

Project Acronym Commons4EU

Grant Agreement number: 297191

Project Title: Commons for Europe

D5.4.2 Report on Pilots on Fiber Deployment - b

Revision: v1.0

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Project co-funded by the European Commission within the ICT Policy Support Programme		
Dissemination Level		
P	Public	X
C	Confidential, only for members of the consortium and the Commission Services	

Revision History

Revision	Date	Author	Organisation	Description
v0.x	>04/11/2013	R. Baig et al.	Guifi/UPF	Internal versions; not made public
V1.0	04/11/2013	R. Baig et al.	Guifi/UPF	First release

Statement of originality:

This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

Abstract

Optical Fiber is certainly the best technology available for data transmission in terms bandwidth, latency, reliability and stability. As installation costs decrease, it is expanding beyond its original realm and major application in the carrier backbone and is moving into the local loop. Following this trend community networks are gradually adopting it. Thus this technology is one of the three selected in Commons for Europe project for Bottom-Up Broadband pilots. The present technical report accounts for progress made during the second reporting period (Nov 2012 - Oct 2013) of optical fiber pilots in the Commons for Europe project.

Background / Suggested Reading

The socio-economics fundamentals of the optical fiber pilots as long as the technological aspects are explained in the report of the first reporting period (Nov 2011 - Oct 2012). The present document reports only on the progress made during the second year of these pilots following the same structure of the first report. Thus, it is strongly recommended to be familiar with the first year report before reading this one.

The "Fiber From The Farm (FFTF) *D5.4.1: Report on Pilots on Fiber Deployment -a*" report, the first reporting period report of fiber pilots, can be found at https://github.com/jbarcelo/C4EU-deliverables/blob/master/D_5_4_1_report_on_pilots_on_fiber_deployment_a/DELIVERED_VERSION/D5.4.1%20Report%20on%20pilots%20on%20fiber%20deployment%20-%20a%20guifi.net_DELIVERED_VERSION.pdf

Index Terms

Bottom-up Broadband (BuB), Community Networks (CNs), Fiber From The Farm (FFTF/FFTx), Optical Fiber (OF), Points-of-Presence (POPs)

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I. DEPLOYMENTS

This section presents the evolution of optical fibre (OF) deployments, from the Points-Of-Presence (POPs) to the end users. POPs are covered in Section II.

A. Pilot's deployments

During the second reporting period¹, *Gurb's* pilot, the most developed of the three pilots, has kept growing steadily in terms of new users connected, in *Vic's* the PoP has been raised and the initial connections have been made, and in *Rubí*, a pilot categorised as "blocked" by the end of the first year, new opportunities for the third year have appeared.

1) *Gurb*: In the first OF initiative in guifi.net, where the PoP infrastructure had been risen, put into service and the first deployment iteration made even before Commons for Europe project was started, the second iteration, the deployment expected for the second year, is being carried out as planned -three fourths of the users are already connected and the rest are expected to be connected before the end of the year. The two first deployment iterations have proved that the BuB OF model works for rural areas (i.e. farms and isolated houses). This kind of deployments are essentially aerial. On the contrary, the area of third iteration, the third year's iteration, is a urban area (mostly detached houses with seldom apartment buildings). This deployment the wiring will be done mostly using already existing ducts owned by the local government. The terms for their usage have already been established and the agreements signed.

Table I summarises the evolution of the *Gurb's* pilot during the second year.

¹NOTE: Commons for Europe project has three reporting periods: Nov 2012 - Oct 2013, Nov 2012 - Oct 2013 and Nov 2013 - Oct 2014. In this document they can also be referred as first year (Y1), second year (Y2) and third year (Y3), or simply 2012, 2013 and 2014.

OF deployment of <i>Gurb's</i> Pilot in 2013	
New users already connected	40
Additional users expected by the end of 2013	20
Unsubscribed users (vs. 2012)	0
Km of OF deployed	20

TABLE I

GURB'S OF DEPLOYMENT EVOLUTION IN 2013.

Figure 1 shows the deployment evolution on a map. Red are lines existing before 2013. Blue and cyan are end user and backbone lines made operational in 2013. Green are lines to be executed by the end of 2013. Brown are backbone lines planned for 2014.

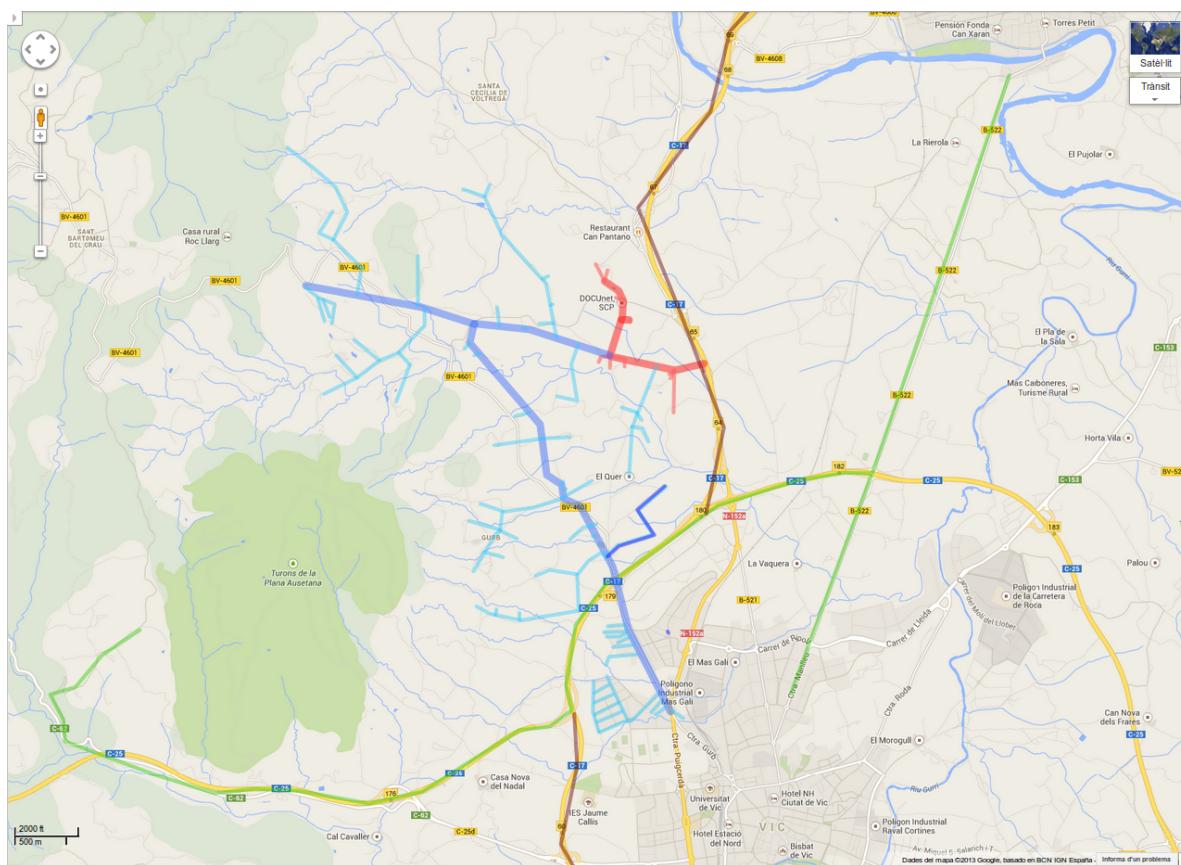


Fig. 1. OF deployment in Gurb's second and third iterations.

Figure 2 depicts how end user connections are made.



Fig. 2. Connecting a farm. Top left: Preparing the fibre splicer. Top right: The fibre splicer and the additional tools needed. Bottom left: The house being connected. Bottom right: Speed test results.

Figure 3 shows the average daily traffic². It increases as the number of connected end users increase. The cut of mid September corresponds to a sabotage that took place in September the 11th³.

²All traffic figures are 95-percentile.

³September the 11th is the Catalan national day. It is suspected that the sabotage was directly related to this fact as part of the reaction of the independence process of Catalonia.

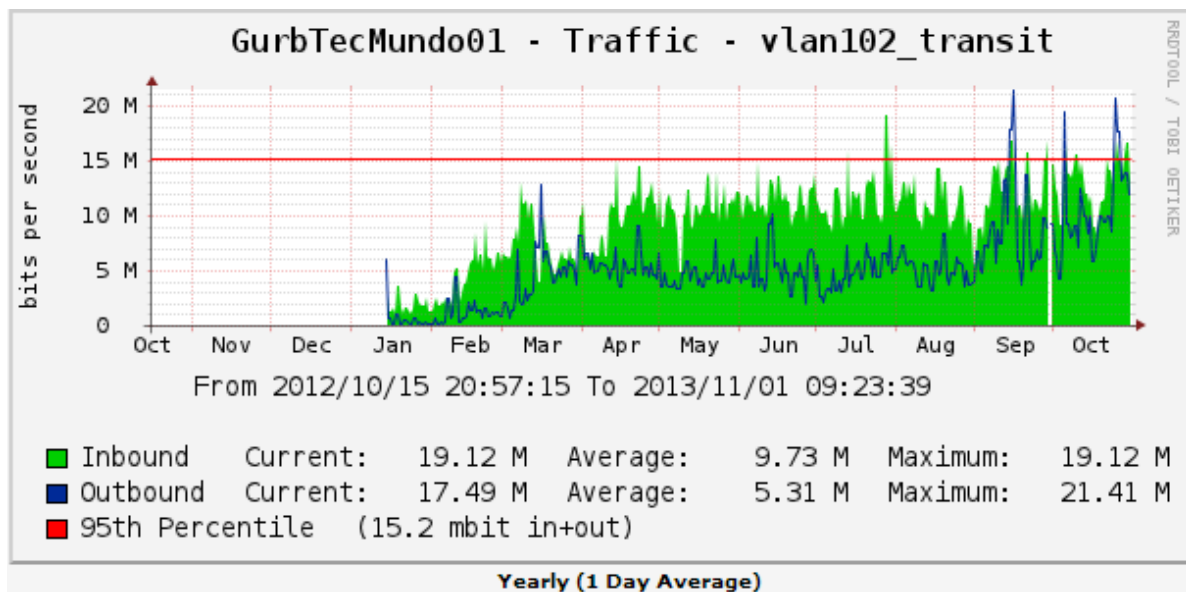


Fig. 3. Gurb's pilot network traffic 2013.

2) *Vic*: This urban deployment is the result of the collaboration of individuals, industries and social services. In the first iteration a primary and a secondary school, a hospital and chemical industry together with a dozen of dwelling houses have been connected. It is expected that the number of connections will significantly increase in 2014.

Figure 4 is the map of the second (2013) and the third (2014) iterations. Green are end user and backbone lines already operational. Orange are lines to be executed by the end of 2013. Red are lines planned for 2014.

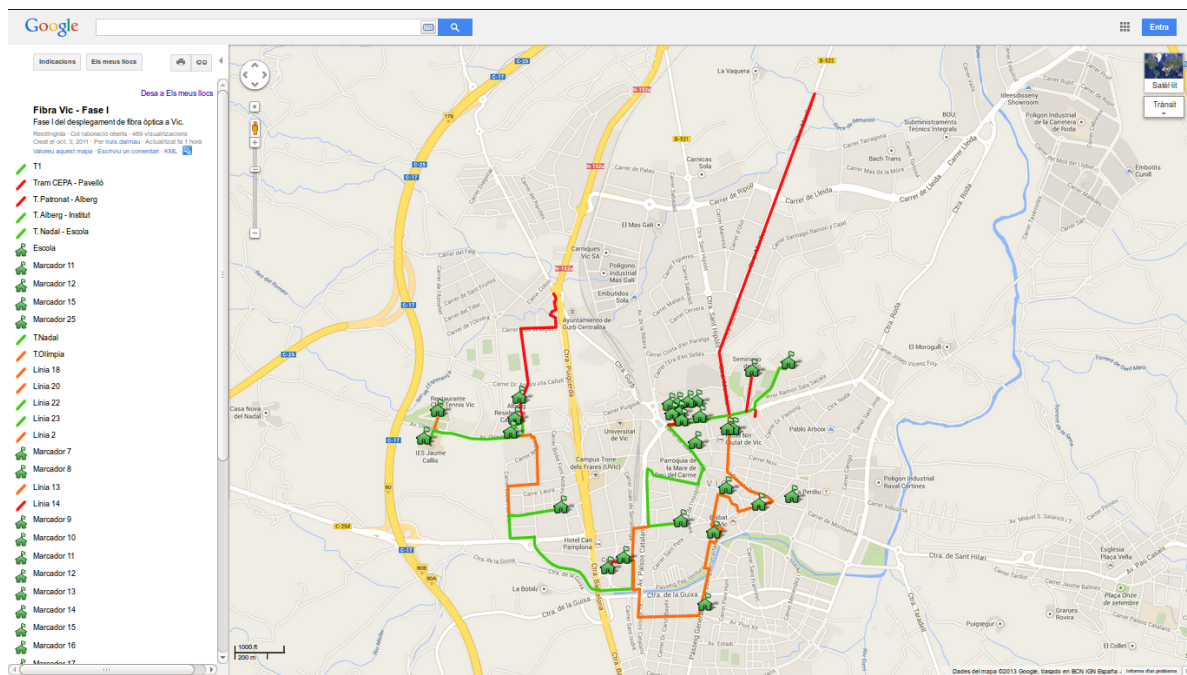


Fig. 4. OF deployment in Vic's second and third iterations.



Fig. 5. Connecting a hospital in an urban area. Top left: The fibre reel close to the Hospital's main entrance. Top right: Already outside the Hospital venue. Bottom left: Along the streets. Bottom right: Working until late at night.

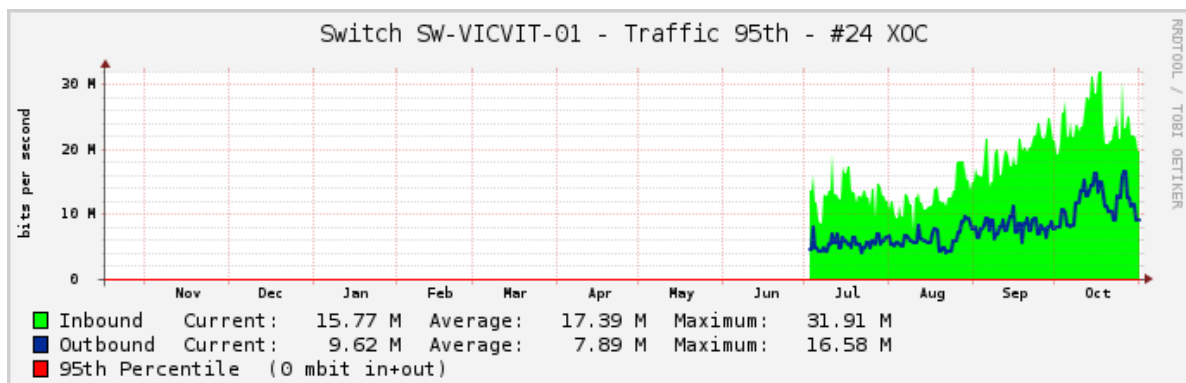


Fig. 6. Vic's pilot network traffic 2013.

3) *Rubí*: As already detailed in the first report, by the end of the first year this pilot was considered to be in a blocked state. In 2013 on the one hand the traditional ISPs have continued deploying their own OF, but on the other hand new opportunities to deploy BuB OF appeared. Indeed, in June a person from the city advised by the local government contacted the guifi.net Foundation to get further information about the BuB model and to discuss on the viability of setting up a consumers cooperative ISP. At the moment it is a work in progress to be consolidated during the year 2014. Nonetheless it looks promising because this person has a wide experience in such kind of cooperatives (she had played a relevant role in the creation of the renewable energies consumer cooperative Som Energia⁴) and because the initiative is viewed as favourably by the local government and has its support.

B. Other deployments

Aside from the selected pilots there are other on-going FO initiatives in side guifi.net at various stages of maturity. The consolidated (those that already have a PoP up and operational) ones are:

- Masquefa
- Igualda
- Manresa
- Aldea
- Tortosa

It is expected that other initiatives will consolidate in 2014.

II. POINTS-OF-PRESENCE (POPs)

During this second year another four territorial PoPs have been raised and made operative, amounting to a total of eight territorial and the concentration one (Telvent-Barcelona) operational. Figure 7 shows their distribution on the map. So far all the territorial PoPs are connected to the concentration one via XOC connections⁵.

⁴<http://www.somenergia.coop/welcome-to-som-energia>

⁵The prices can be found at <http://www.xarxaoberta.cat/en/prices>.

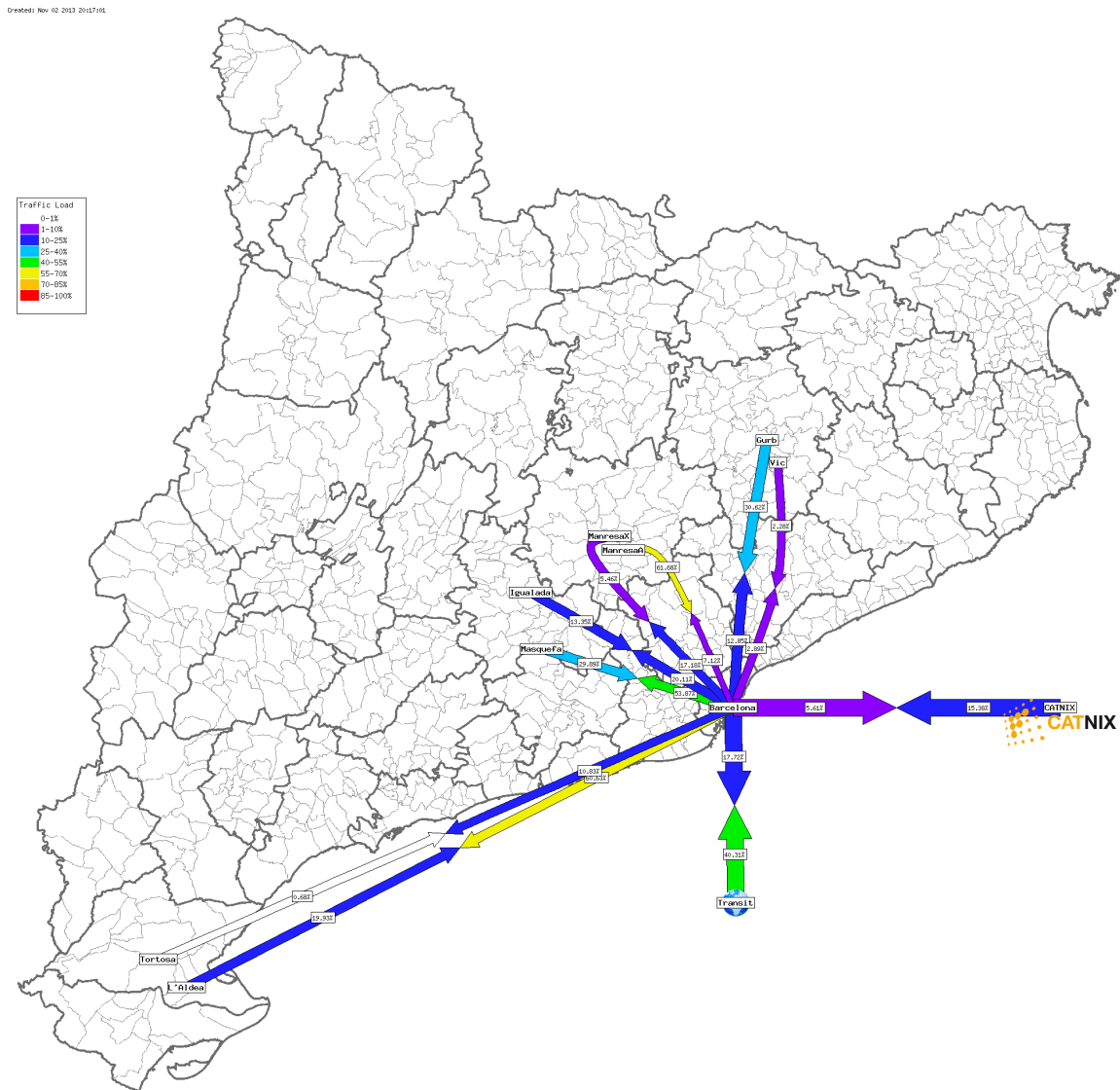


Fig. 7. Guifi.net fiber POPs network map 2013.

With respect to the IXs operation, the following improvements have been applied during this year:

- The management system has been notably enhanced.
- A new monitoring development was launched in June 2013 (consequently, most of the traffic graphs shown in the document stars at that moment).
- The implementation of a more efficient accounting system has been started and it is expected to be fully operational in 2014. This system will make the ISPs'

theshowback/chargeback more accurate and fair.

- The equipment of most of the PoPs has been completed and updated.

As an example of the current state of the art of the PoPs Figure 8 shows Telvent's PoP at wiring level.

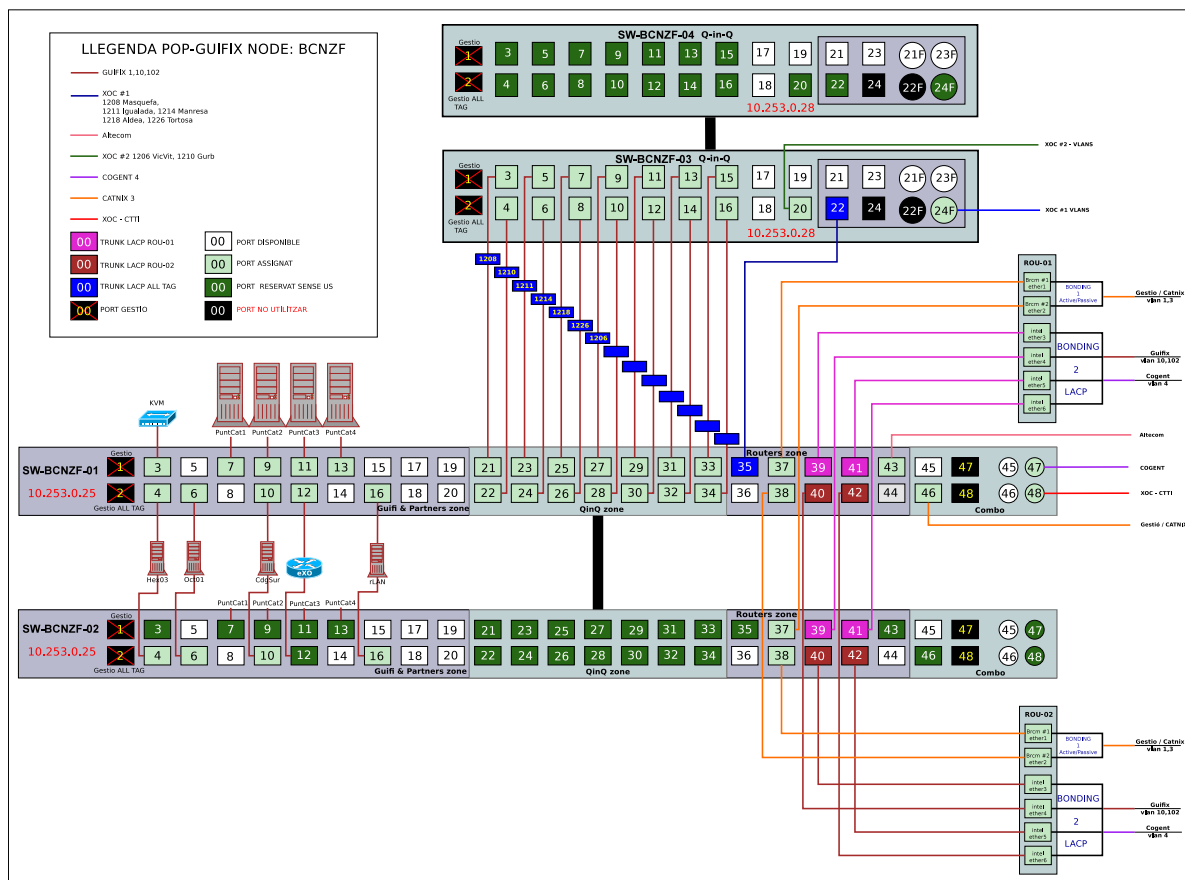


Fig. 8. Telvent network diagram Oct. 2013.

During this period the CATNIX (the Catalan exchange point) peering process has been completed. As a result, the guifi.net Foundation is peering with all the other CATNIX members with the exception of the big ISPs (the Telefonica -the incumbent, Ono and BT). These ISPs have not shown any interest in peering with us.

Figure 9 shows the evolution of the peering traffic and Figure 10 shows the traffic to Cogent (our internet carrier). A second carrier is expected to be hired in the coming weeks, essentially to have a redundant internet access but also to anticipate the

bandwidth demand.

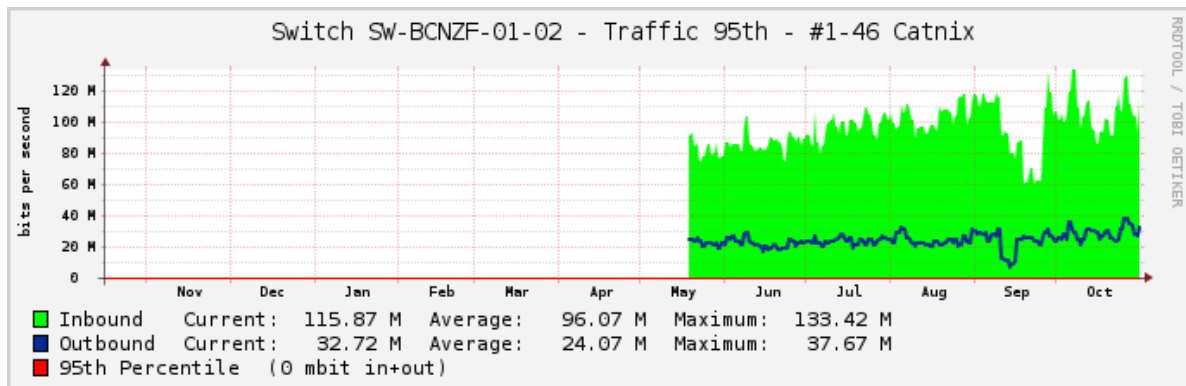


Fig. 9. CATNIX traffic 2013.

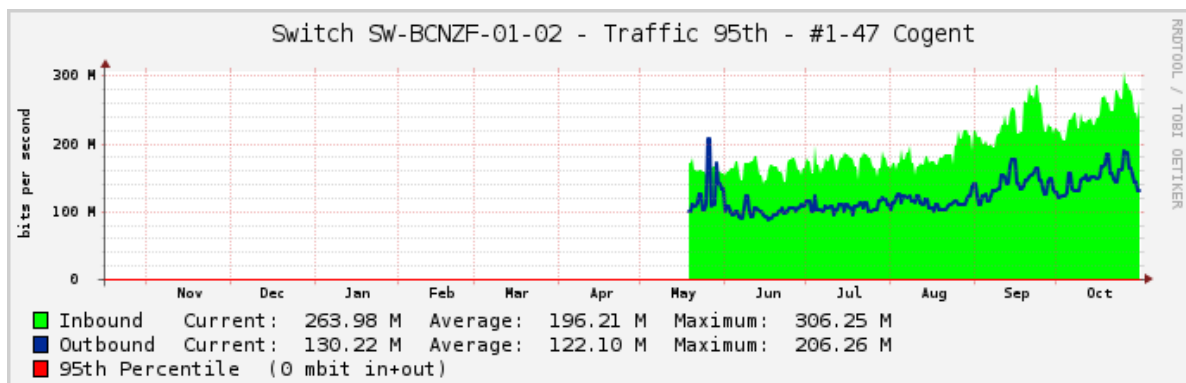


Fig. 10. Cogent traffic 2013.

A. Pilot's POPs

1) *Gurb*: This PoP has been operative since 2010. This year the power supply system has been improved by adding a back-up power supply. Also the electronic equipment has been significantly extended to accommodate the necessities deriving from Gurb's OF pilot deployment and other connections. Figure 11 shows the transit of this PoP.

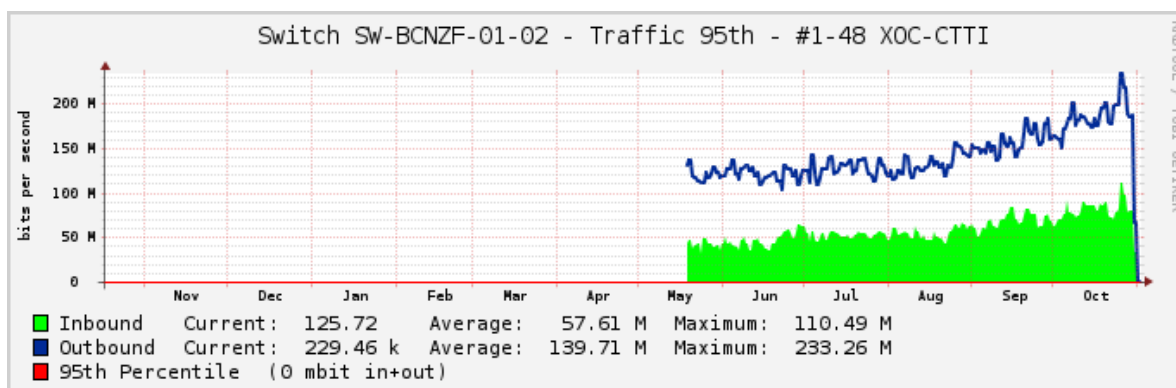


Fig. 11. Gurb PoP traffic 2013.

2) *Vic*: As already foreseen in the previous report, this PoP was activated few days after the report was realised. Despite the fact that Vic borders Gurb, This PoP was raised as an alternative to the impossibility of reaching the Gurb's PoP. The equipment is allocated in a data centre of a facilitate of the local government (<http://www.vitvic.cat/>). Figure 12 shows the transit of this PoP.

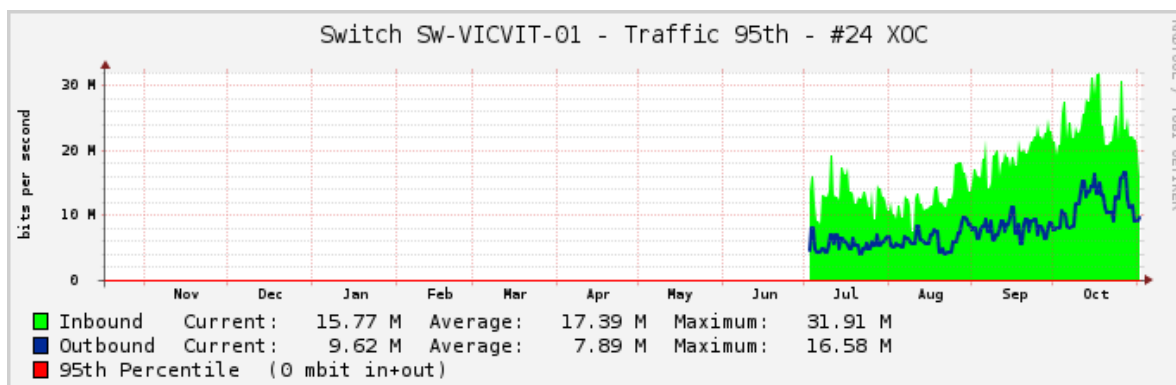


Fig. 12. Vic PoP traffic 2013.

3) *Rubí*: In contrast to Vic, where due to its proximity to Gurb the option of not raising a PoP was worked, Rub pilot clearly needs its own PoP. Thus, if the pilot is eventually developed in 2014 this PoP must be raised.

B. Other POPs

Figure 13 shows the transit of the rest of the operational territorial PoPs .

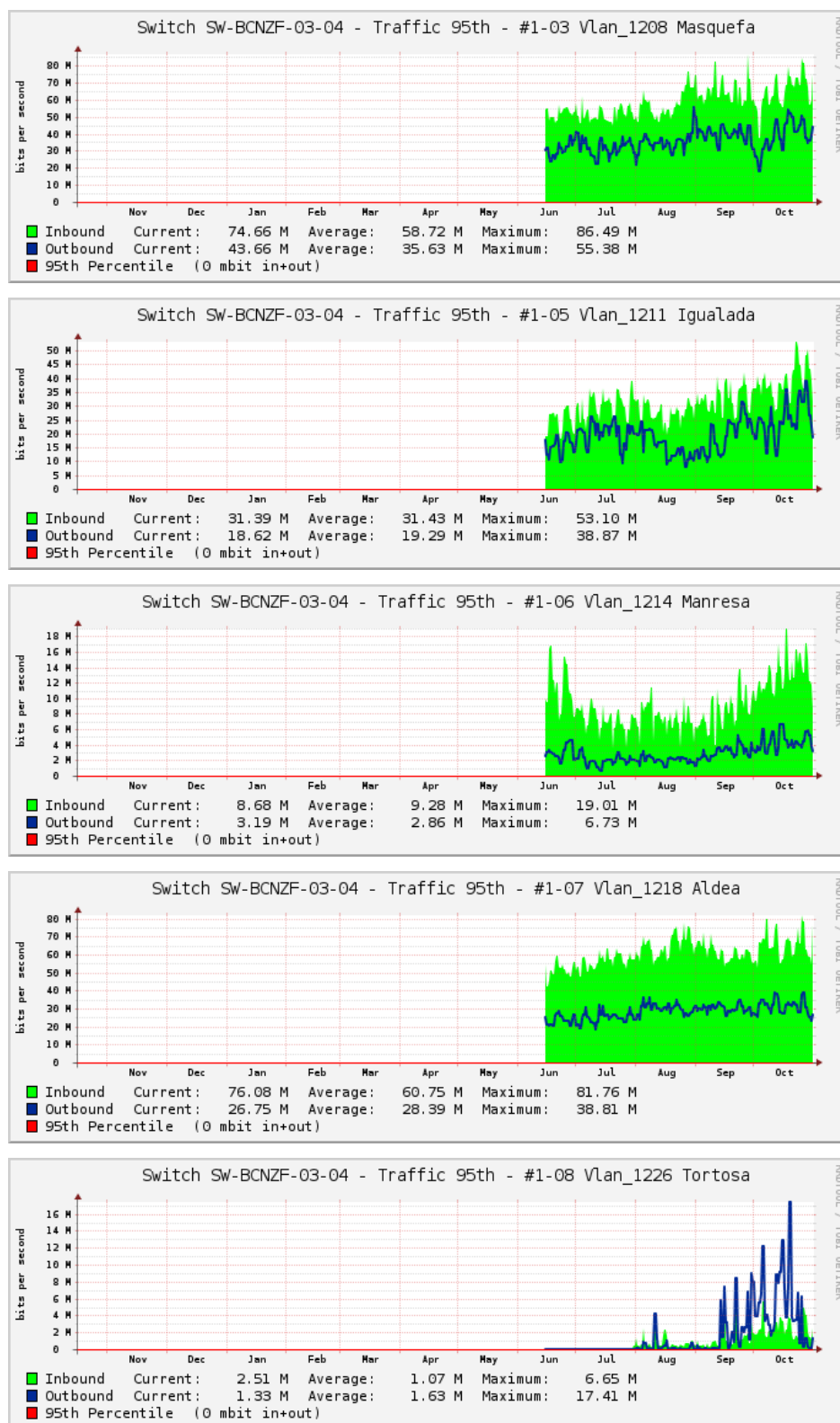


Fig. 13. Other PoPs traffic 2013. Top: Masquefa. Second top: Igualada. Middle: Manresa. Second bottom: Aldea. Bottom: Tortosa.

III. EVALUATION OF PILOT'S RESULTS

Despite the fact one of the three pilots is still blocked the progress of the other two together with the results of the other initiatives the experience, as a whole, in our opinion, is a great success. Given the fact that this year there have already been many deployments in parallel, instead of presenting their specific numbers we focus on the most relevant contributions of the BuB model already observed.

A. Model acceptance

Despite all the difficulties inherent to new models, the already seen traffic graphs together with the facts that none of the existing users have withdrawn and the future previsions, prove that the model has been widely been accepted.

B. The pilots as a reference

The pilots are playing a fundamental role with regards the other projects because they constitute precedents that can be reused in other cases.

Legal uncertainties clarification Although the telecommunications market is liberalised, the facts that it has been a state monopoly for a long time in almost European countries and that it is unusual that the citizens play an active role in it result in a general lack of knowledge regarding the real rights of the citizens and how to exercise them. Learning about these rights and telling to the third parties (specially to the public administrations) has consumed a lot of resources. Having an already running cases together with the support of being a partner of the CommonsforEurope project helps to reduce this overhead in great manner.

Local agreements Agreements to regulate the citizens-private-public collaboration are part of the tools that have had to be developed. The current ones are used as guide for the new ones.

Best practices The day-to-day work is the best way to gain expertise. Best practices regarding technical, financial, etc. aspects are shared among the pilots and the community.

C. Sustainability and Scalability

The results achieved, specially the fact that new initiatives are being developed, show that the model is sustainable from the economic point of view and that it is feasible from the technical and the social points of view.

D. Local economic promotion

In addition to the impact in terms of local economic promotion any deployment of an optical fibre network accessible by the inhabitants (essentially in terms of the cost, because, unfortunately, few people is concerned about other aspects like data retention, surveillance, etc.) has, specially if it is the first one available, the BuB model the following traits:

Knowledge transfer All knowledge and information is accessible to the public. Thus everybody has the same opportunities to start a business. Professional secrecy has a extremely bad reputation.

Job and small business creation Many SMEs have been created so far around guifi.net Two types of job positions are the most common so far: Internet service access (over the CN) and physical installations. Frequently SMEs combine both of them and, additionally, take the participation in the project as an opportunity to better position themselves in the market.

SMEs cooperation The guifi.net Foundation strongly promotes the cooperation among SMEs in terms of knowledge sharing, resources sharing, etc. The activity in the concentration PoP is clear example of this collaboration. There ISPs operating in guifi.net (they are all SME) gather together to deal special offers with the providers (carrier, collocation, etc.) and share costs.

E. Digital divide reduction

The presence of a decent internet access has many other benefits for the population aside from the direct impact on the local economy. Nonetheless these benefits are restricted to those who can afford the connection cost. The BuB model is a significant contribution towards the digital divide reduction because BuB is a cost oriented model

(fairness in prices is a compromise taken by the ISPs) and also a Do-It-Yourself model (so everybody has the right to make his own deployments).

F. Social Implication

BuB model fosters social implication of individuals in great manner. Things do not happen if people do not want them to happen. After almost ten years of activity people have (re-)learn how to cooperate to achieve a common objective, how to interact with the public administrations, how and why to take care of the common good, etc.

We are convinced that this way of doing things can be exported to many other fields like the electrical power or the health care systems.

IV. CONCLUSION

During the second reporting period four new operational PoPs have been added to the five already existing ones. Thus, there are already eight on-going deployments in parallel and others are expected to consolidate during the next year.

As far as end-users accounting metric is concerned, in order to preserve the inherent autonomy of the BuB model and to better adapt to the current number of PoPs and its expected future evolution, in this report we introduced the PoPs traffic at the expenses of the precise number of end-users connected. By the end of this reporting period the aggregated OF transit (internet carrier + CATNIX peers) is above 500Mb/s (95% percentile). The yearly traffic graphs presented show a clear sustained rising trend.

In addition to the PoPs and end-user results, the contributions made in local economic promotion, social implication, digital divide reduction, etc. must also be highlighted.

Thus, the overall assessment of the job done and the results achieved so far is very positive. We face the last pilot year with the highest expectations.

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.