like **to review our promotion activities** in terms of interfacing with EC projets, organizing special sessions and workshops as well as our annual conference.

Since its beginning in 2012, NEWCOM# has organized no less than five workshops at various international conferences such as ISWCS, ICC, WCNC, and WiOpt. In parallel, four NEWCOM# special sessions were held at various conferences. It should be added that NEWCOM# also technically sponsored a major international conference (2013 IEEE International Symposium on Information Theory). **These are excellent achievements.** Furthermore, I am happy to say that more events are planned over our last year! Let me also remind you that if you are organizing a special session or a workshop, it is still time to do it under NEWCOM# umbrella: you only need to drop me an email!

As you might also know, NEWCOM# is involved in the Radio Access and Spectrum (RAS) cluster. RAS is a cluster activity comprising a portfolio of more than 20 research projects participating in the 7th Framework Program and investigating Radio Access and Spectrum aspects of future wireless networks. Within RAS, researchers from NEWCOM# contributed to a white paper as well as to the pre-FIA workshop on "**Radio Access and Spectrum Innovation for 5G**" (which was held in Athens in March 2014).

Last June, **our network held its annual conference in Bologna** (Italy) in conjunction with EuCNC 2014. The NEWCOM# annual conference consisted of two tutorials, one workshop, four technical sessions covering Tracks 1 and 2, an exhibition, an Advisory Board meeting, as well as our General Assembly meeting. Thanks to all participating researchers, this event was a true success, with lots of interesting discussions and hopefully new emerging collaborations. If you were not able to attend, now seems a good time to recall that all presentations, papers, etc. are available on our web portal.

In summary, I was really delighted to report in our first WP deliverable that NEWCOM# partners have so far put significant efforts in organizing various workshops and special sessions and shown a growing implication in RAS cluster activities. The much-attended annual event held in conjunction with EuCNC 2014 also illustrated the level of involvement and collaboration within our network. Let's make it even better in our third and final year!

Finally, I am ending this short foreword by wishing you all the very best for 2015, not only in your research, but also (and mostly) in your personal life!

Claude Oestges

To subscribe to the newsletter please go the Newcom# webpage website and follow the "Newsletter" link

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Fp7 Network of Excellence in Wireless COMmunications NEWCOM# (Grant agreement no. 318306)

INTER VIEWS

Newcom#

UNIVERSITÉ PARIS SUD

Name: Lila
Surname: Boukhatem
Title: Associate Professor
Affiliation:
University of Paris-Sud 11

1. Favorite areas of interest and research
Currently radio resource allocation, energy-efficiency in wireless networks, mobility management

2. What is the most promising research direction in the wireless communications area?
Context-aware communications to enable spatio-temporal optimizations.

3. Which innovation, according to you, influenced mostly the scientific world (but not only) in the last 10-20 years and which finished with "dead end"?
Mobile satellite systems and Intelligent agents paradigm.

4. What was your motivation to become the researcher?
Freedom of thought

5. N# is....
..an excellent opportunity to exchange ideas and initiate new research collaborations.

1. My favorite non-scientific book, musician and movie...
Book: "The plague" by Albert Camus, "The poor man's son" by Mouloud Feraoun.
Music: Ludwig Van Beethoven, and El Hachemi Gueroubi (Chaabi Music).
Movie: Grand Torino, Seven.

2. I like to spend my free-time / vacation in....
At home or a sunny sea-front whenever possible...

3. My favorite course (meal)...
Rechta, traditional Algerian meal

4. The character trait I really dislike....
Arrogance and hypocrisy

5. My best adage...
Eyes do not serve a blind brain.

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Fp7 Network of Excellence in Wireless COMmunications
NEWCOM# (Grant agreement no. 318306)

http://www.newcom-project.eu/

Newcom# INTER VIEWS

Name: Filippo
Surname: Giannetti
Title: Professor
Affiliation: CNIT/University of Pisa, Department of Information Engineering

cnit consorzio nazionale interuniversitario per le telecomunicazioni

UNIVERSITÀ DI PISA

1. Favorite areas of interest and research
Radio resource management; cross-layer optimization; signal processing algorithms for digital modems; software-defined radio architectures

2. What is the most promising research direction in the wireless communications area?
Heterogeneous multi-radio access technology and wideband air interfaces

3. Which innovation, according to you, influenced mostly the scientific world (but not only) in the last 10-20 years and which finished with "dead end"?
Code-Division Multiple-Access

4. What was your motivation to become the researcher?
Curiosity about the functioning of things, especially communication devices. Actually, as a child, I had a strong inclination to disassemble and to try modifying radios (... with mixed results, I must admit).

5. N# is....
The clear evidence that a broad community of friendly-cooperating European researchers is much more successful than a host of national research teams.

1. My favorite non-scientific book, musician and movie...
Book: *"I Robot" and the original "Foundation Trilogy", by Isaac Asimov.*
Musicians: *Kraftwerk, Franco Battiato*
Movie: *"Non ci resta che piangere (Nothing Left to Do But Cry)", starring Roberto Benigni and Massimo Troisi*

2. I like to spend my free-time / vacation in....
I like to spend my (very limited) free time in amateur radio activities (for those interested, my call sign is IW5DPW). When possible, I like to spend my vacations travelling across Europe, otherwise I spend them at the seaside in Tuscany

3. My favorite course (meal)...
Seafood.

4. The character trait I really dislike....
Egoism.

5. My best adage...
If there is no solution to the problem then don't waste time worrying about it. If there is a solution to the problem then don't waste time worrying about it." (Dalai Lama XIV)

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Scientific visits

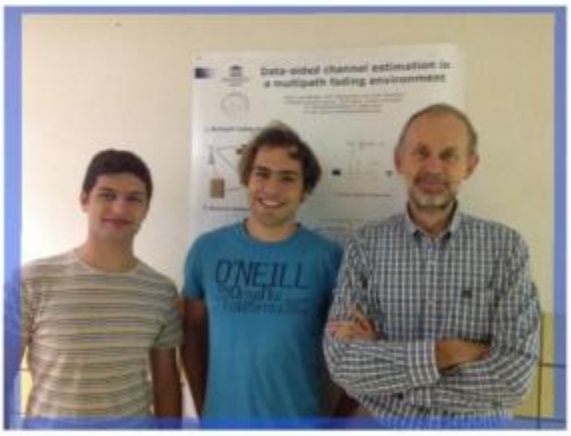
Paolo Del Fiorentino visited Ghent in July

by Filippo Giannetti

Paolo Del Fiorentino, a PhD student from CNIT – University of Pisa (CNIT-PI) under the supervision of profs. Filippo Giannetti and Vincenzo Lottici, was awarded by a NEWCOM# Mobility Grant. In July 2014 he spent the grant as a visiting researcher at TELIN department of the **University of Gent (UGent)** in Belgium where he worked with prof. Marc Moeneclaey and his PhD student Jeroen Van Hecke in the framework of the joint research activity (JRA) 1.3.3.D "resource allocation algorithms in cognitive radio networks with outdated CSI". The JRA deals with resource adaptation (RA) techniques for cognitive radio (CR) multicarrier systems.

During this period, the cooperation between CNIT-PI and UGent was strengthened and a new phase of the joint work was started, that exploits the results of preliminary cooperation activities carried out since the early stages of the JRA. In particular, a clear work plan for harmonizing and merging the scientific works carried out by CNIT-PI and UGent in this field was defined. A research activity was defined in the medium term that will entail further scientific visits to UGent during the next year. The most important results achieved during the visit are: development and testing of software simulators, investigation of novel and more efficient resource allocation algorithms for multicarrier systems. Moreover, this JRA produced two joint conference papers and another one is planned for submission to the forthcoming ICC 2015 conference.

Concerning his experience, Paolo says: "**This research visit at the University of Gent gave me a unique opportunity for a fruitful exchange of experience, ideas and knowledge**. Indeed, I had the opportunity to interact with people from everywhere in the world, thus having the feeling of belonging to a truly global scientific community. Finally, having closely worked with an experienced PhD student like Jeroen, I significantly increased my technical background. I also faced new, and very challenging, scientific problems, learnt new mathematical tools and understood how to employ many techniques to implement mathematical models on software platforms. Concluding, I am glad to say that the N# project is enabling the creation of living contacts between universities/research centers. Moreover, I would like to thank prof. Marc Moeneclaey and PhD Jeroen Van Hecke for their openness, scientific enthusiasm and personal commitment during my stay at the University of Gent.".



From left to right: P. Del Fiorentino, J. Van Hecke and M. Moeneclaey in the TELIN Lab. (Department of Telecommunications and Information Processing) at UGent

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Newcom# HOT Research Topics and Ideas

Hot Research Topics in Information Theory with Implications on Current and Future Communications Technology

by Shlomo Shamai
Electrical Engineering Department
Technion - Israel Institute of Technology, Haifa, ISRAEL

The exponential technological progress we experience in the recent decade, has a major impact on theoretical research in Information Theory (IT). The change of paradigms from 'how to do (implement)' modern communications systems to 'what to do' **made IT into a primary timely fundamental theoretical and PRACTICAL tool!** This is since IT addresses directly the problem of 'what to do' and even more, what is 'ultimately best to do'.

Here we point out shortly some central and timely directions in IT research (mentioning relevant overview references), which we trust will have direct impact on future communications systems, putting emphasis on wireless communications.

Interference Alignment [1]
Interference alignment and in particular robust interference alignment opens a way to new approaches to multi-terminal networks, where novel concepts in treating interference are introduced. Those do not reply on classical and by now standard time/frequency/spatial resources distribution among users, but introduce new concepts which might be useful (the robust approaches) in future wireless systems.

Cooperative Communications [2]
IT analysis and concepts point directly on the benefits of cooperation as far as reliable communications goes within a network. This is in particular of relevance in wireless and advanced generation of cellular networks, which are to provide with high reliability very fast data rates to a variety of users, accounting for time-varying channels. IT is able not only to address such scenarios, but actually to highlight advanced and promising approaches in this field.

Massive MIMO [3]
The concept of multi-input-multi-output (MIMO) systems which emerged from an IT view, is now classical not only as a theoretical tool, but widely appears in a variety of applications. While the demands for wireless reliable communications are steadily increasing, one of the possible beneficial strategies to meet these challenges is massive MIMO. By now, the wide-scope theoretic literature provides not only an IT view of the potential and limitations of this technology, but in fact, combining also theories in the related fields of communications and signal processing, establishes the elements of a new promising wireless technology.

Cloud Communications Systems [4]
Cloud computing is by now a classical concept. Cloud radio access networks, where radio units are connected via fronthaul links to a central cloud processor, is a timely idea of great interest. Here IT is not only an essential tool which addresses directly the penalty associated with finite rate fronthauls, but it provides also the directions of robust and efficient approaches to implement such systems. Distributed compression techniques, based on advanced IT concepts is a key to future technology in this domain.

Physical-layer Information-theoretic Security [5]
The wiretap channel, facilitating physical layer secret communications has been introduced in IT as a theoretical interesting model decades ago. Yet, the full understanding of physical layer secrecy demands in networks, as well as assessing the penalty in terms of rates suffered due to meeting such secrecy demands, calls for much further theoretical research. Such settings which account also for uncertainties in channel state information, as well as stealth features stands now in the focus of massive IT research. A mature theory in this domain is able to point ou advantages and disadvantages of considering physical layer secrecy demands in practical communications systems.

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HOT Research Topics and Ideas

IT Network Aspects [6], [7]

Network IT is a classical subject, though many fundamental problems in terms of optimal reliable rate regions are open for decades (as the capacity regions for general broadcast, interference and relay channels). Yet intensive IT research has provided so far, and will do even more so, not only new insights, but eventually fundamental ideas and elements of efficient network based communications. Some of the by now classical examples account for: Network coding (and noisy network coding), Cross-layer information theoretic design and information theoretic approaches in sparse communications and compressed sensing systems. IT arguments are central also in examining timely problems as caching, and efficient device-to-device communications strategies.

Inter-disciplinary Information Theoretic aspects: Statistical Physics, I-MMSE [8], [9], [10]

IT has demonstrated since its very introduction, its ability to impact in an interdisciplinary fashion. In fact, IT concepts and analysis enjoy the benefits of the interdisciplinary connections, and one of the timely examples is the intensive use of the replica method of statistical physics. The cross fertilization of IT and statistical physics is now evident, with almost daily contributions in this domain. Further classical connections, as relatively recent results that connect mutual information to estimation and Minimum Mean Square Error (MMSE) in the Gaussian regime, have been used in recent years to establish new results and gain insights into communications systems, with practical applications and implications. One such example accounts for the insights established for efficient coding over interference channels, invoking MMSE type of disturbance factors, supporting the Han-Kobayashi rate splitting based coding on one hand and interference alignment strategies for multiple user interference MIMO channels on the other.

To summarize, we trust that advanced IT concepts will impact the very notion of modern communications with emphasis on wireless communication and the way it is conceived. IT has the potential to fundamentally impact on conceptual understanding of communications networks, and the (close-to-optimal) way to combine classical communications and networking aspects in a unified framework. While seemingly IT is considered to be a mature field, we trust that most of the exciting and revolutionary theoretic view is at its infancy and yet to come. Unlike our (not that remote) past IT experience, where implementing relatively complex algorithms was the main hardship, now we lack basic, most demanded, theoretical results in network IT and related mathematical fields. This motivates massive IT research, which will evidently carry almost immediate practical values and implications.

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N# dissemination

Displaying NEWCOM# at 2014 Researchers' Night event in Pisa

by Filippo Giannetti

Prof. Filippo Giannetti (second from left) with some researchers of CNIT-Pisa at the booth

NEWCOM# promotional material to be distributed to the visitors

Since 2005, across Europe the fourth Friday of September is dedicated to the Researchers' Night, and this year it was celebrated on September 26th. On this occasion, Tuscany's regional government (in Italy) organized an event programme called BRIGHT 2014, to symbolise the 'bright light' that illuminates the darkness: the light produced by curiosity, tenacity, the will of human beings to understand the world, to push the boundaries of what you know a little further.

BRIGHT 2014 took place in the major university towns of Tuscany, i.e., Florence, Pisa, and Siena, and also in some smaller cities. It provided many different kinds of activities, designed to engage the entire audience curious to understand and interact with the research, including exhibitions, stands, "appetisers" and "science cafes", films and much more.

In the context of BRIGHT 2014, professor Filippo Giannetti and his team-mates of the research unit of CNIT-Pisa (Photo 1) attended a science expo event in Pisa with a booth (Photo 2) displaying educational kits, wireless sensor network (WSN) and software-defined radio (SDR) demonstrators, together with NEWCOM# promotional material (Photo 3) and scientific results (Photo 4).

Professor Giannetti and his team-mates had the opportunity to illustrate NEWCOM# activities and achievements to a large number of visitors, including many young students (Photo 5, Photo 6) that showed great interest and appreciation in discovering some of the "hot" trends towards the development of next future wireless communications.

A poster panel illustrating the NEWCOM# project and some scientific results of CNIT-Pisa

Demonstration of wireless communications at the booth of CNIT-Pisa

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Newsletter

March 2015 Issue no 9

http://www.newcom-project.eu/

Ready, steady, experiment!

... of course experimentation in Newcom# towards 5G!

I am pleased to open the 9th issue of the Newcom# newsletter, which comes, roughly, eight months before the end of the project and in the middle of a crucial moment for wireless communication research as I will try to argue in this editorial.

One of the most important events that took place since the issue of the 8th newsletter was the Newcom# Track 1 & 2 yearly meeting, which was held in Athens last January from the 21st to the 23rd. As expected, all attendees shared and discussed their latest results achieved in the context of the Joint Research Activities and it was a great opportunity to network among peers, which made the meeting a success. However, on this occasion, the yearly meeting also represented the cornerstone for the continutation of the "Newcom community" as we know it: the meeting programme included a panel workshop dedicated to the survivability of Newcom# after the end of the EC support. It is clear, thus, that we are facing a critical moment and that **it is paramount to keep the momentum to make the Newcom spirit last long.**

The importance of the present moment also extends beyond the scope of Newcom and Newcom#. In the wireless communication research arena, the focus is now set on 5G, around which a huge amount of questions remain to be solved. With respect to previous mobile network generations, the 5G network will need a much higher degree of flexibility and adaptability, to serve applications with extremely diversified requirements, whose viability is yet to be proven. Moreover, from the radio access network side, the envisaged massive use of small cells, with distributed or centralised coordination and control, the novel backhaul paradigms based on multi-hop links, the use of fragmented spectrum, together with spectrum efficiency requirements pose many challenges that will need to be addressed before 5G can become a reality. While theoretical research will be (of course) required to deal with all these challenges, it won't be until the proposed approaches and solutions are evaluated and validated experimentally that the true potential of 5G will be actually demonstrated and unleashed.

Consequently, in order to play a key role in the development of 5G, **Europe requires** the availability and use of **experimental platforms and facilities such as the ones provided by EuWIn** (arguably, one of the main assets for the Newcom community survivability). Accordingly, in addition to all the experimental activities per se performed within Track 2 and geared towards 5G, EuWIn has also recently prepared a submission for a Special Session in the upcoming European Conference on Networks and Communications (EuCNC) on the topic of European platforms and facilities for experimentation, both from the industry and academia.

I am thus confident that the Newcom# and EuWIn communities are ready to face the research challenges that lie ahead us. So let's keep up the good work and delve on the intricacies of 5G!

Miquel Payaro

To subscribe to the newsletter please go the Newcom# webpage website and follow the "Newsletter" link

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Fp7 Network of Excellence in Wireless COMmunications NEWCOM# (Grant agreement no. 318306)

QUESTIONNAIRE

N# Researchers - Qustionnaire Results

by Danilo Abrignani and Roberto Verdone

The questionnaire was tough to be submitted to young researchers within the NoE Newcom#.

The definition of "young researcher" we adopted was the follow: "PhD candidate or PhD till 4 years after the defence".

The Network of Excellence was a FP7 tool for cooperation that is not present anymore in the new EU program (H2020) and this NoE is approaching his end. The motivation behind this questionnaire was two folds:

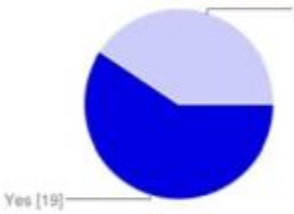
- The needs to find a way to pursuit the activities and collaborations beyond Newcom# is over.
- The will to include young researchers in the discussion, bring our/them prospective and vision
-

The questionnaire is structured as follows:

- Profiling the researcher: few questions where we tried profiling the young researcher in terms of experience, field of expert, research activities (Theoretical oriented, Experiment oriented or both)
- Research vision: in this part, we asked researcher them "position" with respect to experimental research and the future of the research (more market/experimental oriented or theoretical oriented/curiosity driven).
- Inclination to collaboration: mainly information above the collaboration, i.e. number of JRAs, number of partners per JRA, if and how carry on the JRA after NoE end
- How to go further: some open suggestion on what researcher will miss and what they had missing more in Newcom#, suggestion and hypothesis on how to go further.

We received 31 questionnaire submissions.

Profiling the researcher:
The average research age of N# Young Researchers is 6.5 years. Out of 31 questionnaires submitted 19 are from PhD Student. Statics are shown in the follow.

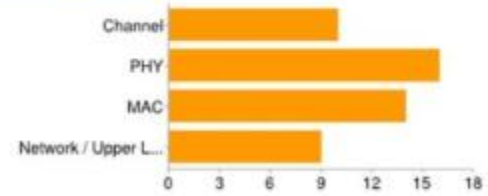


Are you currently a PhD Student?

Yes	19	59%
No	13	41%

Field of Expertise:

Channel	10	31%
PHY	16	50%
MAC	14	44%
Network / Upper Layer	9	28%



Are you more interested in

Theoretical Research (Mathematical Modelling / Simulations)	23	72%
Experimental Research (Lab Facilities /Test beds)	16	50%

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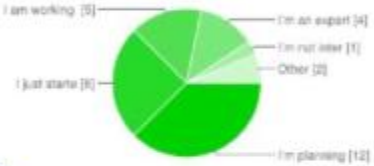
QUESTIONNAIRE

H2020, with respect to FP7, is pushing forward Innovation as a key element that should be reflected in all projects; in other words, project results are more oriented to the short term than in the past; with respect to this, which of the following sentences is more representing you:

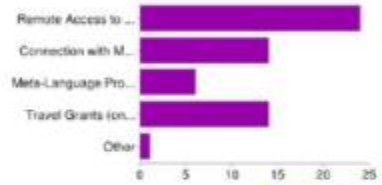
I like the idea that research should be closer to the market	8	25%
Research should find a compromise between market needs and long term visions	19	59%
I believe research should be only curiosity driven	5	16%
Other	0	0%

In Scientific Literature the use of the keyword "Experimental" is increasing at least by 30-40% on a yearly base; with respect to the last statement, which of the follow sentences is more representing you:

I'm planning to work on / I want to be an experimental research expert	12	38%
I just started (since 1-2 Years)	8	25%
I am working on (since 3-4 Years)	5	16%
I'm an expert of / I am leading experimental activities	4	13%
I'm not interested at all	1	3%
Other	2	6%



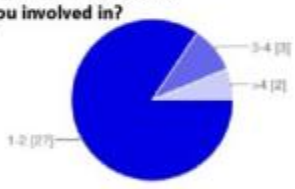
Which of the following features would increase your interest on experimental activities (you can choose more than one):



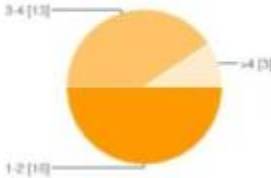
Remote Access to the experimental facilities	24	75%
Connection with Matlab/Octave	14	44%
Meta-Language Programming feature (Block Programming like Simulink)	6	19%
Travel Grants (on-site activities)	14	44%
Other	1	3%

Within the work programme of Newcom#, how many JRAs are you involved in?

1-2	27	84%
3-4	3	9%
>4	2	6%



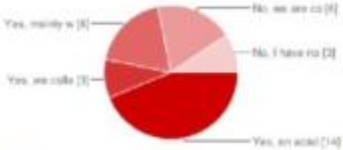
How many partners are involved in your JRA?



1-2	16	50%
3-4	13	41%
>4	3	9%

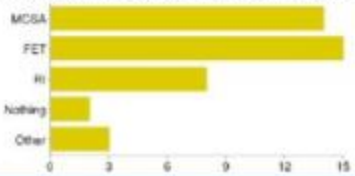
Are you planning to carry on the collaborations set through your JRA after Newcom# is over?

Yes, on academia /industry funds	14	44%
Yes, we collaborate because of other EC projects	3	9%
Yes, mainly with virtual meetings	6	19%
No, we are concluding our collaboration	6	19%
No, I have not been involved in any JRA	3	9%



H2020 promotes three main action programmes for fundamental research: Marie Skłodowska-Curie Action (MSCA), FETs and Research Infrastructures (RI); in your opinion, the Newcom# future will relief on:

MCSA	14	44%
FET	15	47%
RI	8	25%
Nothing	2	6%
Other	3	9%



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INTER VIEWS

Newcom#

TECHNISCHE UNIVERSITÄT DRESDEN

Name: Gerhard P.
Surname: Fettweis
Title: Professor
Affiliation: TU Dresden

1. Favorite areas of interest and research

Impacting the future of wireless communications by signal processing algorithm design, and silicon implementation.

2. What is the most promising research direction in the wireless communications area?

Anything, which enables the Tactile Internet, i.e. upgrading today's wireless infrastructure into a ubiquitous "remote control" such that we can steer and control any real/virual object..

3. Which innovation, according to you, influenced mostly the scientific world (but not only) in the last 10-20 years and which finished with "dead end"?

Silicon integration innovation together with MIMO clearly opened up the largest boost for innovation in wireless transmission, and interference alignment turned out to be impossible to implement (under normal conditions)..

4. What was your motivation to become the researcher?

For me, endeavoring in creativity is the most interesting activity; and, trying to see if ideas can be brought "to market". Hence, next to research I have focused on starting companies to make innovation happen.

5. N# is....

...a great network of true leaders in the research community which are role models far beyond the N# network itself.

1. My favorite non-scientific book, musician and movie...

Musician: Beethoven – what a genius!
Movie: Walt Disney's Jungle Book. A true statement that everyone of us must be a source happiness

2. I like to spend my free-time / vacation in....

Enjoying my family, and inviting friends for dinner and parties.

3. My favorite course (meal)...

something new, every day. I love eating (and cooking)!

4. The character trait I really dislike....

Hurting others for achieving an egoistic advantage

5. My best adage...

Smile – and the world smiles with you. Cry – and you cry alone..

TU Dresden, Germany

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Newcom# INTER VIEWS

Name: Ana
Surname: Perez-Neira
Title: Full Professor
Affiliation: Universitat Politècnica de Catalunya

UPC

1. Favorite areas of interest and research
Multi-antenna PHY-MAC cross-layer design and Satellite communications

2. What is the most promising research direction in the wireless communications area?
Its convergence with optical communications

3. Which innovation, according to you, influenced mostly the scientific world (but not only) in the last 10-20 years and which finished with "dead end"?
I am not quite sure if I have understood this question right, an innovation with dead-end was maybe the Concorde plane. Another one is the video-phone. If, in addition, it has to influence the scientific world, maybe WAR?

4. What was your motivation to become the researcher?
Learning and create

5. N# is....
...a community of researchers that enjoy working and progressing together

1. My favorite non-scientific book, musician and movie...
Book: *"Crónica de una muerte anunciada" by Gabriel García Márquez*
One of my favourite musicians: *Vivaldi*
Film: *"House of Flying Daggers" (Shi mian mai fu) directed by Zhang Yimou*
Two film directors: *Quentin Tarantino and Ingmar Bergman*

2.I like to spend my free-time / vacation in....
Greek Islands

3. My favorite course (meal)...
I love ice-creams...and if this is not a valid answer, then I would answer Paella.

4. The character trait I really dislike....
Selfishness

5. My best adage...
"Wahrlich es ist nicht das Wissen, sondern das Lernen, nicht das Besitzen, sondern das Erwerben, nicht das Da-Seyn, sondern das Hinkommen, was den grössten Genuss gewährt"
"No es el conocimiento, sino el acto de aprendizaje, y no la posesión, sino el acto de llegar allí, que concede el mayor disfrute."
"It is not knowledge, but the act of learning, not possession but the act of getting there, which grants the greatest enjoyment"
by Johann Carl Friedrich Gauss

UPC, Spain

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N#ews

Mobility Grants
by Danilo Abrignani

I am glad to announce the opening of the call for third year Newcom# mobility grants.

The aim is to facilitate the development of personal skills and the growth of professional competence in research. There will be provided maximum of 6 grants this year for young researchers who wish to spend at least 1 month on scientific visit. **Each grant amounts to 2000 EUR.**
It is worth mentioning that the call is open not only to researchers from Newcom# or associated partners, but also to external institutions.
All details, guidelines, and the application form can be found on Newcom web site.

Filled application forms, with the applicant CV attached, should be sent to the project office before 30th March 2015 (project_office@newcom-project.eu).

I hope many of the NEWCOM# researchers will participate in this innitiative. Such visits will provide a great opportunity to boost research activities in the third year of Newcom# project.

LINK TO MOBILITY GRANT

GENERAL ASPECTS	
Purpose	The aim of the mobility grants is to enhance face to face cooperative research and to promote exchanges of researchers among different institutions.
Participants	Young researchers (typically early stage researchers) preferably from N# beneficiaries or associate partners, not excluding external institutions.
Duration	The duration of the research stay is not fixed, as long as it is within NEWCOM# duration. Priority will be given to stays with a duration of 1 month or above.
Budget	The total budget allocated for each grant is € 2.000,00.
Number of grants	The maximum number of grants to be issued in the third year is six.
Claim and Proof	The grant will be directly paid to the winner by the coordinator CNIT. Within 60 days from the end of the stay the researcher will send to the project Office a short activity report as well as a certification by the hosting institution with starting and ending date of the stay.
EVALUATION OF PROPOSALS	
Criteria	• Relevance to the objectives of NEWCOM# (links to WPs). • Feasibility and clarity of the objectives. • Integration: o added value to already existing liaisons; o new collaborations; o "Cross-fertilization" (The person who moves should have complementary knowledge with respect to the one of the hosting institution in any case helpful for the research) • Quality of applicant's CV; • Proposals coming from N# Institutions will be favored • Proposals showing inter-track (Track1-2) collaboration will be favored • Preference will go to female researchers *ceteris paribus*.
Procedure	Each project will be evaluated by the Mobility Panel to be appointed by the Executive Board. In case of conflicts of interest, the corresponding member(s) of the Panel will be replaced by a person chosen by the Executive Board.
Supporting Documentation	Application Form and Applicant's CV

SCHEDULE

- Proposal Submission: 28th February 2015
- Application Deadline: 30th March 2015
- Decision Notification: 10th June 2015.

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NEWCOM# VISION

My vision or dream for 5G

by Marco Luise
University of Pisa, ITALY

vi·sion *noun* \'vi-zhən\

: the ability to see : sight or eyesight

: something that you imagine : a picture that you see in your mind

: something that you see or dream especially as part of a religious or supernatural experience

As you can see above, the online Merriam-Webster English dictionary offers three principal meanings for the word vision. Adrian asked me to write something about the NEWCOM# vision in this issue of then newsletter, and here I am. **But, what is the "vision" that he had in mind for me to write about?** Not certainly i) – everybody is supposed to possess it. Perhaps it's something in between ii) and iii): a picture that I have in my mind, and something that, although vivid and clear, is actually at the moment a dream. Definitely not coming out of a supernatural experience, neither anything to do with magic or transcendence. Rather, something very tangible that will come out of science and technology: **my vision of the ubiquitous wireless communication network of the 5th generation, the "notorious" 5G.**

It is correct calling this picture a vision, because at the moment nobody actually knows for sure what 5G is going to be – the huge European research effort on the subject in H2020 has just started. Nonetheless, I bet every NEWCOM# researcher has her or his own vision of 5G, when it comes to the specific technologies that in the long run will be essential part of it. I'm no exception, so I will take this challenge and try to spell my own out.

Speaking of vision, another word comes to my mind: visionary, a person that sees beyond things, knows where the future is going before others do, and in many instances contributes to the shaping of the future as he or she sees it (**like Marconi, Gates, Jobs**). You have probably to be born visionary, and I was not, so please don't ask me to pretend I am. Still, since I'm supposed to bring my own vision, this time I will try to go beyond current technology and possibly beyond current sight, imagining to create one further layer up in the OSI stack,. beyond "Application", to depict the "5G that I dream of".

What's this 8th OSI layer? Let's call it the layer of "Benefit": I want to have a benefit of a certain kind that needs communication, so I call an application with a certain presentation that opens a session bla bla bla… it's consistent with our stacked vision of things, I just need to specify what the benefit is. If a make it, then the vision of 5G will be consequential. Especially, the adoption of a certain set of technologies rather than another will be highly motivated just by the needs of this further 8th layer.

If I enquire our NEWCOM# researchers, they will say that there is already a corpus of technologies that at the moment we may qualify as "definitely 5G", let me name a few: small cells, millimeter wave, massive MIMO, cooperation. They're all technologies, ça va sans dire, well within the expertise and grip of NEWCOM#. I would even say that, well, in many of our JRAs we're already beyond those, and we might already rightfully self-qualify as B5G (you know what it means), but I wouldn't want to be appear too self-assured. As always happens with the leap from one generation of wireless networks to the next, probably the main justifications of such technologies is: let's make next-generation faster than the previous one – and this is especially the motiv for going towards ultra-wide-band mm waves and high-Shannon-capacity MMIMO. But, is this really the main part of my own vision? Perhaps not so much, or at least not completely.

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NEWCOM# VISION

My vision or dream if you wish, for 5G is more centered on the other already-5G technologies that I mentioned: small-cells and cooperation. I actually dream of a wireless network with i) real ubiquitous access, ii) so robust that it offers a user experience on a par with wired connections, and where capacity is so easily available that, well, iii) a basic digital access is granted to everybody and is for free: especially the third feature is something that definitely lies into my own 8th OSI layer. And when I speak of capacity, I don't mean the 100Mbit/s or 1Gb/s on a smartphone I frankly at the moment don't exactly know what to do with – rather, I envisage smooth, ever-available, free, and robust 10Mb/s with which you can do pretty much anything you'd need when in mobility.

I suspect that my vision, if and when coming true, is going be more the result of (leaner) small-cells and cooperation technologies than of (bigger) MMIMO and mm waves. If I push the vision to its extreme, think of a fully cooperative 5G network that, at least in densely populated areas, operates on a pure peer-to-peer cooperative basis without the need of any infrastructure, and that grants that kind of robust and "basic" free access to everybody that I mentioned above: this is not only the communication engineer's dream, but, well, the mobile subscriber dream as well –a real quantum leap.

Can we call this **the NEWCOM# vision or the NEWCOM# dream**? Is my vision realistic of a piece of science fiction? Do we master the technologies behind it? Rhetoric questions, we already know the answers to all of them. It is true that there are a lot of implications behind this vision, not only technical, but also social as well as economical – this is a consequence of my trespassing into the 8th layer. But, to come back to more familiar domains, I also see the possibility to make the vision come true via another key technology of 5G everybody is speaking about these days: software-defined networking.

With SDN, you create your own customized 5G sub-network that suits your needs and has exactly the features you want to have: you want it wideband and multicasting, or perhaps peer-to-peer and zero delay, you will get it. You will have at the tip of your fingers a number of APIs that you can use to configure the inherent resources of the network according to the "profile" that you wish to implement – you need of course the underlying technology to be able to "compile" your network and make it work after debugging. So, we have our vision now, let' start preparing our "makefile" for the future.

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ASSOCIATE PARTNERS

AtlantTIC

Universidad de Vigo

Atlantic Research Center for Information and Communication Technologies

AtlantTIC is a research center promoted by the University of Vigo (Spain) composed by 11 research groups from the Engineering School of Telecommunications. The experience of its researchers covers a wide range of scientific areas in the field of telecommunication.
The center has participated in hundreds of contracts with companies and national and European R&D projects. This allows a fruitful combination of scientific excellence and capacity for technology transfer to the industry. AtlantTIC researchers also coordinate diverse postgraduate programs, which offer a competitive international environment for the training of new scientists.

Francisco Javier González-Castaño
Professor

Juan Carlos Burguillo
Associate Professor
Agent technology

Cristina López-Bravo
Associate Professor
Next generation Wireless networks, Intelligent networks

Felipe Gil-Castiñeira
Associate Professor
Next generation wireless networks, Intelligent networks

GTI

Information Technologies Group

The main research lines of the group are: next generation wireless networks, intelligent networks, multimedia systems, agent technology, advanced user interfaces and data analytics.

GTI has taken part in diverse relevant European projects, such as "BEInGRID: Business Experiments in Grid", "BONE: Building the Future Optical Network in Europe", "SatNex II: Satellite Communications Network of Excellence", and "NEWCOM: Network of Excellence in Wireless Communications" as associate partner.

Besides, the group has participated in many regional and national projects, such as the "Tactica" subproject on 5G Networks, and project "Characterization, evaluation, planning and improvements of the key technologies for Future Internet (CALM)", both funded by the Spanish Ministry of Economy.

The current focus of our research in 5G networks is related to the following areas: mmWave networks, multi-hop cooperative schemes, cognitive networks, multi-technology networks, business models for multi-operator negotiation and mobile services in Smart Cities. Our most relevant results in the previous fields can be found in [1]-[5].

GTI works in close cooperation with other research groups in AtlantTIC. As result of this cooperation, the following references are relevant for the research ins 5G networks: Full-Duplex relays and MIMO systems [6], satellite channel for future 5G working frequencies [7], cognitive radio [8], precoding for mmWave MIMO systems [9], mmWave channel modelling and measurement [10].

Finally, we would like to emphasize the international cooperation with leading institutions such as Polytechnic Institute of New York University and University of Texas at Austin on mmWave networks and Virginia Tech on business models for network access.

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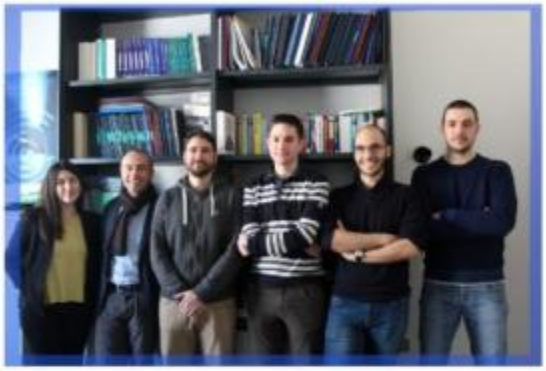
ASSOCIATE PARTNERS

SPADiC

The Department of Information Engineering of the University of Parma, Parma, Italy, was founded in 1990 to promote research and university education in the fields of Computer science, Control systems, Microelectronics, and Telecommunications. The staff includes 45 people (85% research — 15% administrative staff). There are also about 40 PhD students and Research Fellows.
The Department is composed of different research groups covering all the areas of the Information Technology. Among them, the Signal Processing for Advanced Digital Communications (SPADiC) laboratory is a leading research group in the digital communications field. It is coordinated by Prof. G. Colavolpe, and includes one Researcher (Dr. Tommaso Foggi), one postdoc Research Fellow (Dr. Amina Piemontese), and three PhD Students (Alessandro Ugolini, Michelangelo Ricciulli and Yuri Zanettini).



From left to right: A. Piemontese, G. Colavolpe, T. Foggi, A. Ugolini, M. Ricciulli, and Y. Zanettini

The research activity of SPADiC laboratory spans a wide range of subjects in the area of digital transmission systems: it has been historically focused on synchronization and detection theory, but it has also expanded towards coding and information theory. The principal research topics can be summarized as follows:

- Adaptive demodulation and decoding techniques for channels with unknown parameters (phase and frequency uncertainty, fading, Doppler shift)
- Graph-based iterative detection and decoding techniques
- Design of spectrally- and energy-efficient nonlinear modulation formats based on information theory concepts
- Electronic processing for high-speed optical communication systems
- Multiple-antenna transmission systems and space-time codes

The SPADiC group has a very large number of academic and industrial connections and collaborators, making it a very dynamic and inspiring research climate. It has extensive publications and an outstanding track record of funded projects, patents and international collaborations. The current research projects focus on:

- Wideband satellite communication systems (DVB-S2X, DVB-RCS2, High-throughput satellite links for Earth observation)
- Satellite navigation systems (GPS, Galileo)
- High-speed optical communication systems
- Wireless communications for 5G systems

A complete list of publications and a brief description of the funded research projects can be found on the SPADiC Official page http://www.tlc.unipr.it/spadiclab/

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Newcom# NEWCOM# meeting

And the saga will end in Barcelona

by Carles Antón-Haro
CTTC,SPAIN

FINAL NEWCOM# EVENT IN BARCELONA
14-15 October 2015 - Save the date!!

It seems like it was yesterday when we met in Pisa for the kick-off meeting...but more than two years have elapsed since then!!!

Not that the project is over yet, but time has come to start planning for its final event. The coordinates? Barcelona, Hotel Plaza, October 14-15, 2015. So, please, save the date!!! As you might already know, this is going to be a joint event with COST Action IC1004 to maximize cross-fertilization between the two communities. This, by the way, has some parallels with the final event of NEWCOM++, which was a joint one too, with COST Action 2100 in that occasion.

The plan is to put together a technical program including plenary sessions (with e.g., invited talks from Advisory Board members or industry representatives), oral and poster sessions to disseminate joint research work, demos to showcase EUWIN results, etc. Of course, there will also be a social program with a Gala Dinner, NEWCOM# awards, etc.

So for the time being, please, save the date: 14-15 October 2015....and stay tuned!!!

Carles

Newsletter

May 2015 — Issue no 10

http://www.newcom-project.eu/

Beyond EuWIn: Integrated Experimental Platforms

Welcome to the tenth Newsletter of NEWCOM#.

We are entering the last 6 months of NEWCOM# life and it is time to draw some considerations about EuWIn and its future.

EuWIn platforms at CTTC, CNIT-BO and EURECOM premises became fully operative during the second year of NEWCOM# and are now hosting several joint experimental research activities. Some of these activities have an inter-Track characteristic with the objective to validate theoretical results from Track 1. Needless to say that EuWIn has represented a fundamental experience for researchers working within and outside NEWCOM# giving them the **opportunity to get close to the "real world"**.

Within EuWIn a particular effort has been devoted to demonstration activities, workshops, and to the organization of training schools dedicated to experimental research. In order to foster industry-academia cooperation, in-company dissemination events to report on lab activities and results carried out at EuWIn have been organized. Starting from this dissemination campaign, some collaborations with companies willing to exploit the capabilities of the EuWIn platform for experimental research have been established. The experience accumulated so far has demonstrated the importance of experimentation in a virtuous cycle with theoretical investigations.

Looking ahead, while the rush for 5G has started, the research activity related to the Internet of Things (IoT) paradigm, social and context-aware networks based on positioning has reached its maturity and engineers are wondering how/if to integrate it in next generation mobile systems.

Probably 5G will include by-design some capabilities today provided separately by different technologies like Zigbee, wireless sensor networks, and ultra-wideband. In such a case, theoretical investigations and experimental activities on these topics are expected to be more and more interlaced and hence they cannot be addressed separately.

As a consequence the availability of experimental platforms offering facilities covering and integrating heterogeneous technologies becomes fundamental to validate 5G performance expectations as well as for the training of young researchers with adequate skills.

In this perspective, **the EuWIn distributed laboratories represent a significant example that should be capitalized beyond the end of NEWCOM#.** But that is another story still to be written.....

Davide Dardari

To subscribe to the newsletter please go the Newcom# webpage website and follow the "Newsletter" link

Contact to the editor: akliks@et.put.poznan.pl

Fp7 Network of Excellence in Wireless COMmunications NEWCOM# (Grant agreement no. 318306)

HOT Research Topics

A Perspective on Virtual Radio Access Networks

by Sina Khatibi, INOV, Portugal

The goal in the virtualisation of radio resources is to serve multiple Virtual Network Operators (VNOs) over the same physical infrastructure, while offering isolation and flexibility in addition to network element abstraction and multi-RAT (Radio Access Technology) support. Instead of splitting the available radio resources among VNOs, they are aggregated and jointly manage by a higher level entity. VNOs request wireless capacity from a set of physical network providers to serve their subscribers, thus, not having to deal with the physical infrastructure, but rather only with the required capacity. This approach offers pay-as-you-go Connectivity-as-a-Service to VNOs, while enabling new business models for network operators and infrastructure providers. As illustrated in Fig. 1, the key concept of Virtual RAN (VRAN) corresponds to the one of Virtual Machines (VMs) in computing. In RAN virtualisation, in contrast to RAN sharing, the physical infrastructure is not transparent to the clients. By means of isolation, services with different protocols, algorithms, and requirements for quality of service can be offered over the same physical infrastructure.

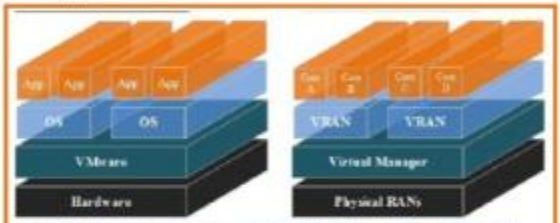

Fig. 1. Comparison between Virtual Machine and Virtual RAN.

In [2, 5], a new model for the management of virtual radio resources is proposed. The model has two main parts: estimating and allocating radio resources. By means of this model, support of different types of SLAs and contracts is possible. The extension of the model to operate in resource shortage situation is presented in [6]. In the same paper, the effect of temporarily changing C-RAN cell layout on VNOs is also studied. In addition, the support for traffic offloading by considering the collision rates in Wi-Fi is presented in [7, 8].

The aim is to prioritise services with higher data rate per session in the offloading procedure, since it leads to a lower collision rate and a higher network throughput. In [6], a model for the management of virtual radio resources, considering different assumptions on terminals' Signal-to-Interference-plus-Noise Ratio is proposed. The model has two main components: estimation and allocation of the available resources. In the former, a technique for obtaining probability functions of the network throughput based on the available radio resources is introduced, while in the latter, a portion of the estimated network capacity is allocated to each of the services of VNOs. Meeting the Service Level Agreements (SLAs) in addition to increasing the efficiency of resource usage are the key objectives in resource allocation. The cellular network capacity can vary from 0.9 Gbps in a pessimistic approach (PE) up to 5.5 Gbps in an optimistic one (OP), the general (G) and realistic ones (RE) being in between. The effect of this capacity variation on the allocation of the virtual radio resources to the services of the VNOs with guaranteed bitrate (GB) is shown in Fig. 2.

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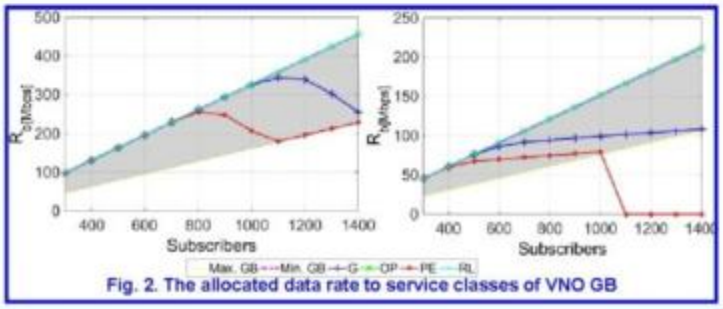

Fig. 2. The allocated data rate to service classes of VNO GB

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Newcom# N#EWS from WPs

WP 22 Networking technologies for the Internet of Things (IoT) with mobile clouds

by Davode Dardari
CNIT/UNIBO

EuWin@CNIT-BO facilities are fully operative and several experimental campaigns have been carried out within the active joint research activities (JRAs). Some JRAs are inter-WP and inter-Track. The former are oriented to increase the integration between the distributed EuWin laboratories. The latter demonstrate the utility of EuWin for the experimental validation of theoretical schemes investigated in Track 1.

Both EuWIn@UniBo and EuWIn@CTTC provide experimental platforms for indoor localisation. For this reason, the inter-WP JRA#1 has also the purpose to integrate software tools and to achieve a common open source platform for indoor localisation. After a first phase where the OpenInLocation board mounted on an ArduPilot-based robot was setup at CTTC in collaboration with a researcher from CNIT-BO, in the last months the same platform has been integrated with the LOCTEST and CASY platforms at CNIT-UNIBO. Specifically, the CASY (Center for Complex Automated Systems) platform has a volume of 11x11x10m3 and is equipped with a motion tracking system composed of 22 infrared cameras each one characterized by 1 Mpixel resolution. The ultra high-definition positioning accuracy of 0.5mm allows the performance characterization of localization and mapping algorithms using different technologies (e.g., RF or geomagnetic). A first measurement campaign has been performed to validate statistical mapping algorithms and a paper has been accepted for the presentation to the ICC 2015 conference.
In the framework of JRA#6 a joint meeting between CNIT-CT and CNIT-BO took place in Athens, where a set of new measurements to be performed was defined. The objective of the new measurements was to test the different solutions

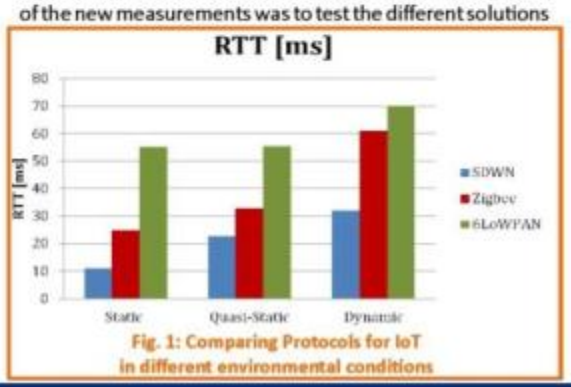

Fig. 1: Comparing Protocols for IoT in different environmental conditions

considered for IoT, SDWN, Zigbee and 6LowPAN, in more complex scenarios, having a larger number of nodes deployed and considering quasi-static and dynamic environments. An example of comparison is reported in Fig. 1, where the round trip time for the different protocols in the various conditions is shown. SDWN is the best solution in all the cases; however it should be underlined that SDWN has the largest percentage of packets lost in dynamic environments, meaning that the protocol has some lack in terms of reactivity to environmental changes. Results have been included in the revised version of a paper submitted to IEEE IoT Journal.
Within EuWIn a particular effort has been devoted to demonstration activities, workshops, and to the organization of training schools dedicated to experimental research. In order to foster industry-academia cooperation, WP2.2 has organized jointly with WP2.1 and WP2.3 in-company dissemination events to report on lab activities and results carried out at EuWin. Starting from this dissemination campaign, some collaborations with companies willing to exploit the capabilities of the EuWin platform for experimental research have been established. For instance, CNIT-UNIBO worked on an activity commissioned by NEC, Germany, through the HGI (Home Gateway Initiative), related to "Testing the impact of IEEE 802.11 over Zigbee networks". The activity has the objective of measuring the performance of a point-to-point Zigbee network in the presence of interference generated by different Wi-Fi access points. The measurements have been carried out at UNIBO through the Flextop EuWIn facility.

CNIT-UNIBO is also carrying out some experi... commissioned by CPL Concordia, an Italian company, in order to test protocols for smart home and smart building applications.
Tests will run on Flextop facility.

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MOBILITY GRANT

On Spatially Coupled Codes

by Najeeb Ul Hassan
TUD

In fall 2014 Najeeb Ul Hassan, a Ph.D. student from the Vodafone Chair Mobile Communications Systems at TU Dresden, was awarded a NEWCOM# Mobility Grant and received funding for a short research visit.

He visited the Information Processing and System Research Lab (ETIS)-CNRS in Cergy, France. Cergy is located in the northwestern suburbs of Paris and is connected by a bus to the Charles de Gaulle Airport in Paris. Najeeb was hosted there by Prof. Dr. Iryna Andriyanova in her Lab and the visit lasted for three weeks. Both researchers, Mr. Ul Hassan and Prof. Andriyanova are involved in the NEWCOM# Project and have been previously collaborating within the Joint Research Activity JRA 1.1.3.1. During the research visit, Prof. Dr. Michael Lentmaier from Lund University, Sweden also visited ETIS Laboratory for a short duration of 1 week. Prof. Lentmaier is also the leader of the JRA on spatially coupled codes. This visit provided the opportunity to further extend the collaboration between the researchers.

The research visit focused on the design of protographs for spatially coupled codes suitable for transmission over mobile-radio channels. The channel model used for this purpose is the block-fading channel that reflects the slowly varying nature of the mobile-radio channel. In addition to the protograph design, some bounds on the performance of spatially coupled codes were also investigated. The experience in the research environment at ETIS Laboratory was very positive. There were regular meetings with the host where we discussed the results and also laid out the plan for the next days. The possibility to discuss face-to-face instead of via Skype was very fruitful and we could exchange a large number of ideas and explain each other's points of view. As an outcome of our discussions, we were able to develop some systematic method for constructing codes with a desired diversity. While our previous results have shown that spatially coupled codes generally can achieve very high diversity, it was earlier not clear which parameters do determine the achievable degree of diversity of a given code. Our new construction gives now some guidelines for how to construct a code specifically for a given target. Furthermore, it helps to fundamentally understand the mechanisms that result in a good behavior of a code.

Other than talking on the research, on one of the weekends, Prof. Andriyanova invited us for a lunch in Paris along with a guided tour in the old town of Paris, including Cathedrale Notre-Dame and Musée du Louvre where the famous portrait of the Mona Lisa by Leonardo da Vinci is kept together with many of other art works in the Louvre Palace.

Fig. 1: Names from left to right, Dr. Iryna Andriyanova, Dr. Michael Lentmaier, Najeeb Ul Hassan

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NEWCOM# special issue

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WIRELESS PERSONAL COMMUNICATIONS

Call For Papers for
Special Issue on

Context-Aware Communications and Networking – an Important Paradigm for 5G Networks

Submission deadline: 15 September 2015, 23.59 UTC
First Round of Reviews: 15 February 2016
Final notification of acceptance: 15 March 2016
Delivery of camera ready paper: 31 March 2016

Overview

The rapid development of communication networks has elevated the importance of reliable access to additional information about the radio environment and the precise characteristics of the deployment environment and network status. For many years the knowledge about the current status of the communication channel, known as, e.g., Channel State Information (CSI), has been used for link adaptation purposes, such as power and bit allocation algorithms. Moreover, access to CSI and devices' locations has driven the development of applications for advanced radio resource and interference management. In both cases, however, the following trade-off can be observed: the more detailed the information, the greater the amount of information that needs to be exchanged. This problem is even more crucial in some contexts, such as MIMO/MIMO-OFDM systems where precoding schemes have to rely, in general, on the information of the channel for each carrier and antenna. Furthermore, numerous applications are strongly dependent on the fast and reliable access to updated data, that can be either related to channel measurements or to other user- or network-related information. These include coordinated solutions such as Coordinated Multi-Point (CoMP) transmission and reception, applications of the mobile small-cells concept, selforganizing networks (SON), convergence between the 3GPP and non-3GPP networks for traffic offloading, development of various spectrum sharing strategies and/or cognitive radio solutions, direct communication approaches, or enhanced car-to-car or car-to-infrastructure communication. Various researchers have concentrated on the benefits that can be achieved by exploiting the presence of rich context information. As the advantages of such approach can be easily foreseen, the drawbacks can also be noted, including wireless security or reliability and accuracy of the stored data. All of these aspects have to be considered in developing new solutions that take advantages of the additional information. Another issue is created by more and more challenging expectations of the end-users, just to mention the need for detailed localization information both indoors and outdoors, for data and multimedia delivery every time and everywhere, rapid file sharing in the form of cellular broadcasting, wireless car video, etc. All of these possible future applications will require reliable access to various sources of context information. This is also related to the further increase of back-haul traffic that is exchanged within the network or stored in cloud databases The goal of this special issue is to concentrate on all aspects and future research directions related to context-aware communications.

Scope

Original papers are solicited on topics of interest that include, but are not limited to:

- Architectures for context-aware communication and networking (CACN)
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- Spectrum sharing strategies in future networks
- Context information in car communications
- Context information in public service systems
- Big-data processing in CACN
- - Routing in CACN
- Security aspects in CACN

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Newsletter

July 2015 — Issue no 11

http://www.newcom-project.eu/

N# at IEEE ISWCS'2015

Dear members of the NEWCOM# community!

This year, the Twelfth International Symposium on Wireless Communication Systems (ISWCS 2015) will be held in Brussels, Belgium, from August 25 to August 28.

This 2015 edition will feature a comprehensive technical program including world-class plenary speakers, tutorials, oral technical sessions and workshops (scheduled on August 25).

The plenary speakers and their talks are

- Prof. **Erik G. Larsson**, Linkoping University, Sweden: « Massive MIMO: Myths and Realities »
- Prof. **Alexandre Proutiere,** KTH/EES, Sweden: « Online Stochastic Optimization with Partial Feedback and Applications to Resource Allocation in Wireless Networks »
- Prof. **François Baccelli,** University of Texas at Austin, USA, « Wireless Networks, Information Theory and Stochastic Geometry »
- Prof. **Michael C. Gastpar,** EPFL, Switzerland, « Information-Theoretic Limits of Caching »
- Prof. **David Gesbert,** EURECOM, France, « Cooperating Devices in Decentralized Wireless Networks »
- Prof. **Bjorn Ottersten,** University of Luxembourg, Satellite Communication Networks - Future Challenges

According to a well established formula, several tutorials are offered in parallel to the sessions and the workshops, and are included in the registration fees :

- "Vehicular Networking", **Christoph Sommer** - University of Paderborn, Germany
- "Modelling And Analysis of Ad-hoc Networks", **Justin P. Coon**, Oxford; **Orestis Georgiou**, Bristol; Carl Dettman, Bristol
- "Game Theory and Communications: Fundamentals, Algorithmic Aspects, and Dynamical Aspects" by Prof. **Samson LASAULCE**, L2S, Centrale-Supélec, France
- "MIMO for 5G Networks: Algorithmic Cross-layer Design and Performance Analysis", **Mohamad Assaad** - CentraleSupélec, France; **Mérouane Debbah** - Huawei, France.
- "From Network based Location Estimation to Location Aided Communications", **Dirk Slock** - EURACOM, France; **Stefan Valentin** - Huawei, France; Rabih Chrabieh - Nestwave, France.
- "Elements of Interference Alignment: From Fundamentals to Practice", **Cenk M. Yetis** - Meviana University, Turkey; **Murat Torlak** - Erik Jonsson School of Engineering and Computer Science, USA; **Chenwei Wang**, DOCOMO Innovations Inc., USA.
- "Centralized Signal Processing Techniques for the Multicell Cloud RAN", **Bjorn Ottersten, Symenon Chatzinotas, Dimitrios Christopoulos**; **Maha Alodeh** - University of Luxembourg.
- "Energy Harvesting Wireless Communication Networks», **Deniz Gündüz** - Imperial College London, UK; **Michele Zorzi** - University of Padova, Italy.

The program also features workshops on the first day, as well as regular and special sessions during the next three days. Last but not least, the attendees will have the opportunity to network and discover known or new facets of Brussels during the social events: a welcome reception at Brussels City Hall, a beer+cheese+chocolate tasting session and a gala dinner.

Please see more at http://www.iswcs2015.org. We look forward to welcoming you all in Brussels !

Luc Vandendorpe

To subscribe to the newsletter please go the Newcom# webpage website and follow the "Newsletter" link

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HOT Research Topics

Leveraging on context-aware Capabilities for operating 5G heterogeneous networks

by Jordi Perez-Romero
and Anna Umbert, UPC, Barcelona, Spain

Following the natural evolution of mobile communication systems, research is nowadays focused on the development of the new 5th Generation (5G) of mobile and wireless systems. It targets a time horizon beyond 2020 providing solutions to the continuously increasing demand for mobile broadband services associated with the massive penetration of wireless equipment, the tremendous expected increase in the demand for wireless Machine To Machine (M2M) communications, and the proliferation of bandwidth-intensive applications including high definition video, 3D, virtual reality, etc. Besides, 5G is expected to incorporate the provision of novel service types associated with a number of vertical industries, such as e-health, automotive, energy, etc.

As discussed in [1] there are still few areas of agreement about 5G, and there are yet debates on several aspects such as whether it will require a new air interface or several, whether it will be primarily driven by ultra-low power IoT (Internet of Things) technologies or by mobile broadband services, the degree of virtualization in the network, etc. Apart from these aspects, there seems to be clear agreement in the fact that ever-smaller cells together with the expansion to use higher frequency spectrum bands and the inclusion of virtualization concepts to support the necessary degree of network flexibility will become pivotal elements in the development of 5G systems.

The challenging 5G use cases identified in [2], which include **the broadband access in dense areas, the extreme real-time communications, higher user mobility scenarios or massive IoT**, suggest that network densification through the use of small cells will play a key role in 5G. From this perspective, the vision of the future 5G network corresponds to a highly heterogeneous network at different levels, including multiple technologies, multiple cell layers, multiple spectrum bands, multiple types of devices and services, etc. Consequently, future 5G scenarios will be characterized by a high complexity associated to the availability of multiple technologies and cells so that each terminal can have different connection possibilities, extreme densification in certain scenarios, so that interference becomes a challenge, high randomness associated to the propagation effects, availability of multiple spectrum bands (including both licensed and unlicensed bands) with different propagation conditions, different types of wireless links (mobile-to-cell, backhaul, fronthaul, device-to-device, etc.).

This increased complexity will impose the need to enhance the methodologies of 5G network operation, by **exploiting the knowledge about the context** where a given network is deployed and by making the network more intelligent and able to adapt to the different conditions. "Context" has a wide meaning and in general refers to the information characterizing the situation where the network entities are operating and the status of these entities. Then, context can include aspects such as geospatial information (e.g. radio-related measurements, demographics, traffic distribution, etc.), network states (e.g. load in the different cells, usage statistics, service performance indicators, energy consumption, etc.), state of the devices (battery level, device capabilities, etc.), information about the applications, etc. **"Context Awareness" can be understood as a response mechanism to the obtained context information, so that the network configuration can be modified at each point of time to adapt to the different situations.**

The **Radio Environmental Map (REM)** concept, which refers to a database that dynamically stores information about the environment wherein a cognitive radio system operates [3] is seen here as an important enabler of the abovementioned context awareness capability of future 5G networks. The REM includes information about propagation conditions, locations of active transmitters in the area, traffic density, etc. Then, this information can be exploited to optimize different functions of wireless networks, and for this reason several applicability areas of the REM have been identified in the past [4].

In [5], the REM was proposed for supporting interference management in heterogeneous networks including both macro and small cells as well as both cellular and non-cellular (e.g. Wi-Fi) technologies. The benefits and architectural implications of REMs were illustrated for various specific techniques, discussing the achievable gains in terms of

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HOT Research Topics cont.

architectural paradigms relying on **Network Function Virtualization (NFV) and Software Defined Networking (SDN)** concepts [6][7] are also envisaged to facilitate the introduction of the REM concept. Through SDN/NFV, local/global REMs could be implemented as virtual databases supporting the interference control functions implemented as software packages. In this manner, the system becomes substantially more adaptive and flexible and can be used to dynamically optimize the information split between local/global REMs and quickly introduce new stored parameters as needed by the network control functions.

Based on all the above considerations, it is envisaged that the development of smart context-aware techniques can be identified as an interesting area of research in the next years for achieving an optimized operation of future 5G heterogeneous networks. Such techniques should support advanced optimization algorithms for interference coordination, efficient sharing of unlicensed bands, energy-efficient user-to-cell associations as well as backhauling aspects, etc. Specific challenges to be addressed include the placement of the optimization algorithms in specific architectures, the identification of the relevant context parameters and its efficient acquisition, the signaling implications or the accuracy of the stored information.

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N# Emerging Topics Workshop

by Jossy Sayir

A NEWCOM# Emerging Topics Workshop took place on 25-26 June 2015 in Cambridge, UK.

The programme is available here:

http://www-sigproc.eng.cam.ac.uk/Main/NsharpETW

There were 32 participants, 17 presentations. About half of the participants came from abroad and half from the UK. The participants were overwhelmingly from academia with the exception of a noted strong interest from Huawei who sent two delegates. The workshop was organised by UCAM and the topics covered concentrated around Task 1.1.3 of NEWCOM#. The social programme of the workshop disproved the common belief that English summers are always rainy: the sun was shining bright and warm as the participants plodded through the countryside, zigzagging between the legendary Cambridge cattle to reach the Green Man Pub in Grantchester where technical problems were discussed while enjoying drinks and fish and chips. The rain did come on cue on the next day of the workshop, constraining all participants to stay inside the lecture room all day to hear the excellent presentations. There were many surprises in store in the programme and every participant came away having learned about at least one technique they knew nothing about.

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INTER VIEWS

Newcom#

CentraleSupélec

Name: Yves
Surname: LOUET
Title: Professor
Affiliation: CentraleSupélec
(Yves.Louet@centralesupelec.fr)

1. Favorite areas of interest and research

Increasing the power amplifier efficiencies by mitigating the crest factor of waveforms so as to save energy in transmitters.

2. What is the most promising research direction in the wireless communications area?

The most promising research direction is green cognitive radio : how cognitive radio would save energy by decentralizing part of decisions and by updating transmission needs.

3. Which innovation, according to you, influenced mostly the scientific world (but not only) in the last 10-20 years and which finished with "dead end"?

Powerful channel coding as turbo-codes or LDPCs pushed the transmission qualities so closed to Shannon limit that it opened the way to very robust communications ever.

4. What was your motivation to become the researcher?

Knowledge and only knowledge.

5. N# is....

... a fantastic European network where research is put at the center of all interests.

1. My favorite non-scientific book, musician and movie...

Movie : Paris-Texas from Wim Wenders for its music, its story, everything ...
Musician : Angus Young from AC/DC ... the most fabulous guitar player

2. I like to spend my free-time / vacation in....

Listening to music.

3. My favorite course (meal)...

Paella is my favorite meal for sure!

4. The character trait I really dislike....

Dishonest

5. My best adage...

You can't judge a book by its cover.

CentraleSupélec,
Campus Rennes, France

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Special Issue on
Context-Aware Communications and Networking –
an Important Paradigm for 5G Networks
Submission deadline: 15 September 2015, 23.59 UTC
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Page 5

NEWCOM# meetings

This event cannot be missed

by Carles Antón-Haro and Marco Luise

Invitation to the final NEWCOM# event in Barcelona

After almost one decade, the NEWCOM saga seems to be coming to an end. At this stage, we know little about the survival of the NEWCOM spirit after October. What we do know, however, is that such a long-lasting and successful series of projects deserves a successful final event too. A place for NEWCOMers to meet, network, showcase project results and, of course, celebrate!!! In fact, not only NEWCOMers will be there since the event will be jointly organized with (and attended by) researchers from the IC1004 COST action too.

When and where? October 14-15, 2015, in Barcelona, at the Hotel Plaza.

PLEASE, SAVE THE DATE !!!

At the time of writing these lines, the program is still under preparation. However, we can already anticipate a few things to you. For the first day, we plan to have a single-track event including a number of keynote speeches both from academia (Prof. Andrea Goldsmith has confirmed her attendance) and the industry, a poster and demo session to showcase results from both projects; and, also, what we refer to as 'the SME event'. What is this about? In fact, this is part of the (very successful) series of in-company dissemination events organized by the project. This time, however, Mohammed will not go to the Mountain. Instead, a number of representatives from technological SMEs from all over Europe will be invited to come to our final event. The plan is to discuss, also with the audience, about SME-academia collaboration in research, and mechanisms to fund for such collaborations. Sounds exciting, doesn't it?

On the second day, there will be a number of parallel sessions, with oral presentations from the NEWCOM# and COST IC1004 communities. In addition, the NEWCOM# track will count with several invited presentations on selected project results, both theoretical and experimental.

And what is the missing ingredient so far? The social event, of course, where we plan to treat you to a restaurant in the city center. In addition, the winners of NEWCOM#'s Best Paper, Best Student Paper, and Distinguished Researcher Awards will be announced there. **Don't miss it!**

Last but not least, there is…Barcelona, of course, one of the nicest European cities to visit. This mediterranean capital has a lot of interesting sights to offer to its visitors:

- walk along the Ramblas,
- stroll the narrow winding streets of the Barri Gotic, the medieval Gothic quarter,
- or Gaudi's modernist buildings, like the famous and still unfinished Sagrada Família or the magnificent Casa Batlló and La Pedrera in the fashion center of the city, Passeig de Gràcia.

For all the above, we are looking forward to welcoming you to the final NEWCOM# event. We sincerely hope that you will take advantage of the social program and the fantastic city of Barcelona during your stay and that you will find this an interesting and inspiring final event. See you in Barcelona!!!

Carles and Marco

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NEWCOM# events

Joint NEWCOM/COST Workshop on Wireless Communications JNCW 2015

October 14 – 15, 2015, Hotel Plaza, Barcelona, Spain

http://www.newcom-project.eu/jncw2015

*The JNCW 2015 is jointly organized by the **FP7 European Network of Excellence in Wireless Communications NEWCOM#** and the former **ICT COST Action 1004 Cooperative Radio Communications for Green Smart Environments**. This workshop will give NEWCOM# and COST IC1004 communities the opportunity to disseminate their research results, after 3-4 years of activity within the framework of the European FP7 research program. Participation and paper submission is open to anyone, member or not of these Actions.*

The workshop program will be composed of invited talks, technical presentations, posters and demonstrations. The accepted contributions from the NEWCOM# and IC1004 "workshop" papers call will be published in the conference CD-ROM. To a limited number of papers, selected on the basis of their high quality, a full submission in the peer-reviewed journal "Advances in Electronics and Telecommunications" will be offered.

The topics include, but are not limited to:

- Radio propagation
- Radio channel characterization and modelling
- MIMO channels and systems
- Compact Antenna Systems
- Radio terminals modelling
- OTA test methods
- Body area networks
- Vehicular Communications
- UWB systems
- Adaptive coding and modulation
- Performance Limits of Wireless Communications
- Opportunistic and Cooperative Communications
- Energy- and Bandwidth-Efficient Communications and Networking
- Radio interfaces for next-generation wireless systems
- Networking technologies for the Internet of Things and Mobile clouds
- Flexible communication terminals and networks
- (Physical) Security in wireless networks
- Interference in wireless networks
- Radio Resource Management, Localization and positioning

Save the date!

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NEWCOM# events

Save the date!

Organizing Committee:	Marco Luise (CNIT/Pisa, Italy), Narcís Cardona (iTEAM - U.P.Valencia, Spain), Carles Antón-Haro (CTTC Castelldefels, Spain), Roberto Verdone (CNIT/Bologna, Italy)
Technical Program Committee:	Andreas Polydoros, Sergio Palazzo, Michel Kieffer, Davide Dardari, Luis Correia, Miquel Payaro, Raymond Knopp, Claude Oestges, Erik Ström, Alister Burr, Sana Salous, Silvia Ruiz, Alain Sibille.
SME Event Committee:	Andreas Polydoros, Danilo Abrignani
Important dates:	NEWCOM# papers & IC1004 "workshop" papers Paper submission deadline: **Sept. 4, 2015** Notification of acceptance: **Sept. 15, 2015** Final version due: **Sept.30, 2015** IC1004 regular TD presentations: TD submission deadline: **Sept. 25, 2015** Final version due: **Sept.30, 2015** Author registration deadline **Sept. 25, 2015** **All deadlines are HARD and subject to no extension.**
Submission format:	NEWCOM# papers & IC1004 "workshop" papers: 2-page extended abstract including references (template-MS, template-tex, bib-files-tex). Authors are kindly requested to express their preferences (oral/poster presentation) at submission time. IC1004 regular TD presentations: Title, abstract and full paper according to COST templates (coverpage)

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NEWCOM# events

Waveform and Network Architectures for the ioT in 5G

EuWIn School, Sophia Antupolis, France, Sept. 14-16, 2015

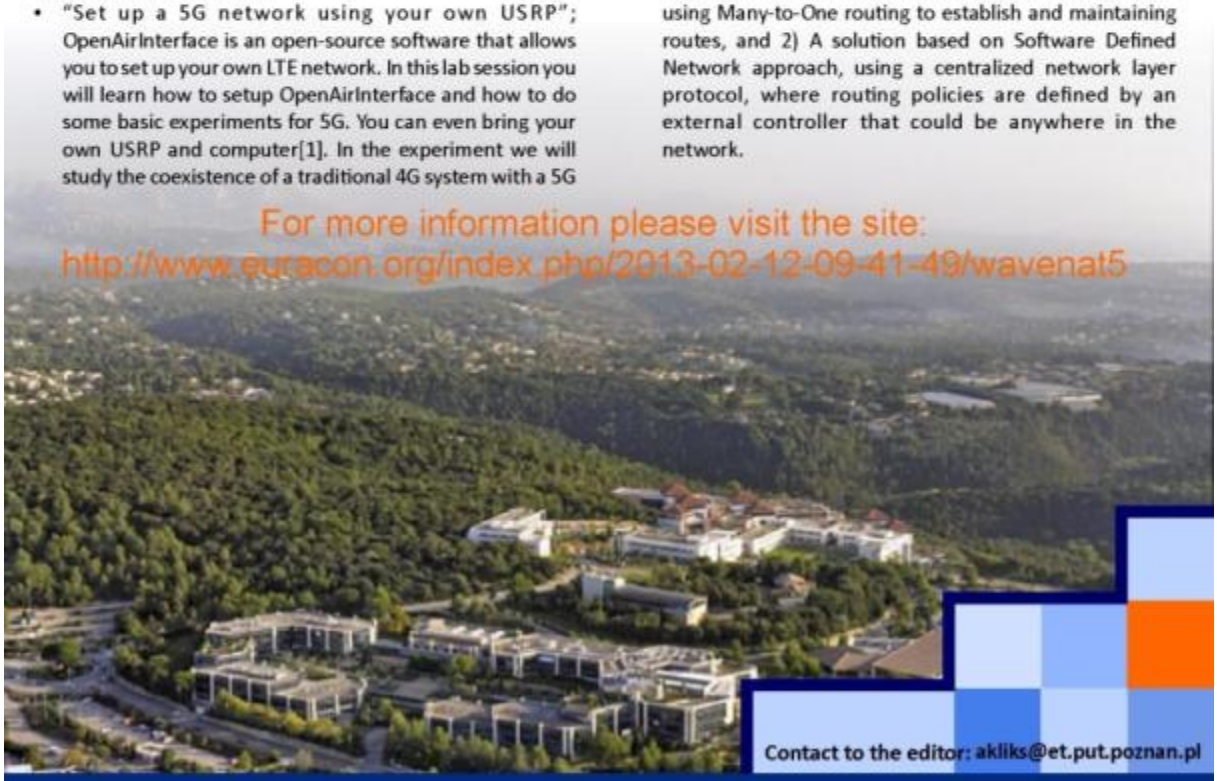
The school addresses the topic of "how 5G will integrate Machine Type Communications (MTC) and the Internet of Things (IoT). The two main streams considered are related to the design of 5G waveforms for MTC, and the integration of IoT network architectures into the 5G Radio Access.

The school follows the success of the previous EuWIn school organized in Barcelona on November 2013; attendees will be exposed both to theoretical and experimental sessions. Theoretical lectures will be given by instructors from Eurecom Institute, the University of Bologna and Technical University of Dresden. The two sites of EuWIn at Eurecom and in Bologna will manage the two lab sessions. Moreover, industry talks will be given by Alcatel Lucent, Cisco, Intel.

The two lab sessions will be dedicated to 5G waveforms and IoT Network Architectures:

- "Set up a 5G network using your own USRP"; OpenAirInterface is an open-source software that allows you to set up your own LTE network. In this lab session you will learn how to setup OpenAirInterface and how to do some basic experiments for 5G. You can even bring your own USRP and computer[1]. In the experiment we will study the coexistence of a traditional 4G system with a 5G system using one of the new waveforms. We will thus setup a 4G LTE eNB with at least one UE connected to it. The other participants will use their USRPs to transmit and/or receive a signal using a new waveform, either UFMC or GFDM. The goal of the lab is to study the impact of the secondary system on the primary system in terms of throughput.
- "Network Architectures for IoT within 5G"; The laboratory will have two main objectives: from one hand to present a precise methodology to perform experimentation and to fairly compare different protocol solutions, and, on the other hand, to allow attendees to implement an example of application of such methodology. In particular, the laboratory activities will focus on the setup of a real wireless network, where nodes have to send data to a final coordinator. Two different protocol stacks will be compared: 1) A standard solution, based on Zigbee and using Many-to-One routing to establish and maintaining routes, and 2) A solution based on Software Defined Network approach, using a centralized network layer protocol, where routing policies are defined by an external controller that could be anywhere in the network.

For more information please visit the site:
http://www.eurecom.org/index.php/2013-02-12-09-41-49/wavenat5



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Comments and suggestions for the improvement of this document are most welcome and should be sent to:

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