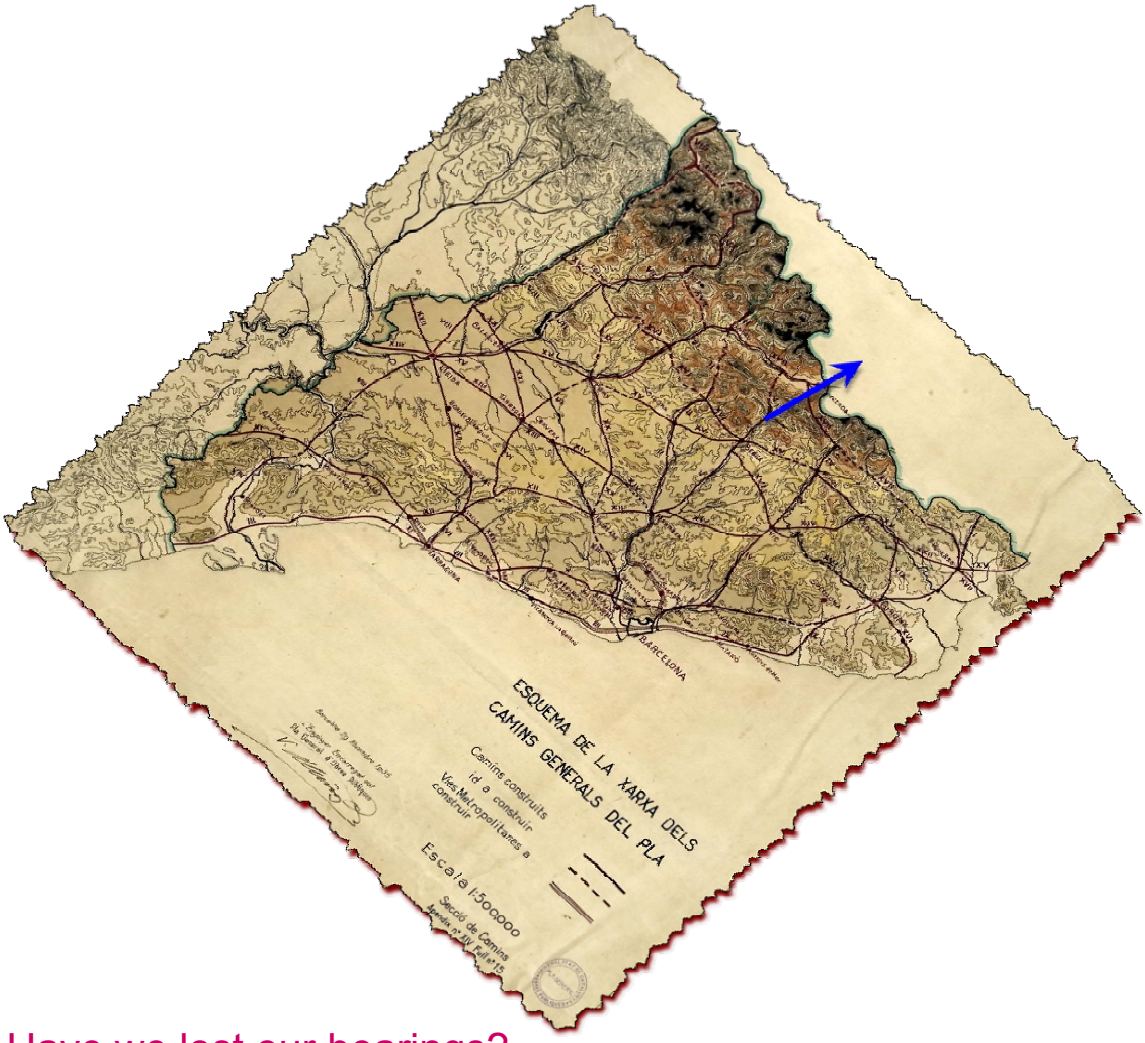
A grass-roots new approach to FTTH deployment in semi-rural areas

TELECOMMUNICATIONS AND THE INTERNET



Have we lost our bearings?
A HISTORICAL TASK:
FIBER MUST BE INSTALLED IN THE TERRITORY

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TRANSLATION: CAT->ENG **NOV'11**
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If you don't use your VHS video recorder, nor your vinyl records, for anything else other than digitalizing your content…

If you don't use technology from the nineteenth century, such as incandescent lamps…

If your television and stereo already have optical digital output…

Then, why don't you provide your computer with the same advances? That is, the possibility of working and receiving information in a purely digital manner (to your house by means of fiber optic) instead of using patched up rusty cables and analog conversions from the past century (ADSL) to reach Internet connection.

Is it because you don't want to?

Or is it rather because the de facto monopoly which manages telecommunications within your country is not interested in deploying a new fiber network capable of reaching your house?

Take note, as a lot of countries have had this technology for years now and others are now finishing its installation (go to Andorra or ask in the south of France). For them, your future is already their present and, therefore, they beat us to opportunities and in competitivity.

Dr. Andreu Veà
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Winter 2009

Barcelona
November 30th 2009

Proposals for a great, inescapable change

"VOLUNTEERS for The FIBER"

WE MUST *ILLUMINATE* CATALONIA ONCE MORE

By **Andreu Veà**, Internet pioneer in Catalonia not linked to any political party.
Internet Invited Scholar at Stanford University (Palo Alto, California) for the past six years, researching Internet access technologies .

The present document aims at providing a detailed description of a serious latent problem which Catalonia has been dragging its feet on for more than 15 years now; namely, the deployment of a telecommunications network which must be neutral, alternative and capable of reaching the majority of Catalan homes, and proposes a realistic solution.

It will consider the aspiration of Catalonia to become a world known territory for new innovation and information technology as the crux of the transformation of society and business. This is based on the experience of other areas (such as Silicon Valley or South Korea) and will be implemented by means of a ten-year strategic program called "Volunteers for the Fiber". In this program three different key participants of regional development are involved in a coordinated manner (Administration, University and Enterprises, or triple helix) together with the civil society, which will be the main protagonist.

Unfortunately, due to the hasty privatization of the telecommunications (at the end of the 1990s), the telecommunications infrastructure of access to homes did not remain public, so that it proved to be impossible for this infrastructure to be rented to all private operators on equal terms. In actual fact, the historical operator took over the infrastructure, which led to the lack of real or effective competition—this is revealed by the Internet retail price over the last 11 years). This shows a sharp contrast with the railroad, where both railroad tracks and stations were transferred to the public sector and, in the future, railroad operators will be able to compete on equal terms.

Just as the fax delayed the introduction and use of the e-mail for more than 50 years, the ADLS has been postponing the deployment of fiber in our area for more than a decade.

> "To achieve the success of the Net, it is important to study what PPTs do. It is also important to do so in a very serious manner, in order to understand their decisions. And afterwards, it is necessary to do exactly the opposite."
>
> **Christian Huitema** (Internet pioneer) "**Internet... una vía al futuro" ("the Internet... a gateway to the future")** (pàg.50) Ediciones Gestión 2000, Barcelona 1995.

"Gentlemen, let's not forget that it if it was down to the business world and the operators, the Internet that we have known so far, simply wouldn't exist."

Andreu Veà, PhD. thesis defense 12-09-2002

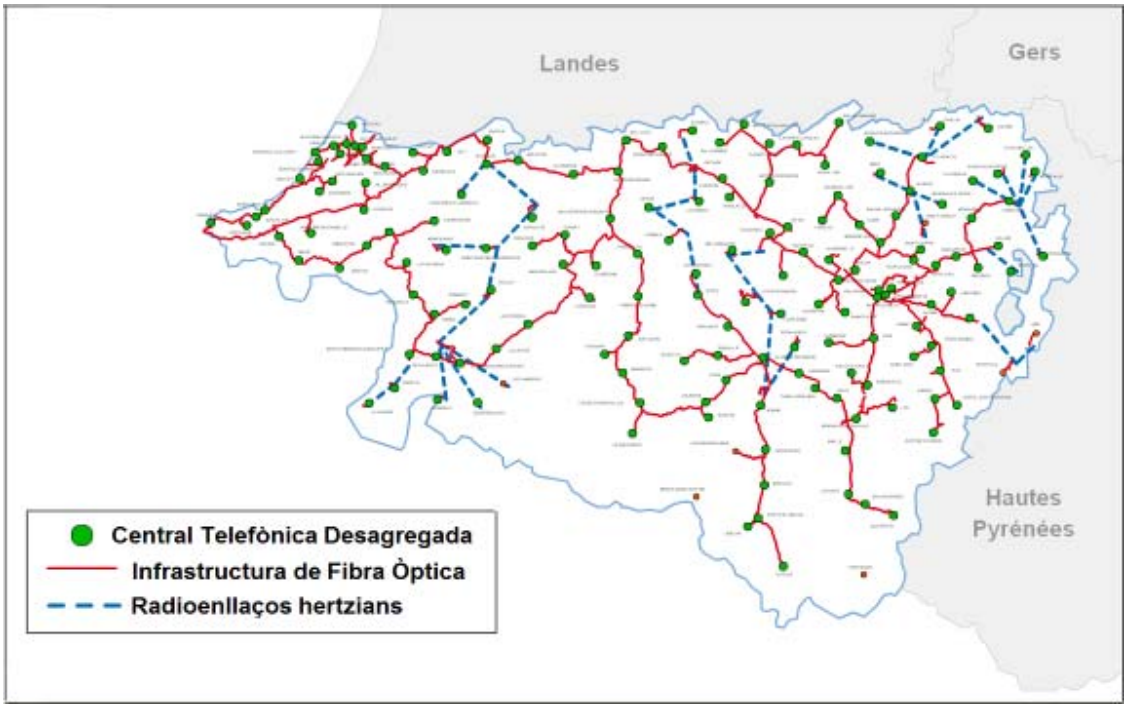
Reflections on the History of Telecommunications and the Internet in our land:

For historical reasons, which are rooted far in the past (and which we do not hereby aim to analyze), Catalonia has always been a land of entrepreneurs; that is, people who believe they have to get things done, otherwise nobody will do so for them. If anyone lives outside the country for a while, they will soon realize that innovations tend to start in Catalonia and, at the same time, the innovation we export usually comes from Catalonia. This is even more obvious in the Information Technology sector and that of technology-based enterprises.

We may find examples of this fact in the Phoenicians and the trade with Barcelona or, even closer in time, Catalonia at the beginning of the 20th century, when, led by Enric Prat de la Riba, this community deployed a basic telephone network which reached access levels incomparable with those reached in any other European area at that time. Where is the trick? Well, in the citizen collaboration, together with a very few public resources and belief that doing so was objectively beneficial fo social progress.

We are facing a similar challenge nowadays, i.e. the extension of fiber optics within the territory.

Is it a new challenge? No, as a matter of fact we have been introducing telecommunications policies to achieve this for years now, despite them having little effect. For the population as a whole, the lack of a widespread fiber network does not represent a “serious problem”, so it is not essential. It is a fact that all strategists and people who think more than four years ahead know it is not expensive anymore, neither snobbish, nor a dream or desire of a manufacturer interested in selling. In spite of this, it has been impossible to make advances towards to fiber in a determined way, just like the Nordic countries or certain Asian countries (such as Korea or Hong Kong) have done.



Our French neighbor (among many others) did it years ago. The Atlantic Pyrenees department is a case study. The Administration has promoted fiber optics deployment, which is at the disposal of enterprises, individuals and telecommunications operators, i.e. a neutral network called iris64. On the map it can be observed that it reaches a great part of the territory and it only uses radio links in very peripheral areas. All the information and features can be found at http://www.iris64.fr

At the beginning of the 1990s, specifically in 1992, when as required by Europe, telecommunications were to be liberalized, the then Spanish government preferred to keep the monopoly. It must be pointed out that back then there was no mobile phone communication, nor the Internet (except for four universities). It was argued that the “cable” should be deployed all around the territory so as to be able to transmit television. In 1995, the “cable law” made it possible to create districts and released a tender for the selection of an operator in each area. CTC (the Catalan cable and TV, later on known as Menta, AunaCable and, nowadays,

Ono) won the tender for the three districts in which Catalonia was divided. At that time, thoughts of providing telephone services emerged and the first pilot tests for Internet access through cable—as had already happened in the US—started to develop.

The change of the government in 1996 led to a rushed liberalization of the telecommunications and, as I see it, a great strategic mistake was made (most likely due to the hurry), i.e. the complete privatization of the operator which had held the monopoly up until then. In addition, access infrastructure; that is, the cable which reaches all homes, within a public entity, was rented to all operators who were interested in it. Later on, with the railroad privatization, this mistake would not be made, as the old company was divided into "infrastructure, stations and access" (ADIF) and the operator (RENFE).

One year later a second operator (Retevisión) appeared and kept an oligopoly for a year. After that, a competition stage would begin and, therefore, new and cheaper services would be offered to consumers.

The regulator's objective was for an operator (and then 30 more) to do—in a repetitive way and within a time frame of five or ten years—what Telefónica had done and for which it had needed more than 70 years, i.e. to reach all homes. In order to achieve this "miracle" they counted on the fact that access through radio was easier to introduce and involved less civil construction work.

In the meantime, pay satellite TV emerged, which contributed to a more diversified offer and to the fact that the possible revenues—which justified the "cable" deployment and which were accounted for in the business plans of the companies—fell through.

In addition, the legislator played a rather passive role and did not facilitate what otherwise should have been the great deployments within the territory. A couple of examples:

- In order to install the fiber optics the "Ley de baja tensión" ("the low-tension law") was to be followed, according to which trenches had to be dug at a depth of 150cm (one and a half meters under the surface!!!). This may be an appropriate security measure for an electric current cable, but definitely not for fiber optics. In fact, in some areas it goes through the gas lines. By working with "photon" (light) instead of "electrons" (electricity) no sparks are created, and it is not at all dangerous for human health (electric shocks or electrocution are utterly impossible). This initial imposition made costs of digging the lines add up to €90,000 (15 million pesetas, the former Spanish currency) per urban Km (which is only enough for a couple of nearby islands).
- The other big obstacle was the neighborhood association's permission. Can anyone imagine requesting permission to take cables through the buildings and having the president saying: "well, we normally meet once a year, we'll keep you posted… In contrast, Telefónica has always had the advantage of not

asking for any permission whatsoever, and staple, if necessary, the cables to the front of the buildings.

Both major problems were gradually weakened and legislation was changed in order for the deployment of alternative networks throughout the territory not to be absolutely impossible, although complex. Therefore, cities were in a mess for four or five years, with construction sites all over the place so as to allow groups of tubes to go through the main avenues and through which fiber optics would be installed in the future.

Reality was totally different and what was expected happened. Radio accesses are never as reliable as wiring and they also have a great disadvantage: after seven or ten years in the open, they need to be replaced. In contrast, some telephone cable devices utilized in big cities have lasted around a hundred years and are still in service.

What are the results of these policies for which only economic profitability is taken into consideration and which place all “responsibility” on a sole entity or private company?

Well, the result is that those cable companies which took on all responsibility for taking cable to all spots in Catalonia in the 1990s have gone bankrupt and have disappeared. They have repeatedly been bought by other competitors, which, in turn, have also closed. This is why big cities have four and even five different deployments of fiber, done by different operators and totally unused, while the rest of the territory has not been provided with any fiber whatsoever!

Due to the regulator's pressure towards Telefónica, the latter is not willing to deploy new networks, since it is aware of the fact that, as per the law, it will be forced to place it at the disposal of its competitors. Thus it is more than comfortable with its own ADSL. We may remember that only former monopolies have access to private homes, they are the only ones capable of providing this service. Although all the other operators may give tempting offers by reducing

prices temporarily in order to gain customers, they are all “resellers” which act as Telefónica's distribution channel.

Here are some remarks which may help us understand why Catalonia (and the rest of Spain) is hindered as far as telecommunications is concerned:

- At the beginning of 1998, I was fortunate enough to attend, as a representative of the sector, the former Ministry of Public Works (at the Telecommunications section), where ADSL “retail” prices were fixed at €39 + VAT (basic price).

- 11 years later, in 2009, what is the price of this “basic” Internet service? €39 + VAT... Does anyone truly believe there is competition nowadays considering prices (and equipment depreciation) have not changed over the these 11 years in a market as competitive and dynamic as is the Internet?

It may well be said that the historical operator (Telefónica) has decided to double the service speed, i.e. from initial 256Kbps at €39 to 2Mbps currently provided) and not to divide the price by two (which is what the market was really requesting), so that we could have an average speed exceeding that of other countries. However, if we take a look at a comparative study dated 2007 (in two years' time things did not change much), we will see that the actual average speed positions us at the very bottom of the developed countries league.

“Analog systems adequacy stops the digital development...”

•The “great invention” of the Fax prevented the e-mail (developed in 1971) from expanding in the course of a few decades, when technology (modems) was more mature and computers already existed in offices.

•It is not surprising for the “great ADSL” which former European monopolies have offered us to make the fiber deployment towards private homes to stop or, at the very best, to slow down for one or several five-year periods, despite its quick development in the second half of the 1990s.

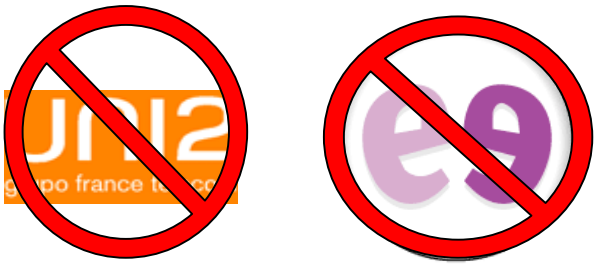
Extract of the PhD thesis defended by Andreu Veà in 2000 (and published in 2002 by Enginyeria La Salle, URL), in which he warned that ADSL deployment only benefited a company per country (the former monopolies), and which is against the general interest of having fiber at their disposal as soon as possible. Just like has happened several times in the history of Technology, in 2009 “Andreu's Law” (“Llei d’Andreu”) was published in the book ***Más allà de Google (Beyond Google)*** Infonomía Ed. 2009

ONCE AGAIN, VICTIMS OF A MONOPOLY:

The situation at the end of the first decade of the 21st century is the following: Most of the users in Spain who are currently connected to the Internet do so by means of ADSL, a type of technology which is inexpensive to install, though with important limitations, especially with regard to data uploading and those homes located more than 3Km away from the Urban Station of Telefónica.

In Spain, the average speed of broadband is approximately **15** times lower than that of France or Sweden, 18 times lower than that of Finland, and between **40 and 50** times lower than Korean or Japanese ones.

Mobile phone coverage in Catalonia does not get to all municipalities, and not even to those within the metropolitan area of Barcelona, nor is it guaranteed throughout roads, railroads or subway.



LOGOMARKS: of Retevisión (1998) and Uni2 (1999), which are already a historical record

- Nowadays, nobody challenges the fact that the fiber arriving home is the best system to have Internet access, and that this access may continue growing in services for decades, supporting applications which had been unimaginable up to now. And that is not all, those countries with a high fiber deployment are the ones which are developing the fastest and which are the creators of the new industries.

- This paper aims to be a warning, expressed in a non-technical and simple way, so as to be entertaining and reach as many people as possible. The objective is to transmit the idea that a new boost (public-private) is necessary in order to take fiber to Catalan homes as soon as possible. We are already 15 years late (since 1994)!

- Only by living abroad for a few years can one realize that difference are getting greater, instead of getting smaller, as well as the fact that access opportunities must be made the same for everybody. Whether they will be used or not is something people will decide later on, but those who live in the Solsonès area (and in so many other spots which are virtually isolated as far as Internet access is concerned) should be granted the opportunity to do business or simply telework and be able to get adapted and teletrained, by which they make themselves more capable of facing the new professions, involving all of them an intensive use of the Internet.

- Knowing the past is always a positive thing. By doing so, one can analyze why Catalonia pioneered telecommunications in the 1920s and ways to manage this new strategic challenge may be proposed.

TELECOMMUNICATIONS MARKET COMMISSION (CMT[1]):
(market regulating organization, active for over 10 years), literally recognizes in one of these several reports that:

[1] The CMT aims at specifying and supervising operators' obligations in the telecommunications markets; promoting competition within the audiovisual services markets; resolving conflicts among operators, and acting as an arbitrator in case of controversies among them.

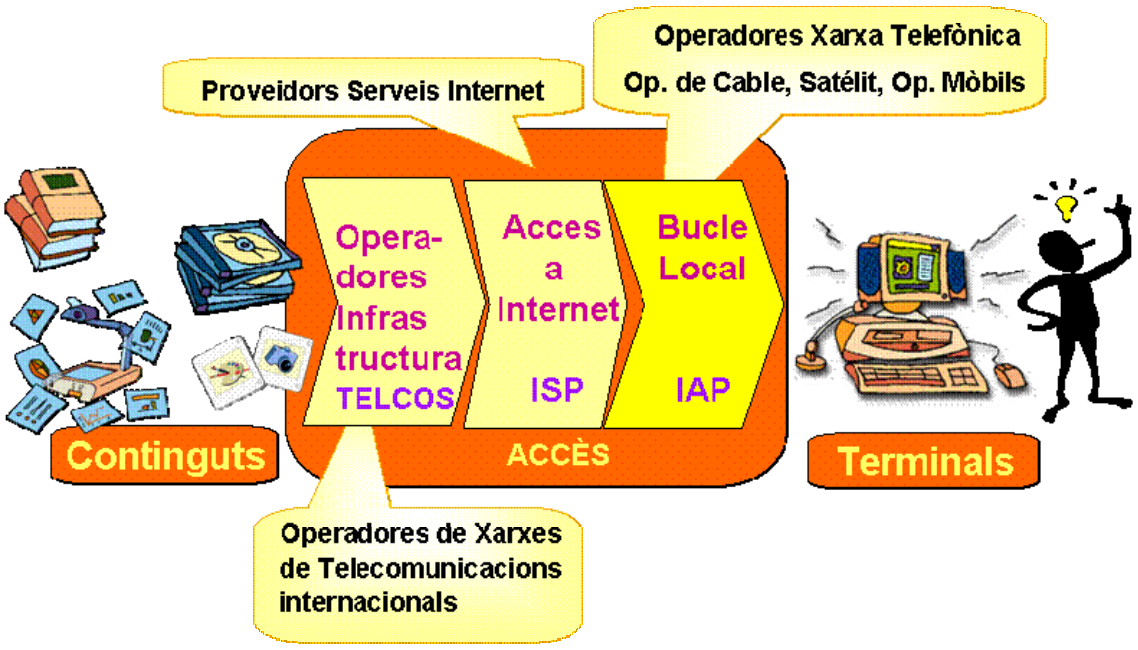
- Considering ADSL 2+ technology features and the current telecommunications infrastructure situation, **20 M speed rate** is only the highest download speed rate, reachable only in peak situations, and generally, **inaccessible for users.**

- This implies that, in general terms, those users who hire these services may be surfing the Net at a download speed of 10, 5 and **even below 2 M**, depending on the distance between their home and the phone station.

- It should also be considered that connections employ data transmission **protocols** (PPP and TCP/IP), which use between **2 and 20% of the bandwidth speed.**

In which other market (apart from the ADSL one) do I buy 100 units and get 10? And on top of all that I pay a lot more than in other nearby countries?.

THUS WE WILL CONCENTRATE ON THE NETWORK OF ACCESS TO HOMES (OR (or LOCAL LOOP)



CONCLUSIONS FROM A TECHNOLOGICAL POINT OF VIEW:

If the time factor is taken into consideration (and the greater maintenance necessary for radio electric systems), as well as factors such as User's Speed and Return Signal Quality, we will verify that the *Technological Adequacy* falls on cabling systems.

Also, as mentioned before, outdoor radio equipment has a lifespan of 7 to 10 years, and it needs to be replaced afterwards, which must be considered in the business plan as it increases costs.

Factor Ponderación	1	1	1	1	1	
Tecnología	Facilidad despliegue	Coste de implantación	Velocidad (usuario)	Calidad en el retorno	Precio Final	**IDONEIDAD DESPLIEGUE**
ADSL	4	4	3	2	4	**3,4**
PLC	3	3	3	4	3	**3,2**
W-LAN	2	2	5	4	3	**3,2**
LMDS	3	2	4	4	2	**3**
TDT	4	4	2	1	4	**3**
Cable	1	1	4	3	3	**2,4**
UMTS	3	2	2	3	2	**2,4**
Satélite	1	1	4	1	1	**1,6**

Factor Ponderación	2	1	3	3	1	
Tecnología	Mantenimiento	Coste de implantación	Velocidad (usuario)	Calidad en el retorno	Precio Final	**IDONEIDAD TECNOLÓGICA**
PLC	4	3	3	4	4	**3,6**
Cable	4	1	4	3	3	**3,3**
W-LAN	2	2	4	4	2	**3,2**
LMDS	2	2	4	4	2	**3,2**
ADSL	4	4	3	2	4	**3,1**
UMTS	3	2	2	3	2	**2,5**
TDT	3	4	2	1	4	**2,3**
Satélite	3	1	4	1	1	**2,3**

SOURCE: PhD thesis about access technologies by Andreu Veà, (Engineering School La Salle Barcelona 2002), published full-length in the index of Networked Theses (Tesis en Xarxa) (http://tinyurl.com/tesinternet)

CONCLUSIONS OF THE TECHNOLOGIES COMPARISON:

After nine years of study and research (nights and weekends, while I was working in the Internet industry), I would like to share briefly some of the conclusions of the first monographic PhD Thesis[2] on the Internet.

- In the long term (tens of years), due to its minor maintenance, cabling access performance remains better over time.

[2] Despite the fact that it was defended in 2002, not only is it still a fully up-to-date piece of work, but it also has been the most downloaded thesis at the Universitat Ramon Llull and it has always been within the Top-25 ranking of all Catalan universities. See: www.tdx.cat

THESIS SUPPORTED (Andreu Veà Thesis May-2001, Published SEP-2012):

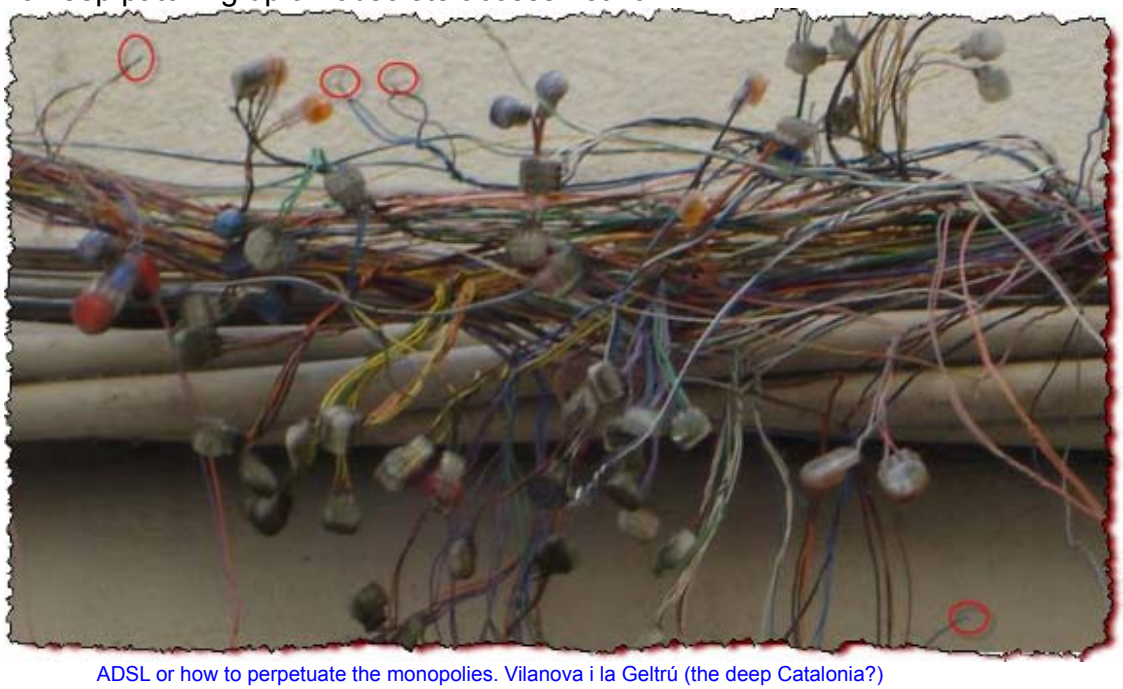
"Analog systems adequacy stops digital development"

The "great invention" of the Fax prevented the e-mail (developed in 1971) from expanding in the course of a few decades, when technology (modems) was more mature and computers already existed in offices.

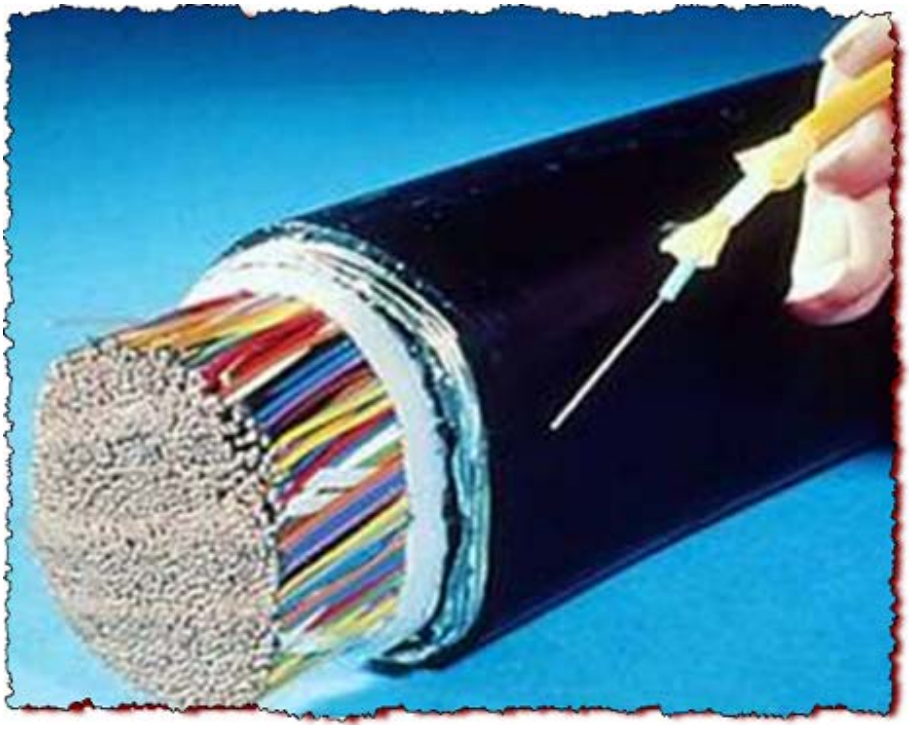
It is not surprising for the "great ADSL" which former European monopolies have offered us to make the fiber deployment towards private homes to stop or, at the very best, to slow down for one or several five-year periods, despite its quick development in the second half of the 1990s.

THEREFORE, WHAT IS THE LONG-TERM SOLUTION?

To keep patching up an obsolete access network?



ADSL or how to perpetuate the monopolies. Vilanova i la Geltrú (the deep Catalonia?)
PENITENCE: without phone connection nor the Internet for 3 months in a row.
SIN: having hired an operator other than the historical one for 2 years.
Photograph of a real case: 28-5-2009 (21st century), notice the connections in yellow circles.



65,000 couples of copper may be replaced by a sole fiber optic cable.

FIBER IS THE SOLUTION

- Greater capacity thanks to a greater bandwidth available on optical frequencies
- Immunity to transmissions crossed among cables, caused by magnetic induction.
- Immunity to static interference due to noise sources.
- Resistance to extreme environmental conditions. Less affected by corrosive liquids, gas and temperature variations.
- Great security during installation and maintenance. Fibers and plastics do not conduct electricity; they can be used in proximity to liquids and volatile gas.

DEPLOYMENT of FIBER: Present and Future. COUNTRIES RANKING:

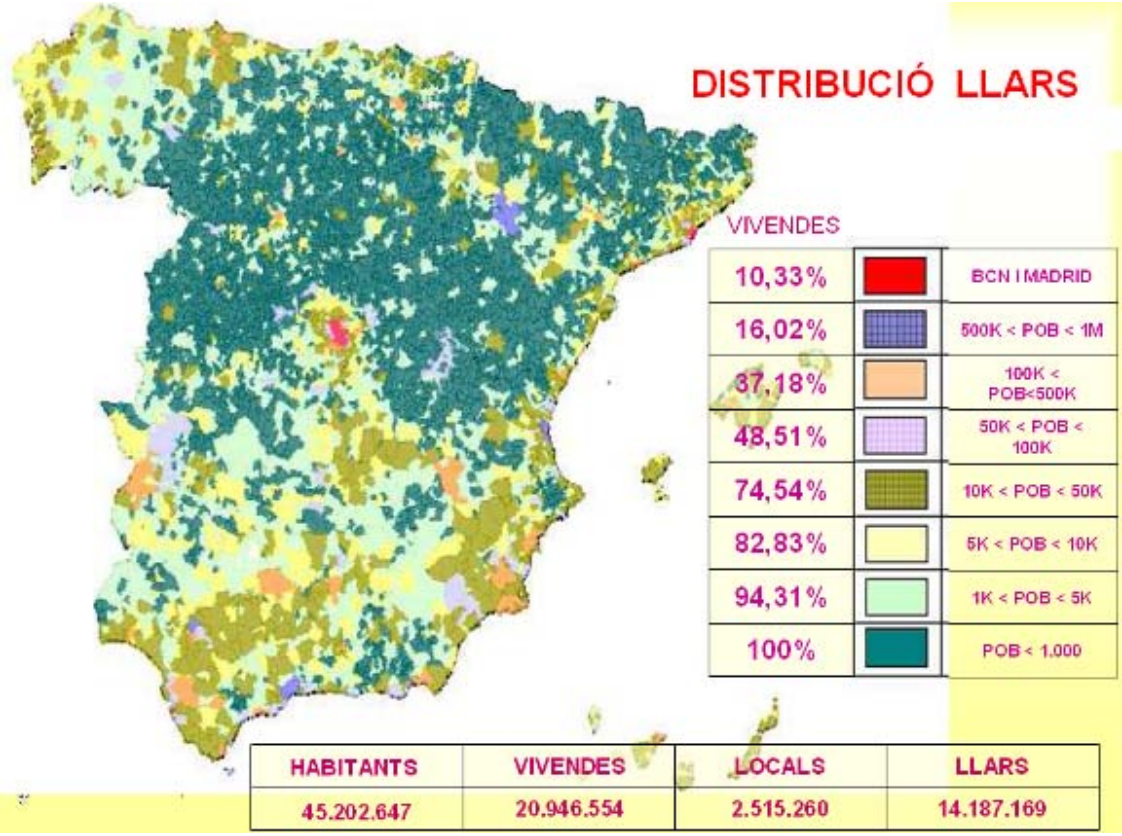
Asian countries continue to be ahead of Europe and North-America as far as the adoption of fiber technology accessing homes (or FTTH “fiber to the home”), as per a new study on worldwide classification conducted by FTTH Councils.

The four countries at the top of the global fiber to the home ranking are: South Korea, Japan, Hong Kong and Taiwan. Asia alone accounts for 27 million out of the estimated total of 32 million FTTH connections.

Closer to us is the case of Andorra with Som Telecom (acting as a monopoly), which had planned to install fiber in all homes of the country throughout 2009. In June 2009 it already had installed fiber in 50% of the homes and hoped to reach 100% of homes at the end of 2010.

HOW TO ANALYZE THE SCOPE OF THE PROJECT:

The classical strategy of an operator who had to install fiber in the whole Spanish territory would be, first of all, try to get to know the distribution and density of the homes.



Study of the CMT (TMC, Telecommunications Market Commission) about the distribution of the homes. Barcelona. September 2008.

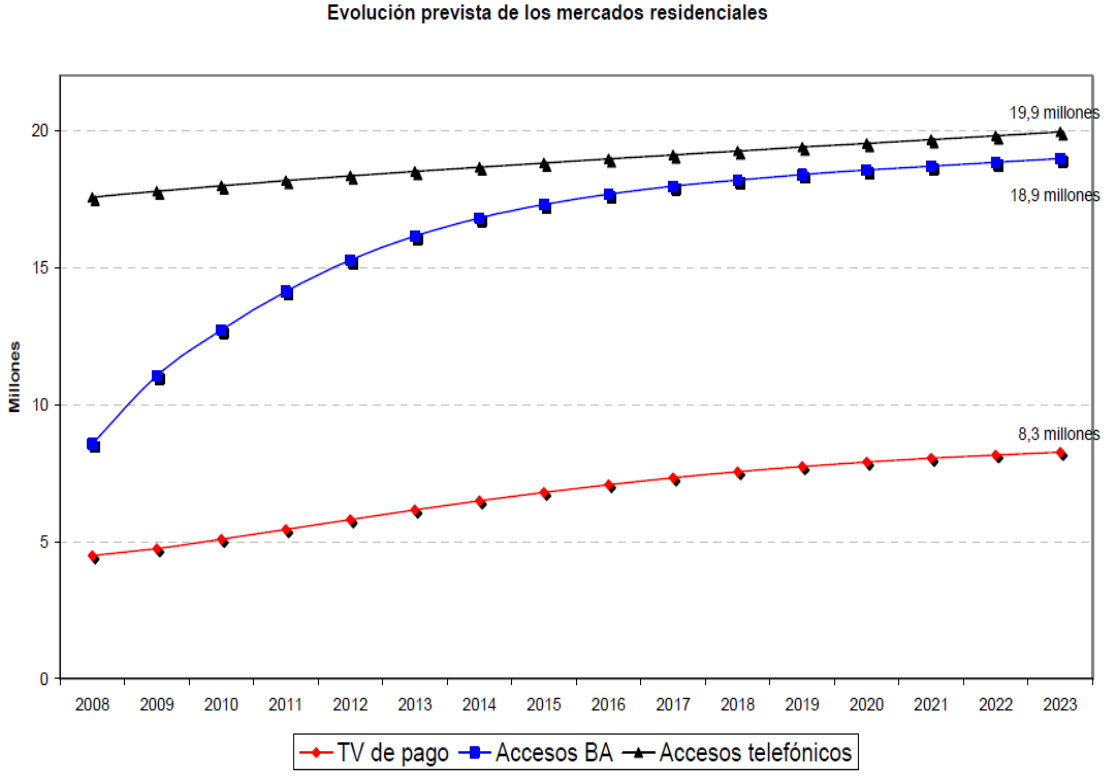
As can be observed above, Madrid and Barcelona alone already account for 10% of homes (not of population though), and this reaches 16% when adding the population of the remaining cities with over 500,000 inhabitants. If population of cities with more than 100,000 inhabitants were to be considered as well, the figure would amount to almost 40% of all homes.

If we focused on Catalonia exclusively, we would be referring to a surface of 32,000 Km2, which gathers a total of 946 municipalities, 59 of which have over 20,000 inhabitants accounting for 70% of the population.

One of the most serious problems according to our experience in fiber deployment is to access the homes (without “Common Telecommunications Infrastructure”); the cable has run into problems with the Neighbors Associations. Authorization from every single one of them must be requested. The *historical* operator does not have any of these problems.

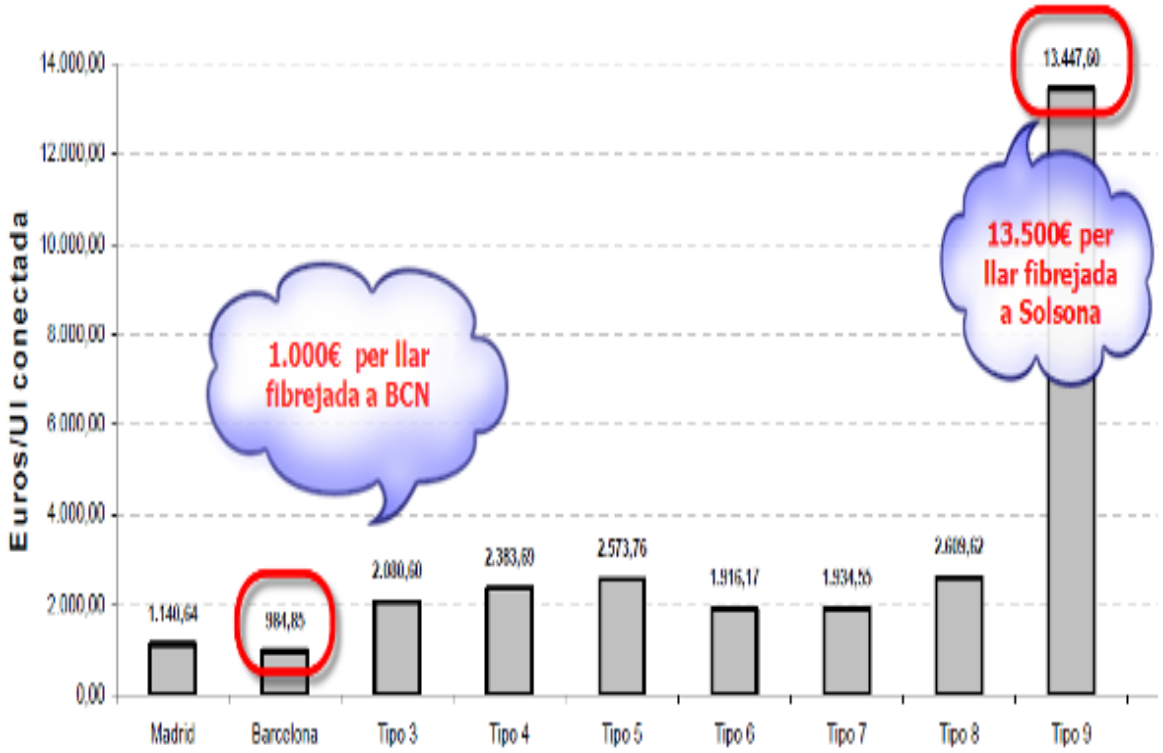
ANALYZING THE MARKET

The same study of the Telecommunications Market Commission states that the estimate of bandwidth lines (understanding by bandwidth all those non-switched connections, i.e. ADSL, Cable or fiber TV) will come to a standstill remaining at 18 million in the next 15 years.



The study is divided into nine types of municipalities: Barcelona, Madrid and seven other types according to their population level and density. The deployment cost may vary depending on the type of municipality. For this reason, the period of time necessary to repay the investment may also vary. If we apply this model to two Catalan regional capitals such as Solsona and Barcelona, and following the previously mentioned study, we will come across the two extremes as far as unit cost of installing fiber at home:

The average cost (roughly speaking) of fibered home in Barcelona amounts to €1,000 and €13,500 for each home in the capital of the Solsonès region.



If we confine ourselves to this study and to the “forces” of the market, two things may happen:

1.It is more than likely that the national telecommunications operators will never install fiber in Solsona.

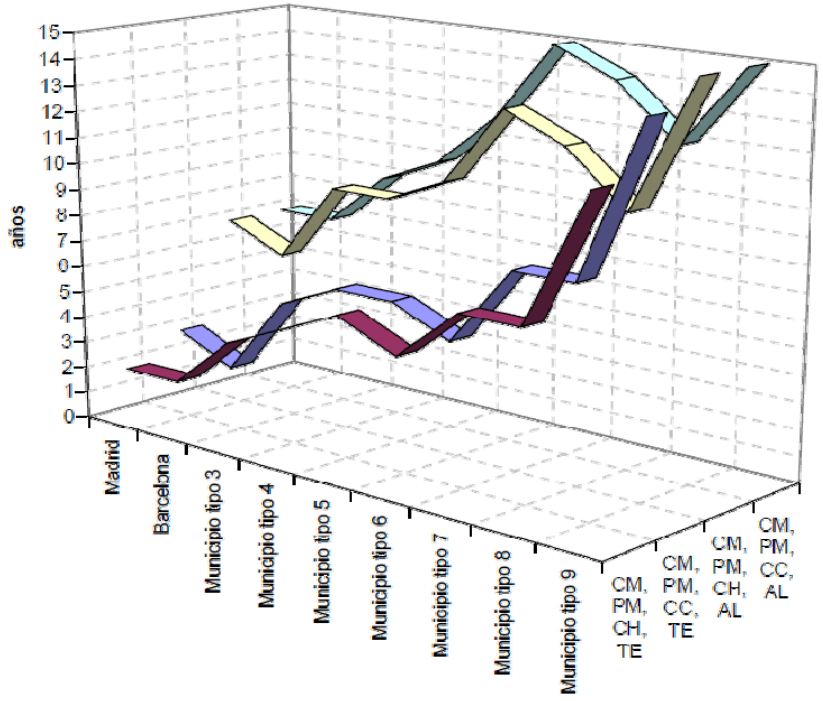
2.Faced with this situation of territorial imbalance, the Administration “says” that they will intervene and will devise a “plan”. However, owing to the fact that these deployments may last several decades and in between there are a number of things going on: shifts in politics inside the same party in power, change of ruling party, new technologies through radio which “promise” to fix everything, and absolute ignorance of the technological environment on the politicians' side (due to their studies or simply to their age). On top of this is its high cost and the fact that this matter has never been considered strategic on a constant basis over time. This is why, in practice (except for small villages and private communities), we are in a pretty similar situation (without fiber) to that 15 years ago.

This assertion may seem exaggerated and even false. However, have you ever wondered what way of accessing the Internet would be left if we eliminated ADSL (a system based on rusty copper cables utilized by a phone company from the beginning of the past century). Does the cable get to your house? Or fiber to the home (FTTH)? If that is the case, you are very lucky. In fact, except for Asturias (where Telecable, widely spread, operates), Euskadi with Euskaltel and R in Galicia, nowadays, the rest of Spain only offers one option for Internet connection through fiber or cable: its commercial name is Ono, which is the result of the

merger between eight regional cable operators such as the old regionals Menta, Madritel and Supercable.

Thanks to the multi-million euro grants from the European Union, Telefónica has developed its own distribution system of TV signal by using its own “same old” cables (you may be familiar with this through Imagenio). Nevertheless, in spite of its success as a company in exploiting investments made with all citizens' money (at the time when it was a public company), this is NOT the solution. Hence it causes the definite deployment of fiber to be delayed, it eliminates any possibility of competition, and it also has the typical restrictions of the maximum bandwidth of a copper cable (in contrast with fiber).

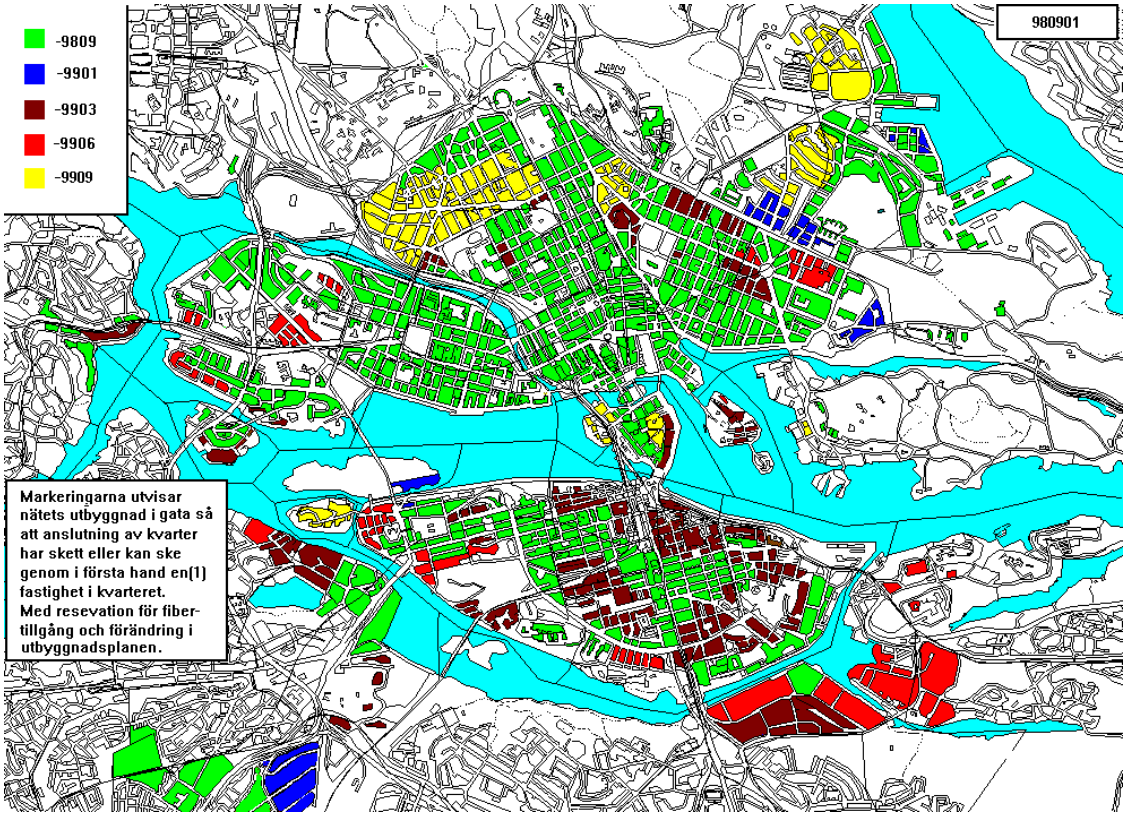
NUMBER OF YEARS TO RECOVER THE INVESTMENT:



Número de años necesarios para recuperar la inversión

In short, it is necessary to adopt a new approach, totally different from the classical one and from that taken over recent years in our country.

Other countries have been clear about this from the very beginning and, as far as the big cities are concerned, the creation of new networks has been promoted. Below is the map of Stockholm, which went through this process from 1998 to 2000. They have already had fiber for more than a decade, which has allowed them to occupy the first positions according to all parameters and indicators—concerning Internet connection and information society—which are normally measured by different sectors (European, state, regional and even local!).

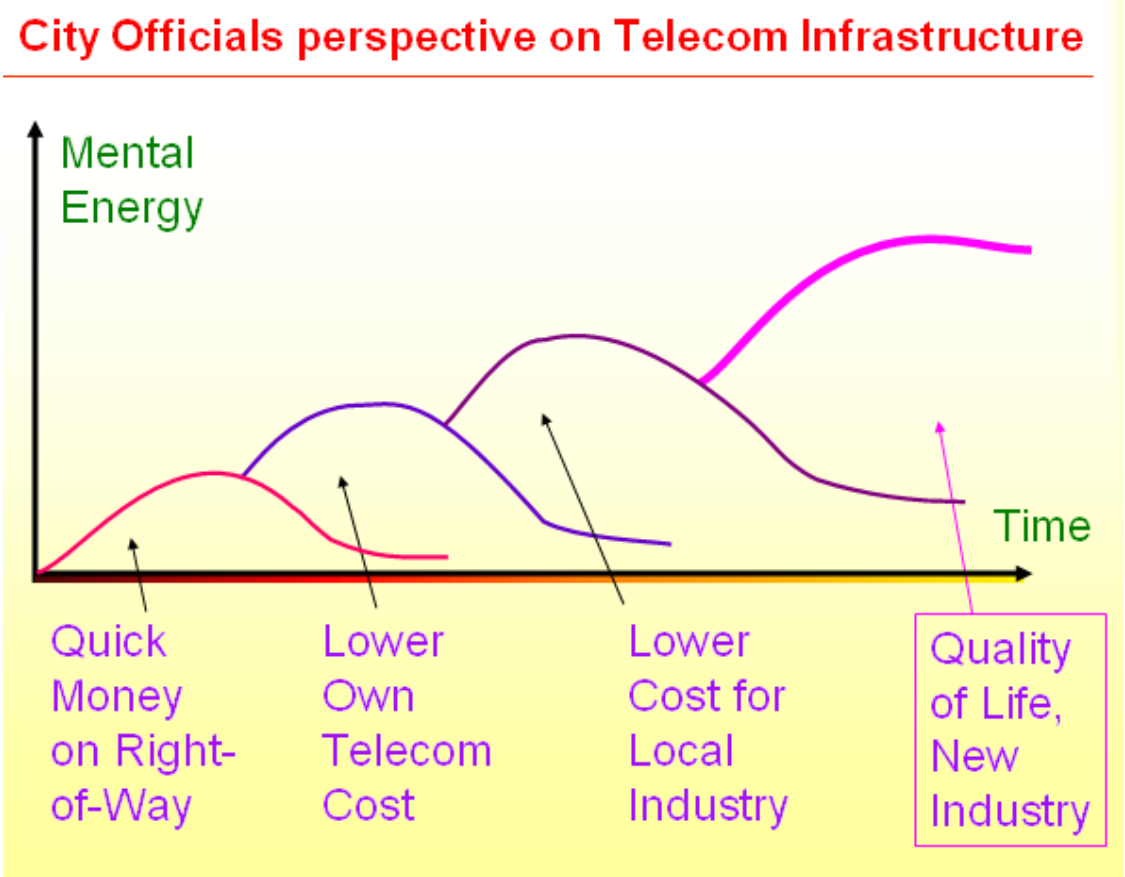


Stockholm (Sweden). Maps of fiber deployment 1998-99.

THE EXPERIENCE FROM OTHER PLACES IS ESSENTIAL

Already in 2001, Bill St. Arnaud (from the Canarie organization, Canada), a great promoter of the fiber in his territory, made me visualize at an Internet Society[3] Congress what the mental evolutionary process of villages' and towns' (both big and small) mayors was towards telecommunications infrastructure, and therefore, towards the deployment of fiber. It is very graphic, right, and simply demonstrable despite our reduced knowledge of the local environment of our village.

[3] Nonprofit organization comparable to National Geographic, but is focused on making the Internet grow locally around the world www.isoc.org)



Evolution of the majors' perspective regarding the local telecommunications infrastructure.

- The first approach of local administrations is, as shown in the graph, to take in new easy money by charging operators wanting to install fiber some new tax instead of *access rights*.

- Only a while later do they realize that it is thanks to this fiber that they are able to cut their own telecommunications costs between buildings and headquarters dramatically.

- It requires more “mental energy” and much more time so as to understand that if the village or town has appropriate fiber infrastructure, operational costs of local industries will be considerably reduced. In the long run, this will encourage more companies of all kinds to set up there, which, in turn, leads to an increase in jobs located there.

- Even though more time will pass and we have also gone through previous stages, what is clear by now is that this fiber infrastructure will end up:

1.Raising people's standard of living (anybody may carry on living in a country house (masia) in the Guillaries if he/she wants to and establish a small translation multinational there, without going away from home nor having to

commute to a big city to work. Also, anybody may be tele-assisted if he/she has a communications infrastructure that is powerful and stable (regardless of whether it is foggy or not).

2.Creating a new industry which didn't exist before and which not even the best planners and strategists from that village were able to imagine. We must bear in mind the big challenge that today's teachers are facing since they are to train and get students ready for jobs (in ten years' time) which do not exist so far.

E.g. think of the most important professions (and best paid) related to the Internet: SEO (Search Engine Optimization) or master of web applications optimization concerning search engines. That is, so as to make sure our corporate web page appears within the first five results of the corresponding search. If it is in the 33th or 600th position is totally irrelevant as, this way, nobody will look at it. This occupation didn't exist five years ago, so obviously nobody is trained for it.

HOW IS FIBER OPTIC DEPLOYED?

HOW CAN WE MINIMIZE DEPLOYMENT COSTS EVEN MORE?

In the municipalities,
A private fiber network allows the connection of all buildings within the municipality in one sole “campus” including the town hall, recreational centers, the fire department, libraries and other local services, which, in turn, will reduce internal communication costs to almost zero. A safe network with no bandwidth limit makes it possible for all buildings to be interconnected. The so-called VIF (or Vertical Inlaid Fiber) provides solutions for fiber optics *last mile* to places which operators have not reached so far. It even allows for fiber deployment in cultural heritage sites, where all the other installation techniques would be forbidden.

The new VIF (Vertical Inlaid Fiber) system as an urban solution offers advantages which involve:

• Minimizing citizens' inconvenience caused by building work.
• Designing customized solutions.
• Having a much easier access to bandwidth services.
• Integrating voice, data and video as if these were local networks.

These are the new vertical conduit models, which allow us to insert a cable containing several fibers in each conduction. As shown in the pictures, five, four three or a sole fiber hose can be used in this type of conduction.

Source: TeraSpan Networks. See: www.TeraSpan.com

Fiber installation and deployment by means of this new system will be graphically explained in the following five steps:

Step 1: make a small vertical cut (with a radial saw) in the road surface beneath which the fiber will be buried.

Step 2: clean well by means of pressurized water.

Step 3: put the hose into the cut and place it well.

Step 4: make sure the hose remains totally flat inside the micro-trench.

Step 5: finally, simply seal it using some asphalt liquid or some similar substance.

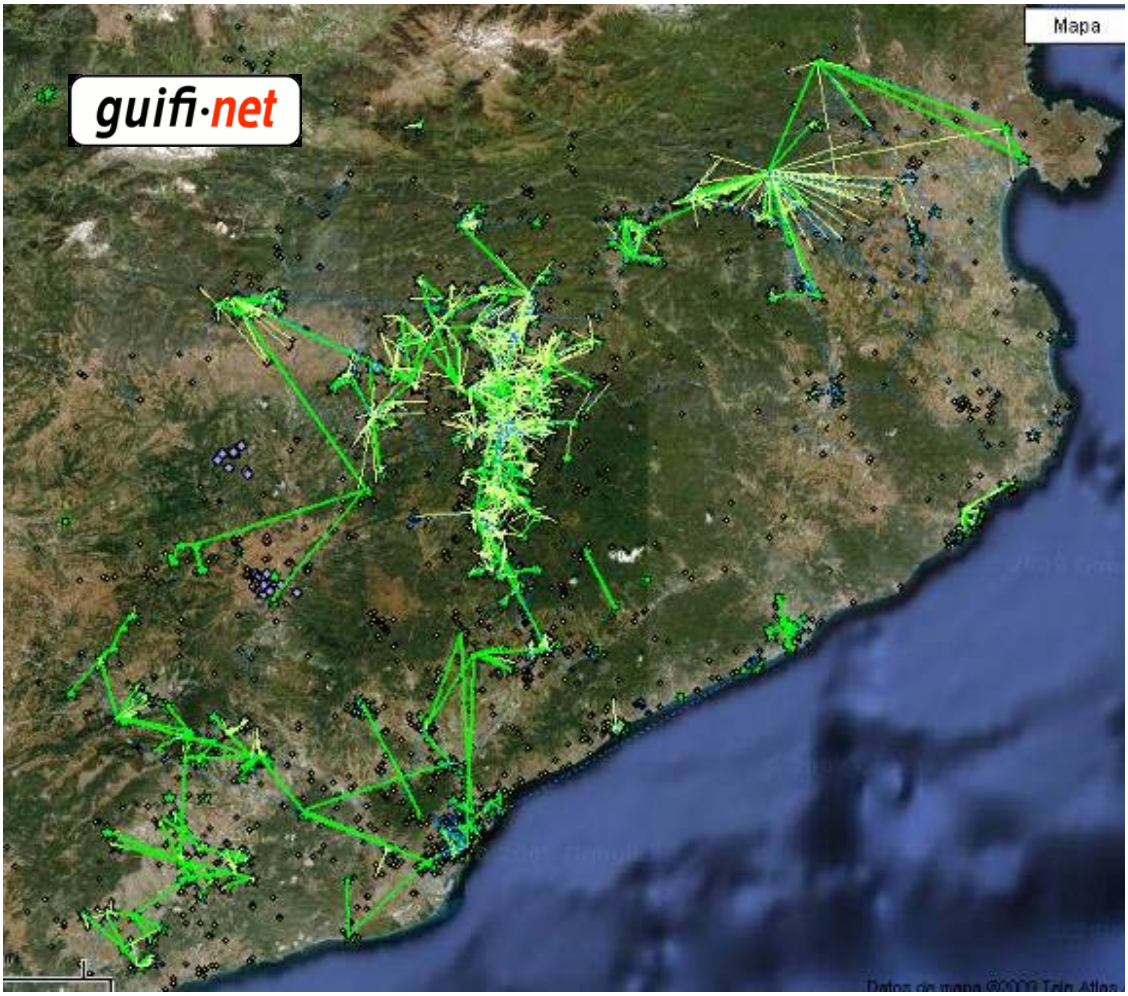
By employing this new system of micro-trenches the usual duration of the very disturbing traditional civil work (45 days on average) is radically reduced to only two days of a small installation and deployment work.

Alternatively, the fiber may be discreetly channeled through the front of our houses as long as urban aesthetics regulations coming from local administrations are taken into account.

IN CATALONIA PEOPLE GET ORGANIZED

The lack of actual bandwidth services as well as the absence of minimum acceptable services in rural areas have made, as in many other occasions in the past, civil society to react and get self-organized on the fringes of the Administration and the market. In this specific case, this has been done through a private organization (called Güifi.net), which makes Internet connectivity easier, especially within rural areas, by means of wireless Wi-Fi networks. At first sight, it seems impossible for this system to work or be maintained. However, the nonprofit help coming from a group of volunteers coordinated by people showing a lot of initiative and technical expertise makes it possible for the network to reach locations which otherwise (in the traditional way) would have been inaccessible for decades.

What is being proposed in this document is closely related to this model of associative and self-sustainable organization.

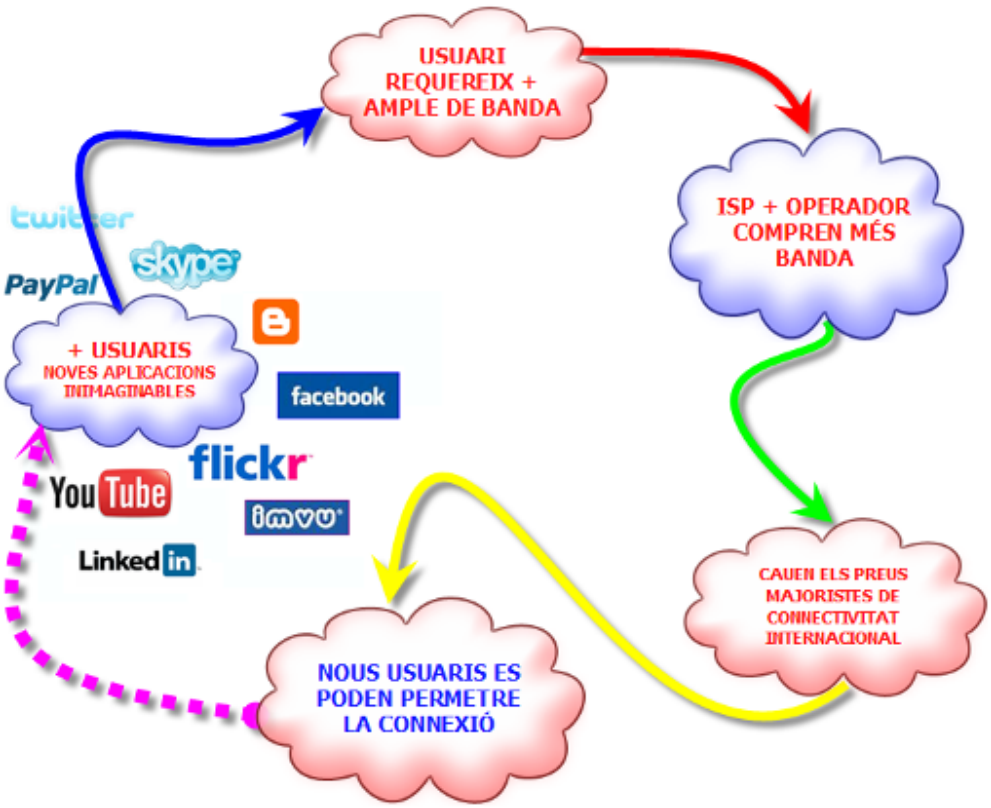


Map of the Güifi.net network coverage with Nodes and Links around Catalonia up to 30-11-2009

THE VIRTUOUS CIRCLE OF BANDWIDTH

Interestingly enough, in contrast with impressions at first glance, the increase of bandwidth in any given territory generates a virtuous circle. First, a new service is created (let's imagine the electronic mail in 1995) which the population will gradually adopt. The more users there are in the network, the greater the bandwidth needs to be, which makes the operator acquire more international connectivity, and this, in turn, forces wholesalers to cut prices in both a spectacular and sustainable manner (from 2002 on wholesale prices have decreased around 100 times). This downturn in the prices in many countries has an impact on the end user. Bandwidth access becomes more achievable for more homes due to the smaller economic threshold. In addition, since there are many more users able to afford the connection, new unimaginable applications are coming out until they require more bandwidth. This obliges the operator (if there is real effective competition) to increase speed for every single user by buying more at wholesale prices and cutting prices again. This phenomenon is

taking place on a global basis in all countries, except for those where there is a smaller development of the telecommunications infrastructure or where competition is not effective or is just nonexistent. Surprisingly, we may easily observe that prices of Internet access and even wholesaler prices in African or Latin American countries may become 10 times greater or even 100 with regard to prices found in Central Europe. As a result, the virtuous circle of connectivity above described does not take place or, in the best case, it will occur much more slowly.



PROPOSAL OF A NEW AND ORIGINAL PROGRAM:

"VOLUNTEERS for The FIBER"

CATALONIA MUST BE REILLUMINATED

In times of crisis (due to the overflowing of the Nile River) Pharaoh Kefren (just like his father Keops, and his son Mikerinos) started a great work: the Gizhè pyramids. Contrary to what was thought, those people who built it were not slaves at all . They were unemployed people who were provided with food and jobs so as to construct something for the future.

In view of the current circumstances, with the highest unemployment rate ever since this figure has been calculated, and bearing in mind the severe delay already mentioned as far as an strategical need on occupation promotion, I pose the following questions and proposals:

Why don't we

1.define some "specifications" of interconnection?
2.and some minimum standards of quality to follow
3.and town councils are allowed to locally convene:
- unemployed ex-construction workers
- and volunteers

4.to install fiber in the streets of all villages?
5.Also, why don't we oblige everybody to place fiber or a channel every time a trench is dug for something?
6.Can you imagine €8,000m (equivalent to the first E-Plan for job-creation) used with intelligence and criteria based on productive investment return and not to repair sidewalks?

People working that way would enjoy free 100 Mbps connectivity in their homes for two years.

The network built up as a result would belong to a new public-private organization (FibraCat) which would administer its operation.

Due to its strategical and national nature of the organization's network, the established "right of way" concept, usually changed to operators by town councils, would need to be repealed.

Roles of the performers of this big undertaking:

(based on the triple-helix model)

1.The public administration:

It would be in charge of getting rid of all current barriers, legislating and helping, as much as possible, to achieve the final objective. It would also take a role in the founding of *Fundació* FibraCat, which would be self-sustainable by small contributions (a maximum of €100/year) of the users linked to the system.

2.Public and private Universities (departments of telematics and civil engineering):

They will define diverse series of technical specifications, among which we may point out: the *"self-installable fiber pack"*, which people will be able to buy later on at any shopping mall. The best typology and organization of the different sub networks which may be deployed gradually. The best way of canalizing (in a trench, through the wall) the fiber in each case and situation. Those departments whose constructive solutions were chosen would receive public academic acknowledgment, and its members involved would also be personally recognized.

3.Civil society:

It will be the main protagonist, as it would install the fiber in their homes (following instructions and recommendations from the university). People would also have the possibility of becoming volunteers for the FibraCat objectives. They will be rewarded with free high speed Internet access service as well as important discounts for years. They will help create practical installation user's guides and resolve doubts by using Web 2.0 tools (wikis, coverage maps, etc.).

4.Companies and self-employed people:

They will supply those installation services which the civil society may not want to or may not be able to cater for. The maximum price of these services will be fixed by the administration and the established technical specifications will be followed. Regarding the telecommunications operators, they will provide international Internet connectivity at competitive prices.

DOS AND DON'TS, RECOMMENDATIONS AND PROPOSALS FOR A GLOBAL AND MUCH MORE COMPETITIVE CATALONIA:

❶ INSTALL FIBER TO HOMES IN CATALONIA

(FTTH -Fiber to the Home- Andorra's example, which, despite its orography, had 100% homes reached by fiber by the end of 2010). Promote citizens' initiatives and support them. Nobody should be forced, but everyone interested in having access to fiber should be provided with the possibility. Citizens' coordination by means Web 2.0 tools.

❷ HELP THE ICT SECTOR IN A PROACTIVE MANNER

(Not by giving subsidies so as to remove any obstacle known by the sector, but by allowing for investments carried out in a natural way, and getting rid of all kinds of absurd norms).

❸ INTRODUCE A STRONG LEGAL CHANGE TO PROMOTE FIBER LOCAL DEPLOYMENT

(Autonomous regions and town councils are now in charge of town planning, and all of them are not expected to change the norms to get rid of the great barrier placed by local permits). Considering the strategical nature—both within the country and even within the EU zone—of the deployment of fiber networks, it seems necessary to think about a new exceptional law reaching a broad consensus, even within Europe.

❹ ALLOW FIBER LOCAL DEPLOYMENT TO SMALL AND MEDIUM-SIZED ENTERPRISES AND PRIVATE INDIVIDUALS

(Obviously, with certain technical and civil work conditions established by the administration through a public-private organization).

❺ DEFINE TECHNICAL SPECIFICATIONS (by creating the *fiber pack*)

(This will reduce the multiple technological possibilities in order to ensure an easy decision and installation. At the same time, the interconnectivity of this neutral network will be determined; a network to which no operator will be able to connect to and offer its services).

❻ DIVIDE THE PROBLEM INTO “SMALL BLOCKS”

(As for the homes:

- Minimize the technological possibilities by making available—through the big distribution channels—a maximum of two or three different options or “self-installable fiber packs”.

- Create a network of authorized installers with fixed maximum prices for installing (if necessary they may receive a subsidy, so that the price does not exceed €90).
- In neighbors associations: legislate in such a way that if a sole neighbor wishes to install the fiber, the neighbors association automatically grants the permission to do so. With regard to costs, if the building is not provided with Common Telecommunications Infrastructure (CTI) the installation will have to be assumed by the association.
- Use and maintain Web 2.0 type of tools which may act as self-help for those wanting to install fiber in their homes. In this respect, the example of a real case, i.e. Fundació Güifi.net, should be very much taken into account).

❼ SHOW THE NEW OPPORTUNITIES TO KIDS AND YOUNG PEOPLE

(The importance of spreading the new technologies at all levels and ages should always be taken into great consideration. Programs for equipping all kids with computers are of great importance, but it is even more important to train young teachers).

❽ SIMPLE PUBLIC-PRIVATE INITIATIVES (having a significant impact).

(Ensure that bandwidth Internet connectivity is free at all airports within Catalonia as well as at all hotels). Keeping in mind that the Internet should be considered like water—a universal service—the abuses that are currently taking place in this sector should be restricted. At the airports this can be done with the taxes paid by its users (or through commercial sponsorships, like Google does at American airports: "to access for free, press the bottom *Thank you, Google*", which, by the way, it is very effective and inexpensive advertising done by the company). It could also be done at hotels to share the cost (up to €70/month) between all the rooms, so that this amount is added up to the room daily rate. In addition, these measures would also have a great positive impact on tourism: *"Catalonia, the land where the Internet is free for all our visitors."*

❾ IMPROVE THE ENTREPRENEURIAL ENGINEER'S IMAGE

(Proposal: to come up with a TV series called *Entrepreneurial Engineers* (just like it has been successfully done with series such as: *Vets* or *Journalists*). It is absolutely clear by now that enrollments in this type of studies is increasing dramatically.

❿ PROMOTE MATHS, ENGINEERING AND ENGLISH

(The first two included in the Obama plan in order to keep the American technological and productivity leadership).

As far as the English language is concerned, it is necessary—taking advantage of the new TDT technology—to ensure that there are enough free TV channels in English. There is no possibility in Catalonia to watch free access TV in English (for free), neither series, nor films or news. Everything is dubbed. It is absolutely essential to have the possibility of watching all this in original version with either Catalan or Spanish subtitles.

This situation must change and it is rather easy to do so. In line with this, class hours devoted to the English subject at school must be increased and teachers training must be improved. A positive aspect will be the increase in teachers needed to be hired (owing to the increase in students and to retirements) prioritizing the recruitment of English/American native teachers.

GENERAL THOUGHTS AND CONCLUSIONS

- Do you think the future can be “foreseen” when talking about the Internet?
- In this sector, innovation and changes imply a breakthrough and not an improvement. Check this out:
- Five years ago video on the Internet did not exist (impossible!)
- Ten years ago music on the Internet (MP3) didn't exist (too slow!)
- Fifteen years ago Internet did not exist...

As soon as the necessary infrastructure conditions are available, the new changes can adopted very rapidly. The maxim “we plough our own furrow” is applied on the Internet. Users always take the initiative and play a proactive role in the installation. Therefore, the operators thesis arguing “tell me which application requires 100Mbps per user? If there isn't any, such a speed doesn't need to be provided” is no longer valid. Things are the other way round: provide high speed access and applications are invented and adapted by the users (see the case of South Korea, Hong Kong or Singapore).

- All studies point to the fact that we must go for CABLE technologies.
- WHAT does not need to be discussed, but we rather need to find the way or HOW to deploy the fiber.
- We should not get mixed up with the applications (confusing access means with transport—the fiber).
- The Net must be neutral, with great capacity/capillarity and it must reach the greatest amount of homes possible. It should act as a territorial backbone national strategy.
- If you live ABROAD or have done so lately you may notice it is as though in Catalonia the clock had stopped.
- LOG INTO SOCIAL NETWORKS... (linked-in, plaxo, orkut)
- And if it is the case, TRY TO LEARN FROM YOUR CHILDREN OR NEPHEWS/NIECES.
- PRACTICE new THINGS on the Internet (although the protocols are 30 years old, the power and changes underlying a high speed network have just started). This habit should be considered like going to the gym, where we get trained for all necessary activities, knowing what to do and what not to do, and how to act in a productive way.

FINAL CONCLUSIONS (FOCUSED ON CATALONIA):

I have lived and worked for more than six years at the cradle of the net (Silicon Valley, Palo Alto, California) conducting research on Internet access technologies at the University of Stanford. This has given me a certain perspective and I am clear (just like most of my colleagues there) that:

In Catalonia, we need an alternative Telecommunications Network:

- Of fiber optics
- Of great capillarity (yes, including the Solsonès area and not "profitable" regions).
- Neutral (so that if operators can rent it, all of them may be able to do so, on equal terms and without *walled gardens*—systems which prevent access to certain contents depending on the operator through which you have access, something typical of cable and triple play operators).
- "Silly", (but of great efficiency and capacity).
- Able to reach homes by means of fiber (something which used to be impossible from an economic and technical point of view), so that it can be used for decades as the main infrastructure, on which new services may be constructed, services which we cannot even imagine now, just like the basic telephone network with copper floor has lasted for almost a century.
- And we are already fifteen years late (from the cable law in 1995).
- Those countries which have these infrastructures will obviously be much more competitive and they will succeed sooner in the undeniable knowledge-based society, which is ever more present.

Citizens, the restless, the nonconformists, the innovators will find the applications and will generate new ones (data mashups). Hence they will not need to ask operators for "permission" so as to know whether they "can" install this or that application on the Net, but they will simply install and distribute it. This dynamic market consisting of Internet users will progressively expand reaching other users. In pure Google style (have you ever seen Google ads in the streets?) No. Those users that are satisfied with its services are indeed their best advertising).

Therefore, we must not repeat those mistakes made with the "cable" law when dividing the territory into districts that were excessively big and impossible to be managed by those companies which became in charge of them after the bid.

I will finish with a sentence that is as cutting as it is true, by the managing director of SRI International Japanese office at a meeting (one of the biggest private research and innovation centers around the world located in Menlo Park, California, open for 64 years now):

"The reasonable man adapts himself to the world;
the unreasonable one persists in trying to adapt the world to himself.
Therefore all progress depends on the unreasonable man."

Andreu Veà. (Sant Feliu de Guíxols - Girona 1969) is a well-known Internet pioneer and entrepreneur. He founded the fourth Internet provider (in 1994) and later on (1998) he led Retevisión-Auna Internet strategy (the second telecommunications operator in Spain; this company put an end to the monopoly which Telefónica had kept up to that moment). He took part in the launching of its ISP, that of free access, and he also created the mechanism allowing the operator to offer the first Flat Rate, which, in turn, made it possible for the market to double in less than a year. He is a telecommunications engineer, Electronic Engineer, and he defended the first doctoral thesis focused on the Internet (2002), which attracted Vint Cerf's attention (the father of the Internet), who encouraged him to continue his research in Stanford (2003). Since then he has been a guest academic at this same university and has concentrated his research on access technologies and the study of Internet pioneers worldwide. This program has been internationally awarded by ISOC (Internet Society), which since 2007 has been supporting his efforts. Dr. Veà has founded, chaired and contributed to many organizations related to the Internet (www.espanix.net, www.catnix.net, www.galnix.net, www.isoc-cat.org, www.isoc-es.org) and has be part of different scientific, managing and organizational committees, such as Internet Global Congress and ISOC. Nowadays he serves as Chief Internet Evangelist at Futura Networks (Campus-Party.org organizers), he is the President of the Board of ISOC-ES and has been appointed *eminent expert* representing Spain in the WSA http://tinyurl.com/wsa-vea (UNESCO's World Summit Awards)
He has written several books, dozens of articles and has participated in 400 conferences, symposiums, and seminars on the Internet and its impact, at both national and international forums.

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