Fiber From The Farm (FFTF)

(C4EU 5.4.1: Report on Pilots on Fiber Deployment -a)

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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. The present technical report accounts for progress made during the first year of optical fiber pilots in the Commons4Europe project.

Index Terms

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

CONTENTS

LIST OF FIGURES

LIST OF TABLES

I. Introduction

Despite the scepticism of some people about the capacity of community networks (CNs) to incorporate the optical fiber (OF) technology in guifi.net there are many on-going initiatives[1] to do so. The fact that some of these projects are already in the stage of being fully operational, bringing of Gbs/s broadband Internet access to places (such as rural areas) where the traditional telcos are currently offering connections of few Mbs/s at most, proves that it is totally feasible to deploy and operate OF infrastructure according to the CNs principals following a bottom-up approach, thus that the aforementioned scepticism is totally unfounded.

The present document reports the presence of OF in guifi.net, paying special attention to the three projects that have been selected as OF pilots [1] in the Commons4Europe project and how they have progressed over the first year. The Gurb[2] project has been selected as a pilot because it was the first OF project started and the most advanced one. The Vic[3] pilot has been selected because it is a case of OF in an urban area. Finally Rubí[4] has been selected as a case where the project at the moment is blocked.

Several new terms have appeared for this new way of deploying OF such as *Fiber From The Farm (FFTF/FFTx)*[5] or Bottom-up Broadband (BuB)[6]. BuB term was introduced in the Digital Agenda for Europe as the result of the guifi.net participation in the Stakeholder Day 2010[7]. All these terms refer to the high degree of the implication of the end user in

[1] In the guifi.net jargon each of these initiatives is called *a project*

[2] Gurb, population 2.538 hab, density 49,19 hab/km^2, located in the ”comarca” of Osona, Catalonia. It is a typical Catalan rural village formed by a few streets and many disseminated farms, some of them rather isolated.

[3] Vic, population 40.900 hab, density 1.336,60 hab/km^2, the capital of the ”comarca” of Osona, Catalonia. It is a typical middle size Catalan city of the Catalan rural areas where most of the population lives in the urban area with several industrial parks.

[4] Rubí, population 73.979 hab, density 2.290,37 hab/km^2, located in the ”comarca” of Vallès Occidental, Catalonia. It is a typical middle size Catalan city of the Barcelona surroundings where most of the population lives in the urban with several industrial parks.

[5] A play on words (i) referring to the active-*from* vs. passive-*to* role of the end users of the CNs models vs. the traditional telcos models, and (ii) reaffirming the popular origin of the initiative *farm* vs. *home*.

[6] Despite this term does not strictly refer to FO the reference is implicit since many people thinks that FO is the only way to grant the broadband.

[7] http://ec.europa.eu/digital-agenda/events/cf/dae1009/item-display.cfm

all the phases of the network deployment and operation.

In FO all connections are end-to-end (Point-To-Point) connections[8]. Hence, the active parts concentrate in the edges. While the intercity connections usually form a mesh network, the so called *backbone*, the intracity connections usually form a start, the so called *user loop* or *last mile links*, centred in the nodes of the intercity mesh. OF wires are passive, so all the electronics and logical configurations concentrate in the edges. While the next section focuses on the physical part of the deployments, called *deployments* itself, the following following focuses on the nodes, named *Points-Of-Presence (POPs)*. The *results* section summarises the results already achieved. Finally the *conclusion* reviews the information presented.

II. About this document

This report has been produced using open source tools such as LaTeX [2] and *git* [3]. 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 firs 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).

[8]Precisely speaking Passive Optical Network (PON) technologies allow Point-To-Multipoint connections. Despite they are widely used, also in guifi.net. For the sake of clarity in this document they are usually treated as a group of PTP links.

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. Related work

TODO

IV. Deployments

This section presents the optical fibre (OF) deployments from the Points-Of-Presence (POPs) to the end users. Therefore it mainly refers to the physical wire deployment. The POPs are described in section V.

A. Pilot's deployments

Two pilots out of the three selected already have OF deployed.

1) Gurb: TODO

2) Vic: Figure 1 Figure 2

3) Rubí: Rubí local government in early 2012 showed interest in deploying fiber following a Bottom-up Broadband model. The first goal was to offer high-speed Internet connections to the largest companies operating in one of Rubí's industrial areas called "Can Jardi". These companies had access only to slow ADSL connections and the absence of a fiber deployment was seriously affecting their competitiveness. The lack of commercial high speed connections offering prompted the city's local government to look for alternatives.

An initial round of conversations took place in Spring 2012 to plan for a deployment during the Summer. The planning involved a strong participation of a local partner, company with experience in wireless BuB deployment. This initial planning for a bottom-up-broadband deployment did not pass unnoticed, and commercial ISPs approached

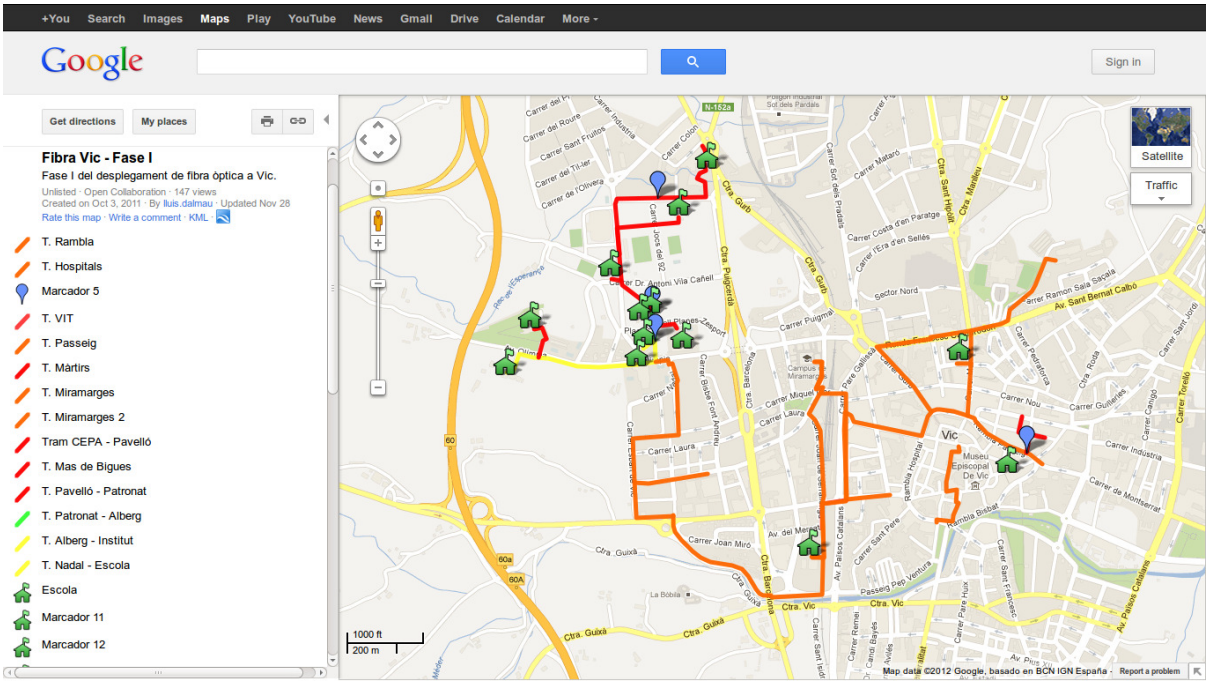

Fig. 1. OF deployment in Vic iteration 1.

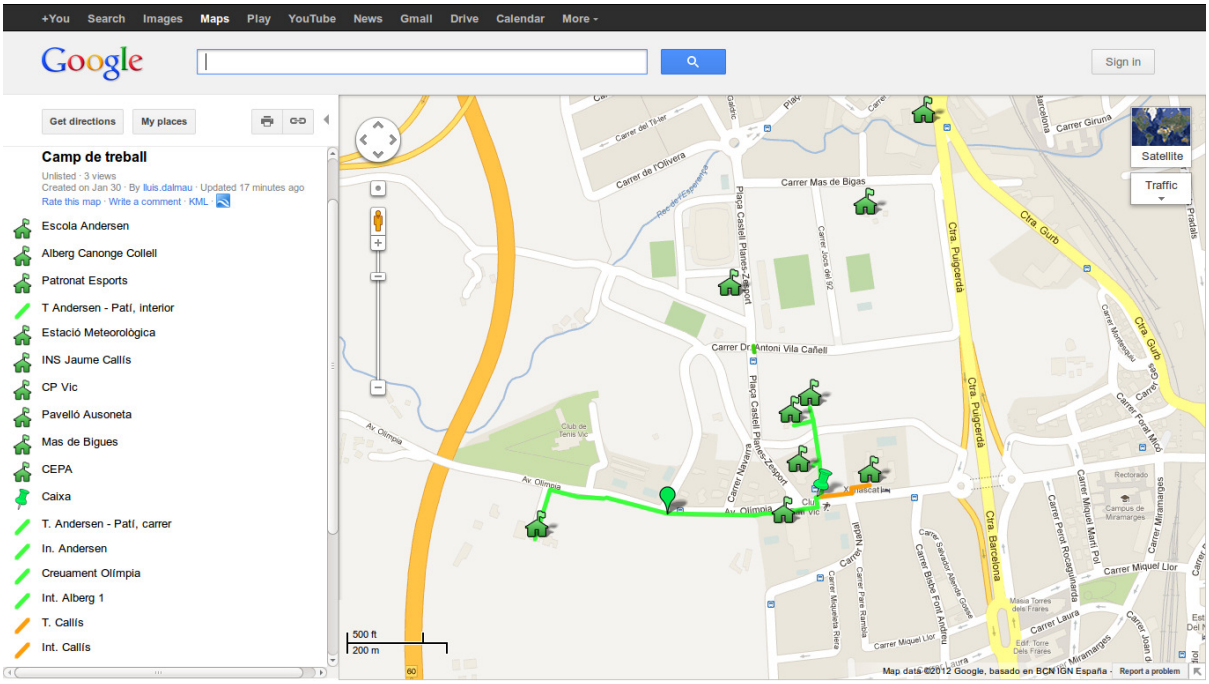

Fig. 2. OF deployment in Vic iteration 1.

the Rubí local government with fiber deployment offerings. The offering was to place the city of Rubí high in de ISPs fiber deployment plans and prioritize it over other cities. Guifi, UPF and the local partner were asked by the city's local government to prepare a concrete offering that could match the offering of the ISPs.

The arrival of traditional ISPs proposals, combined with the uncertainties of the competence of the local partner to carry out fiber deployments and internal discrepancies in the Rubí's local government slowed down the pilot. Currently this pilot is on hold, and it is not clear how it will resolve. Personal interests and personal connections within the City Hall may play an important role in the final resolution.

It is remarkable that the fact that the City Hall entered in conversations to plan a BuB deployment triggered a number of events that placed the city in a much favourable situation to negotiate with the ISPs about future fiber deployments.

B. Other deployments

V. Points-Of-Presence (POPs)

A Point-Of-Presence (POP) is an artificial demarcation point or interface point between communicating entities. In our case we are referring to optical fiber interconnection points. From 2010 until now the guifi.net community has raised six points of presence over the Catalan territory. This POPs are following the network model of freedom and neutrality specified in the community network license[9]. Thus anyone is able to connect to them but always respecting the same conditions.

From a general perspective guifi.net community is building a set of neutral exchange points, leaving the infrastructure available to the individuals, associations or either companies. These kind of POPs are named POP-IX making reference to the internet exchange points (IX).

Figure 3 shows the fiber network map of guifi.net POPs (not all of them).

The current guifi.net POPs are managed, maintained and also economically sustained for the community. To interconnect all of them it is need to use third party infrastructure.

[9]This is the agreement all users must accept to join the network. It's mission is to keep the network free, open and neutral. The Catalan version can be found at http://guifi.net/ca/CXOLN. It has not yet been translated into English

The FFTH projects are able to deploy some kilometres of optical fiber but not hundreds or even thousands.

In Catalonia there exist a set of deployed fibers which are owned by the Catalan government, available to any entity and rented for a regularized price. Most of the guifi.net POPs are connected to such network to interchange data between them. Figure 4 shows a slice of the network fiber map provided by the government.

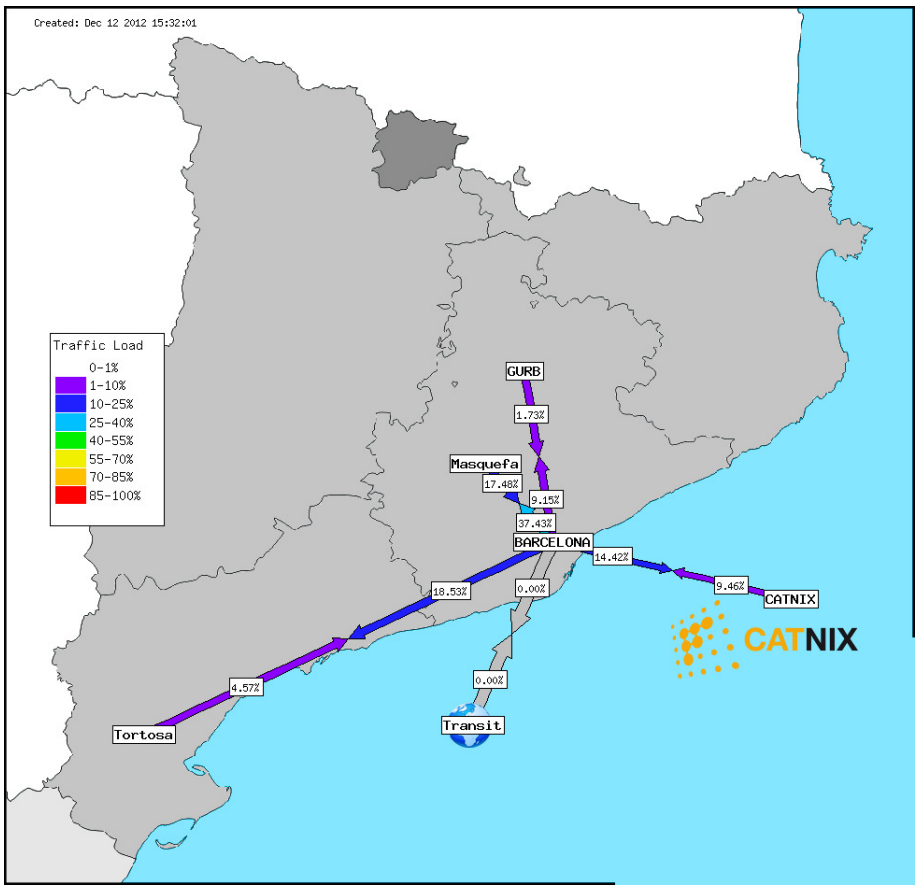

Fig. 3. Guifi.net fiber POPs network map

A. Pilot's POPs

1) Gurb: Gurb is a small village in a rural area of the geographical center of Catalonia. Back in 2004 the first guifi.net community was born here. Probably because of that Gurb is nowadays one of the places where the bottom-up broadband model has more

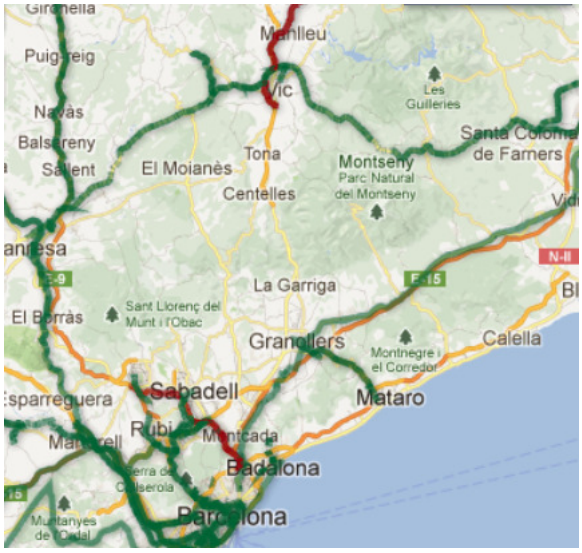

Fig. 4. Available regularized fiber

influence. As explained in Section IV the community users deployed some optical fiber kilometres to reach the government infrastructure and connect with other POPs.

It is a very important point-of-presence because it allows a small data center provided and maintained by the community. There are even ISP companies connected to such POP following and using the open-network model to provide Internet connectivity to end users.

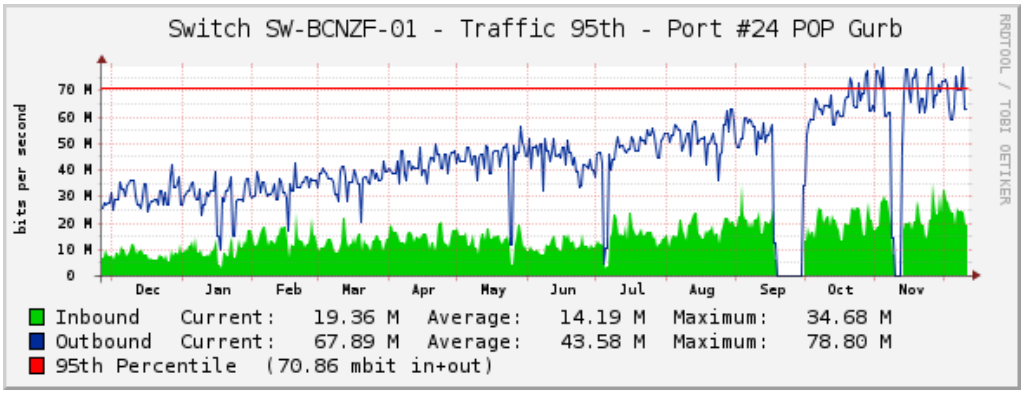

Fig. 5. Gurb's POP network load (year 2012).

2) Vic:

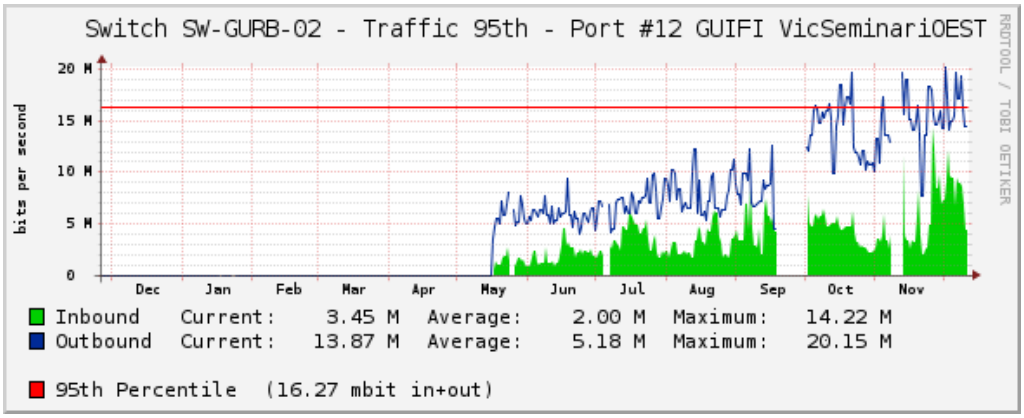

Fig. 6. Vic's POP network load (year 2012).

B. Other POPs

Other points-of-present not directly related with this project are:

- Masquefa: blablabla IGLU?
- Tortosa: It is a city placed on the sud of Catalonia. The guifi.net users started a goverment's funded project named OpenFPnet[10] which tries to create an open and neutral fiber backbone around the zone and the surrounding villages. Starting from that point they opened a POP to connect with the rest of guifi.net infrastructure. Currently this point-of-presence is economically maintained by some community users grouped in associations and some company with interests of use such fiber.
- Barcelona: The Catalonia's capital POP is the one placed in the Internet exchange point CATNIX.

1) Telvent-Barcelona: Telvent-Barcelona is a commercial data center of Telvent[11] placed in an industrial park of Barcelona. It hosts CATNIX[12], the Internet exchange point (IX) of Catalonia, a physical infrastructure provided by the Catalan government. IXs are critical for the Internet since they are meant to let the network operators exchange their information and connect their networks (autonomous systems).

[10] http://openfpnet.guifi.net

[11] http://www.telvent.es/en/

[12] http://www.catnix.net

On the one hand, as be shown in Figure 3, all guifi.net POPs are linked to TELVENT-Barcelona. On the other hand, guifi.net connects to the Internet through this POP.

guifi.net Foundation operates it's own backbone infrastructure using the ASN 49835 (Autonomous System Number). An open peering policy is followed to establish peering sessions with all potential partners. Figure 7 shows the total peering traffic. Additionally guifi.net Foundation has an Internet Gigabit uplink contracted with Cogent[13]. Figure 8 . All guifi.net Foundation routers and servers are allocated in a 22U rack in Telvent-Barcelona, shown in Figure 9.

Figure 10 shows a connection scheme (layer 2) of the hardware used for the CATNIX POP. The first port of the switch SW-03 is the optical fiber which brings the data from the other POPs. As can be seen each of them use a separate VLAN. The seventh port of the second switch is the connection with the carrier to reach the Internet. And the eight is connected to the CATNIX infrastructure where the exchange of data with other ISPs and networks is possible.

The Telvent-Barcelona Foundation resources are shared with other partners, such as puntCat[14], the Catalan Top-Level Domain (TDL), which is currently using half of the space available.

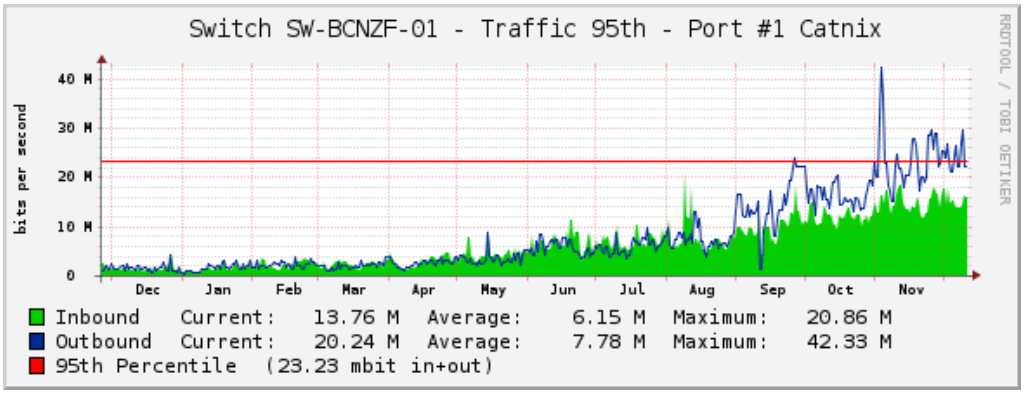

Fig. 7. Telvent-Barcelona's POP network load (year 2012).

[13] http://www.cogentco.com/en/

[14] http://www.domini.cat/

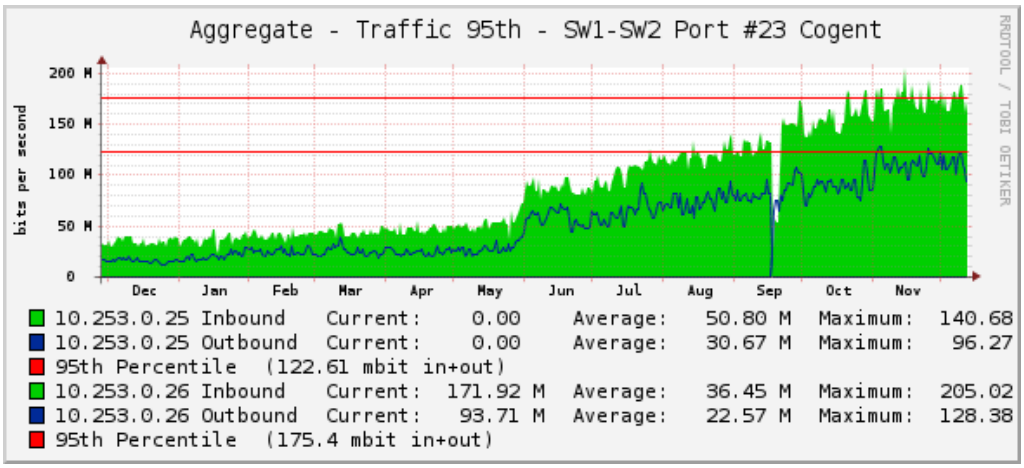

Fig. 8. Internet uplink load (year 2012).

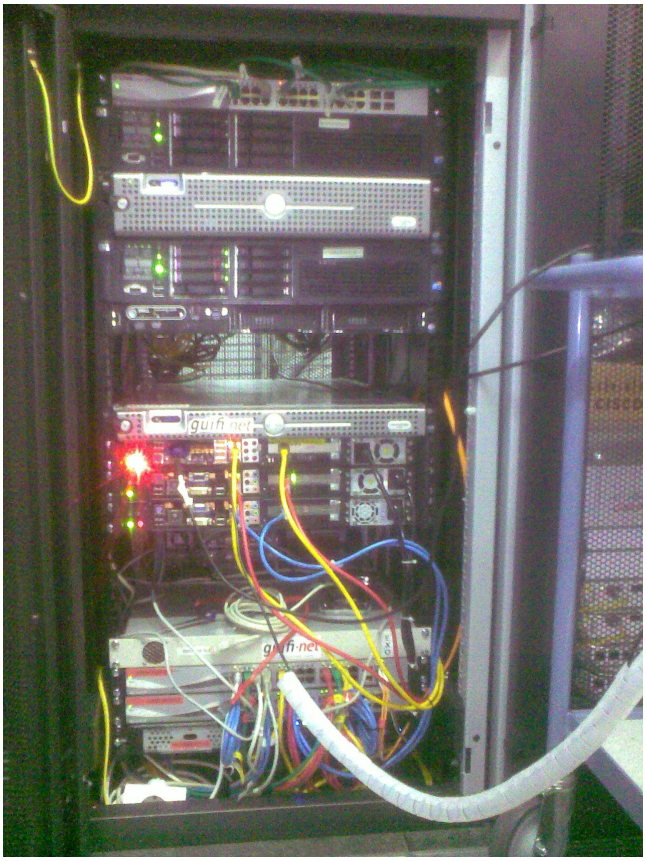

Fig. 9. guifi.net Foundation rack in TELVENT-Barcelona.

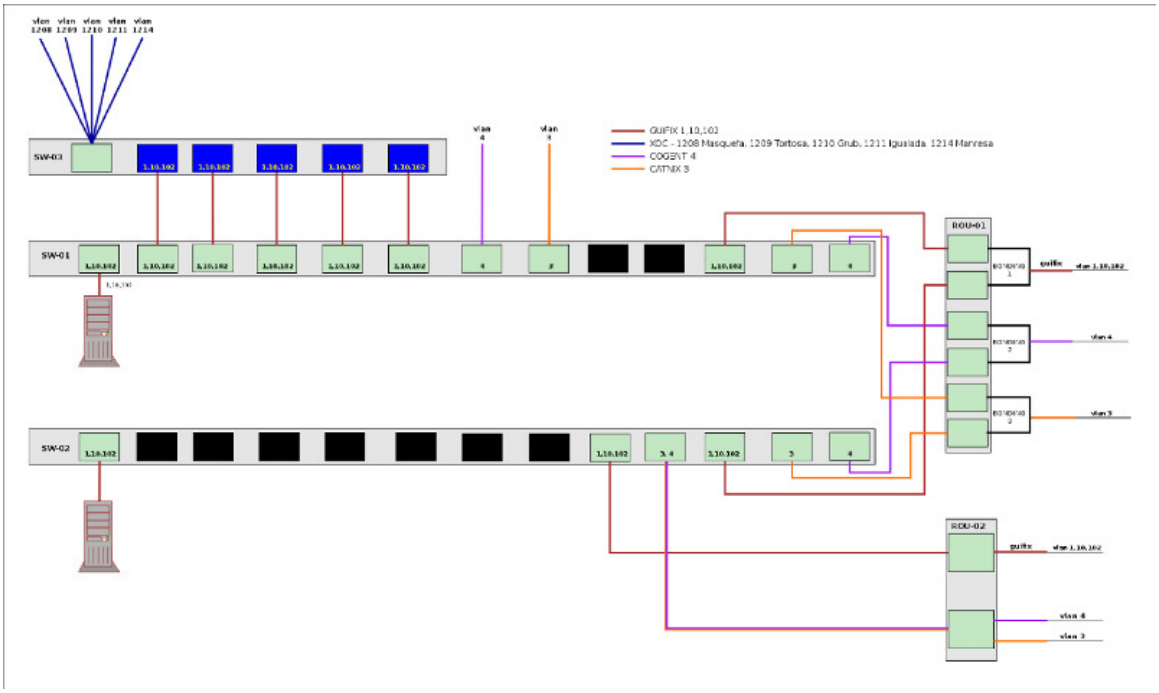

Fig. 10. CATNIX connections scheme

2) Tortosa: Tortosa is a city placed on the south of Catalonia. The guifi.net users started a project named OpenFPnet[15] with the objective of create an open and neutral fiber backbone around the surrounding villages. This project was initially partially-funded by the government.

Starting from that point they opened a POP to connect with the rest of guifi.net infrastructure. Currently it is economically sustained by community users grouped in associations and some company with interests in use this open and neutral point.

3) Masquefa:

VI. Results

TODO table summarsing results

* several deployments and POPs in several environments: rural, sub-urban, urban, industrial

[15]http://openfpnet.guifi.net

VII. CONCLUSION

The results of the first year of fiber deployment are outstanding. Firstly, over 60 fiber connections have been made in 2012 (60 farms in the Gurb pilot), and 5 non-residential buildings in the Vic pilot). Secondly, 3 Points-Of-Presence (POPs) have been activated in 2012 and at least 4 expected for 2013, one of a selected pilots (Vic pilot). Thirdly, the activity is not restricted to the selected pilots since many other initiatives are going-on in parallel, some of them very autonomous and barely known by the guifi.net Foundation. Finally, the future is very promising since the model proves to be self-sustainable.

This document is publicly available as a common resource to be shared by the community.

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