

# Bottom-up Broadband Pilots in Europe

## (C4EU 5.1.3: Report on Selection of Opportunities and Projects - c)

Name Surname, Name Surname, Name Surname, Name Surname,  
Name Surname, and Name Surname

### **Abstract**

This report covers the second call for pilots of the Bottom-up Broadband initiative, the consensus process that led to the definition of the pilots to be executed, and also the teams and pilot charters of the pilots that will be executed.

### **Index Terms**

Bottom-up-Broadband (BuB), wifi, fiber, sensor networks, BuB pilots

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## I. INTRODUCTION

This report introduces the second round of pilots in the Bottom-up Broadband initiative. Section II explains that it is a collaborative document and how to contribute. Section III reproduces the text of the second call for pilots and Section IV contains the received proposals. The combination of different proposals to obtain the pilots to be executed is described in Section ???. The team in charge of the execution of the proposals and the pilot charter document for each pilot is introduced in Section ???. Finally, Section VII concludes the document.

## II. ABOUT THIS DOCUMENT

This report has been produced using open source tools such as  $\LaTeX$  [1] and *git* [2].  $\LaTeX$  is widely used in academia to prepare print-class documents. It automatically takes care of numbering, cross-referencing, tables of contents, bibliography, etc. *Git* is a high performance distributed revision control which is used in many open source projects, such as the linux kernel. Git makes it easy and safe to collaborate as each contributor works on his or her own personal copy. Good contributions can be easily shared with others, and it is always possible to revert to a previous version.

Our git repository is publicly available in *github*:

<https://github.com/jbarcelo/C4EU-deliverables>

Anyone who is familiar with  $\LaTeX$  and *github* can contribute to this document. The first step is to make a copy (a *fork* in *github* jargon). The contributor can work in this copy and make changes to improve the document. After that, it is necessary to request that these changes are merged into the original copy of the document (a *pull request* in *github* jargon).

If you see anything that can be improved, feel free to contribute. This document is alive in the sense that it will keep evolving as long as contributors make changes and improve it.

The system automatically keeps track of all the contributors and their contributions. It is possible to see who is contributing more actively and which are the exact changes made by each contributor. And everything is public on the web.

### III. THE SECOND CALL FOR PILOTS

In February 2013 started the dissemination of the second open call for pilots. The call was first distributed among the *Commons for Europe* partners, then at *BattleMesh* (University of Aalborg) and the TCCC list (The Technical Committee in Computer Communication). We reproduce here the text of the call:

Dear colleagues,

We are currently studying "Bottom-up Broadband". This is collaborative grass-roots network deployment and maintenance. In this networks, the users (individuals, institutions, companies or other organizations) participate in the funding, planning, deployment and maintenance of the network. If you are participating in one of this initiatives or are interested in bottom-up-broadband, please contact us.

Open source software has changed the way that software is produced and maintained. Wikipedia has changed the way encyclopedian information is compiled and refined. P2P file exchange has changed the way files are shared and distributed. We believe that collaborative network deployment can change the way that networks are built, extended and maintained.

Probably, the most prominent example of collaborative network deployment is guifi.net. The size of this community network exceeds 20,000 nodes. Last year's efforts have been focusing on community fiber deployment with around 70 homes and farms connected today.

Besides fiber, we are also interested in ad-hoc mesh networks to cover events, wireless sensor networks to gather environmental data and public wifi offering models.

I attach the Bottom-up broadband call for pilots below.

Best regards, Jaume

\*\*\*\*\* BOTTOM-UP BROADBAND CALL FOR PILOTS \*\*\*\*\*

The high expectations created by the European Digital Agenda call for new models for network deployment. A combination of fiber and wireless technologies must be part of the solution to achieve the objectives in 2020.

The "Commons for Europe" competitiveness and innovation project explores "Bottom-up Broadband" (BuB) network deployment initiatives to analyze the best practices, find replicable success models and offer guidance to policy makers. In BuB networks, the users play a relevant role in planning, funding, deploying and maintaining the network. By users we mean the individuals and organizations, including commercial companies and public institutions, that benefit from the network. Network are shared as a "commons" resource by the communities for a greater benefit (and lower costs) for all the participants. The idea of BuB is closely linked to that of open access networks, which are proliferating in northern European countries.

\*\*\* BuB Call for pilots 2013 \*\*\*

We are looking for BuB initiatives to be considered in the "Commons for Europe" project. These initiatives will be profusely documented and used as examples for future BuB network deployments. Each selected pilot will receive the backing of a BuB fellow for nine months.

Proposal submission deadline: May 15th 2013 Selection decision: June 15th 2013 Start of the pilot phase: July 2013

Visit our web

<http://bub4eu.net/>

and join our mailing list

<https://listes.guifi.net/sympa/arc/bub>

for more information.

A brief description of the first round of executed pilots follows. (The application form is at the end of the email) restrictions of the existing infrastructure, allowing mobility and autonomy is an important field that can benefit all the parts involved as long as we find the right balance.

Application form:

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This pilot project data sheet will help us to keep track of all pilot initiatives. Please complete the following fields and submit to [jaume.barcelo@upf.edu](mailto:jaume.barcelo@upf.edu) (or even better, send it to the bub mailing list if you are registered)

Title:

Brief description:

Goals:

Estimated start date:

Estimated end date:

Priority: (Low/Normal/High)

Stage: (Prospect/Pre-project/Review/Execution/Evaluation/Finished)

Type: (Wifi/SuperWifi/Fibre Optics/Hybrid)

Status: (Not Started/In Progress/On Hold/Completed)

Progress %:

Country:

Area:

City:

Neighbourhood:

Project type:

Contacts:

Risk %:

(0% means that the success is guaranteed, 100% means that it is impossible to successfully complete this pilot)

Regulatory issues:

Potential impact (e.g., number of users, BuB funds raised, cities involved, etc.):

Comments:

Thanks for your collaboration :)

End of application form.

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#### IV. RECEIVED PROPOSALS

##### *A. A Pilot Wireless Network for Remote Sensor Data Collection from Griffin Forest in Central Scotland*

Title: A Pilot Wireless Network for Remote Sensor Data Collection from Griffin Forest in Central Scotland

Brief description and Goals:

Geoscientists from Edinburgh University have been conducting field experiments since 1996 in the Griffin forest in central Scotland, 4Km southeast of Aberfeldy. The focus of the current experiment, which is expected to continue for at least 5 years, is on understanding the impact of aerosolbased nitrogen fertilization to stimulate forest growth in comparison with the traditional fertilization method based on solid pellets in significantly higher amounts and infrequently (typically every 5 years). Understanding the effect of background levels of nitrogen on forest growth requires monitoring various environmental, microclimatological and hydrological factors that together reflect forest growth rate. Consequently, the experimental site in the Griffin forest has a wide range of sensors deployed over a 1Km<sup>2</sup> area. Currently there is no communications network infrastructure in place at the experimental site for remote access from Edinburgh as well as for onsite communication among various geographically distributed sensors. As a result, geoscientists from Edinburgh connected with the experiment have to make weekly trips to the site for data collection and maintenance of site infrastructure (e.g., replacement of batteries on sensors). The goal of this project is to enable network connectivity to Edinburgh for remote sensor data collection and site monitoring. This will be achieved by deploying a wireless base station at the site and a wireless relay that bridges connectivity between the base station and nearest Internet connection point. Given the remoteness of the site, both these wireless masts have to be selfpowered via renewable energy sources (solar and wind). Longdistance WiFi could be used to interconnect these wireless masts. Since the vegetation and forest cover dampens wireless signal propagation, we also intend to experiment with SuperWiFi to understand the benefits it provides towards achieving required coverage with low power power conservation is important when using selfpowered wireless relays for reliable connectivity at low cost. The Forestry Commission



Scotland, who have a base near the Griffin site, have in principle agreed to allow us to share their Internet connection.

Estimated start date: 1 August 2013

Estimated end date: 30 April 2014

Priority: (Low/Normal/High) High

Stage: (Prospect/Preproject/Review/Execution/Evaluation/Finished) Preproject

Type: (Wifi/SuperWifi/Fibre Optics/Hybrid) Wifi and SuperWifi Status: (Not Started/In Progress/On Hold/Completed) Not Started

Progress

Country: UK

Area: Rural

City: Near Aberfeldy, Scotland

Neighbourhood: Griffin Forest

Project type:

Contacts: Dr Mahesh Marina (mmarina@inf.ed.ac.uk)

Risk %: 0%. Through the Tegola project <sup>1</sup>, we have substantial experience on successfully using longdistance WiFi for wireless Internet access in rural and remote areas. (0% means that the success is guaranteed, 100% means that it is impossible to successfully complete this pilot)

Regulatory issues: For experimenting with SuperWiFi, we will get an experimental license from Ofcom, the UK telecommunications regulating authority.

Potential impact (e.g., number of users, BuB funds raised, cities involved, etc.): Having the experiment site connected to the Internet leads to several benefits. Firstly, it will result in cost savings through reduced travel requirements for sensor data retrieval from the site. Secondly, it will enable remote monitoring of the experimental system for faults in near realtime that will in turn lead to data quality improvement and more informed site visits. Thirdly, networking among sensors within the site will enable development of adaptive sampling systems which would allow for event driven sampling based on measurements from noncolocated measurement systems. Finally, external communication capability

<sup>1</sup>Tegola Tiered Mesh Network Testbed in Rural Scotland

would allow for more rapid dissemination of results from the experiment to interested communities (e.g., European scale carbon exchange modelling efforts).

Comments: We would benefit from ready to use equipment for this pilot approximately valued around 5000, thanks to the Tegola project which initially was deployed as an experimental wireless testbed but now has evolved into a selfsustaining rural wireless network owned and run by the local communities in Northwest Scotland. As already mentioned, this pilot would also benefit from an Internet connection generously provided by the Forestry Commission Scotland. We would however need a person to help with the pilot deployment at Griffin site who we hope would be supported through the BuB initiative.

## V. PILOT PROPOSAL COMBINATION

After receiving all the proposals we started to analyze common trends and possible synergies among them. The fellows were selected and offered to choose the pilot of their interest. In what follows, we reproduce the pilot charter of all the pilots that will be executed in the second round of pilots.

## VI. PILOT CHARTER: MESH NETWORKS OF PEOPLE

Fellow: Sergio Almendros

Mentor: Daniel Mur

Advisor: Jaume Barcelo

### *A. Pilot purpose or justification*

The purpose of this pilot is to create an android mobile application that allows users to create a mesh network. The nodes of the network will be the mobile devices running the application, and they will share information among the participating users.

### *B. Measurable pilot objectives and related success criteria*

- The android application has to be able to have a list of the people around the smartphone that are using the the application, at least 10 users.
- If there is a user that is sharing information, other users must be able to see it in less than 1 minute.

## VII. CONCLUSION

### ACKNOWLEDGMENT

This work has been partially funded by the European Commission (grant CIP-ICT PSP-2011-5). The views expressed in this technical report are solely those of the authors and do not represent the views of the European Commission.

### REFERENCES

- [1] L. Lamport, *LaTeX: A Document Preparation System*. pub-AW, 1994, vol. 14.
- [2] S. Chacon, J. Hamano, and S. Pearce, *Pro Git*. Apress, 2009, vol. 288.