A New Broadband Network in the Middle of Italy: the Project of Terrecablate

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ABSTRACT

This paper is devoted to illustrate the project of a new broadband network, that is seeing its realization in the Province of Siena, in the middle of Italy. The network is going to be built by a brand-new public society, the "Consorzio Terrecablate Telecomunicazioni" ("Terrecablate" in the following) that has been established last year by the Authority of the Province of Siena, the City of Siena and all the Municipalities of the Province. As follows, the purpose of Terrecablate's project is to create a telecommunication Broadband Network – with a backbone of about 650 kilometers of fiber optic – by using the most recent and innovative technologies, giving thus all the services related to the high speed connectivity at the lowest price of the market. The whole network, that should be realized within year 2007, means an investment of 85 millions of Euro, of which the 70% will be financed by the Public Administration. On July 2003, the first backbone ring is going to be completed, and it is expected to start providing of TLC services within year 2003.

Keywords: Broadband Network, Public Society, Fiber Optic, FTTB, High Speed Services.

1. INTRODUCTION

The Province of Siena is settled in the heart of central Italy (see Figure 1), in the famous region of Tuscany, largely known in the world for its cities, loaded of artistic and historical traces– just to give some examples – Florence, Pisa and Siena.
Tuscany is also well known for the fascinating landscape of its countryside; this region is also leader among other Italian regions for the variety of its products: wines, olive oil, food and for its ancient traditions: culture and history. The Province of Siena can count on its old tradition of craftsmanship, small industries, commerce, banking, agriculture and tourism. On the other hand, this area is not very well connected with the main Italian highways and railroads. This latter fact, joined with the increase of broadband demand, has been the main motivation that suggested to the Authority of the Province of Siena to develop a project of a telecommunication Broadband Network, in order to connect all the towns of the Siena Province.

Figure 1: The Province of Siena in the Tuscany Region (in dark gray): the heart of Italy

Just to give a brief description of the present scenario of Italian TLC Providers, those have been classified into three big categories:

- National Backbones Providers: some big private companies, that have thousands Km of fiber optic laid down in Italy. The most important are "Telecom Italia" (the *incumbent,* formerly owned by the State), "Wind-Infostrada", "Albacom", and others.

- Local Operators: typically they sell TLC services using others operators networks. Actually there are hundreds of them, but many of these are in a serious financial problems.
- Access Network: the "last mile" or "local loop" is mostly provided by the incumbent with its copper pair; others are starting to do some investments like Wind and the brand-new company "FastWeb" in Milan and main cities in the north of Italy.

Presently, in the Province of Siena, it is operating – with a its own network – only the incumbent Italian TLC carrier, that cannot guarantee any "real" broadband access. Its offer is just related to the ADSL technologies, that is furthermore available just in a small part of the area around Siena.
It is worth noting that the city of Siena is *the first city in Italy* that has been connected by Telecom Italia with fiber optic up to the buildings, which are internally wired by HFC (Hybrid Fiber Coax) technology.
The project of Terrecablate is more ambitious, since the network will be finished, all the inhabitants of the province of Siena (not only the city of Siena) will have full services availability related to the broadband connectivity at the lowest price of the market, by using the most recent and innovative technologies.

2. WHAT IS TERRECABLATE

Terrecablate [1]-[2] was established in April 2002 with following members:
- Siena Province: 20% of participation
- Siena Municipality: 20% of participation
- Other 35 Municipalities: 60% of participation

In Italian language, the mean of "Terrecablate" is "wired land", and it is well represented by the logo, where the profile of the Province of Siena is sketched on the left, with some cables highlightered. Also, the cables "feeds" the cypress trees that characterize the Tuscany's landscape. That represents the strong relationship between the high-tech project of Terrecablate and the territory where it is developed.

Figure 2: The Terrecablate's logo

The main strategic goals of Terrecablate are to develope and manage the following activities:
- research and development of telecommunication and information technologies;
- to plan, construct and manage the local and regional broadband infrastructures;
- to promote, to plan, to implement and manage TLC networks for the public administrations, private companies and residential customers;
- develope telecommunication services and products;
- develope educational activities on telecommunication and multimedia services for the citizens of Siena.

Furthermore, we are conscious that many people have not yet understood the meaning of the term "broadband", therefore Terrecablate pursues to give to the market the opportunity to trial and experiment these new type of services.
Actually, the technical definition of "Broadband" is still object of discussion and it changes according to the different contexts. In Italy, a task-force established by the Ministry of Communications, together with the Ministry of Innovation and Technologies, has given the following definition: "*a technological environment that allows the use of digital technologies with the maximum levels of interactivity*."
Pursuing the definition of above, the project of Terrecablate has been oriented to three big categories of customers – or market segments – with their related services as follows:

1. *Public Administrations (including University, Schools, Hospitals, etc.):*
   Broadband Connectivity, Telephony, Videoconference, E-learning, E-medicine, E-working, Document management, E-government, VoIP (Voice over IP), etc.
2. *Private Companies:*
   Broadband Connectivity, Telephony, Videoconference, E-working, Peer-to-peer networking (Virtual Communities), VoIP, etc.
3. *SOHO (Small Office House Office) and citizens:*
   Broadband Internet, Pay-TV, Video on Demand (VOD), E-working, Peer-to-peer networking, VoIP, cable TV, etc.

In order to have an efficient broadband penetration, it must be simultaneously guaranteed:
- Interactivity;
- High speed availability and reliability;
- Competitive prices.

In the following pages it is presented the Vision, Mission and the Role of Terrecablate.

Terrecablate: The Vision

The realization of a broadband network has a strategic value for the whole Province and its social, economic and cultural actors.

By now, the possibility to have access to the information technology represents a new *"right of citizenship"*, which must be guaranteed by the Public Administration with direct investments, also where private players are not yet prepared to operate.

Terrecablate: The Mission

The Mission of Terrecablate can be summed up into the subsequent points:

- Laying down the fiber optic in the whole province area, even reaching the farthest areas and guaranteeing the maximum technological innovation
- Becoming the leader provider of Broadband Connectivity, IP (Internet), TV and multimedia services in Siena Province.
- Performing close relationships with the target market (Siena Province) in order to satisfy their needs and expectations.
- Expanding the Service Areas in order to strengthen its leadership as a Broadband operator.

Terrecablate: The Role

According with the Italian law [3], three TLC functions may be defined, each of them ought to be carried out in a regime of accounting separation:

- Construction and management of the infrastructures (diggins, tubes).
- Building up and management of the network (Fiber Optic and equipments).
- Services and Content Delivering.

Being Terrecablate a public society is inclined to look for synergies with other local companies and public services, already operating in the same area.

The division of competencies can be displayed as follows:

- *Construction and management of the infrastructure*
  According to a Italian law (DPCM March, 3rd 1999) the construction of the main infrastructures may be entrust to the companies which have already made significant experience in that area as - for example - water and gas companies (utilities companies). For these reasons, Terrecablate has signed two partnership agreements with "Intesa" and "Gestioni Valdichiana", that are the gas companies operating in the Siena Province, in order to build and maintain the tubes where the Terrecablate's fiber optic will be laid down.
- *Services and content' s provider*
  Terrecablate's main duty will be to guarantee the same level of access to all public and private services providers, and to offer the same possibility to provide services in a scenario of real competition.

3. TERRECABLATE: THE PROJECT

In the following, we are going to illustrate some financial and technical characteristics related to Terrecablate's project.

As previously sketched, the Province of Siena (see Fig. 1), is located in the center of Italy, and it has an extension of about 3.870 Km^2, whose larger part is hill-shaped with a low density of inhabitants. Also, the population of the Province of Siena counts about 255.000 people, subdivided in 36 medium and small towns, some of them having less than 1.000 inhabitants.

Then, in order to connect all the towns of the Province, the optical fiber span will be about 650 Km of backbone and 50 Km of distribution network.

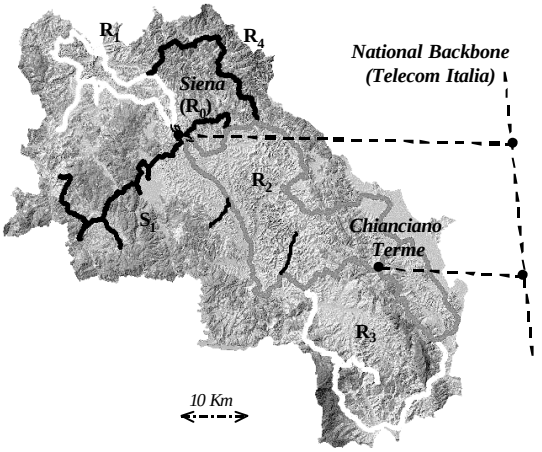

Figure 3: The whole network of Terrecablate, to be completed within year 2007

The whole network, that should be realized within year 2007, will cost about 83,5 millions of Euro, of which the 70% are financed by the Public Administration, that has strong relationships with

one of the more important and ancient Italian banks, the "Monte dei Paschi di Siena".
In the next future (years 2003-2005), the investments plane is expected to amount of about 68,3 millions of Euro, of which the 65% will be devoted to business customers and the remainder 35% to residential customers.
Figure 3 shows the structure of the network, that is subdivided in 4 rings (R_1 to R_4), some small links to little towns and a ring around the city of Siena of 27 Km (R_0), that is next to be completed. TLC services will start to be provided within 2003. The network will be completely redundant and it will have two main network nodes, one of them at Siena and the other one at Chianciano Terme, where the connections with the national backbone of Telecom Italia are located.
The backbone and distribution networks will be realized by using the transport SDH (Synchronous Digital Hierarchy) technology in order to deliver traditional TLC services, and high speed accesses up to 1 Gbps to offer ASP and ISP services. All the backbone rings will have STM16 as a minimum bandwidth. The public administrations, farm servers and large and medium companies will be connected by using different type of interfaces, 10/100 Mb/s or 1Gbps for data, Internet, Video, 2 Mbps transparent for Voice services all integrated in a unique broadband access.

As sketched in Figure 4, the end-customers will be reached through two different tecnological architecture:

- Fiber Optic: used as backbone and access for the Public Administration, Business Customers, University, Hospitals, etc.
- FTTB: for residential customers and SOHO.

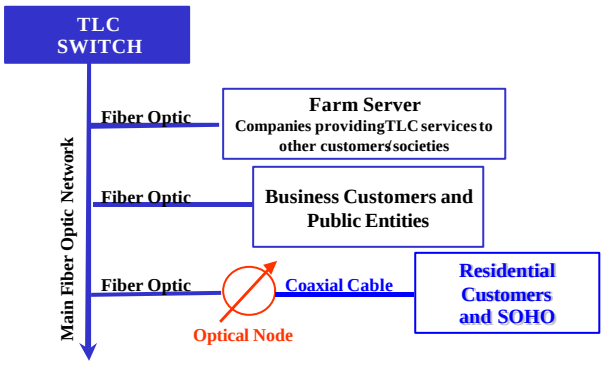

Figure 4: The adopted technology: Fiber Optic and FTTB

FTTB stands of fiber optic to the building (where the users of the interactive and multimedia services live and work). The houses and buildings will be able to use the existing coaxial cable TV plant, as a connection to the Fiber Optic Network (see Figure 5, for a sketch).
The FTTB tecnology allows to deliver broadband services to private customers, taking advantage of the existing TV equipment's.
The main advantages of these technologies are:

- no structural works into buildings and houses are needed;
- possibility to have a broadband signal with up to 50 analogical TV channels and 400 4Mb-digital channels.

In conclusion, FTTB technology is an exclusive Net Platform, where all the signals for advanced telecommunications and TV services converge:

- *Analogical and digital TV information*
  Free TV channels, civic TV channels, satellite analogical channels, Video on Demand (VoD), Pay-TV, etc.
- *Interactive Digital Services*
  Services of public interest (i.e. school registration forms, fees, documents, etc.), E-learning, E-medicine, E-working, sport happenings and entertainment shows, home-banking, E-reservations, etc.
- *Voice Services and Fast Internet Connection*
  Possible even by using just a TV set.

At the moment, Terrecablate, in joining with a local TLC-equipment supplier, is developing the project of a suitable set-top-box to connect the existing TV equipment's with the FTTB network,
Indeed, by using this device, it will be possible to bring together the broadband services of above, without any civil engineering work and further installations at home.

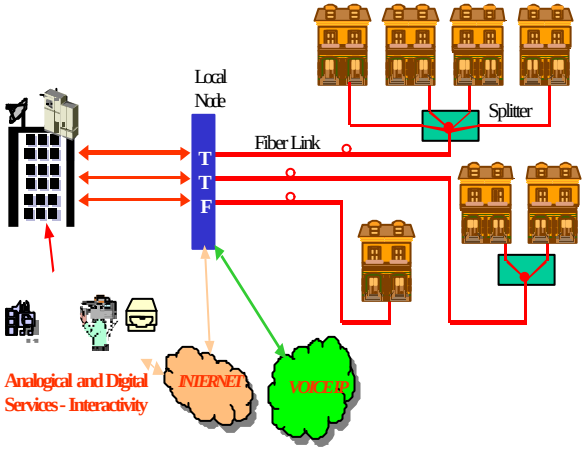

Figure 5: The new FTTB technology: existing Fibers and TV plants

4. CONCLUSIONS

Related to the facts and purposes of above, the mission of "Terrecablate" could be summed up in four items:

1. about 650 kilometers of optical fibers (backbone network) to be laid down in the area of Siena, and in all towns of the Province, in order to interconnect them with a high level technology;
2. to become the broadband TLC Service Provider in the territory with the lowest price offer compared with other TLC competitors;
3. to be considered as a "proximity and trust-worthy operator" for the customers, being Terrecablate a society that will be strongly joined with its geographic area;
4. to expand the service areas to other territories outside the Province of Siena in order to strengthen its leadership as a Broadband operator as well as take advantage of the technologies and services already developed.

In conclusion, the realization of the broadband network of "Terrecablate" in the Siena's area will have a great strategic value, allowing the Public Administration to deliver many services "close to the people".
On the other hand, this network will yield the area of Siena extremely competitive – in comparison with other areas in and out of Italy – facilitating a fast business development as well as a "look to the future", with the help of the most innovative technologies and advanced instruments.
Within the year 2007 Terrecablate Broadband Network in the Province of Siena- completely owned by the Public Administration - will be completed and effective.This Network will connect the 36 towns of the Province, with a high technological level operation and a unique strategic value in the whole Italian territory.

5. REFERENCES

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