



ICT-601102 STP TUCAN3G

Wireless technologies for isolated rural communities in developing countries based on cellular 3G femtocell deployments

2nd Quarterly Management Report

Reference Period (*from 01.05.2013 to 31.07.2013*)

Project coordinator

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Consortium composition

- 1 UPC*
- 2 URJC*
- 3 PUCP*
- 4 UCAU*
- 5 FITEL*
- 6 IPA*
- 7 TdP*
- 8 EHAS*
- 9 TIWS*
- 10 CREP*
- 11 KINNO*



1 – Project status: Technical plan and corresponding achievements

WP1: Management

1A1: Administrative management

- UPC. The project website and email reflectors have been continuously updated. An RSS channel has been set up. The consortium agreement signatures were finally collected and distributed. Initiated preparation of subcontracting for WP7 activities.
- URJC, EHAS and UPC organized the second plenary meeting in Madrid

1A2: Technical management

- UPC launched technical coordination of activities in 4A2.
- URJC announced the Redmine web-page with an informative presentation, and coordinate the partners to update their activities. Renewed the web-page due to the problems on settling-up period. Started activity, milestone and deliverable checks with respect to updates on Redmine. Risk council has started monthly meetings for detailed risk analysis.
- PUCP has participated in the administrative coordination and technical coordination of WP6.
- UCAU has participated in the technical coordination of WP7.
- FITEL is coordinating activities in WP3.
- EHAS has continued with WP2 coordination.

WP2: Requirements and specifications

2A1: Technical and socio-economic scenarios

- UPC. Contributed to the final definition of the technical and socio-economical requirements towards WP4.
- URJC. Contributed to generate general constraints of the transport network regardless of technology in D21, essential requirements and a description of a specific case of WIFI and WIMAX technologies for long distance links.
- PUCP has completed the description of the target network in WP6.
- FITEL.
- TdP. Contributed in this task supporting EHAS in the definition of operational scenario models, supplying concrete data of Peruvian socio-economical evolution and main rural areas characteristics.
- EHAS has performed the description of scenarios of remote rural areas in developing countries for D21.

2A2: Requirements and specifications for transport and access networks

- UPC.
- URJC reviewed and commented the WP2 deliverables.
- EHAS has worked with TdP to have a first insight of the expected traffic in the network.
- TIWS has made an analysis about the state-of-the-art related to IP transport network through satellite links. In the first part, the objective is to have a brief overview of satellite communications: satellite orbits, network architecture and topology, frequency bands, etc. In the second part, the objective is analyzing the mechanisms to achieve greater efficiency and savings of satellite bandwidth in cellular networks (3G and 4G).

2A3: Parameters and scope of market research and business models

- UCAU: Review of the contribution about the description of the operational scenarios for rural areas of Colombia.
- FITEL.



- TdP. Contributed in this task providing the operator's perspective of Peruvian rural jungle in this days and its possible evolution, describing socio-economical characteristics of business and private users based on existing studies and its own know-how.
- EHAS has performed a review of similar experiences worldwide and edited D23.
- CREP. Identification of six rural localities in Colombia that may be a potential market for the technology developed in TUCAN 3G and description of social and economic characteristics of these localities based on existing studies. CREPIC proposes the structure of the Business Model for TUCAN3G in three phases: Phase 1 description of the nine elements, Phase 2: deepen and evaluate each element of the business model to identify opportunities, strengths, weaknesses and threats, Phase 3: Improving model according to the results of the deepening and evaluation
- KINNO did a detailed planning of methodological approach and refinement of research questions, as well as identification of relevant research tools.
- IPA completed its task to supply the manufacturer's market description and candidate market research questions that a manufacturer would wish to answer before entering the rural coverage market segment.

2A4: Architecture for the demonstration platform

- PUCP has been performed a preliminary network proposal reinforcement and have been proposed performance tests for the demonstrative platform.
- IPA has contributed more details of its product roadmap and capabilities. It has also started preliminary discussions about including technology from a 3rd party company that, if used, may improve the performance of the demonstration platform by introducing LIPA which would modify some local aspects of the architecture.
- TdP.
- EHAS has defined and reached an agreement with the rest of partners on the target localities and the architecture for the proof of concept. EHAS has also edited the Operational Technical Handbook (D22) with the planning provided by each WP leader, and has analyzed task relations inside WPs and among WPs. The definition of supervision methodology was performed together with the project technical coordinator.

WP3: Business case study

3A1: Market study

- UCAU. Review of research questions per target group.
- FITEL has contributed with: 1) support in the preparation of D31, 2) analysis of the questions of research versus the structure of the business model, 3) definition of locations along of Napo River and locations corresponding to the four poorest regions of Peru (Apurimac, Ayacucho, Cajamarca and Huancavelica), 4) selected of sample of institutional and business users.
- TdP. Contributed to the research questions and Application of the research method to supply side stakeholders and business users.
- CREP contributed to the research questions for market study and business model.
- IPA contributed the questions for the manufacturers section of the research and identified target companies to interview.
- KINNO. Preparation of execution of market research. Identification and analysis of research methods. Development of research guides for each research method. Analysis and categorization of research questions to relevant constructs and development of draft research tools.

3A2: Product definition

- FITEL.
- TdP.
- EHAS.



3A3: Models for funding and return on investment

- UCAU.
- FITEL.
- TdP.
- EHAS.

3A4: Business model design and verification

- UCAU.
- FITEL.
- IPA.
- TdP.
- EHAS.
- CREP.
- KINNO.

WP4: Access network optimization

4A1: Network dimensioning

- UPC has kept on working on the definition of a methodology for the network planning, coverage analysis and dimensioning based on a 3G access network. UPC has evaluated, among other parameters, the coverage and the probability of congestion for an analysis of the traffic/coverage to be supported by the IPA equipment and the bands defined in the deployment. Such methodology has been applied to different real locations in Perú according to the deployment objectives of the project and using realistic data and characterization of the traffic and the locations provided by TdP. The main objective is to generate a set of accurate recommendations for the deployment of the access network
- TdP. Contribution to this task was providing a traffic model and a long haul model based in real traffic and socio-economic evolution from localities with typical characteristics of Peruvian rural jungle, and the traffic evolution forecast in a 4 year period.
- IPA has supplied a description of the current performance (range, power, etc) of IPA products, and analysis of limitations on and possible enhancements to the scope of this performance. This will assist selection of product, frequencies, scenarios and possible modifications to meet the target scenarios.

4A2: Femtocell network optimization and monitoring

- UPC. Launched a discussion with URJC and IPA to define a joint plan for the definition and execution of joint tasks within this activity. An initial workprogramme has been defined and will be included in M42.
- URJC has started to work on comprehensive joint network optimization on access network. However the task needs as input the results of some other activities. The review of the state is planned to be finished by August 2013.
- IPA has provided input on areas of network optimization that are of interest for the purposes of the program and may be beneficial, and selected the areas that it will study as part of the 4A2 optimisation deliverable.

4A3: Access and transport network interoperability

- UPC has begun to define a set of problems to be solved in the project. In particular, these problems are concerned with the development of techniques for single- and multiple-HNB channel state-aware packet scheduling. These techniques aim at minimizing the transmission power under constraints related to a minimum rate per user including, within the optimization variables, the number of spreading codes assigned to each communication. These techniques will also be used to derive procedures for admission control.



- URJC has reviewed the state of art and analyzed different alternatives for traffic offloading. Also some discussions, recommendations have been held with other partners. Preliminary results suggest that LIPA is a suitable solution for the project.
- IPA has provided details of any interactions, between femtocell and transport network, and possibilities that IPA has been working on separately to TUCAN3G to manage congestion that could assist in alleviating overload on the transport network. These will be considered in 4A2 and for inclusion in the software to be used in deployment. IPA is also working on seeing if there is a way to bring LIPA into the deployed solution.
- TdP.

4A4: Beyond 3G-based access

- UPC. Discussion with other partners in order to define a set of problems to be analysed and solved within the framework of this task.
- URJC.

WP5: Transport network optimization

5A1: Usage terms of WiFi, WiMAX and VSAT links

- URJC has studied the theoretical fundamentals of the application of WiFi and WiMAX, chosen and completed appropriate analytical models and obtained results about the expected performance and behavior of those technologies over long distances. Simulations with the NS3 simulator have been run in order to validate theoretical results.
- PUCP has made trips to areas where target networks are deployed, however, problems were found in networks and extensive tests were not completed. PUCP has schedules a new visit in August. Has also been reviewed the information available for the preparation of technical and non-technical reports.
- UCAU. Description of the IP layer functionalities for QoS provisioning. This is necessary to define the mechanisms for guaranteeing end-to-end QoS in heterogeneous networks
- TIWS has contributed with information from standardization bodies and scientific literature to help to foresee the performance, and with expected performance in satellite communications systems.

5A2: Heterogeneous transport network architecture for the backhaul

- URJC has started the high-level description of an architecture that combines WiFi, WiMAX and VSAT systems for a heterogeneous rural transport network, identifying what would the logical role be for each of those technologies in the heterogeneous architecture, and the interfaces that must be defined.
- PUCP has made the coordination with URJC in order to purchase the laboratory equipment.
- UCAU. Study of the requirements to design the WiMax-WiFi interface.
- TIWS.

5A3: Transport network optimization

- URJC.
- PUCP.
- UCAU.
- TIWS.

WP6: Demonstration platform

6A1: Technical and operational design

- PUCP has completed the realization of the sensitization workshops and reunions in the areas of intervention. Also has collected information and agreements and have made field visits and preparation of the respective reports.



- FITEL is reviewing the existing legal and regulatory framework.
- IPA has commenced internal discussions with its Professional Services, Manufacturing and Export departments for defining the likely software releases, component lead times and export requirements for the demonstration platform.
- TdP.
- EHAS has provided PUCP with the quotation of the equipment and materials for the test lab .EHAS is now working on the identification of resources and services to be shared with the new telecommunications system in the selected networks.

6A2: Compatibility tests

- UPC.
- URJC.
- PUCP has made the quotation and then the purchase and delivery of most equipment for URJC Laboratory, is still pending the purchase of femtocells. Also, PUCP has continued a series of coordination with FITEL in relation to the execution and concretion of the amount contributed by the partner.
- FITEL is coordinating with PUCP in relation to the financial contribution to the project.
- IPA.
- TdP. Contributed in this task providing the compatibility test for operation, manage and configuration to connect IP Access RNC to TdP's voice and data core network and the integration guide to install and integrate IP Access Equipment in TdP's Node in Lima for the validation of the model designed by TUCAN 3G in a real scenario.

6A3: Pilot network deployment

- PUCP.
- FITEL.
- IPA.
- TdP.
- EHAS.
- TIWS.

6A4: Interconnection to the operator's network

- PUCP.
- FITEL.
- IPA.
- TdP.
- EHAS.
- TIWS.

6A5: Validation

- PUCP.
- UCAU.
- FITEL.
- TdP.
- EHAS.
- TIWS.



WP7: Dissemination and knowledge utilisation

7A1: Dissemination

- UPC has generated press releases that have been transformed in several press articles (see section 4.1 below).
- URJC participated the project dissemination strategy discussions.
- PUCP.
- UCAU: Coordination with all partners the writing for M712 “Dissemination and standardisation plan”.
- FITEL elaborated the institutional dissemination plan for TUCAN3G.
- IPA participated in the dissemination strategy discussions and has defined its dissemination plan, based on developing a Case Study and White Paper once the deployment has started, press releases related to the study, and using this in certain conferences. The Study would be available on the TUCAN3G and IPA web sites, and IPA is evaluating hosting a webinar on the Study.
- TdP.
- EHAS has selected a set of 3 events where could be interesting to co-locate the half-day technical workshop and is working towards organizing it.
- TIWS.
- CREP has developed the following activities: 1) working meetings with graphical designer and social communicator (addition of a template to the institutional portal www.crepic.org for post project progress and achievements; creation of a facebook account to spread the project on social networks), and 2) drafting and publishing project's news on CREPIC website.
- KINNO Participated to the conference “Globalization of Technology Transfer” with the invitation of Tii in 5-10th of May 2013 in Beijing, China. In the presentation, Technology transfer between different levels of the pyramid, insights from EU- Latin America collaboration, TUCAN3G is presented as an example of technology transfer between different continents and developed to developing countries.

7A2: Standardisation

- UPC. Definition, jointly with other partners, of a roadmap for contribution to 3GPP and ITU-D. Contacts done to participate in ITU-D meetings in Sep 2013 and Sep 2014 under the auspices of Spanish Ministerio de Industria. Launch subcontracting of standardization activities.
- UCAU. Initial actions for keeping track the activities of the IEEE 802.11 Working Group

7A3: Use of knowledge

- FITEL.
- IPA.
- TdP.
- TIWS.
- KiNNO has designed an execution strategy for 7A3, Use of Knowledge, which includes identification of research areas of sub-products produced by the TUCAN3G Project.

2 – Unattained planning items and rationale

Item description <i>(explanation of the causes)</i>	Action Items <i>(corrective actions envisaged)</i>
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<i>Changes in schedule of deliverables</i>	Deliverable D41 scheduled in M6 (Jul 2013) has been delayed to M8 Deliverable D31 scheduled in M8 (Aug 2013) has been delayed to M9 Deliverable D51 scheduled in M8 (Aug 2013) has been delayed to M9 Deliverable D61 scheduled in M8 (Aug 2013) has been delayed to M9
<i>Changes in schedule of milestones</i>	
<i>Red flags</i>	
<i>Any other issues or problems that might affect achievement.</i>	

3 – Deliverables and milestones finished as planned

Deliverables and Milestones in the reporting period		
Document code and title	Originally planned	Actual delivery month
D21 <i>Socio-economic scenarios, technical specifications and architecture for the proof of concept</i>	M4	M4
D22 <i>Operational technical handbook</i>	M4	M4
D23 <i>Parameters and basic conditions for the market research and the business model</i>	M4	M4

4 – Dissemination

4.1 Articles published, presentations at conferences, TV broadcasts, etc.

- Submitted papers
 -
- Accepted papers
 -
- Presentations
 -
- Press releases (use the links on text to access the documents)

These have been generated by UPC in the current period.

- 24/07/2013 [Diario Expansión](#)
La UPC lidera un proyecto para llevar la conexión 3G al corazón de la selva de Perú
- 24/07/2013 [RDi Press](#)
La UPC lidera un proyecto europeo para llevar la telefonía móvil 3G al corazón de la selva peruana
- 24/07/2013 [Lainformacion.com](#)
Una universidad española estudia llevar telefonía móvil 3G a la selva peruana
- 25/07/2013 [Instituto de la Ingeniería de España](#)
La UPC participa en un proyecto para llevar la telefonía 3G a la selva peruana
- 30/07/2013 [Tendencias 21](#)
Europa lleva el 3G a la selva peruana, pero retrasa la implantación del 4G en su territorio



4.2 Web Sites

The project website (www.ict-tucan3g.eu) was setup in Dec 2012 and has been continuously updated since then. An RSS channel has been included.

4.3 Other relevant information: Patent applications, guidelines standards, Masters, PhDs....

- Ongoing Master Thesis at UPC by Jaume del Olmo, defense expected in November 2013.

5 – Meetings Held

Meetings, Phone Conferences, Conferences or Workshops attended

Partner	Dates	Meeting place	N° of persons	WP/Task/expected results/details
All	19-20 June 2013	Plenary Meeting	---	2 nd plenary meeting in Madrid (EHAS premises).
UPC, TdP	8 July 2013	Conference Call	4	WP4, 4A1. Internal discussion on topics related with network planning. The objective was to identify which is the information to be provided by TdP to characterize the traffic in different kinds of locations.
UPC, IPA, URJC	16 July 2013	Conference Call	6	WP4, 4A2. Internal discussion to define a set of concrete tasks to be developed within activity 4A2.
UCAU-CREP-PUCP	14 Jun 2013	PhCall	6	Discussion of CREP proposal for dissemination/sensitization activities related to 6A1.2 and 7A1

6 – Resources Employed/Expenditures



Reference Period: "1 May 2013" to "31 Jul 2013"
 Effort for the reference period per WP and per Participant (Person-Months): planned vs. actual spent

Participant	WP1		WP2		WP3		WP4		WP5		WP6		WP7		Total per participant		Total Cumulative from start of the project		Justification (if needed)
	plan	spent	plan	spent	plan	spent	plan	spent	plan	spent	plan	spent	plan	spent	plan	spent	plan	spent	
1 – UPC	0,84	0,84	0,13	0,13			2,77	3,20			0,00	0,00	0,25	0,25	3,99	4,42	6,20	6,63	
2 – URJC	1,90	1,90	0,36	0,36	0,00	0,00	1,04	1,04	3,44	3,44	0,00	0,00	0,20	0,20	6,94	6,94	7,56	7,56	
3 – PUCP	0,20	0,20	1,45	0,05					1,50	1,00	2,20	0,60	0,90	0,90	6,25	2,75	8,45	6,95	
4 – UCAU	0,10	0,10	0,06	0,06	0,15	0,15	0,00	0,00	0,63	0,63	0,00	0,00	0,34	0,34	1,28	1,28	1,87	1,87	
5 – FITEL	0,10	0,10	1,00	1,00	1,20	0,60					0,10	0,10	0,10	0,10	2,50	1,90	2,50	1,90	
6 – IPA			0,00	0,13	0,50	0,25	0,88	0,63			0,13	0,13	0,10	0,10	1,60	1,23	2,36	1,99	Wp3 delay
7 – TdP			1,25	1,25	0,30	0,30	1,59	1,59			0,42	0,42	0,10	0,10	3,66	3,66	3,66	3,66	
8 – EHAS	0,50	0,25	2,00	1,00	0,25	0,00					1,00	0,50	0,25	0,25	4,00	2,00	10,00	7,00	Activities in WP3 and WP6 are
9 – TIWS									1,00	0,75					1,00	0,75	1,25	1,25	
10 – CREP			0,13	0,13	0,10	0,10							0,15	0,15	0,38	0,38	0,91	0,91	
11 – KINNO			0,25	0,50	0,20	0,50							0,20	0,20	0,65	1,20	1,70	2,20	
Total per WP	3,64	3,39	6,63	4,61	2,70	1,90	6,28	6,46	6,57	5,82	3,85	1,75	2,59	2,59	32,25	26,50	Grand total for the ref. period		
Total Cumulative from start of the project	4,98	4,73	16,52	14,80	3,00	2,40	7,11	7,29	6,57	6,07	5,00	3,35	3,29	3,29	46,46	41,91	Grand total from start		

Expenditures for the reference period per Participant (k€, EURO*1000): planned vs. actual spent

Participant	Durable equipment		Subcontracting		Travel and subsistence		Consumables		Protection of knowledge		Other Specific Costs		Total per participant		Total Cumulative from start of the project		Justification (if needed)
	plan	spent	plan	spent	plan	spent	plan	spent	plan	spent	plan	spent	plan	spent	plan	spent	
1 – UPC													0,00	0,00	8,73	8,73	
2 – URJC							0,24	0,24					0,24	0,24	1,76	1,76	
3 – PUCP	7,4	7,4			5,0	5,0	4,4	4,4					16,75	16,75	16,75	16,75	
4 – UCAU					1,27	2,44							1,27	2,44	3,80	4,97	
5 – FITEL													0,00	0,00	0,00	0,00	
6 – IPA													0,00	0,00	0,00	0,00	
7 – TdP													0,00	0,00	0,00	0,00	
8 – EHAS													0,00	0,00	3,80	2,64	
9 – TIWS													0,00	0,00	0,00	0,00	
10 – CREP					2,8	2,8							2,83	2,83	6,26	6,26	
11 – KINNO					0,8	1,1							0,80	1,07	0,80	6,16	
Total per cost item	7,4	7,4	0,0	0,0	9,9	11,3	4,6	4,6	0,0	0,0	0,0	0,0	21,9	23,3	Grand total for the ref. period		
Total Cumulative from start of the project	8,9	8,7	0,0	0,0	28,4	33,9	4,6	4,6	0,0	0,0	0,0	0,0	41,9	47,3	Grand total from start		

7 – Changes in personnel

Personnel leaving the project		
Name	Partner	WPs involved
Jerry Pridgen	IPA	Listed in original project proposal but no longer with IPA
Javier Romeu	IPA	Listed in original project proposal but no longer with IPA
Dr Andy Tiller	IPA	Listed in original project proposal but no longer with IPA



Personnel joining the project			
Name	Partner	WPs involved	Expected participation (in months)
Dr Kimon Nicolaides	IPA	WP2, WP4, WP6	M3 – M9
Alexander Ratanov	IPA	WP4	
James Harrow	IPA	WP4, WP6	
Andreas Schroeder	IPA	WP6, WP5	
Dr Nick Johnson	IPA	WP4, WP6, WP7	M3 – M18
Victor García Giganto	EHAS	WP3, WP6, WP7	M7-M30

Kimon Nicolaides is a Senior Product Manager at ip.access, in charge of ip.access HNB, HNB-GW and management system products. He has a PhD in Radio communications and has worked on a range of wireless development and consulting projects. He has over 8 years' experience in small cell development.

Alexander Ratanov is a System Architect in the Systems Group at ip.access. He has over four years' experience in design, development and support of small cell systems. During the last year his work has including working on design and implementation of mechanisms to manage and adapt backhaul transport congestion and overload in small cell systems.

James Harrow is Director of Solutions at ip.access. He lead the development teams of ip.access 3G access points and now directs work in solution planning and implementation.

Andreas Schroeder is Head of Professional Services at ip.access and works with clients on ensuring smooth configuration and delivery of ip.access solutions.

Nick Johnson (Chief Technology Officer) founded ip.access in 1999. He led ip.access' 3G femtocell technology into partnership with Cisco and the world's largest femto deployment with AT&T. Nick leads the business's next generation technology activities and initiated the development of the nanoLTE⁺ products. He also chairs the Radio and Physical Layer working group of the Small Cell Forum. Nick has a PhD in Microwave Scanned Imaging Techniques from University College, London, and a MA in Physics from the University of Cambridge.

Víctor García Giganto received his degree in Telecommunication Engineering from UPM, with specialization in the field of bioengineering. In 2012 he collaborated with EHAS Foundation in the study of remote management of the wireless networks that EHAS had deployed over the Napo River, in Peru. In 2013, in collaboration with EHAS Foundation, he performed a viability study for the deployment of DHIS2 software as Health Information System in the Ministry of Health of Paraguay. Currently, he works as researcher in the EHAS Foundation, researching on low-cost tele-microscopy systems.