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CASE STUDY: BROADBAND THE CASE OF ITALY

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1 FOREWORD

Broadband services are rapidly developing, fostered by the Internet-driven hunger for bandwidth. Furthermore, broadband services allow the development of completely new services delivered through an IP platform, such as broadcasting, video conferencing and video on demand. Broadband can be described in general as the capacity to support bi-directional bandwidth to the consumer greater than 128 kbit/s (the bandwidth of an ISDN line). Many alternative technologies are available to deliver broadband services, which use different kinds of networks: these vary from DSL technologies over the traditional PSTN network, to cable modems which use CATV networks, new fibre networks, and mobile solutions (e.g., wireless local loops and UMTS 3G technologies).

However, new networks take time to develop, while a competitive broadband services market needs to develop quickly throughout Europe. The objective of broadband regulation is, in theory, quite simple: in the short term ensure broadband access to existing networks, and in particular to the PSTN, which is still by far the most ubiquitous European network. On the other hand regulation should also follow a facility-based approach, providing incentives for the implementation of alternative networks. At the same time, regulation should be kept at a minimum, not to hinder the competitive development of these new segments of the communication market. These principles hold true for the Italian market, but also for the European market, and are indeed the tenet for the architecture of broadband regulation, which will be discussed here.

In Italy, broadband services are relatively a new issue, due to the low PC and Internet penetration rates, compared to other European countries. The market is at its very beginning, and it is mostly composed of DSL services and leased lines for large business users, while services based on satellite and fibre connections (where available) are still of a limited relevance.

Italy also has a relative lack of alternative networks: the only complete broadband infrastructure consists of Telecom Italia's own network. Other broadband networks are less developed: only 4 per cent of Italian households are connected to a CATV network, while only 10-15 per cent are linked to a satellite digital TV. While several operators (such as Colt, Hermes, Worldcom) are building long-distance networks, fibre is mainly deployed locally in the major urban areas, such as Milan and Rome. Wireless Local Loops are not yet operational. The wireless delivery of broadband services is now at a very early stage, but it could play a very important role in the future with GPRS and 3G UMTS technologies — this looks particularly promising in Italy, given the very high degree of penetration of mobile telephony.

Following the European Union framework, the regulation of broadband services has so far mainly focused on ensuring access and interconnection to Telecom Italia's fixed broadband network, in particular with mandatory unbundling of the local loop and wholesale offers to other operators for each retail broadband services provided by the incumbent. Other regulatory measures have been taken in the field of digital TV, imposing the use of a single technology for conditional access systems and limiting the share that any operator can hold of exclusive broadcasting rights of major football matches. With reference to market structure, a proposed concentration between an Internet portal (subsidiary of Telecom Italia) and a small TV channel is currently disputed. The Administrative Court has rejected a decision by the Communications Regulator (AGCOM) to stop the proposed takeover. The Appeals Court will rule on this matter in the coming months.

In this Report on Italian broadband regulation we shall provide a more detailed examination of the Italian scene briefly outlined above; this will be set in the broader landscape provided by the European regulatory framework. Section two of this case study provides data on the Italian broadband market, players and infrastructures. Section three gives an overview of the basic regulatory principles of the European Union framework for telecommunications, which obviously inspire Italian legislation. Section four reviews Italian regulatory structure and the main decisions related to broadband. Section five reports the point of view of some of the main players in Italy on the current and future regulatory system for broadband services. Section six provides a summary of what is seen as the major areas of policy development in the coming years.

2 SOME DATA ON BROADBAND MARKET DEVELOPMENTS IN ITALY

Internet penetration in Italy has increased significantly over the last 2 years (refer to Table 1); however, despite recent improvements, Italy's Internet penetration is still lower than the average rate in Western Europe (Western European average 34 per cent in 2001).

Table 1: Selected basic indicators for the broadband market in Italy

	1999	2000	2001
Population (thousands)	57'230	57'194	58'018
Internet penetration (%)	14.3	21	28.3
DSL penetration (%)	0	0.5	0.7
Mobile penetration (%)	53.1	64.5	83.9

Source: OECD, IDC, ITU.

On the other hand, there is a very high penetration rate of mobile telephony in Italy (83.9 per 100 inhabitants), which is well above the Western European figure (75.2 per cent at the end of 2001). The market for Internet Service Providers (ISPs) is more concentrated than in other European countries, with the top three ISPs having a market share of over 80 per cent of the total market.

According to EITO¹, the Italian telecommunications market value has grown significantly in the past three years, and is expected to follow the same trend in the future. Values are shown in Table 2, and a global overview of Italian broadband market players is shown in Annex 1.

Table 2: Italian telecommunications market values: 1998-2001

	1998	1999	2000	2001
Telephone services	13'480	13'730	13'695	13'385
Mobile telephone services	6'891	9'600	12'600	14'700
Switched data and leased line services	2'331	2'447	2'635	2'814
Internet and online services	301	455	787	1'387
CaTV services	34	44	59	80
Total	23'037	26'276	29'775	32'366

Source: European Information Technology Observatory 2001.

Note: Figures are in Euros

2.1 Broadband access through PSTN networks

The only existing nationwide broadband network is provided by Telecom Italia, which can be used to provide various types of DSL technologies, from ADSL (which usually takes the technical form of 640 kbit/s downstream and 128 kbit/s upstream) to HDSL (from 2 to 8 Mbit/s both downstream and upstream). The target for the so-called xDSL services consists of small and medium enterprises and residential users, while broadband services based on leased lines fit better the needs of large business users.

The market for xDSL services can still be considered to be in its early stages, although the Italian National Regulatory Authority (NRA) gave final approval to the incumbent's retail and wholesale offers in April 2000 (ADSL services) and in March 2001 (HDSL services). Local loop unbundling has been operational since mid-2001 in limited areas, and before then wholesale offers were the only feasible alternatives for new entrants to provide broadband xDSL services. ADSL services currently offered by Telecom Italia and its main competitors are shown in Table 3.

¹ See European Information Technology Observatory 2001.

Table 3: Main ADSL retail offerings in Italy

Operator	Service	Speed
Seat/Tin.it	ADSL 640 Base/LAN Available in more than 100 cities	Up to 640 kbit/s downstream, 128 kbit/s upstream
Infostrada	Libero ADSL (standard/premium)	Up to 640 kbit/s downstream, 128 kbit/s upstream
Albacom	Business Offering	
Wind	Wind Net Available in 15 cities	Up to 640 kbit/s downstream, 128kbit/s upstream
Fiscali		Up to 640 kbit/s downstream, 128 kbit/s upstream

Sources: Corporate Websites

As at the end of 2001, there were 390,000 xDSL subscribers in Italy. This represents rapid growth from 52,000 connections in only April 2001². Retail offers have developed briskly, and there are currently about 150 different ADSL packages on offer from several operators. Estimates show that by the end of June 2002, the number of subscribers had risen to 550,000³.

2.2 Mobile market

Mobile penetration growth in Italy has exceeded all expectations, reaching 48,7 million subscribers at the end of 2001. The continuing increase in competition, with concomitant price reductions, is likely to continue in the near future (see following Table 4). Total subscriptions is expected to exceed population in 2003, as holding more than one SIM card becomes a widespread practice among consumers who actively pursue low tariffs.

Table 4: Mobile telephony subscribers in Italy, 1998-2003 ('000s)

	1998	1999	2000	2001	2002	2003
Total subscriptions	20'400	30'068	42'500	48'700	55'000	58'000
Digital subscriptions	16'700	26'768	39'600	47'500	53'000	56'600

Source : EITO Task Force 2001

Four operators are currently positioned in the market for mobile services:

- TIM (Telecom Italia Mobile, running an analogue and a GSM 900/1800 digital network);
- Omnitel (controlled by Vodafone, running a GSM 900/1800 digital network);
- Wind (controlled by Enel, a majority State-owned power company and France Telecom, running a digital DCS1800 network);
- Blu (jointly owned by Autostrade, the largest Italian motorway company, British Telecom and other partners running a DCS 1800 digital network).

Table 5: Key figures of the Italian mobile market, 2000

Operator	Launch date	Users (as of July 2000)	Yearly growth	Prepaid users	Digital market share
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² ECTA (2001) < www.ectaweb.org >

³ <http://www.point-topic.com>

		July 2000)			share
TIM	April 1995	21'600'000 (*)	20%	80% (*)	48% (*)
Omnitel	December 1995	14'920'000	43%	N/A	37%
Wind	March 1999	4'900'000	292%	95%	12%
Blu	May 2000	800'000	N/A	90%	2%

(*) including TACS analogue users.

Source: Public Network Europe [2001]

Two important features of the mobile market concern the impressive percentage of pre-paid users, and the non-existence of handset subsidies, which usually oblige consumers to keep the same SIM card for a defined period of time (also called SIM-lock contracts). These aspects are combined with a strong competition on tariffs related to outgoing calls, and significant discounts on “on-net” calls.

For all these reasons, it is very likely that mobile telephony will play a key role in the future as a medium to access the Internet, though WAP technology has not been so far very successful.

The Italian cellular infrastructure recorded a further growth during 2000, due to the enhancement of existing networks, the market entry of the fourth GSM licensee (Blu) and new investments in GPRS technologies.

GPRS services are due to be launched by the end of 2001. Blu is especially keen on GPRS as it was the only existing operator that did not get a UMTS licence. The UMTS auction was a major event in September 2000. Six players were admitted to the bidding (five licences were auctioned), but after Blu’s withdrawal, the other five players were each awarded a licence. The five licensees (see section 4.4 for further details) are: TIM (controlled by Telecom Italia), Omnitel (controlled by Vodafone), Wind (controlled by Enel and France Telecom), and the two new entrants Ipse 2000 (controlled by Telefonica but with the participation of Sonera) and H3G (owned by Hutchison Whampoa and Tiscali). UMTS services are expected to be launched by early 2003.

2.3 Digital satellite TV market

The Italian digital satellite TV market is characterised by the presence of only two operators: D+ (99 per cent owned by the French broadcasting group Canal+, and the remaining 1 per cent by RAI, the Italian public broadcasting company); and, Stream, which is currently a joint venture between Telecom Italia and News Corp (www.newscorp.com). Both D+ and Stream operate in pay-TV mode in Italy, as well as in other European countries. The public broadcasting company RAI also offers digital services: its bouquet consists of 10 thematic channels, only four of which are available free-to-air, while six are part of the D+ offer. In early 2001, Telemontecarlo Group announced its intention to launch a number of digital channels, but its recent sale to Seat-Tin.it, the Internet subsidiary of Telecom Italia Group, has postponed those plans. This takeover underwent two inquiries, one by the Competition Authority and the other by the NRA — with mixed results. The former cleared the operation subject to particular conditions, while the latter gave a negative judgement.

D+ and Stream currently have a total of about 2.2 million subscribers in a market with 21 million homes (10.4 per cent penetration rate). D+ is the dominant operator in Italy, having in December 2000 1'370'000 digital subscribers, but its market share is steadily decreasing (from 81.6 per cent in March 1999 to 61.7 per cent in December 2000). On the other side, Stream is offering digital satellite services to about 850,000 subscribers at year-end 2000, with a market share of 38.2 per cent. D+ dominance is mostly due to historical reasons. From 1996 (when digital TV was introduced in Italy) to 1998, D+ was the only satellite digital TV operator in Italy, while Stream was providing cable-only digital services. The poorness of the Italian infrastructure cable (see next section) has limited Stream’s position and strengthened that of D+. In 1998 Stream reoriented its commercial strategies, adding satellite to its digital TV service offers, with immediate good results in terms of subscribers and market shares.

The development of the pay-TV market in Italy has been slower than in other European countries. This may be in part related to the quality and availability of free-to-air TV offerings. Italy has over 10 national channels, provided by a duopoly (RAI and Mediaset), many local networks and also free-to-air digital

channels that broadcast in Italian. Regulation⁴ limits the number of events which can be broadcast through pay-TV. For some things, such as all the matches of the Italian national football team, Formula One Championships and Olympics are qualified as “national interest events” for which, no pay-TV broadcast is allowed. In fact, the main driver for the growth of Italian digital satellite TV market seems to be exclusivity broadcasting rights for series A football matches. However, to prevent dominant positions in the market, regulation imposes conditions on the rights to these games, see section 3.5.

Furthermore, the Italian government has recently issued a White Paper on digital terrestrial television, proposing the start of free-to-air simulcasting technology in 2003, with an analogue transmission cut off in 2006. Four frequencies have so far been reserved for experimental broadcasting. RAI, the public Italian broadcaster, is going to be the only operator to offer a DTT network carrying both public and commercial channels. It is currently carrying out several trials of the system in different geographic areas of the country.

The use of satellite in Italy as a medium for Internet access is limited. Although, through Webcasting technology, this service enables the delivery of broadband services such as real time audio, video and data streaming, the technology suffers a main problem. It is properly “broadband” in one direction only. In fact, while data may be downloaded from the Internet with relative ease, with high bandwidth available, data uploading is largely impossible through satellite.

An intermediate solution has been trialed in Italy by Netsystem, a company that offers broadband PC Internet connectivity via satellite, through a partnership with Astra (Société Européenne de Satellites). The Netsystem model consists of a satellite broadband downstream link, while upstream connection is narrowband, to a normal ISP, via a traditional phone modem. The latest available market data show more than 20,000 users in April 2001⁵. The company also operates “videoportal.com”, an entertainment broadband portal that offers audio and video files and is considered to be one of the first examples of Italian web TV.

2.4 Cable TV market

Cable is a marginal market in Italy, with a penetration rate of about 1 per cent and about 1’000’000 homes passed. The network owner is Telecom Italia, which built it under a project called Socrate, started in 1995. This project suffered a dramatic slowdown in 1997, due to strategy changes after the privatisation of Telecom Italia. At the end of 1997 the network was reaching about 1’500’000 households in 54 cities, but only two thirds of them were equipped to receive CATV signals. No relevant changes have taken place since then; the decision of Stream (a subsidiary of Telecom Italia at that date) to enter the digital satellite TV market has completely stopped the project. Tele+, the other digital pay-TV operator, has negotiated access with Stream to its CATV network. There are, therefore, two operators in the CATV market, but the services on offer are no different to those from satellite digital TV.

2.5 Fixed wireless access market

The fixed wireless access (wireless local loop) could be a promising alternative to the use of Telecom Italia’s local loop, because it is quick to implement and at a low cost. However, this technology is not yet developed in Italy: no licences are available (and will not be) in the 3.5 GHz and in the 10.5 GHz spectrum. A series of bidding for regional licences in the 26 GHz spectrum should have taken place in March 2001, but they have been delayed by the Regulator until the coming months. Growing awareness of potential “magnetic pollution” problems linked to wireless aerials could however make it difficult to implement such a technology on a large scale.

2.6 Direct fibre market

The Italian market for direct fibre connections is marginal, if we exclude point-to-point leased line links frequently used by corporate users for Internet purposes.

⁴ See AGCOM Order n° 8/99, March 9th, 1999, “Lista degli eventi di particolare rilevanza per la società da trasmettere su canali televisivi liberamente accessibili” (List of events for which no pay-TV broadcast is allowed), (in Italian only) at: <www.agcom.it>

⁵ See the press release at the website: <www.netsystem.com>

Fibre rings are currently deployed in main Italian urban areas by some operators (Colt, Hermes, Worldcom) that target only of business users. The only exception is e.Biscom, which is both a telecom, Internet and a Pay-TV operator, providing broadband services in urban areas using a fiber-to-the-building network (FTTB). The business model of e.Biscom usually involves a joint venture with a local public company to build and manage the fibre infrastructure, and another joint venture to run services over the fibre network. In Milan, the company has formed two joint ventures with the local power company (AEM), Metroweb and Fastweb. Metroweb (66% AEM, 33% e.Biscom) has built so far a 1,200 km fibre-optic network in Milan, reaching 5,500 buildings at year-end 2000. e.Biscom plans to expand its fibre-optic network by 2001 in other cities, such as Genoa (220 km by year-end 2001), Turin (150 km) and Rome (180 km).

Fastweb (owned 55% by e.Biscom, 37% AEM, and 8% Fastweb employees) is the first company to create direct access to the homes and companies, offering integrated broadband voice, high-speed Internet (10 Mbit/s, always on, for residential users), data and video services. Through a joint venture with RAI, Fastweb will have access to all the content produced or owned by RAI, and it is therefore able to develop entertainment content. At year-end 2000 Fastweb was reaching about 6,000 customers, with a significant percentage of large businesses having their headquarters in Milan.

2.7 Backbone providers market

Recent years have seen substantial investments mainly aimed at improving and expanding backbone capacity of networks, both for incumbent and alternative operators. These network roll-outs has been undertaken by firms having widespread operations across the country, in electricity, gas, railways and motorways, which have been later sold or leased to new communication operators as well as by pan-European carriers such as MCI Worldcom, Colt, Global Crossing.

In coming years, however, Telecom Italia is very likely to remain the nationwide dominant operator in this segment; this view is also supported by the slowdown that has hit the financial markets, and has forced many operators to cut their investment plans.

A summary of main backbone providers presence and offerings in Italy, updated to second half 2000, is detailed in Table 7 below.

Table 6: Main national backbone providers in Italy

Operator	Connected route km	Fibre density	Comment
Telecom Italia	2'700'000		Incumbent operator
Nautilus/Med1 (51% owned by Telecom Italia)	7'000	6 fibre pair cable	Eastern Mediterranean subsea cable network linking Italy, Greece, Turkey, Egypt.
Infostrada	6'000		
Tiscali	30'000	High capacity	
Albacom	N/A		Backbone network connected to BT/Farland and Concert networks
Fastweb	1'500		
Wind	12'000		6 fibre rings in metropolitan areas
Atlanet	300		JV between ACEA and Telefonica
Global Crossing	N/A		1 fibre ring in Milan
Colt	N/A	2,5 Gbit/s	3 fibre-optic rings in Milan, Turin, Rome.

Sources: Company websites, Schroder Salomon Smith Barney (2000)

Furthermore, international links to most pan-European backbone operators are available in main Italian cities, as shown in Table 9 below.

Table 7: Pan-European backbone operators with connections in Italy

Operator	
Cable & Wireless	Milan and Rome linked to pan-European network
Carrier 1	Milan belongs to a loop linking Paris, Zurich and Geneva
COLT	Milan, Rome and Turin are linked to pan-European network
KPN Qwest	Milan, Turin are connected to a Southern Ring spanning a pan-European network
MCI Worldcom	Milan connected to Ulysses network
BT/Farland	Connection with Albacom network
Global Crossing	Milan and Turin connected to the pan-European network.

Source: Company websites and Schroder Salomon Smith Barney (2000).

3 AN OVERVIEW OF THE EUROPEAN REGULATORY FRAMEWORK AND ITS IMPLICATIONS FOR BROADBAND

The framework for broadband regulation in Europe is defined by two European Commission Directives⁶: Directive 90/387, which foresees the creation of a harmonised framework able to guarantee the access to network and telecommunications services (open network provision, or ONP); Directive 90/388 (the Services Directive), aimed at liberalising the market for telecommunications services. In this context, there are five major regulatory issues relating to broadband:

- liberalisation of telecommunications services;
- regulation of cable television;
- access and interconnection of telecommunications networks;
- licensing and universal service.

The European regulatory framework has been recently given a new perspective by two documents. The Convergence green paper⁷, published in 1997, and the 1999 Telecommunications policy Review, which spawned a batch of new proposed Directives, published by the European Commission in July 2000.

In both documents the European Commission stresses the need to modify the existing regulatory framework, arising from the development of digital technologies. The current regulatory framework in the Union is not indeed technology-neutral. While the wide diffusion of broadband services allows several network platforms to handle services which are fundamentally similar, different rules apply to the same service if it is supplied over fixed networks, mobile networks, or broadcasting networks. In both the Green Paper and in the 1999 Review⁸, the Commission has clearly stated that technological convergence does not necessarily imply regulatory convergence, but has suggested the gradual adoption of a horizontal regulatory approach, that is of a set of technology-neutral rules, referring to network access: this should be complemented, where appropriate, by a vertical or sectoral regulatory approach, referring to specific aspects of services supply.

⁶ European Commission (1990), Council Directive 90/387/EEC of 28 June, on the establishment of the internal market for telecommunications services through the implementation of open network provision, and (1990): more information available at <http://europa.eu.int/eur-lex/en/lif/dat/1990/en_390L0387.html> Commission Directive 90/388/EEC of 28 June, on competition in the markets for telecommunications services. See also <http://europa.eu.int/eur-lex/en/lif/dat/1990/en_390L0388.html>

⁷ European Commission (1997), Green Paper on the convergence of the telecommunications, media and information technology sectors, and the implications for regulation, COM(97)623 <http://europa.eu.int/eur-lex/en/consleg/main/1997/en_1997L0033_index.html>

⁸ European Commission (1999) Communication [Com(1999)539] to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions reviews recent developments in the market for electronic communications services within the EU and provides a number of proposals for possible future regulatory measures specific to this sector. <http://europa.eu.int/eur-lex/en/com/pdf/2000/en_500PC0393.pdf>

3.1 Broadband telecommunication services

Directive 90/388 was originally aimed at favouring liberalisation of the market of telecommunications services (excluding vocal telephony services), through the abolition of special or exclusive rights bestowed upon national Telecom operators by member governments. Originally liberalisation excluded several services, as the Directive did not apply to network infrastructure for telex, mobiles, paging and satellite. From 1990 through 1996, the Commission has modified the regulatory framework by abolishing special and exclusive rights for the supply of satellite services infrastructure (Directive 94/46)⁹, removing the restrictions relating to the use of cable television networks and liberalising supply of mobile communications services (Directive 96/19)¹⁰. While we shall discuss in the following paragraphs the regulatory framework relating to cable television, it is important to stress here that article 2 of Directive 94/46 states that satellite services are telecommunications services and, as such, are subject to the overall regulatory framework. In particular, the abolition of special and exclusive rights relating to satellite infrastructure and services allows for the development of a transmission technology of broadband services that can be complementary to terrestrial transmission.

3.2 Cable television networks

The supply of new services, such as interactive television and video on demand and online data services, is authorised by Directive 95/51¹¹. This Directive has actually eliminated all regulatory restrictions that forbade the use of cable television networks for the supply of services other than the diffusion of broadcasts, and in particular of new services.

Until that time, measures adopted by Member States to stop cable distributors from offering transmission capacity in competition with telecommunications undertakings for the supply of liberalised services were limiting the overall supply of capacity in the market and eliminating incentives for telecommunications undertakings to increase rapidly capacity of the old networks, reducing average cost and lowering tariffs. Article 1(2) of the Directive thus mandated that Member States should authorise the interconnection of broadcasting cable networks with telecommunications networks, in particular with leased lines; furthermore, all restrictions to the direct interconnection of cable television networks should also be lifted.

The existing regulatory framework does not allow, at the community level, for compulsory access to cable television networks: the rationale for this is that there obviously exist alternative technologies. However, in Member States with high cable TV network coverage, such networks may provide an alternative infrastructure by which telecommunications services providers can obtain access to the customers, thus bypassing the local loop bottleneck of the dominant telecommunications operator. For this reason, when an operator owns both cable television and telecommunications networks, Directive 95/51 mandated a soft (i.e., an accounting) separation. Later, Directive 99/64¹², seeking to favour competition among different infrastructures, created a somewhat harder separation, by mandating that broadcasting networks and telecommunications networks under the property of a single owner should be managed by different legal entities.

3.3 Access and interconnection

The key legal provision in the field of access in Europe is set out in Directive 97/33¹³, which builds upon the principles established by Directive 90/387, laying out the fundamental principles governing interconnection. Article 4, paragraph 2 of the Directive mandates that telecommunications operators endowed with a significant market power must allow access to their networks on the basis of transparent and non

⁹ European Commission (1994), Commission Directive 94/46/EC of 13 October, amending Directive 88/301/EEC and Directive 90/388/EEC in particular with regard to satellite communications. More information is available at <http://europa.eu.int/eur-lex/en/lif/dat/1994/en_394L0046.html>

¹⁰ European Commission (1996), Commission Directive 96/19/EC amending Directive 90/388/EEC with regard to the implementation of full competition in telecommunications markets.

¹¹ European Commission (1995), Commission Directive 95/51/EC of 18 October, amending Directive 90/388/EEC with regard to the abolition of the restrictions on the use of cable television networks for the provision of already liberalized telecommunications services. More information is available at <http://europa.eu.int/eur-lex/en/consleg/main/1995/en_1995L0051_index.html>

¹² European Commission (1999) Commission Directive 1999/EC of 23 June, amending Directive 90/388/EEC in order to ensure that telecommunications networks and cable TV networks owned by a single operator are separate legal entities. More information is available at <http://europa.eu.int/eur-lex/en/lif/dat/1999/en_399L0064.html>

¹³ European Commission (1997), Interconnection Directive 97/33/EC, on the availability of contents of interconnection agreements.

discriminatory conditions. Significant market power is generally defined as enjoying a market share of about 25 per cent in the relevant market, although such a definition is currently under revision by the European Commission and the European Parliament.

As far as prices are concerned, article 6 paragraph 2 of the Directive mandates that interconnection tariffs must respect the principles of transparency and cost orientation. Later, a recommendation by the Commission, has suggested the adoption of long-run incremental costs. Under community law, however, a recommendation is just a recommendation, thus it does not carry any strict obligation. Consequently we can see a variety of costing principles being adopted by Member States. In order to reduce what might have been a very large cross-country variance of such prices, the Commission, in the same recommendation, has indicated “best practice” interconnection prices, based upon the three lowest prices to be found within the European Union. Although the legal basis for this is quite shaky, such a policy choice has been successful, and national regulators have quickly forced prices down to “best practice” levels.

Mandatory access is, however, limited only to operators of public telecommunications networks, and does not extend to access to other telecommunications networks, such as cable television networks. Here the 1999 Review by the Commission recommends that Member States should foresee an obligation to negotiate access upon operators of cable television networks enjoying a significant market power, with an intervention by national regulatory authorities when commercial negotiations would fail.

The regulatory framework relating to access has been recently complemented by Regulation 2887/2000¹⁴ of the European Parliament and of the Council concerning the unbundled access to the local loop.

As far as the unbundling of the local loop is concerned, the Regulation mandates that operators enjoying a significant market power must allow access at cost-oriented prices to their networks, in a disaggregate fashion. This will allow new entrants to compete with the incumbent operators in the supply of high bit-rate data transmission services for continuous Internet access and for multimedia application based upon digital subscriber lines as well as voice telephony services.

Directive 92/44¹⁵ establishes an obligation upon the incumbents to offer a minimum set of leased lines, composed of 64 kbit/s and 2 Mbit/s circuits. It also mandates that prices should be cost oriented, transparent and objective. By 1993 Member States should have prepared and applied a cost accounting system. However, given the large delays in enacting the directive in national legal systems, the Recommendation 3863/1999¹⁶ of 24 November 1999 has supplied a benchmark approach for leased lines that will probably be applied along the lines that have been established for interconnection pricing within the European Union.

3.4 Licensing

Individual licences are required in Europe for broadcasting satellite services for both GSM and UMTS. The fundamental principles in the field of licensing have been established by Directive 97/13¹⁷: National Regulatory Authorities must assign the licences on the basis of non discriminatory and proportional transparent criteria. Furthermore, individual licences should only be employed where scarce resources have to be utilised to supply the services, such as in the case of spectrum. Class licences¹⁸ should be utilised in all other circumstances.

Notwithstanding the Directive, only a few Member States have extensively utilised class licences. Such a practice can, however, hamper the development of pan-European services, especially in the fields of satellite services, and in the 1999 Review the European Commission has proposed to further limit the recourse to individual licences.

¹⁴ European Commission (2000) Regulation 2887/2000 of the European Parliament and of the Council on Unbundled Access to the Local Loop. <http://europa.eu.int/eur-lex/en/lif/dat/2000/en_300R2887.html>

¹⁵ European Commission (1992), Council Directive 92/44/EEC of 5 June 1992 on the application of open network provision to leased lines. More information is available at <http://europa.eu.int/eur-lex/en/lif/dat/1992/en_392L0044.html>

¹⁶ European Commission (1999) Regulation 3863/1999 of 24 November, of the European Commission on leased lines interconnection pricing in a liberalised market.

¹⁷ European Commission (1997), Directive 97/13/EC of the European Parliament and of the Council of 10 April, on a common framework for general authorizations and individual licences in the field of telecommunications services. More information is available at <http://europa.eu.int/eur-lex/en/lif/dat/1997/en_397L0013.html>

¹⁸ A class licence is a light form of regulation that sets out rights and regulations that apply to anyone who engages in those activities covered by the licence. The idea is not to restrict the number of licencees but record and to monitor.

3.5 Universal service

The regulatory framework defined by Directive 97/33 mandates that all European citizens should have access at affordable conditions to a certain set of telecommunications services that are deemed to be essential. The list of such services has been defined at the Community level, while individual Member States should define the means by which the supply of such services should be financed on the basis of non-discriminatory, transparent and proportional criteria.

The set of services defined as essential under the Directive include vocal telephony but do not include broadband services. The 1999 Review has discussed the opportunity to include within universal service broadband services, such as cable television, satellites or DSL services. The Commission, indeed, has expressed the opinion that the supply of broadband services will be essential in assisting the development of the information society in the European Union. A further step in the same direction was taken by the European Council held in Lisbon in March 2000. Despite the fact that this Council established that by year end 2001, all schools within the European Union should have access to the Internet and to multimedia, and that within 2002, all students completing their education should be able to make use easily of all the facilities offered by the digital age, no hard policy changes have taken place so far.

4 THE ITALIAN EXPERIENCE OF BROADBAND REGULATION

As discussed in section 2, the only infrastructure existing in Italy able to supply broadband services to a very large proportion of residential customers and to small and medium-sized firms is Telecom Italia's network, the local loop of which can be upgraded on the basis of xDSL technologies. Moreover, cable television and satellite services do not have any substantial diffusion in Italy. Mobile broadband services will be relevant, albeit only in the future.

In order to foster the development of broadband services, the NRA has adopted several measures enabling new operators to gain access to the local copper network of Telecom Italia. Given the very limited supply of alternative networks, the opening of the last mile of the incumbent's network to local loop unbundling acquires in Italy a far greater importance than in other countries.

Other relevant regulatory decisions in Italy have been taken relating to access to set-top boxes for digital television and leased lines regulation. In particular, as far as electronic conditional access to systems are concerned, the Italian Regulator has imposed to the two existing operators, the use of set-top boxes based upon the same technology, in order to limit transferring costs to consumers.

The obligation to unbundle the local loop has therefore been introduced in Italy in a very broad form. In fact such an obligation has been complemented by the obligation upon the incumbent operator to supply to its competitors wholesale services for broadband, strictly analogous to the offers that the incumbent makes to its customers. According to the Italian Regulator, the price of such wholesale services should be oriented to the prices that Telecom Italia¹⁹ charges for its final services, according to a "retail-minus" approach. Such a decision is aimed at avoiding any unfair advantage that Telecom Italia may have in being able to supply broadband services far earlier than anybody else, as this would have allowed the incumbent to acquire a dominant position in the emerging broadband services market. On the other hand, this encourages competing operators to pursue rent-seeking behaviour, as they can easily arbitrage between wholesale and retail prices, and have little rational incentives to invest. We shall discuss such issues in the next two sections.

4.1 Local loop unbundling

The Italian Regulator established the guidelines for the introduction of local loop unbundling in March 2000²⁰. The Italian decision has anticipated the European Regulation referred to above which has been issued only in December 2000. The Italian Regulator, in establishing the guidelines, had two major objectives: opening the last mile of Telecom Italia's network in order to promote competition in the telecommunications market, including vocal telephony services, and to promote the development of innovative broadband services for the mass market based upon DSL technologies.

¹⁹ Telecom Italia, (2001), *Regulatory update*, Andrea Camanzi, Annual meeting with the Financial Community, Florence, 5-6 February.

²⁰ See AGCOM Order 2/00/CIR, "Linee guida per l'implementazione dei servizi di accesso disaggregato a livello di rete locale e disposizioni per la promozione della diffusione dei servizi innovativi"(Guidelines on the introduction of local loop unbundling), available (in Italian only) at the website: www.agcom.it

From a technical point of view, the Italian Regulator has imposed upon Telecom Italia²¹ a very broad set of obligations, which in part are different, and on the whole heavier, than the ones recommended by the European Union. In particular, Telecom Italia is under the obligation to offer, at cost-related conditions:

1. Unbundling of the copper wire from the user's premise to the Main Distribution Frame (MDF);
2. Unbundling of the local fiber optic network. This option is excluded by the European regulation approved in December 2000, which does not consider the fiber local loops as essential facilities;
3. Bit stream access, composed of a 2 Mbit/s leased line provided between the user's premise and the MDF. This service shall be provided only if physical access and/or co-location are unavailable;
4. A transmission link from the MDF to the local exchange. This is an ancillary service provided by the incumbent if co-location in the same building is impossible. This service shall be provided only for a limited time (3 years);
5. Co-location services;
6. Permanent virtual circuits (xDSL wholesale offer).

The guidelines of the Italian Regulator do not however contain the option of "shared use of the copper local loop", included in the European regulation. This would entail that the incumbent operator continues to offer on the same twisted copper pair POTS to the final users, while the competing operators offer broadband services.

In the Italian guidelines, local loop unbundling is considered as a case of special access to the network, and therefore similar to interconnection. The determination of the economic conditions for local loop unbundling should, therefore, take place in a totally similar way, on the basis of long-run incremental costs, as recommended by the European commission. However, considering the difficulty in establishing an accounting system based upon such costs, the Italian Regulator has preferred to opt for a fully distributed historical cost methodology. Such a methodology has the obvious advantage of being more readily available, However, it has the potential to distort is the development of competition in the market. In particular, in the case of the local network, historic costs underestimate by a significant amount of current costs, as rights of way and digging costs were in the past far lower than they are today. Tariffs based upon historic costs will thus be lower than the actual costs met by an efficient operator, and would therefore favour inefficient entry in the market. In this case there would also be a discrepancy with the criteria utilised for the estimation of interconnection costs. This has a remarkable consequence — different elements of the same network would be priced on the basis of different cost, depending on their utilisation.

The guidelines of March 2000 foresaw a stringent timing for the introduction of local loop unbundling in Italy — 45 days for the presentation of a reference offer and of service level agreements; the Regulator should examine these within 30 days; and within the 30 October 2000 deadline the service should be operational. Actually, the complexity of defining tariffs and solving numerous technical problems imposed a slower pace. At the time of writing this paper (April 2001), unbundling had started in 500 MDF of Telecom Italia's network, and local loop unbundling is forecast to be fully operational throughout the country only at the end of 2002. Unbundled tariffs in Italy are currently those depicted in Table 7.

²¹ (2001), *TI Wireline Services: Shifting Gears*, Rocco Sabelli, Annual meeting with the Financial Community, Florence, 5-6 February.

Table 7: Local loop unbundling tariffs in Italy

Access to copper pairs (Values in €)

	1 pair for POTS ISDN BRA	1 pair for ADSL	2 pairs for HDSL ISDN PRA
Monthly rental fee	11.46	12.54	22.20
Installation fee (*)	90	90 + 38.6	100

* for existing pairs; for spare pairs fees are respectively 106 € and 133 €.

Access to optical (Values in €)

	2 fibers
Monthly rental fee	591.55
Installation fee	164.74

Bitsream access (2 Mbit/s) [proposed tariffs under approval by the NRA] (Values in €)

	To the MDF	To the local exchange(*)
Monthly rental fee	245	1.041
Installation fee	675	962

*) If the MDF is located in the same building of the local exchange, the charge “to the MDF” applies.

Transmission link from MDF to the local exchange (Values in €)

	2 Mbit/s	34 Mbit/s	155 Mbit/s
Monthly rental fee	796	6.056	17.588
Installation fee (°)	339	339	339

Note: Values are in Euro's (€), the UN exchange rate effective 01 May 2001 is equal to € 1.117 = 1 US\$

Italian tariffs are therefore quite low by international standards, and new operators enjoy the regulated supply of services that are not available to them in other countries. If pursued for an extended period, such an asymmetric regulatory policy runs the risk of discouraging investment. Thus the search for a better balance between short-term and long-term objectives is a critical area of broadband regulation in Italy.

4.2 Wholesale broadband offers

In Italy, every new commercial offer by Telecom Italia is subject to approval by the regulator. In the case of new DSL-based broadband services, in order to obtain such an approval Telecom Italia must present a parallel wholesale offer for the same service to competing operators. The rationale for this is rather clear: as local loop unbundling is currently not available in practice, it would be impossible otherwise for other operators to supply such services. In this case, Telecom Italia would be able to leverage its dominant position in the new market for DSL services. As in the case of unbundling, however, such a regulatory decision entails a delicate balance between short-term and long-term, as it encourages a rent-seeking behaviour by new entrants. They have the benefit of knowing in advance what new broadband offers will be proposed by Telecom Italia, and they enjoy a large discount (typically, around 30 per cent) over the retail price, which provides them with a rather comfortable margin.

Wholesale broadband offers must be transparent, non-discriminatory, and adequately disaggregated. Their prices must not be oriented to costs, but rather are determined on the basis of Telecom Italia's price for the its final customers, on the basis of a retail-minus approach. Thus, the wholesale price is determined by subtracting from the price for final customers the costs relating to the commercialisation of the offer (such as marketing, advertising and other commercial expenses) and customer management costs such as billing and customer care.

The introduction of wholesale broadband services in Italy has taken place in a highly litigious environment, which has slowed down substantially their supply to final customers. The first regulatory decision

concerning the supply of broadband services was a provisional authorisation to Telecom Italia to offer ADSL services in 15 Italian cities, granted in December 1999. This included a retail and a wholesale offer for other operators and ISPs for ADSL services with a 640 kbit/s downstream and 128 kbit/s upstream capacity. When the offer presented by Telecom Italia was fully analysed, the Regulator requested substantial revision, but granted approval in April, 2000. At that time, however, the Antitrust Authority had already opened proceedings against Telecom Italia, which had been accused by competing operators of having begun offering ADSL as early as 1998 in 16 cities, enjoying an unfair competitive advantage as competing operators could not access then Telecom Italia's network in order to offer such services to their customers. The Antitrust proceedings on this have been very slow, and indeed at the time of writing, they are still open²².

The regulation of higher speed broadband services (such as HDSL with speeds between 2 and 8 Mbit/s and SDH technologies between 30 and 155 Mbit/s) has turned out to be equally complex. The dominant operator began supplying such services at the end of 1999, without providing at the same time a wholesale offer. This was actually requested by the Regulator only later (March 2000). In May 2000, the incumbent operator published the wholesale offer for HDSL/ATM services. Following a request by two OLOs asking for lower wholesale charges, and lacking an NRA Decision about the matter, the retail HDSL offer was suspended by the Rome Appeals Court in August. In January 2001, the Regulator concluded its enquiry, by imposing upon Telecom Italia the obligation to supply HDSL and SDH services in an unbundled fashion. In this case the retail-minus criterion for the determination of prices within the wholesale offer has been replaced by a 30 per cent discount both for non traffic-sensitive and traffic-sensitive services. Telecom Italia has also been obliged to publish a flat-rate reference offer. Current rates are as follows:

Table 8: Telecom Italia traffic-sensitive wholesale broadband offers

Equipment (ADSL/HDSL modem)	123.95 €
Installation fee	180.76 €
Annual access fee	545.89 €
Charge for each 2 Mbit of traffic	0.01 €
Transport services	255.13 €

The flat wholesale rates, valid for ADSL services only, are:

Table 9: Telecom Italia flat wholesale broadband offers

Installation fee	180.76 €
Annual charge	2065.73 €

Litigation has been quite damaging to broadband diffusion in Italy, as HDSL services are not yet available.

4.3 Leased lines

The main alternative to the use of local loop unbundled elements, or DSL services, is obviously provided by leased lines. The Italian regulatory framework here has aligned with European Directive 92/44, which establishes an obligation upon dominant operators to supply leased lines at fair, cost-based, transparent and non-discriminatory conditions. This has not always been the case in Italy. Telecom Italia was condemned by the Antitrust Authority in January 2000 for abuse of its dominant position. Telecom Italia was said to be

²² See AGCM (2001), Proceeding A285, Albacom/Infostrada vs. Telecom Italia, available (in Italian only) at the AGCM website, <www.agcm.it>

keeping the prices of direct circuits high in order to create entry barriers to the detriment of ISPs²³. Telecom Italia later presented a revised offer containing substantial price reductions. On the basis of the benchmarking method proposed by the European Commission in November 1999, the Regulator altered the proposed prices, by introducing substantial discounts especially for short urban circuits. The leased line prices in Italy appear now to be in line with those of other countries; in the long-distance segment of this business competition is at last beginning to deploy its beneficial effects, and prices are dropping.

A significant development in the leased lines regulation has been the recent consultation opened by the Italian Regulator concerning the possibility of introducing a compulsory offer for competing operators for the supply of these lines. This is a relevant development as it entails that leased lines seem to be now considered by the Italian Regulator as being a final service rather than an intermediate service.

4.4 UMTS

In June 2000 the Italian Technical Ministry of Communications Regulator issued an Order concerning the auction of 5 UMTS licences. The frequency blocks to be assigned were: 2x10 MHz symmetric and 2x5 MHz asymmetric blocks for each licence; 2 extra frequency blocks were available to new entrant. The duration of a licence was 15 years, starting from January 2002. The licence includes an obligation to cover Italy's main urban areas with a UMTS network within 30 months (June 2004); and to cover the remaining urban areas in a further 30 months (December 2006).

Operators currently offering GSM or DCS mobile services, being granted a UMTS licence, should provide to new entrants national roaming for 30 months nationwide and for 60 months in the smaller urban areas. Where mobile operators had been notified as having significant market power on the national market for interconnection, roaming charges should be cost-oriented. This applied in practice to TIM and Omnitel, both GSM 900 operators²⁴, but not to Wind or Blu. Licences also include a reciprocal obligation to existing operators and new entrants to site sharing and co-location.

The auction base was established at € 2.06 billion. Six operators took part in the auction, which started on 19th October 2000: TIM, Omnitel, Wind, Blu (existing operators) and Andala (controlled by Hutchison Whampoa) and Ipse 2000 (controlled by Telefonica) were new entrants. The auction ended, after the eleventh round, with the Blu consortium dropping out the auction. Therefore, the five UMTS licences were awarded to the following operators:

Table 10: UMTS licences in Italy

Licencee	Controlled by	Amount paid
TIM (Telecom Italia Mobile)	61.2% Telecom Italia	€ 2.41 billion
H3G (formerly Andala)	78.3 % Hutchison Whampoa	€ 2.42 billion
Wind	ENEL (56.63%) France Telecom (43.37%)	€ 2.42 billion
IPSE	Telefonica Moviles (45.56%) Atlanet (ACEA, Telefonica) (19%) Banca di Roma (19%) Sonera (12.55%)	€ 2.44 billion
Omnitel Vodafone	Vodafone (76.86%) Verizon (23.14%)	€ 2.45 billion

As discussed above, Italy is the largest mobile market in Europe. It is unclear whether this will help or hinder the diffusion of 3G broadband services as customers will have to be convinced to leave their 2G services (content provision is likely to be the key factor here).

²³ See AGCM(2000), proceeding A255, "Linee guida per l'implementazione dei servizi di accesso disaggregato a livello di rete locale e disposizioni per la promozione della diffusione dei servizi innovativi"(Guidelines on the introduction of local loop unbundling). AIIP –telecom Italia, available (in Italian only) at the AGCM website, <www.agcm.it>

²⁴ See Order 197/99 of AGCOM, published in September 1999, "Identificazione di organismi di telecomunicazioni aventi notevole forza di mercato" (Operators having significant market power).and available (in Italian only) at the website: <http://www.agcom.it>.

A further unknown factor is the actual ability to build the new networks, in the light of a growing anxiety by the public about possible health consequences of radio emissions and of new legislation enacted by Parliament which effectively gives to local authorities the power to prevent the construction of base-stations.

4.5 Conditional access systems for digital satellite TV

Conditional Access Systems (CAS) hold the keys to access, via set-top boxes (or decoders), to pay-TV subscribers. Major regulatory problems here are to avoid that the adoption of a specific technology representing a high entry barrier for new operators by entailing substantial switching costs for consumers; and to foster the supply of Internet-related services, such as e-commerce.

Only the first problem has been addressed in Italy. Tele+ and Stream began broadcasting in 1996 using different means: satellite (Tele+) and cable (Stream), two different operating systems and also two different CASs. The Regulator repeatedly pressured the two companies to find an agreement allowing inter-operability of their systems, but with no success. In March, 2000, however, Parliament passed a law that mandated for an inter-operable decoder by July, 2000. The law also established that soccer teams were the sole owners of encrypted broadcasting rights for their matches, and forbade any operator to control more than 60 per cent of such rights for First (A) and Second (B) Italian football leagues. As a consequence, broadcasting rights for the A teams were sold in part to Stream and in part to Tele+. Subscribers of one TV platform would therefore receive only some matches of their favourite team, without having the chance to follow other matches the broadcasting rights of which had been sold to the other digital TV operator. In order to see all matches of one particular team, a subscriber should therefore subscribe to both pay-TV services.

Unfortunately, the process for the unification of the decoding systems has not been very easy, since market conditions were not favourable for an agreement (fast growth of the market and increasing market shares for Stream). During the second half of 2000 the two operators introduced new conditional access systems with no interoperability, which were in open violation of the legislative framework, whose implementation deadline had been fixed by law at July 2000. The Italian NRA opened an inquiry in September 2000, and began to fine the two operators. Only in November 2000, D+ and Stream struck a deal on Simulcrypt technology, which will allow the simultaneous transmission of multiple cipher keys, belonging to different operators. Therefore, from April 2001 onwards, Italian digital TV should have been able to switch operators without changing the box: this has however not happened yet.

5 THE ITALIAN OPERATORS' POINT OF VIEW

In order to gather the views of Italian operators concerning broadband regulation, we have conducted interviews with Telecom Italia (the incumbent), some of the major alternative national (Infostrada) and local (Fastweb) operators. We have also discussed the issues also with the two major mobile operators (TIM and Omnitel-Vodafone) and with Tele+.

Telecom Italia broadly agrees with the regulatory framework, but stresses two major problems. First, the decision of the Italian Regulator on unlocking the local loop imposes obligations (i.e., the supply of virtual private circuits) which are not called for under Community law. Telecom Italia believes such obligations to be non-proportional, as they force the supply at cost-related prices of elements that are mere bottlenecks and not essential facilities. Secondly, Telecom Italia believes that it is under no legal obligation to provide a wholesale offer for any new service for which it prepares a retail offer: such a regulatory burden hinders innovation, as the profitability of innovative commercial offers is drastically reduced.

Infostrada, however, believes that wholesale broadband offers are necessary to allow the correct development of a competitive market; otherwise Telecom Italia is likely to leverage its dominant position in new markets. Infostrada also stresses the need for clearer rules in the regulatory framework, especially for what concerns delays and problems in the implementation of NRA decisions, because these aspects may as well hinder the development of broadband services.

Fastweb considers that broadband regulation in Italy has mostly favoured service-based competition, with many resellers and very few infrastructure-based operators. On one hand, regulation has delayed solutions for important issues, such as number portability, while on the other hand main difficulties have arisen in obtaining rights of way by local municipalities. This model has therefore hindered investments in a favourable period, when financial markets were bullish. Furthermore, very low prices charged by operators for DSL technologies may benefit the final user, but they slow down the development of alternative, fibre-

optic networks; the market is then currently limited to technologies that can not make use of the full potential offered by broadband. Another important issue is related to the availability of contents, the most important of which are covered by exclusivity rights that usually exclude on-line broadcasting.

The two mobile operators share the view that license prices in Italy, although falling below the British and German ones, have been very high. In general, enormous cross-country differences in UMTS license costs are likely to distort the European mobile market. Their main concern about broadband regulation is related to emerging legislation at the Community level, whereby it seems likely that both operators may be deemed to have a significant market power and hence forced to open their networks (possibly including 3G networks) to other operators: such a possibility was explicitly denied by the Italian Government during the UMTS auction, and any policy reversal here would fundamentally alter the profitability of UMTS.

Tele+ is particularly concerned at this time with content regulation, and in particular with the fragmented structure which has been forced upon the soccer rights market: this tends to increase purchasing costs for the company. It also forces consumers to have two subscriptions in order to enjoy the matches of a single team, and this obviously limits market growth and upsets the economics of the market.

6 CONCLUDING REMARKS

Broadband regulation is a complex issue, that spans across different technologies, platforms and services: indeed, nowhere else is clearer the need for a coherent technology-independent regulatory framework, which has been advocated in Europe by the 1997 European Commission Green Paper on Convergence, and has led to the proposal in July, 2000, of a new set of Directives by the Commission. From an Italian perspective, the major issue seems to be how to strike a correct balance between the need to hasten the supply of broadband services, but avoiding two major pitfalls: letting the incumbent leverage its dominant position in such new markets; providing incorrect incentives to new entrants, thereby lowering investment.

ANNEX 1

Table A.1. Broadband communication players in Italy

Company	Fixed line	Mobile	Cable	Backbone	Internet
Telecom Italia (controlled by Olivetti)	Incumbent operator; 26 million subscribers; 77% total market share	60% controlling stake in TIM	50% ownership of Stream	103,2 million km copper access network; 450,000 km fibre access network; 2,2 million km fibre carrier network	64% controlling stake in Seat/Tin.it, n°1 ISP/Portal
Infostrada (controlled by Vodafone, currently being sold to Enel)	Second fixed operator, 15% fixed line share	-	-	6,000 km fibre optic network	IOL-Liber: n° 2 ISP/Portal
Tiscali	Third fixed line operator; 4% market share	0,3% stake in H3G, a UMTS licensee	-	30,000 km pan-European fiber optic network	First free-ISP; n°3 ISP/Portal
WIND (controlled by Enel (56.6%) and France Telecom (43.4%))	Fourth fixed line operator 4% market share	Third mobile operator (6% market share); UMTS licence	-	N/A	ISP with 2% market share
Albacom (19.5% Mediaset, BT 25%, 35% ENI)	Specialized in business services	-	-	-	BT Infinito ISP/Portal
Fastweb (AEM 33%, e.biscom 58%)	Fifth operator in Milan with 6000 users	-	-	800 km fibre-optics network in Milan	-
Atlanet (34% Telefonica, ACEA 33%)	New fixed line operator	Has a 19% stake in IPSE 2000, UMTS licensee.	-	300 km fibre optics network	-
Telecom Italia Mobile (61.2% Telecom Italia)	-	First mobile operator, 60% market share; UMTS licensee	-	-	WAP services
Omnitel Vodafone (76.8% Vodafone)	New fixed line operator	Second mobile operator, 36% market share; UMTS licensee	-	-	WAP services
BLU (jointly controlled by BT, Autostrade)	-	Fourth GSM operator, 1% market share	-	-	-
Seat/Tin.it (64% Telecom Italia)	-	-	-	Telecom Italia backbone	First ISP/portal (29% market share)
Netsystem (participated 5% by Astra)	-	-	-	-	Internet through satellite connections
Freedomland	-	-	-	-	WebTV
Tele+ (99.9% controlled by Canal+; 0.1% RAI)	-	-	First cable and satellite pay Tv operator (2.5 million subscribers)	-	-
Stream (50% participated by Telecom Italia)	-	-	Second cable and satellite pay TV operator (0.5 million subscribers)	-	-