

IV. NETWORK ACCESS

IV.1. Penetration of Network Access Technologies

This chapter looks at the level of network access technology penetration in Bulgarian society. Several aspects that cover all major variations of modern network access technologies are studied and discussed below.

1.1. Basic Telephony

Teledensity (number of telephone lines per 100 people): Teledensity is an indicator with the longest observed values. A decade ago Bulgaria had the highest teledensity among the former COMECON countries with a level of about 30 PSTN (main) lines per 100 inhabitants. These lines were entirely old-fashioned analogue connections designed exclusively for voice transmission and did not permit high-speed network access. Often even the quality of voice transmission was poor. Currently, the connection speed over these lines reaches maximum 28.8-33 kbps. According to Bulgaria Online in two-thirds of the cases the speed does not go beyond 19.2 kbps.

The number of PSTN lines has increased by about 25 percent in the last decade reaching the teledensity of **37 lines per 100 people**, the new lines being all digital, 56 kbps capable lines.

Penetration of phone lines into households: Since most dial-up Internet connections are still made over classical PSTN lines, this is another important aspect of telephony availability. In Bulgaria the number of the operational residential PSTN lines (about 2,454 million) is close to the number of households (2,956 million⁶) in year 2001, amounting to density of 83 lines per 100 households. However in representative surveys by Vitosha Research and other sociological agencies households which reported telephone lines are less. Still, Bulgaria proves to have a significant level of PSTN penetration for home and office use which provides an important communication medium to $\frac{3}{4}$ of the population. As a comparison, there are 469,000 main business lines, although this number refers to officially registered lines. The difference of 5-8 percent in residential teledensity above could be explained by the fact that many companies use residential lines for their everyday business.

Penetration of digital phone lines: “Digital” here refers to phone lines that have tone dialling and are 56 kbps capable. The ration of “digital” lines to all lines, as reported by BTC, 22 percent, suggests important characteristics of fixed telephony. All new lines are digital and some of the old analogue lines are replaced with digital. As of January 1, 2002 the number of digital lines is 442,000.

Penetration of ISDN phone lines (2x64 kbps capable): ISDN services were introduced in Bulgaria only about 4 years ago. The short period, together with the higher setup and maintenance fees in comparison with digital phone lines, are the

⁶ Based on the last census preliminary data, National Statistical Institute 2001

main reasons for the extremely low level of ISDN penetration, reaching only 0,34 percent (in measured by numbers) and 1.4 percent (if measured by channels). As of January 1, 2002 the number of ISDN lines was 9,543 BRI, 707 PRI, and 299 R2D-MFC.

1.2. Cable Access

Home access to cable TV: Cable TV started developing in Bulgaria more than 10 years ago. Being an inexpensive alternative to terrestrial broadcast while offering much more entertainment opportunities, it quickly become a widely popular service. The penetration of cable TV is considered important for the overall network connectivity because Internet access via cable was introduced in early 1999 and since then has become a network service with increasing importance. Cable is the cheapest way to bring broadband connectivity to lots of end users and currently more and more cable network operators are introducing two-way transmission channels that will make their services interactive. About 48 percent of the households now are reported to have access to cable TV.

Internet access via cable TV. Due to the late development of interactive services over cable networks the percentage of their users is still low, especially when compared with the overall penetration of cable services – only 3,3 percent. However, their number is more than doubling in each of the past two years and the service is becoming increasingly available in cities and smaller towns across the country. Still an obstacle to growth remains the high price of modems.

1.3. Mobile Communications

Penetration of mobile phones. Bulgaria's first mobile operator, Mobikom, appeared in early 1993 as a joint venture between the state-owned Bulgarian Telecom Company and Cable&Wireless of the U.K. In 1996 the first GSM operator launched its services. Currently these two operators cover more than 90 percent of the territory and more than 95 percent of the population of the country, while a second GSM operator under the name GloBul was launched in late 2001. Although the high cost of the mobile service has been an obstacle for some time, in the past two years the number of mobile service subscribers has increased more than 5 times. At the end of 2001, **14,3 percent of the population were reported to use mobile telephones**, although the data reported from the mobile operators show than 18 percent of population uses mobile phones.

With the popularity of mobile services increasing rapidly over the past two years, the mobile phone has turned from a luxury "high-tech gadget" to a mass product with about **¼ of the households possessing at least one mobile device**.

Shares of different mobile services. This issue is important in analysing the progress in implementation of the latest mobile technologies. While some two years ago the share of the NMT operator, Mobikom, was twice the share of the then-only GSM operator, about a year ago, they became equal in number of subscribers and today the GSM technology definitely prevails with two GSM operators.

Mobile Internet access. Only insignificant number of people use mobile Internet access due to at least two reasons: the relatively high price (more than 3 times the price of regular dial-up access) and the low connection speed (currently the GSM network of Mobiltel only supports connection speeds of up to 9,600 bps).

1.4. Penetration of computers in households

The main assumption made is that every computer, even if it is not so modern, is capable of Internet access. This figure is important since it confirms that the majority of Internet users in Bulgaria are not home users but access the Internet from other places (e.g. Internet cafes, public access points, schools and universities, workplaces and offices, etc.) The main reason for this distribution of Internet access points is again the overall economic situation which makes an investment of more than four average monthly salaries for a modern computer still impossible for the great share of Bulgarian households. As a whole, about 4 percent of the households are reported to have a computer at home. (This issue is further discussed in the section on “e-Society”.)

1.5. Quality of Network Access

Dial-up connection failures. With the new digital technologies being implemented by the state-owned Bulgarian Telecom Company, the number of connection failures seems to slowly, but steadily decline. With the improvement of the ISP's hardware, almost all unsuccessful calls (busy line – impossible to reach the dial-up phone number, premature termination of connection, etc.) currently originate in the existing poor quality analogue phone lines. It should be noted that many cases when it is impossible to reach the dial-up phone number because of telecommunications problems are still recorded as “unsuccessful attempts”. Since there is no effective instrument to measure the percentage of unsuccessful dial-up attempts, an estimation has been made based on user feedback and statistical data. It can be considered optimistic that the rate of reported failures is decreasing compared to some 1-2 years ago.

Web sites reaching failures. With the improvement of the equipment of Bulgarian ISPs and with the development of local Internet content it has become quite rare that web sites are not accessible. Several typical measures to ensure content availability include duplicated connection lines, clustered servers, data backup, among others. Once again it is not possible to give a precise figure. That is why an estimation has been made on the basis of downtime statistics provided by several major ISPs. The rate of reported failures is definitely declining compared to period of 1-2 years ago.

Security related problems (viruses, hacking etc.). With the growth of Internet as a universal medium, more and more people begin to appreciate the security risks it involves. The level in Bulgaria seems lower than in developed countries due to some general market drawbacks (e.g. very low level of e-commerce and other online activities), low online time per, low overall knowledge of Internet technology. Most of the reported cases of security breaches are limited to unauthorized access to web sites (a.k.a. hacking) and virus infections. There are

almost no reported cases of economic espionage or compromised sensitive fiscal information (like credit card numbers, bank account information, etc.)

1.6. Number of domains registered under the country's TLD

The number of domain names under the country's top-level domain (TLD) has grown by more than 50% in the past year. Although twice as high compared to a year before, it is still lower than the growth rate reported in developed countries. The main obstacles relate to the slow development of online B2B and B2C solutions, as well as the high price charged by the only country's TLD manager (i.e. the annual subscription fee is about 2.5 times higher than for a .com domain name). The monopoly position, long registration procedure and the lack of online registration and transfer mechanisms are also serious obstacles.

IV.2. Network Connectivity

Compared to EU countries and USA, Internet in Bulgaria has a shorter history. Internet connections were first established at the beginning of the 1990s, but it was 1995 when Internet became a commercial product and the Internet services market started its development in Bulgaria.

The history of Bulgaria's Internet market can be roughly divided into two periods: a start-up period of establishment and initial steps, and a second period of professional development.

The initial/start-up period began in the early 1990s and lasted until the end of 1997. It was characterized by:

- Lack of technical professionals
- Lack of marketing professionals
- Lack of high-quality equipment
- Lack of sufficient Internet connectivity for the ISPs (i.e. insufficient up-link bandwidth)
- Lack of cross-link connections among Bulgarian ISPs
- Underdeveloped market with large deviations in quality and pricing among different suppliers;
- Insufficient information about market needs.

Networking development first began in the largest scientific institutions in Bulgaria – e.g. Bulgarian Academy of Science and Technical University in Sofia – as purely non-commercial research projects. In 1991, a company was founded under the name of Digital Systems, which became the top-level domain registry for Bulgaria. By mid-1994 Bulgaria was already connected to the Internet thanks to the collective efforts of Open Society Fund and several non-governmental initiatives through establishing a new organization called Unicom-B to provide Internet connectivity to several universities through a leased line to Vienna. At the same time, American University in Blagoevgrad established its own satellite Internet link.

In late 1994 and early 1995 the first two commercial Internet Service Providers appeared on the market – KIT and Bulnet. Being experienced in offering e-mail services, they quickly expanded by offering full Internet access.

In addition to the already mentioned objective reasons, the poor macroeconomic situation in Bulgaria in the second half of 1996 and first half of 1997 additionally constrained the hi-tech sectors, like ICT, from developing properly.

The end of 1997 can be considered the starting point of professional development of Bulgaria's ICT market. With the economy gaining stability and the growing demand for better information services (especially from large corporate customers), several companies took the lead as national information suppliers. All of them, either fully or partially, fulfil the following elements:

- Broadband connections to one or more international networks
- Private national backbones
- Business-to-business and business-to-customer solutions
- Full range of Internet services (dial-up and leased lines operation, Web hosting services, broadcasting services)

Two general types of ISPs could be found on the Bulgarian market:

First-level ISPs, whose main business activities are to provide broadband Internet connectivity to end-users nationwide and to serve as primary Internet suppliers to all second-level ISPs. First-level ISPs also supply Internet services to large corporate customers. Currently, there are four major wholesalers:

- BTC Net (subsidiary of the Bulgarian Telecommunications Company)
- Digital Systems – the Bulgarian TLD registry
- Mobikom – first mobile operator
- Orbitel, a private company established in 1997 with portfolio investments from the European Bank for Reconstruction and Development.
- Spectrum Net, a private company acquired in 2000 by the Austrian EuroPro Net.
- ITD Networks, a private company currently controlled (by acquiring two thirds of the capital in 2001) by the Belgian Sky Vision, a subdivision of UU Net.

Second-level ISPs, who operate typically within a single town/city or several nearby towns. They usually provide Internet connectivity and accompanying services to end users and small business. The number of second-level ISPs reached more than 150 in the year 1999, but after a series of mergers and acquisitions the number fell down to about **50-60 companies**.

First-level ISPs are located in the country's large cities, mostly in Sofia, Plovdiv and Varna. Second-level ISPs operate in big cities and small towns alike (for a detailed information on distribution of second-level ISPs in small towns, see below).

Currently, first-level ISPs use two strategies to expand their operations in the country:

- By building their own backbones; or
- By opening franchises and supplying Internet services to second-level providers.

Several types of terrestrial communications are available to end users:

- Dial-up services – the most popular and most often used. They provide more than 90 percent of end-user Internet connectivity;
- ISDN services – available only in large cities, but becoming ever more popular;
- Cable modems – available only in Sofia. The service is currently offered by only one company and is mainly used for building VPNs between offices.
- High-frequency wireless links;
- Satellite links.

Besides local dial-up pools, Bulgarian Telecommunications Company introduced nation-wide Internet access through a universal dial-in system. It uses a single access number reachable from around the country without long-distance telephone charges.

A separate study conducted in 2001 by Vitosha Research of the network connectivity in smaller town shows the following highlights:

- Internet in the small towns is quite less available than in large cities, with poorer quality and almost no choice between Internet suppliers.
- Most of the studied towns don't have any access to Internet (over 60% in number) or have only one ISP (about 30%). Only a small number of towns have more than one ISP (less than 10%).
- Relatively larger towns offer more possibilities for access to Internet - more than 50% of the total population of the studied towns has the potential ability to access the Internet.
- The average prices for access to the Internet (where available) are almost as twice as higher than in the large cities. The average price is over 60 cents per hour for a monthly package of 30-40 hours.

2.1. International connectivity

The main Internet wholesale supplier is the Bulgarian Telecom Company, which is reported to operate about 79 Mbps over fiber optics channels. The main link goes through OpenTransit (a division of France Telecom)

Two other operators have two-way VSAT connections – one is ITD Networks, a private company, which is a division of the SkyVision – the Belgian part of UU Net Europe. The second is the state-owned Digital Systems, which is connected through the CyberStar (formerly known as Lorel-Orion) service in USA. Each of these connections is estimated to be of about 4-5 Mbps.

In addition to this, some Second-level ISPs operate Digital Video Broadcast (DVB) Service – a download-only service originally designed for home Internet. It is not possible to evaluate the incoming traffic via DVB but it can be estimated that there are at least 100 such devices in use only for the needs of ISPs and public Internet access points. Many more are used for home and corporate Internet access.

One of the most objective indicators of international connectivity to be studied, especially in the long run, is the **total international bandwidth per capita**. This figure can give a rough idea of how the national nets are connected to the worldwide ones. The low absolute value of **6,5 bps** can be explained by several factors:

- Bulgaria's geographical location, neighbouring on countries with the same level of economic development;
- The lack of satellite coverage over the Balkan Peninsula, which makes VSAT and other two-way satellite connections harder to establish and more expensive to support;
- A decade of civil war in former Yugoslavia, which made fiber optics channels too expensive (i.e. they had to be built around Yugoslavia through other countries).

However, in retrospective, the total international connection per capita has more than tripled for the past two years.

2.2. National cross-connectivity

At the end of 1998 most major Internet suppliers in Bulgaria put their efforts together in building a domestic network of cross-links (also referred to as "peering").

The main purpose of this network was to capture all Bulgaria-to-Bulgaria traffic, thus significantly reducing the international traffic and lowering the average traffic cost. It is claimed that about 30% of the traffic in Bulgaria is domestic traffic, i.e. the typical case of a Bulgarian host accessing a Bulgarian server. Due to the cross-links, now this domestic traffic is about 6-8 times cheaper than international traffic.

The national peering was initially built by some of the first-level ISPs – Global One, Lirex, Spectrum Net and Orbitel, with some second-level providers participating in it – like ProLink and MobilTel. Initially the peering agreement provided for free traffic between peering members, but due to behavioral and economic reasons some of the biggest ISPs stepped back from the agreement. This led to second peering agreement that still holds the traffic inside the country and each ISP pays traffic differences to the partners.

With the launch of the BTC's Metropolitan Area Network (MAN) in Sofia at the end of 2001, many of the ISPs will have the option of replacing the old-fashioned DLS connections between themselves with VPNs over fiber optics channels. The latter will result in dramatic increase of the throughput of the peering system.

The **total national bandwidth per capita** is the most objective data to be studied in the long run. The figure of **20 bps** gives a rough estimate of how the national nets are connected prior to the launch of MAN. The growth of local content is a significant driving force for the increase of internal traffic – Some 3 years ago it was almost impossible to find Bulgarian language content, but now over 90 percent of the content is offered in Bulgarian, including daily news and information, search engines etc.

The monopoly of the Bulgarian Telecom Company, which is the only company authorized to transmit data and voice in real time, keeps the prices of long distance data transmission still high and the technology improvement – relatively low.

2.3 Number of users per dial-up access point

This is another important figure in the description of Bulgaria's computer nets. Still the great majority of home users and many of the corporate ones use dial-up access through regular phone lines, so it is critically important to always have sufficient available incoming ports.

At the beginning of Internet development in Bulgaria, it was quite common to have up to 15 or even more users per single dial-up point. With the growth of Internet usage, the figure steadily declined and in 2000 it reached 8 users per dial-up port. A figure below 5 is considered economically unfeasible. On the other hand, during the last year the average monthly usage of dial-up users with unlimited (flat rate) access has remained stable at a point of 85-90 hours. The current figure of 6,2 users per dial-up port shows that most of the ISPs have reached their optimum in terms of per-user investments.

2.4 Average bandwidth of a leased line

At present leased lines are the most commonly used medium to provide instant data connections to corporate customers and to build cross-links between ISPs. It can be estimated that leased lines (and similar types of terrestrial connections, incl. fiber optics) currently carry over 90% of the Internet traffic in Bulgaria. The average bandwidth of leased lines shows, on one hand, that most of the corporate users have the capability of a more or less fast Internet access. On the other hand,

there is still much to be done to achieve the bandwidth required for broadband transmission, because today we have only 133 kbps as an average bandwidth of a leased line.

IV.3. Network Access Affordability

The aim of studying this indicator is to assess the affordability of network access to Bulgarian society. Thus, several economic aspects of networks development and access technologies are studied and commented below.

3.1. Average price of 1 hour of dial-up Internet access.

The absolute price of 1 hour of regular dial-up access is higher than in developed countries. Taking into account that most of the small office / home office (SOHO) users still rely on this type of access, it is important to monitor its dynamics. In the past year and a half, the average price for this type of access has dropped almost twice to 0,25 USD (in mid-2000 the average price was about 0,45 USD).

Compared to the minimal monthly wage, this figure helps understand the value of the service to the customer. As can be expected, the ratio – 0,5% – is much higher than in developed countries due to the overall economic situation in Bulgaria. Still, with the rise of the minimal monthly wage and the drop of the average Internet access prices, this variable is expected to go down even faster. Compared to the previous year, the figure has declined 2 ½ times, which can have a significant impact on the Internet market as well as on the general attitude of society.

3.2. Average price of 1 hour of ISDN Internet access

Although ISDN users are still less than 1% of all dial-up users, it is important to monitor the dynamics of the prices for this service. Taking into account the fact that ISDN offers significant technological benefits compared with regular telephone-based service, it is quite normal to expect higher prices. Some ISPs in Bulgaria have tried to offer a single-channel ISDN at the price of regular dial-up, thus depriving it of its two main advantages: the broader bandwidth and the guaranteed transfer rate. Given the low number of ISDN users, this policy has not influenced the market as a whole. The average price of 1 hour ISDN access is 0,46 USD.

Compared to the minimal monthly wage, the absolute figure of 0,9% is about twice that of regular dial-up. However, it should be noted that ISDN access in Bulgaria is used mainly by corporate customers and the demand for a more or less affordable high speed Internet connection tends to prevail over the actual price of the service.

3.3. Average price of 1 hour of public Internet access.

In our definition, public Internet access includes Internet cafes, public access points and similar places. The public network access is not as popular as the dial-

up one, but for a large category of people who do not have a PC at home it remains the only option for accessing online services.

Being a public service and thus requiring greater investment and support, this type of access not surprisingly has a price that is higher than regular dial-up. What can be noted here is the fact that while the cost of one hour of regular dial-up in Bulgaria – now 0,45 USD – is higher than in developed countries, with public access the situation is reversed – in Bulgaria one hour costs less than in Western countries. The explanation of this phenomena lies in the fact that many small computer game rooms have become cyber cafes. Most of them rely on regular dial-up (meaning low-quality) service and just few of them – usually the large ones – can afford leased lines with fast Internet connection.

The same comparison with the minimal monthly wage is made as with the similar items mentioned above. The fact that 1 hour of public Internet access costs almost 1% of the minimal monthly wage means that there are still serious fiscal barriers to people who do not have access to a computer to use online services.

3.4. Average price of unlimited dial-up Internet access

Since the unlimited (flat fee) Internet access is the most common subscription option available in Bulgaria, it is interesting to keep a record of the market dynamics. Currently, the average price in absolute terms has dropped even below the level in Western countries. This can be explained with the increasing competition among ISPs, but also with the overall economic situation, in which most consumers prefer to pay less for lower quality than vice-versa.

However, it should be noted that for the past year and a half the average price has dropped about twice and has reached the minimal feasible value from an economic point of view. In large cities the price of unlimited access is currently about 10-12 USD per month (and was 20-25 USD a year ago). A significant drop is not very likely to occur. The all-country average is 14,5 USD.

When compared with the minimal monthly wage, the ratio (30%) seems high due to the low level of salaries in Bulgaria. However, a year ago the same comparison yielded a result of 67%. The decrease seems to make the instant Internet access at least more affordable to home users.

3.5. Average price of 1 hour local telephone call

It is hard to estimate the price of a local telephone call. It is dramatically different if depending on the line – digital calls are paid per time, while analogue are flat rate. Depending from various factors the quality of the analogue line could allow for one hour call without a single drop-out or several calls would be required to have one hour call.

The prices of local calls were cross-subsidized by international and long-distance calls. The competition (both current - through IP telephony and expected - after the monopoly ends in 2003) forced Bulgarian Telecommunications Company to reduce the prices of the long distance calls and to increase local calls.

While most of the other prices have dropped (in both relative and absolute terms) during the past year, local telephone calls increased by 0,5 to 0,6 percent.

3.6. Average price of 1 hour Internet access through mobile service

Although there are not yet many users of mobile network access, due to both technological (low speed of connections) and economic (significantly higher fees of 1,6 USD per hour) reasons, the popularity of this service will undoubtedly increase. However, if compared with Western Europe, it can be seen that the price for network access via mobile devices in Bulgaria is several times higher, while the connection speed is limited by the single provider – Mobiltel – to just 9,600 bps.

A comparison between the absolute figure and the minimal monthly wage shows clearly that the cost of mobile network access is still too high.

3.7. Percentage of the telecom expenses in the overall expenses for Internet (ISP price + telecommunications price)

Bulgaria Online experts assess that around 70 percent of the total expenses for Internet access are telecommunication costs. This situation seems quite abnormal, but with the rising telecom charges and dropping network access expenditures, it cannot be expected to dramatically improve before the beginning of 2003, when the state monopoly over telecommunications will end.

IV.4. Hardware and Software

Prior to discussing the hardware market in Bulgaria, several issues need to be pointed out:

- Bulgaria has a small computer market, compared to developed or other emerging markets;
- In 1960s to 1989 Bulgaria hold 48 percent of COMECON ICT market. Vitosha, Izot and Pravetz were produced through reversed engineering from existing hardware in USA and Japan (Motorola and Intel) and were exported primarily in Soviet Union.

In the early 90's 100% of the PCs available on the market were imported assembled. Later, many private companies in Bulgaria started importing OEM hardware and assembling computers locally. Together with this, after sales service was established.

In mid-90's with the increasing flow of foreign investments, several manufacturers of the so-called "brand computers" came to the market. Companies like Hewlett-Packard, Dell, and IBM established a presence either through their own offices or through authorized dealers.

Today we can distinguish between two competing tendencies:

- Lower priced "no name" computers, assembled domestically from various OEM hardware, are widely available on the market. These types of

computers have about 2/3 of the whole market for PC. They are purchased mainly for home and SOHO use.

- “Brand name” computers, offered at about 20-40% higher prices. The most popular brands include Compaq, Hewlett-Packard, IBM, and Dell. These computers have two primary types of customers. The first type are large companies that rely on the cost effectiveness of their long-term exploitation. The second type are government and other budget-funded organizations that are required to hold tenders for any purchase of equipment. In such tenders a certificate of origin and/or ISO9000 certificate is normally required.

Experts estimate the aggregate turnover of the computer market to have reached the amount of \$ 150 m in 2001.

A retrospective review of the software market bring us back to the late 1970's and early 1980's when Bulgaria started producing some PC software for office use. The main goal was to bring Bulgarian-language software on the market. However, the efforts did not have a significant result due to several reasons:

- Computers were still considered “exotic” and very few people had sufficient knowledge about their use;
- Computers were introduced slowly into central and local government administrations and the management of state-owned companies;
- Computer networks, even Local Area Networks, were absent;
- The software was not designed from scratch, but rather original English-language software (like Microsoft Word, for example), was reverse engineered and then recompiled with a Bulgarian language interface.

With computers becoming more popular in the early 1990's, computer piracy emerged as one of the most serious legal issue on the IT market. The spread of this pandemic was prompted by a number of factors:

- Almost no legal software existed on the market. With the Bulgarian economy opening to the rest of the world, for several years not a single software producer was present on the domestic market.
- No software was available in Bulgarian language.
- No proper legislation was available to protect copyrights.
- It is a world-wide issue.

Alongside this process, several domestic companies tried to respond to the demand for Bulgarian-language software. Their efforts were channelled in two directions – localization of existing software (i.e. bringing Cyrillic alphabet to computer operating systems) and development of integrated accounting and resource management software that had to comply with the local tax legislation. Of course, these companies also suffered a lot from software piracy and only managed to stay on the market thanks to additional business activities and/or extended customer service.

In 1993 a new Copyright Law was enacted. Local officials and foreign observers claimed the law was one of the finest examples in Europe. However, lack of proper

enforcement mechanisms for many years, and even up to the present moment, made this law a fine example of legislation with no positive impact on the market.

In 2000 the Law was amended to include better property rights protection for software products, followed up by a “legalization campaign” led by the government together with the several large software producers and their representatives in Bulgaria. While it is certain that the campaign gained some positive results, it was relatively unsuccessful in achieving its main goals – eradicating or limiting software piracy in the country.

Volume estimations show that in 2001 the legal software market in Bulgaria has reached some \$ 25-30 m. At the same time, different studies held independently by Microsoft and domestic organizations show that losses from the illegal software market were about \$ 115 – 130 m in 2001. This means that despite some claims of “a decline of illegal software”, about 80% of the software products in Bulgaria are still sold illegally.

IV.5. Service and Support

With an underdeveloped market such as Bulgaria’s, it can be expected that many of the customers do not pay sufficient attention to the quality of the service and support with which they are provided.

It was expected that with increasing competition, the IT companies would try to offer higher quality support to their customers. However, this did not happen – or did not happen to the expected extent.

Again, two main tendencies can be noted on the IT market at present:

- The “brand name” companies, which represent large western corporations like Intel, Compaq, Cisco, IBM, Microsoft, Hewlett-Packard, Dell, etc. have to comply with the uniform service policies of their parent companies. These market players have established service networks that are also charged with customer support. Usually such re-sellers offer full warranty as specified by the manufacturer. Through a variety of subscription schemes and post-sales services, they are closely in touch with their customers. Most of them are registered under ISO9000, or apply similar internal quality-of-service-regulations. That is why such suppliers are preferred by large business enterprises and by government and state-funded organizations. The same observations apply to national network access operators. The economy of scale allows such companies to achieve better results with smaller relative investments.
- Smaller companies have developed different approaches – the warranty they provide and their post sales services are limited, and their quality is not guaranteed. They also do not offer any extended service to their customers. Their philosophy is that the low prices they are forced to offer in order to withstand the market competition do not allow them to invest in any serious support and service. Typical customers of such companies include home users and SOHO customers.

A recent survey amongst end customers of Internet access services showed that less than 10 percent believe “service and support to be of critical importance” when they chose their suppliers. This once again confirms the fact that there is a long way to go until market mechanisms, on one hand, and sophisticated customers, on the other, would help improve the service and support that every customer should enjoy.

IV.6. Quantitative Assessment

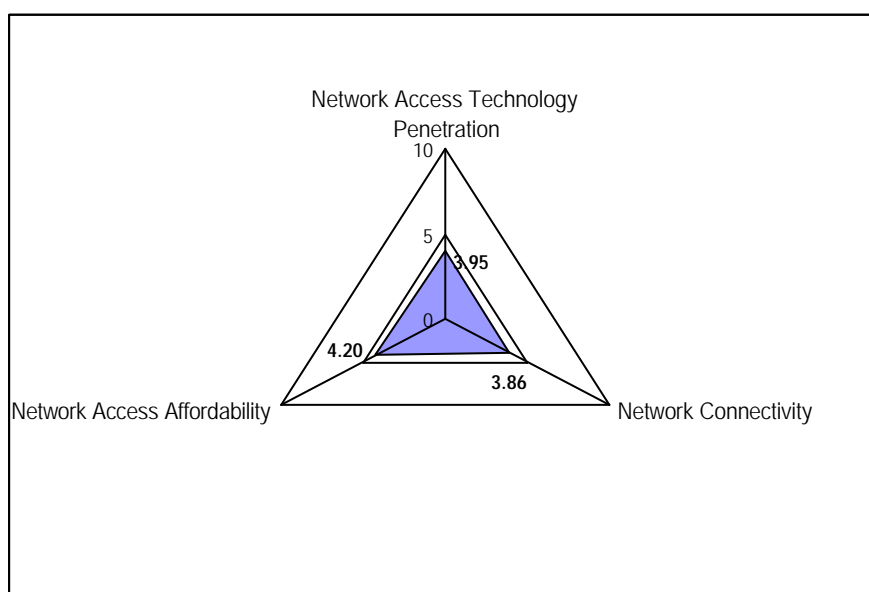
The following scoreboard resulting from the network access assessment provides a summary of the study and can generate guidelines for future development. The overall score for network access (4.0) in Bulgaria is higher than the overall e-readiness index (3.36). This means that technology-wise Bulgaria is making a significant progress which could be used to boost developments in other areas such as e-society or e-economy.

Also, the three main indicators here – technology penetration, access affordability and connectivity – seem to develop coherently providing, to the extent possible, a steady and self-supporting technological growth.

Possible steps that can be expected to further boost network development in the country remain mostly in the field of indirect legislative measures, such as:

- Improvement of the overall economic situation to help, in particular, eliminate the “gray” economy;
- Encouragement of long-term investments both through taxation and through government participation;
- Support to high-tech business through taxation;
- Privatization of the telecom structures;
- Enforcement of anti-piracy legislation.

FIGURE 4.1. E-ACCESS



Average value: 4.0

PROFILE OF BULGARIAN INTERNET USERS

Source: Bulgaria Online

An average profile of the Bulgarian Internet user is given below. A dial-up connection is assumed.

Web Browsing – a ratio of about 8:1 is assumed for incoming-to-outgoing traffic. Also, time is required to read and understand the web page after it is rendered on the screen. A single computer generates the following traffic:

- Incoming - 0.8 KByte/sec
- Outgoing - 0.1 KByte/sec

Downloads – a ratio of about 12:1 is assumed for incoming-to-outgoing traffic. Also, full load of the connection line is observed. A single computer generates the following traffic:

- Incoming - 3.2-5,6 KByte/sec depending on the type of the phone line (analogue, digital)
- Outgoing - 0.27-0,47 KByte/sec

The streaming media also belongs to this type of Internet services.

Uploads - a ratio of about 1:12 is assumed for incoming-to-outgoing traffic. Also, full load of the connection line is observed. A single computer generates the following traffic:

- Incoming - 0.27-0,47 KByte/sec depending on the type of the phone line (analogue, digital)
- Outgoing - 3.2-5,6 KByte/sec

Sending emails also belongs to this type of Internet services.

Chat – symmetrical traffic is observed. A single computer generates the following traffic:

- Incoming - 0.05 KByte/sec
- Outgoing - 0.05 KByte/sec

Video & Audio conferencing, VoIP. ?. symmetrical traffic is observed. A single computer generates the following traffic:

- Incoming - 2.0 KByte/sec
- Outgoing - 2.0 KByte/sec

The following average usage profile was observed for Bulgarian users:

Web browsing – 50%,
Downloads – 32%,
Uploads – 2%,
Chat – 10%,
Video & Audio Conferencing – 6%

The average online time is about 62 hours per user monthly.

The email-only users represent an exception to this profile. They are about 10% of all users. Their usage is as follows:

Downloads – 60%
Uploads – 40%

The average online time for email-only users is about 2 ³/₄ hours per user monthly.