Internet in a transition economy:

Hungary Case Study

International Telecommunication Union

ITU

April 2001

INTERNET IN A TRANSITION ECONOMY: HUNGARY CASE STUDY

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Tim Kelly, Michael Minges and Lara Srivastava of the International Telecommunication Union (ITU), and Jozsefne Pergel of the Hungarian Communication Authority have prepared this case study. Vanessa Gray edited the report and Nathalie Delmas was responsible for production. This report is part of a series of Case Studies on the state of the Internet around the world. Other country case studies on Internet diffusion can be found at <www.itu.int/ti/casestudies>. This study is based on field research conducted between 2 - 6 October 2000, as well as on various reports, articles and electronic correspondence. The opinions expressed in this study are those of the authors and do not necessarily reflect the views of the International Telecommunication Union and its membership nor the Hungarian Government.

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1. Country background

1.1 Overview

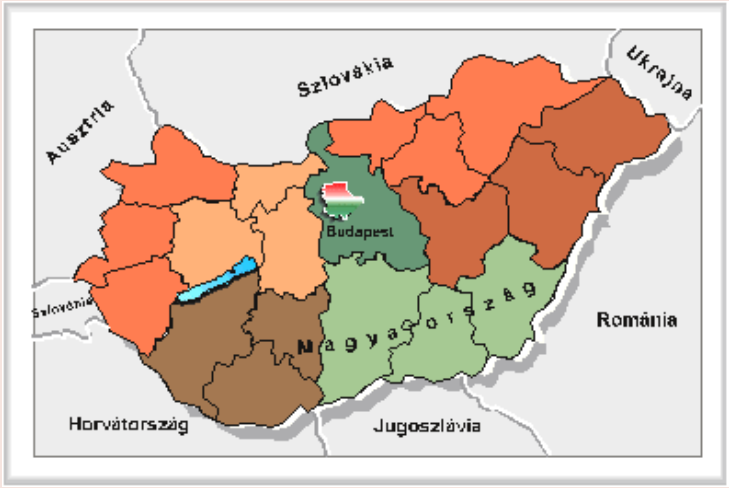
The Republic of Hungary, just over 93'000 square kilometres in size, is a landlocked country located on the Danube River Basin in Central Europe. It is bordered by Slovakia, Ukraine, Romania, Croatia, and Yugoslavia, as well as Slovenia and Austria. The broad Danube River divides the Great Hungarian Plain in the east from Transdanubia in the west. Most of the country is flat, with the exception of low mountains in the north and north-east and north of Lake Balaton, the largest freshwater lake in central Europe. Hungary's access to land routes between Western Europe and the Balkan Peninsula as well as between Ukraine and the Mediterranean basin give it a strategic location in the heart of Europe. The country is divided into 19 counties and the capital region of Budapest.

1.2 Demography[1]

The last census was carried out in 1990 and showed a population of 10.4 million. The latest estimates in 1999 were slightly lower, indicating a declining populace. Hungary's population growth rate in 1998 and 1999 was –0.4 and –0.5 per cent, respectively. The capital of Hungary is Budapest, which (in 2000) had an estimated population of 1.8 million. Hungary's population density that same year was 108 people per square kilometre. An estimated 59 per cent of the population lives in towns with more than 10'000 inhabitants. Around 63 per cent of the population are between 15 and 59 years old, 20 per cent are over 60 years old and only 17 per cent are under 15. In 1999 life expectancy at birth for men was 66 years, while that for women was 75 years.

Hungarians are almost 98 per cent Magyars and the largest ethnic minorities are Roma (Gypsies), Germans, Slovaks, Croats, Serbs, as well as Romanians.[2] The majority of the population, around 68 per cent, are Roman Catholics. Some 21 per cent are Calvinist, four per cent Lutherans and one per cent Jewish. Hungarian (Magyar) is spoken by 98 per cent of the population.[3]

Figure 1.1: Hungary



Source: Hungarian Central Statistical Office.

1.3 Economy[4]

After ten years of transition, despite an initial recession between 1990 and 1993, Hungary has one of the strongest Central European economies. It is on track to become one of the first Central and Eastern European countries to join the European Union (EU).

GDP growth per year has been above five per cent since 1997 and inflation, while still relatively high, has dropped to below ten per cent. Unemployment was down from almost twelve per cent in 1993 to seven per cent in mid-2000, well below the European average and comparable to OECD countries.[5] Privatization and

Table 1.1: Population indicators

1 January 2000

Total Population	10'043'000
Population Density (Per/ km^2)	108
Per cent of population:	
-Living in settlements of less than 1'000	7.8
-Living in settlements 1'000-10'000	33.3
-Living in settlements 10'000-100'000	29.4
-Living in settlements > 100'000	29.6
Age Distribution:	
Below 15 years (%)	17.1
15-59 years (%)	63.2
60 years and older (%)	19.7

Source: Hungarian Central Statistical Office.

structural reforms since 1995, leading to a stable and predictable trading environment, have contributed to GDP growth and foreign trade has continued to grow, both on the export and the import side.

In 1999 GDP was US$ 48.4 billion, consisting of five per cent from agriculture, 33 per cent from industry, and 62 per cent revenues from services.[6] GNP per capita was US$ 4'700 in 1999, up from 4'100 in 1995. Exports have grown by an average of 23 per cent per year between 1997 and 1999. This, and a high level of foreign direct investment, which amounted to a total of US$ 19 billion through the end of 1999, have led to a considerable decline in the net external debt, down from 38 per cent of GDP in 1994 to 25 per cent of GDP in 1999. Foreign companies generate much of Hungary's exports with sites in Hungary, especially in the automobile, electronics and computer sector.[7] Apart from producing an estimated 70 per cent of the country's foreign trade, these companies also invest in research and development within the Hungarian market.

Major export commodities include machinery and equipment (52 per cent), manufactured goods (33 per cent) and agriculture and food products (11 per cent). Similarly, machinery and equipment (47 per cent) and manufactured products (40 per cent) and fuels and electricity (7 per cent) were predominant in imports. Some 75 per cent of Hungary's exports and the majority of is imports, are with the European Union.[8]

1.4 Human Development

According to the UNDP, Hungary ranks 43rd out of 174 countries in the Human Development Index (HDI), which places the country within the high human development group.[9] The HDI is a composite of key indicators of well being including life expectancy, literacy, school enrolment and per capita GDP. Table 1.2 shows that Hungary ranks high compared to other countries in Central and Eastern Europe.

1.5 Politics[10]

Hungary gained independence in 1000 under King Stephan I and celebrated its one thousandth anniversary in 2000. Between 1867 and World War I the Hungarian Monarchy, together with Austria, were the Austro-Hungarian Empire, which was defeated during the War. This defeat cost Hungary part of its territory, which it tried to recover in World War II, as an ally of Germany and Italy.

In 1945, following World War II, Hungary became part of Soviet influenced Eastern Europe and its government and economy were adapted to the communist model. Increasing economic hardship led to general discontent and finally to a public uprising in October 1956. The Hungarian people's demand for a democratic and free Hungary was, however, violently crushed by a Soviet intervention.

In 1968 the Communist government initiated the first market-oriented reforms and in 1982 Hungary was the first Central and Eastern European country to become a member of the IMF and the World Bank. Despite these

Table 1.2: Human Development Index

Indicator, Hungary	Value
Life expectancy (years)	71.1
Adult literacy (%)	99.3
Combined school gross enrolment ratio (%)	75
GDP per capita (US$, PPP)	10'232
Nation	**HDI rank**
Greece	25
Portugal	28
Czech Republic	34
Hungary	**43**
Poland	44
Bulgaria	60
Romania	64

Source: UNDP Human Development Index, Human Development Report 2000.

modest reforms, the country's economic situation continued to deteriorate and more and more people called for economic and political change. When Hungary allowed East Germans to cross its border into Austria in 1989, this marked an important step towards democratic rule and an end to the Cold War.

Hungary held its first free parliamentary elections in 1990 and has since undergone a successful and stable transition to democracy. In 1994 the centre-right coalition was replaced by a socialist government but, like the previous government, it pursued economic reforms, privatization and Euro-Atlantic integration. Voters elected a centre-right government in 1998, headed by 35-year-old Prime Minister Viktor Orban.

Euro-Atlantic integration remains the government's first priority on the foreign policy agenda and Hungary has successfully achieved integration into the Western economic and security organizations. After joining the Partnership for Peace program, it became a member of North Atlantic Treaty Organization (NATO) in 1999. In 1994 it applied for membership in the European Union and in 1998 official accession negotiations started. Although the exact date of Hungary's membership depends on its ability to meet the accession criteria, it is expected to join in the next few years.

[1] Unless otherwise indicated, information in this section is derived from the Hungarian Central Statistical Office <www.ksh.hu>.

[2] European Commission, Hungary country profile <www.europa.eu.int/comm/enlargement/hungary/index.htm>.

[3] Ethnologue, Language database <www.sil.org/ethnologue/countries/Hung.html>.

[4] Unless otherwise indicated, the information is from The World Bank, Hungary Country Brief (September 2000) and Country Data Profile (1999), at http://wbln0018.worldbank.org/ECA/eca.nsf.

[5] OECD economic survey Hungary, November 2000, at http://www.oecd.org/eco/surv/esu-hun.htm.

[6] Hungarian Central Statistical Office, Hungary in figures, at http://www.ksh.hu/eng/free/e7maor/ftartj.html.

[7] Financial Times survey , Economic outlook Hungary 1999, at http://www.ft.com/ftsurveys/country/scadbe.htm.

[8] The CIA World Factbook 2000, Hungary Country Profile, at http://www.odci.gov/cia/publications/factbook/indexgeo.html.

[9] UNDP Human Development Report 2000, Human Development Index, at http://www.undp.org/hdr2000/english/presskit/hdi.pdf.

[10] The information draws on The European Commission, Hungary's Application for Membership, at http://www.mfa.gov.hu/dok/www/a.htm.

2. The Telecommunication Sector in Hungary

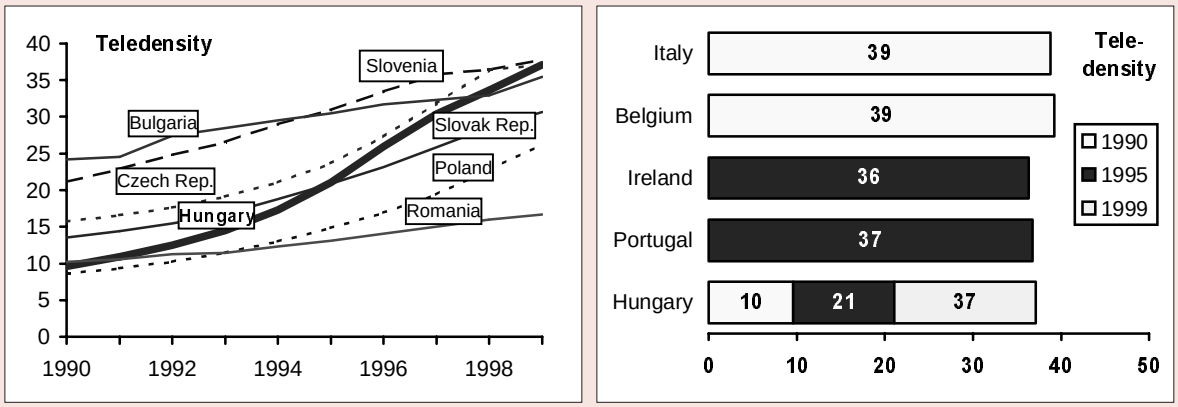
2.1 Overview

Among the economies in transition from centrally planned to market-based economies, Hungary's telecommunication growth is perhaps the most remarkable. At the time of the political changes at the end of the 1980s, Hungary had the third lowest *teledensity* (telephone lines per 100 inhabitants) among the countries of Central and Eastern Europe (above only Albania and Poland), below one line for every ten inhabitants. Over the past decade, Hungary has sustained a compound annual growth rate of just over 15 per cent in its fixed-line telephone network (the government has mandated a rate of 15.5 per cent per year), enabling it to overtake many of its neighbours. Today, it has the second highest teledensity in the region, just after Slovenia (Figure 2.1, left chart). Back in 1990, one of the stated objectives of government policy was "to reach a European telecommunications level equivalent to the needs of Hungary by no later than the year 2000". By the start of 2000, Hungary's teledensity of 37.1 was almost where Belgium and Italy were at in 1990, and about where Portugal and Ireland were at in 1995 (Figure 2.1, right chart).

For Hungary's telecommunication sector, at least, the concept of a *transition* will soon be out of date. It is nearly there and, with further market opening moves on the horizon, growth shows little sign of slowing down. In a significant move towards the end of the year 2000, Hungary's incumbent public telecommunications operator (PTO), Matáv, emerged as the winner in the auction to acquire a 51 per cent share in the incumbent PTO in the former Yugoslav Republic of Macedonia.[1] From being one of the *sick men* of Europe, Hungary is emerging to become a major regional player.

Figure 2.1: Catching up

Teledensity, selected Central and Eastern European countries, 1990-99 and Hungary's 1999 teledensity compared to selected Western European countries



Source: ITU World Telecommunication Indicators Database.

2.2 Industry evolution

How did this transformation come about? Three key factors seem to have been important:

- The early start in the market liberalization process. For instance, Hungary was the first of the transition economies to license a privately owned mobile communications operator to enter a joint venture with the incumbent.

- Hungary moved much earlier and much further than other countries in the region towards a tariff rebalancing strategy, which provided the platform for attracting investment and moving towards self-sustaining network growth.

- Hungary achieved an efficient separation between operational and regulatory functions at an early date. The regulator set ambitious targets for network growth among licensed operators.

The key date was 1989, which is when the political changes in the broader Hungarian society (the break-up of the former centrally-planned Eastern bloc) coincided with the start of market opening in the telecommunication sector. Reform has followed several distinct phases:

- **1989-1993**: In this phase the focus was on establishment of a digital network for basic telecommunications, drawing upon loans arranged with the World Bank and the European Investment Bank, and the separation of regulatory and operational functions. Previously, the Hungarian PTT had been responsible for all aspects of regulation and service provision, including spectrum management. In 1989, regulatory functions passed to the Ministry of Transport, the predecessor of today's Ministry of Transport, Communications and Water Management (KHVM). Two regulatory authorities were established: the postal and telecommunications inspectorate and the frequency management institute. Three new telecommunications acts were passed:

  - Act XVI (1991), which established the basis for issuing concessions;

  - Act LXX11 (1992), which split the telecommunications market into activities that required a concession and those which are open to competition;

  - Act LXII (1993), which defined the functions of the KHVM with respect to frequency management.

  During this phase, the privatization of Matáv (see below) was carried out. The first mobile company, Westel 450, was also established in 1989.

- **1994-1997**: During this phase, attention switched to extending the range of advanced services available for business consumers, including the introduction of SDH technology in the national backbone network. The two inspectorates were merged into a newly created regulatory authority in 1993, which was renamed as the Communications Authority of Hungary (HIF) in 1995. Although it was under the control of the Ministry (KHVM), HIF has its own budgetary structure and its own clear set of responsibilities, which cover licensing, supervising, regulating and administering telecommunication and postal services and managing the civil frequency spectrum. During this period, the provisions of the concession act were activated and an invitation to tender for provision of PSTN services was issued in 1994. Some 25, mainly rural, primary areas were defined (Matáv was selected on a monopoly basis in a further 29 municipalities, including Budapest). Of the 25 areas up for tender, Matáv won licenses in five and was the "fall-back" operator in two others, which received no bids. The remaining 18 were awarded to *Local Telephone Operators* (LTOs). Following subsequent mergers and alliances, Vivendi has emerged as the main LTO, with seven subsidiaries. A

second LTO, HTCC, now has four subsidiaries and a third LTO, Monortel, one (see below). Matáv retains a monopoly on long-distance and international telecommunications.

During this phase, two GSM digital mobile operators were licensed and began offering services: Westel Mobil and Pannon GSM, which both launched service at the end of March 1994.

- **1997-2000:** In a third phase of reform, focus has shifted to delivery of a wider range of business services and to reduction of tariffs. The Telecommunications Act was amended in 1997 and again in 1999 with a view to hastening the arrival of competition. For instance, a more liberal attitude has been taken towards IP Telephony as a way of creating downward pressure on international call prices and of introducing *soft* competition ahead of a more thorough market liberalization, starting in 2002. A third mobile operator, VRAM, which is majority owned by Vodafone of the UK was licensed in July 1999 for constructing a GSM 900/DCS1800 network. This phase has also seen the build-up in Internet use, which is detailed in chapter three.

2.3 Industry structure

2.3.1 Regulation and policy-making

Responsibility for policy-making had been with the Ministry of Transport, Communications and Water Management. In 2000, this was transferred to the Prime Minister's Office through the **Government Commissioner Office for ICT**. This office is responsible for policy-making, drafting legislation and granting concessions. This is viewed as a provisional move eventually leading to the creation of a new Ministry of Information Technology in 2002.

The Telecommunications Act called for the establishment of a regulator in 1993. The General Inspectorate of Communications was established to carry out regulatory matters by merging the Postal and Telecommunications Inspectorate and the Frequency Management Institute. In 1995, the name was changed to the **Communications Authority** (Hírközlési Fõfelügyelet, HIF) <www.hif.hu>. The Communications Authority is responsible for supervising and regulating the telecommunications and postal markets, granting licenses and frequency management. The HIF has its own budget with most of its revenues from frequency usage fees and equipment certification. Its President, which holds the rank of Deputy State Secretary, reports to the minister responsible for telecommunications.

2.3.2 Public Telecommunication Operators

Fixed telephone operators

The incumbent telecommunication operator is **Matáv** <www.matav.hu>, which was created on 31st December 1991 following corporatization of the former Hungarian PTT. The privatization process that followed, in 1993, was one of the earliest in the region (see below). The State now owns only a symbolic "golden share" in Matáv. The majority owner is Deutsche Telekom which has progressively increased its stake, including buying out its joint venture partner Ameritech, to the point where it now stands at almost 60 per cent. The remaining 40 per cent is publicly traded. Interestingly, Matáv now provides a disproportionately high share of Deutsche Telekom's corporate profits, which may be due to the fact that Matáv does not face the same competitive pressures in its domestic market as Deutsche Telekom faces in Germany and in other more liberalized markets.

Matáv provides a comprehensive range of services, as befits an incumbent public telecommunications operator:

- It retains a monopoly in the provision of international and domestic long-distance services, until 2002.

- Its local telephone service concessions cover 70 per cent of the territory of the country and it had 78 per cent of fixed-line subscribers at the start of 2000.

- In the mobile market, where Matáv's subsidiaries, Westel 450 and Westel Mobil had almost a million subscribers by the end of 1999, its market share was just under 60 per cent.

- In the Internet service provision market, Matáv is present both as a direct provider of Internet access through its subsidiary, MatávNet, but perhaps more importantly it also provides the backbone for the academic Internet network, HUNGARNET. Matáv's Internet services are detailed in chapter three.

After Matáv, the next biggest fixed-line service provider is **Vivendi Telecom Hungary (VTH)** <www.vivendi.hu>, which is a subsidiary of Vivendi (formerly, Compagnie Générale des Eaux), headquartered in France. The seven concessions owned by Vivendi cover some 15 per cent of Hungary with a population of 1.5 million inhabitants. They were acquired in several stages, following the initial award of concessions in the early 1990s. At the end of 1999, VTH had 463'469 local subscriber lines. The VTH group has some 1'500 employees in the country and around US$ 550 million in investments. Vivendi reported revenues of US$ 23 million in 1999 from its share of its Hungarian telephone operations. In addition to providing local telecommunication services, Vivendi also provides business data communications through a subsidiary, Partnercom <www.partnercom.hu>, which owns a fibre backbone network serving some 12'000 clients, including eight of the leading universities. Vivendi was the first of the public telecommunication operators to create an ISP, back in 1996, and, thanks to its ownership of local service subsidiaries, was also the first to offer a "free Internet" service, by which local telephone service access charges are bundled with Internet access charges. Vivendi currently has around 5'500 Internet subscribers among its seven concessionaires. Vivendi also provides a voice over IP service, via Matáv's network.

Other fixed-line service providers include the **Hungarian Telephone and Cable Corporation (HTTC)** and **Monor Telefon (Monortel)**. HTTC, founded in 1992, has four local telephone concessions with 276'500 homes in its concession area. At December 1999, HTTC had 200'500 access lines in service. Major owners include Tele Danmark (21.4%), the American Citizens Utilities Company (19%) and Postabank (20%). HTTC's 1999 revenues were US$ 40 million. Monortel has been providing cable TV and telephony service in the Monor region since 1994. At December 1999, there were 85'693 homes in the concession area and 73'221 lines in service. Monortel is majority-owned by the cable television company UPC. Monortel had telephony revenues of US$ 13 million in 1999.

Mobile cellular operators

There are four mobile cellular operators providing service over three digital and one analogue networks. **Westel 450** was founded in 1989 and provides analogue NMT service. It is 51 per cent owned by Matáv and 49 per cent owned by Deutsche Telekom. **Westel Mobil** was founded in October 1993 to provide a GSM 900 service. It launched a 1800 Hz frequency service in 2000. Westel Mobile has the same ownership as Westel 450.

Pannon GSM, founded in October 1993, launched its digital cellular service in March 1994. It has gone through various ownership changes and is today owned by a consortium of northern European telecom operators (KPN (Holland, 44.7 per cent), Telenor (Norway, 25.8 per cent), Sonera (Finland, 23 per cent) and Tele Danmark (6.6 per cent)). Pannon had revenues of US$ 295 million in 1999 and at December 2000 it had 1.2 million subscribers.

VRAM, established in September 1999, won Hungary's third GSM

Table 2.1: Hungarian public telecommunication operators

December 2000

Company	Subscribers	Website	Note
Fixed	**3'726'000 (1999)**		
Matáv	2'899'855 (1999)	www.matav.hu	Has exclusive long distance license until December 2001. Provides local telephone service in 36 concession areas.
Vivendi	463'469 (1999)	www.vivendi.hu	Provides local telephone service in 9 concession areas.
HTTC	200'493 (1999)	www.htcc.hu	Provides local telephone service in 4 concession areas.
Monortel	73'221 (1999)	www.monortel.hu	Provides local telephone service in one concession area.
Mobile	**3'076'279 (2000)**		
Westel 450	75'866 (2000)	www.0660.hu	Provides nationwide analogue cellular service.
Westel 900	1'599'086 (2000)	www.westel.hu	Provides nationwide GSM service.
Pannon	1'217'000 (2000)	www.pgsm.hu	Provides nationwide GSM service.
VRAM	184'000 (2000)	www.vodafone.hu	Provides nationwide GSM service.

Source: ITU adapted from company reports and Communication Authority.

license in July 1999, bidding HUF 48.5 billion (US$ 202 million) for the license. It launched GSM 1800 service on 30 November 1999 claiming it was the world's fastest rollout of a GSM network. The total cost of the network is expected to be US$ 250 million. VRAM is owned by Vodafone (UK, 50.1%), RWE (Germany, 19.9%), Antenna Hungária (20%) and Magyar Posta (10%).

2.4 Privatization

The privatization of the incumbent operator, Matáv, occurred at around the same time as the issuing of concessions as a result of the 1992 Telecommunications Act. Magyarcom, a joint venture between Deutsche Telekom (Germany) and Ameritech (US) won the tender process and paid US$ 875 million for a 30.29 per cent share in the capital of Matáv in December 1993. The same consortium paid a further US$ 852 million in 1995, to raise its stake to 67.36 per cent. An additional 25 per cent of Matáv was sold two years later in November 1997 in an Initial Public Offering (IPO) when the shares of the company were listed on the Budapest and New York stock exchanges. In the Spring of 1999, the remaining state holding (5.75 per cent) was sold in a secondary offering. In July 2000, Deutsche Telekom bought out its partner in the Magyar consortium to own some 60 per cent of the company.

2.5 Licensing

In Hungary, communications services are divided into two categories: concession-based and competitive. Concession-based services include public telephony, mobile telephony, nationwide paging and national and regional distribution of radio and television programs. Other services, including leased lines, data transmission, Internet service and cable television are competitive. Concession services require a concession. The number and scope of the concession are defined by the Minister responsible for telecommunications. Competitive services require a license granted by local or regional authorities.

Table 2.2: Licenses

Number of licenses issued, February 2000

Category	Nation wide	Regional / local
Long distance (national and international)	1	0
Local telephone	0	14
Mobile cellular	4	0
Paging	2	1
Internet	39	23
Leased line	16	11
Other data transmission	11	4
Program distribution (e.g., CATV)	0	254
Other	7	16

Note: Shaded areas are concession-bound. Other areas do not require a concession.
Source: Hungarian Communications Authority.

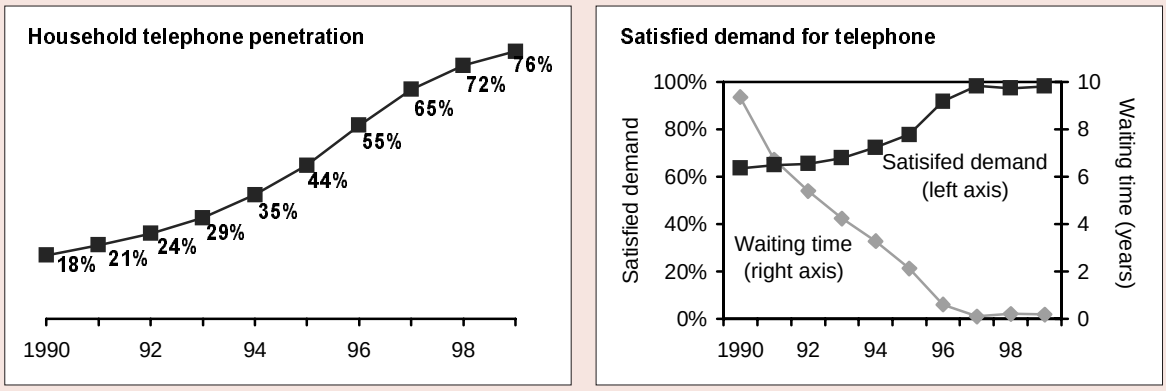
2.6 Universal service

There is not yet an explicit government policy for universal service. Enhanced access to telecommunications has been indirectly encouraged through fixed-line growth targets and competition in mobile market. Operators can also be penalized if they do not provide service within a certain period of time. The introduction of local telephone concessions could also be construed as somewhat of a universal access policy by decentralizing service provision to rural areas where access has been lacking. For example, Budapest, with 18 per cent of the population, had 26 per cent of all telephone subscribers at the end of 1999.

Hungary has made impressive progress in universal telephone service. Less than one fifth of homes had a telephone in 1990. By the beginning of 2000 around three quarters of Hungarian families had a fixed-line telephone. Over the same period, the number of applicants waiting for a telephone line has declined from 657'000 to 77'000. The average waiting time has declined from over 9 years in 1990 to a little over a month by the end of 1999. According to HIF

Figure 2.2: On the way to Universal Service

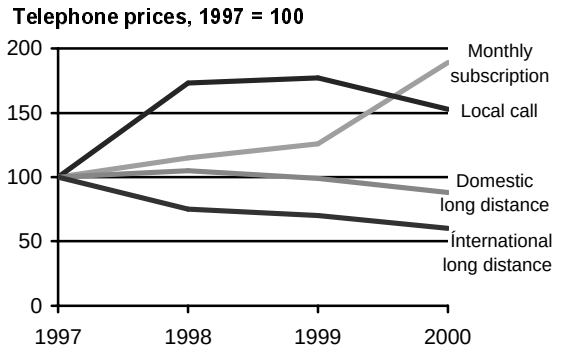
Household telephone penetration in Hungary and satisfied demand and waiting time for a telephone in Hungary



Note: Household telephone penetration rate calculated by number of residential lines / dwellings.
Source: ITU adapted from HIF.

Figure 2.3: Telephone tariffs

Evolution of telephone prices, 1997-2000 and Matáv's telephone tariffs at January 2000



1 January 2000	HUF	US$
Entrance fee:		
–Residential	27'000	106.92
–Business	60'000	237.60
Monthly subscription		
–Residential	1'814	7.18
–Business	2'440	9.66
3 minute peak call:		
–Local	27.60	0.11
–Fixed to mobile	186.00	0.74
–Domestic long distance	87.00	0.34
–International long distance		
—Neighbouring countries	222.00	0.88
—Other Europe	285.00	1.13
—North America	294.00	1.16

Note: Excluding VAT. In the left chart, data refer to January 1 of the year indicated. Monthly subscription refers to residential, Domestic long distance refers to Zone 3 and International long distance refers to North America.
Source: ITU adapted from Matáv.

data, 98 per cent of registered fixed-line demand is now satisfied. It must be assumed that either the 25 per cent of households that do not have a fixed-line telephone either have a mobile or cannot afford fixed-line telephone service. Thus the main barrier to universal service is now economic. This has been exacerbated by tariff rebalancing, which has increased the price of local calls. In January 2000 Matáv introduced a special tariff for low usage subscribers, which has lower subscription prices but higher usage charges.

2.7 Tariffs

Fixed-line telephone tariffs are regulated under a price cap formula based on consumer price inflation and productivity gains. The minister responsible for telecommunications, in conjunction with the Ministry of Finance, establishes maximum tariffs based on the provisions of the Pricing Act. These are typically specified in annual Decrees.

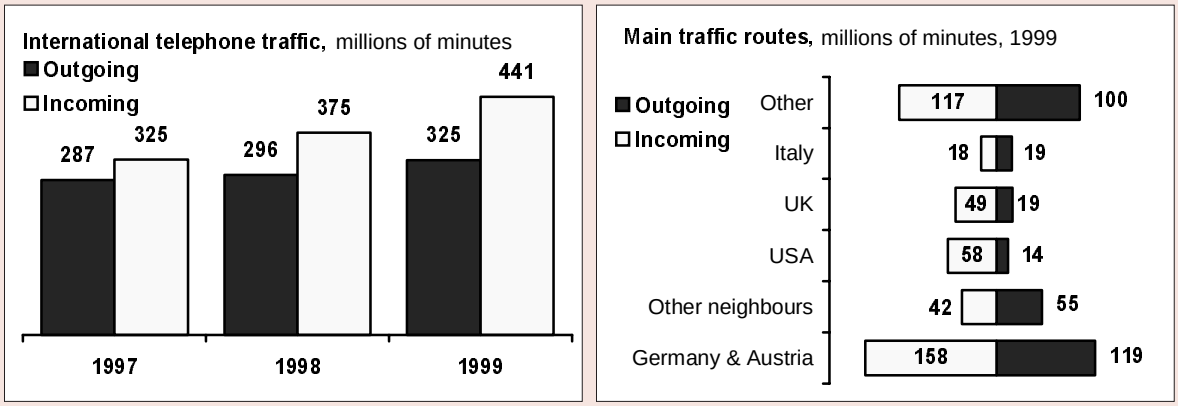
Since privatization, Matáv has moved aggressively to realign the prices of its services closer to their costs. This has chiefly involved the lowering of long-distance telephone rates and the raising of local telephone service charges. Between December 1997 and December 1999, Matáv lowered international long distance tariffs by 13.4 per cent and domestic long distance tariffs by 12.5 per cent. Over the same time period, monthly telephone subscription charges rose by 22.4 per cent and local telephone calls by 18 per cent. Furthermore, the 20 free call units that had been included with the monthly subscription, were abolished from January 1999. Though rebalancing has helped Matáv maintain its profitability, it has had an adverse effect on Internet take-up since users must pay for local telephone charges when dialing-up their Internet Service Provider (see Chapter 3). Users of Vivendi local telephone service benefit from a "free Internet" tariff of Internet access bundled with fixed-line telephone access.

2.8 International traffic

Matáv has the exclusive right to provide international public telephone service. It earned HUF 43.8 billion (US$ 173 million) from international services in 1999. This amount is equivalent to 10 per cent of its total revenue. This relatively low share reflects the success of Matáv's rebalancing program and insulates it from the effects of forthcoming com-

Figure 2.4: International traffic

Matáv's international traffic, millions of minutes, 1997-1999 and main traffic routes, millions of minutes, 1999



Source: ITU adapted from Matáv.

petition when its exclusive license expires at the end of 2001. Despite ongoing price reductions in international tariffs the ratio of incoming to outgoing traffic was 1.4 in 1999 reflecting the fact that tariffs are dropping even more in Hungary's main calling partner countries. The greater amount of incoming traffic also means that Matáv earns slightly more from incoming settlement payments (HUF 22.6 billion in 1999) than from outgoing traffic (HUF 21.2 billion). Hungary's top five calling partners, Germany, Austria, USA, UK and Italy, accounted for 52 per cent of outgoing traffic and 64 per cent of incoming traffic in 1999. Matáv is promoting itself as a traffic hub between Western and Eastern Europe and handled some 61 million minutes of transit traffic in 1999.

Although Matáv has the exclusive right for circuit-switched international traffic, international calls over IP-based networks are legal in Hungary and described further in Chapter 3.

[1] "Matáv Completes Purchase of Majority State in Maktel." *Matáv Press Release*. 16 January 2001. <www.matav.hu/english/world/news/010116_b.html>.

3. The Internet Market in Hungary

3.1 Introduction

The development of the Internet in Hungary has been largely dominated by the academic sector. In the early 1990s, Internet use flourished among universities, colleges and research institutes. It was only in 1995 that the first commercial ISPs began offering services. E-mail was the main application in the early days of the Internet, as academics and students used the network to exchange information. Today, estimates give the Hungarian academic and research network close to 45 per cent of the Internet market. Moreover, there has been a shift in focus among ISPs, away from the residential market to the corporate market. If this trend continues, the take-up of the Internet among home users is unlikely to increase substantially, and a plateau of Internet usage may soon be reached.

3.2 The Origins of the Internet in Hungary

The Internet in Hungary has its origins in 1988, when the Hungarian Academic and Research Network, HUNGARNET <www.hungarnet.hu> was created.[1] In that year, the academic sector set up its own private X.25 network to allow researchers to send e-mails to each other and exchange files. In 1990, political changes lifted the restrictions against Hungary and international connectivity was introduced. Hungary was finally allowed to connect to the public Internet in 1991.

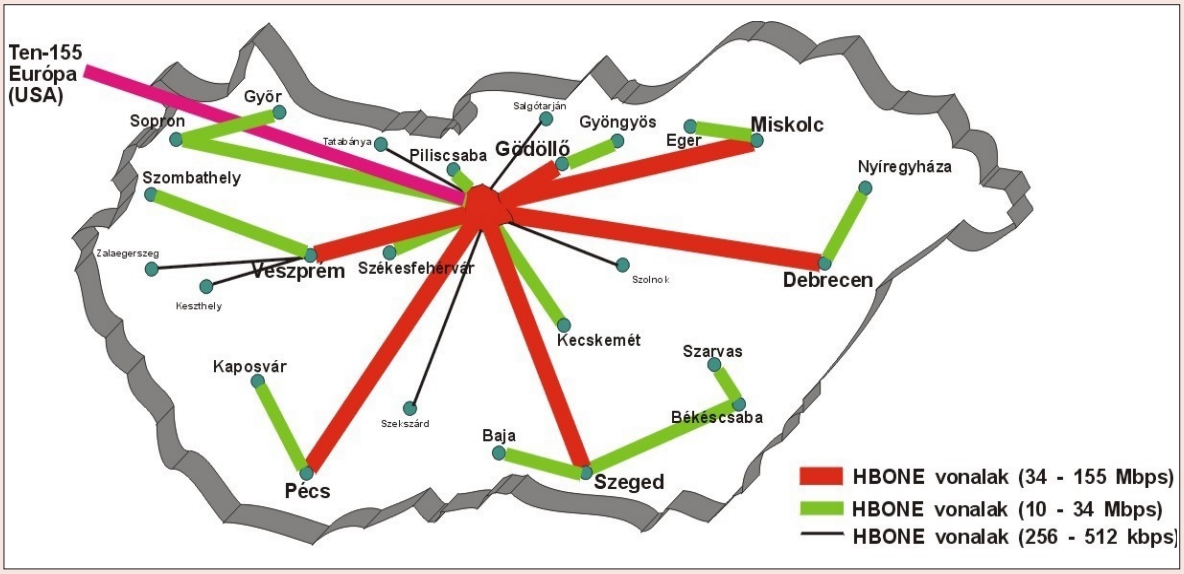
The first step in connecting Hungary was the creation of a TCP/IP link to the US National Science Foundation Network (NSFNet). This was done in 1991, via a 9.6 Kpbs line (X.25) from Budapest to the University of Linz in Austria, funded by the US Mellon Foundation. The Hungarian academic sector continued its expanding international relations program in the early 1990s by joining the European Academic and Research Network (EARN).[2] The Austrian Academic Network (ECONET) and RIPE <www.ripe.net> also assisted HUNGARNET.[3] Later on, HUNGARNET joined the European Association of Academic Networks (RARE), and is now also a member of Trans-European Research and Education Networking Association (TERENA) <www.terena.nl>. It was also one of the establishing members of the Delivery of Advanced Network Technology to Europe (DANTE) consortium <www.dante. net>.[4] In fact, it was the first Central and Eastern European country to join DANTE and since then, only Slovenia and the Czech Republic have followed suit. It is noteworthy that Hungary looked to Europe for its international connectivity rather than to the United States. As one interviewee explained, at the time, the United States seemed reluctant to connect to individual European academic networks and preferred to establish connectivity with Europe as a whole.

Hungary's first national backbone was built in 1993. It became known as the HBONE, the academic community's own private TCP/IP network. In the beginning, it consisted of the largest universities in Budapest and two-thirds of rural universities, representing four to five nodes. This evolved with increasing bandwidth availability. As more and more users came online, network operations were stabilized and regional centres created in 1996. Due to the fact that 20 per cent of Hungary's population is concentrated in the Budapest area, the HBONE is based on a radial topology (Figure 3.1).

When HUNGARNET joined DANTE in 1996, connectivity jumped to two Mbps, from 256 Kbps the previous year. In 1997, when it joined the TEN-34 <www.dante.net/ten-34/project>, the core of HUNGARNET's backbone

Figure 3.1: HBONE

National backbone topology of the Hungarian Academic and Research Network, June 2000



Source: HUNGARNET.

was 34 Mbps, and its outskirt nodes were connected with ten Mbps lines. In 1999, HUNGARNET was connected to the TEN-155 <www.dante.net/ten-155> project at 34 Mbps. Since May 2000, international connectivity has been 68 Mbps. The network is currently being upgraded and it is hoped that a speed of 155 Mbps will be reached by December 2000. In 2001, HUNGARNET plans to benefit from gigabit connectivity to the GEANT <www.dante.net/geant> network. In terms of its domestic network, HUNGARNET's backbone had a capacity of 64 Kbps until 1998, backed by PSTN packet-switched lines. In 1999, this was upgraded to 34 Mbps. Today, there are forty regional nodes in Hungary, mostly connected by 34 Mbps lines, with a dozen or so connected by 155 Mbps lines.

HUNGARNET has 900-1'000 institutional members, 60-70 per cent of which are educational institutions. Other members include research institutes, libraries and museums. Every higher education institute in Hungary is a member of HUNGARNET. Some 200 secondary school members and a few dozen elementary schools have also joined the network. In addition to institutional memberships, HUNGARNET also grants individual memberships to professors, teachers and researchers, allowing them unlimited access to the Internet (although local call charges still have to be paid to the telephone company). The individual membership fee is a mere honorarium at HUF 1'000 (US$ 3.55).

The annual budget for HUNGARNET is HUF 1.5 billion (US$ 5.3 million). Institutional members, whose contribution levels depend on traffic and backbone connectivity, contribute about ten per cent of the budget. The rest is provided by the Ministry of Culture and Education. It is remarkable that as much as 80-90 per cent of the annual budget goes towards domestic and international connectivity needs, leaving little for user training or applications development. The average ISP in the United States or Canada only spends about 30 per cent of their annual budget on connectivity.

The development of the HUNGARNET network has been financed and coor-

dinated mainly by the National Information Infrastructure Development Program (NIIF) <www.iif.hu/dokumentumok/niifp9606/niif.html>. It was the Hungarian Academy of Sciences (MTA) <www.mta.hu> that was responsible for first setting up the NIIF program, as the IIF in 1986. The IIF was an independent ministry-level entity until the late 1990s, after which it became more closely affiliated with the Ministry of Economic Affairs. Since early 2000, the NIIF is part of the Ministry of Culture and Education (MKM) <www.mkm.hu>. Until 1999, funds for the NIIF were collected from the Hungarian Scientific Research Fund (OTKA) and from the budgets of related Ministries and academic organizations (e.g., the National Committee of Technological Development (OMFB) and Hungarian Academy of Sciences (MTA)). However, due to heavy lobbying, the government decided to shift the funding for the NIIF and HUNGARNET entirely to the Ministry of Culture and Education.

3.3 The Growth of the Internet in Hungary

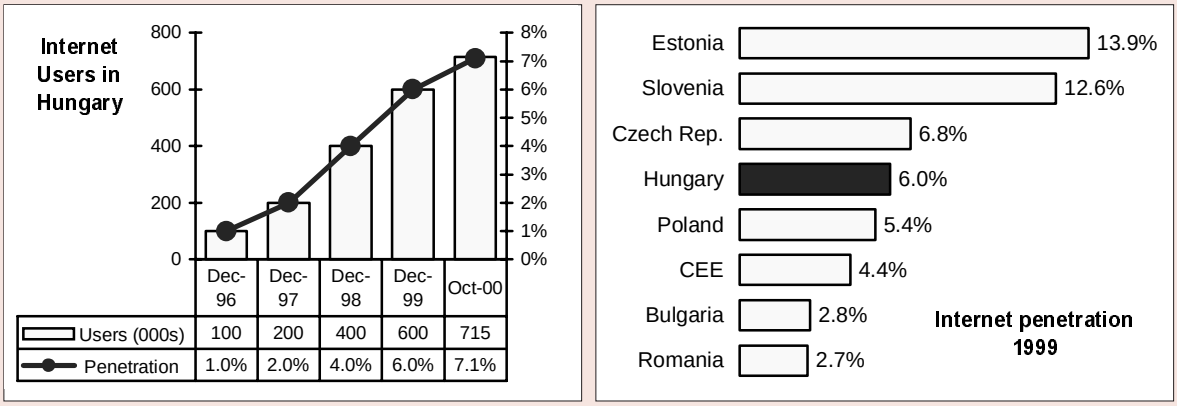
The total number of users in Hungary was estimated at around 715'000 in October 2000 (a penetration of 7.1 per cent) including academic, residential and corporate users. This number has grown steadily since 1996, at a cumulative growth rate of almost 50 per cent a year. The growth in Internet usage is largely due to HUNGARNET's "subscription-free" academic network. Compared to some other Central and Eastern European countries, Hungary has had a head start (Figure 3.2, left chart).

However, the Hungarian Internet market has far from reached its full potential, and is now lagging behind other countries in the region. The proportion of Internet users in Hungary is less than Estonia, Slovenia and the Czech Republic (Figure 3.2, right chart).

Reasons for Hungary not being an Internet market leader in the Central and Eastern Europe region include the low penetration of personal computers and high local call tariffs. Hungary's 1999 PC penetration of 7.5 per 100 inhabitants is lower than a number of CEE countries (Figure 3.3). This is due in part to the high custom duties on the import of computers and Internet hardware.[5] In 1998, 337'000 households had PCs and in 1999 that number only increased to 400'000. This means that in 1999, only one in ten households was equipped with a PC. According to a survey conducted by the Prime Minis-

Figure 3.2: Internet users in Hungary

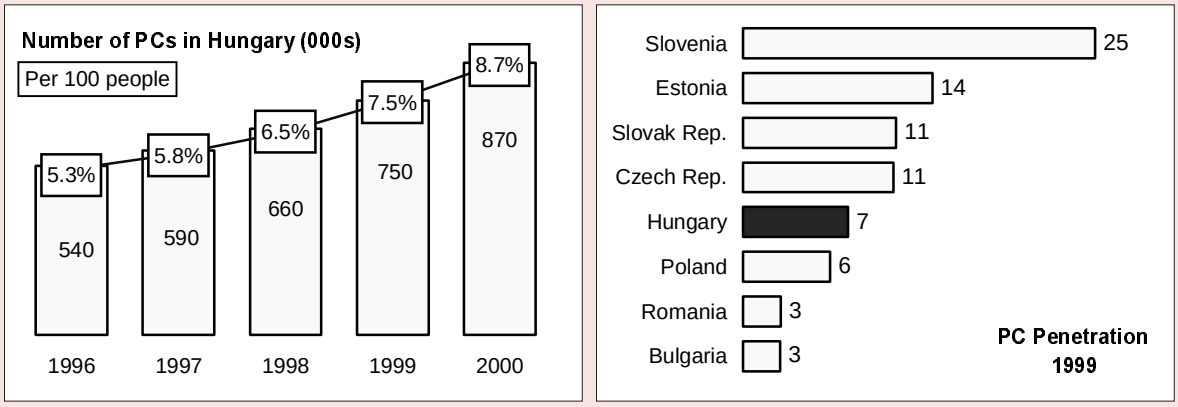
Total number of Internet users and penetration, Hungary, 1996 to 2000 and Internet penetration, selected Central and Eastern Europe countries, 1999



Source: ITU Telecommunication Indicators, Hungarian Communication Authority, Carnation Consulting.

Figure 3.3: Penetration of Personal Computers in Hungary and CEE

Number of PCs in Hungary (000s) and PC Penetration in the CEE region 1999



Note: PC stock calculated on the basis of previous five years sales.
Source: ITU Telecommunication Indicators database.

ter's office, only 3-4 per cent of Hungarian families have Internet access. The government has launched a modest program to provide subsidized PCs and Internet access to some families (see Box 3.1).

One of the more significant barriers to the absorption of the Internet is the high cost of access. Basic telecommunication charges in Hungary are high relative to the purchasing power of the average consumer. The OECD reports that Hungary is the most expensive OECD country for Internet access at off-peak times and the second most expensive at peak times (see Figure 3.7).

It has been suggested that another barrier to growth of the Internet has been HUNGARNET's dominance. Although HUNGARNET greatly improved the Internet penetration in the country in the early years, it also dominated the market to such an extent that ISPs wishing to focus on the residential market were left with a small number of users to cater for. In June 2000, HUNGARNET had 44 per cent of the market (Figure 3.4).

Box 3.1: PCs for Families

In late September 2000, the government announced a project providing funds to acquire computers and Internet access for certain families. The Családnet (Family Net) program will start with a budget of HUF 125 million (US$ 440'000), sponsored by the Prime Minister's office and, *inter alia,* Compaq, the Post Office, Postabank, Matáv and Vivendi. Computers will be distributed to 1'400 families with some level of understanding of the Internet but without the financial means to acquire access. In addition to the hardware, families will receive 20 hours of monthly Internet access over two years. They will pay HUF 6'800 (US$ 24) per month over a period of three years for the equipment. The equipment is around 40 per cent cheaper than the market value and the Internet access is discounted. Some 100'000 families have already expressed interest in the program. The criteria for selection include age, minimum income, number of children (two or more) and good credit rating. The program will be run initially on an experimental basis but will most likely continue into 2001. Although this will help some families to gain access to the information society, it will not go a long way in addressing overall penetration levels. The program also does not address PC penetration in lower-income households. In fact, many observers argue that this money would be better spent in providing computer equipment in primary schools. However, the program will serve to improve public awareness about the Internet, particularly if it is coupled with an official Internet policy statement of support from the highest level of Hungarian government.

Table 3.1: Families with Internet Access

Based on a survey of 4'882 households conducted in October 1999

Features	Households	National average with Internet
Family has active earners	91 per cent	58 per cent
Head of family 40-49 years	~33 per cent	~20 per cent
Family lives in Budapest	46 per cent	~20 per cent
Family with four members	~35 per cent	18 per cent
Family with children	36 per cent	26 per cent

Source: AGB Hungary.

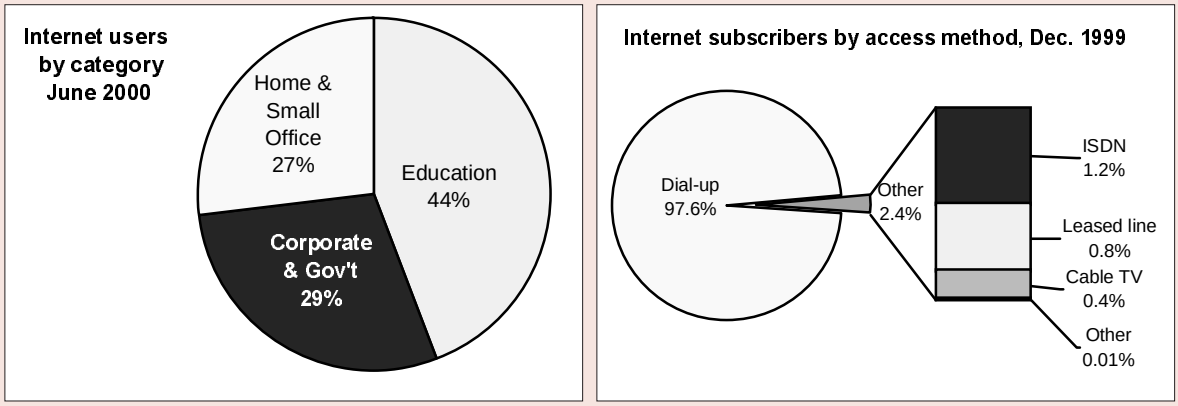
A household survey on Internet use was conducted by AGB Hungary in October 1999, based on 4'882 households. The results are outlined in Table 3.1. As in many other countries, Internet use is much higher in households with youths aged 15-29. Higher-income households tend to make more use of the Internet and a large proportion of Hungary Internet users (44 per cent) are familiar with the English language.

In general, the growth in the number of Internet users in Hungary has been slower than anticipated, relative to the size of its economy and the penetration of home PCs. Internet usage has been characterized by high cost, insufficient focus on small and medium-sized enterprises (SMEs) and residential users, and the dominance of the academic sector.

Less than one per cent of Hungarians have taken advantage of teleworking. The professions most likely to engage in telework in Hungary are computer programmers, researchers, translators, bookkeepers, and journalists.

Figure 3.4: Who and how

Internet users by category, June 2000 and
distribution of Internet subscribers by access method, December 1999



Source: ITU adapted from Carnation Consulting and CSO.

Rarely do employees of traditional firms telework full-time or even part-time. Multinational companies with offices in Hungary tend to apply this form of work more frequently, such as Ericsson, Siemens and IBM. One of the main difficulties in promoting teleworking is the small number of households equipped with PCs. Furthermore, the cultural attitude towards teleworking is one of distrust. In order to address this problem, a plan for the training of telework specialists has been developed within the framework of the Neopraxis program, supported by the European Commission.

3.4 Commercial Internet Services

Commercial Internet Service Providers (ISPs) began appearing in the mid-1990s, 3-4 years after HUNGARNET was first set up. In 1997, the Council of Hungarian Internet Providers (ISZT) <http://www.iszt.hu> was created. Their main objective was to create an Internet traffic exchange point, the Budapest Internet Exchange (BIX). The BIX's IP switch was set up in 1997 and provided a central point where ISPs could exchange traffic. Since HUNGARNET was the biggest ISP at the time, it was agreed that traffic was to be exchanged with HUNGARNET in proximity to its backbone network. The incumbent, Matáv, was also involved in the creation of BIX. BIX is a non-profit organization and has 30 members, both commercial and academic. Different members have different international connectivity, in and out of the BIX exchange.

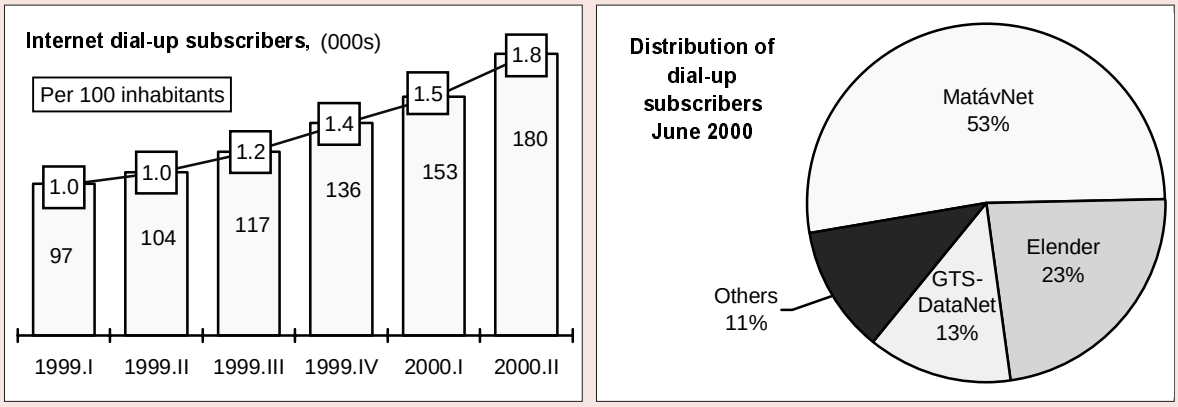
The total number of dial-up subscribers in Hungary has been growing steadily, despite the stranglehold on the academic sector. Numbers have been increasing at a cumulative growth rate of over ten per cent since the beginning of 1999. In June 2000, there were 180'000 dial-up subscribers in Hungary, up almost 45'000 since the end of 1999 (Figure 3.5).

Although there were over 100 licensed ISPs at the end of January 2000, the market is dominated by three providers with close to 90 per cent of the market. The three provide nationwide connectivity and are backed by major foreign investors:

Matáv's ISP, **MatávNet** <www.matavnet.hu>, is by far the largest with 95'000 dial-up subscribers at the end of 2000. The firm was established in November 1998 to operate Matáv's Origo portal and ISP service. MatávNet has 468 leased line subscribers for a roughly 25 per cent share of that market.

Figure 3.5: Internet Dial-Up subscribers

Total number of dial-up Internet subscribers and dial-up subscribers by ISP, June 2000



Source: ITU adapted from Hungarian Central Statistics Office, company reports.

Elender <www.eol.hu> grew out of a computer company established in 1990. It was one of Hungary's first ISPs providing service since 1996. It had around 35'000 dial-up and some 500 leased line subscribers in mid-2000. Elender has been strong in the business market that generates a substantial portion of its revenues. It also provides connectivity for SuliNet, the nationwide educational network. In 1999, Elender was the target of hackers who wrote obscenities on its homepage and revealed the names and passwords of subscribers.[6] Elender was purchased by US ISP PSINet in September 1999.[7]

GTS-DataNet <home.datanet.hu> was established in 1993 and the first in Hungary to provide Internet access in 1995. In mid-2000 it had 20'000 dial-up and some 400 leased line subscribers. It focuses on small- to medium-sized companies. Global TeleSystems Group (GTS), a large Internet provider with operations in some 20 European countries, purchased DataNet in early 1999.[8]

Some analysts fear that residential dial-up access will soon reach a plateau, as more and more commercial ISPs shift their focus to the corporate market. For instance, one of the biggest ISPs in Hungary, EuroWeb, only has some 1'500 dial-up subscribers and derives 90-95 per cent of its revenue from 250 large corporate customers. The attention given to big businesses will serve to reinforce the low take-up of the Internet among homes and SMEs.

One barrier to wider dial-up access penetration are high access charges as a result of local telephone usage charges. A regulatory framework for the introduction of subscription-free ISP packages had not been developed when this report was drafted. Hungarian fixed telephone operators are not obliged to share the revenue from local call charges incurred by Internet users. The first free ISP services were on offer by mobile operators and Vivendi, Hungary's biggest Local Telephone Operator (LTO) but only for their own telephone clients. Vivendi offers a pay-as-you-go flat-rate ISP service. In order to register, users can call a special phone number and are given a username and password. The user then incurs local call charges at a premium rate, about 2-3 HUF more than the standard local tariff. Vivendi started the service in 1997, and found that many of its customers use both the free ISP service and their regular subscription package at different times. In December 2000, two ISPs announced the launch of free Internet services: Kiwwi and Start.[9] This makes Hungary the second country in Central and Eastern Europe to offer free Internet services. The free ISPs will face tough competition, especially given that there is no sign that the regulator will be introducing sharing of telephone usage charges with ISPs. In January 2001, after a month of operation, Kiwwi claimed some 25'000 subscribers.

3.5 The content industry

A significant barrier to the success and attractiveness of the Internet in Hungary has been the lack of Hungarian language content provision. The first Hungarian web sites only appeared in the mid 1990s. This delay can be explained in part by Coordinating Committee for Multilateral Export Controls' (COCOM) restrictions on hardware and software exports to eastern bloc states. Restrictions were eased in the early 1990s. Another factor is the small size of the Hungarian market and its unique language. Unlike other countries that are part of a large linguistic grouping such as English, Spanish, French or Russian, Hungary cannot leverage on content developed elsewhere and must create its own.

Magyar Honlap ("Hungarian Homepage") <www.fsz.bme.hu> was the first Hungarian web site on the Internet. It was launched in February 1994 by the Budapest Technical University. The goal was to create a portal with links to Hungarian web sites and to facilitate navigation on the Internet. The first periodical to appear only in an online format was *InTerNeTTo* <www.internetto.hu> in 1995.

Since then, Hungarian content has developed rapidly. According to one con-

tent provider, there are around two million separate web pages that are related to Hungary, of which 90-95 per cent are in Hungarian and 85 per cent use the .hu domain.

By the late 1990s, investments in the Hungarian content industry were on the rise. Matáv entered the content market with its *Origo* portal <www.origo.hu> to compete with non-profit academic web sites, as well as with *InTerNeTTo,* which had been the market leader for the preceding two years. At the end of 1999 Origo was the most visited Hungarian site with some 120'000 sessions per day. Part of this is due to its popular *Altavizsla* Hungarian search engine and its *Freemail* service taken over from C3 in July 1999, which had some 250'000 users in January 2000.

The most popular independent portal site in Hungary is *Index* <www.index.hu>. It was formed when part of InTerNeTTo split from its US owners. It receives around 300'000 page impressions each working day and 200'000 per day during weekends. Index has built a community of 100'000 registered users through its forums. Index has about 25 per cent of the online advertising market, and expects to show sales of HUF 400-450 million in 2000, or US$ 1.5 million. It has tripled sales since 1999.[10]

Heureka <www.heureka.hu> is a search engine developed by Hungary.Network, one of the first Internet companies in Hungary. It receives about 70'000 page impressions a day. This is up from 2'000 in 1996 and 20'000 in 1998. Formed in 1995, it had about HUF 100-150 million in sales in 2000, equivalent to about 5-6 per cent of the advertising market. Hungary. Network is an Internet content provider and not an ISP. It plans

Box 3.2: Top Hungarian Web sites

Web site audience measurement provides crucial information for advertisers. Unlike most developed countries, there are no major international market research firms ranking Hungarian web sites. As a result, Hungarian companies have stepped in to fill the void. They include Medián <www.median.hu>, a public opinion and market poll firm; the Hungarian Audit Bureau of Circulation <www.matesz.hu> which certifies newspaper circulation; and AGB <www.agb.hu>, known for measuring TV viewing.

Since they apply different methods, it is difficult to compare results. All three companies use the "page impression" method to count the number of times a page is visited. Median additionally uses the session parameter, which means that pages that were not completely downloaded, are not counted. All three state that they filter out significant manipulations (e.g., downloading robots and "padding visitors", i.e., deliberate attempts to inflate apparent usage).

Medián's results for the top Hungarian web sites are shown below. It is interesting to note that unlike most countries, major international portals such as Yahoo or Microsoft do not figure in the most visited web sites. One reason is that they do not offer Hungarian versions. According to Carnation, a Hungarian Internet consulting firm, less than 6 per cent of Hungarian Internet users access only English web pages. Hungarians using the Internet for less than two years, primarily surf Hungarian pages (55 per cent) as opposed to 25 per cent of those using the Internet for more than two years.

Box Table 3.2: Top Hungarian Web Sites

Average values of 5 working days previous to 25 February 2001

Site name	Web page	Page impressions	Sessions
Origo	www.origo.hu	652'431	152'851
Index	www.index.hu	563'133	90'511
Habostora	www.habostora.hu	219'650	22'697
Terminal	www.terminal.hu	128'980	26'651
Startlap	www.startlap.hu	99'902	50'184
Nexus	www.nexus.hu	97'135	19'629

Source: Medián.

to launch its own software for e-business. Their most likely target is the financial sector and they are already running four separate e-business pilots.

Although thematic portals have been successful in Hungary, and there is a move to focus on the Business-to-Business (B2B) market, adequate content and e-commerce applications remain limited.

3.6 Media and the Internet

3.6.1 Print

Around 80 per cent of Hungary's print media is privately owned and the country has a wide range of independent newspapers and journals. In 1999, Hungary had 33 daily newspapers, of which eleven were national and the rest regional. With a total circulation of around two million, about one out of four Hungarian adults reads a daily newspaper.

The print media has recognized the potential of the Internet and many newspapers now have an online version of their publication. With a daily print run of about 240'000, the most popular newspaper is *Népszabadság* <www.nepszabadsag.hu>, a former Communist paper now partly-owned by Bertelsmann of Germany. One of the fastest growing newspapers is *Metro* <www.metro.hu>, a free tabloid distributed at Budapest's subway stations. There are a couple of English language weekly journals with web sites (*Budapest Business Journal* <www.bbj.hu> and the Budapest Sun <www.budapestsun.com>) as well as weeklies in German and Italian.

Internet-only online magazines have appeared lately such as *Magazix* <www.magazix.hu>, launched in August 2000. The e-zine contains information ranging from a real estate guide to beauty tips, to weather reports and information on pet care.

3.6.2 Broadcasting

In 1996, Act No. I on Radio and Television Services (Media Law) put an end to the state's monopoly over broadcasting services. In order to ensure the "*freedom and independence of radio and television broadcasting, and of expressing opinion, to ensure the equilibrium and objectivity of information provided … and also to support the assertion of the diversity of opinion and culture, as well as to prevent the emergence of information monopolies*", the National Radio and Television Commission (ORTT) <www.ortt.hu> was created. This may be incorporated into future plans for regulatory convergence.

Radio

In 1998, there were 17 AM and 57 FM radio stations in Hungary.[11] All of the national radio stations are publicly owned but some regional, privately owned, stations, such as Radio Juventus and Radio Bridge, can be received nationwide through transmitters. In 1997 Hungary had some seven million radio sets for a penetration of around 70 per 100 people.

Television

Terrestrial, cable and satellite television broadcasting are available in Hungary. There are three national public television channels, MTV 1, broadcast by terrestrial network, and MTV 2 and Duna, broadcast by satellite. There are also around 26 private commercial TV stations, with national or regional coverage, and over 200 regional cable companies.

The difference between the public and the commercial broadcasters lies in the time spent on so-called public service programs. Whereas all TV stations are obliged to dedicate at least ten per cent of their broadcasting time on programs of educational and informative value, the public channels have to concentrate on programs dealing with "*Hungarian, national and ethnic minority cultural values, … the life of nations and ethnic minorities living within Hungary, … information for educational or training purposes, … scientific activities and achievements*". Most commercial channels resemble those in Western European countries, showing a wide range of films, series, talk-shows, political magazines and entertainment programs.

Table 3.2: Mass media indicators

Indicator	Value	Source
Number of daily newspapers	33	Hungarian Central Statistical Office
Circulation	1.9 million	UNESCO Statistical Yearbook 1999 (data for 1996)
Number of radio receivers	7 million	UNESCO Statistical Yearbook 1999 (data for 1997)
Sets per 100 inhabitants	69	
Television households	3.71 million	Astra (data for mid-year 2000)
Households with a television (%)	91.4%	
Number of cable TV subscribers	1.59 million	Astra (data for mid-year 2000)
As % of TV households	42.9%	
Number of satellite dishes	840'000	Astra (data for mid-year 2000)
As % of TV households	22.6 %	

Source: ITU adapted from sources shown.

Table 3.3: Radio and TV web sites

Name of radio or television station	Web site
Jász-Nagykun-Szolnok county TV and radio program	www.externet.hu/jnszm/musor
Sztaki radio side	www.sztaki.hu/providers/radio
Radio	
92.9 Star Radio – Budapest	http://star.irisz.hu
Budapest Radio – Budapest	www.budapestradio.hu
Danubius Rádió – Budapest	www.danubius.hu
Egri rádiók	www.agria.hu/radio/index.html
Fehérvár Rádió – Székesfehérvár	www.datatrans.hu/~fehervar
Juventus Rádió – Budapest	www.juventus.hu
Petőfi Radia	www.petofi.radio.hu
Rádió Jam – Veszprém	www.ivn.hu/jam
Radió Szentes – Szentes	www.szentes.hu/radio/index.html
Tilos Rádió – Budapest	http://tilos.datanet.hu
Television	
Duna TV – Budapest	www.dunatv.hu
Fehérvár Televízió – Székesfehérvár	www.alba.hu/ftv
Magyar Televízió – Budapest	www.mtv.hu
Tatai Televízió Közalapítvány – Tata	www.c3.hu/~tataitv
Telin TV – Szeged	www.tiszanet.hu/telin/index.htm
Veszprém TV – Veszprém	www.ivn.hu/vtv

Source: ITU adapted from sources shown.

Many foreign broadcasting companies have obtained shares in Hungary's television channels, although a minimum of 26 per cent of a channel must remain in Hungarian possession. Also, no single company is allowed to own more than 49 per cent of a channel.[12]

In mid 2000, there were an estimated 3.7 million television households, meaning that just over 90 per cent of Hungarian households have a television. Of those, 66 per cent have access to multiple channels either via cable television (1.6 million subscribers) or direct-to-home satellite dishes (840'000).

Radio and TV on the Internet

Radio and television broadcasting on the Internet have become increasingly popular. There are about 30 radio stations on the Internet.

Since November 2000 listeners can log into the program of *Indexradio* <www.indexradio.hu>. This radio station can only be received on the Internet. Indexradio allows its online customers to watch what is going on in the studio 24 hours a day. Cameras provide live broadcast and include discussions and programs on different kinds of topics, including movies, fashion, politics, science–fiction and radio plays. The audience can also see their favourite media stars.

Radio and television guides found on the Internet can be divided into three main groups. The first group consists of the national radio and television stations that have their own web site (e.g., www.radio.hu, www.musor. mool.hu, www.juventus.hu, www. danubius.hu/musorok, www.mtv.hu/tvmusor, www.tv2.hu, www.rtlklub.hu, www.dunatv.hu/musor, www.hbo. hu).

The second group includes the local television channels. These have their program schedules on the Internet, including recommendations on certain programs and on specific topics. These web sites only contain information on the channels, and no additional information (e.g., www.scifi.hu/film/vmusor).

The third group are like an online magazine, with information on different programs from different channels. Besides the radio and television programs, there are also listings for movie and theatre programs (e.g., www.port.hu, www.comedia.hu/tvdb). There are fewer sites with information on radio programs. This is true especially for the second group (local stations). Apart from publishing the time of the different programs these sites include other services, such as voting, contribution, program recommendation, content of films, series, etc.

3.7 Internet tariffs

As mentioned above, Hungary has one of the highest costs for Internet access among the OECD countries. This is largely due to the high cost of local telephone calls.

Table 3.4: MatávNet Internet Packages

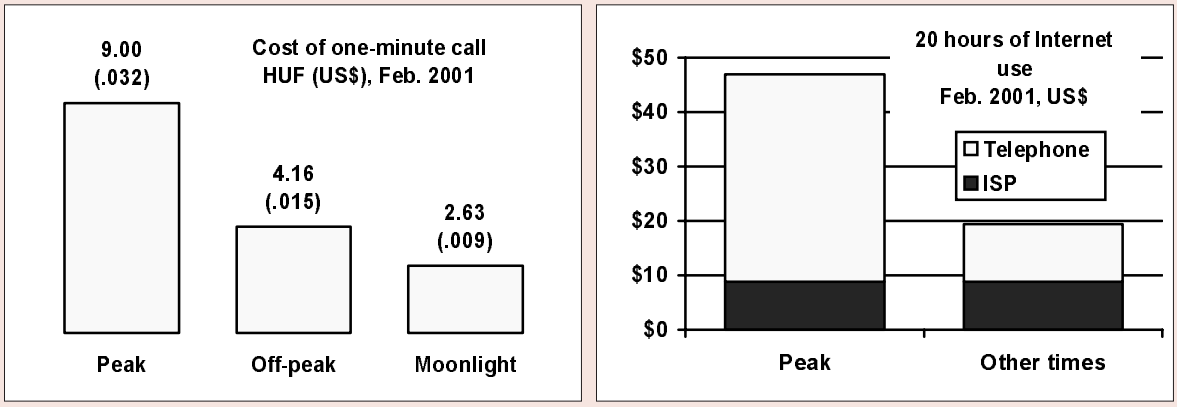
Prices in HUF and US$, including 25% VAT, but not including local phone tariffs, February 2001

Package	Hours included	Monthly Fee		Extra Traffic (Per Hour)	
		HUF	US$	HUF	US$
START	5	1'200	4.24	360	1.27
HOBBI	20	2'500	8.83	300	1.06
OTTHON	Unlimited*	4'500	15.89	300	1.06
PROFI	Unlimited	7'500	26.48	0	0

Note: Converted at exchange rate of 1 February 2001 (HUF 283.187 = US$ 1). * Unlimited access on week days from 6pm-7am and weekends and holidays from 3pm-7am. Outside of these times, extra traffic fee applies.
Source: Matáv.

Figure 3.6: Local call charges

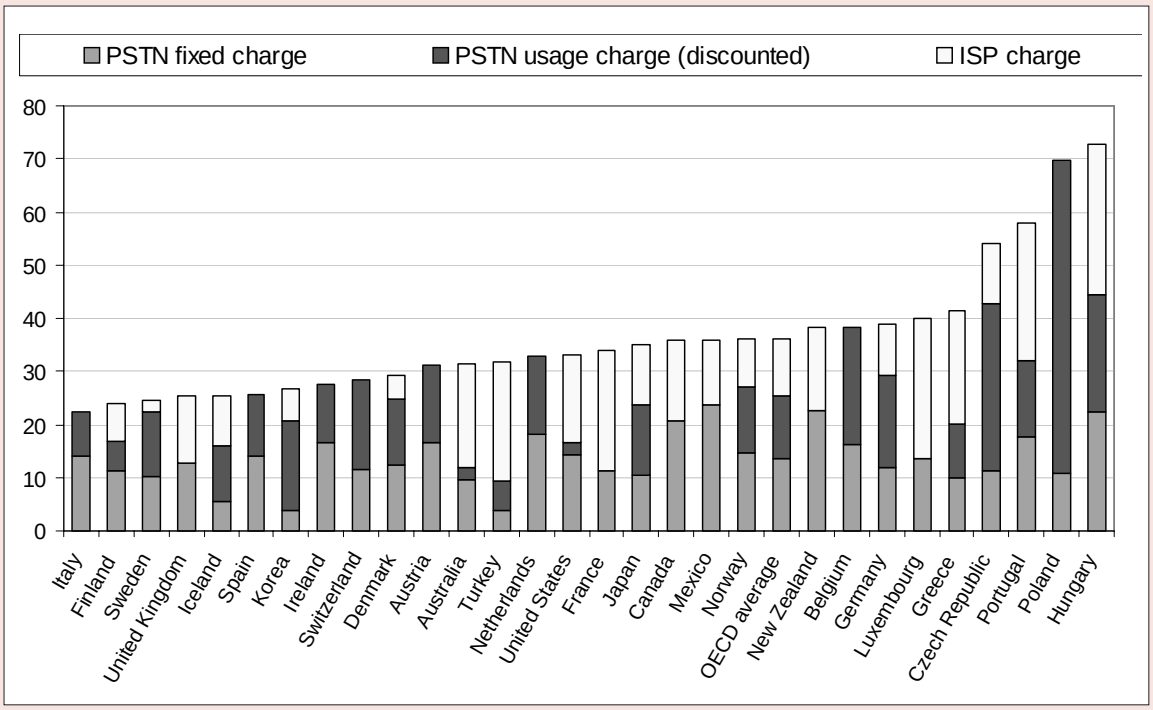
Price of a one-minute telephone call in HUF and 20 hours of Internet access, February 2001



Note: Converted to US$ at rate of 1 February 2001. Matáv has three calling periods: Peak (workdays from 7am-6pm), Off-peak (workdays from 5am-7am, 6pm-10pm and weekends and holidays from 5am-10pm) and Moonlight (every day from 10pm-5am). In addition, there is a maximum rate of HUF 150 (0.53) per call in discounted periods (workdays from 6pm-7am and weekends from 3pm-7am).
Source: ITU adapted from Matáv.

Figure 3.7: OECD Internet Access Basket

20 hours at off-peak times, 2000, in US$



Note: Public Switched Telephone Network (PSTN) fixed charges include monthly line rental fee and additional monthly charges related to discount plans, if applicable. The basket includes 20 one-hour calls. Off peak is taken at 20h00.
Source: OECD, http://www.oecd.org/dsti/sti/it/cm/.

Table 3.4 sets out prices for various Internet packages offered by MatávNet, the largest ISP in Hungary (see also Annex 2). Figure 3.6 (left chart) sets out Matáv's local telephone call charges. For the first hour of Internet use per month at peak times, an Internet dial-up subscriber would incur a telephone charge of HUF 540 (US$1.92). Matáv has a special flat rate telephone charge for Internet use during off-peak hours capped at HUF 150 (US$ 0.53) per call. The impact of the telephone usage charge on Internet pricing is significant. Telephone usage charges increase the dial-up bill by 80 per cent during peak periods and 55 per cent during off-peak.

According to the OECD, Hungarians would pay US$ 73 for 20 hours of dial-up Internet access at off-peak rates (adjusted for Purchasing Power Parity and including the monthly telephone subscription charge). This rate is three times as much as in Italy or Finland and 1.35 times the rate in the Czech Republic (Figure 3.7). Cost of access, therefore, remains one of the principal factors slowing the growth of the Internet in Hungary. The standard of living in Hungary is lower than in other OECD countries and a significant portion of its population lives in villages. The minimum wage per month is a mere HUF 25'000 (US$ 80) per month. The set-up cost for a PC and Internet access can amount to HUF 200'000 or eight times that amount. This means that in many cases, despite Internet awareness, many Hungarians cannot afford to get connected, particularly since the free ISP market is limited.

3.8 Universal Internet access

3.8.1 Telecottages

The shortage of IP bandwidth and Internet connectivity outside of Budapest and other urban centres means that rural Hungary does not stand to benefit as much from access to information and communication technologies. However, this is changing as new initiatives are being launched and the network is being digitized. One of the main initiatives bringing the Internet to villages is Telecottages.

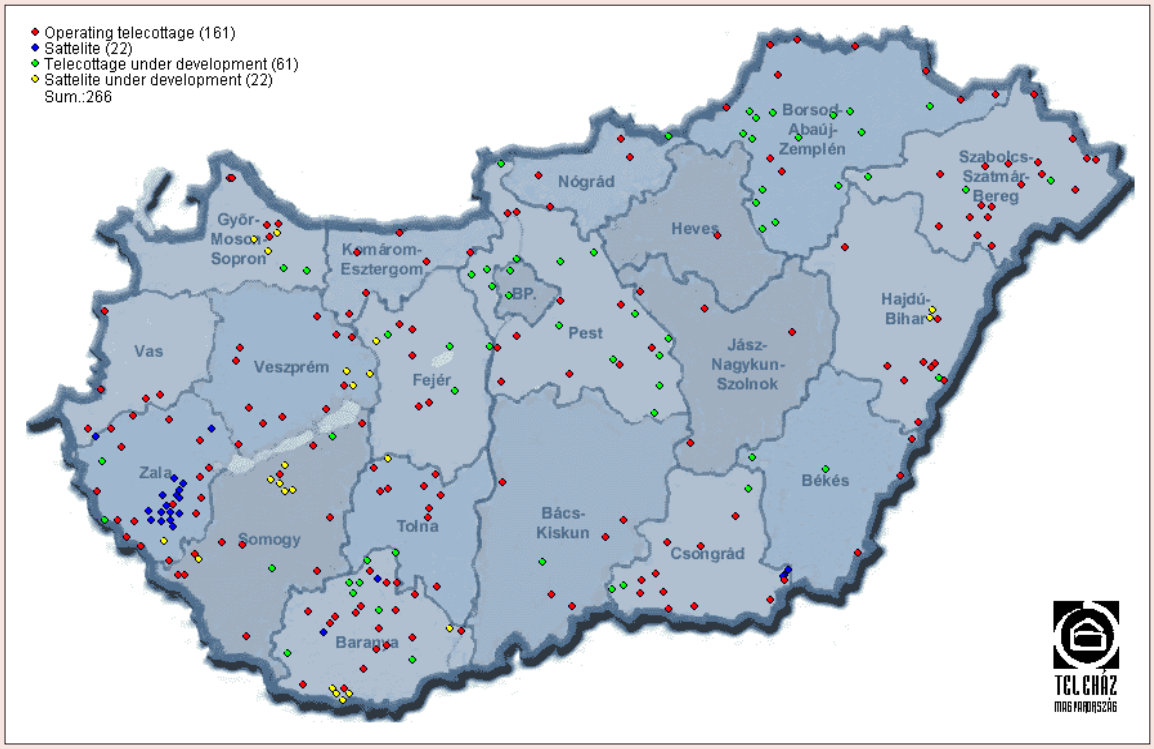
In the early 1990s, librarians in Hungary decided to make new information sources, media and tools available to a variety of users who otherwise did not have access to such services. They were inspired by description of tele-service centres in Denmark and Sweden. They thought mostly of small communities in the countryside, where small libraries with limited resources could renew themselves by taking on new functions and strengthening their positions. The first "telecottage" or "TeleHaz" in Hungary was established in 1994. It stemmed from a community initiative in Czákberény, a small mountain community in mid-western Hungary. The local government, the business sector and the Welfare Ministry provided financial support. [13]

Fifteen individuals, representing various professions, then established the Hungarian Telecottage Association <www.telehaz.hu> at the end of 1994. The Director of the USAid-funded "DemNet" program launched a grant competition for the establishment of more Hungarian telecottages in the shortest possible time. Between 1997 and 1998, therefore, 31 new telecottages were established, at the cost of US$ 1.5 million. Around this time, at the end of 1997, the Prime Minister's Office also decided to help support the plans for expansion.

By the first quarter of 2000, there were 161 operational telecottages (Figure 3.8). Up to 100 more are planned by the Telecottage Association. There are also other tele-service programs running simultaneously, some of which result in the establishment of telecottages. The present number of telecottages serve around one million people, covering most of the country and there is at least one telecottage every 50 kilometres. The aim is to reach 250-300 telecottages by the middle of 2001. More and more small villages are also establishing simple access points, with a few computers and a telephone line. These "satellite" telecottages are then able to gain electronic access to the services of the nearest telecottage and tap

Figure 3.8: Telecottages in Hungary

Status of Telecottages, April 2000



Source: Telecottage Association of Hungary.

into their facilities, without having to invest in infrastructure of their own.

Funding for telecottages is necessary for the first two years of operation. On average, it requires at least US$ 15'000 to set up a telecottage, and annual operating costs are in the same range. Funding in 1999 was US$ 5 million, of which 28 per cent came from various foreign sources. After the first two years, given good network service and some degree of entrepreneurship, a telecottage can support itself from at least four sources of revenue:

- Fees for local services (office services, local media, education, retail, etc.);
- Grants and donations;
- Business services (trade via the network, distance learning, teleworking, etc.); and
- Provision of state or local government services based on outsourcing (social services, regional development, public information dissemination).

Each telecottage can provide services for a maximum of 10'000 people and the average number of people served by each telecottage is between 4'000 and 6'000.

The need for telecottages in Hungary is significant, given that the country has about 3'200 small villages. 90 per cent of these have less than 3'000 inhabitants. Moreover, 7.8 per cent of Hungary's total population lives in settlements with less than 1'000 inhabitants. These villages typically lack state institutions and public service

delivery and have poorly developed retail and business services.

The average number of PCs per telecottage is five. Free e-mail service is provided by the telecottage's own mail server. After registering, users have to wait about two hours to start using their e-mail service. They receive their own e-mail address, which includes the name of the village: (e.g., name.village@telehaz.hu). Each telecottage also includes tele-working facilities. In fact, the Telecottage Association has created 300-350 full-time workplaces since 1994, with an average of two employees and eight volunteers per telecottage. Telecottages have therefore served two important functions: Internet diffusion and job creation.

The Telecottage Association has set up a tele-working scheme, involving the collection and dissemination of public information. Many public institutions do not have the funding or resources to undertake the task of making their information publicly available on the Internet. Under the Public Works scheme in Hungary, the state now finances 70-90 per cent of the wage of "public workers". 10-30 per cent have to be covered by the employee. In order to address this, telecottages approach public agencies and offer to collect and disseminate their information in exchange for the 10-30 per cent wages. This is an excellent opportunity for the public agencies to make their information public at a reduced rate, and an effective job creation program through tele-working.

One of the main recurring costs for telecottages are local call tariffs. Telecottages still have to pay the LTO or incumbent operator for the use of the telephone to access the Internet. For this reason, the Telecottage Association plans to set up its own microwave system, especially since the cost for such systems is rapidly decreasing. They estimate that HUF 3'000'000 would be needed per telecottage. Since telecottages are static, an antenna is easily set up. The 50 kilometres between telecottages, known as "white spots" can also be bridged in this manner. The Association planned to submit a proposal to the HIF before the end of 2000.

3.8.2 Internet cafés

Another form of public Internet access is the Internet café. The number of Internet cafés in Hungary is increasing but they are not necessarily popular among Hungarians and most of

Table 3.5: Internet Café Prices

September 2000

Features	Castro Bisztró	Matthias Rex	Vas street	Libri	Vista	Budapest Net	EasyNet	AMI
Number of computers	6	8	12	5	8	50	17	49
Charge for one hour Internet usage	680 HUF	660 HUF	300 HUF	300 HUF	660 HUF	700 HUF	900 HUF	700 HUF
Allowance for students	No	Yes, 500 HUF/hour	No	No	No	Yes, 630 HUF/hour	Yes, 600 HUF/hour	No
Subscription	Yes	Yes	No	No	No	Yes	Yes	Yes
Most advantageous charge per hour	380 HUF	400 HUF	300 HUF	300 HUF	660 HUF	380 HUF	700 HUF	380 HUF
Restaurant	Yes	Only dispensers	Yes	Yes	Yes	Only dispensers	Only dispensers	Yes
Own homepage	Yes	Non	No	Yes	Yes	Yes	Yes	No

Source: DNO. <home.datanet.hu/cikk.php3?./online/internet/dnavigator/20000919cafe.cikk>.

their clientele are foreign visitors. Cafés try to market their services by offering a variety of activities and products. Prices for Internet use range between HUF 300 (US$ 1.05) and HUF 900 (US$ 3.16) per hour (Table 3.5).

3.8.3 Other universal access points

Hungary has made major progress in providing Internet access for universities and primary and secondary schools. This is discussed in Chapter 4. Another program for promoting public access was the Centre for Culture and Communications (C3) <tech.c3.hu>. Established by the George Soros Foundation, C3 has been connecting non-profit organizations to the Internet since January 1996. This includes over 500 organizations as well as several public access points in railway stations and shopping malls. This program came to an end in December 1999 and its fate is uncertain.

3.9 Alternative access

3.9.1 ADSL

In October 2000, Matáv received a license to offer Asymmetric Digital Subscriber Line (ADSL) services.[14] The new service, *NetExpressz*, will contain three different packages depending on the transmission speed (from 64–364 kbps upstream to 384–1'500 kbps downstream). Matáv intends to provide it initially within given areas of Budapest. Prices for the new service are set out in Table 3.6. Matáv was also licensed in November 2000 to provide wholesale ADSL to other carriers. Matáv has some concerns that ADSL will affect its growing and profitable ISDN business. It had about 60'000 ISDN subscribers in late 2000 and was adding around 3'000 a week.[15] As a result, the ADSL monthly fee is priced at between 3-15 times higher than ISDN. Furthermore, initial installations require the user to already be an ISDN subscriber. Matáv reckons it will sell several thousand ADSL accesses in 2000 and tens of thousands in 2001.

3.9.2 Mobile Internet

Mobile Internet services using the Wireless Access Protocol (WAP) were launched in Hungary in early 2000 by Westel and Pannon. Like in other European countries, WAP has not been a resounding success. Data-enabled handsets are in short supply and are also subject to high VAT and custom duties. It is estimated that only about five per cent of the handsets in circulation in Hungary have data capabilities. According to a recent survey by TNS Modus, less than half a per cent of Hungarian mobile subscribers use WAP. Short Messaging System (SMS) usage, however, has been consistently on the rise, matching the pattern in other European countries. Hungary's newest mobile operator, Vodafone, reported that its customers alone sent seven million SMS messages in December 2000. Operators are encour-

Table 3.6: Matáv's ADSL Services

Prices in US$, excluding VAT

Speed (kpbs) Up / Down	64 / 384	128 / 768	384 / 1500
Connection charge	$160.06 ($106.70)	$160.06 ($106.70)	$266.76 ($177.84)
Monthly fee	$53.35 ($42.68)	$106.70 ($85.36)	$266.76 ($213.41)

Note: The figure in parenthesis is the price for a minimum one-year contract.
Source: Matáv.

aging SMS by including a certain number of free messages per month in their subscription packages.[16] Mobile operators are planning to introduce faster data speeds using General Packet Radio Service (GPRS) in 2001.[17] Unlike neighbours Czech Republic and Poland, the government has not yet enunciated plans for the introduction of third generation mobile services. This is partly due to effective lobbying by incumbent mobile operators that are fearful of the extra competition and high investment costs that 3G could bring.

3.9.3 Cable TV

Just over 90 per cent of Hungarian households have a television and of those, some 43 per cent subscribe to cable television. Thus Internet access via cable modems is a potentially attractive proposition in Hungary. One of the main players in the cable Internet market is UPC. UPC owns one of the largest broadband networks in Europe and UPC Hungary currently has 550'000 cable subscribers. It buys its IP connectivity from GTS, Pantel and Trafficom. For its IP services, UPC Hungary has partnered with Chello, a European broadband Internet service provider. The cable modem provides speeds of 300 Kpbs downstream and 64 Kpbs upstream – UPC offers an always-on service for a flat fee. UPC Hungary launched its cable modem service in November 2000.[18] There are 5 packages currently on offer, with prices depending on web space and traffic limit:

1. *Privat* at 7'000 HUF (24.58 US$) per month, mainly for new users.
2. *Profil* at 9'000 HUF (31.60 US$) per month. This is the most popular package – about 90 per cent of UPC's Internet customers have chosen this option.
3. *Maximum*, at 12'000 HUF (42.13 US$) per month.
4. *Soho*, at 40'000 HUF (140.43 US$) per month.
5. *Business packages*. UPC only has 2 or 3 business subscribers at this time.

There is also a set-up fee over and above the monthly charge. The first four packages target residential users. Thus far, the service is only being

Table 3.7: Prices of selected Hungarian cable Internet service providers

Name	Service area	Unlimited subscription				
		Entrance HUF	Monthly fee HUF	Downloading limit	Endpoint	Over limit fee HUF/Mb
TVNET Kft.*	Budapest*	48'000	10'000	-	1	-
Datatrans	Székesfehérvár		20'000	-	1	-
Szabinet	Nyíregyháza	50000	10'000	-	1	-
Cory-Net*	Szekszárd	37'500	20'000	-	1	-
SédNet	Veszprém	12'500	37'500	400 Mbyte	1	75
MATÁV - CATV	Szeged		15'000	-	1	-
TiszaneT	Szeged		15'000	-	1	-
UPC - Broadband	Miskolc	25'000	8'750	Max 2 GB	1	-
UPC - Sienet	Nagykanizsa		19'800	-	1	-
Dunaweb	Vác	381'250	50'000	-	5	-
Drávanet*	Pécs*	62'500	12'500	-	1	-
Sugonet	Baja		16'000	-	1	-
MATÁVkábel	Budapest XVI.	Install. fee: 10'000	10'750	-	1	-

Source: http://www.grafikon.hu/grafikon/internet/kabel.html.

offered in small cities in the eastern part of Hungary where UPC holds a franchise. It has found that many of its subscribers (ten per cent) exceed their traffic limit. In the future, therefore, it plans to offer only one package, at a cost of 10'900 HUF (38.27 US$) with no traffic limit. UPC Hungary started its IP services in December 1999 and had 1'300 subscribers by October 2000. On the whole, prices for cable Internet service are not affordable for most Hungarians. Table 3.7 shows prices for cable Internet services across Hungary.

One of the first cable TV firms to become an ISP is TVNet. It has offered its services since 1995 in some districts of Budapest. TVNet now has a presence in six districts, and in one of these districts it has become a serious business rival to UPC.

One of the main hurdles to the future development of cable Internet services is the Hungarian Media Act, which limits each cable operator to a maximum subscriber base of 1/6th of the population. UPC is heavily lobbying the government for changes to the Act. However, it is not an easy task, and any amendment would require a two-thirds majority in Parliament. Moreover, Matáv is a formidable competitor as it still retains effective control of its cable company, MATÁVkábelTV, even after having sold 25 per cent of shares and 75 per cent of voting rights to one of Hungary's largest insurance companies, Hungária Biztosító (part of the German Allianz Group), in accordance with European directives. In its investigation of the matter, the Competition Office found that, whereas the outright ownership of cable companies by incumbents was prohibited, effective management control was not. Proposals have been submitted to change the vague wording in the new Act but it remains to be seen whether or not these will be accepted.

3.10 Internet regulatory environment

3.10.1 ISP market

In Hungary, ISPs need to apply to the Communications Authority or a regional body for a license. Licenses are distinguished between nation wide, regional or local service. Beginning in 2001, ISPs have to pay a yearly quality control fee of HUF 136 (US$ 0.48) per subscriber. The number of ISPs has increased rapidly. While there were only 30 ISPs in April 2000, six months later the number had increased to about 90. ISPs are allowed to provide their own national and international Internet infrastructure. There are no restrictions on foreign investment in ISPs.

3.10.2 VoIP

Voice over Internet Protocol (VoIP) was legalized in July 1999. Licensing started instantly and the number of providers with VoIP services increased from nine in mid-1999 to 40 by late 1999. VoIP service providers must ensure that the quality of their service is less than that of the traditional public telephone switched telephone service until the exclusive license of Matáv and the LTOs for providing voice telephone service expires in 2002. They must also inform clients that the quality is not as good as a standard telephone call.

3.10.3 Domain name

The process for obtaining a Hungarian domain name (i.e., .hu) was liberalized in March 2000. Before this only companies could register domain names and they could only use names that were connected to their business. Now any name, within certain limits (see below), can be registered by anyone. Though the previous method was restrictive, the present situation has added to the confusion and has uncertain implications for trademark registration. As a result, there are a number of legal disputes. For example, a company called Extra 7 was able to register the domain name <www.compfair.hu>. Compexpo Computing, a company that organizes a computer fair called "Compfair", which is a protected name, now claims this domain name. Another example is <www.dunaplaza.com>, owned by Pólus Center, a rival of Dunaplaza. Another example is Matáv that found when it wanted to register its search engine <www.altavizsla.com> the name had already been taken by a student.

Box 3.3: IP Telephony: facilitating the early introduction of competition

The Hungarian administration has followed a relatively orderly progression towards the introduction of competition beginning with the allocation of local telephone franchises, passing via the awarding of competitive mobile licenses and liberalisation of the value-added service market and culminating in the full liberalisation of the market in 2002. From beginning to end, the process will have taken just over ten years. The problem is that, in view of changes in the external market environment, it is just *too slow*. In particular, it has not brought about the level of telecommunication price reductions that would increase Hungary's attractions as location for foreign direct investment, able to compete with other European markets.

Fortunately, technological change has presented policy-makers with a way of advancing the introduction of price competition without abandoning the overall liberalisation timetable. Hungary has defined IP Telephony in such as way that it can be offered on a competitive basis, especially for international calls, without undercutting Matáv's monopoly. To do this, the HIF has adopted an approach, unique in the world, of defining IP Telephony according to quality of service criteria and asking Internet Telephony Service Providers to guarantee an *inferior* quality of service in order not to infringe Matáv's area of exclusivity. Indeed, Hungary's VoIP policy may be the most direct and detailed in the world. While it is similar to that of the European Commission, it goes much further in defining quality criteria.

The policy, released on 22 July 1999, applies to all telecommunications service licensees and license applicants. It states that Matáv's exclusive rights (until 31.12.2001) to carry international public long-distance voice telephone traffic can only be by-passed if the established speech connection qualifies as a "non-public-voice-telephony" connection. To qualify, those speech signals must meet a series of conditions. The service provider must: (1) ensure a minimum 250 millisecond (ms) average delay of speech signal transmission between the terminal devices; (2) not guarantee that the loss of speech packets causing short interruption of speech will be less than 1%; (3) draw users' attention to the quality parameters which differ from those of public voice telephony when publicizing the service; and (4) meet a number of other minor requirements, such as ensuring that only type-approved equipment is used.

The main application of IP Telephony in Hungary has been for savings that can be made on international calls, especially those made from mobiles. A growing proportion of international traffic, probably as high as 15 per cent, is now generated from mobilephones, especially from GSM users, roaming outside their home country. The three competitive mobile operators were obliged to pass via Matáv for origination and termination of international traffic. They saw IP Telephony as an opportunity to route their international traffic (including incoming calls) via least cost routes, thereby securing cost savings and lower rates for their customers. Although there are more than 15 licensed Internet Telephony Service Providers, in practice, what has emerged is that there are a smaller number of wholesale IP providers, including Novacom and Matáv itself, which serve licensed retail IP Telephony service providers, including the mobile operators. Matáv is actually competing with itself in offering wholesale IP Telephony. The potential savings to be made are very attractive and, in some cases, a call made abroad from a mobile in Hungary via IP can be cheaper than the equivalent call made over a fixed-line network.

One of the reasons for the success of IP Telephony in Hungary is that it is relatively simple to make a call, by adding an extra zero to the number being called. There is a pre-registration scheme, but at least one of the operators (Westel 900) bypasses this requirement by offering an opt-out scheme for customers. Interestingly, the option of sending calls via IP Telephony is also available to foreign users roaming in Hungary, again by adding an extra zero to the number.

It is difficult to build up an accurate picture of the volume of traffic currently being routed via IP Telephony but it is clearly growing and, according to the operators, customers are happy, both with the quality of service and with the reduction in call prices. However, the operators do report some reliability problems with the VoIP equipment, especially with regard to mis-directed calls. Perhaps the real test will come at the start of 2002 when the mobile operators and other entrants have the opportunity to bypass Matáv's international gateway by more conventional means. Will they still choose to use to VoIP?

Source: Communication Authority, Hungary, "Information for telecommunications service license applicants intended for voice telephony usage of Internet" (22 July 1999), <http://www.hif.hu/voipdir3.htm>, and "Regulation of public fixed telephone services and VoIP (Voice over Internet Protocol) in Hungary", <http://www.itu.int/osg/sec/spu/ni/iptel/countries/hungary/index.html>.

The Council of the Internet Service Providers in Hungary (ISZT) has overall responsibility for domain name registration (information can be found at <www.domain.hu>). Despite the liberalization, a domain name may still be refused, if it:

- is identical to an existing firm name;

- is connected with rival firms;
- is very similar to the title of an artistic creation (e.g., title of a book);
- is identical to one of the trademarks listed in the Hungarian Patent office (MSZH);
- could be illegal or misleading;
- is the name of a private person; or
- can be considered offensive.

To avoid violations, two independent divisions handle domain name registration within the ISZT simultaneously. So far, about 500 domain names have been refused. Most registrations were refused because applicants attempted to use obvious trademarks (e.g., samsonite.hu, toshiba.hu, etc.). Domain name registration has been delegated to some 40 or so ISZT members who charge varying fees. Matáv charges a one-time fee of HUF 8'000 (US$ 28) to register a .hu domain name and an annual maintenance fee of HUF 9'600 (US$ 34). ISZT is planning to move to a franchise system for domain name registration whereby anyone could become a registrar upon payment of registrar's fees.

The number of registered domain names ending with .hu is around 40'000. Structured second level domain names (.e.g, .gov.hu, .com.hu, .edu.hu, etc.) are not required in Hungary. As a result the Internet Software Consortium reported 2'717 second level domains under .hu in its July 2000 survey. RIPE reported 104'415 hosts in Hungary in December 2000, including 15'549 web sites.

The restrictive nature of domain name registration in the past as well as the recent liberalization has resulted in a brisk market for domain names. Domain name shoppers can choose from about 36 thousand registered names and the competition is tough. There are special web sites, with lists of domain names that are for sale, some of them for several million HUF. At the same time, some companies are solely in the business of registering domain names for future resale.

[1] The term HUNGARNET refers both to the association of network users and to the network itself.

[2] TERENA was later formed in 1994 by a merger of RARE and EARN. Its aim is to "promote and participate in the development of a high quality international information and telecommunications infrastructure for the benefit of research and education."

[3] RIPE (Réseaux IP Européens) is a collaborative organization open to organizations and individuals operating wide area IP networks in Europe and beyond. Currently, more than 1'000 organizations participate in RIPE's work.

[4] DANTE is owned by the research networks responsible for its establishment and organises, manages and builds international networking services on their behalf.

[5] The World Trade Organization's Information Technology Agreement ("Singapore Agreement") sets a timetable for the elimination of customs duties on IT equipment. The Ministerial Declaration on Trade in Information Technology Products (ITA) was concluded by 29 participants at the Singapore Ministerial Conference in December 1996. The ITA provided for participants to completely eliminate duties on IT products covered by the Agreement by 1 January 2000. As of 10 March 2000, the ITA had 36 participants (covering 52 Members and States or separate customs territories in the process of acceding to the WTO) representing approximately 93 per cent of world trade in information technology products. See http://www.wto.org/english/tratop_e/inftec_e/inftec_e.htm for more information. Hungary is not yet participating in the Agreement.

[6] See "Elender's new name." *The Budapest Sun Online*. 6 July 2000.

[7] "PSINet Acquires Hungary's Second Largest Internet Service Provider." *News Release*. 15 September 1999. <http://www.psinet.com/news/pr/99/hungary.html>

[8] "GTS Grows Share of Central European ISP Market." *Press Release*. 16 February 1999.

[9] See Svetlana Issaeva and Denis McCauley, "Free Internet Makes a Foray into Hungary." *PYRAMID ALERT*. 15 December 2000.

[10] Concorde Securities Ltd, Hungarian Internet Research, 2000.

[11] CIA World Factbook, at http://www.odci.gov/cia/publications/factbook/geos/hu.html.

[12] Freedom House, at http://www.freedomhouse.org/pdf_docs/research/nitransit/NITransit.PDF.

[13] See Gábor Bihari & Charles Jókay , *Telecottages in Hungary: The Experience and the Opportunities*, I.G.E. Limited, 1999.

[14] Asymmetric Digital Subscriber Line (ADSL) is a modem technology, which uses existing telephone copper lines for high-speed data communications. ADSL allows a subscriber to receive date (download) at speeds of up to 10 Mbps, and to send (upload) data at speeds of up to 1 Mbps.

[15] "Internet access to speed up." *The Budapest Sun Online*. 7 September 2000. <www.budapestsun.com/ll_story.asp?ArticleId={965A723613BA4948889CCAC4D334549B}&From=Business>.

[16] For instance, Pannon GSM offers 20 free SMS messages per month for its pre-paid subscribers. After that allotment is used, there is a charge of 25 HUF per message.

[17] GPRS (General Packet Radio Services) is a packet-based wireless communication service that provides data rates from 56 up to 114 Kbps and continuous connection to the Internet for mobile phone and computer users.

[18] "Chello broadband extends service to Central Europe." Press Release. 6 November 2000. <www.unitedglobal.com/euroFregion.html>.

4. National Absorption of Information and Communication Technology

4.1 The government

4.1.1 The role of the state in determining goals

When Hungary applied for EU membership, it committed itself not only to becoming a member of the European Community but also to establishing and developing its society so as to keep up with the collective speed of the community. This implies, amongst other things, a commitment to the "new (information) economy", as well as to the "knowledge based information society".

The Hungarian government has a determining role in:

- specifying the direction and the expansion of infrastructure and service based competition;
- promoting and regularizing its own ICT activities;
- organizing pilot projects and developing new initiatives; and
- concentrating the resources of the country on policy goals.

Concerning the Internet, the Hungarian government sees the protection of consumers and the harmonious functioning of the market as its primary goal.

4.1.2 The state as a content provider

One of the major goals of the state should be to use new information technologies to provide government services online. By accessing administrative services online, citizens as well as the government can save time and resources. Electronic public purchasing is similarly important, particularly in the EU context where programs for state procurement have priority. This is being developed and initial results are expected in the first half of 2001.

Although the government administration does not yet offer services online, most government entities have their own homepage with information on their organization. Each ministry has its own web site containing information on the ministry itself, as well as on the sectors supervised by it. There is a government portal <www.meh.hu> with links to ministries.

In order to assist and support Members of Parliament (MPs) in their legislative activities, an Information Centre was opened in the Hungarian Parliament in September 1991. The Information Centre provides information such as legislation and pending legislation status, activities of MPs, election results, committees and parliamentary factions. The Information Centre consists of a library with computers and databases (e.g., legal texts, Internet access to EU sites, etc.). It offers full services to MPs and limited services to the public. In 1997 the Information Centre established a public telephone service but many people seem to prefer e-mail so that the Centre has decided to provide online information via e-mail. Publicly available information on the activities of the Parliament can be found on its homepage <www.parlament.hu>. This web site not only supplies information on the activities of the Hungarian Parliament but also provides the user with methodological suggestions on how to search for information, thus making research easier.

4.1.3 The state as user

Hungary has a good quality backbone network that connects the central institutions of the government. The problem is that this network is limited to the government's central institutions. An important objective of the government has to be the expansion of the network to cover the entire government system, including all the different sectors.

Table 4.1: Computer penetration in public administrations

Year	Number of institutions	Number of operated networks	Number of computers connected to networks	Number of Internet connections	Total number of computers
1996	492	1'561	39'884	.	54'882
1997	451	1'648	46'678	.	63'130
1998	444	1'754	58'523	18'260	75'075
1999	n.a.	n.a.	n.a.	29'796	93'306

Source: Hungarian Central Statistical Office.

Computer penetration in Hungary's public administrations varies by region. The highest computer density is found in the central region, i.e., Budapest and its outskirts.

The most popular services within the government are e-mail and searching the web. The infrastructure should be suitable to the requirements of integrated services. The government also needs to improve its security level so as to protect itself from potential infringements to its databases.

4.1.4 Government financing of IT

The state has spent several billion HUF on IT research and development and the former National Technical Development Committee allocated significant sums to IT development. The Committee's objective was to subsidize and promote the development of software and content and to establish the government's own web sites. Although some of the undertakings failed, some projects turned out to be very successful. One example is the online compilation of Hungarian literature, established in co-operation with the Faculty of Arts of ELTE and the Gépeskönyv company, allowing students, for instance, to analyze the differences between various editions of the same text, as well as to access the original manuscript. Another example is an affiliated company of KFKI, Számítástechnikai, the Institute of Musicology of the Hungarian Academy and the Ethnographical Museum, which built a web site with a digital folk song collection and a search engine that searches by melody fragments.

The Ministry of Education, now in charge of the program called "Application of information and communications technologies", hosts a competition to encourage researchers and engineers to come up with innovative applications. The Ministry of Youth and Sports allocated HUF 30 million in 2000 for a project providing free Internet access to youth organizations. Apart from Internet services, this project provides technical training to youth communities and non-government organizations that perform actions of public utility in the interest of children and youth. In the framework of this program, about 500 youth organizations are provided with electronic connections.

Another government project distributed some 2'000 computers to Hungarian families. In order to reduce the price of computers, the government is considering signing the World Trade Organization agreement that abolishes taxes on imported hardware and software.

4.1.5 Local government

One fifth of local governments are currently connected to the Internet. All

local governments of Budapest, its districts and counties have their own web site, as do many towns. These web sites indicate their location and allow the user to download forms such as job applications. In some cases web sites allow for electronic administration, that is, effecting administrative matters online.

4.1.6 Research and development

Research and development within the IT sector play an important role because it has an impact on the general IT situation within a country. It creates groups of specialists who take on pioneering work and help create an IT culture nation wide. In Hungary, computer networks and their applications have been developed since 1986, in the framework of the Information Infrastructure Development Program.

As a result of more than ten years development, the research infrastructure in Hungary can be considered good, even by international comparison. HUNGARNET has united about one thousand institutions from research and education, nationally and internationally (TERENA, DANTE, QUANTUM, etc.), and has laid out the framework for IT development within the higher education and research sector. As a result, the organization was able to join the most up-to-date European information highway, TEN-155.

Government Decree 95/1999 (VI.23) regulates the work of the National Informational Infrastructure Development Program. It determines the purpose of the program, its budget and financing, its organizational structure, as well as the process of competition.

Investment in research and development are very important and Hungary collaborates with EU institutions specialized in IT research and development activities (e.g., DGIII, DG X, DG XII, DG XIII, FP5, etc.). Multinational firms settled in Hungary are starting to establish their own local research centres and more and more Hungarian researchers are involved in research activities. In the field of telecommunication, Nokia and Ericsson have recently founded their own research centres in Hungary.

4.2 Education

In order to prevent Hungary's society from splitting into a digitally literate group on the one hand, and an illiterate group on the other hand, it is necessary to fulfill certain educational and cultural requirements (preparing study material, teaching pupils and teachers, etc.) as well as to provide the necessary IT infrastructure (hardware, software, services, etc.).

4.2.1 Primary and secondary schools

An Internet program for Hungary's secondary schools, named SuliNet (SchoolNet) <www.sulinet.hu>, was launched in 1996, under the auspices of the Ministry of Culture and Education. The Hungarian Parliament approved the program in its 1997 budget, allocating approximately HUF three billion (US$ 11 million) to SuliNet. An amendment of the Public Education Act in July 1996 offers the necessary legal conditions for the teaching of IT and for providing the necessary financial sources from the central budget.

The program consists of five consecutive stages, aimed at training each and

Table 4.2: WWW indicators of Primary and Secondary schools

October 2000

Type of school	Total Number	Number of web sites	Per cent
Primary	3'541	236	6.6
Secondary	1'068	620	58
TOTAL	**4'610**	**856**	**19**

Source: http://www.ispo.cec.be/esis/default.htm.

every teacher in the following Internet related activities:

1. Infrastructure basics: Internet services via digital leased lines;

2. Setting up Internet studios, further steps in infrastructure;

3. Planning, organizing and financing the contents of the network;

4. Teacher development: creating 'human infrastructure';

5. A two-way movement of information: the public education database.

The SuliNet program has changed since its founding and is now called *SuliNet-Irisz* (Schoolnet-Iris). It provides every Hungarian secondary school with direct access to the Internet and has started to provide the same service to primary schools. Teachers are strongly encouraged to become familiar with IT and get training in this field.

The goal of the Ministry is to make the Internet accessible to every institution within the public education and cultural sectors. It also wants to provide technical and professional support to staff and students and to help ethnic Hungarians abroad keep in touch with their culture, as well as to produce databases with information on public education, accessible to everyone.

All secondary schools have Internet connections and the number of web sites is increasing (see Table 4.2). In the last two years the number of connections to the SuliNet-Irisz network doubled, to 1'700. The future of the program is jeopardized by increasing costs and one of the main tasks is to sort out the financing.

4.2.2 Universities

In April 2000 there were 88 universities and colleges in Hungary, 66 (65 per cent), of which had their own web site. In the academic year 1999/2000, 2'818 computer science students graduated in one of the state's institutions. 3'500 new computer science students have been admitted, 800 more than planned. More and more IT specialists are needed and estimates show that the Hungarian private sector is already short of several thousand IT professionals, reaching up to ten thousand in a few years. According to the government, every person with higher education should have a basic IT knowledge and a level similar to the "European Computer Driving License" Foundation (ECDL) computer qualification.[1]

4.2.3 Other forms of education

In Hungary there are other possibilities to gain IT knowledge either in individual courses or within a group. Hungary joined the ECDL Foundation in 1997 <www.ecdl.iif.hu>. The examination authority, that is, the right to test and to certify, belongs to the John von Neumann Computer Society, a Hungarian member of the Council of European Professional Informatics Societies (CEPIS). The first 19 examination centres opened in December 1997. Today there are over one hundred accredited ECDL centres. TV broadcasting helped to popularize the program, which was advertised as the "Driving License for Computers."

The virtual university is a form of tele-education. Although some personal meetings between teachers and students are necessary, the actual teaching takes place over the Internet. UNIWORLD <www.uniworld.hu> is establishing a virtual network in which Hungarian, European, and American institutions of higher education co-operate. The courses and subjects to be offered, typically in both Hungarian and English, will be co-developed and jointly taught to students of the participating institutions. The partner institutions are expected to mutually recognize the credits and diplomas issued by all the institutions involved.

Tele-education centres are working together with about ten universities and colleges in Hungary. These regional educational bodies help tele-education to develop by opening up demand and by offering tele-education in co-operation with the National

Council of Tele-education (NCT). The NCT contributes to this program partly by providing material resources, partly by providing organizational know-how and partly by forging national and international relations.

In the long term, UNIWORLD plans to give the tele-education program a more independent status vis-à-vis the traditional educational bodies and let students enrol directly in the program, which will issue its own degrees. UNIWORLD is furthermore in the process of extending its activities to the Hungarian national teacher-training program and to specialized professional training.

There are different types of language courses available on the Internet in Hungary. Some Hungarian language schools and teachers began to work on the methodology and practice of computerized language learning decades ago. The most popular Hungarian site to learn English online is Elek Máthé <www.englishlearner.com>. The user will find different types of interactive tests and exercises, including grammar and vocabulary, reading, crosswords and games. This web site also offers free English lessons via e-mail.

4.3 Health

Health-related applications in the Hungarian Internet market appeared some years ago. The first Hungarian health site was Pro Patient Health & Medicine <www.pro-patiente.hu>, which started in 1996. The site offers news, reports and books concerning health issues ranging from lifestyle to medicine and hygiene. It also contains a database on upcoming conferences and information on medication and homeopathy. The web site lists all medical papers published in the Hungarian medical press, and links to related URLs, including electronic journals, medical associations, organizations and firms. The site contains more than 10'000 indexed, searchable documents and has more than six thousand registered users. An average of 350 thousand pages are downloaded from the site each month.

Daily updated medical press reviews are available at <www.med-courier.com>. This site is especially interesting for health professionals because it contains professional publications, a calendar of events, and a catalogue of medications. Non-professionals may also find the site interesting for its homeopathic tips, joke collection and links to lifestyle magazines. The site also offers an online discussion and the possibility to raise health-related questions.

When the Ministry of Health laid out its national health promotion strategy in 1999, an essential goal was to make use of new technologies and to create an Internet-based health network linking the Hungarian health community. The National Institute and Library for Heath Information (MEDINFO) <www.medinfo.hu> is funded by the Ministry of Health and functions as a professional information centre for the Hungarian healthcare sector. Services include journal reviews, documents of the World Health Organization (WHO), a calendar of programs and a career centre. In the "Internet Aula" in the entrance hall to the building visitors can use the Internet and take part in IT courses.

Similar to other countries, web sites on medicine play an important role in online health services in Hungary. At <www.patika.hu> we find details on drugs and data on pharmacies, while <www.hazipatika.hu> provides newsletters, forums, games, competitions, tests and books on health. This latter site won the top prize in Hungary's first web-competition in 1999. Another site, <www.pharmanet.hu>, is addressed to pharmacists and pharmaceutical factories. Visitors find the lists of professional pharmaceutical organizations and may browse press reviews and check out the calendar of events.

There are many more web sites related to the health sector for both professionals as well as laypersons. At <www.babanet.hu> or <www.kismama.hu>, pregnant women and parents can find all kinds of health-related information and tips concerning the newborn.

Table 4.3: WWW indicators of Hospitals and clinics

July 2000

	Number	Number of web sites	Per cent
Capital	30	25	83 per cent
Other	253	48	19 per cent
TOTAL	**283**	**73**	**26 per cent**

Source: http://www.ispo.cec.be/esis/default.htm.

A new Internet service, *netkórház* (Net Hospital) <www.netkorhaz.hu> provides users with the possibility of directly consulting a specialist online. The virtual Internet hospital employs 60 specialists part-time. These experts answer questions sent to them via e-mail within 24-48 hours. Pharmaceutical companies finance the web site, which has been in a testing phase since July 2000.

E-commerce with pharmaceutical products will start in January 2001 on a specialized Internet market place created by PriceWaterhouseCoopers. Participating pharmaceutical companies are Richter Gedeon, Chinoin, Hungaropharma and Phoenix Pharma.

4.4 E-business

4.4.1 Internet penetration in the private sector

A survey by market research firm TNS Modus found that 53 per cent of Hungarian companies had Internet access in the 1st quarter of 2000.[2] This means that about 25'000 Hungarian companies use the possibilities offered by the Internet, including information gathering and public relations. Access varies depending on the size of the company with 95 per cent of larger companies expected to be online before the end of 2000, compared to 75 per cent for medium sized ones and 65 per cent for small companies.

The number of business web sites is growing continuously. In the first quarter of 2000 only 31 per cent of Hungarian firms had Internet homepages but about six months later this had increased to 38 per cent. According to forecasts, half of all Hungarian companies with more than ten employees will have their own web page by the end of 2000. Although these numbers are encouraging, most web sites turn out to belong to large companies and the Internet is not yet used in all industries alike, with some branches more reluctant than others to introduce and use the Internet. Companies use the Internet mainly to communicate via email, to promote their products or services, to browse and to gather market information. Interestingly, small Hungarian companies make more purchases over the Internet than larger ones. Approximately 25 per cent of Hungarian companies are using the Internet for sending fax while around one in ten uses it for voice telephone calls. Despite the relatively high Internet penetration and high number of web pages, only about five per cent of the surveyed organizations are involved in e-commerce.

4.4.2 Advertisement

Online advertising is a significant source of income for both new media companies as well as established ones moving to the Internet business. Web sites financed solely through advertisement are typically horizontal (general) portals, vertical (specialized) portals and online variants of traditional media firms.

There are two main horizontal portals, <www.index.hu> and <www.origo.hu>. InTerNeTTo <www.internetto.hu> used to dominate the market but has lost most of its market share since its founders left after various disagreements. They now work for Index and telnet, among others.

New market entrants have to spend time and resources on developing content, acquiring technological skills and promoting their services. So their circle is reduced to telecommunication companies (e.g., UPC, Vivendi) and media companies (e.g., VNU[3] and over-the-air commercial TV stations)

since they are the ones with the necessary resources and competence in all three fields.

An example of a new portal is www.vianovo.hu, a highly advertised site, which does not seem to have taken off and cannot live up to expectations. Another portal whose future is unclear is FotexNet <www.fotex.hu>, owned by a large retail chain and specialized in Business-to-Commerce (B2C).

Vertical portals (e.g., specializing in health, sports, informatics, personal finance, investment, etc.) earn less income through online advertising. The growing popularity of the Internet will, however, most likely make these web sites increasingly valuable to advertisers with specific services and products. The press and electronic media are comparatively well represented on the Internet, with HVG Online and Pesti Est in leading positions. Both groups are potential candidates for possible Initial Public Offerings (IPOs). All four national political dailies have their own homepage. However, the press pays less attention to online versions since the two media channels are considered to exclude each other. Advertising revenues from printed copies are much higher than those generated from online versions.

The conflict between printed and online publications also appears to be valid with regard to the Internet and television. Internet users tend to watch less television than before. At the same time, commercial TV stations broadcast advertisement to promote their homepages.

Vertical portals and online newspaper publications are estimated to have advertising revenues of about HUF 1.5 billion. Discounts and barter transactions reduce these revenues to about HUF one billion, accounting for less than one per cent of total advertising revenues in Hungary, which are estimated at HUF 150-200 billion.

4.4.3 Electronic stores

Like in other countries, Hungarian book and CD retailers were the first to take advantage of the Internet and sell their products online (e.g. www.konyvkereso.hu). The range of products has increased and almost everything is available online: IT material, technical equipment, groceries (www.netpincer.hu), fast food, flowers, stationery (www.ebolt.hu), jewellery, communication equipment, toys, movie and theatre tickets, car parts, etc. Some sites, such as www.rozsakert.net and www.plaza.nepszabadsag.hu provide online shopping centres.

Consumers can chose from 100-140 electronic shops. Most entrepreneurs have their e-shops developed by one of the popular content service providers. The virtual shops and storehouses are operated by businesses already performing commercial activities. There are several specialized web sites, such as www.marketline .hu, which help the Internet user to quickly find the appropriate shop or service that he/she is looking for.

4.4.4 Music

The LXXVI Act of 1999 protects intellectual property. The *Artisjus* (Hungarian Copyright Office) is assigned to represent the interests of artists, protect copyrights, and establish and collect royalties. It uses a computer system to track daily purchases, calculate royalties, record collections and make electronic transfers to artists' bank accounts.[4] The Artisjus sets the royalty fee for MP3 at HUF 1'000 per hour and a minimum net royalty at HUF 55-200, depending on the length of the CD used for private copying.

Besides the Index and Origo portals, there are other sites with virtual music shops that let you download songs. The FotexNet web-plaza <www.fotex.hu> is the biggest online provider of CDs. Visitors can download around 500 thirty-second MP3 clips to sample the music. There is an MP3 store at <www.673.hu> and some 3'500 songs can be downloaded from sites provided by Plussz Mentha for 50-200 HUF per song, including a 12 per cent royalty payment.

According to public opinion polls, downloading music is not very popular. Only one fifth of Hungarian Internet users have downloaded music from the Internet; of those, only one quarter does so regularly. The reason may be the low degree of Internet penetration in general, as well as the rigorous copyright law.

4.4.5 Web design, consultation, developing

Around 200 web design firms work in the Hungarian Internet market and most of them have good graphical skills. Graphics firms consider web design an important activity and the estimated revenue from this market is above HUF 700 million.

Due to growing Internet penetration and sophistication, Hungarian firms are paying more attention to the professional development of a web site. While most firms used to be satisfied with a decorative homepage that would be updated every six months, they now see their business interests furthered by investing in their online presence. Besides relatively small firms (e.g., Kirowski, Webigen) multinationals, too, have improved their online presence (e.g., McKinsey and Andersen). The turnover within the online design and consulting service market was estimated at HUF 2 billion in 2000.

4.4.6 E-commerce

In Hungary, e-commerce falls under the same laws as any other commercial activity and is considered similar to "mail-ordering". Government Decree 17/1999 (II.15) regulates commercial transactions between remote persons and is based on EU directives. According to the Decree, any business has to be officially registered before it can engage in commercial activities. The Decree also obliges the merchant to inform the consumer about the terms of trade, including guarantees and warranties.

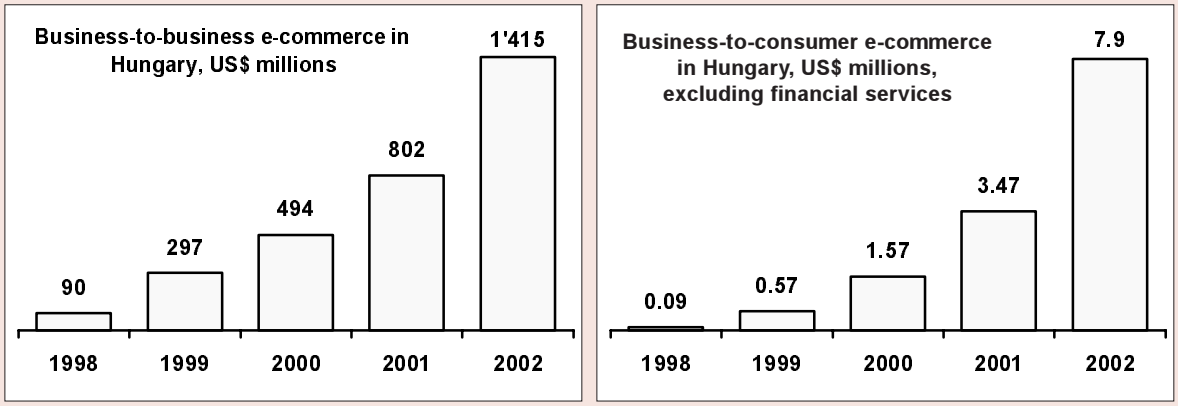
Business-to-Business (B2B)

Business-to business e-commerce in Hungary is relatively well developed and the value of online business is increasing. Carnation Consulting estimates that the turnover of the B2B market in Hungary will growth from US$ 500 million in 2000 to US$ 1.4 billion by 2002.

In September 2000, Matáv, along with Compaq, Anderson Consulting and SAP announced the launch of Marketline <www.marketline.hu> at a conference attended by 800 IT participants. Marketline provides a portal

Figure 4.1: e-commerce in Hungary

B2B and B2C revenues, US$ millions



Note: Converted to US$ at 31 December 2000 rate of HUF 281.15 = 1 US dollar.
Source: ITU adapted from Carnation Consulting.

with online supply catalogues, transaction processing, liaison with suppliers and other services. The founders of Marketline hope that the 200 largest companies in Hungary will join. According to Marketline's founders, this would generate e-commerce revenues of up to HUF 100 billion (US$ 355 million).

Business-to-Consumer (B2C)

The B2C potential in Hungary is still rather underdeveloped. The main reasons, besides the low Internet penetration, are the constraints and mistrust with online payment methods and the uncertainty of delivery.

In 2000 the amount spent on B2C e-commerce was around US$ 570'000. At less than 0.1 per cent of total retail turnover, the revenue is negligible for the time being. However B2C e-commerce is projected to more than double each year for the next few years. One bright spot is that half of Hungarian Internet users planned to make an online purchase in 2000.[5] According to one consulting company, B2C e-commerce will reach US$ 150 million in 2004.[6]

Like in most other countries, the products most often traded online in Hungary are books and CDs, IT products, and electronic equipment.

The Hungarian B2C market is dominated by large companies, with financial resources that allow them to invest into the B2C business and to establish their future presence. We also find smaller companies on the B2C market and in 1999 there were about 200 e-commerce web sites but it appears that the traditional retail chains (e.g., Office Depot, Fókusz, Fotex) will take the lead.

The first online broker firms appeared in 1998, all owned by independent local financial groups. The low number of Internet users and the lack of investments have stopped the amount of money invested online from increasing and the number of accounts is now still below ten thousand.

General Providence Insurance Company was the first Hungarian insurance company to sell its services online, hoping to acquire a greater share of the overall market. The company, which mainly sells its products over the telephone, started its online service in November 2000. According to their policy, online contracts are legally valid. Other insurance companies seem to be less convinced and are waiting for the Hungarian parliament to pass an electronic signature law, probably in 2001.

4.4.7 Payment and bank services

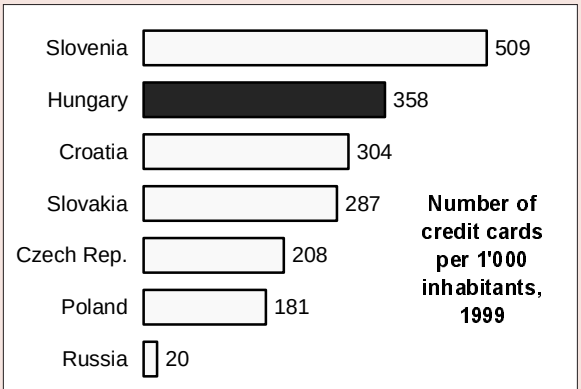
The number of credit cards is relatively high in Hungary. It grew dramatically when exchange controls on Hungarian currency were lifted in January 1996. At the end of 1999, there were 3.8 million payment cards in circulation, an increase of 31 per cent over the previous year. Hungary ranks second among CEE countries in terms of the number of credit cards per inhabitant, with one in every three Hungarian adults in possession of a banking card.[7] Nonetheless, the country remains cash-oriented with 85 per cent of payment card transactions being cash withdrawals.[8]

Although the possibility exists to accept credit card payments from Hungarian B2C sites, Hungarians are sceptical of buying online. This is reflected by a recent survey commissioned by Europay and MasterCard. According to the survey only 30 per cent of Hungarians believe that banks keep their personal data secure. Only 22 per cent said they fully trusted their banks. Around one fifth of Hungarian Internet customers have doubts about the safety of their personal data while making online purchases. Over 80 per cent of Hungarian customers did not state a preference for the payment method when making online purchases, while eight per cent said they would prefer to use a bank card. This survey shows that it will be a major challenge to get Hungarians to trust online payment methods. In the meantime, cash on delivery is used for 85 per cent of Hungarian B2C payments.

Despite the scepticism, several banks provide online banking services (see

Figure 4.2: Payment cards in Hungary

Number of credit cards in selected CEE countries, 1999 and payment card statistics, Hungary, 1999



Payment card statistics, Hungary	1999
Number of payment cards	3'843'011
Cash withdrawal facilities:	
ATMs	2'358
POS terminals / Post Offices	3'518 / 4'246
Merchant terminals	20'643
Payments by cards issued in Hungary	HUF 1'690 billion
Number of cases of fraudulent activity	9'300
Loss from credit card fraud	HUF 324 million

Source: ITU, adapted from Hungarian National Bank.

Box 4.1: PC for your banking

One obstacle to online banking is the relatively high cost of PCs and Internet access. In 2000, the largest retail bank in Hungary, OTP, offered a PC Internet package for their customers. The package includes a discounted ISDN connection, a personal computer and five hours of Internet access a month, for a one time charge of about HUF 200'000 (US$ 702.14). The Internet access is valid for 13 months.

This move is to encourage customers to use OTP's HáziB@NK online banking service. OTP also has other projects to promote PC usage. Through the bank the customers can buy discounted computers and the software is installed and configured for free.

Table 4.4). The number of people using online banking was around 55'000 by the end of 2000. It is worth noting that a third of the Hungarian population is "unbanked" and the country has far fewer bank branches per capita than any other European nation. This may actually help promote online banking as banks will try to build their customer base.

Table 4.4: Internet banks

December 2000

Bank	Website	Name of Service	Services	Number of users
Inter-Európa	www.ieb.hu	BankoNET	Account information, transactions, paying bills, transfer funds, make deposits, cancelling bank cards, send SMS messages to mobile phones, purchasing investment funds	Several thousand
OTP	www.otpbank.hu	HáziB@nk	Account information, transfer funds, create savings account, recharge mobile prepaid cards	More than 25'000
Raiffeisen	www.raiffeisen.hu	Internet Banking	Account information, transactions, card control, purchasing investment funds	~ 500
Citibank	www.citibank.hu	CitiDirect	Account information, changing PIN codes, transfer funds	n.a.
HBW Express	www.ebank.hu	NetBank	Account information	n.a.

Source: http://www.bankkartya.hu/sajto.shtml.

Box 4.2: Culture on the net

There are about 900 museums in Hungary of which one fifth have web sites. A directory of museums and galleries can be found at <pestimusor.euroweb.hu/musor/muzeum/jobb.html> as well as <www.port.hu/kultura/hasznos/index.htm>. These give links to museums ranging from the Ethnographical Museum <www.hem.hu> to the "Szoborpark" <www.szoborpark.hu/indexm.htm>, popular with foreigners because of its communist era memorabilia.

Artists and designers, too, have recognized the possibilities of the Internet. Not only are traditional galleries on the Internet, but also many virtual galleries have been established. Some of them show traditional works; other virtual galleries take advantage of the Internet to show multimedia art. Some can be found at <www.sztaki.hu/gallery/index.hu.html>.

Most libraries belonging to the counties and the universities have Internet access as well as web sites. Virtual libraries have also appeared. One of them is the Hungarian Electronic Library (MEK) <www.mek.iif.hu>, a project of the National Information Infrastructure Development Program and the Hungarian National Library (Országos Széchényi Könyvtár). The MEK is establishing a central collection of Hungarian electronic texts for educational, scientific research, and cultural purposes. Towards the end of the year 2000, the MEK had 3'000 electronic documents and was averaging 20'000 visitors a month, generating one million page views.

An electronic catalogue of several university library holdings is available at <www.kozelkat.iif.hu>. A few universities have established electronic libraries such as Pázmány Péter University <www.piar.hu/pazmany>.

WWW indicators of Libraries and Museums

January 2001

Type of Library	Number	Number of Web sites	Per cent
Libraries	**3'379**	**332**	**9.5%**
City/town/village	~3'000	178	6%
County	19	19	100%
Professional	250	44	18%
University/college	110	81	74%
Museums	**904**	**180**	**20%**

Source: <http://www.eu-esis.org/esis2www/HUwwwh.htm>.

[1] The European Computer Driving License (EDCL) Foundation was established by the Council of European Professional Informatics Societies to support and co-ordinate the work of the ECDL organization in each country. The ECDL Foundation works to promote an International certification of industry-standard computing skills. See www.ecdl.com.

[2] Impilzus. www.modus.hu/homepage/sofres_eng/impulzeng.html.

[3] VNU Budapest Lapkiadó Rt. Its popular portal www.startlap.hu is working since June 2000.

[4] Old World Meets New: Hungarian Copyright Office Protects Intellectual Property on Compaq Alpha Platform." <www.success-stories.compaq.com/cgi-bin/cssextusr/s=display/i=66>

[5] Carnation Consulting. "Half of active Internet users plan online shopping." Press Release. 31 May 2000. <http://www.carnationresearch.hu/sajt_00maj31_e.html>

[6] IDC. "eCommerce To Go Mainstream in Hungary in 2001." Press Release. 10 January 2001. <http://www.idccentraleurope.com/press/index.php?quote=200101HUEC>

[7] Gfk. "*One in Three Adults Has a Banking Card*." Press Information. December 2000. <www.gfk.hu/angol/sajtokoz/fr_banks.htm>

[8] Other factors promoting cash are that one third of Hungarians do not have a bank account and the underground economy (estimated at six per cent of GDP). See Beáta Pál. "Third of population shy away from banks." The Budapest Sun Online. 5 October 2000. For more on the underground economy see: Hungarian Central Statistical Office. "Hidden Economy In Hungary." <www.ksh.hu/eng/news/hidden.html>.

5. Summary and Recommendations

5.1 State of the Internet in Hungary

The Mosaic Group <http://mosaic.unomaha.edu/gdi.html>, has developed a framework for characterizing the state of the Internet in a nation. They consider six dimensions, each of which has five ordinal values ranging from zero (non-existent) to four (highly developed). The dimensions are as follow:

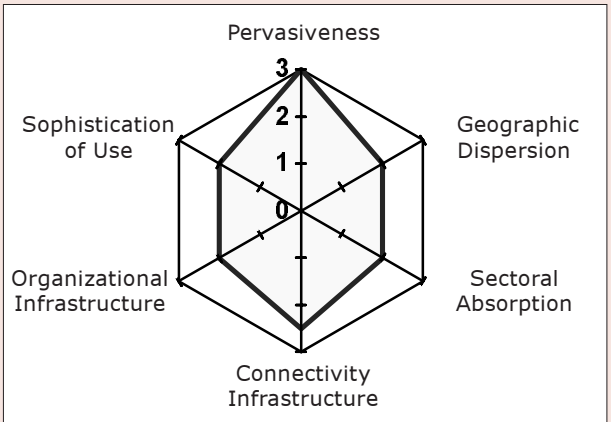
- **pervasiveness:** a measure based on users per capita and the degree to which non-technicians are using the Internet.
- **geographic dispersion**: a measure of the concentration of the Internet within a nation, from none or a single city to nation-wide availability.
- **sectoral absorption**: a measure of the degree of utilization of the Internet in the education, commercial, health care and public sectors.
- **connectivity infrastructure**: a measure based on international and intranational backbone bandwidth, exchange points, and last-mile access methods.
- **organizational infrastructure**: a measure based on the state of the ISP industry and market conditions.
- **sophistication of use**: a measure characterizing usage from conventional to highly sophisticated and driving innovation.

A definition of each dimension and its levels is shown in Annex 3, and Hungarian values for these dimensions are shown in figure 5.1.

Pervasiveness is rated at level 3, *Common*. There are an estimated 715,000 users out of a population of 10 million for a user rate of 7.13%. The Internet is growing in popularity. The number of cybercafés is on the rise and more and more Hungarian content is coming online. A large pro-

Figure 5.1: State of Internet in Hungary

Dimension	Value
Pervasiveness	3
Geographic Dispersion	2
Sectoral Absorption	2
Connectivity Infrastructure	2.5
Organizational Infrastructure	2
Sophistication of Use	2
TOTAL	**13.5**



Note: The higher the value, the better. 0 = lowest, 4 = highest.
Source: ITU.

portion of young adults are connecting to the Internet due to the strength of the academic sector. Internet infrastructure is well established, although not extensive.

Geographic Dispersion is rated at level 2, *Moderately dispersed.* In terms of telecommunications infrastructure, Hungary is not homogeneous, mostly due to the fact that one fifth of the country's population lives in the capital, Budapest. Public Internet access in rural areas is still fairly limited. Those users without home, school or work access cannot easily find public access points. Moreover, the only international IP link to the TEN-155 network is in Budapest.

Sectoral Absorption is rated at level 2, *Moderate.* This ranking is a function of the type of connectivity in business, government, health care and education. Although there is a relatively high connectivity at the university level and initiatives for secondary school access exist, little use of the Internet is being made in business and government. Few companies have web sites and electronic commerce is in its nascent stages.

The Connectivity Infrastructure is at level 2.5, *Expanded*. International connectivity is at 68 Mbps with the TEN-155 network, with plans to upgrade to 155 Mbps by 2001. There is a highly developed academic backbone, but private sector development has been relatively slow. The domestic backbone is mainly connected by 34 Mbps lines and some 155 Mbps lines. There is one Internet exchange and most users connect to the Internet through dial-up services.

The Organizational Infrastructure is at level 2, *Controlled*. There are a limited number of commercial ISPs because the market is dominated by the academic service provider. Despite the recent decrease in leased line prices, competition in domestic network development is fairly limited. The incumbent operator, Matáv, still maintains a monopoly over long-distance and international calls, and has a market share of more than 75 per cent over local services. Total IP connectivity is less than 100 Mbps.

Sophistication of Use is at level 2, *Conventional*. There is a great shortage of employees with relevant technical skills in the market. The most popular applications remain communication applications, such as e-mail and chat. The government has begun e-government initiatives to place more public information at the reach of Internet users. An increasing amount of Hungarian portals and online stores are coming online. However, compared to the overall commercial activity of the country, business-to-consumer electronic commerce is not very significant. Similarly, business-to-business e-commerce is hindered by the lack of sophisticated internal information systems in Hungarian firms.

This framework has been applied in case studies for a number of other countries (see www.itu.int/ti/casestudies).

5.2 Recommendations

Since the political changes at the start of the decade and the first steps towards market liberalization shortly afterwards, the telecommunications sector in Hungary has expanded rapidly. Teledensity has risen from below ten lines per 100 inhabitants at the start of the 1990s to more than 37 by the end of the decade. The waiting time for connection, which had averaged almost 15 years at one time, has now been largely eliminated. The mobile sector, which now has three principal players (Westel, Pannon and Vodafone), has also expanded rapidly and there are now some three million mobilephone users in the country.

The Internet has benefited from the overall growth in the telecommunications sector and has expanded at a relatively rapid rate, mainly driven by demand in the academic sector, where the Hungarnet network now serves between 350'000 and 400'000 users. The commercial market has also grown rapidly in recent years, reaching some 152'000 dial-up subscribers by April 2000. However, there are now signs that growth in the dial-up mar-

ket is slowing down due to the strength of the academic sector and increased focus on the corporate market.

The total number of Internet users, at October 2000, is estimated at just over 700'000 users, or around seven per cent of inhabitants. The government has announced a series of initiatives to encourage the information society. However, if the Internet is to penetrate the mass market, then there is a need for a shift in policy focus. This will require, for instance:

- Greater emphasis on raising general awareness of the Internet and its potential applications and benefits. For instance, this could take the form of official statements, at the highest level of government, in support of the Internet as the platform for the information society. Also, the government should take a lead in the introduction of e-government to demonstrate interactive applications and access to information. The government has already taken significant steps towards the creation of an independent Ministry of Informatics.

- A greater focus on the residential dial-up market. This could involve, for instance, steps to encourage more ISPs to enter the dial-up market, to develop more innovative tariff packages, including "free Internet access", and steps to reduce the burden of local call charges, both for residential users and small and medium-sized enterprises using dial-up access.

- Within the education sector, the focus should not only be on the higher education sector, which is generally well served, but also on the secondary and especially the primary education sector. At present, services aimed at this sector are hindered by high daytime access charges.

- In addition, steps should be taken to create a more Internet-friendly environment, for instance through the elimination of customs duty on the import of computers and Internet hardware and a reduction in the level of sales tax on residential Internet services.

- A general reduction in the level of regulation applied to the Internet market, including the different access markets (fixed-line, cable TV, mobile), would also bring benefits.

1. **Continue efforts to liberalize the market and increase competition**. The experience of market liberalization since the early 1990s has proved positive for the general growth of the Hungarian telecom market, especially fixed-lines and mobile services. There are already plans to liberalize further the draft of the *Unified Communications Act*, but where possible, liberalization should be speeded up. This is especially true for the Internet sector, which the government has recognized as a priority area. While general market liberalization is planned for 2002, in line with WTO commitments, steps could be taken to increase the level of competition in certain key areas, for instance:

   1.1. Requiring the unbundling of the local loop, so that, for instance, competitive market entrants can lease local lines to enable the offer to subscribers of flat-rate tariffs for narrowband services, or to develop DSL (Digital Subscriber Line) services;

   1.2. Eliminating the licensing requirement for ISPs so as to facilitate market entry and exit and removing any barriers to market consolidation;

   1.3. Reducing restrictions over the spread of broadband Internet, for instance by lifting the geographical cover-

age constraints on LTOs (Local Telephone Operators) and the market share constraints on cable TV companies, so as to increase the level of effective competition in this future market.

1.4. Creating a level playing field with regard to cross-ownership regulations for cable TV and telecommunication network in order to address the effective monopoly of cable networks by the incumbent.

2. **Create a market for "free Internet access".** In many countries, the introduction of "free Internet" has given a significant boost to the take up of Internet among residential users. In Hungary, "free Internet" has thus far been limited to certain LTOs (Vivendi) and mobile operators. Matáv has not introduced such a service and has not permitted ISPs to offer such a service over its networks. Regulators should set a timetable within which the incumbent and the ISPs can agree upon an interconnect regime for Internet access, which would permit revenue sharing of local call charges between Matáv and the ISPs. It may be necessary to apply a special national dial code for such shared-revenue services.

3. **Progressive elimination of import duties on PCs and Internet hardware.** The World Trade Organization's Information Technology Agreement (the "Singapore Agreement") sets a four-year timetable for the elimination of customs duties on IT equipment, including PCs and mobile handsets. Hungary should accede to the Agreement and move quickly towards the elimination of such duties, which would, in any case, be incompatible with Hungary's aims to join the European Union.

4. **Alleviating the impact of high call charges.** It is widely accepted that high local call charges are a major constraint to the development of Internet access in Hungary. OECD tariff comparisons show that Hungary is among the most expensive countries for Internet access. When the limited purchasing power of Hungarian consumers is taken into account, this puts Hungary in an even worse situation. Steps that could be taken to address this problem could include:

4.1. Reducing or even eliminating value added tax on ISP subscription fees and on "free Internet" calls.

4.2. Introducing a version of the off-peak Internet tariff (which sets a ceiling price of 150 HUF for a single call) that would be applicable during working days. For instance, a ceiling price could be 300 HUF for a single local call.

4.3. Extending the economy discount period to the whole weekend rather than, as at present, from 3 p.m. onwards.

5. **Increased commercial focus on the dial-up market**. Many ISPs are currently ignoring the residential market and instead targeting the business market because the margins are higher and the affordability constraints less significant. If a mass-market for Internet access is to be achieved, there needs to be a greater policy focus on encouraging the residential dial-up market. This could, for instance, include:

5.1. Introduction of "free Internet" (see Rec. 2).

5.2. Minimal licensing requirements for ISPs (see Rec. 1).

5.3. Reducing the administrative burden on other license holders in order to enable

them to introduce new services incorporating Internet access more efficiently.

5.4. Encouraging the development of "bundled packages" such as the one currently offered by MatávNet and OTP, which includes PC ownership, Internet access, telephone charges and Internet banking services. The availability of such packages would help to reduce the overall barriers to entry for first-time Internet users. Bundled packages will also help users predict and manage their expenditures for Internet use.

6. **Voice over IP (VoIP).** The actions of the regulator in encouraging the take-up of VoIP services by classifying it as outside the Matáv and LTO monopoly has had a very positive effect in encouraging price competition in international networks. This should now be brought also into the domestic sphere. One way of further facilitating VoIP would be to remove the requirement for users of the VoIP services to pre-register. In the future, the licensing requirement for providers of VoIP services should be phased out and the market should be fully-liberalized.

7. **Raising Awareness.** An official Internet policy statement at the highest level of Hungarian government would serve to improve public awareness. This could, for instance, be targeted at encouraging Internet use in schools, as well as by dial-up users and small businesses. Government should take a lead in putting its own services and information online through encouraging the e-government initiative. Each Hungarian Ministry has already developed its own web site but more work needs to be done to improve the availability of content and services.

8. **Create trust in cyberspace.** Electronic commerce has been relatively slow to develop in Hungary, partly due to the small size of the addressable Hungarian-language market, but also because of the limited ownership of credit cards. The government can help to raise awareness about the benefits of electronic commerce and should help to create an atmosphere of trust in cyberspace. One positive step that could be taken would be to pass the draft electronic signatures bill into law quickly. There may also be a requirement for a certification program for secure e-commerce sites.

9. **Encourage regulatory convergence.** In common with most countries, Hungary currently has separate regulatory structures for telecommunications, including Internet and frequency management (HIF) and for broadcasting and content (ORTT). Current steps to create a *Unified Communications Act* and to bring together the telecommunication and information technology sectors within the Prime Minister's office are to be applauded. In the longer term, the aim should be to move away from sector-specific regulation towards greater dependence upon competition policy and consumer protection.

10. **Encourage Internet use at primary and secondary school level.** The *SuliNet* initiative has helped to spread the use of Internet in secondary schools. This initiative should now be taken forward, for instance, by:

10.1 Undertaking a second stage of the *SuliNet* project to complete the diffusion of Internet access in primary as well as secondary schools.

10.2 Promoting greater involvement of the teachers, parents and students at individual schools in shaping the initiative and in assessing local needs.

10.3 Encouraging closer ties between the HUNGARNET and

SuliNet initiatives. This could, for instance, involve *SuliNet* sharing international Internet connectivity with Hungarnet, which will soon have a 155 Mbps link under the TEN 155 project. By comparison, *SuliNet*'s international Internet connectivity is currently restricted to just 4.5 Mbps.

10.4 Encouraging greater use of competitive tendering in *SuliNet* procurement and more reliance upon the services of commercial ISPs.

11. Encourage Tele-education. Tele-education initiatives in Hungary over the past few years have served to make higher education more accessible to the public. These should be encouraged. There is a shortage of trained IT professionals in Hungary and the formation and maintenance of distance education centres would help current training efforts. In addition, accessibility could be further increased through closer cooperation between these centres and the Telecottages.

12. HUNGARNET. The HUNGARNET academic IP network is one of the great Hungarian success stories and most Hungarian users' first experience of the Internet is thanks to free access provided by HUNGARNET. Much of the local *Internetocracy* was trained at the Computer and Automation Research Institute (SZTAKI) of the Hungarian Academy of Sciences, which hosts Hungarnet and the BIX exchange. But the funding mechanisms that were effective in the early stages of Internet development may not be appropriate in more mature stages of market development. The success of HUNGARNET may be "crowding out" smaller, commercial ISPs, few of which have reached any significant size. The following steps are suggested:

12.1 Increasing the contribution to HUNGARNET's IP connectivity and telecommunication costs from individual academic institutions from the current ten per cent to 50 per cent over a number of years, while maintaining the principle of a free service, in order to ensure a more efficient resource allocation and to allow SZTAKI to allocate more resources to applications development and training.

12.2 Allowing HUNGARNET to offer services on a commercial basis in order to encourage closer academic/industry collaboration.

12.3 Establishing collaboration between HUNGARNET and the network of tele-cottages in order to establish facilities for distance learning in rural and remote areas of Hungary.

13. Creation of a Health Network, equivalent to *SuliNet*. The *SuliNet* initiative has helped to raise awareness of the Internet in the education sector. At present, there is no equivalent in the health sector, though organizations such as MediNet are doing an excellent job. The current Internet penetration in clinics and hospitals is only 20 per cent. There is scope to organize a similar effort to install basic Internet facilities in these and other healthcare facilities in order to promote Internet use and collaborative email in this important sector.

14. Conduct more market research. The Information and Communication Technology (ICT) market is evolving rapidly and there is a need for more accurate market research, particularly on usage patterns. The Central Statistical Office has made an excellent start in putting together a basic set of indicators (e.g., household budget survey) and should be supported in its efforts.

Annex 1: Acronyms and Abbreviations

ADSL	Asymmetric Digital Subscriber Line
B2B	Business-to-Business e-commerce
B2C	Business-to-Consumer e-commerce
CEE	Central and Eastern Europe
EU	European Union
HIF	Hírközlési Fõfelügyelet (Communication Authority). The telecommunication regulator.
HUF	Hungarian Forints. The rate to one United States dollar on 31 December 2000 was 281.15
ICT	Information and Communication Technology
ISDN	Integrated Services Digital Network
ISZT	Council Of Internet Service Providers
IT	Information Technology
LTO	Local Telephone Operator
OECD	Organization for Economic Cooperation and Development
PC	Personal Computer
SZTAKI	Hungarian Computer and Automation Research Institute

Annex 2: ISP packages in Hungary

ISP	Dial-up				Leased Line	Cable
	Least Expensive Package			*Unlimited Package*	Monthly fee for 64 Kpbs bandwidth unlimited access (includes set-up and traffic fee) k)	Monthly fee for unlimited access
	Basic Monthly Fee (HUF)	Traffic Use incl. in Monthly Fee (hours)	Charge for Extra Usage (HUF per hour)	Monthly fee e)		
Alarmix	2'375	20	300	5'500	75'000 (unlimited)	-
DrávaNET	1'875	10	375	5'000	75'000 (unlimited); 50'000	12'500
DunaNet	2'500	10	g)	7'500	37'500 (to 500 Mb); 37'500	-
Elender	2'500	10	g)	7'500	50'000 (up to 500 Mb)	-
Emitel	1'200 c)	10	375	4'000 i)	37'500 (plus traffic fee: under GB 112, 5HUF/MB); 150'000	-
EuroWeb a)	4'375	5 MB in	h)	8'750	50'000 (unlimited); 50'000	-
GTS-DataNet	1'875	2	225	7'500	46'250 (unlimited)	
Internext Studio	2'495	10	313	7'495	50'000 (to 500 MB); 31'250	-
InterWare	2'500	from 8h00 to 18h00	No Extra Use	6'250	118'750 (unlimited)	-
MatávNet	1'200	5	300	7'500	110'000 (unlimited); 25'000	
Netx Consulting	2'000	10	250	10'000	193'750 (unlimited); 500	-
SédNet	2'500	12	125	-	43'750 (up to 400 MB)	37'500 (up to 500 MB)
Starking O'Buda	3'500	20	200	7'500	112'500 (up to 1'200 MB)	-
Tiszanet	0	20 minutes	1'250 HUF/ every 5 hours (billed in 5 hour units)	3'750	213'750 (unlimited) i); 250'000	40'000
TVNet	d)	-	-	12'500 i)		86'250
Vivendi Telecom b)	d)	-	-	3'750 f)	62'500 (up to 1GB - 60 HUF/MB); 68'750 (unlimited access, guaranteed bandwidth): 477'550	-

Notes: a) Only for subscribers in Budapest. b) Deltav, Digitel, JászTel, BakonyTel, Dunatel, EgomCom, KIsdunaCom. c) For companies and business subscribers 1'500 HUF. d) Only unlimited access packages available. e) If there are several packages, this refers to the least expensive package. f) Weekdays from 6 pm to 7 am, on holidays, each month includes 4-hour free line-usage. g) for up to 20 hours of traffic, the whole monthly subscriber cost is 37'500 HUF. h) for up to 100 MB, 375 HUF/MB, 100-4000 MB 312.50 HUF/MB, 400 MB-3GB, 125 HUF/MB, Over 3GB, 75 HUF/MB; from 8 pm hour to 8 am, there is 40 per cent discount. i) For companies and business subscribers: 5'000 HUF. j) The one-time entry fee for private subscribers is 48'000 HUF, for companies and business subscribers 60'000 HUF. k) If no unlimited package exists, the lowest traffic package is used. l) Includes unlimited IP Telephony on the existing line.

Annex 3: Framework dimensions

Table 1: Pervasiveness of the Internet	
Level 0	*Non-existent*: The Internet does not exist in a viable form in this country. No computers with international IP connections are located within the country. There may be some Internet users in the country; however, they obtain a connection via an international telephone call to a foreign ISP.
Level 1	*Embryonic*: The ratio of users per capita is on the order of magnitude of less than one in a thousand (less than 0.1%).
Level 2	*Established*: The ratio of Internet users per capita is on the order of magnitude of at least one in a thousand (0.1% or greater).
Level 3	*Common*: The ratio of Internet users per capita is on the order of magnitude of at least one in a hundred (1% or greater).
Level 4	*Pervasive*: The Internet is pervasive. The ratio of Internet users per capita is on the order of magnitude of at least one in 10 (10% or greater).

Table 2: Geographic Dispersion of the Internet	
Level 0	*Non-existent*. The Internet does not exist in a viable form in this country. No computers with international IP connections are located within the country. A country may be using UUCP connections for email and USEnet.
Level 1	*Single location*: Internet points-of-presence are confined to one major population centre.
Level 2	*Moderately dispersed*: Internet points-of-presence are located in at least half of the first-tier political subdivisions of the country.
Level 3	*Highly dispersed*: Internet points-of-presence are located in at least three-quarters of the first-tier political subdivisions of the country.
Level 4	*Nationwide*: Internet points-of-presence are located in all first-tier political sub-divisions of the country. Rural dial-up access is publicly and commonly available and leased line connectivity is available.

Table 3a: Sectoral Use of the Internet			
Sector	**Rare**	**Moderate**	**Common**
Academic - primary and secondary schools, universities	>0-10% have leased-line Internet connectivity	10-90% have leased-line Internet connectivity	>90% have leased-line Internet connectivity
Commercial-businesses with > 100 employees	>0-10% have Internet servers	10-90% have Internet servers	>90% have Internet servers
Health-hospitals and clinics	>0-10% have leased-line Internet connectivity	10-90% have leased-line Internet connectivity	>90% have leased-line Internet connectivity
Public-top and second tier government entities	>0-10% have Internet servers	10-90% have Internet servers	>90% have Internet servers

Table 3b: The Sectoral Absorption of the Internet		
Sectoral point total	**Absorption dimension rating**	
0	Level 0	*Non-existent*
1-4	Level 1	*Rare*
5-7	Level 2	*Moderate*
8-9	Level 3	*Common*
10-12	Level 4	*Widely used*

Table 4: Connectivity Infrastructure of the Internet					
		Domestic backbone	**International Links**	**Internet Exchanges**	**Access Methods**
Level 0	*Non-existent*	None	None	None	None
Level 1	*Thin*	≤ 2 Mbps	= 128 Kbps	None	Modem
Level 2	*Expanded*	>2 – 200 Mbps	>128 Mbps -- 45 Mbps	1	Modem 64 Kbps leased lines
Level 3	*Broad*	>200 Mbps -- 100 Gbps	>45 Mbps -- 10 Gbps	More than 1; Bilateral or Open	Modem > 64 Kbps leased lines
Level 4	*Immense*	> 100 Gbps	> 10 Gbps	Many; Both Bilateral and Open	< 90% modem > 64 Kbps leased lines

Table 5: The Organizational Infrastructure of the Internet	
Level 0	*None*: The Internet is not present in this country.
Level 1	*Single*: A single ISP has a monopoly in the Internet service provision market. This ISP is generally owned or significantly controlled by the government.
Level 2	*Controlled*: There are only a few ISPs because the market is closely controlled through high barriers to entry. All ISPs connect to the international Internet through a monopoly telecommunications service provider. The provision of domestic infrastructure is also a monopoly.
Level 3	*Competitive*: The Internet market is competitive and there are many ISPs due to low barriers to market entry. The provision of international links is a monopoly, but the provision of domestic infrastructure is open to competition, or vice versa.
Level 4	*Robust*: There is a rich service provision infrastructure. There are many ISPs and low barriers to market entry. International links and domestic infrastructure are open to competition. There are collaborative organizations and arrangements such as public exchanges, industry associations, and emergency response teams.

Table 6: The Sophistication of Use of the Internet	
Level 0	*None*: The Internet is not used, except by a very small fraction of the population that logs into foreign services.
Level 1	*Minimal*: The small user community struggles to employ the Internet in conventional, mainstream applications.
Level 2	*Conventional*: The user community changes established practices somewhat in response to or in order to accommodate the technology, but few established processes are changed dramatically. The Internet is used as a substitute or straight-forward enhancement for an existing process (e.g. e-mail vs. post). This is the first level at which we can say that the Internet has "taken hold" in a country.
Level 3	*Transforming*: The user community's use of the Internet results in new applications, or significant changes in existing processes and practices, although these innovations may not necessarily stretch the boundaries of the technology's capabilities. One strong indicator of business process re-engineeering to take advantage of the Internet, is that a significant number (over 5%) of Web sites, both government and business, are interactive.
Level 4	*Innovating*: The user community is discriminating and highly demanding. The user community is regularly applying, or seeking to apply the Internet in innovative ways that push the capabilities of the technology. The user community plays a significant role in driving the state-of-the-art and has a mutually beneficial and synergistic relationship with developers.