

# TELECOMMUNICATIONS

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The Hellenic Telecommunications Organization SA, known as OTE or OTE SA, was the first incumbent telecommunications organization in Greece. OTE was incorporated as société anonyme in Athens, Greece, under the laws of the Hellenic Republic in 1949, pursuant to the provisions of Legislative Decree 1049/1949. From 1949, OTE was the exclusive provider of fixed-line voice telephony in Greece and provided local, long-distance and international telecommunications services to Greek and foreign businesses, consumers and government agencies. In 1994, OTE launched ISDN services in Greece.

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OTE has made significant investments both in telephony operators and in acquiring regulatory licenses in order to provide fixed-line and mobile telecommunications services in the following Southeastern European countries: Albania, Bulgaria, FYROM, Serbia and Romania. This regional expansion strategy has made OTE the leading telecommunications operator in Southeast Europe, as well as a strong player in the development of the European telecommunications sector in accordance with the geographical coverage it provides.

At the beginning of 2001, the period of exclusivity in the provision of fixed-line voice telephony services in Greece expired for OTE. As a consequence, the communications market has been open to competition since then in accordance with Greek and European Union legislation. OTE was first privatized (8%) in 1996. Today the Greek Government controls the management of OTE and holds a minority share in the company. The Greek Government intends to sell its remaining shares to a strategic investor in the near future.

The telecommunications market in Greece is regulated by an independent regulatory authority, the Ethniki Epitropi Tilepikinonion & Tahidromion - HTPC (the Hellenic National Telecommunications and Post Commission). HTPC was established in 1994 and put into action in 1988. The Ministry of Transport and Communications (MTC) retains the responsibility for drafting legislation.

### **FIXED-LINE VOICE TELEPHONY**

Following the liberalization of the telecommunications market, OTE continues to be the leading provider

of fixed-line voice telephony in Greece. In 2002, OTE completed (100%) the digitalization of trunk and switching networks and it continues to invest in upgrading and expanding these networks. The trunk network in Greece consists of fiber-optic cables by approximately 95 percentage points. In remote and rural areas, where fiber-optic cable is not affordable, microwave links are deployed. In the first quarter of 2007, a total of 24,000 kilometers of fiber-optic cable were installed as part of a national program to further improve the capability and increase the capacity of the trunk network in Greece. The transmission network consists of seven core DWDM rings and many hundreds of secondary SDH rings.

Over the last few years, a decline has been recorded in the number of PSTN lines and a rise in ISDN lines that has resulted in the stability of OTE's total number of fixed lines in service. In the third quarter of 2006, the total number of OTE fixed lines in service was approximately 6.3 million (mln), with 4.9 mln PSTN lines and 1.4 mln ISDN lines. OTE is estimated (excluding Internet) to control approximately 75% of the Greek fixed-line market share of traffic and 73% of voice-call minutes.

OTE first faced competition from alternative operators in 2004, three years after the full liberalization of the Greek local fixed-line access market. At the end of 2006, the existing fixed-line operators in Greece were the following (in alphabetical order): Altec Telecoms, Algonet, Cosmoline, Forthnet, Lannet, Netone, Q-Telecom, OTE, Teledome, Telepassport, Tellas, Vivodi and

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Voicenet, HOL. OTE remains the incumbent fixed-line operator, while the leading alternative operator is Tellas, with some 700,000 connections as of December 2004 (latest available data), followed by Lannet Communications, which had 213,000 connections and 142,000 customers in 2005. Some of the alternative operators have developed their own infrastructures and they are increasingly competing with OTE in data transmission, broadband and value-added services.

Since 2006, the regulator HTPC has approved new reduced tariffs for the high-speed leased lines that OTE provides to the alternative carriers and ISPs, stimulating the further development of broadband services in Greece. For example, the annual rental of 622Mbit/s long-distance market was reduced by 58%. OTE is obliged to provide alternative operators with full and shared access local loop services, distant and physical co-location services and wholesale leased line services upon their request. A significant increase in the number of unbundled local loop sites may allow the operators to improve the quality of their products and services and potentially reduce their prices, which could increase competitive pressures on its products and services.

Six years after liberalization, the fixed-line telecommunications market in Greece has acquired remarkable dynamics. All operators continue to invest in upgrading and expanding their networks in order to be able to offer a range of technologically advanced services, mainly in the broadband area. The competition between the operators

accelerates the convergence of communication infrastructures to multimedia broadband technologies. Day by day, the quality of provided services is improving and the tariffs are decreasing.

### DATA AND BROADBAND NETWORKS

At the end of the '80s, OTE launched the largest data network (Hellaspac) covering the whole of Greece. Hellaspac offers permanent end-connection (up to 2Mbps) to the network and accessing information by dialing into the network. It also offers integrated packet-switched data communications services between companies, frame relay services with greater transmission speeds, as well as communication services to data networks of other countries through an international gateway. The biggest Hellaspac customer was the Greek Organization of Football Prognostics (OPAP), which manages a network of approximately 5,500 agents across the country.

At the end of the '90s, OTE installed a public Asynchronous Transfer Mode (ATM) backbone commercial network (HellasStream), to serve as the basis for the nationwide broadband network, which covers the whole country. This network offers connectivity through constant bit rate (CBR) and real time variable bit rate (rt-VBR) services, which are appropriate for real time applications requiring a high quality of service. Moreover, it offers non-real time-VBR service, which is appropriate for non-real time applications requiring a lower quality of service, as well as unspecified bit rate

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(UBR) service. Moreover, OTE has installed the nationwide IP/MPLS and Gigabit Ethernet networks in order to provide IP-based solutions including, among others, the managed IP virtual private network (IP VPN) services for corporate subscribers and the IP-Dial-Access-Platform Services for Internet Service and Content Providers.

OTE has also developed a fully operational terrestrial trunked radio (TETRA) network (OTELink), which provides voice services, including group calls, individual calls, broadcast calls, emergency calls, calls to PABX, PSTN and data services, including short data services (SDS), status messages (SMS) and connection oriented packet data (28.8 Kbps). Customers of this network include Athens International Airport, the Piraeus Port Authority, and the Athens Urban Transport Organization.

In parallel, all operators are expanding the broadband coverage in local access network across Greece using, at 96%, asymmetrical digital subscriber line (ADSL) technology. OTE was the first to launch the ADSL access technology in Greece in the first half of 2003. The xDSL and all the latter technologies cover 3% and 1%, respectively, of the local access network. These access technologies deliver integrated voice, video and data services and other multimedia services to the operators' customers, through several access rates, such as 384, 512, 1024, 2048 and 4096Kbps. In the wholesale market, OTE provides other operators with interconnection services to their broadband remote access servers. These services enable ISPs and other operators to

provide high-speed Internet access to their customers over ADSL access (ADSL links plus backhaul service through the ATM network) or over dedicated IP link over ATM or Gigabit Ethernet connections.

Based on ADSL access, in the Greek market the operators offer all-inclusive broadband solutions for residential and business customers, including access, Internet feed and equipment. These solutions have helped increase broadband penetration in Greece in 2006 since they provide wide access to existing content portals, IP-VPNs over ADSL and the "voice over ADSL" service.

The number of ADSL lines increased by 251% in 2006 (Diagram 1, source HTPC). At the end of 2006, there were some 900,000 active ADSL customers in Greece, the vast majority of which use OTE infrastructure with the remainder being served by the other operators. The capacity of OTE's ADSL network amounted to 800,000 installed ADSL ports and 1,100 points of presence (PoPs), which are located in digital exchanges that cover approximately 93% of telephone lines in service.

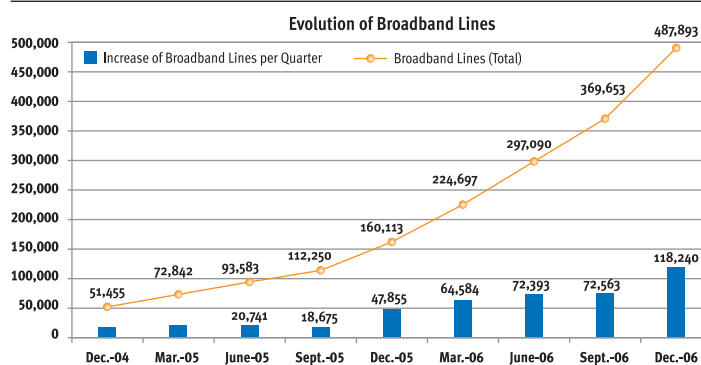
In accordance with HTPC regulations, OTE provides full and shared access local loop services and distant and physical co-location services to other telecommunications service providers in Greece. In the second half of 2006, the communication centers in Athens, which provide the physical co-location to different providers, increased from 5 to 20. This means that 1,030,000 subscribers (instead of 310,000) will have access to broadband

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services. Also keep in mind that the physical co-location of the service providers has recently started to be offered to the main cities and it is rapidly expanding to all urban areas of Greece.

The ADSL market shows strong growth in Greece, as the operators roll out infrastructure and struggle for market share with attractive prices and packages. Moreover, price cuts for leased lines for alter-

Diagram 1



Source: Hellenic Telecommunications and Post Commission

The Greek Government has used the established broadband infrastructure in order to implement an integrated data and voice network (SYZEFXIS) for the public sector. SYZEFXIS serves up to 1,700 end-points and distinguishes four operational domains (Health, Municipalities, Administrative Authorities of the EU and Military Offices), each one of which is served by a separate virtual private network (VPN). SYZEFXIS categorizes the end-points as small and medium, which are served through 2Mbps and 4Mbps/8Mbps SDSL connections, respectively, as well as large end-points served through 34Mbps optical SDH connections. The state-owned academic institutions, research institutions and other authorities in Greece have also created their own broadband IP networks.

native carriers and ISPs will further stimulate development of the broadband market. This fact has rendered Greece the fastest increasing broadband communications market in Europe. Nevertheless, the Greek Government wishes speed up development in order to expand the established local access network and limit the existing gap between Greece and other developed countries. For this reason, the Greek Prime Minister has declared 2007 the year of broadband communications in Greece.

### INTERNET SERVICES

The Internet market in Greece (revenues and number of subscribers) has continued to display an upward trajectory over the last few years, as can be seen in Diagrams 2 and 3 (source HTPC). However, despite the very high fixed-line

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penetration rate, Internet usage in Greece remains low and is on track to reach a penetration rate of nearly 35% by 2010. The total number of ceded names of web domains with the suffix .gr exceeded 126,000 at the end of 2005 (Diagram 4, source HTPC). The contribution of HTPC was critical for the above increase.

and, second, the upgrade of ADSL access speeds at no extra cost.

All ISPs are now rapidly deploying services and aggressively pursuing subscribers with attractive deals. They are using the broadband services, mainly those which are based on ADSL access network, as a vehicle to drive growth, introduc-

Diagram 2

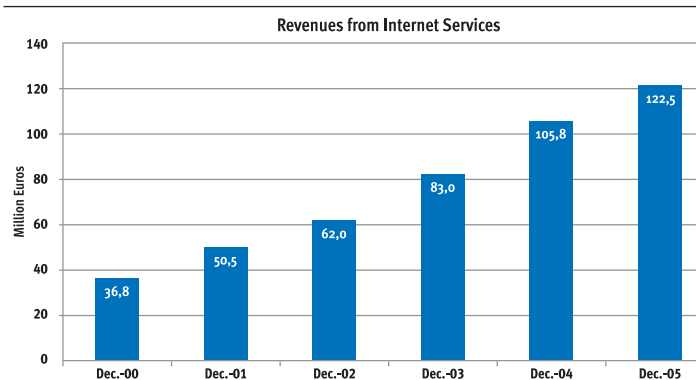
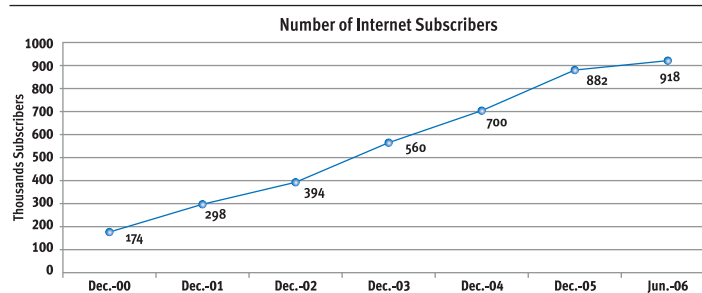


Diagram 3



Many private companies act as Internet Service Providers (ISPs) in Greece, amongst which the most well known are (in alphabetic order) FORTHnet, Lannet, OTENet and Tel-las. OTENet is the leading ISP in Greece. In 2006 the Internet market was stimulated by two factors. First, the new reduced OTE high-speed leased lines tariffs for ISPs,

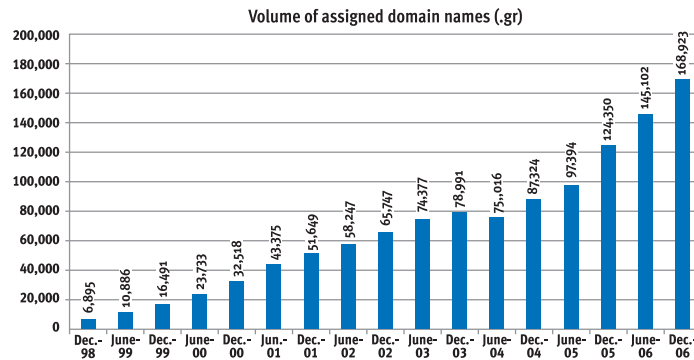
ing at the same time competitively priced packages. The ISPs' portfolio of products and services includes fast Internet access and services both for residential and business users, IP-based voice and data services, e-business application and broadband portal development, hosting services, pre-paid card, access including

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many classes of services and customized service level agreements.

Telecom by TIM Hellas shareholders. Q- Telecom is operated as a separate business unit within TIM

Diagram 4



### MOBILE COMMUNICATIONS

In August 1992, Greece awarded two second-generation (2G) GSM 900 licenses to STET Hellas (now TIM Hellas) and Panafon (now Vodafone), which launched services in 1993. In 1995, Cosmote (an OTE-affiliated company) was also awarded a dual band GSM 900/1800 license. In 2001, Vodafone and STET Hellas were awarded additional frequencies at 1800MHz, and Q-Telecom, a new entrant, was also awarded 2G spectrum. Q-Telecom introduced its own services in 2002. The 2G system is used mainly for voice, SMS and packet data transmission which can accommodate a series of value-added services, such as multimedia messaging services.

At the same time, three of the existing operators were also awarded third-generation (3G) GSM licenses and launched commercial 3G services during 2004. In 2006, a fourth license was also auctioned by HTPC, which did not attract any bids due to the acquisition of Q-

Hellas and remains a strong brand in the prepaid market segment. In 2005, OTE transferred 70% of the share capital of Cosmote-Romania (formerly known as Cosmorom) to Cosmote and also 100% of the shares of Globul and Cosmofon, its mobile telephony subsidiaries in Bulgaria and FYROM. Cosmorom launched commercial operations at the end of 2005.

In Greece, the mobile market includes more than 11 mln customers and continues to go from strength to strength, given the saturation (penetration 125% in 2006). In this market, competition for all products and services remains intense. All mobile operators provide commercially viable telecommunications services. Therefore, they meet the needs of their subscribers through the interconnection of their telecommunications networks (in a cost-effective manner) in order to complete calls between their subscribers and others on the public fixed-line telephone network or other mobile telecommunications networks. The 3G network

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currently covers approximately 50% of the country's population, including the metropolitan areas of Athens and Thessaloniki and other major Greek cities. These investments in 3G networks have led, on the one hand, consumers to change the way they use mobile services beyond basic telecommunications needs and, on the other hand, to the availability of competing technologies and services. The 3G system provides a richer set of services besides voice, such as video telephony and high rate packet data, which provides faster Internet access and a wide variety of other data services, such as Multimedia Messaging (MMS), video streaming, video calling and faster Internet browsing. In addition, some operators have implemented GPRS nationwide on its network.

Mobile operators have interconnection agreements with OTE and the other fixed-line operators in Greece and in other countries and they have control over the quality of the interconnection services. All operators are subject to strict regulations for their wholesale services. This is the result of the increased regulatory attention given to the mobile market both in Greece and in the European Union.

### SATELLITE COMMUNICATIONS

Hellas Sat Consortium Limited (HCL), an affiliated company of OTE, launched the first Greek satellite, Hellas Sat-2, into geostationary orbit 39° E in May 2003. The total cost of the Hellas Sat program was approximately 172.0 million euros. Hellas Sat-2 has two fixed antennas, which provide pan-European coverage, and two steerable antennas providing coverage over Southern Africa, the Middle East, the Indian subcontinent and Southeast Asia. The first

two transponders were made available to the Greek State.

HCL provides space segment capacity, telecommunications and broadcasting services, as well as satellite broadband services, which are used to offer high-speed reliable Internet access to rural areas (called Hellas Sat Net). The above services include video and audio broadcast cable TV feeds, direct to home (DTH) TV, VSAT Networks, IP Backbone connectivity, International / Domestic telephone relay.

HCL has also launched added-value services, such as Content Distribution, Business Television (BTV) and Video Distribution carrying today over 100 TV channels, Subscription-Based News Distribution PPV / VoD, Distance Learning / Telemedicine and tailored solutions for customer requirements.

### Conclusion

Greece is one of the most economically and politically stable countries in the region of Southeast Europe, with a high level of telecoms market maturity and a competitive and liberal telecoms environment. Considering all the above, it is obvious that the ongoing strong growth in the telecommunications market, in conjunction with the low penetration of the broadband networks, the Internet and value-added services, have caused the region to develop great opportunities in the telecommunications field.

### USEFUL LINKS

Ministry of Transport and Communications  
[www.yme.gov.gr](http://www.yme.gov.gr)

Hellenic Telecommunications and Post Commission  
[www.eett.gr](http://www.eett.gr)