Informatikai és
Hírközlési
Minisztérium

BROADBAND IN HUNGARY

Strategy for Broadband Electronic Communications

(v.2.0)

Budapest, June 2004

CONTENT

I. EXECUTIVE SUMMARY

THE STRATEGY: OBJECTIVES

The primary objective of the strategy for broadband electronic communications (hereafter: "National Broadband Strategy" or "NBS") is to make broadband electronic services available to the population, enterprises and public institutions and thus support the spreading of network communications, the expansion of content supply, the improvement of the country's competitiveness, the strengthening of social cohesion and, ultimately, the dynamic development of Hungary's information society.

To both individuals and enterprises the achievement of the strategic objective of the NBS will manifest itself in the availability of affordable broadband electronic services suited to actual user needs. Primarily due to considerations related to equal opportunities, general service availability will also be supported through the installation of broadband community access points. In the case of institutions of the public sector the task is not only to enable access but also to provide the technology and the funding required for unlimited access and service usage. In the private and business sectors the strategic priority is **to enable the deployment of broadband connections,** while in the public sector **the key goal is to actually provide broadband access until 2010 – the period covered by the Hungarian Information Society Strategy ("HISS"; "Magyar Információs Társadalom Stratégia", "MITS").**

For the population and enterprises the targeted main change is to expand broadband geographical coverage, while for public institutions the goal is to increase the number of broadband connections. In accordance with these objectives, **the goals and means defined in the NBS for the medium term (2004-2006)** have been selected in the light of the following three priorities (VI.1):

BROADBAND COVERAGE OF THE POPULATION AND ENTERPRISES

- **Make affordable broadband services available to over 80 percent of the population by 2006**
- **Make affordable broadband services available to over 90 percent of SMEs by 2006**

BROADBAND COMMUNITY ACCESS POINTS FOR EACH MUNICIPALITY IN THE COUNTRY

- **Finalise the conditions of operation, the base infrastructure and the organisational background for the community access points ("eHungary" points) in the course of 2004**
- **2700 broadband eHungary points by the end of 2004**
- **4000 broadband eHungary points by the end of 2006**

BROADBAND ACCESS IN THE PUBLIC SECTOR

- **Survey the broadband coverage and service needs of Hungarian public institutions: by the end of 2004 smallregions and towns will be surveyed and classified, identifying those where major state intervention is required to establish state-of-the-art broadband infrastructures.**
- **As part of the "PublicNet" ("Közháló") Program, 7300 new endpoints will be installed in public institutions by the end of Q3 of 2005.**
- **At the end of 2006, each primary and secondary education institute will have its own broadband access point.**
- **At least 50 percent of municipalities will have broadband connections by the end of 2006.**
- **Further dynamic broadband network deployment will be implemented in higher education and research institutes in 2004-2006.**

For the main "access" objectives of the National Broadband Strategy to be achieved, it is necessary to gradually lessen the current, non-infrastructure related impediments to the spreading of broadband electronic communications. The expansion of attractive broadband content offering, positive changes in digital literacy and the opportunities to use electronically available information (i.e. the acquisition and utilisation of knowledge), an increase in people's interest in Internet usage and the lessening of security concerns are equally important prerequisites of the spreading of broadband electronic communications. Improvement in these areas will boost broadband demand, will enhance the efficiency of market mechanisms and will, thus, decrease the need for public funding to achieve the strategic objectives of the NBS.

In Content, Security, Motivation and Education the main action programs are covered by the Hungarian Information Society Strategy in the following three intervention areas:

- Content and services (Content)
- Knowledge and skills (Education),
- Legal and social environment (Motivation, Security)

The NBS surveys the most important actions in the light of the objectives defined in the HISS (see VI.2).

STRUCTURE AND LOGIC OF THE NBS

As a starting point, the National Broadband Strategy describes an attractive service vision (Chapter II), which sets out the social and economic advantages expected as a result of broadband development and which clearly

justifies the efforts made to support the spreading of broadband coverage and the use of broadband services.

This is followed by an enumeration of the reasons for strategy compilation (Chapter III). Besides striving to support positive economic and social changes, the main objectives of the NBS are

- to contribute to the elaboration of the European Union's broadband deployment policy and
- to coordinate and orientate the development efforts made in the public, business and civil sectors.

The strategic objectives and the methods used (as described in Chapter VI) are based on a situation analysis (Chapter IV) and the basics of the strategy derived from this analysis (Chapter V).

SITUATION ANALYSIS AND BASICS OF THE STRATEGY

The situation analysis in the NBS surveys the available broadband technologies (IV.2) and the market trends (IV.3) in detail and provides an estimate of the already existing broadband coverage of the different regions and the different groups of individuals and enterprises. This may efficiently support the identification of the areas where sufficient market strengths exist to implement broadband access and the ones where state intervention is likely to be necessary.

BROADBAND: SWOT ANALYSIS

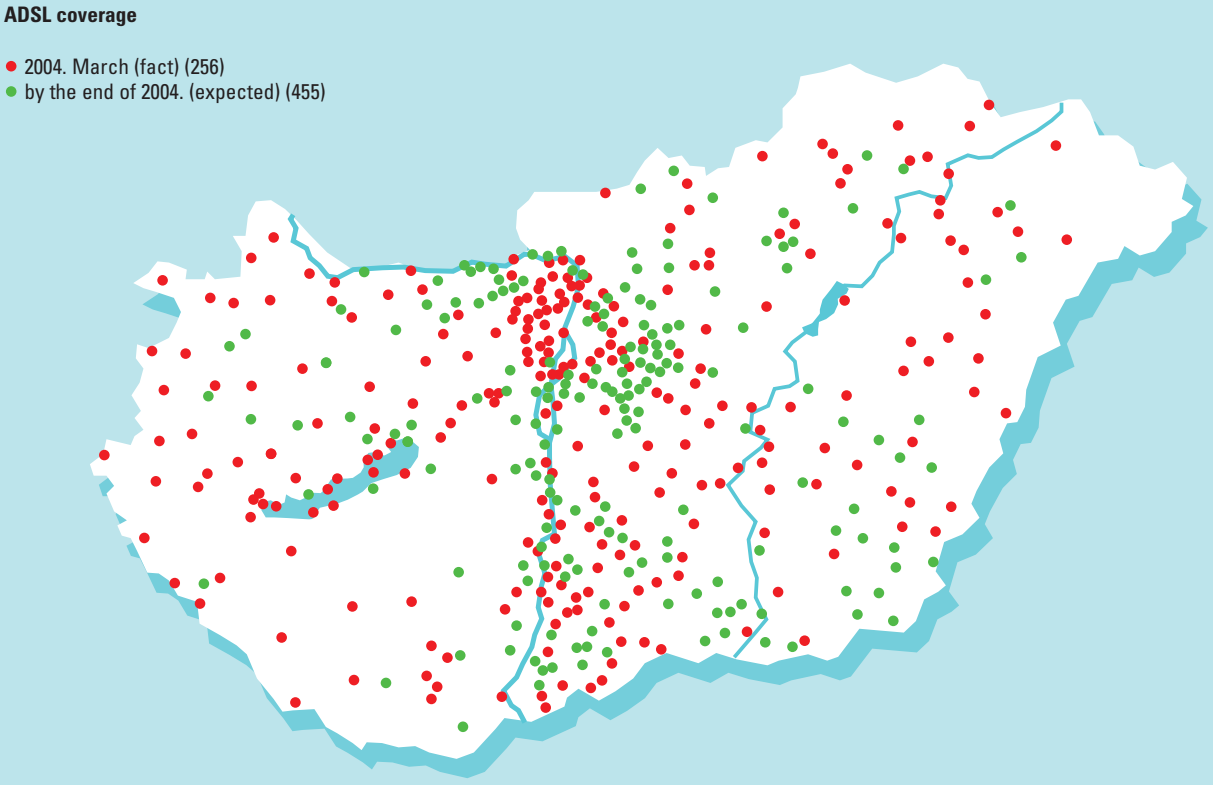
STRENGTHS	WEAKNESSES
• dynamic broadband electronic communications market, with rate of subscriber number increase above EU average in 2002-2003, • wide range of broadband technologies available, major investments, fierce competition on the data transmission market, • high CATV penetration, • high mobile penetration, • proportion between broadband and total Internet subscriptions above EU average, • high-speed network for research & higher education institutes among EU best, • demand aggregation program with high potential ("Közháló" - broadband access for public institutions)	• home Internet use and penetration low in international comparison, • lack of interest in the Internet, negative attitude, digital illiteracy all hinder development, • high broadband monthly fees (compared to income levels), • level of development of the broadband infrastructure is uneven in Hungary's territory both as regards density and the actual technologies used, • relatively high portion of population living in rural areas, • little broadband content supply, • low level of development of e-government applications
THREATS	**OPPORTUNITIES**
• constantly low Internet penetration and usage, gradually saturating residential broadband market, • decreasing willingness of service providers to make investments and carry out deployments, • continuing regional differences, widening digital gap, • increasing backwardness compared to other EU member states	• as a result of the "network effect", the current dynamism on the Internet market will accelerate development in 1-2 years, • Hungary can capitalise on the "advantages of latecomers": the high ratio of broadband subscriptions (compared to EU average) will continue, the period of dial-up dominance will shorten significantly, • as a result of market dynamism, the network effect and active communications the "apathy" towards the Internet will disappear, • improving life standards, strengthening social cohesion, increasing competitiveness, • widening range of broadband and interactive content available

ADSL COVERAGE OF DIFFERENT MUNICIPALITY CATEGORIES (CATEGORISATION BY SIZE): MARCH 2004

Category (size)	Number of municipalities in category	Population	Actual ADSL coverage, as of March 2004 (in percentage of population)	Expected ADSL coverage, as of December 2004 (in percentage of population)
1.000.000 -	1	1 749 389	74%	74%
100.001-1.000.000	8	1 175 041	97%	97%
50.001-100.000	12	768 375	97%	97%
25.001-50.000	25	830 314	97%	97%
20.001-25.000	17	380 645	91%	91%
15.001-20.000	28	487 459	86%	86%
10.001-15.000	51	618 273	83%	88%
7.501-10.000	46	397 763	58%	83%
5.001- 7.500	90	549 986	22%	62%
2.501- 5.000	335	1 141 463	16%	40%
2500 and below	2 522	2 088 870	3%	8%
Total	3135	10 187 576	57,7%	64,8 %

Source: Ariosz

MUNICIPALITIES WITH ADSL COVERAGE



BASICS OF THE STRATEGY (CHAPTER VI)

- Description of the targeted broadband development scenario (VI.1),
- Survey of technologies being the best choice in the different areas to implement full broadband coverage (VI.2),
- Terms and concepts used in the strategy (VI.3),

DEVELOPMENT PHASES IN THE EU AND THE TARGETED DEVELOPMENT SCENARIO IN HUNGARY

	INITIAL PHASE	EXTENSIVE PHASE	INTENSIVE PHASE
	Until 1999	**2000-2001**	**From 2002**
EUROPEAN UNION	Relatively low Internet penetration (below 15-20 percent), moderate growth. Market is dominated by modem and ISDN accesses.	As a result of the network effect, Internet penetration accelerates for a period of 1.5-2 years. In certain countries, Internet penetration increases to two-four times its initial level, to 35-64 percent. Demand for broadband connections increases.	Compared to the year 2001, the rate of Internet penetration increase significantly slows down. Proportion of broadband accesses gradually increases.
	Until 2003	**2004-2006**	**From 2006**
HUNGARY	In international comparison, Internet penetration is low (10-15 percent) but growth accelerates. Starting from a low base, the number of broadband subscriptions increases fast.	As a result of the network effect, the number of Internet subscriptions grows significantly, up to over 30 percent (optimum). Owing to the delay in development, at least every third subscriber may have a broadband connection even during the acceleration phase.	Growth of Internet penetration continues but slows down, proportion of broadband subscriptions further increases.

LONG-TERM ROLES OF BROADBAND TECHNOLOGIES, BY MUNICIPALITY TYPES [8]

Population of town/city	Number of municipalities in category	Population	Technologies					
			LMDS WiMAX V-SAT DTV	KTV	ADSL	VDSL	FTTx + VDSL	FTTx
1.000.000 -	1	1 749 389						
100.001-1.000.000	8	1 175 041						
50.001-100.000	12	768 375						
25.001-50.000	25	830 314						
20.001-25.000	17	380 645						
15.001-20.000	28	487 459						
10.001-15.000	51	618 273						
7.501-10.000	46	397 763						
5.001- 7.500	90	549 986						
2.501- 5.000	335	1 141 463						
2500 and below	2 522	2 088 870						

[1]From the year 2006, third generation mobile systems – whose applications are not yet in use – are also expected to play a significant role in broadband services. However, their role cannot be classified into municipality categories as mobile communication offers national coverage.

KEY AREAS AND MEANS OF BROADBAND DEVELOPMENT

ACCESS	MOTIVATION	CONTENT	SECURITY	EDUCATION
- accessible network infrastructure - affordable end-user equipment - affordable broadband Internet service	- consciousness-raising about the advantages and positive effects of broadband electronic communication	- attractive content offering (e-administration, e-healthcare, e-environment, National Digital Archives, e-business, other attractive state and market based content development)	Create security conditions for broadband transactions (copyright protection, data protection, anti-virus protection, electronic signatures, protection of minors, spam-filtering, etc.)	- obtaining the digital literacy required to use information and communication equipment - support training of ICT experts

HORIZONTAL PRIORITIES (INNOVATION, EQUAL OPPORTUNITIES)

MARKET MECHANISMS	REGULATION (Electronic Communications Act and other regulation tools)	FISCAL, PUBLIC POLICY MEANS (orientation, coordination, setting examples, subsidies)

According to the National Broadband Strategy, the state should strive to identify and eliminate any bottlenecks in the development of access, motivation, content offering, security or the level of e-literacy in order to support the development of the information society. In this role, the **state can use regulatory, public policy and fiscal means to eliminate any impediments to the spreading of the use of the Internet in general and of broadband Internet usage in particular, in order to ensure the operation of healthy market mechanisms, equal opportunities in society and the evolution of innovation processes.**

ACCORDINGLY, THE ROLE OF THE STATE IS TO ACT IN THE FOLLOWING AREAS AND WAYS:

- Definition of strategy; compilation of an operative program, orientation, coordination
- Regulation; creation of a proper regulatory environment
- Development of state and public administration, introduction of e-administration, setting an example
- Provision of resources and support to eliminate development bottlenecks

This order also reflects the logic of the support of the evolution of the information society – and, as such, is also an order of priorities. The regulation of competition plays a key role in encouraging market mechanisms in electronic communications services. This is important as in the lack of efficient regulations

- fiscal and public policy interventions may become difficult to justify,
- state funding programs will become more costly.

Of the above-described key areas of development, the spreading of broadband technologies is primarily supported by a two-pole spiral forming as a result of the development of broadband infrastructure and the widening of the available content and applications portfolio. This broadband spreading model can be described as a recurring cycle comprising the following phases:

PHASE 1 Creation of a broadband infrastructure providing basic (less networked) national coverage and offering attractive contents via this network. As a result of the appearance of early adopters, there is an ever growing number of users.

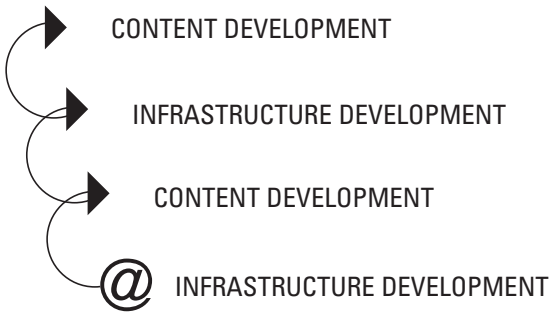
PHASE 2 Availability of new contents and applications on the existing broadband infrastructure (priorities being e-government, e-education, e-healthcare and e-commerce, focused on by the Action Plan), spreading as novelties;

PHASE 3 Increase of infrastructure coverage, density and capacity, application of new technologies and infrastructures;

PHASE 4 The cycle restarts from Phase 2

The rollout of broadband development, triggered by interaction between the availability of new applications and infrastructure opportunities, requires that the said positive processes be not hindered by the lack of motivation/education or security considerations.

THE BROADBAND SPREADING MODEL



The above model reflects the concept, also described in the eEurope 2005 Action Plan, that "infrastructure deployment and the provision of new services must be supported in a coordinated manner". In this respect, the National Broadband Strategy may become, through a more efficient enforcement of infrastructure deployment principles, a useful contribution to the Hungarian Information Society Strategy's service-oriented approach, may lay the foundation for the updating of the HISS Infrastructure Program and may define priorities for rolling planning in different areas where intervention is required (Contents and Services, Knowledge and Skills, Legal and Social Environment).

II. BROADBAND VISION

Broadband technologies are causing changes in many areas of our everyday lives. According to the national broadband vision, the acquisition, exchange and integration of information via networks will play an increasing role in the lives of individuals, organisations and institutions. The wise and purposeful use of the services and applications available as a result of technological development can save us time, energy and costs and can help us make well-grounded and free decisions.

However, it is now difficult to foresee the actual changes broadband will bring about in economy, work, education, free-time activities or in healthcare and government projects. The speed of development, the experience with already available services and now defined business and government plans, however, enable and necessitate the identification of certain expected development trends that point out the long-term importance of opportunities offered by broadband technologies.

Naturally, the unavoidable negative side-effects of the spreading of broadband electronic communications and, in general, information society services would deserve a separate social and economic case study (e.g. effects on employment and on the demand for traditional services) – which, however, is not a subject of this document.

>> E-COMMERCE

Broadband networks make different e-commerce applications more attractive to consumers and businesses. The increase of transmission capacities may lead to the on-line availability of information to customers. The different video and audio applications have an increasing role in product presentations. As interactivity increases, virtual shopping will more and more resemble the traditional way of buying goods. The portfolio of products most popular in on-line shopping (CDs, books, household articles, etc.) may widen and include other types of products.

The development of e-commerce increases the amount of information available to customers and thus helps them make better buying decisions. The enhancement of databases supporting product development and marketing activities accelerates corporate innovation processes, positively affects changes in product and service portfolios and improves the price-value ratio. The decrease of logistical and distribution costs owing to the application of e-commerce solutions improves the chances of SMEs for successful market entrance and helps them join global business processes.

>> E-WORKING

Broadband technologies enhance the efficiency of the operation of not only the product but also of labour market.

Information on the demand and supply sides of this market more efficiently reaches both potential employers and employees. Accelerated labour market adjustment processes reduce unemployment.

Potential employees can more efficiently collect information on the skills/education required on the labour market and the IT platforms integrated into high-capacity transmission networks may play a crucial role in establishing the preconditions of home- and e-working.

E-working may greatly support part-time employment, home-working by parents and the better positioning of people with disabilities (e.g. blind, visually impaired, physically disabled or suffering from allergies) on the labour market.

>> E-EDUCATION

E-education will also improve the flexibility of the labour market and the level of education of the labour force. Besides, e-education plays a key role in establishing the preconditions of life-long learning and in ensuring equal opportunities in the obtainment and updating of knowledge.

Network technologies enable the distribution and timely utilisation of tailor-made educational products, which, in turn, increases the value of investments in the human capital: e-learning solutions support the transfer of appropriate information and knowledge to the appropriate people at the right time.

Owing to the availability of broadband services, real-time interactivity and on-line group work will become reality in e-education programs. The use of web-based cooperation tools will also support the sharing of educational experience. Sophisticated education management systems enable the monitoring of preferred education styles and the progress made by students, which facilitates syllabus tailoring and the achievement of educational goals.

>> E-HEALTHCARE

Since the very beginning, information society visions have considered healthcare as a key area. The primary reason is that in the information society human resources become the vehicle with the most significant comparative advantages. Broadband technologies efficiently serve not only to retain jobs and know-how but also to preserve health. According to the base concept of e-healthcare, broadband technologies offer efficient high-capacity communication between healthcare institutes, patients, the public, government, financing institutes and private non-profit organisations. This information flow enables the compilation of databases using reliable information, makes decisions well-grounded and increases the cost efficiency, transparency and accountability of the healthcare system.

Broadband networks, which turn healthcare institutions, hospitals, clinics, GP surgeries, pharmacies, etc. into on-line service providers, digitise prevention and information supply activities and, in the long run, will enhance the efficiency of treatments. The spreading of remote diagnostics may be an important motivator of the deployment of infrastructures offering high and symmetric bandwidths.

>> E-TRAFFIC

Broadband technologies can also serve to ease traffic-related problems. Telematics services enable the more efficient use of the road network, the improvement of road safety, the increase of the efficiency of public transportation and carriage and the reduction of pollution and noise. Moreover, new value added services can be developed for integrated networks (e.g. to offer tourist information), which may create new jobs even in the short term.

The automatic navigation systems of public road vehicles use real-time, automatic data exchange, which makes useful information available about traffic, accidents and weather. Data are sent from the centre to drivers' radio display screens or directly to the vehicles' on-board computers. These on-board information projects can be used to manage city traffic, the use of national and international highways and to supply information to traffic control centres. Broadband mobile communication thus enables the efficient management of vehicle movements, supports the transfer of goods and transport monitoring in the course of combined road/railroad transportation and may also play an important role in the transport of hazardous materials and in customs clearance.

>> E-ENVIRONMENT

The information society will create favourable conditions for the preservation and sustainable development of the environment. The reduction of environment pollution, the increase of environmental safety may jointly result in the decrease of health destruction effects rooting in environmental damages.

In Hungary there is an ever-growing interest in and demand for easy-to-understand environment-related information that is transparent and meets accountability requirements. In accordance with Hungarian and international regulations on free access to environmental information, correct and up-to-date information must be made readily available to the whole society as support on behalf of society and the involvement of individuals in

environmental issues can be expected only if the sufficient amount of information has been made available.

>> E-DEMOCRACY

Quick and easy access to information may increase people's involvement in decision-making on issues affecting communities and the individual, which strengthens social cohesion. In the information society, the considerations behind the main social and economic subsystems may become more transparent and new interactive communication institutions and forums may be created as a result of supporting the implementation of mutually beneficial programs and efforts.

A cornerstone of modern representational democracies is the use of the largest possible amount of relevant information by citizens with voting rights in decision-making during elections. In this respect, access to a wide portfolio of information clearly improves the quality of democracy, opportunities to exercise liberties, as well as the efficiency of operation of institutions representing democracy and their acceptance by the general public. In addition to better access to information – if the appropriate security and data protection technologies are available – the on-line exercise of democratic techniques (referenda, elections) may also become reality.

>> E-GOVERNMENT

To state institutions the availability of information and communication technologies via high-capacity networks offers new opportunities in several aspects. On the one hand, such technologies are an extremely cost efficient and user-friendly means to publish information of common interest. Broadband access makes electronically stored information accessible, clear and usable by anyone – which increases the level of control over public sector processes by society.

Besides, it becomes possible to electronically provide state services. This may mean partial interactivity – and, in the long run, we may even expect a major decrease in paper-based administration requiring personal presence. This will significantly decrease the time requirement of administration, service availability restrictions will practically disappear and costs will be saved.

The development of information technologies not only places the state/citizen relationship in a new context but will also transform communication and information flow between state administration bodies. The integration of public institutions into information networks will improve coordination in state administration. Interoperability between databases and processes will further the efficiency of operation of state administration and will improve the quality and reduce the time needs of services.

III. MOTIVATIONS FOR THE ELABORATION OF THE NATIONAL BROADBAND STRATEGY

ECONOMIC AND SOCIAL BENEFITS

According to the Hungarian Information Society Strategy (HISS), in the information society information becomes part of the everyday lives of individuals, organisations and institutions, a major part of social communication is via digital channels and the information sector becomes the dominant sector in society and economic life. The Hungarian Information Society Strategy (HISS) considers the spreading of the use of information and communication technologies key to the country's reaching EU standards. The widespread use of these technologies and their utilisation as means of production may guarantee the modernisation of economy, the enhancement of efficiency and competitiveness and the achievement of the goals of the information society.

This is especially true from the perspective of the broadband strategy: the gist of the information society is "network-based knowledge economy". This term vividly expresses the fact that the information covered is **items of information organised into knowledge,** which are accessible, possible to combine and unite to create synergies.

The dynamic growth of transmission capacities not only makes existing on-line communication and transactions more comfortable but, as a result of the availability of new services and applications, also opens a new era in network communications, hallmarked by a new quality standard. This gives society and businesses access to information and applications which are not only more in quantity but are also of higher value than what is currently available. As a result of these,

- economic competitiveness will improve,
- the amount of information accessible by businesses and households increases,

• employment increases;
• new opportunities will present themselves in public education and entertainment;
• greater utilisation of the country's innovation potential becomes possible,
• the operation of the system of democratic institutions will become smoother,
• regional differences will shrink,
• social cohesion and equal opportunities will lessen,
• the role of the public sector will be more of that of a service provider,
• the efficiency of public funds management will improve.

In the information society, access to communication technology will cease to be a monopoly of a small minority and will become a public asset. Broadband infrastructures are covering ever more towns and households (just like running water in the old days) and, as a result of the installation of public access points ("public wells"), are becoming available to everyone. This enables the building of continuously expanding networks, which will change such fundamental everyday activities as shopping, entertainment, traffic, the exercising of democratic and freedom rights, administration, work or education.

CONTRIBUTION TO THE DEVELOPMENT OF THE EU'S EMPLOYMENT POLICY

Attention was drawn to broadband communications by the political goals defined in the eEurope 2005 Action Plan. The current evaluation of the implementation of the first half of the Action Plan and the Growth Initiative further emphasise the importance of this issue as a firm political intent is to provide the infrastructures and contents required for the implementation of broadband communication in EU member states – thus supporting the strengthening of economic competitiveness and social cohesion. In order to coordinate the efforts made by the whole of the EU and its individual member states, the European Commission requested the member states to elaborate their respective national broadband strategies by the end of 2003. Based upon the national strategies submitted, the Commission will submit a position statement to the Committee of Ministers suitable to define principles regarding the medium term development of broadband electronic communications. One of the main goals of the NBS is to contribute to the shaping of a general broadband vision and specific measures for the European Union.

COORDINATION OF THE DEVELOPMENT EFFORTS OF THE PUBLIC SECTOR, ENTERPRISES AND THE CIVIL SECTOR

One of the basic challenges of Hungarian Government is to promote the conviction to the business and civil sectors – and, ultimately, to the whole population – that those who seize the opportunities offered by information technologies may significantly improve their opportunities and competitive power in the world, whereas those who do not may significantly get left behind.

• The efficient utilisation of the development potential offered by broadband electronic communication requires a strategic coordination of the efforts made to positively influence the construction of the broadband infrastructure, the development of applications, the acquisition of education required for technology use and the attitudes of the business sector players and people in general. The main directions of these efforts are defined in the Hungarian Information Society Strategy (HISS), approved by Government in November 2003 (www.ihm.hu/strategia).
• The National Broadband Strategy supplements and accurately defines the situation analysis and the tasks regarding the development of broadband electronic communication in line with the main directions defined in the National Broadband Strategy: to implement the goals of the HISS the areas, degree and expected effects of concerted actions by the State must be identified in detail. The NBS thus contributes to the updating of the infrastructure direction of the HISS and the orientation of the government's actions and competition development efforts through rolling planning.

The HISS: areas of intervention and main directions

CONTENT AND SERVICES
• Economy direction (e-working, e-business, e-traffic, e-agriculture)
• Public Administration direction (e-government 2005, e-local government)
• Culture direction (NDA)
• Education direction (e-education)
• Health direction (e-healthcare)
• Environment direction (e-environment)

INFRASTRUCTURE
• Broadband Infrastructure direction ('Közháló' and 'NIIF' projects)
• Access direction (eHungary Point)
• Infrastructure Services direction ("infrastructure" of information of public interest and for public use)

KNOWLEDGE AND SKILLS,
• Knowledge & Skills direction (digital literacy)

LEGAL AND SOCIAL ENVIRONMENT
• Legal and Social Environment direction (e-security, e-democracy)

HORIZONTAL
• Research and Development direction (IT R+D)

IV. SITUATION ANALYSIS

IV.1 BROADBAND: DEFINITION

The basic feature of the 'broadband' concept can be described as a set of technological possibilities which enables the fast transmission of large data volumes in order to provide access to a wide portfolio of digital services.

Due to the dynamism of technological development, the different levels of development and infrastructure coverage of countries and the varying popularity of applications, there is currently no uniform international definition for broadband electronic communication yet.

The bandwidth needs of different on-line services may differ significantly and the minimum and optimum data transmission needs of a given service may also be far apart.

Table 1. **MINIMUM AND OPTIMUM BANDWIDTH NEEDS OF SOME APPLICATIONS**

	Minimum (kbit/s)	Optimums (kbit/s)
e-working	110	7000
video conferencing	110	800
e-education	110	7000
video telephony	70	200
DVD download	1000	7000
audio download	110	700
on-line games	40	600
tele-shopping	40	7000
on-line banking	40	400
on-line magazines	40	2000
digital TV	1000	7000

Source: Plannedapproach Inc.

The primary reason for our inability to give a general definition for „broadband" is that needs are dynamically growing over time. A few years ago even the 64 kbit/s data transmission capacity of a simple phone line counted as revolutionary. However, the spreading of interactive video services would require a minimum symmetric bandwidth of 1.5 Mbit/s.

Ideally, broadband communication is supported by a technological environment that enables the transmission of digital contents, while offering interactivity. According to experience in most EU and OECD countries, this requires a download bandwidth of at least a few hundred kbit/s in the case of private users. However, as development unfolds, this requirement may relatively shortly reach the order of magnitude of several Mbit/s and upload capacity needs are also bound to increase. In accordance with the position of the ITU and OECD, the lowest download and upload speeds of "broadband" electronic communications networks are considered 256 kbit/s and 64 kbit/s (respectively) in Hungary today. In other words, the floor of "broadband" is somewhat above the base-band ISDN transmission capacity and, based on the terms of past Hungarian and EU funding programs, must meet the following criteria:

- minimum 25% BIX, 12% international bandwidth compared to the above bandwidths,
- monthly service availability must be at least 95 percent,
- no time or traffic limitations for connections,
- packet loss must be below 0.5% in 24 hours (if measured on a network with a load of max. 65%),
- round-the-clock call centre and Internet customer service available for not more than the price of local calls.

As to regulatory and deployment-funding measures related to broadband infrastructures and broadband access we must emphasise that a fundamental government principle in Hungary is technology-neutrality in both network solutions and end-user equipment. This approach is justified by the obligation to be unbiased in competition, the relative infancy of broadband solutions and the dynamism of technological development.

IIV.2 BROADBAND TECHNOLOGIES AVAILABLE IN HUNGARY

The level of development of the broadband infrastructure is uneven in Hungary's territory both as regards density and the actual technologies used. The backbone endpoints and the BIX (Budapest Internet Exchange) are located in Budapest and, as a result, ISPs operating outside the capital must pay significant extra costs to connect to the backbone network – is a form of discrimination. The backbone network, which connects municipalities, crosses 800 of Hungary's nearly 3,200 municipalities. Only 500 of these have dropouts. At the backbone network level of the broadband infrastructure there is a capacity surplus, while the distribution network, comprised of leased lines installed to serve service providers, and last miles are heterogeneous both as regards the level of development and transmission capacities.

The fact that the data communications market is one of Hungary's most dynamically growing areas within its telecommunications sector may play an important role in the lessening of regional differences. The telecommunications enterprises operating in Hungary offer a wide range of broadband technologies. Besides the most common solutions (CATV and DSL), several other alternative technologies suitable for electronic communications are already available or being developed, having the potential to once replace or serve as alternatives to today's two most widely used services.

According to the experience of the past 2-3 years, there is a tendency of technical solutions applied in broadband access networks becoming ever more cost efficient and thus making available more and more sophisticated applications.

XDSL

ADSL, the currently most frequently used broadband service, is offered by some 20 ISPs as wholesale dealers in the primary areas of incumbent telecommunication service provider Matáv and of Monortel, Invitel and Emitel. According to data from the second half of 2003, Axelero Rt., Matáv's fully owned subsidiary, had a 51% share on the ADSL market.

The ADSL subscription prices of service providers operating in Hungary do not differ significantly: competition is more in communication, the quality of customer service and the additional services offered as part of the ADSL packages available. Such additional services include web space, e-mail address, free items of software, spam filtering and analogue or ISDN access offered at a discount. In the future, further services available may include domain names with Hungarian accents.

The fast spreading of the ADSL technology in Hungary was primarily due to the fact that this technical solution is capable of enabling the existing copper-based telecommunication network to provide broadband data transmission. The economic importance of this is that the most expensive part of fixed networks reaching end users is the subscriber loop, i.e. the network section between the user's premises and the nearest exchange. The largest cost factor in this structure is the installation of new connections to the target spots (laying of underground infrastructure, installation activities inside buildings. etc.

Besides relatively low installation costs, another advantage of xDSL technologies compared to other broadband solutions is greater bandwidth stability: users are connected to the backbone network via dedicated individual subscriber connections, in a point-to-point architecture. The biggest disadvantage of xDSL is that this technology can be used only within 5 kilometres of local exchanges: infrastructure installations to reach any access points outside this are usually uneconomical.

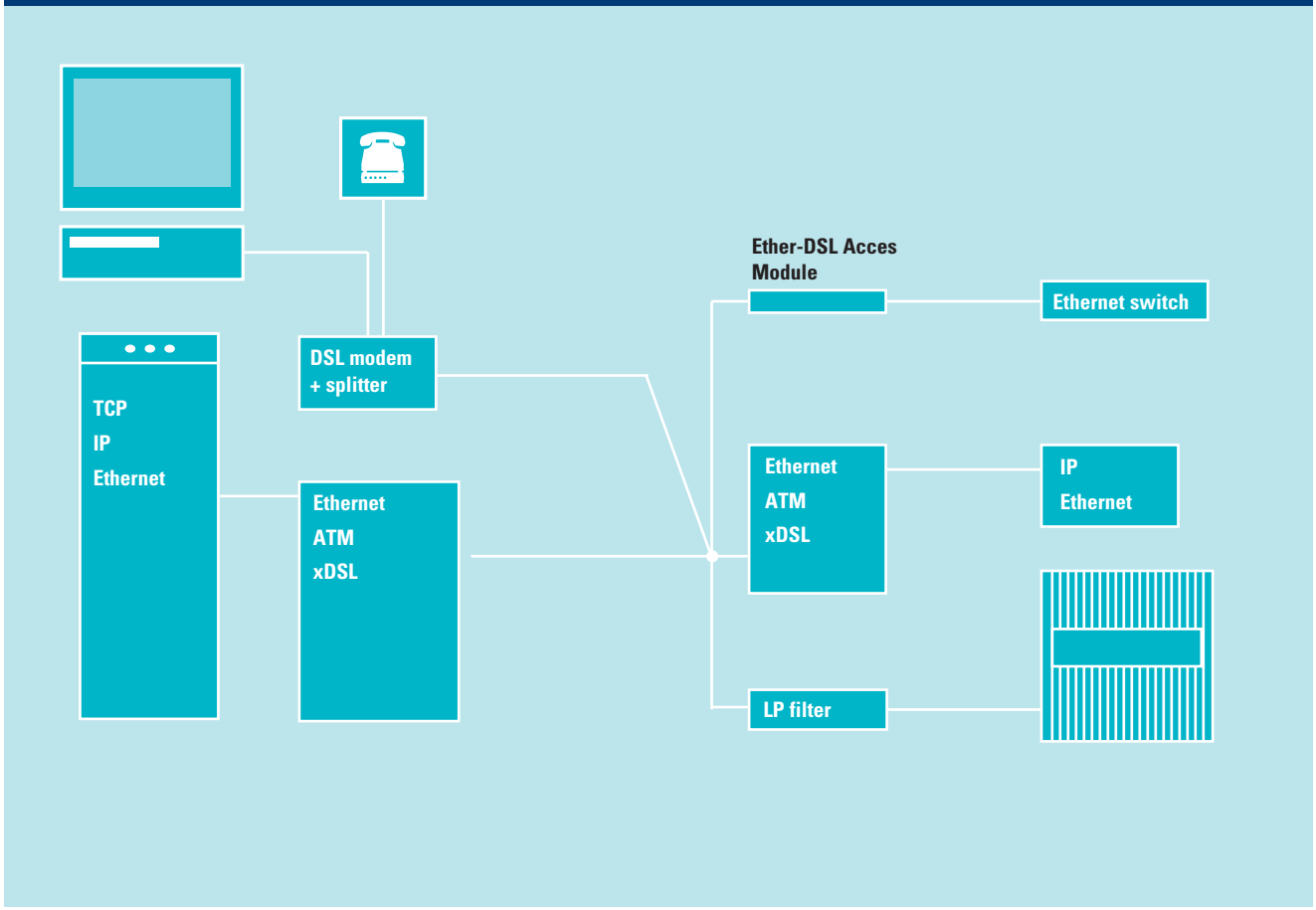
Table 2. **MAIN CHARACTERISTICS OF DIFFERENT DSL TECHNOLOGIES**

	DOWNLOAD SPEED	UPLOAD SPEED	TRANSMISSION DISTANCE	VOICE TRANSMISSION
ADSL (G.dmt)	8 Mbit/s	1,5 Mbit/s	3 km	Yes
ADSL (G.lite)	1.5 Mbit/s	512 kbit/s	5.4 km	Yes
SHDSL 2	2.3 Mbit/s	2.3 Mbit/s	3 km	No
SDSL	160 Kbit/s –1.5 Mbit/s	160 Kbit/s –1.5 Mbit/s	3-7 km	No
ADSL2	8-12 Mbit/s	1 Mbit/s (+256 kbit/s)	3,3 km	Possible to eliminate
(ADSL2+ 1	16-24 Mbit/s	1 Mbit/s (+256 kbit/s)	1.5 km	
VDSL	13-52 Mbit/s	16 Mbit/s	0.3-12 km	Yes

Of the different DSL technologies the most popular one with small users is ADSL (Asymmetric Digital Subscriber Line). Of the two ADSL types, ADSL (G.dmt) and ADSL (G.lite), the former is in the lead in Hungary. This technology is cheaper to install, has a shorter transmission distance but offers a higher bandwidth: the maximum download/upload speeds are 8 Mbit/s / 1.5 Mbit/s (respectively).

The regional deployment of ADSL may be greatly supported by the fact that, due to the intensification of competition, service providers show a strong interest in the application of low-capacity, Ethernet-based, modular DSLAMs, which consist of cheaper autonomous elements and are, therefore, better scalable. Owing to the use of these items of equipment, the provision of the DSL service at sites earlier considered uneconomical to cover due to their size and/or purchasing power may now be profitable. The installation of Ethernet-based DSLAMs began in three primary areas (Kiskunhalas, Kiskőrös and Baja) already in 2003. According to information from service providers, this solution makes the development of a given switch economical even if the potential subscriber number isonly 8-10.

DSL SERVICE USING ETHERNET-BASED DSLAM



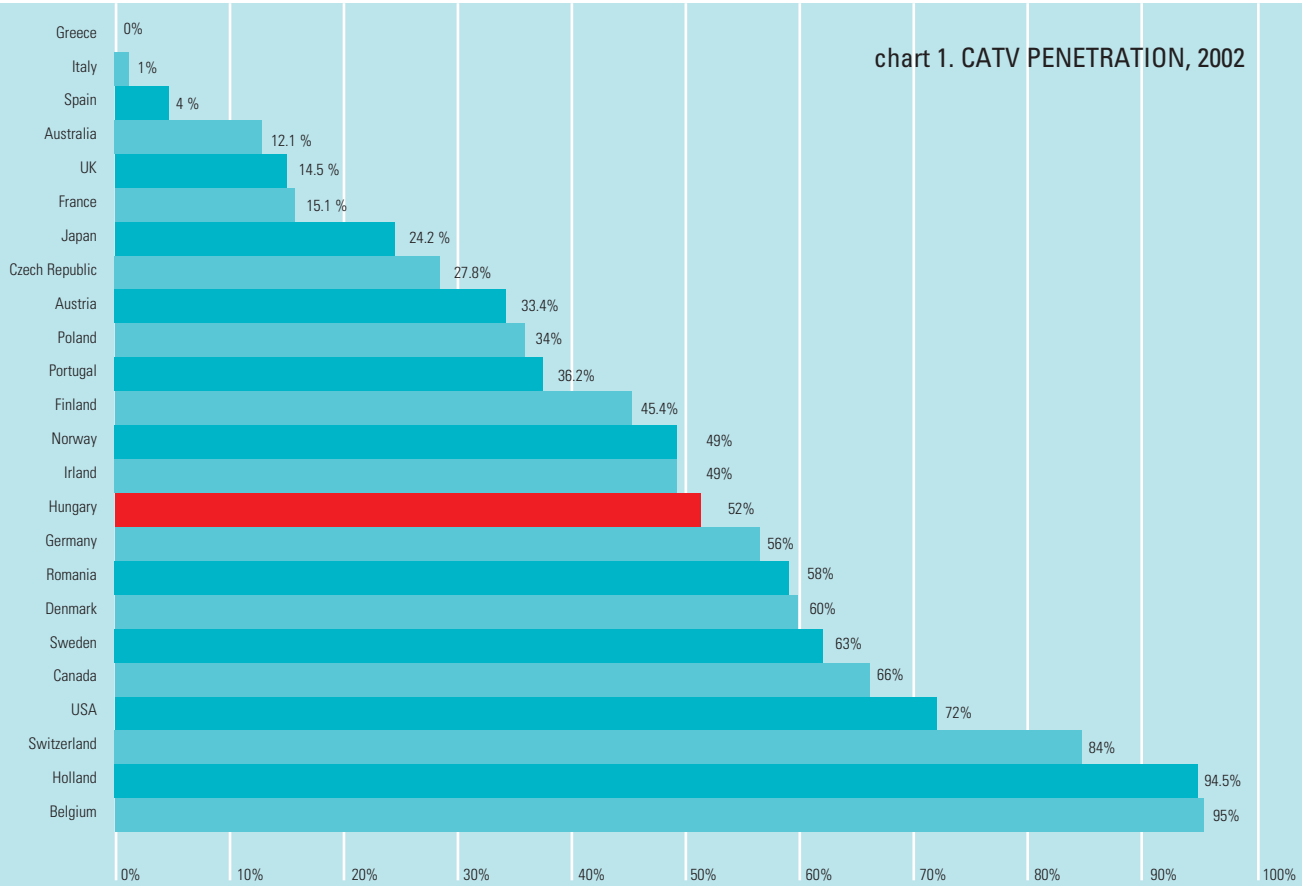
INTERNET SERVICE VIA CATV NETWORKS

Internet via CATV networks – especially existing ones enabled for upwards communication – is a relatively fast and cheap deployment solution. Another advantage over the xDSL technology is that the distance measured from the local exchange is less limited. However, a disadvantage of CATV Internet is the potential decrease of bandwidth available to the individual user during peak hours – as a result of the point-to-multipoint infrastructure architecture.

The use of CATV Internet is supported by Hungary's relatively high CATV penetration in international comparison. As of January 2004, some 55 percent of the 3.8 million households had CATV subscriptions.

Several hundred players are operating on Hungary's CATV market. Yet, this sector is strongly concentrated. The two largest service providers have over half of the subscriber base: on the CATV market UPC's share is 36 percent, while that of Matávkábel is around 15 percent.

chart 1. CATV PENETRATION, 2002



Source: OECD

The installation of broadband accesses via cable networks started in 1999. Less than a dozen service providers are now offering broadband Internet access.

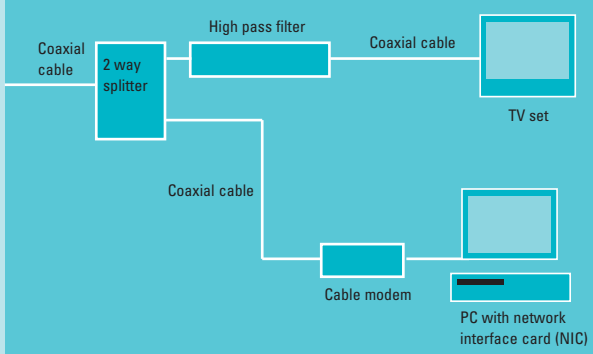
According to data from the second half of 2003, UPC has the highest number of subscriptions (70 percent) in this segment. The second largest CATV ISP is Matávkábel (through Axelero): its market share is 9 percent.

BROADBAND SERVICES VIA CATV NETWORKS: DEVELOPMENT REQUIREMENTS

With cable networks, preconditions of launching the Internet service are the enabling of two-way communication (modems) and the creation of the star-topology (switched network architecture). On cable networks, connections without time limitations can be established and it is also possible to simultaneously use the television, Internet and other voice and data communication services. Depending on local network features, the maximum data transmission capacity of such networks is 10 Mbit/s per subscriber access point.
To provide new broadband services, Internet traffic has to be routed into the network at the CATV feeder station, connections must be established to the phone network, media servers have to be installed and broadband connections must be established to media service providers.

Similarly to phone networks, the primary way to use the Internet over CATV networks is through modems. To enable Internet use, special modems, so-called cable modems have been developed for use in CATV systems.

INTERNET ACCESS VIA CATV NETWORKS, USING A CABLE MODEM



The majority of minor service providers have not yet made the investments required to enable Internet access in spite of the fact that the same is a clear prerequisite of getting access to state funding. Many have failed to do so not only for lack of financial resources but also due to the need to install and operate the subscriber and service management systems.

WIRELESS TECHNOLOGIES

Of microwave WLAN (Wireless Local Area Network) technologies, the fastest spreading one both in Hungary and internationally has been the so-called WiFi in recent years. The free usage of the 2.4 GHz frequency band has brought about a major increase in the number of business applications, an intensification in innovation efforts and a decrease in the prices of service provider and subscriber equipment.

In the 3.5 GHz band enabling fixed wireless access (FWA) (which was granted to service providers at an auction back in 2001) no residential broadband services have yet been launched. In the near future, the typical areas of use of fixed wireless access are likely to remain leased line applications (IP VPN, LAN connections) and the additional services supported by network services (IP telephony, multimedia applications, etc.).

Typical areas of use and features of wireless local area networks (WLANs)

A wireless local area network (WLAN; R-LAN or radio LAN) is a network in which at least one segment uses electromagnetic waves instead of the traditional wire access to send and receive data within a certain distance. Due to their limited geographical range, WLAN technologies are primarily used to extend the coverage of existing broadband access networks, "on the last 100 metres". A typical use of the WLAN is the sharing of the capacity of a DSL or cable modem connection between several computers operating in the same house/office. Besides, WLAN is also more and more often used as a technology to provide broadband access for rural communities and small villages.

Technology	802.11	802.11A	802.11B (WIFI)	802.11G	BLUE-TOOTH	HYPER LAN2	HOME RF
Bandwidth [Mbit/s]	2	54	11	54	1	54	10
Distance [m]	500	500	500	500	50	500	50
Frequency [GHz]	2.4	5	2.4	2.4	2.4	5	2.4

Besides indoor usage, WiFi in Hungary has an increasing role in providing broadband communication in public areas and public institutions ('hot spots') and in serving distant, poorly developed regions that are less attractive from a business point of view: in such areas, problems rooted in the limited transmission distance are usually solved by increasing the number of access points and the radiation power and through the use of special aerials and repeaters.

Small and medium-size enterprises offering primarily WiFi-based access usually launch services in places where no other broadband access exists or where they have high hopes to successfully compete. There are some wireless service providers which will install their system anywhere within Hungary with sufficient demand for their services. A major advantage of this technology is that, owing to the relatively low network-side costs, the service may be profitable with as few as 20 subscribers.

The most important factors preventing the faster spreading of WLAN technologies used in outdoor spots and the coverage of larger areas are the fact that bandwidth drops in reverse proportion to the number of users connected, the occurrence of interferences between service providers and with other equipment (cordless phones, microwave ovens, etc.) and security considerations related to user access and data protection.

Large service providers usually apply wireless solutions as a secondary technology, in business-wise and/or technically problematic areas or to cover large, densely populated sites. In early 2003, Hungary's two leading mobile operators, Matáv-interest Westel Mobil Távközlési Rt. and Norwegian Telenor Group member Pannon GSM Távközlési Rt. both put into operation experimental WLAN hot-spots at Ferihegy Airport. Matáv also launched its EasyNet Plusz service in 2003, a project offering wireless Internet access for portable and palmtop computers at public sites.

Győr was the first city in Hungary to have free broadband Internet access points in public areas, installed in 2003. At present, the service is available at two sites, another eight access points are being installed. The system can be dynamically extended with mobile cameras and with temporary Internet access points for special events.

Broadband Mobile Technologies

Second-generation (GSM) mobile networks using digital voice transmission have a successful history of over a decade internationally. Their enhancement to handle data transmission after the millennium turn (GPRS) paved the way for the launch of medium speed (maximum 144 kbit/s, in practice app. 40 kbit/s) services using mobile data transmission. Third-generation (3G) mobile systems will bring about dramatic changes both in terms of bandwidth and the available service portfolio.

As regards mobile penetration, Hungary is among world leaders. As of the end of 2003, the number of registered SIM cards activated to receive calls was 7 944 000, which represents nearly 80 percent penetration (basis: 100 citizens). Service providers mostly provide only narrowband data services and 85-90 percent of their revenues still come from voice traffic. However, this high penetration and intensive mobile usage may indicate a major business potential for broadband services, to be launched in the future. In favour of the realisation of this potential is the keen competition between the three mobile operators – not only in prices and quality but also in the introduction of new services.

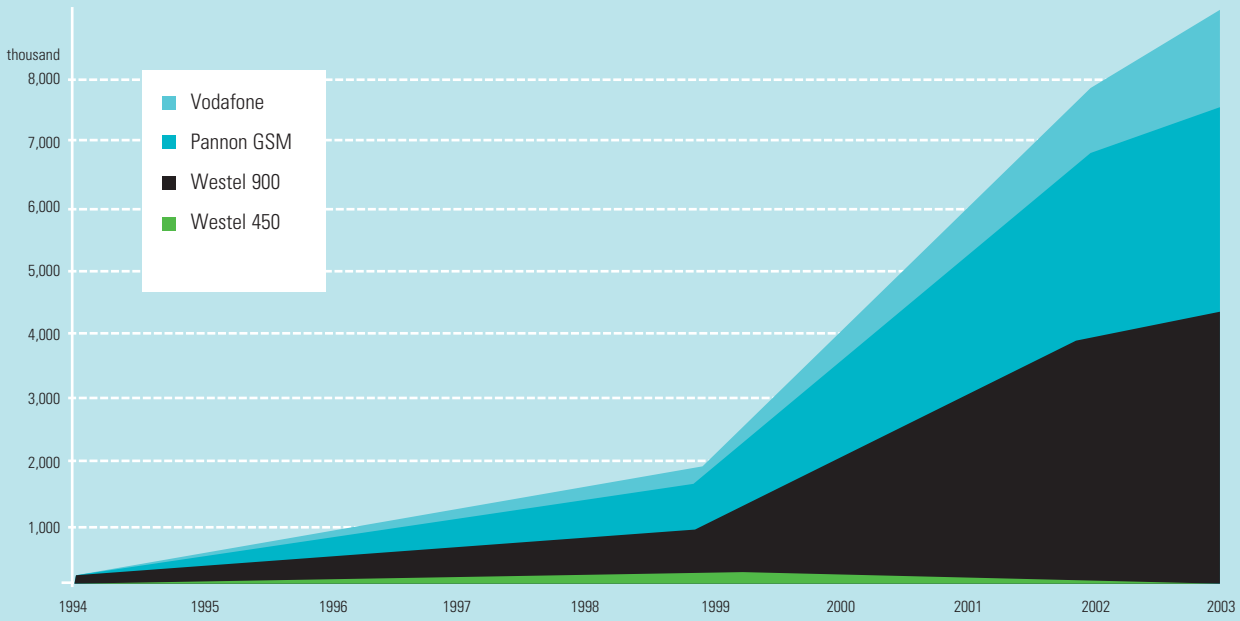
At present, UMTS launch is in the preparation phase and, according to plans, frequency licences may be granted in the second half of 2004. Commercial UMTS services are expected to be available from 2005-2006. In the course of

3G AND 4G

The first major step towards broadband access was the UMTS system. This enables the provision of data channels operating at a maximum speed of 2 Mbit/s for stationary users. Channel capacity may be fixed or traffic-dependent to ensure efficient system utilisation. UMTS also satisfies the data transmission needs of moving endpoints. In this case, the minimum access speeds available are 384 kbit/s (walking users) and 144kbit/s (users in vehicles). The currently developed enhancement of UMTS, HSPDA (High Speed Packet Data Access), may boost data transmission speeds for stationary endpoints up to as much as 10 Mbit/s, which may make the technology a serious competitor to xDSL access connections operating via twisted copper pairs.

Research in 4G mobile systems is running simultaneously with the launch of 3G systems, primarily in the Far East. The goal of these research activities is to implement systems offering a speed of 40 Mbit/s to moving data users. However, the launch of such systems in Europe is not to be expected within the next 10 years, before the return of UMTS investments.

Chart 2. NUMBER OF MOBILE SUBSCRIPTIONS AS OF THE END OF THE YEAR



Source: National Communications Authority, Digital Mobile Flash Report, Central Statistical Office

UMTS PROSPECTS

Third-generation mobile is likely to fundamentally change not only telephony but even the whole IT market. This change, however, is likely not to do away with GSM, which is in its heyday now: the two technologies will work simultaneously for a long time as there will always be people who only want to use their phones to talk. GSM is likely not to disappear as an obsolete technology also because it will not be profitable for enterprises to provide full UMTS coverage for the whole country. In practice – at least during the transition phase – UMTS usage is likely to be such that subscribers will be able to contact one another from spots w/o UMTS coverage in the traditional way (GSM): in such areas UMTS sets will switch to GSM mode.

UMTS launch, the first steps will be to cover busy city areas and key roads, through GPRS-based UMTS islands. Consequently, coverage for less densely populated towns is likely to be postponed until the arising of major demand – similarly to fixed-line deployment history.

Besides 3G networks, mobile bandwidth increase in Hungary may also be enabled by the installation of the EDGE system. This technology can increase the voice and data transmission capacities of already installed 900/1800 MHz GSM networks to three-four times the current level. In the early phase of commercial EDGE launch in Hungary service providers will provide a bandwidth equal to that offered by ISDN. However, in the long term, EDGE may be an efficient supplement to the UMTS service in areas without 3G network coverage – primarily in rural regions.

OTHER BROADBAND ACCESS TECHNOLOGIES

Optical Data Transmission

The only factor putting limitations to the speed available with optical data transmission is the capacity of terminal equipment. The data transmission capacity of this technology reaches 10 Gbit/s. This bandwidth can be significantly increased further through the application of a special wave multiplexing method (DWDM).

In Hungary, data transmission through fibre optics is used primarily in backbone networks. Exceptions are large business accounts for whom optical networks have been installed by service providers both in Budapest and in other cities. The replacement of copper networks with fibre optic connections is not expected in the medium term. Based current trends, the role of fibre optic connections will grow in backbone and distribution networks in the course of the next 2-3 years.

Ethernet Technology

In Hungary, Ethernet networks have been widely used inside buildings and building groups. However, their use for telecom access has only started recently. One prospective area of application is the integrated provision of telecommunication services – voice, Internet, CATV – in buildings and apartments in new housing estates. Another possibility for utilisation is to install long reach Ethernet connections (up to 1.5 km) in the vicinity of exchanges or remote switching units.

Broadband communication via power networks

In theory, broadband data communications via the power network (PLC; power line communication) is already possible. The basic concept of this technical solution is

RELATIVE COSTS OF DEPLOYMENT OF OPTICAL ACCESS NETWORKS

In the long run, the increase of the value of fibre optic networks is expected also with local networks (FTTH; fibre to the house). This is likely to be brought about by increasing bandwidth demand and by the fact that the installation of fibre optic networks is relatively costly only in comparison to other telecom infrastructures. Compared to roads, water, sewer or gas networks, its deployment costs are extremely low.

AVERAGE ESTIMATED COSTS OF INSTALLATION OF ONE KILOMETRE OF DIFFERENT INFRASTRUCTURE TYPES

Infrastructure type	Cost/km (water = 100%; 2002)
Water	100%
Sewer	35%
Electricity	26%
Gas	15%
Fibre optic	4-6%
Coaxial cable	2-4%
Copper wire	1-3%
Wireless connections	1-3%

Source: estimate by Upper Canada Net.

that the power sockets are not only the source of the power required for the operation of users' terminal equipment but also the interface to the actual broadband transmission medium. According to the results of experimental tests, the maximum transmission bandwidth available is between 1-4 Mbit/s. Enterprises with interests in this area are performing technical tests – but commercial services are not expected to bewidely used in the short term. In the long run, the PLC technology may be used as a makeshift solution

PROBLEMS RELATED TO THE WIDESPREAD USE OF THE PLC TECHNOLOGY

1. A major challenge and cost factor for broadband power line communication is the fact that the transformers installed in the network must be bypassed to ensure uninterrupted communication (data must be routed off the power line upstream of transformers and rerouted downstream of them). In Europe, the average density is 100-150 household per power transformers.

2. The other major issue is that the cabling of homes was not designed for broadband data transmission and, as a result, high-speed signals can be transmitted over relatively short distances within the power network. Reasons include cross-talk due to high speed communication over the power network, high attenuation and the mutual disturbances between radio, television and telephone sets on the one hand and PLC on the other. Due to the above problems, wide area high-speed networks using PLC are scarce even internationally (e.g.: Reykjavik).

3. Broadband data transmission over the power network could be efficiently implemented in practice only if the cabling of households and the power network were designed and built to handle high-speed data transmission. This solution, however, is only realistic with new buildings: with old ones it would require complete interior re-cabling.

Satellite Data Transmission

Broadband services provided via satellites may be a promising solution to serve less populous, poorly served areas. A disadvantage of this solution is the high transponder rental and the relatively high costs of information upload. For this reason, even commercially launched applications use an alternative (usually mobile or fixed line) technology in the reverse direction. Another difficulty with this solution is the influence of bad weather conditions on bandwidth. Moreover, due to the high propagation delay, time critical interactive services like telephony or on-line games are impossible to use.

Due to Hungary's geographical position, size and demographic features, it is not realistic to install a broadband network based on this technology for the mass market. In the short term, however, the VSAT technology may play an important role temporarily in the quick launch of the service – until the final network, whether fixed or wireless, is installed.

Digital Terrestrial Television

The importance of digital television broadcasting is in the fact that it enables the launch of value added service packages to better serve customer needs – not only in itself, but, especially, by accelerating the convergence of multimedia and broadcasting. This technological feature is extremely valuable since television is expected to remain the most popular medium both for external information access and entertainment.

By offering two-way communication, digital TV enables direct end-user connections. This is a good foundation for the long-term launch of new media products like video-on-demand, broadband Internet access or interactive television. Therefore, digitisation brings about not merely quality enhancement and portfolio widening but also makes television an efficient alternative end-user means to support the evolution of the information and knowledge-based society – besides personal computers.

In Hungary, a basic feature determining the digitisation of terrestrial broadcasting is that this service today is basically of a social and public service nature. This is the result of the facts that, on the one hand, analogue terrestrial broadcasting is free for households and, on the other, that possibilities for technological replacement are limited for a large number of users. Today's roughly 35-percent ratio of exclusively terrestrial reception is expected to drop only slightly even in the long term as in small villages and for user groups with low income levels CATV and satellite pay Tv are not realistic alternatives.

The technological preconditions of the digitisation of the terrestrial video broadcasting network already exist. The incumbent broadcasting company, Antenna Hungária Rt., started preparations already in the middle of the 1990-ies and the company already broadcasts digital terrestrial programs in a pilot project.

Important tasks for the year 2004 are to finalise the National DVB-T action plan, to prepare the necessary amendments in regulations and to clarify the role of the state in the launch of digital tv.

BROADBAND INTERNET ACCESS VIA DVB-T NETWORKS

As, in theory, digital terrestrial television (DVB-T) is capable of handling broadcasting and data traffic simultaneously, it is possible to offer interactive services in the 470-862 MHz frequency band. According to experience, the download speed with the digital television technology is up to 3 Mbit/s. Similarly to the majority of satellite solutions, two-way communication in DVB-T can be ensured through the use of alternative technologies.

No commercial Internet service has been launched on digital terrestrial networks yet. In Europe, experiments have progressed best in Finland: telecom service provider ELISA will provide information upload for Internet services via the DVB-T network through a GPRS system.

A problem with DVB-T-based Internet services may be that – due to network features – multi-channel television programs take the majority of the available bandwidth. This puts a sort of technical limitation to the launch of Internet services, which generate major data traffic, if – in the course of the sizing and construction of the network – enabling significant volumes of broadband data traffic is not a priority.

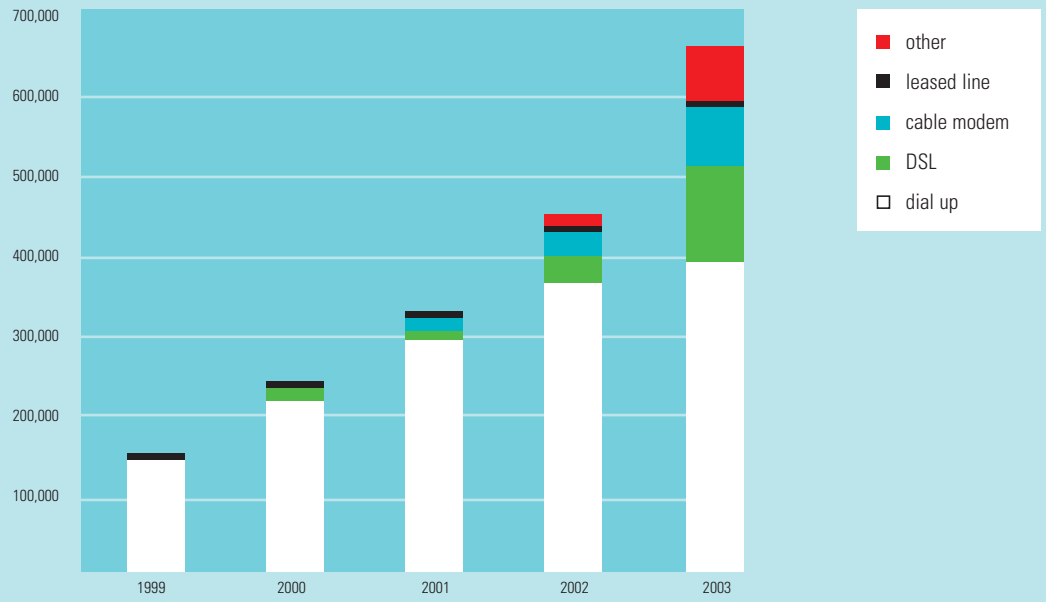
IV.3 MAIN TRENDS ON HUNGARY'S BROADBAND INTERNET MARKET

According to data provided by the Central Statistical Office, nearly 674 thousand Internet subscribers were registered in Hungary as of the end of 2003. Nearly 70 percent of these were residential ones. Over the past 4 years the number of Internet subscriptions increased by over three hundred and fifty percent. Nevertheless, Internet penetration for the whole population and for households is still relatively low in international comparison: 25 and 12 percent (respectively).

In Hungary, the majority of subscribers still use low-bandwidth analogue dial-up access. In 2003, nearly 60 percent of users had such connections for Internet access. The relative weight of this access type, however – similarly to the previous three years – significantly dropped as a result of the dynamic growth of the number of broadband access users. Practically the same tendency is experienced with ISDN lines, whose price-value ratio is decreasing.

In 2002-2003, the biggest growth on the Internet services market was in broadband access. The number of broadband subscriptions increased to two and a half – three times its original level. Growth was extremely fast both in ADSL and CATV subscriptions. From 6,500 (as of 2001) the number of ADSL subscribers had risen above 110 thousand by the end of 2003. Meanwhile, the CATV customer base, roughly 17-18 thousand in 2001, has risen

Chart 3. **NUMBER AND TYPES OF INTERNET SUBSCRIPTIONS IN HUNGARY: CHANGES BETWEEN 1999-2003**

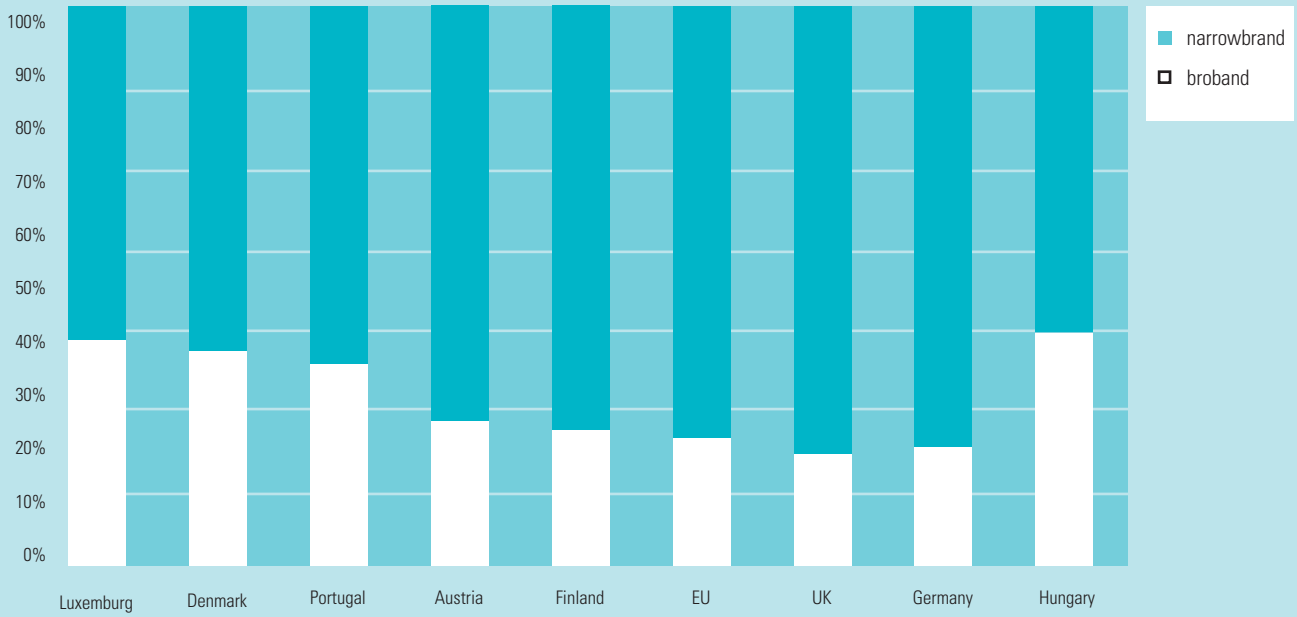


source: Central Statistical Office

to nearly 80 thousand over the past 2 years. As a result of the dynamic market changes in the years 2002-2003, the proportion of broadband access connections has reached about 30 percent. This proportion and the rate of increase of subscriber numbers are high even by EU standards.
The major increase in broadband penetration in 2002-2003 was to a large extent due to the relatively high prices of dial-up access, the decrease of prices of broadband services in 2003, service providers' intensive promotion campaigns and internal migration processes (i.e. replacement of dial-up access with broadband connections).

According to expert estimates, the internal migration rate was around 60 percent in 2002-2003. In 2004 the proportion reversed: the majority now is new customers. However, there are assumed to be many who were active Internet users at school or the workplace earlier. At the same time, survey results show that the number of first Internet users beginning with broadband connections is increasing.

chart 4. **PROPORTION BETWEEN BROADBAND AND NARROWBAND SUBSCRIPTIONS IN THE EU AND IN HUNGARY AS OF END 2003**

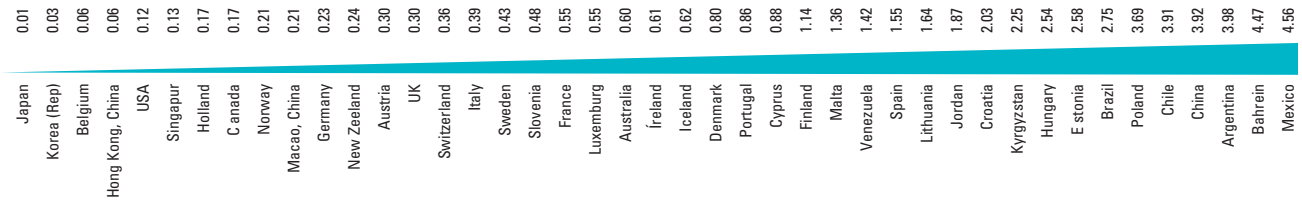


Source: Central Statistical Office, European Commission

As a result of the dynamic market changes in the years 2002-2003, the proportion of broadband access connections has by now exceeded 30 percent. This proportion and the rate of increase of subscriber numbers are high even by EU standards. At the same time, the number of broadband Internet connections per 100 people is still only one third of the EU average.

As for the dynamic growth of broadband services we must emphasise that this growth occurred despite the fact that – primarily due to the country's relatively low personal income levels – subscriptions are still rather expensive, both in EU and international comparison. Based on the ratio between the price of broadband subscription fees vs. monthly incomes, Hungary is 35th on the international list and 23rd in Europe – which in practical terms means that a Hungarian ADSL user spends nearly ten times as much of his/her income on a broadband subscription as a German or Austrian customer.

chart 5. **Price of 100 kbit/s of broadband access, expressed in proportion to the average monthly income, June 2003**



Source: ITU World Telecommunication Indicators Database

According to the findings of household panel research projects organised by public opinion research institutes in 2002-2003, the low household penetrations are rooted in lack of motivation, interest, computers and necessary knowledge and the relatively low income levels. The relatively poor motivation level is also shown by the ratio between the number of residential Internet subscriptions and that of households with computers. Of the recently joined EU member states Hungary has the largest percentage of people with no current Internet usage who could afford an Internet connection without serious efforts.

Table 3. **RATIO BETWEEN HOUSEHOLDS WITH INTERNET CONNECTIONS AND THOSE WITH COMPUTERS – FIRST HALF OF 2003**

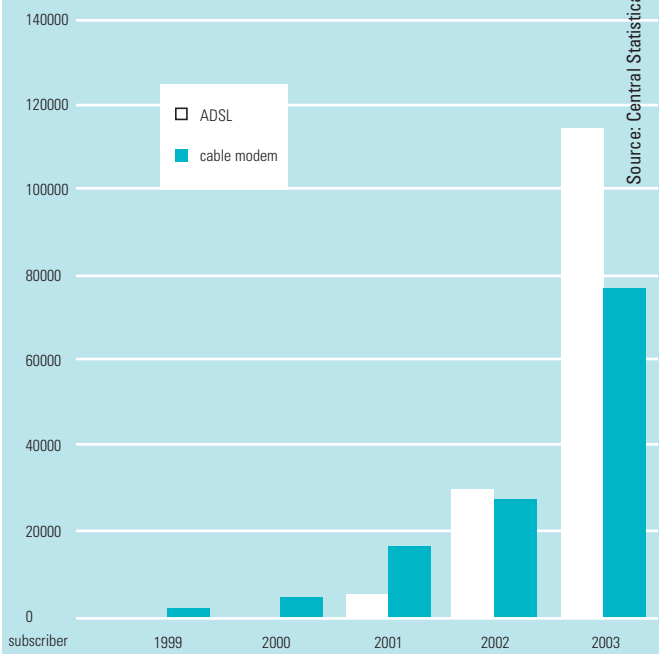
COUNTRY	INTERNET/COMPUTER PENETRATION OF HOUSEHOLDS
Malta	84%
Slovenia	74%
Estonia	70%
Cyprus	69%
Czech Republic	65%
Latvia	36%
Slovakia	34%
Lithuania	33%
Poland	33%
Hungary	30%

source: eEurope+ Progress Report (2004 February)

In 2003, a change was experienced in the competition of the two most significant broadband technologies. In 2002 roughly as many customers chose ADSL for Internet access as CATV. In 2003, however, the number of new DSL subscribers was almost fifty percent higher. ADSL has become popular especially with business customers. According to an estimate based on a questionnaire survey, cable modems and ADSL both represented some 14-15 percent of residential Internet subscriptions as of the end of 2003 .[2]

As a result of developments, a total of 265 of Hungary's 3,200 municipalities has ADSL coverage as of March 2004 – making ADSL available to some 58 of the total population.

chart 6. CHART 6. ADSL AND CABLE MODEM SUBSCRIPTIONS, 1999-2003



The ADSL coverage of the population, however, significantly depends on the size of the given municipality. Three quarters of the households in Budapest and over 80 percent in other towns and cities with a population over 10,000 had access to ADSL as of March 2004. In contrast, in smaller towns and villages ADSL coverage decreases parallel with the size of the given municipality. In villages with a population of less than 2,500 (i.e. the municipalities in which twenty percent of the country's population live) ADSL coverage is only 3 percent.

[2]ITTK-Tárki (2003): „Map of the Digital Future", World Internet Project (WIP)

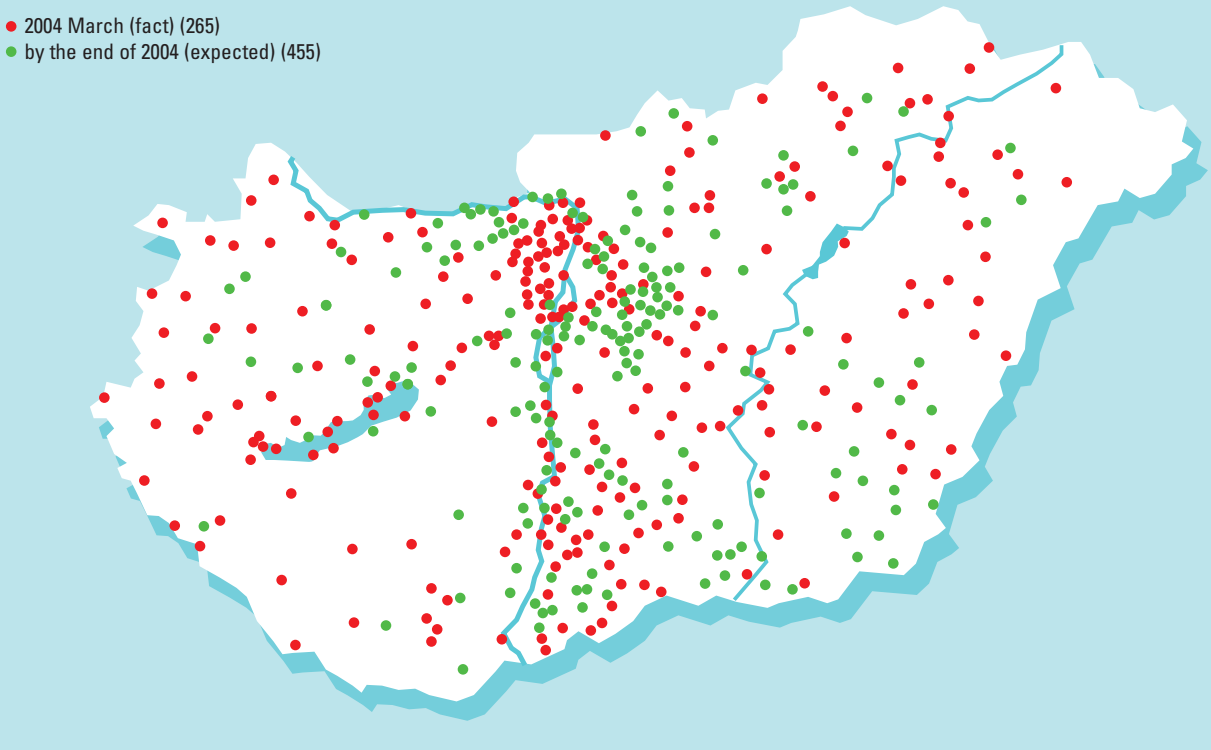
Larger towns and cities are also better off from the point of view of competition: only municipalities with a population of over 10,000 stand a real chance of having technology competition through the availability of cable modems.

Table 4. **ADSL COVERAGE OF DIFFERENT MUNICIPALITY CATEGORIES (CATEGORISATION BY SIZE)**[3]

Category (size)	Number of municipalities in category	Population	Actual ADSL coverage, as of March 2004 (in percentage of population)	Expected ADSL coverage, as of December 2004 (in percentage of population)
1.000.000 -	1	1 749 389	74%	74%
100.001-1.000.000	8	1 175 041	97%	97%
50.001-100.000	12	768 375	97%	97%
25.001-50.000	25	830 314	97%	97%
20.001-25.000	17	380 645	91%	91%
15.001-20.000	28	487 459	86%	86%
10.001-15.000	51	618 273	83%	88%
7.501-10.000	46	397 763	58%	83%
5.001- 7.500	90	549 986	22%	62%
2.501- 5.000	335	1 141 463	16%	40%
2500 and below	2 522	2 088 870	3%	8%
Total	3135	10 187 576	57,7%	64,8%

Source: Ariosz

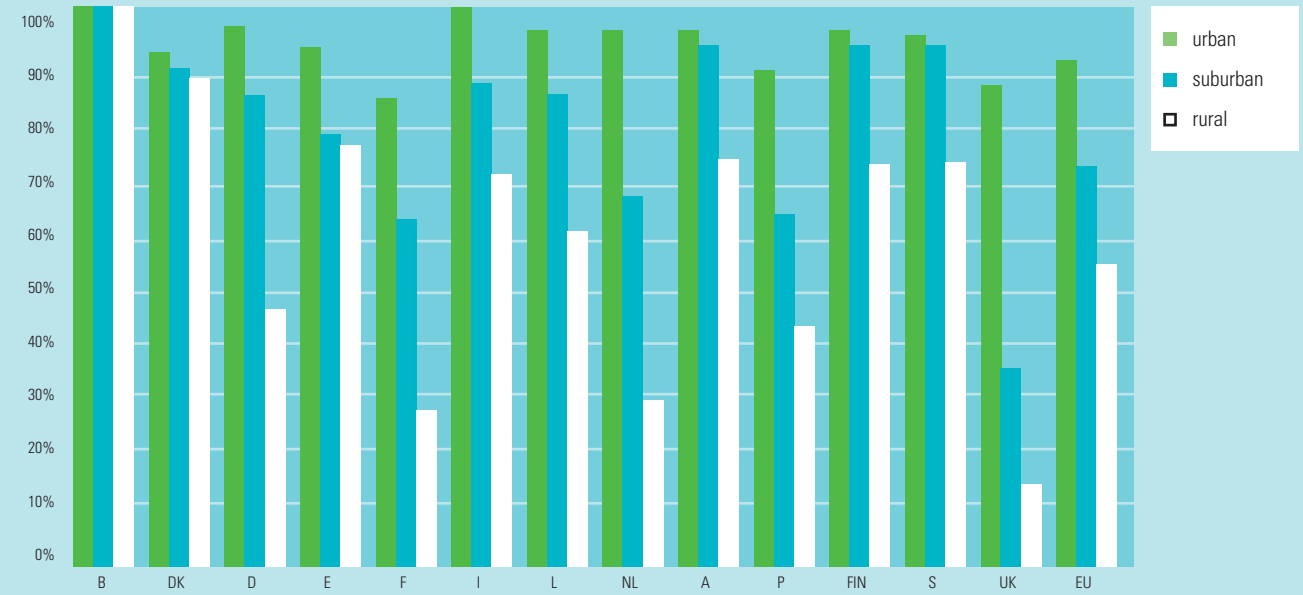
CHART 7. MUNICIPALITIES WITH ADSL COVERAGE



[3]The following calculation method was applied to estimate coverage. From the homepages of the incumbent service providers we collected the list of municipalities where the technical conditions of Internet access through ADSL exist. To identify coverage within the individual municipalities we used the municipality coverage maps published by service providers (where such maps were available) and, in the case of certain service providers, coverage of individual streets. We also took into account the population data published by the Central Statistical Office for the individual towns, the areas of municipalities and the density of population of the districts within individual municipalities. The results of Tender no. IHM-HHÁT-2 of the Ministry of IT and Communications were used to forecast the situation as of the end of 2004.

The relationship between residential ADSL coverage and the density of population is similar to that between ADSL coverage and the size of municipalities. In towns and cities with a density of population over 500/km2 coverage is 85 percent, while in places with a population of 100-500 people/km2 it is 69 percent. In contrast, in rural areas with a population of 100 people/km2 only 18 percent of households have access to broadband technologies. Hungary's backwardness compared to EU average is the worst in rural areas. This is caused partly by bottlenecks in telecom infrastructure and demand with sufficient purchasing power and partly by the fact that a relatively high percent of the country's population live in such areas.

Chart 8. **DSL COVERAGE IN EU MEMBER STATES, 2003** [4]



Source: IDATE

Table 5. **DISTRIBUTION OF POPULATION BY AREAS WITH DIFFERENT DENSITY LEVELS**

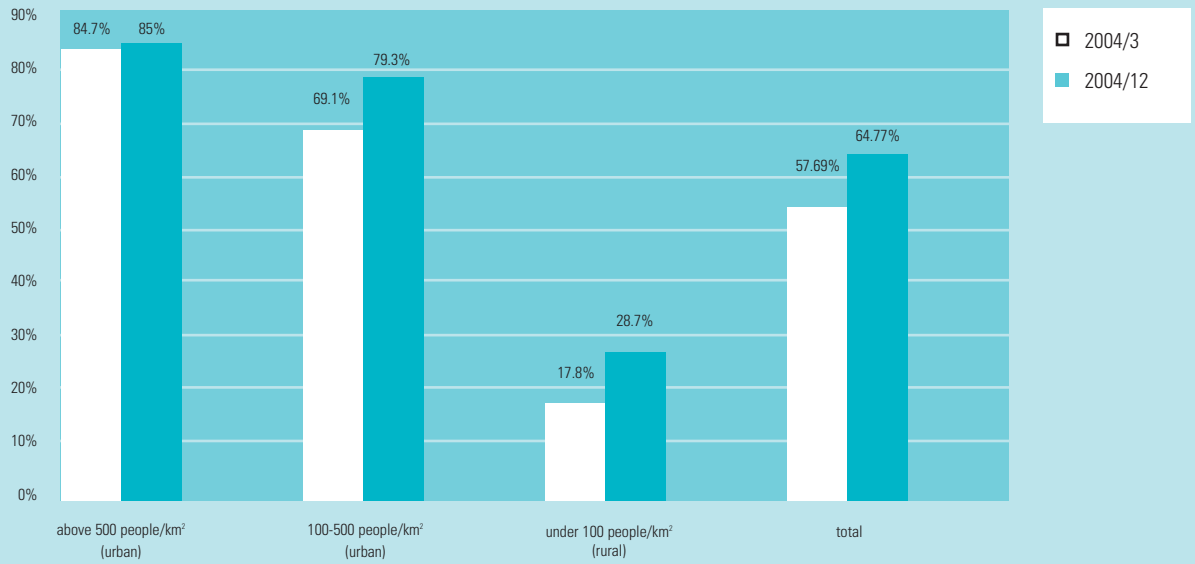
Country	Density of population over 500/km^2	Density of population between 100-500/km^2	Density of population below 100/km^2
Belgium	56.4%	38.8%	4.8%
Denmark	30.3%	39.4%	30.3%
Germany	40%	43%	17%
Spain	54.7%	23%	22.4%
France	53%	23.8%	23.2%
Italy	48.4%	38%	13.6%
Ireland	28.7%	2.6%	68.7%
Luxemburg	44.3%	38.4%	17.3%
Holland	65.6%	32.1%	2.3%
Austria	30%	40%	30%
Portugal	30.5%	44%	25.6%
Finland	35%	30%	35%
Sweden	40%	43.3%	16.7%
UK	61.9%	28.6%	9.5%
Hungary	33.9 %	33.7%	32.4 %

source: Eurostat, KSH

[4]This chart shows the percentage of population with access to the DSL service in areas with different densities. "Urban": above 500 people/km2, "Suburban": 100-500 people/km2, "Rural": below 100 people/km2.

Owing to dynamic development efforts, coverage is improving relatively fast. Ongoing projects will increase residential ADSL coverage by 8 percent, to 64 percent by the end of 2004[5]. The most impressive development is expected in municipalities with a population below 10,000. However, the significant differences in service availability between rural and urban areas will remain.

Chart 9. **EXPECTED CHANGES IN ADSL COVERAGE BY 31 DECEMBER 2004 IN URBAN, SUBURBAN AND RURAL AREAS**



source: Ariosz

As the distribution of business sites is less even among urban and rural areas, the ADSL coverage of small and medium enterprises (SMEs) is better than that of the population.

Table 6. **ADSL COVERAGE OF BUSINESS SITES – BY MUNICIPALITY CATEGORIES**

Category (size) of municipalities	Number of SMEs in category[6]	Ratio of SMEs in category[7] (%)	ADSL coverage 03/2004(%)	ADSL coverage 12/2004 (%)
1.000.000 -	119 762	61,2%	74,2%	74,2%
100.001-1.000.000	12 613	6,4%	97,5%	97,5%
50.001-100.000	7 168	3,7%	97,5%	97,5%
25.001-50.000	19 427	9,9%	97,5%	97,5%
20.001-25.000	16 652	8,5%	95,5%	95,5%
15.001-20.000	12 795	1,4%	87,6%	87,6%
10.001-15.000	2 936	1,5%	87,1%	89,6%
7.501-10.000	1 876	1,0%	68,7%	85,9%
5.001- 7.500	1 972	1,0%	29,8%	69,3%
2.501- 5.000	4 291	2,2%	24,0%	50,4%
2500 and below	6 317	3,2%	5,4%	12,0%
Total	119 762	100 %	77,2%	78,6 %

source: Ariosz

[5]Ariosz (2004): Estimated ADSL Coverage in Hungary by region and type and size of municipalities
[6]distribution of enterprises with 1-250 employees among municipality types
[7]distribution of enterprises with 1-250 employees among municipality types

V. BASICS OF THE STRATEGY

V.1 CONCLUSIONS FROM THE SITUATION ANALYSIS

BROADBAND: SWOT ANALYSIS	
STRENGTHS	WEAKNESSES
• dynamic broadband electronic communications market, with rate of subscriber number increase above EU average in 2002-2003, • wide range of broadband technologies available, major investments, fierce competition on the data transmission market, • high CATV penetration, • high mobile penetration, • proportion between broadband and total Internet subscriptions above EU average, • high-speed network for research & higher education institutes among EU best, • demand aggregation program with high potential ("Közháló" - broadband access for public institutions)	• home Internet use and penetration low in international comparison, • lack of interest in the Internet, negative attitude, digital illiteracy all hinder development, • high broadband monthly fees (compared to income levels), • level of development of the broadband infrastructure is uneven in Hungary's territory both as regards density and the actual technologies used, • relatively high portion of population living in rural areas, • little broadband content supply, • low level of development of e-government applications
THREATS	OPPORTUNITIES
• constantly low Internet penetration and usage, gradually saturating residential broadband market, • decreasing willingness of service providers to make investments and carry out deployments, • continuing regional differences, widening digital gap, • increasing backwardness compared to other EU member states	• as a result of the "network effect", the current dynamism on the Internet market will accelerate development in 1-2 years, • Hungary can capitalise on the "advantages of latecomers": the high ratio of broadband subscriptions (compared to EU average) will continue, the period of dial-up dominance will shorten significantly, • as a result of market dynamism, the network effect and active communications the "apathy" towards the Internet will disappear, • improving life standards, strengthening social cohesion, increasing competitiveness, • widening range of broadband and interactive content available

In international comparison, the Internet usage and penetration of households are low. In the business sector and in public institutions our backwardness compared to the EU is less. The relatively low Internet usage and penetration figures of Hungary's households are the combined result of several factors. According to the findings of our situation analysis, the most important of these factors are as follows:

1. Lack of interest in the Internet
2. The relatively low income level of the population
3. The lack of digital literacy
4. The relatively high portion of the population living in rural areas
5. The uneven distribution of the existing telecom infrastructure

At the same time, a promising phenomenon is that extraordinary dynamism has been experienced on the broadband Internet access market over the past two years: its growth is well above the rate of development of the overall telecom market. In the telecommunications sector there is fierce competition, there is a broad supply of services and, as a result of developments, the country's broadband coverage is growing fast. In large towns and cities the demand for broadband electronic communication services can be largely satisfied in the medium term through market coordination mechanism.

Due to the high speed of development and the expected revival of demand it is currently difficult to identify the regions and municipality types which the broadband communications infrastructure would not reach without

state support. Under the current demand parameters, according to estimates regarding broadband coverage and information provided by service providers, the extra business risk threshold is a population of 15,000 people for cable modem access and a population of 7,500 with ADSL access (as the same is shown on the coverage estimate).

The paragraphs that follow outline, based on the findings of the situation analysis, the targeted development scenario, the strategic technological vision and the role and means of the state in supporting broadband electronic communications.

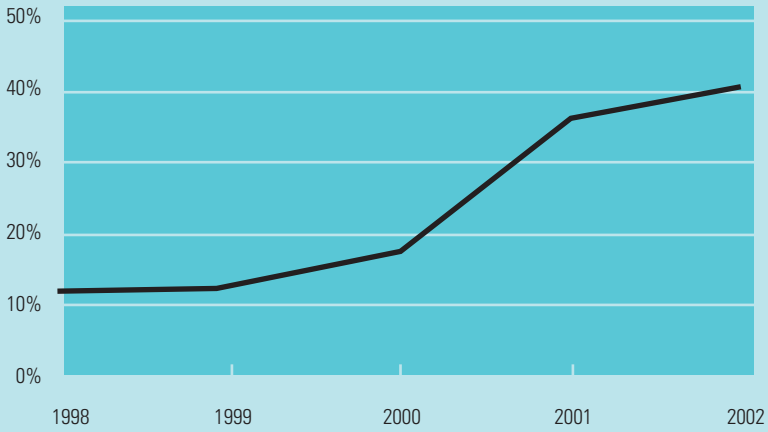
V.2 THE TARGETED DEVELOPMENT SCENARIO

An important assumption is that, to catch up with other EU member states Hungary will follow a similar pattern of development to other EU members – the only difference being that Hungary seems to have a chance to base its development on the spreading of broadband access.
As for prospects a promising fact is that if the dynamism of development experienced in the course of recent years continues, Hungary's household Internet penetration may soon reach the 20 percent ratio at which the so-called 'network effect' may give a major boost to growth even if all other circumstances remain unchanged.

NETWORK EFFECT ON THE INTERNET MARKET

The gist of the 'network effect' is that in the case of electronic communication services (e.g. mobile telephony, Internet) the number of users increases at an accelerating rate as a result of penetration increase. As the network grows more and more people feel a need to get access to it – thus a sort of 'angelic circle' forms. It is primarily due to this network effect that in the majority of EU member states growth followed a special S-shaped pattern: in the first phase Internet penetration, starting from a low level, increased moderately, followed by a period of dynamic growth, which was again followed, from 2001, a drop in growth intensity.

Household Internet penetration changes in the EU in 1998-2002; in percentage of the total number of households



Source: Eurostat

The following table not only presents the main phases of development (initial, extensive, intensive) and their features, based on experience gained in EU countries, but also describes the potential time period and parameters of Hungary's optimal development scenario.

DEVELOPMENT PHASES IN THE EU AND THE TARGETED DEVELOPMENT SCENARIO IN HUNGARY

	INITIAL PHASE	EXTENSIVE PHASE	INTENSIVE PHASE
	Until 1999	**2000-2001**	**From 2002**
EUROPEAN UNION	Relatively low Internet penetration (below 15-20 percent), moderate growth. Market is dominated by modem and ISDN accesses.	As a result of the network effect, Internet penetration accelerates for a period of 1.5-2 years. In certain countries, Internet penetration increases to two-four times its initial level, to 35-64 percent. Demand for broadband connections increases.	Compared to the year 2001, the rate of Internet penetration increase significantly slows down. Proportion of broadband accesses gradually increases.
	Until 2003	**2004-2006**	**From 2006**
HUNGARY	In international comparison, Internet penetration is low (10-15 percent) but growth accelerates. Starting from a low base, the number of broadband subscriptions increases fast.	As a result of the network effect, the number of Internet subscriptions grows significantly, up to over 30 percent (optimum). Owing to the delay in development, at least every third subscriber may have a broadband connection even during the acceleration phase.	Growth of Internet penetration continues but slows down, proportion of broadband subscriptions further increases.

Another important basic assumption is that the spreading of Internet is likely to be similar to that of traditional info-communication products. As penetration increases, different consumer segments with different characteristics will join the market and want access to the Internet.

Table 8. **THE ADOPTION PROCESS OF COLOUR TELEVISIONS AND VIDEO PLAYERS**

	IN PERCENTAGE OF THE ADULT POPULATION	ADOPTION PERIOD
innovators	2.5	3 years
early adopters	13.5	5-6 years
early majority	34.0	10 years
late majority	34.0	15 years
Laggards	16.0	more than 15 years

Source: Forrester: The Business of Digital Television Focal Press 2000

In the first phase „innovators" and „early adopters" play the key role. The second phase is characterised by purchases by the „early majority". The group of people referred to in the professional literature as the „late majority" joins the trend in the third phase. The first such surveys were carried out for the purchase of colour televisions. However, the ratio estimates put together also apply to info-communication equipment (e.g. video players).

GROUPS OF PEOPLE ADOPTING INNOVATIONS:

1. *Innovators:* they represent app. 2.5% of people approving innovations. They have an interest in novelties and are the fastest in accepting, evaluating and understanding such novelties and their technical background. They will take a risk and have the resources to bear any potential losses they may suffer through the acceptance of novelties that may later prove inefficient. Within this group people know and communicate with one another. Local communities do not always consider them examples but the members of this small group may play an important role in making local communities accept innovations.
2. *Early adopters:* they represent app. 13.5% of people approving innovations. In contrast with cosmopolitan innovators, they are more embedded in the local community, have a stronger influence on others' opinions and are an example to the other community members. They are aware that in order to keep their position in the community as examples and their acceptance by others they must make careful decisions about the acceptance of innovations. They reduce their uncertainty regarding novelties by accepting them.
3. *Early majority:* about 34% of people accepting innovations. They often communicate with others belonging to the "early majority" category but do not have an influential role in the community. They are careful in choosing anything new – and their careful decisions usually take long. They are an important link between the low number of early adopters and the large group of the 'late majority'.
4. *Late majority:* they represent about 34% of people accepting innovations. They are sceptic, mistrustful and usually act under peer pressure or out of economic necessity. For them to accept anything new the rules within the community must be innovation-friendly. Generally, due to their lack of resources, they will wait until uncertainties regarding novelties disappear and only then apply anything that is new.

5. and 6. Laggards: laggards represent about 16% of people who accept innovations. They do not affect the opinion of the public, are usually isolated people and their opinions are determined by the past: they are suspicious of novelties and people who favour changes. As their resources are limited they are slow in making decisions about innovations: they want to make sure the given innovation works in practice before they start using it.

Source: Rogers, E. Diffusion of Innovations, 1st edition 1962, 4th edition. 1995. New York: The Free Press

From the point of view of the dynamism of spreading of a given info-communication product the length of the time period between the appearance of the small group of innovators (those open to new technologies and services) and that of early adopters is of key importance. This latter group is comprised of people with higher income and education levels, who are more open to novelties than the average and whose purchasing decisions are motivated primarily not by price but other motivational factors. Owing to their status, such people also motivate the purchase decisions of the 'early majority' and 'late majority' groups. This very effect of setting an example may result – due to the interactive nature of the technology – in the formation of the so-called 'network effect', i.e. the skyrocketing of penetration.

For this reason, in the initial phase of the spreading of Internet use most of the users are innovators and early adopters. In the extensive and intensive phases, the early majority and late majority groups play the key role. An important aspect from the point of view of the identification of the strategic target groups in the different phases of development is the main social and economic characteristics of the members of the user segments appearing in the initial, extensive and intensive phases.

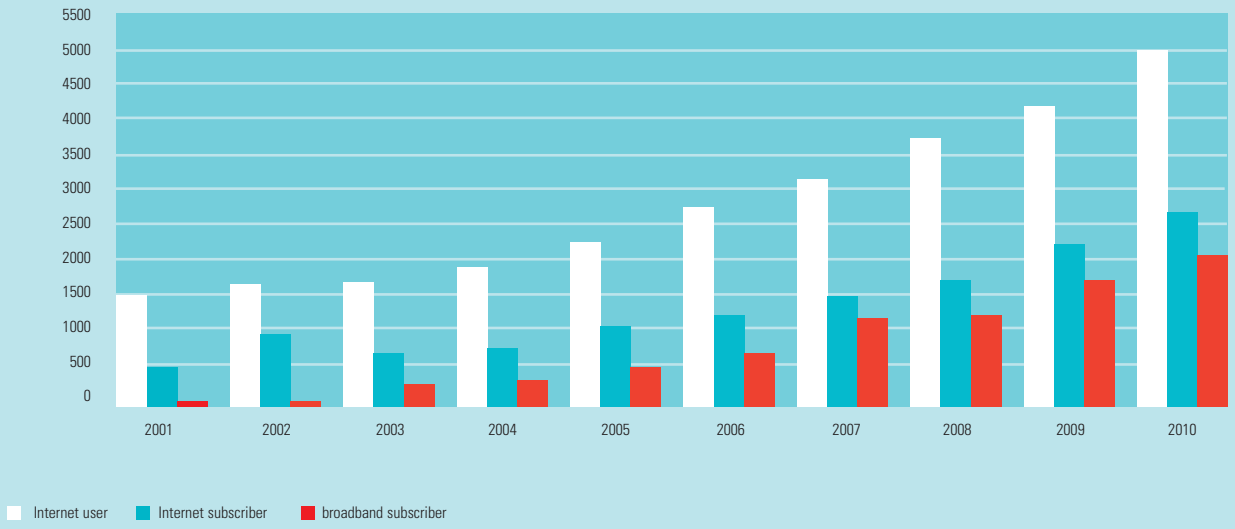
Table 9. **SOCIAL AND ECONOMIC CHARACTERISTICS OF THE USER GROUPS DOMINATING IN THE DIFFERENT PHASES OF THE SPREADING OF INTERNET USE**

PHASE OF DEVELOPMENT	Initial phase	Extensive phase	Intensive phase
USER GROUP	innovators and early adopters	Early majority	Late majority
CHARACTERISTICS OF THE USER SEGMENTS			
Financial status	+ + +	+ +	+
Social status	+ + +	+ +	+
Openness to new technologies and services	+ + +	+ +	+
Education	+ + +	+ +	+

+ + + above average, + + average, + below average

If the general attitude of the population to the Internet changes in a relatively short period of time, service providers and other businesses could get involved in the implementation of the goals set by the State. If this happens, a development scenario may take place which will result in Hungary's catching up with other EU members. In this case, the Internet penetration of households would get near 40 percent in 3 years, half of subscriptions being broadband ones. The pages that follow outline an objective and identify means for the strategy based on this assumption and summarise the technological preconditions and opportunities for such strategy.

Chart 10. **THE TARGETED DEVELOPMENT – MEDIUM AND LONG TERM**



V.3 TECHNOLOGICAL CONDITIONS AND OPPORTUNITIES

Both internationally and in Hungary the bottleneck in the spreading of broadband electronic communications is not the capacity of backbone networks. In response to increasing demand, all backbone networks are expected to gradually become optical ones in Hungary. As traffic volumes and the coverage of networks grow, the main questions will be the number of layers (using different network technologies) of the network and how such layers cooperate, which ones will be the control and management layers, where the boundaries will be between the configured and switched layers, the electronic and optical parts and circuit and packet switching.

From a strategic point of view the deployment of both the backbone network and the distribution network (which connects the access and backbone networks) is considered an area of development dominated by private investments that suit bandwidth needs and the

technological, network management and quality assurance conditions to the increasing consumer demand and the expanding local access networks.

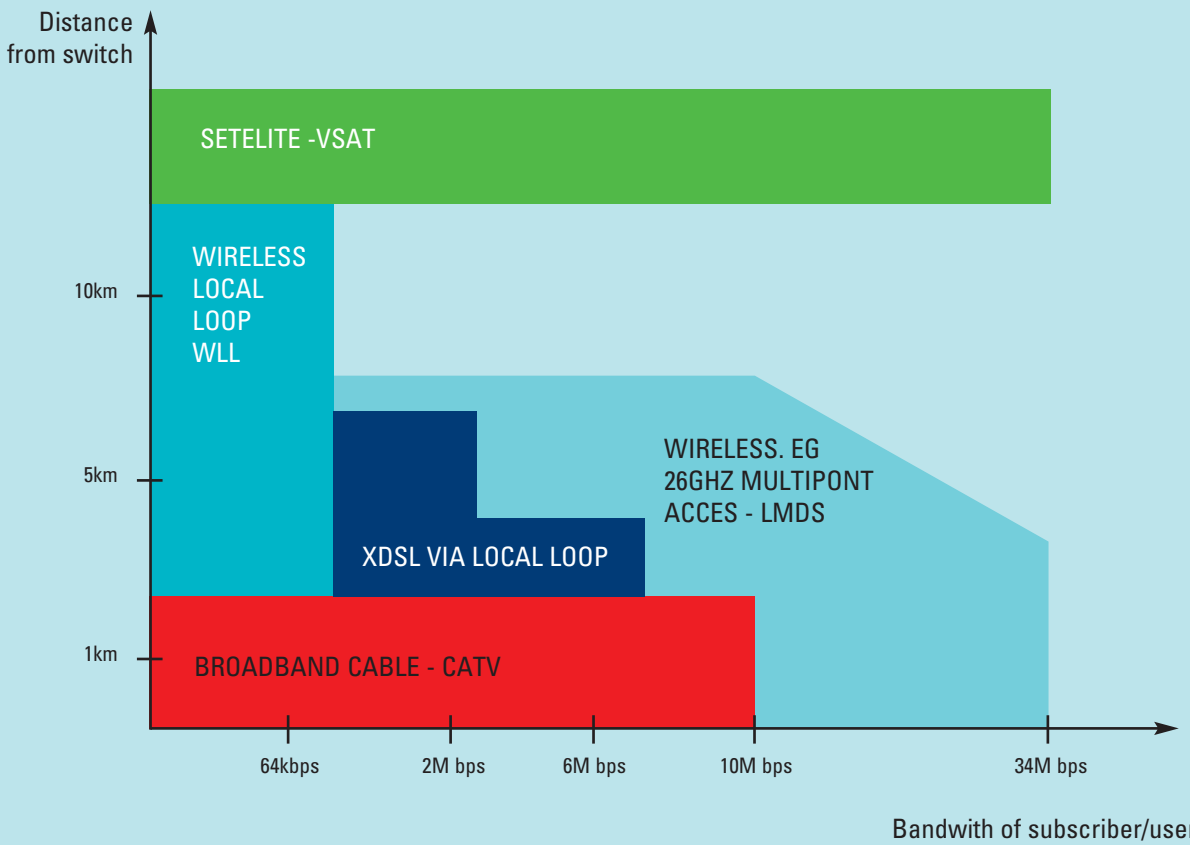
The development of access networks is far more likely to become the bottleneck in the spreading of broadband electronic communication. Disregarding business aspects we can see that the spreading of the currently most promising technologies – ADSL and cable modem access – may have technical and business limitations as the number of subscribers increases, especially in rural areas with a low population density.

The best solution to handle technological bottlenecks in the long term is the spreading of optical access (FTTx) technologies. In the future, the boundary of optical transmission should get "closer" to the customer. If this happens, VDSL or Ethernet access lines can be used to connect subscribers.

The other main possibility is the use of wireless broadband access technologies, primarily FWA (Fix Wireless Access), LMDS and WiMAX solutions. As part of the spreading of digital television, satellite Internet connections may also become one of the alternatives on the market – to a few percent.

The likelihood of the use of actual technologies in the different municipality types depends primarily on the distance from the switch and the possible maximum bandwidth available.

Chart 11. **BROADBAND ACCESS NETWORK TECHNOLOGIES – DIAGRAM FOR SYSTEM CHOICE**



There is no one-on-one matching between technological solutions and municipality types. However, for the individual technologies we can identify the municipality types where the given technology will be dominant. The matching of technological possibilities and municipality types also clearly shows that the larger a municipality is the more access technologies are likely to be applied – offering a better chance to consumers to enjoy the benefits of competition between technologies and, thus, the freedom of choice.

LONG-TERM ROLES OF BROADBAND TECHNOLOGIES, BY MUNICIPALITY TYPES [8]

Population of town/city	Number of municipalities in category	Population	Technologies					
			LMDS WiMAX V-SAT DTV	KTV	ADSL	VDSL	FTTx + VDSL	FTTx
1.000.000 -	1	1 749 389						
100.001-1.000.000	8	1 175 041						
50.001-100.000	12	768 375						
25.001-50.000	25	830 314						
20.001-25.000	17	380 645						
15.001-20.000	28	487 459						
10.001-15.000	51	618 273						
7.501-10.000	46	397 763						
5.001- 7.500	90	549 986						
2.501- 5.000	335	1 141 463						
2500 and below	2 522	2 088 870						

[6]From the year 2006, third generation mobile systems – whose applications are not yet in use – are also expected to play a significant role in broadband services. However, their role cannot be classified into municipality categories as mobile communication offers national coverage.

Naturally, the state strategy and orientation may not aim at giving preference to any of the broadband transmission technologies available on a competitive market and considered state-of-the-art.

However, the absolute and regional "capacity limitations" of the currently dominant technologies (ADSL, CATV) and the development potentials of less frequently applied ones will attract attention to the importance of supporting technology intensive and exemplary developments and service provider models even in a technology-neutral regulatory and funding environment.

V.4 THE STATE'S ROLE: CONCEPT AND MEANS

The Hungarian Information Society Strategy (HISS) considers the spreading of use of information and communication technologies key to the country's reaching EU standards. Of these technologies, broadband electronic communications plays a key role as digital and network development – owing to high capacity, fast data transmission – has the biggest potential to improve quality of life and competitive power.

In spite of the existence of cultural, historical, geographical and economic differences, the main factors characterising regions with a highly developed broadband infrastructure and usable for strategic orientation by less developed countries are clear:

ACCES

1. Widespread broadband infrastructure, competition in services, reasonable prices

Arousing consumers' interest is related to the prices of broadband services and prevailing income levels. Market competition must result in a price structure that makes both broadband services and end-user equipment affordable due to a healthy cost/profit ratio. However, prices must ensure a reasonable return on broadband infrastructure investments so that service availability can also be quickly extended geographically.

MOTIVATION

2. Successful communication and information supply on the advantages of broadband Internet usage

It is of key importance that potential broadband users clearly understand the advantages of the service and its value to the user. Both government and the private sector may play an important role in organising communication campaigns and programs to achieve this understanding and, ideally, they should make joint efforts to increase people's motivation.

CONTENT

3. Appropriate broadband application and content supply

Key to boosting demand for broadband services is the availability of relevant contents, services and applications. Different video and audio applications, VoIP, on-line games and relevant national content in the user's mother tongue may pave the way for penetration increase – similarly to the availability of e-commerce and e-administration services and applications.

SECURITY

4. The security and technological conditions of secure broadband Internet usage exist

The increase of broadband Internet usage may be supported by regulatory measures increasing broadband electronic service security (electronic signatures, data protection, digital protection of copyright and related rights, etc.) and technological solutions (content filters for the minor, spam filtering, anti-virus protection, etc.).

EDUCATION

5. Digital illiteracy does not prevent broadband access from becoming a mass product.

The speed of technological development creates major challenges in education – both school and adult. In information societies a basic requirement is to ensure that no one finishes compulsory schooling without having the basic skills required for the use of information services and that the same knowledge is possible to obtain for elder generations through reasonable efforts.

The conclusions of the strategic situation analysis are in line with the above assumptions. It is, therefore, fair to assume that if bottlenecks are found in any of the above areas the spreading of broadband electronic communication may slow down or come to a halt. Governments, therefore, should aim at identifying and doing away with any bottlenecks in access, motivation, content, security or education. In the course of such efforts, **the state can support the spreading of Internet and, more specifically, broadband Internet access use through regulatory, public policy and fiscal means, to ensure the operation of healthy market mechanisms, equal opportunities in society and the evolution of innovation processes.**

IN ACCORDANCE WITH THE ABOVE, THE STATE CAN PLAY A ROLE IN THE FOLLOWING AREAS AND MANNERS:

- **Strategy definition, compilation of an operative program, orientation, coordination**
- **Regulation; creation of an appropriate environment**
- **Development of state and public administration, introduction of e-administration; example setting**
- **Financing and support to eliminate factors of limitation**

The above order also reflects the logic of supporting the evolution of the information society from the state's point of view – in this sense, it is also an order of priorities. The regulation of competition plays a key role in supporting the working of market mechanisms in electronic communications services. This is important as in the lack of efficient regulations

- fiscal and public policy interventions may become difficult to justify,
- state funding programs will become more costly.

KEY AREAS AND MEANS OF BROADBAND DEVELOPMENT

ACCESS	MOTIVATION	CONTENT	SECURITY	EDUCATION
- accessible network infrastructure - affordable end-user equipment - affordable broadband Internet service	- consciousness-raising about the advantages and positive effects of broadband electronic communication	- attractive content offering (e-administration, e-healthcare, e-environment, National Digital Archives, e-business, other attractive state and market based content development)	Create security conditions for broadband transactions (copyright protection, data protection, anti-virus protection, electronic signatures, protection of minors, spam-filtering, etc.)	- obtaining the digital literacy required to use information and communication equipment - support training of ICT experts

HORIZONTAL PRIORITIES (INNOVATION, EQUAL OPPORTUNITIES)

MARKET MECHANISMS

REGULATION (Electronic Comm. Act and other regulation tools)

FISCAL, PUBLIC POLICY MEANS (orientation, coordination, setting examples, funding)

Of the above-described key areas of development, the spreading of broadband technologies is primarily supported by a two-pole spiral forming as a result of the development of broadband infrastructure and the widening of the available content and application portfolio. This broadband spreading model can be described as a recurring cycle comprising the following phases:

Phase 1 Creation of a broadband infrastructure providing basic (less networked) national coverage and offering attractive contents via this network, used by an ever growing number of users convinced by early adopters.

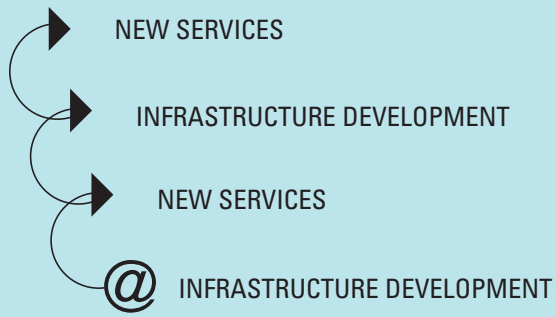
Phase 2 Availability of new contents and applications on the existing broadband infrastructure (priorities being e-government, e-education, e-healthcare and e-commerce, focused on by the Action Plan), spreading as novelties

Phase 3 Increase of infrastructure coverage, density and capacity, application of new technologies and infrastructures;

Phase 4 The cycle restarts from Phase 2

The rollout of broadband development, triggered by interaction between the availability of new applications and infrastructure opportunities, requires that the said positive processes be not hindered by the lack of motivation/education or security considerations.

Chart 13. **THE BROADBAND SPREADING MODEL**



The above model reflects the concept, also described in the eEurope 2005 Action Plan, that "infrastructure deployment and the provision of new services must be supported in a coordinated manner". In this respect, the National Broadband Strategy may become, through the more efficient enforcement of infrastructure deployment principles, a useful supplement to the Hungarian Information Society Strategy's service-oriented approach.

VI. STRATEGIC OBJECTIVES

Strategic Objective

VI.1 ACCESS

The primary objective of the National Broadband Strategy (NBS) is to make broadband electronic services available to the population, enterprises and public institutions and thus support the spreading of network communications, the expansion of content supply, the increase of the country's competitive power, the strengthening of social cohesion and, ultimately, the dynamic development of Hungary's information society

To both individuals and enterprises the achievement of the strategic objective of the NBS will manifest itself in the availability of affordable broadband electronic services suited to actual user needs. Primarily due to considerations related to equal opportunities, general service availability will also be supported through the installation of broadband community access points. In the case of institutions funded by the state the task is not only to enable access but also to provide the technology and the funding required for unlimited access and service usage. In the private and business sectors the strategic priority is to enable the installation of broadband connections, while in the public sector the key goal is to actually provide broadband access until 2010 – the period covered by the Hungarian Information Society Strategy ("HISS"; "Magyar Információs Társadalom Stratégia", "MITS").

For the population and enterprises the targeted main change is to expand broadband geographical coverage, while for public institutions the goal is to increase the number of broadband connections. In accordance with these objectives, **the goals and means defined in the NBS for the medium term (2004-2006)** have been selected based on the following three priorities:

PRIORITIES:

H.1. Broadband coverage of the population and enterprises

H.2. Broadband community access points for each municipality

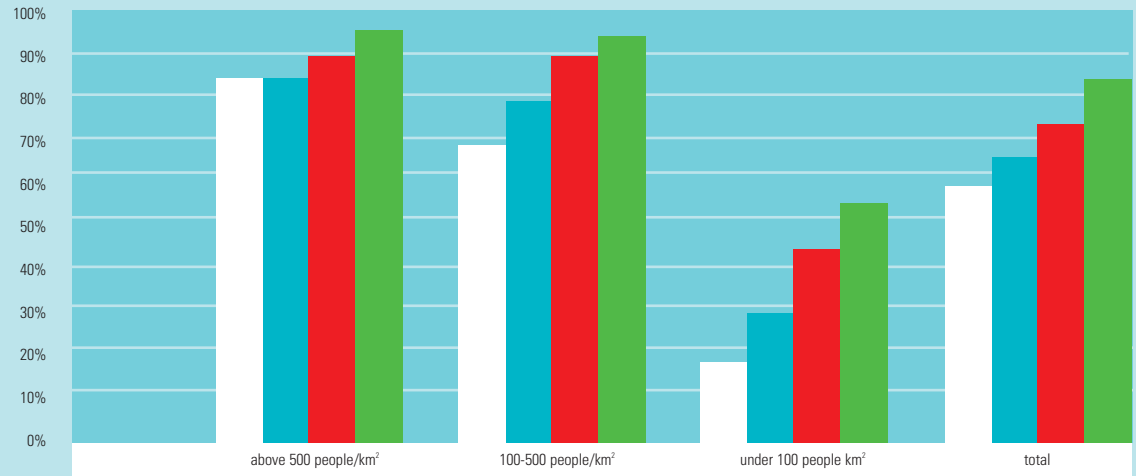
H.3. Broadband access in the public sector

H1. BROADBAND COVERAGE OF THE POPULATION AND ENTERPRISES

- **Make affordable broadband services available to over 80 percent of the population by 2006**
- **Make affordable broadband services available to over 90 percent of SMEs by 2006**

Based on the coverage data and the ongoing technological processes described in the situation analysis of the NBS, ***the broadband coverage of Hungary may exceed 80 percent in the period between 2004-2006.*** The most dynamic development is expected in rural areas with a density of population below 100 people/km2. However, in such regions only less than half of households will have access to broadband electronic communication services.
Based on the distribution of SME sites, ***over 90 percent of SME sites will be operating in municipalities with access to broadband services.***

Chart 14. **EXPECTED CHANGES IN BROADBAND RESIDENTIAL COVERAGE UNTIL 2006**[9]



	above 500 people/km²	100-500 people/km²	under 100 people km²	total
2004-03	84.7%	69.1%	17.8%	57.2%
2004-12	85%	79.3%	28.7%	64.3%
2005-12	90%	90%	45%	75%
2006-12	95%	95%	55%	81.67%

[9] The forecast for coverage changes took into account the expected tendencies of all fixed and wireless technologies.

The achievement of this strategic objective is expected primarily as a result of the efficient working of market mechanisms and an increase in consumer demand. From this point of view the modification of regulations is of key importance. Such modifications, however, must be accompanied by different fiscal measures required due to the country's relatively poor level of development and low personal income levels.

H.1.1 NEW ELECTRONIC COMMUNICATIONS ACT, IN FORCE SINCE 1 JANUARY 2004. The regulation of competition plays a key role in enforcing market mechanisms in electronic communications services. This is what makes it extremely important that the new Electronic Communications Act entered into force in Hungary on 1 January 2004 (making it the first among pre-accession countries), which – through intensifying competition and reducing prices – may accelerate the spreading of broadband accesses and thus creating a higher demand for content services.

MAIN OBJECTIVES OF THE ELECTRONIC COMMUNICATIONS ACT

- Intensify competition between technologies and service providers
- Create clarity on the telecom and Internet markets
- Offer real alternatives to consumers
- Protect consumers against service providers
- Create harmony with EU directives and expectations
- Accelerate the spreading of Internet use
- Establish the National Communications Authority

Besides improving the general conditions of market competition, a key achievement of the Electronic Communications Act in broadband developments is that – in conformity with Regulation 2887/2000/EC of the EU and in accordance with EU Directive no. 2002/19/EC ("Access Directive") – it orders the cost-based unbundling of local loops (twisted subscriber pairs). This is an important regulatory measure, which will have a positive effect on the spreading of Internet access in the long run, as a result of the spreading of collocation schemes.

H.1.2 CANCELLATION OF THE "ONE SIXTH LIMITATION" ON THE CATV MARKET. The year 2003 brought about positive changes also for broadband services provided via CATV networks. CATV development came to a halt in 2000-2001 as the limitation of subscriber numbers (set out in the Media Act) prevented development. The Electronic Communications Act, in force since 1 January 2004, reduced the limitation set forth in the Media Act (i.e. that the number of subscribers contracted by any CATV service provider may not be higher than one sixth of the total potential customer base) to half its original level: now one service provider may have as much as one third (instead of one sixth) of the customer base. As a result of this modification, an acceleration of the consolidation process and an increase in investments are likely on this market, which still has several hundred competitors.

H.1.3 NEW FREQUENCY BAND FOR WIRELESS BROADBAND SERVICES. As to wireless broadband services, a positive change may be triggered by the expected granting of the 26 GHz frequency band already in 2004. In the European and Hungarian Frequency Allocation Plans this frequency band has been allocated to the LMDS (local multipoint distribution system). The introduction of the LMDS enables the provision of broadband microwave transmission capacities in locations where the same is impossible or less profitable through fixed lines. LMDS can be a new solution to connect small towns and villages to the Internet – via connections operating at acceptable bandwidths.

H.1.4 HUF 10.48 BILLION FOR INVESTMENTS IN BROADBAND INFRASTRUCTURE PROJECTS IN POORLY DEVELOPED REGIONS. Priority 4.4 of the Economic Competitiveness Operational Programme (Hungarian acronym: "GVOP"), funded from EU Structural Funds and the Hungarian state budget, devotes HUF 10.48 billion to supporting broadband infrastructure development in poorly developed regions until 2006. The purpose of the program, entitled „Support of Construction of Broadband Networks by Small and Medium-size Enterprises in Poorly Developed Regions", is to increase broadband Internet penetration in small towns and villages (i.e. those with a population of less than 15,000), currently being poorly covered with infrastructures and less attractive to businesses, where the infrastructure required to provide broadband services would be built only in the future or not at all without state support. This enables SMEs, potential employees and – through the community endpoints available for use by anyone – to develop and join business processes.

H.1.5 TAX CONCESSIONS TO SUPPORT SPREADING OF BROADBAND ACCESS. The Hungarian State supports the construction of broadband infrastructures by granting a 50 percent profit tax concession (Article 22/B of the Company and Dividend Tax Act; Act 81 of 1996). This tax concession is available to telecommunication companies whose expected profit exceeds HUF 50 million and which have invested over HUF 100 million.

The relatively low level of income of Hungarian citizens also justifies the temporary subsidising of end-user equipment costs. In 2003, only people in education (teachers, students and their parents) were eligible for the HUF 60 thousand tax concession after the purchase of information and communication equipment **("Sulinet Expressz" Program)**. In 2004, eligibility criteria are expected to be loosened, though subsidies will only be available to those who also invest their own money in such purchases. Besides, tax refunds will only be available to people in the

lower income bands. The importance of this subsidy type is shown by the fact that, according to preliminary information, over five hundred thousand products were purchased under the "Sulinet Expressz" project, 60 thousand new computers were installed in homes and 150 thousand computers were upgraded in 2003.
The **"Employee PC Program"** also offers a tax concession after employer-to-employee equipment transfers, to develop the information society. The main elements of this program are as follows:
• Businesses may write off the costs of purchased, rented or leased IT equipment in two years after 2003;
• Employers have to pay neither personal income tax nor social security contributions after the costs of computers and Internet access provided for employees in their homes and may transfer ownership of PCs over two years old to employees without paying any such tax or contribution;
• The costs of computers and Internet access provided for employees for home use can be written off in one amount

H.1.6 SUPPORT FOR INNOVATIVE, TECHNOLOGY INTENSIVE INFRASTRUCTURE DEVELOPMENTS AND SERVICE PROVIDER MODELS. During the period until 2006 – similarly to and based on the experience of the HUF 400 million support program in 2003 (program code: IHM HHÁT-3) – a series of funding schemes will be launched to support viable, exemplary, innovative and technology intensive infrastructure developments and service models, which will result in
• an increase in residential broadband Internet penetration even in towns and villages where infrastructure development is currently limited by business and/or technological circumstances,
• the availability of broadband residential services which could not be made accessible under the current infrastructure conditions (higher bandwidth, non-geographical applications, etc.),
• the introduction of integrated technology and service models which ensure full broadband Internet coverage in a given region and can also be used to cover small regions in the long run.

INNOVATIVE AND TECHNOLOGY INTENSIVE PROJECT PROPOSALS SELECTED AS WINNERS IN THE IHM-HHÁT-3 PROGRAM

1. Development of wireless infrastructure offering the same level of security as fixed line solutions, for fixed and hot spot users, in one of the worst developed regions of Hungary (Szabolcs-Szatmár-Bereg County)
2. Model for a significant acceleration of residential access through Ethernet-based development
3. Integrated small region broadband solution that uses the ADSL and WiFi technologies and the power network
4. Mixed utilisation of fixed and wireless technologies to provide full broadband coverage of a small town.
5. Financially reasonable ADSL development for the sake of 6 subscribers.
6. Hot spots in two tourism centres: the Balaton and Velencei lakes.
7. Symmetric residential service offering thirty times the bandwidth of base ADSL – based on the Ethernet technology.
8. Financially reasonable infrastructure deployment with short sections installed independently, offering operation as per the ADSL II. Recommendation.

H 2. BROADBAND COMMUNITY ACCESS POINTS FOR EACH MUNICIPALITY
• Finalise the conditions of operation, the base infrastructure and the organisational background for the community access points ("eHungary" points) in the course of 2004
• 2700 broadband eHungary points by the end of 2004
• 4000 broadband eHungary points by the end of 2006

To consumer groups who cannot use broadband services for financial reasons the solution is community access points that can be used free or for a reduced price. Besides the fact that it ensures equal opportunities, the deployment of a broadband community access infrastructure will also arouse the interest and increase the number of residential users. Once tried out at community access points, services and equipment will be easier to use at home and the price/value ratio of broadband connections will be easier to evaluate.

As for the number of public access points per 1,000 inhabitants – installed in "tele-houses", library information and network points, "tele-post" houses, Internet cafés, web terminals – Hungary is at the top among new EU members and at the average within the whole of the EU. The purpose of telecom service institutions, established for different objectives and under different conditions, is to offer shared use of network access. Within public Internet access points, the "eHungary points" form a special group from the point of view of quality. These community access points have the following features:
• service at these points was launched primarily to emphasise community objectives and values (solidarity, social considerations, etc.), rather than business motivations,
• they are operated by an "embedded" organisation that is art of the local community,
• the objective of the service is not only to offer access to the Internet but also to educate people in service use,
• supplementary services are also available at these community access points.

In this context, the eHungary points are a special group of public access points that meet accurately defined criteria and with uniform features. purpose of this uniform network of community access points (i.e. the eHungary points) is to

enable all members of the local community to regularly use state-of-the-art computers and applications on an efficient broadband network in their local environment, using, if need be, the assistance of the so-called "IT mentors".
The purpose of the first phase of the program for the creation of a nationwide network is to install at least 2,700 public Internet access points in the year 2004, where
• a permanent broadband Internet connection (fixed IP address) is available
• people can access the Internet regularly, during published opening hours, in buildings accessible by people with physical disabilities, using the assistance of trained helpers, free of charge or for reduced tariffs.[10]

Table 11. **ESTIMATED TOTAL RESOURCE NEEDS OF THE EHUNGARY PROGRAM UNTIL 2006 (IN MILLION HUF)**

EU resources	Local resources		Total local resources	Grand total
	Resources provided by the state	Private equity		
6000	9200	4800	14000	20000

Source: eHungary Points, Information Society of Small Communities (HISS, Strategy Program Booklets series)

H 3. BROADBAND ACCESS IN THE PUBLIC SECTOR
• survey the broadband coverage and service needs of Hungarian public institutions: by the end of 2004 small regions and towns will be surveyed and classified, identifying those where major state intervention is required to establish state-of-the-art broadband infrastructures.
• As part of the "PublicNet" ("Közháló") Program, 7300 new endpoints will be installed in public institutions by the end of Q3 of 2005.
• At the end of 2006, each primary and secondary education institute will have its own broadband access point.
• At least 50 percent of municipalities will have broadband connections by the end of 2006.
• Further dynamic broadband network deployment will be implemented in higher education and research institutes in 2004-2006.

As regards the Internet penetration of the public sector, Hungary's relative backwardness is less than in the Internet penetration of households. As of the end of 2003, 85 percent of elementary and secondary schools, over 80 percent of local governments, 99 percent of hospitals and 100 percent of higher education institutes had access to the Internet. In the National Broadband Strategy, the prioritised group of public institutions for broadband connections is that of elementary and secondary schools. Owing to their attitude-shaping role within the family, the members of the youngest generation will efficiently contribute to arousing interest in the Internet and to increasing digital literacy and the use of broadband Internet connections in homes. For this consideration, all elementary and secondary schools will be connected to the broadband communications network by the end of 2006 and the currently dominant ISDN and dial-up school connections will be replaced with broadband access lines.

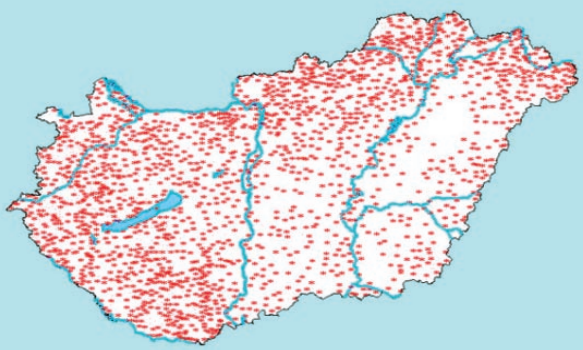
As for the other public institutions, the prime task for 2004 is to survey current penetration and actual needs. Simultaneously, the institutions covered by the strategy and the objectives for their broadband penetration must also be accurately defined.

In the public sector the general introduction of broadband electronic communications is primarily a fiscal task. As the needs to be satisfied are geographically concentrated and are for a relatively homogeneous service portfolio, the primary way to increase penetration is to aggregate demand – in order to ensure cost efficiency, uniform network management and service quality and to be able to offer additional services.

H.3.1 "KÖZHÁLÓ" ("PUBLICNET").
The "Közháló" program, launched for considerations related to demand aggregation and being a priority program in the infrastructure intervention part of the HISS, defined the following goals:
• Install a network ensuring broadband access in all towns and villages of Hungary by end 2006;
• Connect all public institutes and private non-profit organisation working for public goals to this network by end 2006;
• Launch model local and small region network deployment programs.

In the first phase – through public procurement tenders invited in 2003 – 7,300 endpoints will be connected to the "PublicNet" ("Közháló"), which offers market services, by end Q3 of 2005. Of these, 5,000 endpoints will be installed in elementary and secondary schools. In the course of the second phase – simultaneously with the first phase rollout – local and small region network deployment programs will be launched in areas with poor infrastructure development.

Chart 15. "KÖZHÁLÓ" ("PUBLICNET") ENDPOINTS PLANNED TO BE INSTALLED IN 2004-2006



Source: Ministry of IT and Communications

[10]First hour max. HUF 100, all further hours max. HUF 200.

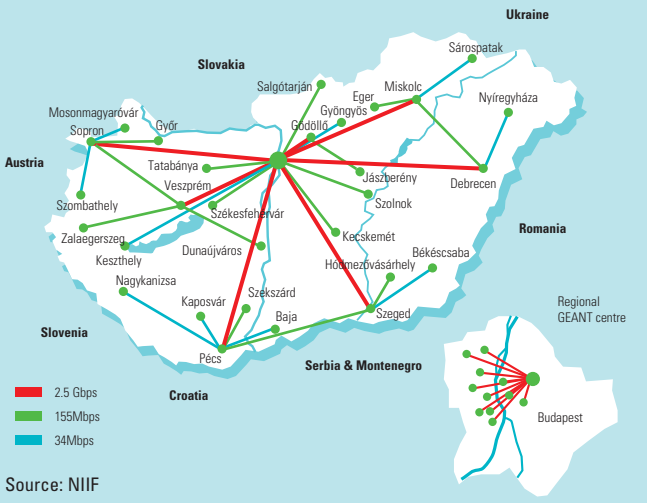
In the third phase, full national broadband network coverage will be reached and island networks will be connected, using the experience gained in the course of model programs.

• To help program implementation small regions and towns will be surveyed and classified by the end of 2004, identifying those where major state intervention is required to establish state-of-the-art broadband infrastructures.

H.3.2 THE NATIONAL INFORMATION INFRASTRUCTURE DEVELOPMENT ("NEMZETI INFORMÁCIÓS INFRASTRUKTÚRA FEJLESZTÉS") PROGRAM ("NIIF")

Besides, "Közháló" ("PublicNet"), the National Information Infrastructure Development (NIIF) Program is another key initiative. It provides organisation services and funding for the installation of a national integrated computer network infrastructure to be used by institutes of education and research and public collections and for the applications and services available through this infrastructure and to be continuously developed. At the end of 2003, some 600,000 users in nearly 700 institutions had access to the state-of-the-art infrastructure, whose combined backbone network capacity was 500 Gbit/s and whose exit speed to the high-speed research network of the EU, the GEANT (Multi-Gigabit pan-European Research Network), was 10 Gbps. The map that follows presents the structure of the "NIIF" backbone network.

Chart 16. THE HBONE BACKBONE NETWORK OF THE NIIF PROGRAM – AS OF END 2003



Source: NIIF

The NIIF Program development strategy defines tasks in four interrelated and complementary infrastructure areas:

• deployment of the high-speed network infrastructure;
• creation of the middleware infrastructure;
• creation of new, network-based types of cooperation (collaborative infrastructure) and
• creation of the calculation infrastructure built on supercomputers.

The target parameters for the development of the different infrastructure areas have been defined for the next three years (2004-2006). For the development of the high-speed network infrastructure these parameters are as follows:

• 10-40 Gbit/s redundant international connections for the purposes of international cooperation and research projects;
• 10 Gbit/s redundant national optical backbone network to support all Hungarian research projects and to enable participation in international projects;
• 10 Gbit/s access network for institutions involved in priority research projects;
• 10-100 Mbit/s access speed to make the digital materials (e-content) of national collections and to enable cooperation between such institutions on a national and international basis;
• an access network with gradually increasing capacity for service providers playing a key role in the information society;
• spreading of collaborative technologies – video conferencing and IP telephony
• institutional internal networks and active elements capable of making the gradually increasing capacities available to end users;
• the full network system should offer high availability (99.75%), use modern network technologies (MPLS, multicast, QoS, VPN, IPv6) and have round-the-clock management.
• through the above
> make available a cost efficient, high-end infrastructure to research and higher education institutes and public collections,
> popularise a sophisticated Internet utilisation culture,
> contribute to the supply of experts on a national basis,
> launch and present the most recent technologies and applications and, as a result of these,
> contribute to the establishment of the information society.

VI.2 STRATEGIC CONDITIONS IN CONTENT, SECURITY, EDUCATION AND MOTIVATION

For the main "access" objectives of the National Broadband Strategy to be achieved, it is necessary to gradually lessen the current, non-infrastructure related impediments to the spreading of broadband electronic communications until 2006. In Content, Security, Motivation and Education the main action programs are covered by the Hungarian Information Society Strategy in the following three intervention areas:

• Content and services (Content)
• Knowledge and skills (Education),
• Legal and social environment (Motivation, Security)

The pages that follow review, in the light of the goals of the HISS, the most important actions in the different areas and the program proposals recommended for careful evaluation in the course of the rolling planning of the HISS.

The expansion of attractive broadband content offering, positive changes in digital literacy and the opportunities to use electronically available information (i.e. the acquisition and utilisation of knowledge), an increase in people's interest in Internet usage and the lessening of security concerns are equally important prerequisites of the spreading of broadband electronic communications. Improvement in these areas will boost demand, will enhance the efficiency of market mechanisms and will, thus, decrease the need for public funding to achieve the strategic objectives of the NBS.

The HISS model identifies the modernisation of processes and the enhancement of services as the two cornerstones of modernisation. The former means the modernisation of the internal operation of processes („back office"), while the latter can translated as the enhancement of the features, available to a high number of users, of the very same processes („front office"). The Strategy groups the interventions required for the improvement of processes into the following areas: content and services, infrastructure, Knowledge and skills, Legal and social environment plus two "horizontal" areas: R&D and equal opportunities.

Strategic Objective

CONTENT

The objective of the National Broadband Strategy (NBS) is to expand the available relevant content and application portfolio in order to enable the spreading of broadband electronic communication and the evolution of positive economic and social changes.

PRIORITIES:
T.1 Digitisation of education and culture related contents, improvement of their availability via networks.
T.2 e-commerce and e-management
T.3 e-Administration
T.4 Creation of environmental monitoring and information systems
T.5 Creation of traffic systems supported by info-communication technologies, connection to similar EU networks
T.6 e-healthcare applications
T.7 e-working
T. 8 Research and Development

Within the HISS, the largest area of interventions is that of Content and Services. The main 'directions' of this area (economy, public administration, culture, education, health, environment) deal with the development of the contents of the services provided in the respective areas of application. Our proposals for action plans, related to these applications, are in line with the contents of the said main directions.

T.1 DIGITISATION OF EDUCATION AND CULTURE RELATED CONTENTS, IMPROVEMENT OF THEIR AVAILABILITY VIA NETWORKS

- Improve the dynamism of the digital content market, development of digital, Hungarian and multi-language contents;
- Utilise cultural synergies in economy and social cohesion and to boost the economy,
- Radically increase the number of cultural products produced by creative industries and improve the quality of services.

T.1.1 THE NATIONAL DIGITAL ARCHIVES (NDA)

NDA INITIATIVE
DIGITISATION OF MATERIALS WITH SPECIAL COVERAGE (INHERITANCE OF SCIENTISTS AND ARTISTS, DIGITISATION OF A BASE LIBRARY ON HUNGARIAN STUDIES, FOLK HANDICRAFTS, ETC.)
VIRTUAL MUSEUMS

ACTIONS:
» Create, standardise and coordinate cooperation between data holder institutes. Prepare methodology recommendations for digitisation, publication, authentication and the use of foreign languages.
» Support content digitisation and catalogue compilation. Support the inclusion of public collections in the NDA, integration of already digitised contents into the NDA: preparation and direct connection of large institutes and tender invitation for other archives.
» Compilation of recommendations for the application of digital copyright management system(s).
» Create a training scheme and curriculum for archive management info brokering and support the implementation of such training schemes. Elaborate and publish auxiliary materials on copyright related issues and questions.
» Promote the NDA, usage and utilisation monitoring.

NATIONAL AUDIOVISUAL ARCHIVES (NAVA)

ACTIONS:
» Establish and operate the NAVA. Build up the technical system for the Archives.
» Handle legal issues.

» Recommendations and training materials for audiovisual archiving.

T.1.3 DIGITAL TRAINING METHODS AND CURRICULA

DIGITAL COURSE MATERIALS
SUBSCRIPTION TO ONLINE INFORMATION SOURCES
COLLECTION OF DIGITAL EDUCATION MATERIALS IN LIBRARIES

ACTIONS:
» Spread eLearning technologies in higher and public education. Standardisation, localisation. Organise and support professional events. Application of eLearning-education methods and digital course materials in training courses organised for the disadvantaged and the unemployed.
» Motivate and support the elaboration of course materials for eLearning.
» Support the establishment of online access to education materials, e-books, professional literature and databases in Hungarian and foreign languages; central subscription to such materials; develop and maintain the infrastructure required for legal access to such materials (e.g. student cards).
» Organise the collection, placement and access to digital course materials in libraries.
» Develop the network of student info centres.

T.2 E-COMMERCE AND E-MANAGEMENT
• Encourage the automation of corporate processes,
• Motivate initiatives aiming at the creation of the background for electronic services,
• Implement electronic public procurement.

E-PUBLIC PROCUREMENT
E-PUBLIC WORKS
SOFTWARE EXPORT SUPPORT
SUPPORT OF SMEs

ACTIONS:
» create a uniform Employment Register.
» Create an employment portal.
» Electronic public works program
» Operate an electronic e-public procurement system
» Support industrial parks, "enterprise incubator houses" and, especially, software exporting. Support software exporters through tax concessions (from the company or personal income tax)
» Support e-economic cooperation in a national testing system.
» Support the participation of SMEs in public procurement projects.
» Support the entrance of SMEs into the B2B markets.

T.3 E-ADMINISTRATION
• Understandable, available and clear e-administration,
• Simpler administration.

ONLINE INFORMATION SUPPLY, E.G.:
- LAND REGISTER DATA,
- ONLINE DATA CONCILIATIONS AND APPOINTMENT MAKING WITH DOCUMENT OFFICES OF MUNICIPALITIES
- INDIVIDUAL PENSION ACCOUNTS,
- VEHICLE REGISTER

E-ADMINISTRATION PROCEDURES
E-ADMINISTRATION CONTENT INFRASTRUCTURE
INTERNET PUBLIC ADMINISTRATION SERVICE

ACTIONS:
» Analyse office processes, design new office processes suitable for e-administration; create the process of definition of work processes; establish integrated information systems in public administration. Develop applications and databases, create internal applications and administration procedures.
» Elaborate procedural rules for the handling of e-documents.
» Uniform government metadata standard, name and address registers and thesaurus development and maintenance.
» Provide the infrastructure for the launch of service provider and customer side services. Create an Electronic Government Backbone Network.
» Provide the human resources for the e-government infrastructure.
» Internet Public Administration Service program
» Online information supply about administration procedures (case descriptions). Implement and modernise e-client handling. Provide electronic documents (forms). Access to the work processes of document offices via the Internet: appointment making, data recording, notifications. Online access to vehicle register data. Online accessibility of the pension account. Access to property data via the Internet.
» Establish IT cooperation schemes between small regions.
» Implement application service provider (ASP) possibilities.
» Compile management information, decision supporting and know-how management.
» Encourage IT development activities and the compilation of IT strategies by local governments.
» Involvement in EU integration programs related to public administration.

T.4 CREATION OF ENVIRONMENTAL MONITORING AND INFORMATION SYSTEMS
• Improve the method of collection and publication of data related to environment protection.

ENVIRONMENTAL MEASUREMENT DATA
ON THE INTERNET
ECO-TOURISM

Actions:
» Create and develop monitoring systems: air pollution, water quality, sewage, waste management and noise measurement networks, databases and Internet information systems.
» Support eco-tourism by improving the publicity of environment-related data.

T.5 CREATION OF TRAFFIC SYSTEMS SUPPORTED BY INFO-COMMUNICATION TECHNOLOGIES, CONNECTION TO SIMILAR EU NETWORKS
• Better organised traffic
• Better possibilities for information collection,
• Lower environment pollution.

DIGITAL ROUTE MAP
INTELLIGENT TOLL PAYMENT
INTELLIGENT PARKING FEE PAYMENT SYSTEMS
VEHICLE AND FLEET ROUTE MANAGEMENT
GPS-BASED SERVICES

Actions:
» Compile digital public road map (digital map)
» Influence traffic: telematics, navigation systems, remote monitoring.
» Define standards for data exchange for travelling and transportation. Adopt international and European telematic standards for public roads and traffic.
» Create system of networked traffic information centres.
» Create systems measuring and calculating the use of the traffic infrastructure.
» Issue route permits for special vehicles and monitor the movement of such vehicles.
» Railroad GPS (Global Positioning System) based vehicle monitoring. Introduce ERTMS (European Rail Traffic Management System).
» Develop an integrated border traffic information system
» Install GPS-based services.

T.6 E-HEALTHCARE APPLICATIONS
• Introduction of economical and easy-to-use registration, data handling, information and consultation applications in healthcare.

HEALTHCARE EMARKET
SOCIAL PORTAL
REMOTE DIAGNOSTICS

Actions:
» support the creation of an Internet-based healthcare eMarket
» Social portal
» A program to create the base registers
» Consultation service programs
» Develop health and social indicator system, reporting system (public health reports, data warehouse), modernise monitoring system and harmonise the same with European recommendations and international reporting obligations; operate Internet-based health data warehouse.
» Through the presentation of "best practices" motivate R&D and education activities in e-healthcare, in remote diagnostics and remote medicine.

T.7 E-WORKING (HOME WORKING)
• Create new jobs;
• Spreading of employment types which are flexible and less dependant on the conditions of "commuting" (for parents with small children, those living in small regions or people with physical disabilities),
• Support the social integration of people with disabilities.

NEW JOBS
METHODOLOGY

Actions:
» Pass more accurately defined items of legislation for home working.
» Have methodology compiled: know-how in analyses, organisation, management, contracting, etc. required for the creation and maintenance of home working jobs.
» Create home working jobs in public administration.
» Support the creation of home working jobs, primarily in SMEs, with priority funding for the employment of people with disabilities.
» Competition for "best practices", supply of information about the same.

T. 8 RESEARCH AND DEVELOPMENT
• Support Hungary's innovation capacity through the development of new broadband Internet applications and services.

DEVELOPMENT OF CONTENT INFRASTRUCTURE
CONNECTION TO EU RESEARCH NETWORKS

Actions:
» The development of Hungarian content infrastructure should be a priority in R&D: launch targeted programs for the concentrated development of these, through joint efforts by Hungary's intellectual centres.
» Support pedagogical and technological research and development for eLearning (R&D programs).
» Support the development of broadband technologies and applications that facilitate the installation of connections to European research networks.

Strategic Objective

SECURITY

The objective of the National Broadband Strategy (NBS) is to ensure that concerns regarding the security of transactions do not put a limitation on the spreading of broadband electronic communications.

PRIORITIES:
B1. Secure Infrastructure Program
B2. Security of Content Program
B3. Culture of Security Program

Security and confidence resources will be will be basic infrastructure elements of the Internet of the future. (These include the infrastructure of certificates; the infrastructure of digital signatures and other authentication procedures; the white and black lists of reliable and unreliable sources – for example for spam filtering; other data about authentic sites; virus databases, etc.).

An important element of confidence is to ensure that users feel secure – both as regards the handling of their own information and the truthfulness of third party information. IT security is primarily not a technological issue – though IT solutions play an important role in the management of this aspect of security.

The level of confidence of users is to a great extent determined by how much confidence they have in the truthfulness, innocuousness and lawfulness of use of the downloaded contents. Sensible and honest usage may be impeded by users' fears of frauds in electronic financial transactions, of downloading viruses with the required information or of access to their personal data by unauthorised persons. Authors are also afraid that their copyrights will not be enforced.

Security precautions for broadband transactions, therefore, should also include copyright issues, data and virus protection, the protection of minors, the spreading of the use of digital signatures and the issue of spam filtering.

Until 2006, the state may achieve positive changes in the area of security primarily by creating examples (e.g. the launch of DRM sample projects), the development of the institutional background (an organisation for security certification and Policy Authority for the definition of requirements for electronic signatures in the public domain, by the end of 2004) and through regulatory measures (fine tuning of the e-commerce and e-signature acts).

Action proposals are grouped according to the security of the infrastructure and contents and the culture of security (B1-B3).

B1. SECURE INFRASTRUCTURE PROGRAM

- From 2006, the security level of the communications and IT infrastructure should reach EU average.
- The security level of Internet servers should reach EU average.
- Professional handling of professional aspects of security issues
- Enforcement of Hungary's national interests in the course of the adoption of regulatory principles and practice.

B.1.1. INCREASE THE NUMBER OF SECURE SERVERS

The use and development of e-commerce and e-public services are in tight correlation with the number of secure Internet servers.

SECURE SERVERS IN PUBLIC ADMINISTRATION INFORMATION AND NETWORK SECURITY REQUIREMENTS

Action:
» Secure server penetration in public administration (index: number of secure servers/1 million inhabitants) should reach the average of public administration within the EU by 2006.
» Define and publish security requirements for Internet servers which are in harmony with international expectations, encourage the application of standards (the other sub-programs within B1 are connected to this).

B1.2. CREATION AND OPERATION OF A SECURITY EXPERT BASE IN HUNGARY

BUILD UP A SECURITY EXPERT BASE

Action:
» As the management of security issues requires special expertise and procedural rules (based on government, state administration, crime prevention, legislation, national defence, consumer protection, professional policy, education and numerous other aspects), it seems purposeful to create and operate an expert base whose members, ideally, could serve all users. As the above listed tasks are mainly those of the state, a scheme, capable of addressing all needs, should be defined which can surpass, owing to its capabilities (including the technical background), all others in response times and knowledge. Quick reactions and a progressive attitude are also very important as security requirements and methods will change ever faster in the future. The drafting of new items of legislation and authority tasks also strongly require such an expert base. This expert base is also expected to provide consultation regarding preparations for catastrophes and systematic intrusion attempts.

B1.3. ACTIVE PARTICIPATION IN INTERNATIONAL SECURITY REGULATION

PARTICIPATION IN INTERNATIONAL SECURITY REGULATION PROCESSES
ACCELERATION OF LOCALISATION PROCESSES

Actions:
» integration of our experts into the system of working committees of the European Union.
» Prepare the professional aspects of the integration of security-related directives into Hungarian law. Accelerate the process of localisation of standards. Organise, manage and evaluate the necessary professional forums.

B2. SECURITY OF CONTENT PROGRAM
• Improve user confidence in e-services
• Simplify copyright procedures and enforce copyrights

The level of confidence of users is to a great extent determined by how much confidence they have in the truthfulness, innocuousness and lawfulness of use of the downloaded contents. Sensible and honest usage may be impeded by users' fears of frauds in electronic financial transactions, of downloading viruses with the required information or of access to their personal data by unauthorised persons. Authors are also afraid that their copyrights will not be enforced.

B2.1. CREATE E-CONFIDENCE (TRUTHFULNESS AND QUALITY OF CONTENT)

SECURITY FILTERING OF PRODUCTS
IMPROVE THE CONDITIONS OF E-SIGNATURES
INTELLIGENT CARDS
SECURE, NO-CASH TECHNOLOGIES
E-DOCUMENTS IN HEALTHCARE
E-TAX RETURNS, ETC.
ENHANCEMENT OF SUBSCRIBER IDENTIFICATION
PROTECTION OF PERSONAL DATA IN WIRELESS SYSTEMS TECHNOLOGY-NEUTRAL INTERCEPTION REGULATION

Actions:
» Filter out market players and products not guaranteeing security minimums
» Fine tune the regulation of electronic signatures, create real competition among the certification institutes, motivate user needs, develop state administration into a sample application area
» Develop intelligent card standards and encourage their introduction
» Encourage the use of secure no-cash technologies and improve consumption culture through education and propaganda
» Confidential electronic document handling in the healthcare sector: lay the technological foundation from state resources, train qualified employees and organise PR campaigns to win the confidence of the population
» Spread the technological preconditions of electronic tax returns and electronic public procurement (electronic signatures, intelligent cards)
» Enhance and standardise the authentication procedures used in GSM and 3G systems (for subscriber identification, billing, authorisation issues)
» Standardise and spread the encryption techniques applied to ensure anonymity and protection of personal data of subscribers in fixed wireless (FWA) and W-LAN systems.
» Technology-neutral regulation of lawful interception.

B2.2. COPYRIGHT PROTECTION

ENFORCE COPYRIGHTS IN PROFESSIONAL LITERATURE AND DATABASES, SIMPLIFY COPYRIGHT ACQUISITION PROCEDURES
DRAFT COPYRIGHT ENFORCEMENT DECREES

Actions:
» Enforce copyrights and other similar rights in professional literature and databases, simplify copyright acquisition procedures, clarify possibilities of free usage.
» Draft and clearly interpret enforcement rules for copyright and database protection for libraries and archives.

B3. CULTURE OF SECURITY PROGRAM
• Involving all affected players, get to know and spread the use of European best practice and develop it into a widely approved base requirement.

Technical solutions in themselves do not suffice. It is therefore necessary to form the attitudes, behaviour, habits and even the way of thinking of service providers and users regarding security aspects – as problems do not solve themselves and are difficult or slow to solve at one's own expense.

Actions:
» Join the 'Culture of Security' EU program (scheduled completion: end of 2005)
» Full utilisation of available EU grants in programs designed to fight user fears and aversions.

JOIN THE CULTURE OF SECURITY EU PROGRAM
PARTICIPATE IN THE SECURITY ENHANCEMENT PROGRAMS OF THE EUROPEAN UNION,
ACQUISITION OF GRANTS

Strategic Objective

EDUCATION

The objective of the National Broadband Strategy (NBS) is to ensure that the spreading of broadband electronic communication is not hindered by bottlenecks in digital literacy or in ICT expertise

PRIORITIES:
K1. Digital literacy
K.2 ICT expertise

The issue of education must be approached from two aspects. On the one hand from the point of view of digital literacy and, on the other, in the light of ICT expertise. The level of digital literacy will increase with the spreading of Internet access, progress can be measured in a sophisticated manner. The introduction of the indicators used in the eEurope2005 Plan in Hungary is planned.[11]

K1. ACCELERATION OF THE SPREADING OF DIGITAL LITERACY

• To diminish the feeling of *„complexity"* regarding the use of ICT tools and the Internet

"THE HUMANITARIAN COMPUTER"
"SULINET EXPRESS"
EDUCATION OF TEACHERS
EXTENSION OF ICT HIGHER EDUCATION
ICT – PART OF EVERYDAY LIFE IN HIGHER EDUCATION
ECDL DEVELOPMENT
PARTNERSHIP BETWEEN ENTERPRISES AND EDUCATION INSTITUTES IN ICT TRAINING
E-LEARNING, WEB-BASED TRAINING MATERIALS AND STANDARDS

We also recommend that the "E-Education: Digital Culture in Education" program (Education Direction of the HISS) and the "Digital Literacy: Literacy in the 21st Century" program (Knowledge and Skills Direction of the HISS) be implemented and the planned indicators be applied. The A Digital Literacy program is built on the ECDL system (managed by the Neumann János Computer Science Society) and its future development. Owing to its relatively widespread use (1.2% of the population are registered students of the ECDL programs, which places Hungary no. 8 on the international list), its nationwide network (nearly 300 examination centres throughout the country, with an even geographical distribution of students with the exception of Budapest) and, last but not least, its acceptance in the EU, the ECDL system is likely to prove a solid foundation.

Actions:

» Familiarise large segments of the society with computers and their use. In contrast with the technology-focused education tradition, the simple handling of computers and the use and exploration of the Internet must be in the focus.
» ICT training of elementary and secondary school teachers in the framework of the Sulinet Express Program;
» In public education, increase the affinity of teachers through the expansion of the infrastructure available to them and further training.
» In higher education, gradual, intensive increase of the number of students majoring in ICT; outside Budapest new ICT departments at colleges and universities;
» Make ICT tools a regular working tool for all instructors and students in higher education;
» Enhancement and broadening of content of the ECDL (European Computer Driving Licence) program (used to certify the level of digital literacy);
» Encourage multinational and Hungarian enterprises to launch e-learning programs, web-based training courses and partnerships with institutes of higher education.

GENERAL PRECONDITION, CONNECTION WITH THE T.1.3. SUBPROGRAM:
1. To make digital tools widely used in education there is a need for available contents, broadly accessible digital course materials, auxiliary materials used in teaching and databases that offer the overall handling and registration of such materials.

To enable easy use, there is a need for common formats enabling changes and the combination of materials, standardisation and to elaborate recommendations.

K.2 IMPROVEMENT OF ICT EDUCATION

• Develop the ICT expert base required for the evolution of the information society

As for electronic or ICT expertise, similarly to other EU member states Hungary also has to educate experts suitable to work in ICT and e-commerce jobs, whose number is expected to increase. This means, on the one hand, the further fortification and broadening (in student numbers, geographical distribution and the number of specialist fields) of ICT training in higher education. (At present, ICT courses are available at colleges and universities in at least 15 cities outside Budapest). Partnerships between enterprises and education institutes and the application of e-learning solutions in education must be strengthened.

On the other hand, it means the integration of ICT training courses into the European system. In the EU the profiles for the different ICT jobs have been elaborated, together with the expertise required in such jobs and the curricula providing such expertise.[12] It is a must to import these.

[11]TÁRKI: Indicators for the monitoring and rolling planning of the HISS. Flash report for the Ministry of IT and Communications, Version 2.0., January 2004
[12]www.career-space.com

We must note that this issue is handled as a priority in the eEurope2005 Program: work meetings and conferences are organised on a regular basis for the elaboration of common methodologies and to get to know best practices.[13] No uniform indicator has yet been defined to measure progress.

Strategic Objective

MOTIVATION

The objective of the National Broadband Strategy (NBS) is to ensure that the spreading of broadband electronic communication is not hindered by the lack of interest of potential users or the lack of knowledge of services.

PRIORITIES:
M1. Identify the reasons for the lack of interest among influential community members

In Hungary, the spreading of broadband access technologies is still hindered by a negative attitude to the Internet, the lack of interest characterising a major part of the population and the insufficient knowledge of broadband possibilities and services.

• The improvement of access opportunities, the expansion of the available content portfolio, the enhancement of the security of services and the spreading of digital literacy are all motivation increasing factors. Nevertheless, in the current, initial phase of the development of broadband electronic communications targeted communication and promotion campaigns play a crucial role. The biggest challenge in this area is the fact that the benefits of broadband services can be experienced basically by using them.
• From the point of view of the spreading of broadband Internet it is highly important to convince the influential members of the community to approve innovations and decision makers (including those with a negative attitude) about the relative benefits of innovations. Such efforts can be successful through well operating services that prove useful to these people. Specific goals in this area have been defined in the „Content Action Plans". The spreading and improvement of digital literacy and ICT expertise can be used to ensure that decision makers do not find innovations overcomplicated. The installation of community access points can be useful to try out and gain experience about the service. The motivation aspects of confidence are covered by the „Security – Confidence Action Plans".

The paragraphs that follow describe an action proposal not yet mentioned so far. No specific action plans are defined to describe the role of the media in influencing the general opinion, advertisement and promotion possibilities or the role of indicators and comparative indices, etc.

M1. IDENTIFICATION OF REASONS FOR AVERSION – AMONG INFLUENTIAL COMMUNITY MEMBERS
• Get to know the positions of people making decisions about the approval of innovations and of those influencing the positions of other community members, identify the reasons for aversion and the solutions to the problem.

SURVEYS, RESEARCH PROJECTS:
- LEVEL OF USE OF ICT
- INFORMATION SOCIETY
- IMPEDIMENTS TO THE SPREADING OF BROADBAND TOOLS
- ROLE OF INFLUENTIAL COMMUNITY MEMBERS
- EXPERIENCE FROM THE CIVIL TELE-HOUSE PROGRAM

Actions:
Surveys and related social science research projects:
» On ICT penetration, general approval and level of use,
» On the identification of the impediments to the development of the information society,
» On the examination of impediments to the spreading of broadband technologies and applications and the method of their elimination
» On the role of influential community members in the information society;
» On the collection of experience gained in the Tele-house civil movement (covering 550 municipalities at present), the use of such experience and its integration in the eHungary Point and PublicNet programs, with special respect to the spreading and enhancement of the applications used in the Tele-house movement.

[13]Pl. European e-Skills Forum, Brussels, 24-25 March 2004; European e-Skills Conference, Thessaloniki, 20-21 Sept 2004.