

Building Regional Open Access Fiber Infrastructure in Catalonia (Northeastern Spain)

In Interviews with Key Participants We Describe the Origins and Rationale for one of the Most Important Regional Infrastructures in Europe [Highlights](#)

Editor's Introduction

I interviewed Jordi Lopez **Benasat** via Skype on June 30, 2005. He is the Operations Manager of LocalRet. As such he works for their municipalities in the deployment of networks, municipal plans, antennas plan, corporate plans, and so on. Previously he worked for Telefónica!. He was also Director of Telecommunications and Electronics Division of the Organizing Olympic Committee for the Barcelona Olympics of 1992., He was also Director of Special Projects at Alcatel, City Manager of Barcelona, and consultant. He is also Director of a Master in Telecoms and Data Processing program at Pompeu Fabra, a public University.

COOK Report: How did your very ambitious effort get its start?

Benasat: The LocalRet or Local Network for these Catalan Municipalities was formed in 1998 when the point of view of the information future in Catalonia was still the information superhighway as being 500 channels of cable TV. For its first year it was seen as a network effort by the nascent cable industry in Spain to connect the nearly 800 Catalan communities to cable TV. Then, in 1999, as the European Commission and other groups emphasized telecom liberalization and opening of markets, the emphasis on cable TV began to recede and the Internet came increasingly to the forefront. The cable TV emphasis remained but after the crisis of September 2001 very little was done on the cable side.

In 2002 and 2003 some of us at LocalRet began to talk with people like Anders Comstedt formerly of Stokab in Stockholm about using fiber to link the mu-

nicipalities together for general telecom purposes. We began to examine in 2004 what should be done from the formal point of view of the network administration. There were conversations on how to increase demand and ones on how to get better services and more bandwidth.

We came to the conclusion a year ago that no one would invest and that the banking community was not ready to support us by enabling us to raise bonds. Furthermore, in 2002, Telefonica had begun to spread doubt as to why we should go ahead saying that they would provide all that was needed. They did not want municipal administrations to invest in the network. They said to us what we have provided you with is quite enough. They said to us if you guarantee the demand we will invest.

I said to them who could guarantee such a thing? They then said we could ask for specific services but refused to talk about the price. In 1999 the cable company had come forward with a business plan for a 15 to 20 year investment. And then after the crisis in early 2002 they said to the local administration: "Be patient, wait two more years and we will have a plan to move forward with a network under our control and not yours." But furthermore those two years passed and they still had no plan.

Liberalization in 1998 Brought a Telco Cable Co Duopoly to Catalonia

When they started the liberalization of the PTT in 1998, the Catalan government said that, in addition to being served by Telefonica, it expected to grant a second license to a cable operator. The Cable operator then said it could do the entire job

in ten years and engage in full competition with Telefonica but, before we knew what happened, the Cable company was saying 25 years because it had figured out it could get a license for that length of time.

But also in 1998-99 the EC was telling us we should open our communications systems to entry by every company in Europe. So now the first cable company, looking at the prospect of having some competitors, backed off and said it could no longer connect all of Catalonia. Still they were planning to do what they could in 15 years. But after the crisis at the end of 2001 the companies said no 15 years was no longer acceptable. If the communities wanted cable, they were told that they must be able to pay in three years. Everyone wisely nodded their heads and said "show us a three year pay back and we will invest in infrastructure." Of course there was no payback and consequently no investment

Right now the only entities that are being connected to anything are large companies that are a short backhaul away from large backbones. We have concluded that we can no longer wait for this kind of infrastructure development and that we should do it ourselves. We have decided to lay dark fiber in ducts or hang it from poles as appropriate. While we are familiar with Stokab, we are also familiar with efforts in Italy, France and Ireland. While Stokab is just the metropolitan area of Stockholm, we are talking about being the fiber provider for an entire region.

COOK Report: But in both cases – Stokab and your much larger national region - the intent is to put fiber out there and have an open access network where service providers can buy or lease a strand or strands of fiber in order to resell ser-

vices over it? The regional administration will maintain the fiber and see that it is available at a fee to those who want to provide services over it?

Benasat: Yes. That is correct. But in many more rural areas we would light the fiber and sell wavelengths. Dark fiber is useful in Barcelona but not so useful in more rural sparsely populated areas. Also we work with a company called KMI to do technical cost planning in Barcelona. As we make with them a five year plan for installation in Metro areas, we are also looking at hybrid optical and wireless networks that will involve WiMAX or Wi-Fi. In this case we would invite an ISP to pay us for access to our infrastructure and to resell to customers.

COOK Report: What at this point is the financial model for your network? According to press accounts that surfaced at the end of June you have planned a 500 million Euro, 800 community network – but it is not clear whether this is to happen in the next two years or 20 years.

In Four Years 300 Municipalities

Benasat: Our intention is to connect 300 municipalities in the next four years. We will make a plan for them as a 25-year investment with the return of 8% a year. We are looking to get the money to build from the Generalitat that is from the Federal Government of Catalonia. The Government will be loaning the money to the network and we are pledging to pay it back with an annual interest rate of 8%. We are talking 200 million euros for the first phase but the final figure is not yet set since it depends on what our study will say.

COOK Report: Earlier you said that Telefonica had been casting doubt among the politicians but it also sound like you are making enough progress with the politicians of your regional government to feel that you have a good chance now to move forward with securing the loan from the regional government that will be paid back according to the parameters of your business plan?

Benasat: Yes, and the next steps that we must take is the writing of a formal set of by-laws under which this network operator will function. Here it is very difficult for municipalities to invest directly in any infrastructure. Therefore we want to promote an operator in which the municipalities will invest that will create the ducts and fill them with fiber. This means that in the balance sheets of these assets will belong to the Catalan Generalitat of Municipalities. But they will give the rights of management of these assets to the special consortium established by the Generalitat and LocalRet. In September 2005 the consortium that will have the rights of management of this infrastructure will be created.

Editor's Note: Jordi sent an Abstract of the Criteria for the Consortium that will be established. It is appended to this article.

Benasat: We are trying to make sure that we won't be harmed by any regulatory legal attacks that accuse us of unfairly influencing the market. We are looking for an operator under open tender to run the infrastructure so that we cannot be accused of making a monopoly.

Nevertheless, Telefonica has accused us of disturbing the market by adding unneeded infrastructure to it. We are doing this openly so we do not see how Telefonica will develop any grounds to make a claim against the effort.

COOK Report: I note that Bill **St. Arnaud** has mentioned that one of your participants, Sergei **Figuerola** has played a key role in the development of User Controlled Light Paths.

Benasat: That is correct. Let me explain. One of our major goals is to connect everyone to our network to follow Metcalf's law and make the network more valuable. The second objective is to require that every street and road that is built have a duct for fiber. Because Catalonia is not well connected to the rest of the county, we will establish a Catalan backbone. We foresee seven fiber rings covering separate Catalan counties. But we also see that it may be impossible to get dedicated fiber every-

where we need it. Therefore we need routing and switching. Consequently, we will require the operator to manage the backbone by being able to do intelligent switching and routing.

COOK Report: So the operator you envision is someone with Layer 1 and Layer 2 switches and state of the art capability to reconfigure bandwidth and light paths?

Benasat: Yes. So the operator will supply both dark fiber and Layer 1 and Layer 2 bit streams.

St. Arnaud: One of the organizations (i2CAT) and an individual - Sergei **Figuerola** - in this project are key collaborators in the development of CANARIE's, CRC's and i2Cat's User Controlled Lightpath (UCLP) software. Congratulations Sergei!!!. Some excerpts from the original LightReading article-- BSA]

Spain Preps \$500M Broadband Net
JUNE 22, 2005 http://www.lightreading.com/document.asp?doc_id=76145

Details of one of the world's largest municipal broadband networks are scheduled to be unveiled at a Light Reading Live conference on Carrier-Class Ethernet in Barcelona, on Thursday, June 30. The project (not the conference) has a budget of €488 million (US\$542 million) and aims to encourage competition among service providers by giving them equal access to low-cost broadband infrastructure, say those familiar with what's involved. The project being planned by the Generalitat de Catalunya (the Government of Catalonia) and Localret (a consortium of 782 municipalities) is a whopper. It aims to cover multiple cities throughout the entire region of Catalonia and will be based on multiple fiber optic rings linked by reconfigurable optical add/drop multiplexers (ROADMs), together with other networking equipment.

Plans for the state-of-the-art broadband network will be presented at the Light Reading Live conference in Barcelona on Thursday, June 30, in a keynote address by two of the project's masterminds:

* Josuè Sallent, strategic project's coordinator of the Catalan Government's Telecommunications and Information Technologies Center * Sergi **Figuerola**, Network Technologies Cluster Coordinator of the i2CAT Foundation, a not-for-profit agency that promotes technology developments in Catalonia, and one of the participants in the project. The idea is to offer more than just dark fiber or wavelength services, as some early municipal operators, such as Sweden's Stokab, have done. This could include Ethernet services over MPLS and SDH infrastructure, TDM services such as E1 leased lines, and pretty much anything wholesale customers want.

Once the project team has gotten input from potential customers, a pilot network will be installed by early 2006, according to **Figuerola**. Requests for proposals for the production network will go out next year. He estimates that digging trenches and installing fiber will cost about €200 million (\$222 million). The goal is to have the whole network operational within four years.

The Catalan government believes its project can avoid the legal challenges that some other municipal networks have faced in Europe, by only offering wholesale services. A ruling from the European Commission in May on plans for a municipal network in France appears to apply to this project as well (see EC OKs B'band Funding).

COOK Report: Here is another chunk of the article worth noting: Figuerola says the project team intends to talk to service providers likely to use the infrastructure, in order to identify the wholesale services they require before formulating plans. The service providers to be contacted are basically all operator or ISPs located in Catalonia. (This list includes but is by no means limited to * Al-Pi * Amena * Grupo Auna * BT Group plc * Colt Telecom Group plc * Communitel * Iberbanda * Jazztel * Telefónica SA * T-Systems Inc. * Vodafone Group plc).

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include Ethernet services over MPLS and SDH infrastructure, TDM services such as E1 leased lines, and pretty much anything wholesale customers want.

Editor's Note: Jordi Benesat skyped me on July 11 and together we filled in some significant gaps. I have invited Sergei **Figuerola** and Jordi agreed to invite Josuè Sallent, from the Generalitat to join our list. I am encouraging Jordi to write directly to the list. He is however apparently spread rather thinly. So we shall see.

Project Direction and Coordination by a Legally Constituted Right of Way Agency

Benasat: We will create a small agency of 5 to 10 people maximum to manage the legal rights of control over the right of way and over the network operator. The agency will have one or two administrators, probably two technical people, a marketing expert and perhaps four lawyers. In the absence of this entity the Generalitat of Catalonia has control over the right of ways that connect the municipalities (railroad, highways, power lines and so on.) LocalRet has control with the municipalities on municipal streets and roads. The idea is to have a third entity to which the municipalities can give what they have ceded to LocalRet for the purpose of having the necessary coordinated physical access needed to build the network.

This small legal right of way agency will also handle all the negotiations with the outside network operator and will oversee the operation and administration of the network by the network operator.

COOK Report: Will this agency play a role in the selection of the network operator?

Benasat: Yes. The idea is to concentrate necessary legal power and technical and operational expertise within this agency. Another goal of this agency is to give municipalities access to needed technical network expertise and administrative

management skills.

COOK Report: Another question about how far down your proposal goes. The slides from June 30 show the backbone fiber ring. And the in each of seven counties they show a municipality fiber ring attached to the backbone ring. The question is whether you are stopping there? Or are you planning to go to all schools, businesses and residences?

Benasat: We are building the backbones first. There will be access networks as quickly as possible. In each municipality in each county the rings will attach to the switches that make up Telefonica's central offices. We do this because Telefonica has the obligation to unbundle its services unlike American carriers. Telefonica will be forced by law to give our network operator access to its local loops. The regional and county wide backbones are the first stage of what we wish to do. The second stage that was not covered in the presentation of June 30 is to create metropolitan area networks in each municipality.

COOK Report: Another objective mentioned by the I2Cat proposal was that you were gathering together a technical consortium that would support what you were doing. The question could be raised whether in return for their financial support these companies could be forcing you to use technology in ways that might be contrary to the interests of your end users at some point in the future?

Will someone be telling me that if my company joins the consortium I cannot extract any concessions that will determine what the network can and cannot do for my users since it uses my technology? In other words how will everyone know that since I am a member of the consortium I cannot impose any restrictions on the operation of the network that will profit my company at the expense of the people in the businesses for whom the network is built?

Benasat: First of all I should say that I2Cat (internet 2 for Catalonia) represents a group of technology experts at our local universities who are assisting us as a group of technology experts in

order to help us define the topology of the network and decide which services to include and so on. They are neither going to run the network nor will they select the network operator. If a company becomes a member of the consortium it will be only because it has agreed to meet terms imposed upon it by our legal network operator oversight entity that is responsible for meeting the standards insisted on by our municipalities and not because it has bought its way in. Members of the consortium will not be allowed to impose restrictions that are not acceptable to the entity that gives the network its overall legal and technical advice.

The network operator will run the services as mandated by the agency. They will be selecting suppliers according to rules established by the agency and designed to protect the municipality and Generalitat. We try to avoid the imposition of any and all kinds of proprietary systems.

For me right now it is very important to have the optical fiber there. I think that the equipment is only 10% or 15% of the network and every 2 or 3 years you can easily put newer and more powerful equipment wherever you want. For us the fiber is only laid once. Therefore our step is to lay the dark fiber and then to consider the services we will place on it.

On July 25 Jordi **Benasat** wrote: "Ens gestor" means "Management Entity". When we finish its creation, it probably will be called Catalan Telecommunications Agency. Its functions are and the functions are to create, promote, and manage an Open Network in Catalonia. It will also coordinate all working relationships with the private operators.

Important points:

-The service providers of the Network will be its final operators and among its major stake holders.

-The Agency will select an infrastructure operator. This operator will manage the network, which is owned by the Agency. It will be called the Neutral Operator with a contract that is contemplated to last for ten or even 15 years. The Neutral Operator also will also be required to

invest some funds into partial ownership of the network. At the end of contract period all network assets will revert to the ownership of the agency.

-We will design a homogenous network for all Catalonia, at least for passive infrastructure level. This will be open and parallel to Telefonica's network.

-We will start integrating the small portions of the networks that the municipalities and Generalitat control as part of their ownership of Railways, highways, streets, and so on.

- We will design Metropolitan Area Networks (MANs) in every city with more than 10.000 inhabitants. We will start construction depending of the economic collaboration of the municipality. In the first stage the network will come to the Telefonica central Office, so the final operators could use the mandatory unbundling of the last mille. Close to the Telefonica buildings we intend to put Nodes or Public Access Points (public facilities for equipment of administration or private operators).

The MANs are constructed with fiber optic cables, and we expect to enable service in the areas close where the cable passes.

Because the cost of lying cable is more related with the cost of personal than material we will try to install a lot of fiber, so in the first stage we can save electronic equipment. However as demand arrives we will deploy electronics.

-In Europe it is not usual, and in Spain not allowed, to have poles for telecommunications and electricity in cities. Consequently, we will define the structure of ducts needed. Whenever a street or road is rebuild or made we will put ducts. We see a long term plan for what we are calling vegetative growth of fiber.

- The MANs are also providing what we call street services: TV cameras for security and traffic management, light control, traffic light control, etc. We think of it as something the Mayors can see and touch and very important show

as an immediate result for all citizens.

In Catalonia we follow the Legal Directives of the European Union (EU), the regulations of Spain, and laws made by the Spanish parliament, or programs put forth by the Spanish government. Our regulator is called CMT- Comisión del Mercado de las telecomunicaciones- like OFCom in the United Kingdom or the FCC in the US. Catalonia as a State has not many legal responsibilities in telecommunications. The "Ens Gestor" will have The Rights of Way's and will invest in the network. We are able to do that.

Ens Gestor Abstract

Editor's Note: The following is the Abstract from a larger document. I publish it as a direct quote because it is in English and few documents in this project are.

"PUBLIC INTERVENTION in BROAD-BAND MARKETS

April 2005

Ens Gestor (Management Agency to Select a Neutral Operator) Project

Study conducted by the research firm Cabinet Analysys on behalf of Communications Regulatory Agency and Caisse des Départements et Consignations

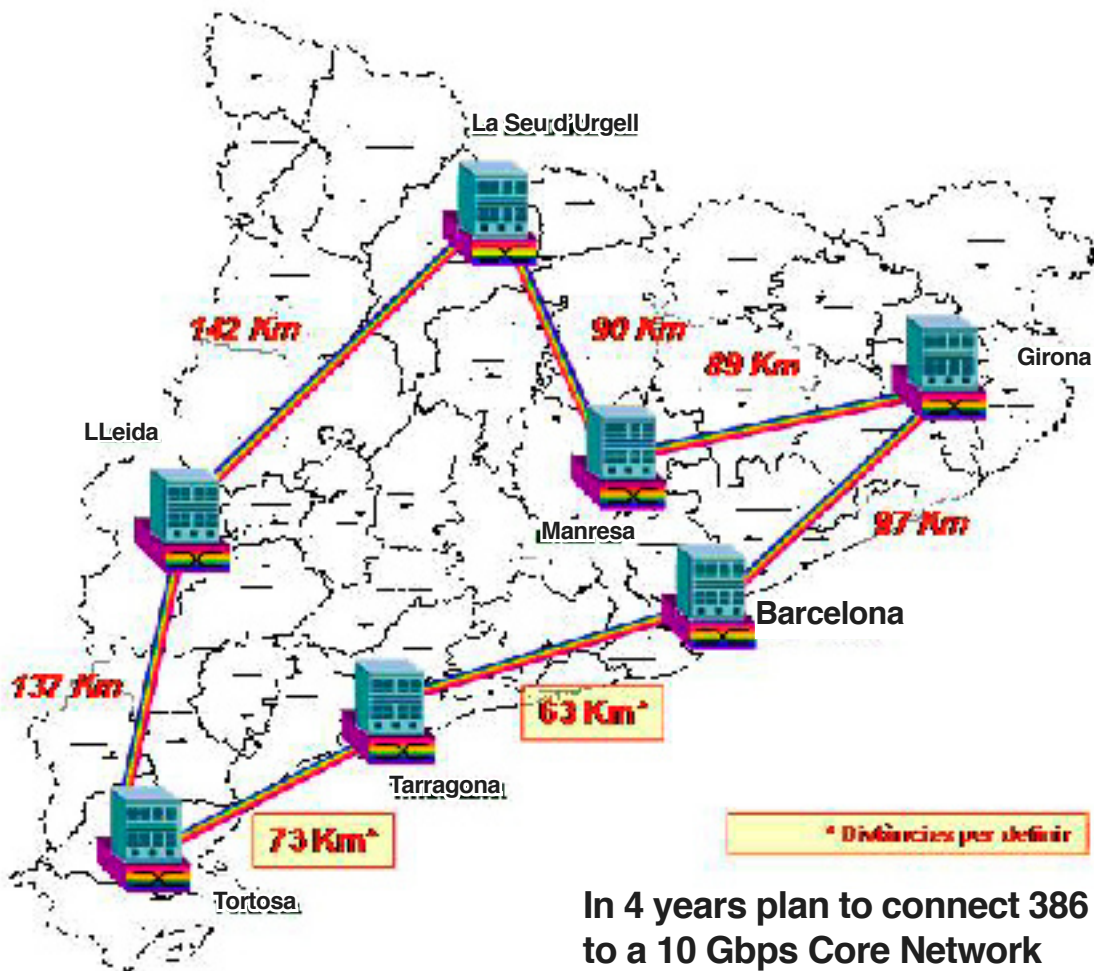
The study will be made public in a concern for transparency and information. The study's conclusions are the sole responsibility of the firm and do reflect in any way the opinions of ART or of CDC - 3 -

Ens Gestor

Ens Gestor is a project that aims to develop a regional fiber network in Catalonia to link the region's population centers with Barcelona. The project is at an early stage of development and operations are expected to commence in 2005.

Background information . Strategic rationale

The rationale for the project is to develop



In 4 years plan to connect 386 municipalities to a 10 Gbps Core Network

Figure One: "Core" Network Topology

Figures provided by Jordi Benasat from the June 30 Light Reading presentations and modified with help of Sergi Figuerola

a future-proof network in Catalonia. It is perceived that the private sector does not have an interest in developing this type of infrastructure as costs would be high and the operators do not invest at the level expected. Officials involved in the project believe that telecoms network infrastructure (ducts and cables in particular) is a natural asset for the public sector to own (even if not necessarily to operate).

Strategic objectives

The main objective of the project is to promote and allow the delivery of advanced broadband services to all citizens and businesses of Catalonia; fostering the final operators to do it. This is perceived as imperative in the context of the region remaining competitive in Europe.

Project framework

The project framework is still being defined, but it is expected that the public sector will build the network infrastructure, and that it will remain under public sector ownership. A second strand for the project which is also being proposed is to amend the law to require all public services companies to install the relevant ducting infrastructure required to reach the customer premises with fiber when they are constructing any public infrastructure. This is expected to result in a widespread coverage of the region in about 15 years.

Description of selected solution - Private sector role

Because the network is expected to be

built by the public sector there is a limited role for the private sector in this project. It is expected that the organization that will ultimately manage the network could be private. For this project, the government of Catalonia expects to negotiate with private sector companies owning other type of infrastructure in the region the rights of way on their duct infrastructure.

Business model

The business plan for this project is still being finalized but current thinking suggest that the required investment will be approximately EUR 50 million per year for four years. The expected internal rate of return more than 7% over 25 years. The risk is expected to be minimized by covering the largest populations first,

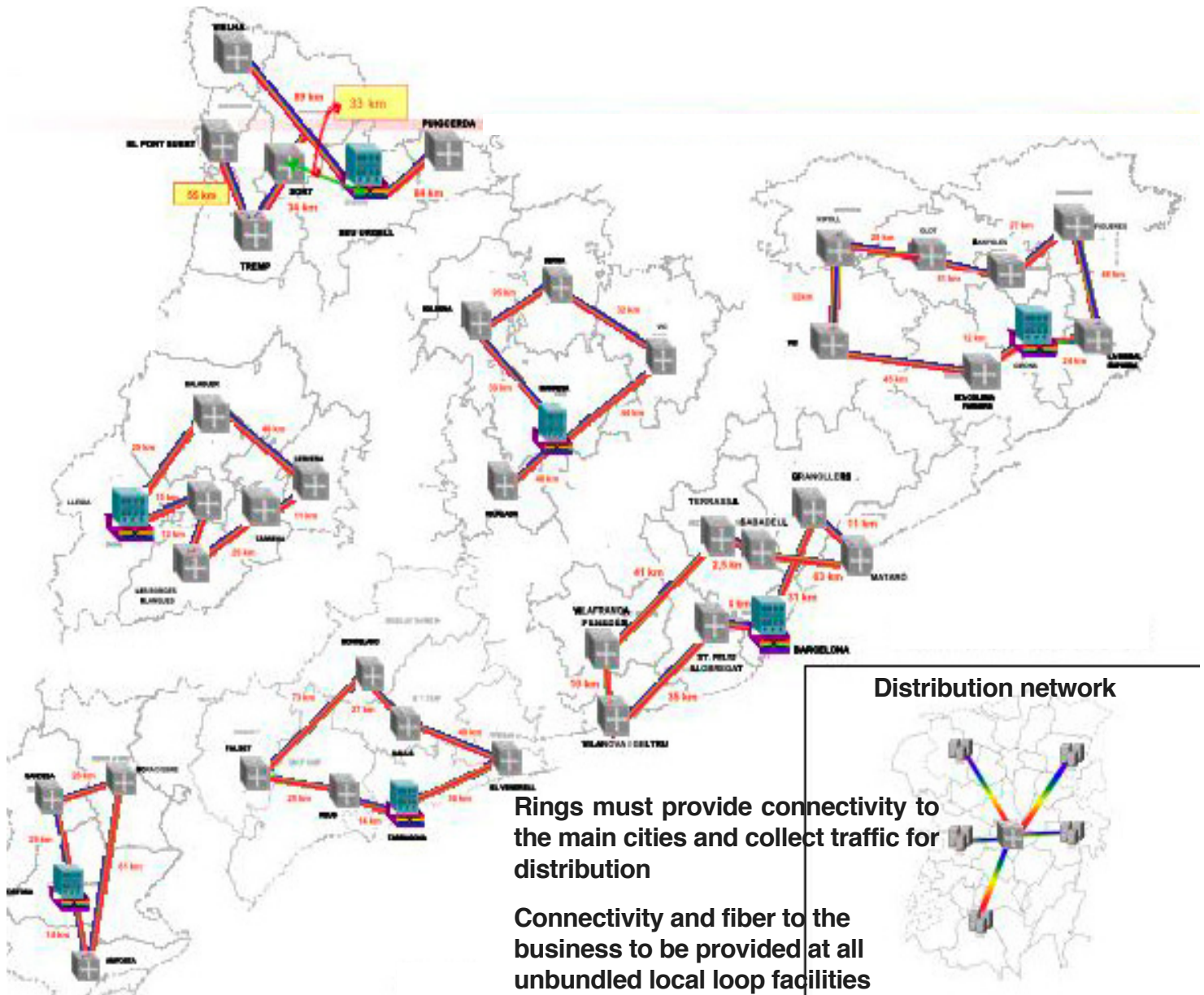


Figure Two: Metro Network Topology

where there is already proven demand for broadband services. .

Role of government agencies

The two organizations involved in this project are the Generalitat de Catalunya, the regional government of Catalonia through the Centre de Telecomunicacions i Tecnologies de la Informaci—, and Localret, a consortium of 800 municipalities in Catalonia established to promote telecoms in the region. The two organizations are finalizing the creation of a limited liability company to manage this project and promote broadband in Catalonia. The shareholding structure of the company has not yet been decided.

The regional government of Catalonia has the necessary powers to develop this project without any approval or intervention from central government in Madrid. .

Financial requirements

The network is expected to be funded with public debt. Application for EC funds is being considered, but it is not the first option.

Economic and technical specifications

Once the network is constructed, it will be managed by the limited liability company created by the Generalitat and Localret strictly as an operator neutral net-

work and providing open access to all interested parties. The plan is to avoid putting switches in the network and provide only dark fiber services in the first stage. It is expected that the fiber links will carry traffic for the public administrations as well. It is anticipated that prices for services will be related to cost. Tariffs are to be set in relation to cost and not to distance. The plan is also to set prices by area. The bigger the area that is contracted, the lowest the price per unit to be paid. .

Project design

The plan is to start using the infrastructure that is already owned by the

Generalitat. The regional railway company (Ferrocarriles de la Generalitat), for example, is a public company owned by the Generalitat which will provide access to ducts and rights of way along the railway lines to build the network. It is also expected that the big companies located in the region will agree to provide rights of way or to use their duct infrastructure. For example, Gas Natural has a long distance network that is mostly empty and the project team is looking to see if it is possible to share the company's telecoms infrastructure for this project. The regional fibre network is expected to be complemented by pilots with alternative technologies for local access such as WiFi, WiMAX and PLC. .

Regulatory and legal issues

The plan is to start the project with a low profile, in particular deploying the backbone to the medium population centers in the region and initially helping the operators to deploy their networks and services. Other legal requirements such as compliance with all EC regulations are being considered.

- 6 - Impacts and feedback on implementation There is no information to report as the project has yet to be launched."

Symposium Discussion

On July 20 **COOK Report:** Sergi and I connected by voice today and talked at length today. As I understand it (and Sergi if I am ever incorrect in my understanding please send a correction directly to the list), Sergi is the lead person at I2Catalonia for technical advice to LocalRet and the Generalitat.

Figuerola: Yes, the i2CAT leading team is composed by Sebastià Sallent (i2CAT Director), Gabriel Junyent (Optical Communications Group Responsible) and myself. It is working in issues. regarding the technical aspects (architecture, technology, dimension...) of the new generation network

COOK Report: Sergi said that he would be willing to answer questions posed to him on the list. He is of course very busy and, if I recall correctly, he said his group

just received a contract from Canarie for further development work on UCLP. He doesn't guarantee 24 hour turnaround on questions but he will try for well under a week. ;-)

Figuerola: Well, I suppose I am as busy as everybody, however I'll do my best to answer questions.

COOK Report: He explained that UCLP would be only one of several transport solutions to be open to service providers who would use the basic infrastructure explaining that many and likely most would want to use GMPLS.

Figuerola: I think (as I suppose Bill St. Arnaud agrees), that there is some existent confusion about what UCLP is, and where it really fits. First and in order to clarify the comment, I would like to point out that we will evaluate where UCLP could fit on that network and the benefits it could bring when interconnecting universities, research centers which may use grid applications. UCLP by itself is not a control plane (as GMPLS is) able to provide SLA of 99.99% as requested by retail operators. GMPLS and UCLP are not competing technologies, they have a different target. As Bill says: "UCLP is an IP network provisioning and configuration tool, which allows the creation of application or discipline specific IP networks that can be built from optical paths obtained from mix of heterogeneous network resources across different management domains." It allows institutions to integrate wavelengths and fiber from different suppliers and integrate with institution's network management domains.

COOK Report: This really leads to the first question for him - one that Frank **Coluccio** can articulate much better than I. But let me try.

Frank has been pointing out that possibly THE single most basic choice to be made about lighting fiber is an architectural one of symmetry or asymmetry. When I talked with Frank this afternoon - and I know I can count on him to correct me - if I am wrong, ;-)- he said that providing a basic architecture that would enable GMPLS, would very likely ensure an

architecture that would make symmetry in bandwidth difficult or maybe even impossible.

Figuerola: I agree with your point, however, what we will not say right now is the technology that the network will use as a control plane. We will start soon (we did a very short round some months ago) a round of meetings with manufacturers (and potential clients, also to know their requirements) in order to evaluate the maturity of their hardware and software solutions. Finally, the i2CAT Foundations strategy in this project is trying to ensure that Catalonia can also become an advanced network lab open to the latest technologies in the world.

What we have seen, is that equipments are becoming GMPLS compliant. However not many deployments have already been done. It may have some constraints when network complexity grows, but we want to assure it is a core and metro network capable to offer to retail operators the choice of offering to end users symmetric and high bandwidth services, obviously some constrains will come depending on the access technology chosen, which will not be offered by the neutral operator, but it will push to promote new deployments.

Coluccio: Symmetry and G-MPLS (or UCLP, where they choose to use that instead) do not work to each other's advantage or disadvantage. Symmetry is merely a line property or attribute, while the others, G-MPLS and UCLP, are switching/routing protocols.

Each addresses different sets of circumstances and provides solutions to different problems, entirely We did, however, discuss the importance of symmetrical design, and I noted that the documentation you sent me (the power point's from Sergi) clearly stated that after the regional networks in Catalonia were built, they would proceed to use existing Cable Modem and DSL lines in the access portion of the network. THAT's where I objected and cited the type of carrier emulation that municipals are known for, as opposed to taking a fresh approach and doing it right (designing in a symmetrical access layer) the first time.

You may recall that I harped on this concept of the municipalities imitating the carriers when putting in their own networks. We see it every day. Okay, with Wi-Fi, there doesn't appear to be a viable means around it. But I'm still questioning the build being contemplated for Lafayette. Will its access network be asymmetrical, merely matching the capabilities of Comcast, or will it strive for an optimum design that includes symmetrical delivery?

Jim Baller? Can you answer this? As I have noted before, I've still not seen a detailed plan of the LUS build, but if it's like most other muni cable systems that I've seen implemented, it's likely to be more of the same, even if it's done entirely over fiber and uses the third wavelength for analog TV delivery. I don't know that they will do that for a fact, because I'm still only speculating. And of course, symmetry is not the only area where municipalities should be looking to differentiate themselves from MSOs and ILECs in order to optimize their designs, but it's a very important one that will open doors to new opportunities, not to mention new problems, as well.

Gordon, I don't have an elaborate list of must-dos in order for the muni design to be optimized. Quite the opposite is true, in fact, since the fewer the number of instances where gunk work is introduced, the better, assuming adequate access and backhaul bandwidth is made available by the access provider.

Coluccio: [Regarding the Ens Gestor document above] On the matter of their delivering services to locations that need it most, last? It's got a familiar ring to it, as I'm sure some here will agree. It's another example of common carrier emulation, just like mimicking the last mile Cable Modem and DSL designs I spoke of earlier.

Perhaps those remote localities should be the first locations to be attended, pushing fiber spurs deep into their cores and supporting a form of interim wireless relief until larger euro amounts can be justified? It would impact the overall financial plan in some marginal way, although

it would also be laying the groundwork for future fiber deployments down the road. And within the course of the multi-year (indeed, overlapping decades of) deployments that the plan speaks of, you can bet that, if they don't address rural and other sparsely covered areas, someone else will. And that's okay too.

The other fundamentals appear consistent with the kind of infrastructure thinking that I believe makes a lot of sense, although I still don't see the formulas that will make everyone happy hanging on the wall just yet. And if I had to answer whether it was a top down or bottom up approach they were taking, I'd have to say top down, in almost every aspect of the term. I don't know if that is necessarily good or evil in this situation, which is why comments are always welcome...

On July 27 Sergi **Figuerola** quoted Frank Coluccio who said above: "We did, however, discuss the importance of symmetrical design, and I noted that the documentation you sent me (the ppt's from Sergi) clearly stated that after the regional networks in Catalonia were built, they would proceed to use existing Cable Modem and DSL lines in the access portion of the network. THAT's where I objected and cited the type of carrier emulation that municipals are known for, as opposed to taking a fresh approach and doing it right (designing in a symmetrical access layer) the first time."

Figuerola: I understand your point of view, however we have no choice but to place ourselves in our local context. Here in Catalonia, we are paying one of the highest prices for broadband access (lets say xDSL, right now), and it is due to the fact that in Catalonia (as in many other places) there is a monopoly in the core/regional/ACCESS network. For example: The average price of ADSL in Spain ranges from 32€ to 39€, while in other places of Europe its cost is 30% less and the bandwidth offered is higher.

This situation forces other operators to use mainly the access network of the incumbent operator whose local loop is unbundled.

When Telefonica opens their central office, it means that another operator can connect its network (mainly E1, E3 circuits) to the Telefonica DSLAM to use the access network of the incumbent to get to the end user. [For the remainder of my response I will refer to Telefonica as the incumbent.]

Not all the operators have or will have fiber to the ULL (unbundled local loop or DSLAM of the incumbent., so the Ens Gestor will lay fiber that allows everybody who wants to rent fiber to the incumbent. ULL, without having to do their own over build to get there.

To be sure if the government had unlimited money, it would also deploy an access network based on fiber. But however money is limited, and with that budget they have, very few cities would be able to build an access network. Therefore, as a public investment. it would not give the same facilities to all the citizens, but some actions are being done on that way, in order to assure that in the near future there will be more fiber in the cities connecting end users

So, some of the ideas behind the Ens Gestor ARE:

1.) Provide a core network (in some places in parallel to the incumbent's network) through out Catalonia in order to have COMPETITION also at that level, and therefore, to will reduce the cost of the region's TRANSPORT services.

COOK Report: The "another core network" will be a new back bone built along the lines indicated in the maps published here and not following the right of way of the incumbent's backbone – because the incumbent would not permit it?

Figuerola: Yes you are right, we cannot use the right of way of the incumbent, since they are not public. The new net will not follow the incumbent network, however will arrive at the same places through other paths. Obviously places where there is no competition

2) With the allocated budget, the network will firstly arrive at all the ULL. The

ULL are nodes where the incumbent has DSLAM's (ULL)] and main governmental administration facilities that we have in Catalonia. In other words these are the places where almost all the other existent operators have also presence right now. It will connect nodes without competition. That is to say where only one operator is providing connectivity to other operators. We will run open fiber into municipalities where only there is one operator, and in places where there is no broadband and where there is demand for an operator to serve that municipality.

3) When we do this, other or new operators should not have to invest in core or regional infrastructures, since they will be able to choose between (at least) two options.

COOK Report: The options being the incumbent's infrastructure and the Ens Gestor infrastructure?

Figuerola: Yes. This means lower cost because of competition. Since the new competitors do not have to build out at the core, it is expected that their investment will be reflected in the access and the service itself, by deploying or expanding their fiber, and by deploying new technologies.

4) Localret has started negotiations with all the municipalities involved in order to gain an understanding of their current infrastructures deployment. (Municipalities are always undertaking digs for many and varied reasons, or doing civil work), Our goal is to make them understand the need to start deploying fiber. The goal is that they have fiber along all their right of ways to allow, when the neutral operator arrives, the promotion of that fiber, perhaps with FTTH deployments. (It is called "vegetative growing").

Although it could seem a top-down, I consider it to be a mixture, also bottom-up, since several lower level activities have also started. These at the end may converge with the top down ones.

5) The 'Ens Gestor' will put great effort into promoting new access deployments, to be done by public or private sector, in order to assure that also competition is being offered at the access network.

The main goals are to improve/increase bandwidth services and reduce costs (to end users) by bringing competition.

Another important issue to be explained is that this is a particular project within

the Director Plan of Infrastructures of Catalonia. A plan that includes also other projects which at the end may converge with the 'Ens Gestor' project, the biggest one.

As an example, there is another project (It started some time ago) that is currently providing bandwidth to rural municipalities. Both may converge at the end (other projects could be also related). PLA BANDA AMPLE RURAL. INTERNET RURAL. I will check for more info

Frank, I hope that I have responded to some of your concerns, or at least explained more of the issues involved on that project.

More information is available at http://www10.gencat.net/dursi/generados/catala/societat_informacio/noticia/1020_12_17706.html

<http://www.cesca.es/promocio/congresos/tac05/J.Bosch.pdf>

J. Bosch is the CTTI director, the department that is being launching the Ens Gestor.