# BULGARIA:
# ICT INFRASTRUCTURE AND E-READINESS ASSESSMENT

**ARC FUND, 2002**

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## I. INTRODUCTION

This report is the result of a World Bank project implemented jointly by Applied Research and Communications (ARC) Fund and Vitosha Research in the period July 2001 through January 2002. ARC Fund (www.arc.online.bg) is a leading Bulgarian NGO working in the areas of Information Society and innovation. The organization has a considerable track record of projects related to ICT's application in democracy, local government reform, NGO empowerment, technology transfer, among others. Vitosha Research (www.online.bg/vr) specializes in social and opinion research, and marketing surveys in a variety of areas, including information technologies (IT). Vitosha Research regularly monitors Internet usage in Bulgaria since 1998.

The main goals of this report have been to

- *assess the current state of ICT infrastructure and availability of Internet and ICT-related services in Bulgarian society, for the purpose of identifying*
- *the key barriers that currently constrain a faster uptake of these technologies, and*
- *opportunities upon which it is possible to capitalize.*

The document thus provides a **snap-shop of Bulgaria's state of e-readiness**, as well as a **benchmarking instrument** against which progress could be monitored in time. As such it can assist government, international donors and private sector organizations in the country in designing and evaluating the impact of national ICT strategies and policy agendas.

The assessment is based on a **methodology** developed by the project team. It uses a combination of existing e-readiness methods, including the CSPP[1] Readiness Guide for Living in the Networked World, APEC[2] "E-commerce Readiness Assessment", and "Readiness for the Networked World: A Guide for Developing Countries"[3]. The methodology adapts certain aspects of these models while it takes into account the specificities of the local environment and the local ICT sector in the country. At the same time, it enables international comparative assessment of Bulgaria's e-readiness. A detailed questionnaire has been developed in an attempt to provide quantitative assessment of the extent to which Bulgaria approaches the ideal state of "e-readiness".

The **definition** of e-readiness is mostly based on the concepts promoted by the Center for International Development (CID) at Harvard University. Similar to the CID matrix, the structure of the Bulgarian assessment focuses on five categories of e-readiness: access, society, education, economy (incl. government) and policy, comprised of total 92 e-readiness variables. A detailed qualitative assessment in each category is followed by quantitative measures (e-readiness indices). The method for computation of these indices is elaborated below. The methodology is unique of its kind; it is still being tested and may require further development and refinement.

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[1] Computer Systems Policy Project www.cspp.org
[2] Asian Pacific Economic Cooperation Electronic Commerce Steering Group, www.ecommerce.gov/apec
[3] www.readinessguide.org

Many people have contributed to the development of this report or have been consulted in the assessment process. These include representatives from the Ministry of Transport and Communications, Ministry of Education, Ministry of Economy, Bulgarian Telecommunications Company (BTC), local NGOs (Bulgarian Association of Information Technologies, Center for the Study of Democracy, Center for Economic Development, Bulgarian Internet Association), foreign donors (United Nations Development Program and World Bank), representatives from the business community and academics.

## II. BULGARIAN E-READINESS ASSESSMENT MODEL AND METHODOLOGY FOR QUANTITATIVE ASSESSMENT

The **definition** of e-readiness is mostly based on the notions promoted by the Center for International Development at Harvard University. It defines the 'e-ready' society as

> *one that has the necessary physical infrastructure (high bandwidth, reliability, and affordable prices), has integrated current ICTs throughout businesses (e-commerce, local ICT sector), communities (local content, organizations online, ICTs used in everyday life, ICTs taught in schools), and the government (e-government).*

The structure of the Bulgarian Assessment focuses on four categories of e-readiness: **access**, **society**, **education** and **economy** (incl. government). A detailed qualitative assessment in each category is followed by quantitative measures (e-readiness indices).

Similarities to the CID matrix, could be summarized in two main objectives:

> **First**, both E-readiness Bulgarian Assessment Model (BEAM) and Network readiness Index NRI divide the total e-readiness measurement in subdirectories corresponding to different aspects of ICT proliferation. They make a distinction between factors that determine the usability of the Network (the Enabling Factors as called in NRI) and variables that reflect the extent of Network Use or Network Access in BEAM.

> **Second**, both indexes are constructed using overlapping indicators, which provides an overall complexity of these measurements and also allows a partial comparison between Micro-Indexes.

The Bulgarian E-readiness Assessment Model contains a series of indexes that summarize the most important indicators affecting the level of development of ICT (e-readiness) in different sectors of society. The model measures four main categories:

1. Network access
2. E-learning
3. E-society
4. E-economy (incl. E-government)

An extensive overview of Bulgarian E-readiness Assessment model is presented in Figure 2.1.

**FIGURE 2.1. STRUCTURE OF THE BULGARIAN E-READINESS ASSESSMENT MODEL**
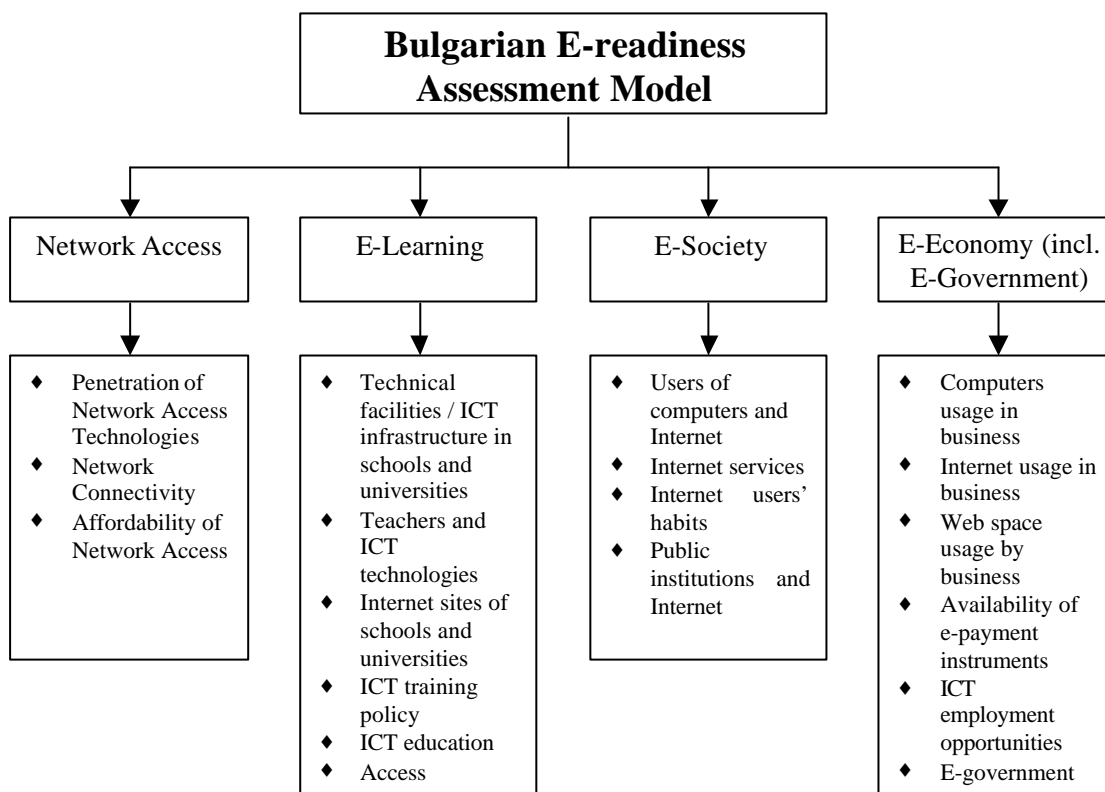


The method for computation of Bulgarian Assessment indexes is elaborated below. The methodology is unique of its kind. It is still being tested and may require further development and refinement.

**Network access**

The goal is to assess the existing ICT and information infrastructure in Bulgaria, based on such indicators as telephone penetration, size of telecom market, market for personal computers, etc. Important sub-categories include:

♦ Penetration of Network Access Technologies
♦ Network Connectivity
♦ Affordability of Network Access

**E-education**

The goal is to assess the ICT infrastructure in Bulgarian schools and universities, the penetration of PCs and availability of internet access, the presence of ICT in the school curricula, different initiatives (private and public) aimed at bringing ICT to schools and universities, and others. The information is structured in the following sub-categories:

♦ Technical facilities / ICT infrastructure in schools and universities
♦ Teachers and ICT technologies
♦ Internet sites of schools and universities
♦ ICT training policy
♦ ICT education

## E-society

The goal is to assess the diffusion of ICT and Internet in particular in Bulgarian society, the quality of Internet services, the number of Internet users and their "habits", the use of Internet by public institutions, etc. The information covers the following sub-categories:

♦ Users of computers and Internet
♦ Internet services
♦ Internet users' habits
♦ Public institutions and Internet

## E-economy

The goal is to assess the use of Internet and ICTs by Bulgarian businesses (and government), the existing infrastructure and quality of Internet/IT services, the limitations in using/adopting new technologies, the access to services, various government initiatives encouraging business enterprise in the field of ICT, and others. Sub-categories include:

♦ Computers usage in business
♦ Internet usage in business
♦ Web space usage by business
♦ Availability of e-payment instruments
♦ ICT employment opportunities
♦ E-government

The full list of e-readiness indicators for each category and sub-category is presented in Appendix 1.

### Method of Computation of E-readiness Indices

The e-readiness indices are a system of synthetic indicators. The main objective in constructing these indices is to reduce the multiple dimensions of the Information Society to a limited set of synthetic measures. The advantages of such an approach are at least the following:

- the employment of synthetic indicators is a prerequisite for establishing time series and respectively for analyzing and assessing change;
- synthetic indicators facilitate the public presentation of the results of the assessment, thus making analysis easier to perceive.

The method used to construct the e-readiness indices involves a number of steps:

**First**, the value of each indicator is measured on a 4 or 5-point scale (see Appendix 1)[4]

**Second**, A rank is assigned to each indicator value using the following procedure:

- A. <u>With 5-point scales</u>: a rank of 1 is assigned to the first value, a rank of 3 – to the second value; a rank of 5 – to the third value, a rank of 7 to the fourth value and a rank of 10 to the fifth value.
- B. <u>With 4-point scales</u>: a rank of 1 is assigned to the first value, a rank of 4 to the second, a rank of 7 to the third and a rank of 10 to the fourth value.

The purpose of these ranks is to ensure compatibility between different scales and present the indicator values in the range 1-10.

**Third**, different variables are divided in two groups depending on their importance to Bulgaria's e-readiness assessment. The level of importance is measured on a 2-point scale ("medium" and "high") based on expert assessment. High-importance variables are weighted by 2 in the computation of the indices.

**Fourth**, the respective ranks (depending on the real value of a given variable) is multiplied by the importance coefficient of the variable (the weighted coefficients are as follows: "medium importance" w=1 and "high importance" w=2).

**Fifth,** the values are aggregated in synthetic indicators in several categories. The value of each index is computed as a sum of the weighted ranks of the respective variables included in a given category / sub-category. Each index summarizes the values of several variables and is presented in a statistically normalized form: from 0 to 10. Values closer to 0 indicate a "low level" of e-readiness in the respective category / sub-category, and those closer to 10 – a "high" state of e-readiness.

The Table 2.1. provides an example on the calculation of the sub-category "Access to PCs" in the E-society index, resulting to the value of 1.5.

The same procedure is used in calculating the values of synthetic indices in each category and sub-category. The aggregate E-readiness index is computed as an average value of the indices for different categories.

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[4]The scales were created with the following approach in mind: the most developed countries were studied and their approximate level was taken as the highest possible; then, the interval was split into five thus giving a linear scale. Most commonly two types of scales are used: one with top level of 100 percent (for long-time available service such as PSTN) and one with top level of 40 percent (for newer services such as mobile phones). In some occasions custom scales were used, mainly for high-tech issues.

**TABLE 2.2. COMPUTATION PROCEDURES FOR ASSESSMENT OF "ACCESS TO PCS" – SUB-CATEGORY IN "E-SOCIETY" INDEX**

| Number of Variable | Rank | Weight | Rank multiplied by Weight (B*C) | Result : $\mathbf{S}$D/ $\mathbf{S}$C |
|---|---|---|---|---|
| *A* | *B* | *C* | *D* | *E* |
| 1 | 3 | 2 | 6 | |
| 2 | 1 | 2 | 2 | |
| 3 | 1 | 1 | 1 | |
| 4 | 1 | 2 | 2 | |
| 5 | 1 | 1 | 1 | |
| | | $\mathbf{S}$ = 8 | $\mathbf{S}$ = 12 | *I = 1.5* |

### Sources of Information

The following sources of data and information have been used in performing Bulgaria's e-readiness assessment:

*Institutional sources:*
- National Statistical Institute
- Ministry of Transport and Communication
- Ministry of Economy
- Ministry of Education
- Internet Service Providers (ISPs)

*Documents:*
- Annual Report of Bulgarian Telecommunications Company (BTC)
- Annual Report of Mobikom (mobile telephone operator)
- Annual Report of Mobiltel (national GSM operator)
- Quantitative surveys of research agencies – Vitosha Research, BBSS, Alfa Research, Gfk, etc.
- IDG Bulgaria
- Bulgarian Association of Information Technologies (BAIT)
- European Survey of Information Society
- IT analytical reports of Bulgarian and international organizations
- Expert assessments of members of project task force group
- Quantitative and qualitative surveys of Vitosha Research agency

## III. AGGREGATE E-READINESS ASSESSMENT

### Background

Bulgaria has had a tradition of excellence in producing information technology products. During its affiliation to COMECON the country specialized in production of mini computers, processors, peripherals (magnetic disk and tape memory devices), teleprocessing systems and devices, and personal-professional computers. Bulgarian computer exports amounted to 48 percent of the entire COMECON market in the 1970s. This market share was maintained until the early 1990's.

According to official statistics for 1989, electronics and telecommunications accounted for 25 percent of Bulgarian industrial production. A total of 130,000 people were employed in this sector, of whom 8,000 were highly qualified engineers. According to independent sources, in 1989 about 95 percent of the total production in this sphere was sold on the COMECON market, mostly to the former Soviet Union. In the late 1980s Bulgaria was the leading supplier of 5th generation computer systems to Soviet research institutes. Bulgaria also covered a large share of the Soviet markets for personal computers[5]. Many of the PBX systems for the COMECON region were also produced in Bulgaria.

These markets were artificially protected and Bulgaria's ICT industry suffered a serious shock with the political transformation and the transition from centrally planned to free market economy after 1990. A number of factors such as global competition, poor corporate management of local enterprises, lack of government support and funding, and disintegrating mechanisms of supply and demand within COMECON led to a dramatic decline in production capacity and severe drop in export figures. The country lost most of its markets in the former Soviet Bloc countries. This led to serious social problems and disqualification of the labour force.

Since 1997 the Bulgarian economy has been going through a period of structural adjustment. In a stabilized macroeconomic environment, characterized by a low level of inflation, an effective currency board, and hands-off approach of the state toward economic activity, ICT has been one of the most dynamic sectors of the economy.

Presently Bulgaria is still at a relatively early stage of preparedness to utilize the benefits which information and communication technologies can offer for achieving economic growth and competitiveness, for enhancing the quality of the education system, or improving the efficiency and transparency of government operations. However the government acknowledges the importance of ICT for development and demonstrated a strong political will to support active development of information technologies and high-tech end-products.

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[5] From Run, R. and Utt, R. (1990) *Bulgarian Economic Growth and Transition Project*, National Chamber Foundation, Washington D.C., p. 22-1

*Network Access*

Bulgaria's telecommunication infrastructure has been fairly well developed prior 1990 and substantially improved in the last decade. In the beginning of 1990s modern technologies were introduced – initially DSL and later fiber optics laid the groundwork of the national telecommunication backbones. All were originally built by the Bulgarian Telecommunication Company (BTC). Mobile wireless technologies appeared widely about 6-7 years ago, but still most of the network access in Bulgaria is provided through the traditional telecommunication network. Foreign investors in telecommunication infrastructure entered Bulgarian market by acquiring majority control or 100 percent ownership of existing companies or establishing new joint-ventures (when dealing with the government). Still a small proportion represent portfolio investors.

At present, the majority of Bulgarians have at least technical capabilities to access the Internet and its information resources. Access is enhanced by competition among Internet Service Providers (ISPs), most of which operate locally. A broad range of services, including pre-paid access and VoIP, is offered with a more or less satisfactory quality. Instant access via dedicated lines is also present in most of the large cities and middle-sized towns. Finally, public access is essential to making the Internet available to greater numbers of individuals and companies in Bulgaria. Telecenters, Internet cafes and community information centers have a great importance in making the Internet available to those who cannot afford personal access at home, in school, at the workplace or elsewhere. Some 10-15,000 people visit these centers every day. Thus, it can be estimated that about 15 percent of all Internet usage is provided by public access points.

An important factor for the increase of Internet usage is its affordability. The prices which businesses and individual consumers pay for Internet access are in most cases determined by a combination of charges for basic telephony and ISP services. In countries like Bulgaria, where the sum of ISP and telephony charges is almost prohibitively high, a disincentive to network usage exists, and access is curtailed. In addition, the overall economic situation in the country has a serious impact on the network affordability, but also the government can influence the situation (for example, by completing the liberalization of the telecom market, since the existing monopoly of the Bulgarian Telecom Company leads to slow technological progress and keeps the price of telecommunication services high).

The available bandwidth, although sufficient to serve the basic needs for connection to the Internet backbone, determines the number of users and types of online activities.

Being a relatively small market both in terms of population and purchasing power, , Bulgaria is not seen as a primary target by both international hardware and software manufacturers. On the other hand, local efforts to produce hardware and software have proven inefficient in most cases and with the development of market economy after 1990, only a small part of original software producers continue to exist. The overall situation, as well as several particular factors discussed elsewhere in this report, determine a considerable level of software piracy in Bulgaria.

The overall score on network access in Bulgaria (4.00) is higher than the average e-readiness index. This means that technology-wise Bulgaria is making 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.

*E-Society*

As barriers to access are being addressed, Internet is becoming more commonly used in Bulgaria. A fairly stable and homogenous core-group of Internet users emerges and is gradually expanding. This may indicate the onset of a new social culture defined by high degree of interest in, and active involvement with ICT. Yet the number of people who currently have access to PCs and the Internet is relatively small. Computer users as of October 2001 are estimated to include 940,000 adult citizens, or 14.4 percent of the population aged 15+. The number of people using the Internet resources as a share of the total population is also rather small. In relative terms, the share of Internet users amounts to 10.4 percent of the population. However, if the present tendency is preserved, this figure may grow substantially over the next few years.

Computers and Internet are typically used in the workplace and public locations (e.g. cyber cafes, computer game clubs, telecenters, etc.) Home Internet users and those accessing the Web at educational institutions represent a smaller relative share.

In terms of demographic characteristics, Internet access is available mainly to young people. Half of those having access to a PC and the Internet are aged 18 to 30, and about one-fourth fall in the 31-to-40 age group. The majority of people capable of accessing the Web live in larger cities and, above all, in the Sofia and Bourgas regions. Internet access is very limited in rural areas and small towns. According to a survey conducted in year 2000 by Vitosha Research, fewer than 3 percent of all Internet users in Bulgaria are residents of small towns. There are substantial regional disparities and a growing "digital divide" both in terms of access to ICT infrastructure and provision of Internet-related services.

The domination of the English language in the World Wide Web poses a serious obstacle to the integration of various user groups. But this situation may also present excellent opportunities to Bulgarian content providers to develop the local market. Yet the supply of online services in Bulgaria is still inadequate, as is the general penetration of these technologies in everyday life. There is still much work to be done in the area of generating locally-relevant content, presenting it in an appropriate manner, and helping people to comprehend how to use the new technologies available to them.

Currently the Internet is most commonly used for information gathering purposes, entertainment, alternative sources of world news, and personal communication. Cost, perceived low security level, availability and local economic conditions currently limit the use of Internet for electronic banking, electronic commerce, or personal activity planning. Barely 3 percent of Internet users in Bulgaria shop online, and 10

percent plan their vacations or travel using the Internet resources, as a recent survey by Vitosha Research suggests.

As a whole, the e-society index is rather low (2.29). This means that, despite some awareness of the Internet phenomenon among the Bulgarian public, there is still limited understanding of the real benefits associate with ICT, and even less direct experience.


*E-Education*


Information about the use of ICT in Bulgaria's educational system is fragmented and often simply unavailable. The Ministry of Education keeps a record of the number of computers used in schools but it has little information about connectivity. It is also hard to make an assessment of the situation in higher education – the existing 48 colleges and universities providing training to 216,926 students have academic autonomy and no government agency collects comprehensive information on them.

The overall penetration of ICT in Bulgarian schools is relatively low. On average Bulgarian schools have one PC for 66 students. The situation is somewhat better at the secondary school level where a mix of government support and local community efforts have brought computers to the classrooms over the past 4-5 years. In January 2001 the Ministry of Education reported that around 50 percent of the secondary schools (514 out of 1023) were equipped with at least a single computer laboratory with at least 5 networked PCs (486 or Pentium). There is no data on the number of computers used in primary and elementary schools but the situation is generally much worse.

Most Bulgarian universities and colleges also have a paucity of computer resources, although the necessary investments in hardware and connectivity are becoming more common, mostly though international programs and donor support. Experts assess the number of PCs at the universities in Bulgaria to be about 20,000. Penetration is highly uneven. For example, the American University in Bulgaria (AUBG) reports around 550 PCs for 700 students (an almost 1:1 ratio), while other universities have one computer for over 100 students. In many cases this equipment is used only in administration (e.g. in accounting) and not for education or research. With the only exception of AUBG no other university in the country currently offers its students free access to computer labs with Internet connections.

Most Bulgarian universities are connected to the Internet but this capacity is very limited and Internet resources are not integrated into the learning process. With the exception of a few technical and engineering schools, Internet is rarely used for education or research. Practically all universities have registered Internet sites.

ICT education in mid 1980s to early 1990s was well-developed in specialized schools – mathematical schools, foreign language schools and some technical secondary schools, but it covered less than 5 percent of the students.

Basic ICT education was introduced to Bulgarian secondary schools in the 1999/2000 school year. A general course on Informatics and IT is currently taught at ninth through eleventh standard grades at all schools nationwide. A more advanced

(optional) course is offered to twelfth graders. Although the state-designed curriculum provides a solid first step at introducing secondary school students to computers and IT, the courses are largely theoretical since infrastructure is still lacking or inadequate, and teachers are ill-prepared and often unaware of the latest developments in the field. Teacher access to computers is available at few or no schools. Classes at secondary school level currently do not integrate ICT meaningfully in the lesson plans.

Overall the level of integration of ICT in education outscores that measured in other categories of e-readiness but it remains unsatisfactory (4.27). The existing situation is largely the result of a sharp decline in public spending on education since 1990. There is a feeling that Bulgarian education is declining somewhat in quality and is subject to further erosion unless schools and universities are wired to the Internet in a matter of urgency and new curricula are developed that integrate ICT in the learning process and promote group work via computers, WWW research, and so on.

### *E-Economy*

There are no representative and comprehensive data on the current use of computers and Internet in Bulgarian companies. According to various surveys conducted in 2001 and expert assessments by Vitosha Research, about 30 percent of Bulgarian companies use computers in their work. However, computers are not used effectively and their penetration is very uneven. Only 7.3  percent of the workplaces are computerized and less than 20 percent of the companies have Intranets. Only 12 percent of Bulgarian companies are connected to Internet. Due to the large proportion of out-of-date technology and a still lacking awareness about the role of Internet communications as a driving force of business development, merely 3.85 percent of employees have access to the Internet and it is used primarily for e-mail communication. The financial services sector (banking and insurance) and telecommunications are the two sectors of the economy which have the greatest IT penetration.

A possible indicator for the state of ICT in Bulgaria's economy is the number of web sites of local companies. There is a tendency toward increased company presence on the Internet. As of March 11, 2002 the number of hosts in the ".bg" domain was 1860. In addition there are about 2,500 Bulgarian sites under ".com", ".net", and ".org" domains and hundreds of others (about 800 in expert estimates) which use free hosting services offered by Bulgarian portals such as www.hit.bg, www.dir.bg, www.online.bg, www.search.bg, to name but a few. The majority of company websites contain mostly static, basic information (limited to a company profile, contact information and listing of products), which is rarely being updated. Websites that are fully interactive for online customer support, or such that offer products and services online, are rather an exception.

According to a survey carried out by Vitosha Research in May 2001, about 186,000 people in the country hold college or university degrees in information and communication technologies and about 565,000 have attended some sort of computer training courses. About 443,000 know how to use a computer through self-training, formal training at the workplace, or have learnt such skills from friends. On this basis

it is possible to conclude that computer literacy amounts to 16.2% of the adult population in Bulgaria.

Experts assess the number of ICT specialists in the country (i.e. those involved in software development, Internet applications and design, system administration, hardware) to be anything between 4,000 and 15,000. If the definition is extended to include also telecoms engineers, teachers and IT specialists employed in public administration this figure may as well grow to 45-50,000. It is very difficult to give a precise figure for the number of ICT jobs because of the large size of the "gray" economy in this sector which reaches between 30 percent and 80 percent of the ICT market, according to various estimates and sub-sectors

On average, ICT jobs in Bulgaria are quite attractive. According to IDC data for year 2000, the average salary of ICT specialists was 220 percent the average monthly salary  in the country, while programmers, system administrators and other highly qualified professionals were paid 340 percent the average monthly salary. Still the local ICT labor market cannot offer the opportunities sought by young and qualified ICT professionals. Many of them are leaving the country if offered a more challenging position abroad. According to the Bulgarian Association of Information Technologies (BAIT) about 15,000 IT professionals have left the country in the past 10-12 years. This is a real "brain-drain" since only 3 percent of these people are coming back to Bulgaria later. A number of managers have a valid concern that Bulgaria will soon have to import ICT professionals from abroad.

An important indicator of the role of ICT in the economy is the progress in e-commerce. Most electronic transaction in the country currently fall within the category of business-to-consumer (B2C), while business-to-business (B2B) share of e-commerce is only negligible. No more than 100 companies, usually small and known to tiny consumer segments, could be considered as e-retailers.  The most common categories of goods and services traded on the Internet include books (45%), prepaid Internet access cards (10%),  flowers and souvenirs (10-12%), music (7-8%), electronics and mobile phones (6-7%), or online payment of utility bills in Sofia (12-15%). However, these transactions are not purely electronic as the Internet is primarily used for processing orders while payment is done in a conventional manner upon delivery. Advertising is often limited to a banner on one of Bulgaria's most popular portals.

Lack of convenient payment instruments is one of the major impediments to a faster uptake of e-commerce in Bulgaria. The number of debit card holders in the country was 800,000 in mid-2001, plus about 7-10,000 credit card holders. On average the number of debit cards has grown by 50 percent in each one of the past couple of years. Some 400 to 700 credit cards are being issued by Bulgarian banks every month.

Yet only 1.4 percent of all debit card holders are registered in ePay.bg – Bulgaria's most popular system for online payments. The registration procedure is rather clumsy and people seem reluctant to provide debit- or credit-card information because they are not sure of system security. A second e-payments system – BGPay.bg – was launched in mid-2000 but reports very limited turnover figures. A new service of online payments by prepaid cards, called Net-Card, is rapidly gaining popularity. There are about 3,000 registered users of this service in just 3-4 months.

So far, Bulgarian companies have been slow to integrated e-commerce into their corporate strategies. There has not been much in the way of B2B e-commerce. Even big companies do not understand that it is important to develop online activity. What little movement there has been is towards e-business solutions aimed at lowering costs and increasing efficiencies. For the most part, these are still at relatively basic level, such as integrating sales and accounting systems. A few are also pursuing supplier integration.

Some of the main obstacles to e-commerce in Bulgaria include the low level of Internet penetration, low level of trust and perceived security problems and, until recently, the lack of a clear legal environment for electronic business. This situation is changing with the enactment in May 2001 of an electronic signatures law which recognizes digitally signed documents and contracts concluded online as having the same validity as conventional instruments. The law also stipulates requirements for providers of digital signatures, which guarantee the veracity and security of the documents transmitted by their clients.

*e-Government*

Bulgaria has made its first steps in the field of e-Government which includes the use of ICT by central and local administrations for the services they provide in order to achieve greater efficiency and higher quality. Given the lack of official statistics on the availability of computers in central and local government, experts interviewed by Vitosha Research assess that about 18 percent of all workplaces in public administration are presently computerized. Internet connectivity is widely varied: 80-100 percent of computers in regional authorities, 70-80 percent of these in ministries and less than 20 percent of those in municipalities are currently hooked up to the Internet. On average, about 20 percent of computers in public administration have access to the Internet.

Bulgaria's public administration has made a remarkable progress in terms of its Internet presence. While in 1997 there were only two government websites, this number grew to 120 in 2001. Over 90 percent of central government agencies and public institutions have websites, as well as 4-5 regional authorities, and about 30 municipal administrations. A couple of comprehensive government websites are currently available to the public. In most cases, however, the information is static and not regularly updated. A few websites (e.g. www.taxadmin.government.bg) provide some degree of interactivity, mostly downloading of forms. The implementation in practice of the new law on electronic signatures is expected to create new possibilities for processing of forms and online payments. As thing stand now, the public administration websites are visited by a small number of people – about 4.3 percent of the population and about 6 percent of companies, according to Vitosha Research.

The overall e-economy index (2.89) is below the aggregate e-readiness score for the country and only higher than e-society. This indicates a relatively underdeveloped e-business environment in Bulgaria. Even the government seems better prepared to take on the opportunities of the new economy. Although Bulgaria is still at an early stage

of conceptualizing the benefits and uses of e-Government (3.89), the country is already making efforts to implement some pilot projects in the field.

Figure 3.1 provides an aggregate scorecard of the current state of e-readiness in Bulgaria. A more detailed analysis, including qualitative analysis, of different e-readiness variables is provided in the remaining portion of the paper.

**FIGURE 3.1. AGGREGATE E-READINESS INDEX**
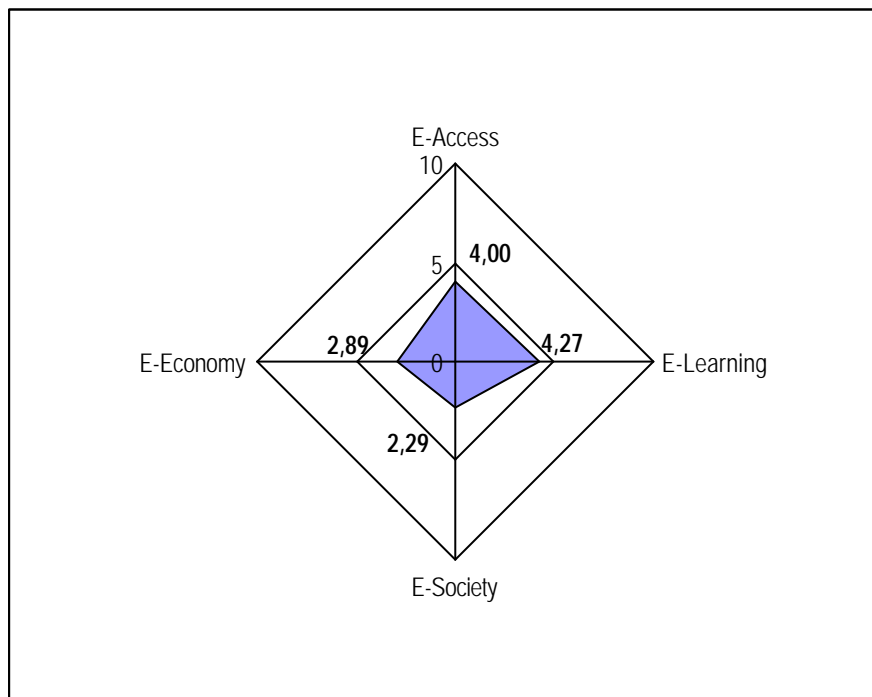


Average value: 3.36

## 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 million[6]) 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 ¾ 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 are 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

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[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 that 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 s 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 that 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 that 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 that 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 in 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 trough 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 or 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 IPSs 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 then 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 this 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 that 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 vise-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 - trough 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 l989 Bulgaria hold 48 percent of COMECON ICT market. Vitosha, Izot and Pravetz were produced trough 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 though 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 that 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**
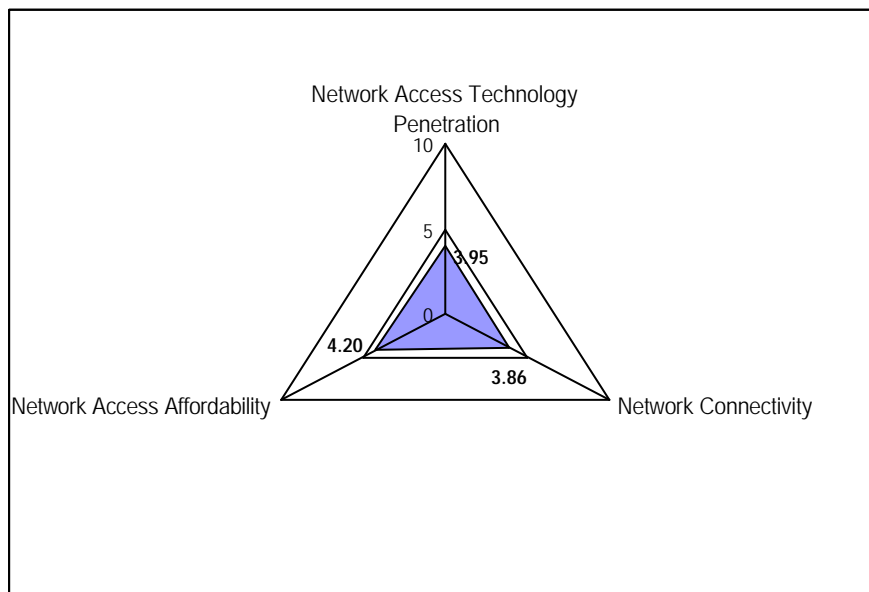


*Average value: 4.0*

**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 ¾ hours per user monthly.

# V. NETWORKED SOCIETY / E-SOCIETY

## V.1. Consumer access to ICT

An accurate and reliable assessment of the number of Internet users in a given country is a complex task. Difficulties arise on account of the dynamic expansion of the Internet, the lack of consistent statistical data, as well as of a viable methodology for collecting such data. The present analysis largely draws on data from national representative surveys conducted by Vitosha Research agency in the period 1998-2001.

### 1.1. Access to computers

Survey findings indicate a low level of penetration of information technologies in the daily life of Bulgarians (see Figure 5.1). Assuming that one per cent of the representative sample equals about 65,000 people, computer users as of October 2001 can be roughly estimated to include 940,000 adult citizens.

**FIGURE 5.1 SHARE OF PEOPLE WITH ACCESS TO COMPUTERS**
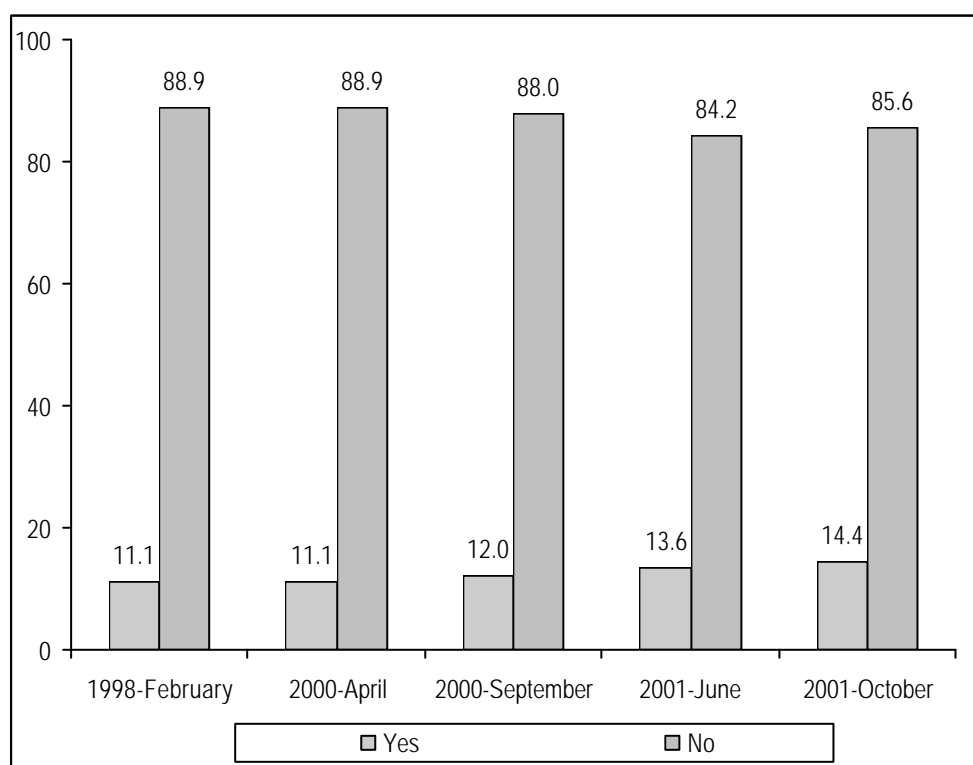


Computers are typically used in the workplace and specialized locations (see Table 5.1). The number of users with access to PCs in the workplace is growing.

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**Table 5.1. Locations providing computer access**

| | *1998 February* | *1999 January* | *2000 April* | *2000 September* | *2001 January* | *2001 June* | *2001 October* |
|---|---|---|---|---|---|---|---|
| Home | 1,7 | 2,6 | 2,6 | 4,4 | 5,1 | 5,3 | 7,5 |
| Friends, relatives | n/a | n/a | n/a | n/a | n/a | 2,3 | n/a |
| School, university | n/a | n/a | n/a | n/a | n/a | 2,1 | n/a |
| Work | 6,4 | 6,1 | 6,3 | 7,5 | 6,7 | 7,8 | 7,1 |
| Public places | n/a | n/a | n/a | n/a | n/a | 4,5 | n/a |

*Source: Vitosha Research*

Respondents aged 18 to 39 make the most active user group. 25 percent of those who have access to PCs fall in the 30-40 age group, while nearly 30 percent are aged 40 to 50[7] (see Appendix 2). Such data evidence a growing presence of information technologies in Bulgarian society, rather than isolated use by a single age group. As a whole, however, the total relative share of computer users is still rather small.

### 1.2. Access to Internet

There is a lasting and clear tendency towards increased use of the Internet by those who have access to PCs. In the past few years the number of people declaring they have access to the WWW and have been using it ever more frequently, has increased several-fold (see Figure 5.2).

**FIGURE 5.2. SHARE OF INTERNET USERS OF THOSE WITH ACCESS TO PC'S (%)**
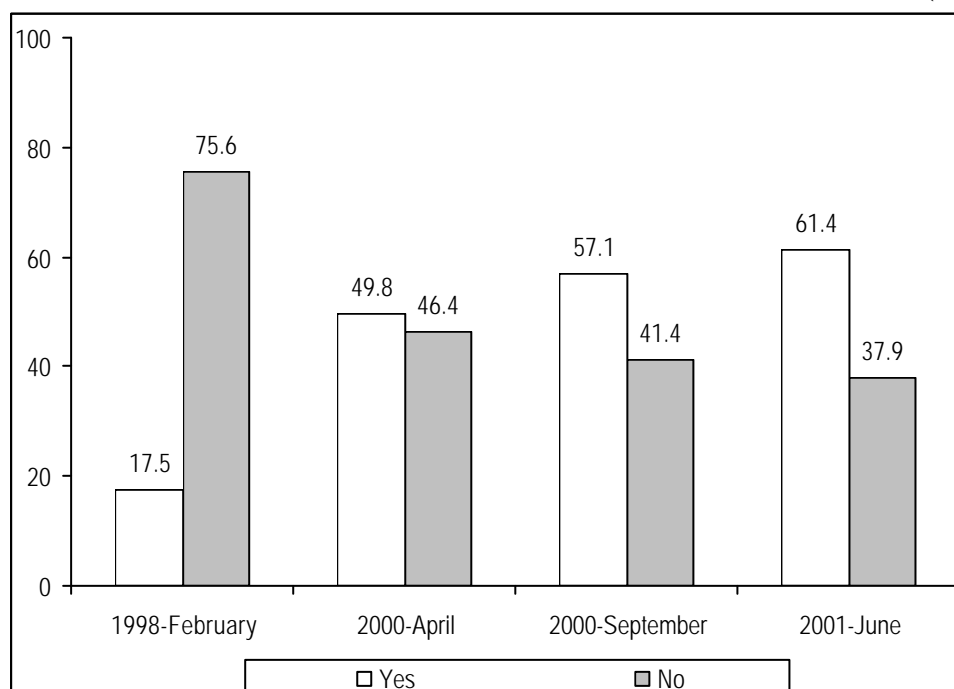


*Source: Vitosha Research*

Nevertheless, the number of people using the Internet resources as a share of the total population is still rather small. In relative terms, the share of Internet users

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[7] The data are drawn from a survey conducted in October 2001.

amounts to barely 10.4% of the population. However, if the present tendency is preserved, this figure will grow substantially over the next few years.

The Internet is typically used in the workplace and some specialized venues. Home Internet users and those accessing the Web at education establishments represent a smaller relative share (see Table 5.2).

A more detailed analysis of the survey data highlights the following **demographic profile of Internet users in Bulgaria**:

- Internet access is available mainly to young people. Half of those having access to a PC and the Internet are aged 18 to 30, and about one-fourth fall in the next age group, 31 to 40.
- The majority of people capable of accessing the Web are concentrated in larger cities and, above all, in the Sofia and Bourgas regions.
- Internet access is very limited in rural areas and small towns. (See Appendix 2)

**TABLE 5.2. ACCESS TO ICTS**

|  | *Access to PC* | | | *Access to Internet* [8] | | |
|---|---|---|---|---|---|---|
|  | *Yes* | *No* | *DK/NA* | *Yes* | *No* | *DK/NA* |
| Home | 29,0 | 59,3 | 11,7 | 30,2 | 64,6 | 5,2 |
| Friends, relatives | 16,6 | 71,0 | 12,4 | 19,8 | 74,0 | 6,3 |
| School, university | 15,2 | 69,7 | 15,2 | 16,7 | 75,0 | 8,3 |
| Work | 53,1 | 38,6 | 8,3 | 41,7 | 53,1 | 5,2 |
| Public places | 33,1 | 53,8 | 13,1 | 46,9 | 49,0 | 4,2 |

*Source: Vitosha Research, June 2001*

### *1.3. Factors affecting the level of ICT access*

Two groups of factors determine the limited ICT access and, particularly Internet access, in Bulgaria. The first group includes objective infrastructure conditions, such as the state of telecoms facilities and equipment directly, or indirectly, related to the provision of Internet access to end users. The second group includes subjective factors, such as personal attitudes and skills of individual users.

**TABLE 5.3. TELEPHONE NETWORK DENSITY**

| Telephone liness | |
|---|---|
| Residential telephone lines installed (number) | 2,454,000 |
| Office telephones installed (number) | 469,000 |

*Source: Bulgarian Telecommunications Company, January 2002*

The problem areas in Bulgaria's telecoms infrastructure have been discussed in detail in the "Network Access" section of this report. Here it is important to note some specific features of Internet use in small settlements and rural areas. According to the findings of a special survey of community centers conducted in year 2000, fewer than 3 percent of all Internet users in Bulgaria are residents of

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[8] Only for respondents who have computer access.

small towns. In 22 settlements with population between 12 and 15 thousands people, the survey found only 50-70 Internet users. The Internet market is highly limited in smaller communities and there is practically no choice of alternative service providers. Less than 30 percent of the surveyed towns have more than one ISP. Consequently, these communities pay much higher prices for Internet services than people in larger, urban areas.

The infrastructure, including telecoms infrastructure, in small towns is less developed compared to larger ones. This is true for the telephone network and the general quality of Internet services. Out of 82 towns surveyed only 17 were connected to the digital ring (i.e. Digital Overlay Network) which allows connection speeds of 64 Kbps[9]. These and a number of other factors account for the limited Internet use in these communities and point to a vast "digital divide" in regional terms.

## V.2. Organizations Online

### 2.1. Public institutions and organizations on the Web

The diffusion of ICT in public institutions and public organizations constitutes an important indicator both as regards their general level of development and the readiness of Bulgarian society to adopt the new information and communication technologies.

**TABLE 5.4. SHARE OF BULGARIAN INSTITUTIONS WITH OWN WEB SITES: (% OF TOTAL NUMBER)**

|  | *October 1999* | *April 2000* | *September 2000* |
|---|---|---|---|
| Elementary and secondary schools | 1.9% | 2.3% | 3.6% |
| Higher education establishments | 88.1% | 92.7% | 95.1% |
| Government ministries | 81.3% | 85.7% | 92.9% |
| Local government bodies | 13.1% (38 out of 28 districts and 262 municipalities) | 14.5% (42 out of 28 districts and 262 municipalities) | 18.3% (53 out of 28 districts and 262 municipalities) |
| Hospitals/clinics | 0.6% (22 out of 300 medical centers and 3,579 polyclinics and consulting rooms) | 0.7% (28 out of 300 medical centers and 3,579 polyclinics and consulting rooms) | 0.9% (36 out of 276 medical centers and 3,610 polyclinics and consulting rooms) |
| Museums | 4.4% | 6.2% | 12.2% |
| Libraries | 0.3% | 0.3% | 0.5% |

*Source: Reports by the European Survey of Information Society*

The total volume of web sites of public institutions and organizations is growing steadily. The online presence of education establishments is expanding most rapidly. This tendency is quite evident with regard to elementary and secondary

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[9] Source: Possibilities and Constraints in Setting Up Internet Centers at the Cultural Centers, survey conducted by Vitosha Research in May 2000.

schools, as well as museums, which doubled their web-presence by the end of 2000 compared to a year before. Yet libraries, which are an important elements of the country's education and cultural environment, preserve the same level of Internet presence (see Table 5.4).

## 2.2. Online media

The first news portals appeared in Bulgaria around late 1996. These included Bulgaria Online (www.online.bg), News.bg (www.news.bg), Netinfo (www.netinfo.bg) and others which provided relevant news and information on a wide variety of topics of local and international concern from sources including 'conventional' media, radio, TV, news agencies, and others.

This development was followed by online presence of nearly all daily and weekly editions of national newspapers – *Sega, Monitor*, *Demokratsia*, *Novinar*, *Standart*, *Kapital*, among others. Popular magazines, radio and TV stations, and the national information agencies are also available online. The only exceptions to this pattern are the largest-circulation dailies, *24 Chassa* and *Trud*, owned by the German media company Westdeutsche Algemeine Zeitung, which do not yet have electronic editions for purely commercial reasons. One of the group's popular publications, *Dneven Trud*, has recently established a web site but it does not feature any news and serves mostly promotional and commercial purposes.

More recent developments have included the launch of a genuine information portal – Mediapool (www.mediapool.bg), an electronic news agency (www.bgnes.com), as well as specialized portals providing economic, business and financial news, such as Econ.bg (www.econ.bg) and Bulgarian Business Advisor (www.bba.bg).

During the latest parliamentary elections (in June 2001) some web sites introduced direct monitoring of election results, including through multimedia applications.

At present Bulgarian Internet users are able to choose among a wide array of web resources, including nearly all of the national news institutions, as well as a number of local media which offer reviews and analyses online. Many sites include fully searchable archives of news dating back 5-6 years. Some of them register over 3-4,000 visitors daily.

Certain sites of 'conventional' media also maintain open discussion fora, which generate further user interest and serve as a secondary source of information, reflecting popular opinions and attitudes on the hot topics of the day. Good examples in this respect are the sites of *Sega*, *Dnevnik*, and *Standart* dailies.

The increasing number of online users has triggered competition among various information portals. As a result they are expanding their databases and adding new services, search options and links.

## V.3. Services provided in Internet

### 3.1. Quality of Internet and IT-related services

The quality of Internet connections is a key factor which determines the level of customer satisfaction and people's motivation for future use of the Internet. Here quality is considered mainly in terms of the speed and reliability of connections to a respective ISP. The present analysis does not intend to describe in detail the various technical aspects of Internet use. Rather, it is concerned with the attitudes of end users to problems related with the speed and reliability of connections used to access the global Internet.

According to data from a national representative survey conducted in June 2000, Internet users tend to assess the service quality in rather negative terms. "Slow and expensive" seems to be the most common definition. Such dissatisfaction has its roots in the objective impediments to Internet penetration and the individual preferences of users. Most users who believe the Internet is a slow and expensive service, would prefer the option of a "higher price for a speedier connection" over a "cheap but poor service." The service quality, rather than its price, seems to be the determinant factor of user attitudes.

**FIGURE 5.3. IS THE QUALITY OF INTERNET SERVICE CONSISTENT WITH ITS PRICE?**
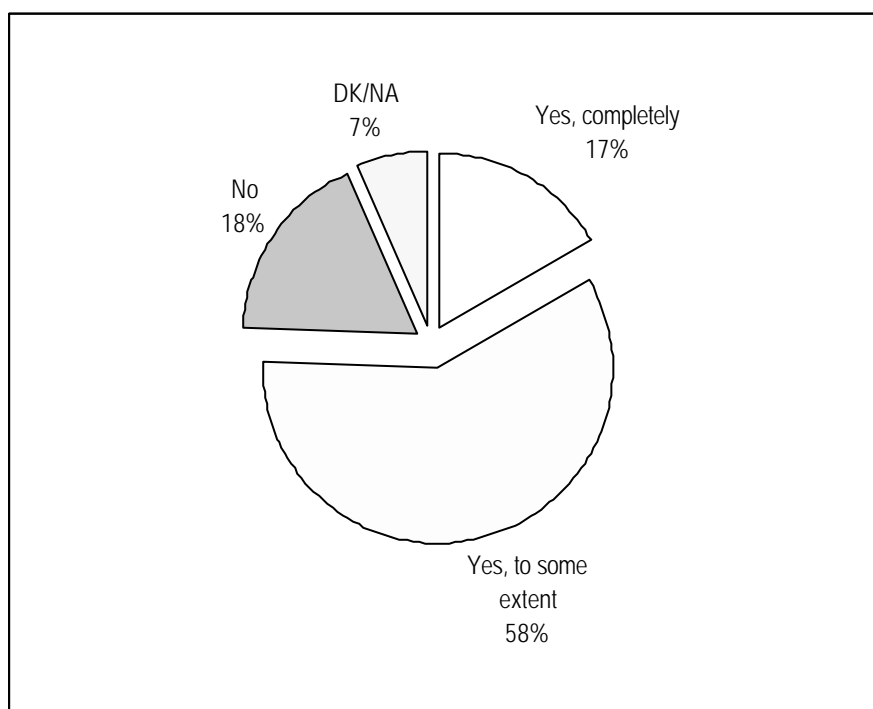


*Base N- 90; Source: Vitosha Research, 2001*

There is a relatively high level of user satisfaction in terms of how the price relates to certain minimum quality requirements (Table 5.5). Yet the share of those who are rather disappointed with the quality-price correlation is also considerable.

**TABLE 5.5. SERVICE QUALITY/PRICE CONSISTENCY BY PLACE OF ACCESSING THE INTERNET**

| Access to Internet | Quality-to-price Ratio | | | |
|---|---|---|---|---|
| | Yes, completely | Yes, to some extent | No | DK/NA |
| Home | 18,5 | 59,3 | 18,5 | 3,7 |
| Friends, relatives | 22,2 | 61,1 | 16,7 | 0,0 |
| School, university | 20,0 | 66,7 | 6,7 | 6,7 |
| Work | 17,9 | 56,4 | 17,9 | 7,7 |
| Public places | 20,5 | 52,3 | 22,7 | 4,5 |

*Source: Vitosha Research, June 2001*

The service appears to be of poorest quality for subscribers connecting from public access points. This is generally understandable because in such places users pay directly and on the spot for the Internet service and very often they experience problems of poor traffic due to network overload or disparate technical capacities of various ISPs.

### 3.2. Bulgarian web services / Locally relevant content

The daily use of the Internet essentially involves visits to Bulgarian portals, search engines, and entertainment sites. The web sites of nongovernmental organizations, online computer distributors, and government institutions are the least popular. On one hand this may be due to the fact that these sites offer very specialized information and services intended for specific user categories. On the other, the low level of popularity could mean that the sites need to revamp their image and incorporate additional features such as search options, online services, etc., in order to enhance their presence in Bulgaria's web-space.

**TABLE 5.6. VISIT FREQUENCY FOR BASIC TYPES OF BULGARIAN WEB PAGES**

| | Several times a week | At least once a day | At least once a week | At least once a month | Less often | Never | DK/NA |
|---|---|---|---|---|---|---|---|
| Portals/Search engines | 6.7 | 15.6 | 21.1 | 10.0 | 14.4 | 20.0 | 12.2 |
| Online news | 0.0 | 6.7 | 21.1 | 13.3 | 21.1 | 26.7 | 11.1 |
| Online newspapers and magazines | 1.1 | 7.8 | 12.2 | 12.2 | 22.2 | 32.2 | 12.2 |
| Government institutions | 0.0 | 3.3 | 11.1 | 8.9 | 26.7 | 38.9 | 11.1 |
| Nongovernmental organizations | 1.1 | 2.2 | 5.6 | 7.8 | 20.0 | 47.8 | 15.6 |
| Business sites | 6.7 | 6.7 | 15.6 | 6.7 | 23.3 | 28.9 | 12.2 |
| Cultural sites | 2.2 | 7.8 | 14.4 | 14.4 | 21.1 | 26.7 | 13.3 |
| Universities and schools | 3.3 | 6.7 | 20.0 | 10.0 | 18.9 | 26.7 | 14.4 |
| Internet providers, computer companies | 1.1 | 2.2 | 10.0 | 13.3 | 22.2 | 40.0 | 11.1 |
| Entertainment sites | 4.4 | 11.1 | 26.7 | 16.7 | 14.4 | 21.1 | 5.6 |

*Source: Vitosha Research, June 2001*

Internet sites with Bulgarian content grow rapidly. According to data from the electronic edition of *The World of Internet* in May 2001, the number of indexed Bulgarian web pages within the .bg domain name was 66,992, while the sub-domains within the .bg domain numbered 1,556 (see Table 5.7)[10]. These indicators appear to be on the rise compared to previous periods monitored.

**TABLE 5.7. BULGARIAN INTERNET PRESENCE**

|  | *Dec. 1998* | *Dec. 1999* | *Dec. 2000* | *Jun. 2001* | *March 2002* |
|---|---|---|---|---|---|
| *Keyword Bulgaria* | | | | | |
| Google | n.a. | n.a. | 1,080,965 | 2,110,000 | 3,766,000 |
| Alta Vista | 382,600 | 284,875 | 498,835 | 671,744 | 5,104,693 |
| AllTheWeb | n.a. | 345,864 | 1,150,000 | 1,954,500 | 2,299,710 |
| HotBot | 219,650 | n.a. | n.a. | n.a. | 741,900 |
| InfoSeek | 205,021 | 70,736 | 116,022 | n.a. | |
| Excite | 56,792 | 76,084 | n.a. | n.a. | |
| Yahoo | 252 | 281 | 322 | 253 | 287+45 |
| *Number of pages* | | | | | |
| In .bg domain | 25.594 | 48.966 | 127.104 | 66.992 | n.a. |

*Source: Svetat na Internet, Bulgarian Internet Fixing, http://I-world.vega.bg/.*

## 3.3. The language barrier to Internet penetration

The domination of English in the World Wide Web poses a serious obstacle to the integration of various user groups. Awareness of this issue has prompted some of the largest websites to design mirror versions in different languages. A case in point is the world leader among search engines, Google.com, which created an equivalent of its search engine entirely in Bulgarian. However, this is an isolated case and is rather a successful marketing strategy than the outset of a general tendency. Countries like Bulgaria are in a highly disadvantaged position due to their small markets and more limited penetration of information technologies. But this situation may also present good opportunities to Bulgarian companies and non-commercial organizations to develop locally relevant content and services. It should be noted that local web-developers are reacting adequately to this situation and that users are likewise adjusting rapidly. Most of them prefer web pages in Bulgarian compared to English language sites (see Figure 5.4). Other popular languages such as French, German, and Spanish are not even cited by Bulgarian Internet users.

In terms of age, Bulgarian language sites are mostly preferred by users aged 18-29. In the other age groups the distribution of answers is relatively even. The preference for Bulgarian language content, shared mainly by the young people, is a certain acknowledgement for the nascent Bulgarian web.

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[10] *Svetat na Internet*, Bulgarian Internet Fixing, http://I-world.vega.bg/.

**FIGURE 5.4. MOST FREQUENTED SITES BY LANGUAGE**[11]
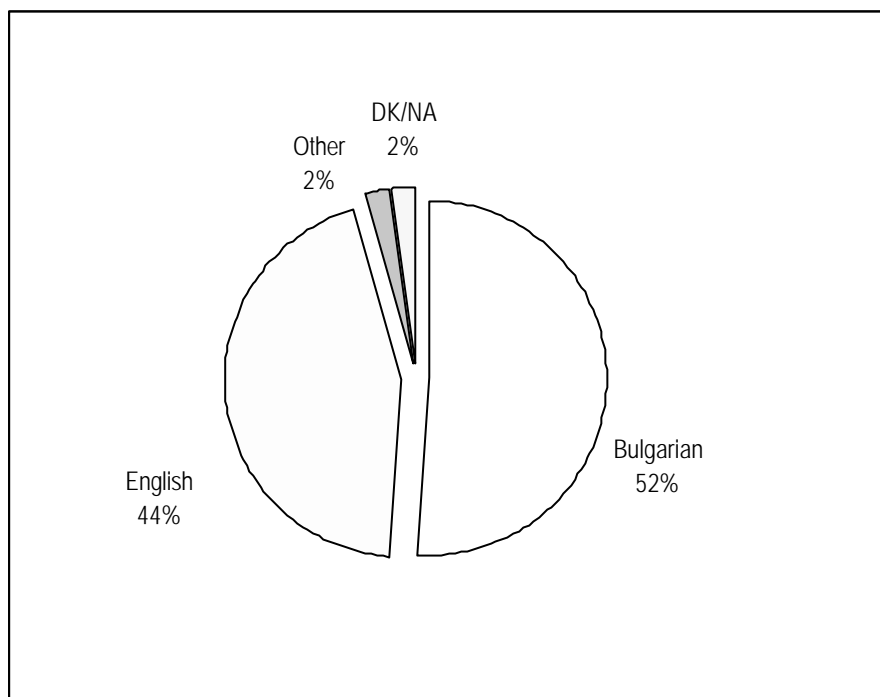


*Base N- 90; Source: Vitosha Research, June 2001*

## V.4. Popular use of the Internet

### 4.1. Frequency of use

Measuring the frequency of use of the various Internet applications on an individual level provides valuable information about the extent to which the Internet is integrated in everyday life. Two of the most common applications have been considered in detail – electronic mail and web surfing.

**Table 5.8. Frequency of e-mail use**

|  | *April 2000* | *September 2000* | *October 2001* |
|---|---|---|---|
| Several times a day | 0,7 | 1,0 | 1,0 |
| At least once a day | 1,1 | 1,4 | 1,7 |
| At least once a week | 2,0 | 1,8 | 3,0 |
| At least once a month | 0,3 | 0,5 | 0,7 |
| Less often | 1,2 | 1,3 | 2,4 |
| **Total** | **5,3** | **6,0** | **8,8** |
| *Base* | *1161* | *1158* | *958* |

*Source: Vitosha Research*

In the past few years the number of people who use e-mail at least once a week has grown substantially.

Data from a representative survey (October 2001) indicate that the majority of people who do not have e-mail addresses are aged over 40. Another alarming tendency emerges in terms of the geographical distribution of Internet users. None

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[11] Only for Internet users and those having computer access.

of the rural area residents included in the sample had used the Internet in one way or another. Bulgaria's rural areas and smaller communities are not affected by the rapid growth of Internet use in the country. (See Appendix 2)

A similar distribution is observed regarding the frequency of Internet use (Table 5.9).

**Table 5.9. Frequency of Internet use (%)[12]**

|  | *April 2000* | *September 2000* | *October 2001* |
|---|---|---|---|
| Several times a day | 0,4 | 0,9 | 1,4 |
| At least once a day | 1,0 | 1,4 | 1,8 |
| At least once a week | 2,2 | 1,6 | 3,8 |
| At least once a month | 0,9 | 0,8 | 1,1 |
| Less often | 1,0 | 2,1 | 2,3 |
| **Total** | **5,5** | **6,8** | **10,4** |
| *Base* | *1161* | *1158* | *958* |

*Source: Vitosha Research*

As evident from the above data, in Bulgaria the Internet is typically used once a week. Yet a solid core of more frequent Internet users is already emerging. The number and structure of these users remain stable throughout the surveyed periods. This is indicative of an internal homogeny of the group and formation of certain behavior patterns of Bulgarian Internet users.

A more detailed demographic profile of Internet use in Bulgaria is presented in Appendix 2.

### 4.2. Tendencies in the popular use of Internet in Bulgaria

Currently the Internet is most commonly used for information gathering purposes. The majority of users describe their main reasons for accessing the Internet as "retrieving professional information, or conducting personal research". The Internet is also used for entertainment and for accessing alternative sources of world news. At almost the same rate (41%) the Internet is used for personal communication. More than half of the respondents highly appreciate the possibility to chat over the Internet. Whether due to financial constraints or the popularity of this service, a considerable number of people believe Internet chats allow them to keep touch with friends and family, and people sharing similar interests[13].

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[12] Only for Internet users and those having computer access.
[13] Source: Vitosha Research, June 2001

**Figure 5.5. Most popular Internet activity and interest areas**
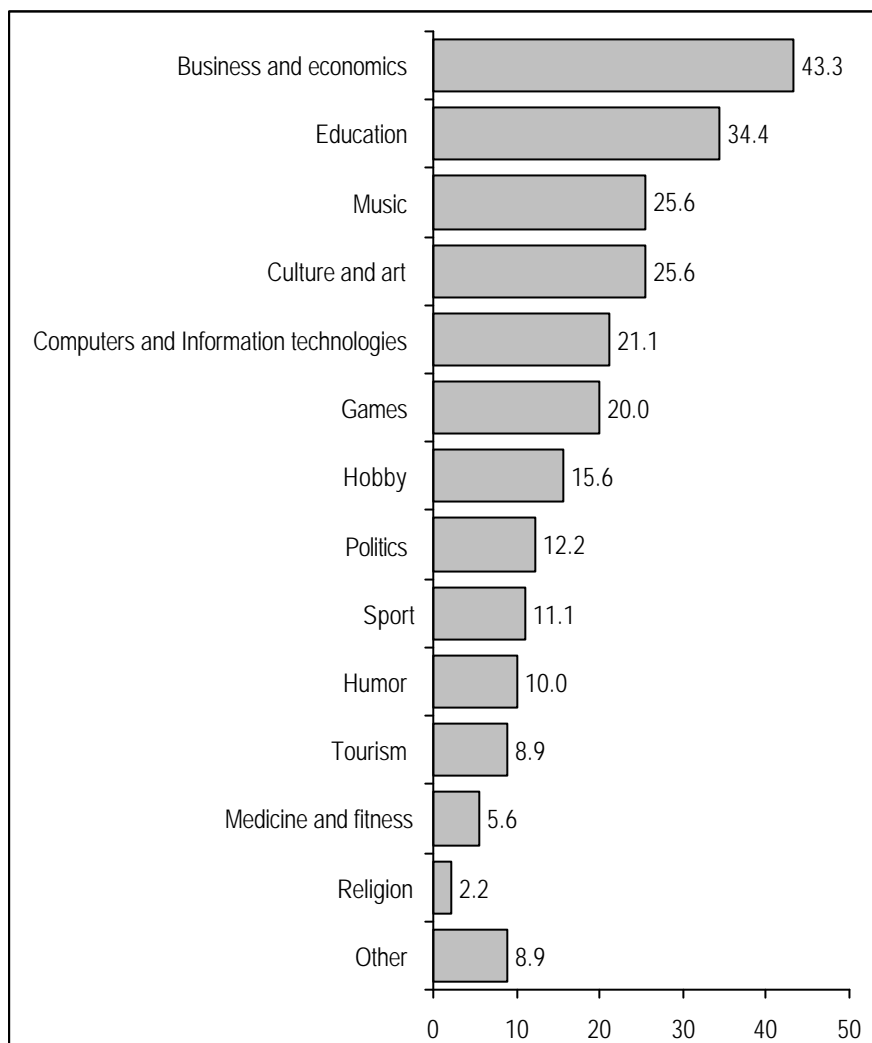


*Source: Vitosha Research*

Cost, availability and local conditions currently limit the use of Internet for electronic banking, electronic commerce, or personal activity planning. Barely 3% of Internet users in Bulgaria shop online, and 10% plan their vacations or travel using the Internet resources.

Set against the global trends in Internet use, Bulgaria seems to lag behind in this category (Figure 5.5).

**In summary**, Bulgarian society is still relatively unprepared to make use of information and communication technologies. Figure 5.6. is a graphic presentation of the quantitative measures of the main e-society indicators: namely users of computers, users of Internet, Internet services, Internet habits, public institutions.

As barriers to access are being addressed, users of computers and Internet services indicators are rather low, respectively 1.5 and 1.00. Despite of that, Internet is becoming more commonly used in Bulgaria as evidenced by the relatively high value of the "Internet habits" indicator (3.50). A fairly stable and homogenous

core-group of Internet users emerges and is gradually expanding. This may indicate the onset of a new social culture defined by high level of interest in, and involvement with ICT.

The supply of online services is still inadequate, as is the general penetration of these technologies in everyday life. A single exception in this category is the diffusion of ICTs in public organizations and mass media where a value of 4.00 is measured. There is still much work to be done in the area of generating locally-relevant content, presenting it in an appropriate manner, and helping people to comprehend how to use the new technologies available to them.

**As a whole**, the e-readiness index of Bulgarian society is rather low – 2.29. It is one of the lowest values among all e-readiness categories being monitored. Despite some awareness of the Internet phenomenon, there is limited understanding of the benefits associate with ICT, and even less direct experience.

**FIGURE 5.6. E-SOCIETY**
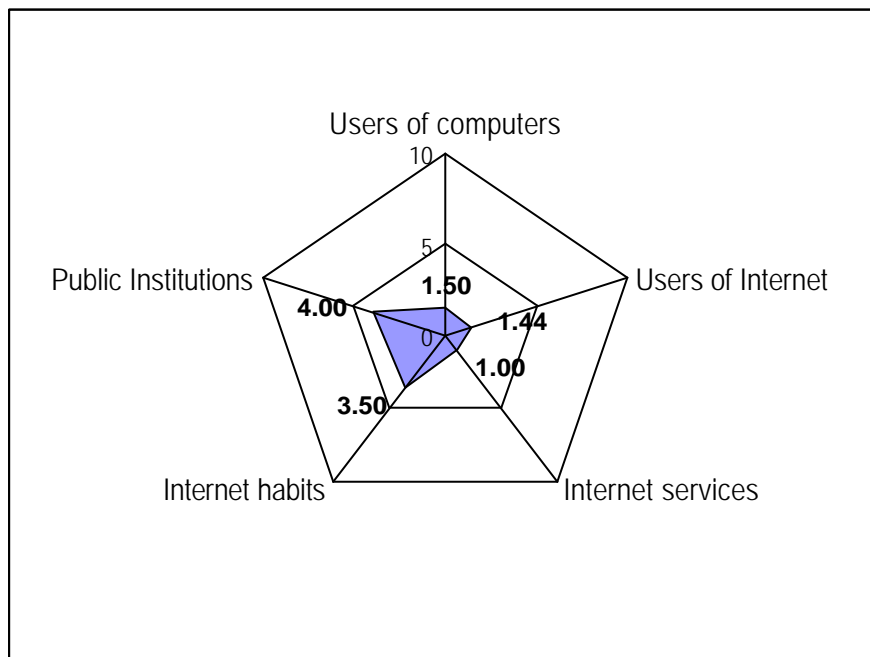


*Average value: 2.29*

## VI. E-EDUCATION

Systematic computer education and use of computers in Bulgaria's educational system first started in the 1986/1987 school year with the introduction of a course on informatics to the secondary schools' curriculum. After the initial comparative saturation of secondary schools with Bulgarian-made 8-bit PCs "Pravetz-8" and partially with 16-bit "Pravetz-16", at the beginning of the 1990s, due mostly to financial difficulties, centralized procurement of computer equipment to secondary schools was terminated.

In 1996 – 1997 an analysis of the state of education on informatics and information technologies was carried out. It became evident from this study that 1,159 schools (out of a total of 3,803 schools operating at the time) had an average of 10.45 operating 8- and 16-bit PCs and 1.47 printers. There was an average of 27 students working on a single 8- or 16-bit PC, or 70 students, if only the 16-bit or higher-class computers were counted. About 120 of the schools covered by the study had Local Area Networks (LANs) and around 50 (in 1998) were connected to the Internet. Ninety-five percent of the software used in these schools was unlicensed software. The situation in the primary schools was even worse.

Taking into account this state of affairs, the Bulgarian Ministry of Education and Science developed a **National Education Strategy on Information and Communication Technologies (ICT)** in 1998. This strategy outlines the principles and goals of modern ICT education in Bulgarian schools. It describes the relevant educational content, the means for ICT's integration in other academic disciplines, the organizational forms of ICT use, the provision of technical equipment and software for the needs of the learning process, the training and qualification of teachers, among other aspects. In 1999, a detailed **Program** and financial plans for the implementation of the this strategy were developed. Part of the program envisages the modernisation of education – i.e. development of standards, adaptation of curricula and syllabuses, etc. – and it is already being implemented. However, financial resources have not yet been released for the procurement of computer equipment and Internet connections in schools. In late 2000 the previous government pledged $15 million[14] for PCs and Internet access to secondary schools. Tender procedures were held and suppliers of equipment and internet services were selected. After the parliamentary elections in June 2001, however, in became clear that these funds were not available in the budget.

Despite such impediments, there has been an increased interest in ICT and more consistent efforts – both by the Ministry of Education and by individual schools and local communities – for computerization of the schools since 1998.

### VI.1. Schools' Access to ICT

Lack of adequate funding is one of the key constrains to meeting the requirements for computer equipment in the educational system. The period 1990-1998 saw a sharp decline in public spending on education– from 6.06% of GDP in 1992 to merely 3.2%

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[14] Later this amount was "corrected" to $10 million.

in 1998. [15] A slight improvement has been observed with the economic stabilization in the country after 1997 and especially during the last couple of years. The budget dedicated to education was 3.88% of GDP in 2001 and reached 4.13% in 2002. Despite this positive development, the public spending on education remains way below the EU average. The economic hardships accompanying the country's transition to market economy seriously impair the penetration of ICT in the educational system.

## *1.1. Schools of Secondary Education*

Data from the Ministry of Education points to the availability of 12,199 PCs in all Bulgarian schools in 2001. The number of "modern" (CPU 386 or higher) computers capable of supporting Internet connections is 8,077. There is a total of 1,311 computer labs (in 2000/2001); 336 schools are connected to the Internet and around 120 have own websites.

**TABLE: 6.1. AVAILABILITY OF PCS AND INTERNET ACCESS IN BULGARIAN SCHOOLS BY REGION**[16]

|  | Region | No. of computer labs | No. of PCs | Pravetz 8 or 16 | Higher class | No. of students per high-class PC | No. of schools with Internet Access |
|---|---|---|---|---|---|---|---|
| 1. | Blagoevgrad | 76 | 339 | 68 | 271 | *74,7* | *24* |
| 2. | Bourgas | 51 | 483 | 65 | 418 | *58,7* | *19* |
| 3. | Varna | 104 | 946 | 396 | 550 | *32,3* | *28* |
| 4. | Veliko Tarnovo | 57 | 616 | 69 | 547 | *40,8* | *21* |
| 5. | Vidin | 22 | 437 | 289 | 148 | *34,4* | *3* |
| 6. | Vratza | 37 | 642 | 480 | 162 | *54,1* | *9* |
| 7. | Gabrovo | 30 | 313 | 22 | 291 | *22,0* | *9* |
| 8. | Dobrich | 21 | 589 | 437 | 152 | *37,1* | *1* |
| 9. | Kardjali | 40 | 279 | 25 | 254 | *33,5* | *4* |
| 10. | Kyustendil | 42 | 382 | 152 | 230 | *43,3* | *4* |
| 11. | Lovech | 30 | 301 | 112 | 189 | *41,3* | *9* |
| 12. | Montana | 40 | 268 | 122 | 146 | *19,2* | *4* |
| 13. | Pazardjik | 45 | 903 | 558 | 345 | *50,6* | *18* |
| 14. | Pernik | 26 | 281 | 22 | 259 | *48,8* | *4* |
| 15. | Pleven | 49 | 376 | 135 | 241 | *47,5* | *5* |
| 16. | Plovdiv | 79 | 651 |  | 651 | *36,8* | *15* |
| 17. | Razgrad |  | 240 | 126 | 114 | *69,9* | *6* |
| 18. | Rousse | 43 | 424 | 41 | 383 | *41,3* | *19* |
| 19. | Silistra | 22 | 229 |  | 229 | *33,3* | *7* |
| 20. | Sofia city | 200 | 490 |  | 490 | *40,6* | *53* |
| 21. | Sofia region | 42 | 589 | 284 | 305 | *78,9* | *10* |
| 22. | Sliven | 36 | 263 |  | 263 | *40,6* | *9* |
| 23. | Smolyan | 36 | 231 |  | 231 | *220,8* | *8* |

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[15] According to various estimates Bulgaria's GDP declined between 30% and 55% during the same period.
[16] Data from MES.

| 24. | Stara Zagora | 49 | 467 | 52 | 415 | *39,0* | *16* |
|---|---|---|---|---|---|---|---|
| 25. | Targovishte | 32 | 465 | 312 | 153 | *73,8* | *6* |
| 26. | Haskovo | 47 | 536 | 288 | 248 | *62,7* | *8* |
| 27. | Shoumen | 26 | 198 | 67 | 131 | *28,9* | *9* |
| 28. | Yambol | 30 | 261 | | 261 | *53,2* | *8* |
| | **TOTAL** | **1312** | **12199** | **4122** | **8077** | **66,4** | **336** |

As of January 2001, around 50 percent of the secondary schools (514 out of of 1023 ) were equipped with at least a single computer laboratory with at least 5 PCs (with PCU 486 or Pentium processors). An interesting observation is that the availability of computer equipment and computer labs does not dependent on the demographic or economic profile of the regions. (see Table 6.1. and Graph 6.1)

**Figure 6.1. Secondary schools with modern computers**
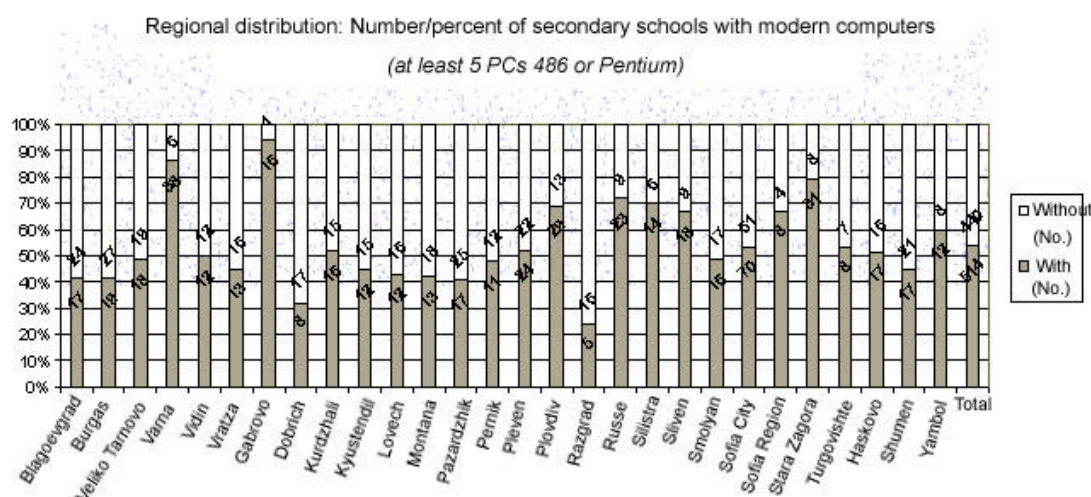


*Source*: Ministry of Education and Science

All schools are provided with licensed software – both system software (Operating Systems) and the most popular application office software, through a contract worth $1,036,000 between the Ministry of Education and Microsoft dated July 1999.

At the same time, the Ministry of Education has no data on the number of computers used in primary and elementary schools. According to the international survey SITES carried out in late 1998, only 3% of the country's primary schools had computer labs. On average the schools had one computer for 270 pupils. Fragmented data from more recent studies indicate that, although the situation might have improved, real access to ICT is not yet available. This could become possible only after ICT is introduced as an obligatory discipline in the primary schools' curriculum.

Overall the **penetration of ICT in Bulgarian schools is still relatively low**. Expert assessments suggests that the ratio students to computers is 66 students per

PC. For comparison, a Eurobarometer survey conducted in February 2001 found that on average, for educational purposes, 94% of European schools were equipped with computers and 79 % were connected to the Internet. The average school in the EU had a computer for every 10 studnets and an Internet-enabled computer for 22 students .

There are two main channels of bringing ICT into Bulgarian classrooms. The first one – the centralized line of government support through the Ministry of Education and Science, and the second one – associated with the efforts of individual schools. According to experts of the international network I*?ARN (that provided funding for more than 80 schools) there is ground for moderate optimism in the second line of development. Individual schools and local communities have become increasingly active in recent years in seeking various funding possibilities to equip computer labs in the schools. The current study has come across various forms of fund-raising – from company sponsorship to collection of "voluntary fees" from parents. Thus some schools have managed to raise considerable financial resources and secure a certain level of ICT access to their students.There is a significant support from the donor community – PHARE program provided funding for digitalization of dozens of professional secondary schools and 13 regional centers for drop-out students, Open Society Fund provided equipment for 12 schools and Internet access for dozens. French language schools received assistance from V-FAX program.

Finally, the assessment of ICT access in schools should necessarily consider an interesting and very important phenomenon for Bulgaria – the existence of computer games clubs. Following the launch of network games in 1998 the country has experienced a real boom in computer clubs. With time these establishments have also enabled access to Internet services on a mass scale. As a result students in even the smallest towns have been given the opportunity to use ICTs despite the delayed computerization of the schools.

## 1.2. Schools of Higher Education

Most Bulgarian universities and colleges have a paucity of computer resources, although the necessary investments in hardware and connectivity are becoming more common. An accurate assessment of the current state of ICT infrastructure in universities is seriously impeded by the lack of reliable and up-to-date information on the availability of personal computers and Internet connections. The reasons for this are many-fold: the academic autonomy of the schools and different management schemes make the collection of such data a very difficult task. As it stands now, no government agency collects comprehensive information on these schools. In some cases, the university managements are not even aware of considerable technological resources that some of their departments have managed to secure on their own. Often there are strange rivalries between the universities and some of their more "popular" departments for projects and hardware equipment..

In such circumstances the **number of PCs at the universities in Bulgaria** can only be approximated based on expert assessments. This number is believed to be

around 20,000 PCs in a total of 48 schools of higher education[17]. About 50 % of these are "modern" PCs. Penetration is highly uneven. For example, the American University in Bulgaria (AUBG) reports around 550 PCs for 700 students (an almost 1:1 ratio), while other universities have one computer for over 100 students.

In many cases this equipment is used only in administration (e.g. in accounting) and not for education or research. With the only exception of AUBG no other university in the country currently offers free access to computer labs and Internet connections to its students.

Practically all universities (45 out of 48) have registered Internet sites and all of them are connected to the Internet. Approximately 40% of the state universities were connected until recently through the National Educational and Research Information Network UNICOM-B that was recently closed down and each university used and uses a variety of commercial ISPs to secure additional bandwidth. Some universities , mostly technical and engineering ones, have good access and fairly advanced ICT facilities but humanitarian faculties still lack behind the technical, mathematical and economics and management faculties.

Limited as it is, the current level of access to ICT in Bulgarian higher education is possible thanks to funding from abroad or donations from private sponsors as university budgets do not allow sufficient ICT spending. ICT resources are dispersed and used inefficiently due to a serious increase of the number of students and campuses together with a decrease of spending on education. There is not sufficient use of ICT in subjects other than those directly related information technology which represents a major brake on progress in most academic disciplines. In such circumstances, Bulgarian universities run the risk of seriously falling behind their counterparts in the rest of Europe if they do not bring innovation both to the educational curricula and teaching and learning methods.[18]

In addition to the limited access to technologies, the qualification of university professors is one of the most serious problems facing higher education in Bulgaria. After 1990 the motivation of students and professors to stay in the educational systems has declined significantly. According to various "brain-drain" studies[19] about 70% of young professors in the field of modern technologies have left the universities. The "brain-drain" works in two directions: internal migration towards the private sector and emigration to universities and private companies abroad. Enrollment in post-graduate programs, particularly in the field of ICT, has also declined and the situation is not likely to improve in the near future.

Some signs of a turnaround in the "brain-drain" situation were noticed for the first time by the end of the 1990s when many software developers  returned to the

[17] There is ? total of 48 universities in Bulgaria, located in 26 towns and cities. There are 8 private schools of higher education, 4 of which are independent colleges. The total number of students at the beginning of 2001-2002 was 215,926.
[18] From "IT for Development Issues Paper", UNDP and Center for the Study of Democracy, Sofia, 2001.
[19] Brain Drain in Easter Europe, 1994-1995,CSD,

country. Some university departments are trying to recruit such specialists by offering them attractive teaching schemes.

### 1.3. Digital Libraries

According to June 2001 statistics, more than 30 classical libraries in Bulgaria are available online. Most of them offer own or international databases. However, a quick review shows that only 13 of them offer real access to their own electronic catalogues. Three other have indicated such services but in practice they are unavailable.

The library at the University of Architecture, Civil Engineering and Geodesy in Sofia is the only one presenting online its whole librarian fund. Others, like the central division library of the Bulgarian Academy of Sciences, offer only access to international databases included in the "EIFEL" project.

The Open Society Fund (i.e. the Soros Foundation in Bulgaria) has played a critical role in the digitisation of Bulgarian libraries – the National Automated Library Information Network – NALIM. In its 10-year history in Bulgaria, OSF has donated computers, established local area networks, purchased library automation systems and educated librarians.

## VI.2. ICT Education and Training

### 2.1. Schools of Secondary Education

Since July 1999, Bulgaria has a new **Law on Educational Degrees, Educational Minimum and Syllabus**. "Mathematics, Informatics and Information Technologies" is one of eight educational areas defined in this law. On August 30, 1999 the Syllabus Regulations were enforced and two obligatory academic disciplines relating to ICT were featured for the first time – *Informatics* and *Information Technologies (IT)*. They were to be taught at secondary education level at all schools nationwide. On September 1, 1999 the new state-designed curriculum was first introduced to ninth graders.

In May 2000 the state standards (requirements) for the educational content of all disciplines, including Informatics and IT, developed by Ministry of Education, were published. The educational content was elaborated on two level: first level – general education minimum, and second level – relating to specialized education. They outline the necessary knowledge, skills and value orientation of all disciplines that students graduating from the relevant educational degree are to obtain.

On this basis, the new curricula on Informatics and IT for $9^{th}$ to $11^{th}$ grades, and specialized education at $12^{th}$ grade of secondary schools, were developed. The new curricula comply with the contemporary requirements for computer and technological literacy and provide for development of problem-solving skills using ICT, work in a networked environment, the use of Internet and contemporary operating systems and different office applications.

By the end of year 2005 obligatory ICT training will be introduced at primary education level as well. In this way computer and Internet literacy will be added to the set of skills acquired by Bulgarian students at school in an attempt to prepare the workforce of the information age.

Currently, however, classes at the secondary school level do not integrate ICT meaningfully in the lesson plans. Computers and Internet – where they are available at all – are rarely used in subjects other than those directly related to ICT. The technology has very low or now impact on the methods and forms of education. In many schools IT continues to be taught mainly as a theoretical class with no real access to PCs and Internet.

The qualification of teachers is yet another challenge facing ICT in education. Most instructors who currently teach IT and Informatics at schools have not been specifically trained in these disciplines. The majority of them come from a background in mathematics or some fields of electronics which are taught at technical universities in the country. Their knowledge of Internet, network technologies and contemporary software is largely the result of self-training or randomly selected ICT training courses. Due to lack of previous experience in teaching ICT at secondary education level, and because of the dynamic development of this field, there is presently a lack of uniform evaluation system to guarantee the quality of ICT teaching practice in schools.

Another challenge is the integration of new technologies in the overall education process – all disciplines not only Informatics and Computer Sciences. This need requires a governmental strategy for continuous training of teachers in use of new ICT.

In respond to that need  the Ministry of Education is organizing training-of-trainers type of seminars with the support of foreign educational institutions but due to serious financial constraints such programs cannot cover all schools in the country.

Finally, a serious problem for secondary schools (as well as in higher education levels) is the fact that once teachers become better qualified they generally migrate to the private sector often attracted by much higher salaries. At the same time a policy of permanent employment in schools does not allow the involvement of instructors from outside the school system. Thus, despite the existence of qualified professionals in the country, the schools are denied outside (often voluntary) assistance due to a centralized teaching policy at primary and secondary school levels.

As a conclusion, which is valid beyond the scope of the education system, there are many dispersed initiatives, duplicating efforts without added value and lack of coordination that leads to cost inefficiency.

## 2.2. Higher Education

Bulgaria has had a tradition of excellence in science and technology education. But many technically educated Bulgarians emigrated after the onset of political and economic transition in 1989, drawn by better employment opportunities in other countries. Some proportion of teachers has also joined to emigrating aboard. There is a sense that Bulgarian higher education is declining somewhat in quality and is subject to further erosion. This is likely to be felt mostly in science and technology, where the skills are easily marketable across national boundaries.[20]

Information technology skills are among the skills most demanded today. Most countries currently (and in the future) suffer from insufficient supply of people qualified to fill all the IT jobs that exist. The supply of IT professionals in Bulgaria will be seriously threatened whenever the shortage becomes acute in the developed world. Germany and the U.S. (among others) are already raising the number of visas available to people with these skills, and Bulgarians are among those attracted to emigrate. The long-run solution to this problem is to raise the domestic investment in such skills to the level where the imbalance between supply and demand is tolerable from a competitive point of view.

Currently, 29 Bulgarian universities offer programs in fields related to ICT . The number of students in this area of study is currently 6,485[21] (about 3% of the total number of students). An additional 221 students are enrolled in post-graduate education programs. The number of doctoral students at the research institutes of the Bulgarian Academy of Sciences is only 59.

Different surveys indicate that 90% of the students in Bulgarian universities use ICTs and about 50% are enrolled in some sort of ICT training. Experts believe this considerable number of ICT-trained students constitutes a pool of human resource which could guarantee the adaptability of Bulgarian industry in the future.

A number of universities have achieved successful cooperation with the private sector on specialized education or professional training programs but, due to the general economic situation in the country and the existence of certain legislative barriers, the private sector has little interest in cooperating with universities or supporting university research programs in the field of ICT.

There are some schools (particularly IT and/or informatics departments at Sofia University or Technical University – Sofia) where practically all students with ICT skills have access to international programs and research projects. In such departments it is common practice that "qualified students" are recruited by their professors. According to international companies recruiting ICT specialists in the country, the personal motivation and access to international projects are the two decisive conditions for the good level of qualification of Bulgarian students.

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[20] Mission report "The IT Industry in Bulgaria" by George Sadowsky http://www.competitiveness.bg/sadowsky.doc
[21] Students in ICT fields at the New Bulgarian University not included

## 2.3. Professional Training

In addition to the number of traditional college and university programs available, there are many other opportunities for study in fields related to information technology. There is a variety of certification programs offered through professional training institutes, such as Cisco Networking Academy or Microsoft Academy.

There are 5 Microsoft and 38 Cisco academies acting in the country at present – most of them affiliated with academic institutions. The scope of their training extends beyond the purely academic community and addresses much broader social segments. Currently several hundred students already take part in courses offered by the academies. Thus, for instance, Cisco's networking academies provide training to a total of 509 people in 2001.Another 1,200 are being trained by Microsoft and about 400 participants are certified annually. At the moment, about 400 database specialists, 70 developers and 70 Microsoft-certified engineers are already employed on the market.

An important goals of these academies is to identify suitable partnerships with government and educational institutions, business and industry. For instance, there is already successful cooperation with the Ministry of Defense in the context of a Program for Social Adaptation for people who are expected to lose their jobs in the next 3 years (about 20,000 military servants) because of the restructuring of the Bulgaria army. Another successful collaboration exists between big IT companies and the Bulgarian Chamber of Commerce on projects providing training to SMEs to prepare them for the coming age of digital economy in the next few years.

Several of the bilateral and multinational donor agencies also develop a few projects connected with ICT training and education. For instance in late spring 2000, USAID funded a PC3 Telecenter project (**http://www.usaid.gov/info_technology/ied/bulgariaied.html**). The Public Computer and Communication Center (PC3) project is a pilot two-year $800,000 project implemented on behalf of USAID by the Academy for Educational Development (AED) through LearnLink. PC3's objective is to increase public access to computers and the Internet by helping small Bulgarian businesses open telecenters, and bring the Internet and its opportunities to smaller under-served Bulgarian towns viewed as unattractive by the for-profit sector. As one of its components, the PC3 project also trains local users and grants free or subsidized access to specifically targeted social groups, women, minorities, and the unemployed, in an effort to address specific community needs and create the customer base for the telecenters.

The World Bank is also working on Bulgaria's participation in the Global Development Gateway project through a Bulgarian country gateway.

Another project, "Chitalishta", is financed on collaborative basis by UNDP, USAID and the Dutch government. The project is developed and supervised by the Bulgarian Ministry of Culture and aims at encouraging the sustainability and the cultural and educational role of these traditional institutions. According to an

agreement between UNDP and Cisco Systems, ICT education and special qualification programs will be implemented in a total of 25 Bulgarian chitalishta (i.e. community centers) and in 3 regional centers nation-wide. The educational program itself is valued at 90,900 USD and is granted for free by Cisco Systems.

## VI.3. Quantitative Assessment

Lack of adequate computer equipment, Internet access and qualified teachers at the early stages of educational development (there is quite inadequate computerization at some universities too) is one of the crucial problems to the quick penetration of ICT in the country. Most of the students are not even aware of the big potential of this technology and realize it much later, after their graduation from school. In order to achieve IT competitiveness Bulgarian society needs much earlier awareness about the advantages of the digital economy.

ICT implementation in Bulgarian education is still at one of the lowest levels in Europe. Even though there are already successful experiments in some universities with distance learning courses, the general perception among Bulgarian society is that computers are still a big expense for an ordinary household or a workplace. This perception is more or less reflected in the state educational system. Even according to the optimum program of the Bulgarian government for computerization of the schools, there will be just one-two computer labs per school, which is highly insufficient for implementing ICT and massive penetration of new information skills in areas other than informatics itself. The average use of Internet in the area of education and science is a little above the average percentage for the country. Presumably there are some research laboratories and "islands of excellence" which rely exclusively on Internet in their daily work and have a number of successful international projects. However the relatively high cost of Internet access remains a huge obstacle to the massive penetration of Internet and communication technologies.

**FIGURE 6.2. E-LEARNING**
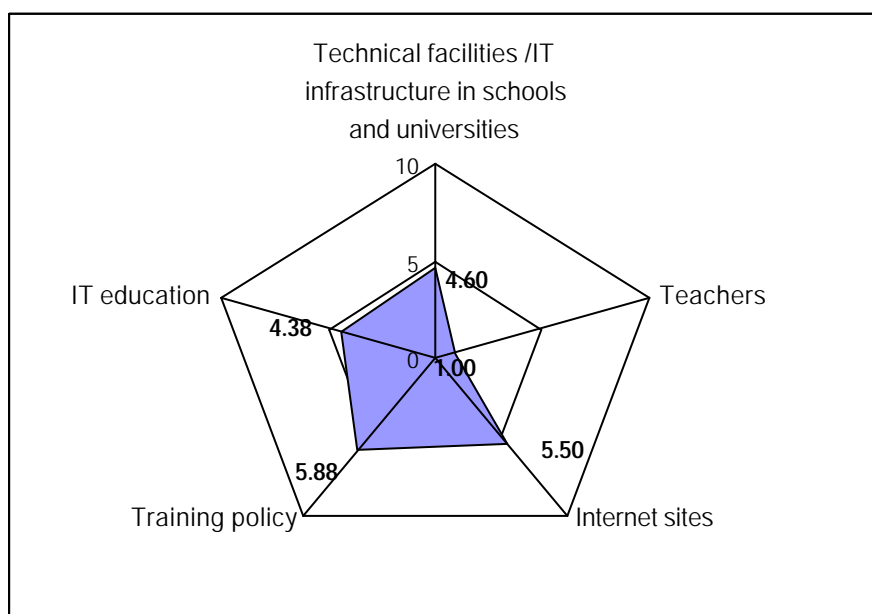


*Average value: 4.27*

## VII. E-ECONOMY

During the 1960s Bulgaria acquired a number of COMECON specializations in the production of communication equipment, which made it possible to begin extensive training of personnel, developing R&D organizations and the respective production capacities. As a result, Bulgaria achieved a monopoly position with over 48 percent of the electronics market in CMEA since late 1970s to late 1980s[22]. Employment in ICT sector reached 200,000 in 1980s and the production capacity of microprocessor plant in Pravetz reached 100,000 annually[23]. 130,000 were employed in electronics and telecommunications in 1989, 8 thousand of them being highly qualified professionals. Almost the entire production (95%) of the sector (equal to 25% of the industrial manufacturing output) was export oriented, mainly targeted at USSR market.

Since 1989, the beginning of transition to market economy, a dramatic decline in electronics production and export was observed. Among the main factors contributing to this situation were: increased international competition, poor corporate governance, lack of state financing and collapsing supply and demand mechanisms within CMEA. Thus, for instance, export decreased more than 20 times over a period of 10 years from $ 1.5 billion in 1984 to less than $ 75 million in 1994. The result was significant structural unemployment, leading to serious social problems and labour force de-qualification, especially in towns whose urban growth was based on new technologies specialization.

In expert estimates, the Bulgarian ICT market amounts to about BGN 1.6 billion, accounting to 6% of GDP. Among the fastest growing markets are mobile communications (preliminary circa BGN 700 million), cable televisions (estimated at BGN 250 million), Internet access and, especially during the second half of 2001, Voice over IP (estimated at BGN 15 million). The computer market is around BGN 480 million, the largest share – 64% being that of hardware, 21% - services, and a small share for software – 15%. The growth is still dependant more on hardware, infrastructure and access to technologies rather than on IPR or services transmitted via them.

## VII.1. Access to ICT

### 1.1. Computers in business

Unfortunately, computer and internet usage in business has not been studied systematically and by representative samples. Nevertheless, a few specialized studies targeted at different types of companies could serve as a starting point for analyses.

At the end of 1999 "around 23% of SMEs had computers and 5.7% had intranet"[24]. A study of the innovation potential of Bulgarian SMEs in third quarter of 2000[25] found that 40 percent of the companies used electronic networks,

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[22] Tactics (2001) Final Reports prepared for the European Commission, Sofia
[23] For comparison, according to IDC, circa 60,000 new PCs were sold in Bulgaria in 2001.
[24] Report on Small and Medium-Sized Enterprises in Bulgaria 1996-1999, Agency for SMEs, 2000
[25] Vitosha Research and IRC-Bulgaria, 2000

databases and Internet. According to Vitosha Research estimates, around 30% of the active companies in Bulgaria use computers in their daily work.

Computers in business are not uniformly distributed and are not effectively used. Only 7.3 percent of workplaces have PCs installed, and only 20 percent of companies with computers have built their own intranets. New computers in private business (excluding finance and telecom sectors) are rarely shipped. Private business and home users segment altogether account to only 14 percent of all new shipments. The government has the largest share of new computer imports – 46 percent of the total volume.

**Figure 7.1. Shipment of new computers by sector**
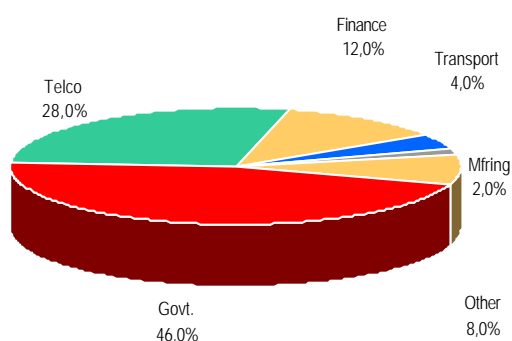


Source: IDC 2000

In the majority of companies, computers are being used for document processing, accounting and legal information systems. Fax machines and telephone, as well as personal contacts, are perceived as key to doing business. It is still required to have signed paper documents almost everywhere.

### 1.2. Internet and web use in business

Around 40% of companies having computers, or 12% of the active companies, are connected to the Internet. Only 3.85% of employees have access to the Internet, which is predominantly used for email communication. This fact could be explained by two factors – (a) a large amount of outdated computers (prohibiting effective use of the Internet) and (b) lack of understanding among business managers about the role of Internet as a driving force for business development.

There was an initial boom of launching Internet sites by companies in 1999 and 2000. The general pattern was to leave the site very simple and not updated. 2001 marked a slight change of the migration of companies to Internet. New sites tend

to be more sophisticated and regularly updates. The growth is rather linear than rapid exponential development (as is the global trend). According to optimistic estimates 5% of Bulgarian companies have Internet sites.

Currently, around 1,900domains are registered in **bg** TLD, being used roughly by 700 organizations. About 2,500 domains are registered in **com**, **.net** and **.org**, but quite a large number of companies maintain two or more domains. In addition, 800 company sites are believed to be hosted by local portal sites (including free hosting) – i.e. www.hit.bg, www.dir.bg, www.online.bg, www.bol.bg, www.search.bg and others.

Company sites present mainly basic, static and rarely updated information, often limited to a short company profile, address and brief description of products and services. Expert estimates suggest that 75 percent of company sites fall in this category (see Table 7.1.) The interactive sites and detailed corporate presentations with actual and dynamic information are rather an exception to the rule.

**TABLE 7.1.: DISTRIBUTION OF COMPANY SITES BY QUALITY (EXPERT ASSESSMENT)**

| "Quality of Internet sites" | Short presentation of the company, not more than 1-3 pages | Detailed presentation, incl. product catalogues, price lists, etc | Dynamic information, news | E-commerce, online payment or payment on delivery |
|---|---|---|---|---|
| Frequency | 75% | 20% | 3% | 2% |

*Source*: Expert assessment by Bazar.bg

There are significant discrepancies in Internet use and quality of websites according to the area of company activity, size, ownership and other characteristics. Foreign companies, export-oriented companies, larger companies, those in the banking and finance sector, software development companies, hardware dealers and technology support centers, and human resource management companies usually have good and updated web pages and use ICT extensively in their everyday work. Small, locally targeted Bulgarian firms use, if at all, Internet primarily for communication purposes and computers – for accounting and warehouse databases or secretarial tasks. There are also a few small Bulgarian internet based retailers.

In a survey (FDI 2000) of companies with foreign direct investments[26] carried out in December 2000, 75.3% of firms (with capital over $10,000) were found to use email and Internet in their everyday work. Despite the obvious use of Internet for general information gathering (74.1% of all firms), Internet is mostly used for interaction with company suppliers – 45.9%. About one-third of the firms used Internet for communication with clients and just 7% were involved in e-commerce.

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[26] ARC Fund was coordinator for Bulgaria in a research project on "Barriers to FDI on the Balkans" funded by Freedom House.

**TABLE 7.2 INTERNET USE IN ENTERPRISES IN BULGARIA**

| Internet usage | FDI 2000 | GCR'99 |
|---|---|---|
| e-commerce | 7.1% | 12.8% |
| Servicig clients | 34.1% | 37.1% |
| Relations with suppliers | 45.9% | 47.1% |
| General information | 74.1% | 83.9% |
| Do not use at all | 24.7% | 16.1% |

The data support the tendency observed by the Global Competitiveness Report for 1999 (CGR'99) (field research conducted in January 2000).

## VII.2. Electronic commerce

Still the share of revenues generated over the Internet is symbolic – 1.06% according to the GCR 2000. 7.6% of companies report that around 2% of their revenue is generated over the Internet. 2.8% report values in the margin of 4 to 11%. It should be noted that the revenue is either generated form outside Bulgaria or trough external online payment systems.

There are two existing e-payment systems in Bulgaria, ePay.bg being the most developed:

**FIGURE 7.2. ELECTRONIC PAYMENTS TROUGH EPAY.BG FOR THE LAST TWO YEARS. (LEFT SCALE – TURNOVER; RIGHT SCALE – NUMBER OF TRANSACTIONS)**
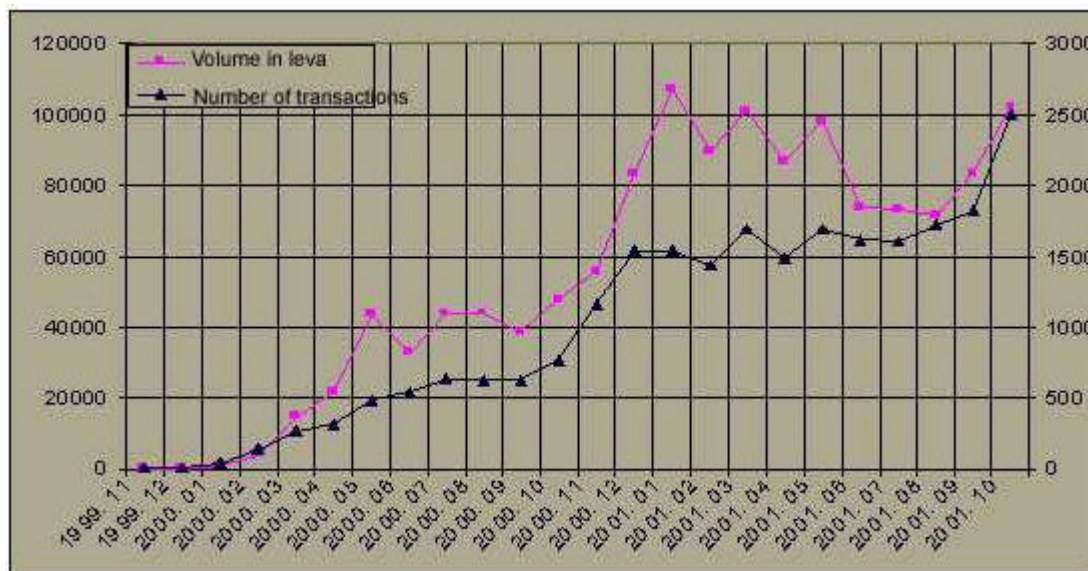


Source: Borika

There is a clear trend of relatively stable transfers via the Internet of about BGN 80,000 monthly. Two major factors account for this situation – demand has already peaked and there are not enough attractive goods and services available for online purchase. The somewhat clumsy and complicated procedure for online debit cards registration is yet another negative impact – only 1.4% of debit card holders are

currently registered in ePay.bg. A second e-payment system, BGPay, was launched in mid-2000 but still has no real turnover.

A relatively new service, Net-Card, for e-payment by prepaid cards is fast growing. In just 3-4 months of existence, registered users of the service are about 3,000 with a total of 11,000 transactions worth BGN 60-70,000.

### 2.1. B2C

E-commerce development in Bulgaria is still at an early stage, when it is difficult to determine the market niches and their potential. The current distribution of existing internet shops/e-commerce sites is given in Table 7.3. . The respective share of turnover is based on expert estimations.

Table 7.3. Distribution of Internet shops by type of payment

| Type of payment | Number of Internet shops | % of total turnover |
|---|---|---|
| Payment trough debit cards | 10-15 | 20-25% |
| Payment trough credit cards | 7-8 | 7-10% |
| Payment on delivery | 40 | 60% |
| Payment services only for utility bills | 1 | 8-10% |

*Source*: Expert assessment by Bazar.bg

There is a bit of confusion in the overall business language related to e-commerce and most of the Internet shops currently in operation are in fact company catalogues for home/office delivery with payment in cash upon delivery. Rough estimates show that they account to 60% of the total turnover, compared to online sales by debit cards accounting to only 30-32% (including payment of utility bills). Although the number of credit cards is significantly less than debit cards, they account for 7-10% of the volume of online transactions.

Based on data from Internet shops and e-payment systems, the major categories of goods and services traded over the Internet are given in Table 7.4:

Table 7.4 Type of products and services sold on Internet

| | |
|---|---|
| Books | 45% |
| Internet access cards | 10% |
| Flowers and souvenirs | 10-12% |
| Music | 7-8% |
| Electronics, GSM telephones | 6-7% |
| Payment of utility bills | 12-15% |

*Source*: Expert assessment by Bazar.bg

The average transaction through ePay.bg is BGN 45-50. The low average level is determined by the low consumer purchasing power. There are some seasonal variations in Internet transactions, partially due to higher utility bills in January (BGN 85 on average).

**TABLE 7.5. AVERAGE TRANSACTION THROUGH EPAY.BG**

| January 2000 | September 2000 | January 2001 | August 2001 | October 2001 |
|---|---|---|---|---|
| 19,1 | 62,29 | 69,49 | 41,61 | 40,82 |

Source: ePay.bg

## 2.2. B2B

Business-to-business e-commerce is still in negligible. Although there are individual attempts for transactions and software platforms for information exchange and internal payment between branches of a company, there are no portals or specialized sites for B2B.

Besides partially payment of company utility bills (water, heating) there are no other major services or goods offered over Internet that could be classified in the B2B category. A few online bookstores (www.office1.bg, www.buloffice.com and others) provide options for online ordering of stationery, but still the majority of orders are made by phone. Rough estimates show that the ration of B2B compared to B2C is about 15:85.

The major barriers for B2B development are low qualifications of company buyers and unwillingness to change stereotypes of work in dealers. Additional factors might be difficulties in accounting and dealing with banks. It was discussed earlier in this report that Internet is mostly used by people younger than 30 years, yet the decision-makers in companies (chief accountants, buyers or even managers) and the majority of public servants feel frightened by the new technologies and do not effectively use computers and Internet.

## 2.3. Availability of e-payment instruments

The overall assessment is that Bulgaria has a favourable legal framework and technological infrastructure of trade and financial institutions, allowing for online authorization and settlement of e-commerce transactions. The majority of the banks issue debit cards and some – also credit cards.

The number of debit cards was 800,000 in mid-2001 and credit cards were between 7,000 and 10,000[27]. An annual growth rate of 50% was observed in the last two years. Credit cards issued in Bulgaria have a stable growth of 400-700 new cards issued each month. The credit cards growth is low due to tough requirements by banks – initial deposit in the range of $300-2,000 (3 to 7 times the average monthly salary) and because the usage of credit cards in Bulgaria is limited. According to the latest available data there are around 3,000 VISA and 4,000 MasterCards in the country. International debit cards Maestro are around 66,000 but the majority of Internet shops do not accept them as a payment instrument.

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[27] According to Borika

Electronic cards could be used by around 10% of the population trough 565 ATMs (as of July 2001) installed in 100 towns and even villages in Bulgaria. There are 200 ATMs installed in Sofia alone (as of end of 2001). In spite of the overall growth of 35% in ATMs, the number of towns/villages covered by the network remains stable in the last year. The major towns and tourist centers are covered by a network of ATMs. POS-terminals, which are more important for e-payment development than ATMs account for a significant growth – from 500 at the end of 1999 they reached 1,600 in mid-2001.

In October 2001 the last remaining five large banks joined in the system of electronic payments and the number of potential users grew by 150% reaching 800,000 people.

**TABLE. 7.6. CARD HOLDERS**

| Card holders | Total | With possibilities for electronic transactions | Registered in ?Pay |
|---|---|---|---|
| December 2000 | 534 000 | 120 000 | 5 000 |
| December 2001 | 810 000 | 780 000 | 11 000 |

Source: Borika

Debit card transactions doubled in 2000. The turnover trough ATMs in 2001 increased with 82.8% as compared to 2000, and the growth in Internet payments is even bigger – 180%.

**TABLE. 7.7. DEBIT CARDS USE**

| | December 1999 | December 2000 |
|---|---|---|
| Withdrawal from ATMs (in BGN) | 2 900 000 | 5 800 000 |
| Payment trough Internet (numbers) | 6 | 1535 |
| Payment trough Internet (volume) | 168,38 | 82 883,68 |

Source: Borika

Electronic payments are made also trough prepaid cards and e-banking: pc banking, telephone banking and online banking. The major difficulties to e-banking include the lack of adequate qualification of bank employees, combined with conservative attitudes towards new technologies, security-related problems, and lack of understanding among the businessmen.

## VII.3. ICT employment opportunities

According to Vitosha Research data[28] 186,000 people in Bulgaria currently have high education related to information and communication technologies, and 565,000 have formal computer training. A quarter of those with high education in ICTs had further or parallel computer training. Around 443,000 people trained themselves, either at the

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[28] National representative survey, May 2001

job or assisted by friends. **It could be concluded that some 16.2% of the population is computer literate.**

Assessment of the labor supply related to production of ICT goods and services is a difficult task and often subjective. Experts estimate IT specialists (incl. software developers, Internet applications and design, system administration and hardware assembling and support) in a wide range from 4,000 to 15,000[29]. In the most popular site for IT jobs ([www.itjobs.bg](www.itjobs.bg)) 2,000 actively seek employment out of 9,000 registered IT professionals.

If other categories are included in this number, such as professional users, telecommunications specialists, ICT equipment dealers, teachers and those employed in the public administration, the range of employed would be from 30,000 to 45,000.

According to experts from recruitment agencies "*IT education is not a decisive factor for recruitment and in more than 80% of the cases it is not a prerequisite for employment. The reason lies in the fact that the skills sought most often are not taught at the university or school but are gained trough individual learning or practical experience.*"

It is even more difficult to assess the ICT related workplaces/jobs. The main difficulty arises from the fact that a large share of this employment is in the gray/informal economy. Employed students, or those working on outsourced projects often are not socially insured even on a minimal wage. In view of this, the only source of information are expert estimations and assessments.

According to different estimates the gray sector of IT market ranges between 30 and 80 percent. Despite its negative effects, the gray economy also has a positive influence on computer and software penetration and computer literacy becomes more accessible.

Although the demand for qualified IT labor force is always ahead of supply, ceteris paribus, we could consider that IT jobs are overall equal to the number of IT specialists, both values increasing in time. The firms and employers meet the demand for more specialists with extension of working time and increasing the requirements/intensity of work, outsourcing orders to partners or on-the-job training. The last option is not considered very efficient, since the majority of those trained soon leave for better employment opportunities and higher salaries. As a reaction to this problem, large IT companies have been seeking closer cooperation with the universities. Up until now this cooperation was based on sponsoring and advertising contracts, but it is expected that in the next few years the cooperation will be institutionalised trough establishment of high-tech parks and contractual relationships with spin-off companies.

As far as official statistics are concerned, according to experts from the National Statistical Institute, the closest chapter is "activities on project-programming production and support and related services". 2,319 firms with a total of 5,117

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[29] The Deputy Minister of Transport and Communications Mr. Nikolay Nikolov mentioned 6,000 at the SEE Economic Forum, October 2001; IDG estimates 3,900-4,2000 IT specialists in a total of 600 active IT companies in September 2001; BAIT puts the figure at 15,000.

employees were reported in 1999, accounting for a growth rate of 12% among firms and 6% among employees, as compared to 1998. Data for 2000 is not yet published but preliminary estimates show 2,600 firms with 5,450 employees.

Workplaces with installed computers (or requiring part-time work with computer) are estimated between 12%[30] and 19%[31]. **For the purposes of the current study the average value of 15% is taken for jobs requiring ICT skills.**

### 3.1. Remuneration of IT specialists

Unfortunately there are no regular labour cost surveys on the ICT market. There is a large discrepancy in salaries – from around BGN 200 in public administration, universities, or start-up salaries of people with no experience in the private sector; through around BGN 400 for heads of IT departments in public administration, qualified students working on international projects at universities or NGOs; to BGN 700-1,200 for middle level specialists in the private sector; to the highest levels of over BGN 2,000-3,000 – for managers, head of IT departments in banks, or the best software developers (around 5% of the total).

**Table 7.8 Salaries in IT-firms**

| Salaries in IT-firms, working for European or American markets | | |
|---|---|---|
| Position | Minimum | Maximum |
| Assistant to the CEO | 250.00 | 800.00 |
| Director of Software Developers Department | 900.00 | 3 000.00 |
| Senior Programmer/Developer | 600.00 | 1 600.00 |
| Junior Programmer/Developer | 400.00 | 1 000.00 |
| Director  Web Design Department | 1 000.00 | 1 500.00 |
| Senior Web Designer | | 1 100.00 |
| Junior  Web Designer | | 500.00 |
| System analyser | 800.00 | 1 500.00 |
| System administrator | 500.00 | 1 500.00 |
| Director Sales and Marketing | | 2 350.00 |
| Senior specialist Sales and Marketing | | 1 500.00 |
| Junior specialist Sales and Marketing | | 650.00 |
| Specialist Databases | | 1 600.00 |
| Specialist Analyzer of Web sites | | 1 200.00 |
| Specialist – Advertising department | | 1 100.00 |

*Source: Dr Pendl and Dr Piswagner – Bulgaria*

According to IDC, the average salary of ICT specialists in year 2000 accounted to 220% of the average salary in the country. Programmers/software developers, system administrators and other highly qualified professionals earned 340% the average salary in Bulgaria.

A leading indicator for the future attractiveness of work in the information society and e-development as a whole is investing in IT (excluding telecommunications),

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[30] Based on employment data from NSI and IDC data on PC penetration in business and public administration

[31] National Representative Survey, Vitosha Research, May, 2001

which is about 1.4% of GDP, according to IDC. The Figure 7.3.provides the comparative positioning of Bulgaria in the context of other transition economies.

**Figure 7.3. IT spending for Central and Eastern European Countries**
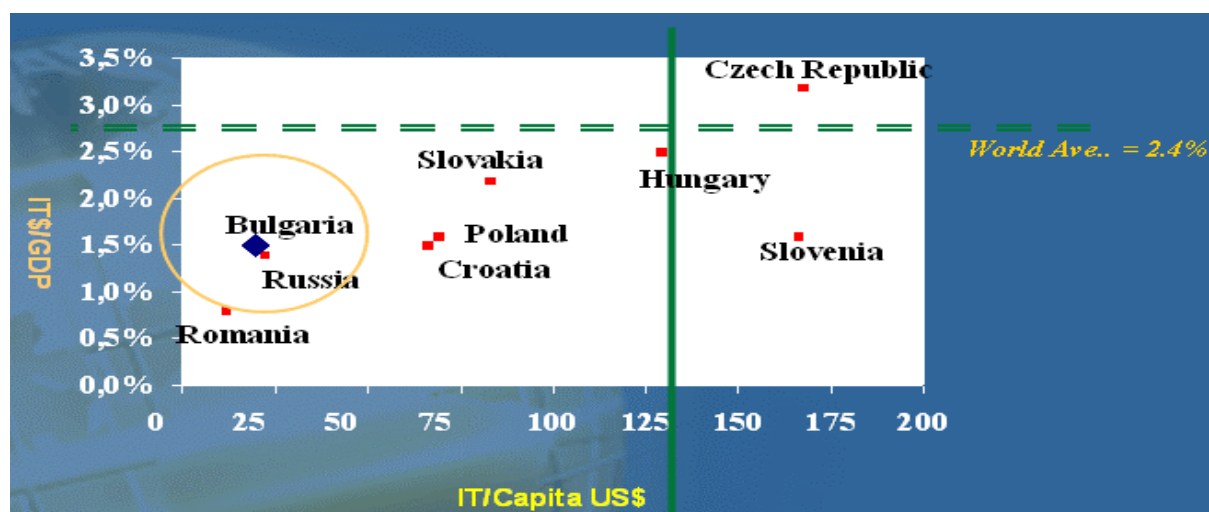


Source: IDC 2001

## VII.4. e-Government

There has been much debate on e-government in the last three years, yet the last year saw the first significant development in this area.

The government has been working for two years now to create a backbone network for internal communication between ministries, regional government, municipalities, etc. The network use an Intranet/VPN solution, opened to the public with own security system, optic-fiber channels for high speed (T-1; T-3; OC-3); supporting systems for national registries with public access and support of internal document management system, and two way Internet connection of at least 2 MB. The launching of the project is expected to be in mid-2002. Currently it is operating in Sofia and some of the larger towns.

The National Statistical Institute collected information on IT resources in public administration in 2001 but the data is not available even to senior state officials. Most recently IDC and the Council of Ministers conducted a survey among central government ministries (with the exception of Ministry of Interior, Ministry of Defense and Ministry of Finance) on IT equipment and human resources. The results of this survey are shown in Table 7.9:

**Table 7.9 : Number of computers in central government ministries**
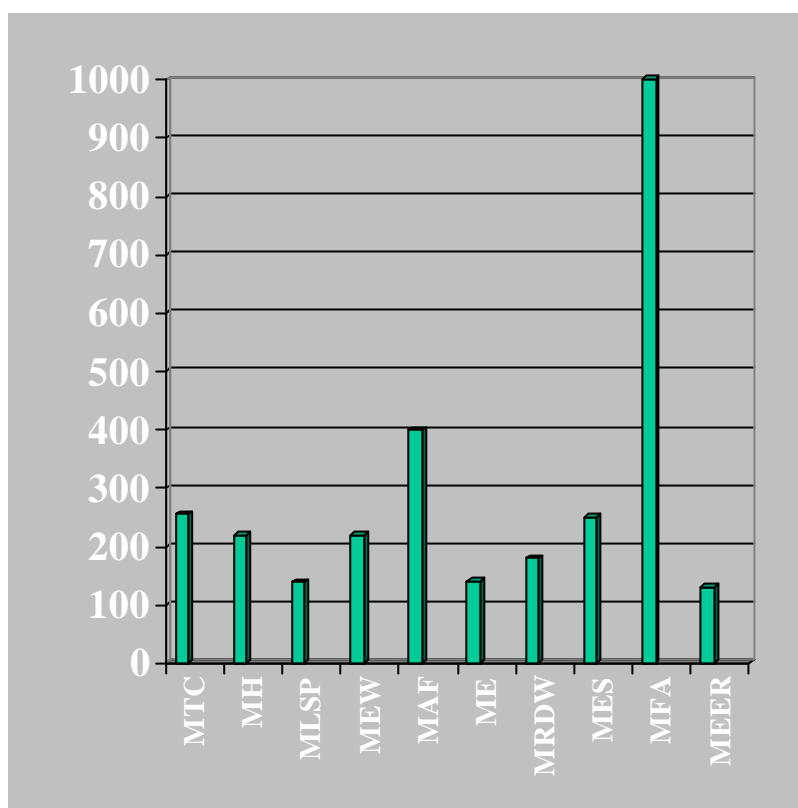


Source: IDC 2002

According to the origin of computers, 45% of respondents indicated that they had computers manufactured by leading EU or US producers, 45% reported leading Bulgarian assemblers , 18% - producers from Far-Eastern countries and 9% - small unknown or even non-brand computers.

Expert estimates suggest that around 18% of workplaces in the central and local government administrations are equipped with computers. The regional governments have the most up-to-date equipment and almost 90-100% of the workplaces are computerized.

Problems related to computer usage in the public administration could be summarized as follows:

- outdated equipment – many departments still have 16 bit PC 386, 486;
- cutting edge technology – mainly bought through loan schemes or public procurement; due to the high cost of this equipment it often impossible to buy appropriate software and consumables for effective use of the equipment;
- low interoperability of databases and specialized software.

Not all computers are yet connected in a network. More than a third of respondents say that intranets do not cover all units or branches of a given ministry in the country. The predominant type of the network in the government is Ethernet (44% of

respondents) and Fast Ethernet (39% of respondents). Only 11% responded that they had FDDI and 6% – Gigabit.

Connectivity to Internet varies from 80-100% in regional administrations, trough 70-80% in the ministries to less than 20% in local government administrations. The average level would be 20% connectivity of computers to Internet.

The public administration shows a positive development in web presence over the last few years. In 1997 there were only two sites, that increased to more than 120 in 2001. More than 90% of the state institutions have Internet sites. 4-5 are the sites of regional administrations, more than 30 of municipalities. Still the sites are mainly with static information and not updated. Where applicable downloading of forms is possible. It is expected that in 2002 with recently published secondary e-commerce legislation necessary for the implementation of the Law on electronic document and electronic signature, more government sites will become interactive and will allow for e-payments and electronic submissions of documents.

**Table 7.10 Government sites**

| Total sites of Ministries | Providing dynamic information | Allowing for feedback | e-Payments, B2G | Good design |
|---|---|---|---|---|
| 15 | 3 | 9 | 0 | 3 |

*Source:* Expert assessment by Bazar.bg

Nine sites of ministries provide feedback possibilities through email or web form. The same option is provided by three to five regional administrations (15%) and around 15-25 of the municipalities (7-8% of all). Sofia Municipality is a big exception at the municipal level providing tracking services for the citizens requests.

Only 4.3% of the population visit public administration web pages. Firms visit more often government Internet sites due to their interest in public procurement – around 6% of the companies use the public-procurement registry, Bulstat, tax administration sites or other company-related online services.

The overall assessment of e-government in Bulgaria is that it is in its early stage of development, but if good coordination and project management is applied, and adequate training of civil servants is provided, it is possible to achieve at least 90 percent of the ambitious government program in e-government.

## VII.5. Quantitative Assessment

The **overall** e-economy assessment is measured at 2.89, (see Figure 7.4) indicating a relatively low degree of preparedness compared to the aggregate e-readiness index for the country – 3.36, and only better than the e-society index.

Different factors in this indicator show serious discrepancies in values. For instance, there are enough ICT employment opportunities – 4.29 with available e-payment instruments – 3.75. Yet, the Internet usage in business is critically low – 1.0 and web space is not effectively used by business – 2.00. This could be partially explained by the low level of computer penetration and usage in business – 2.43.

The government seems somewhat better prepared for the new economy than business – the e-government indicator is measured at 3.89. One of the reasons is the larger funds available for investments in IT from the government than the private sector.

**Figure 7.4.: e-Economy**
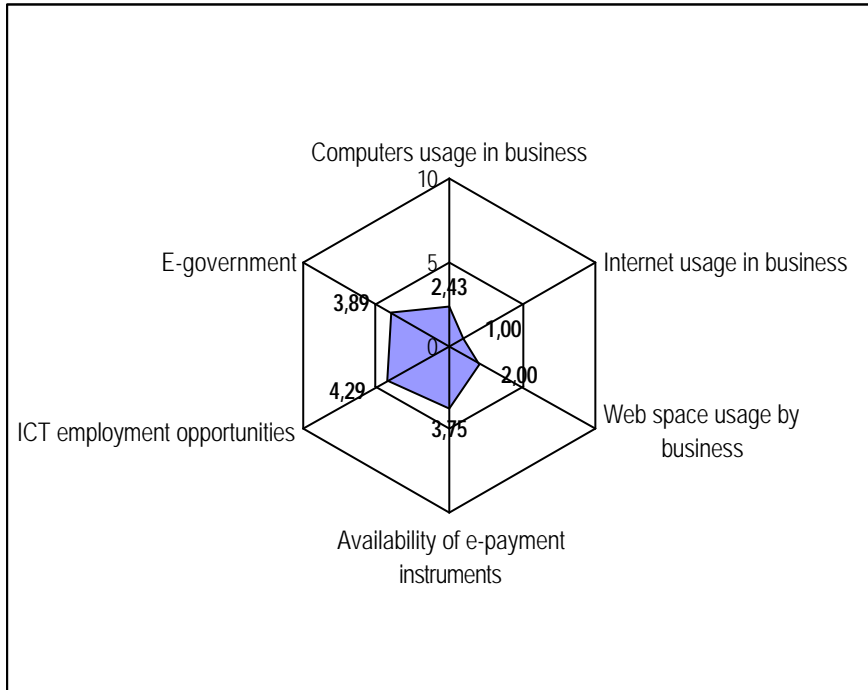


Average value: 2.89

## VIII. NETWORK POLICY / E-POLICY

The state policy in the field of information and communication technologies (ICT) is among the key issues when assessing the country's e-readiness for the Information Society (IS). The analysis below examines the governmental policy in the ICT sector in general focusing mainly on the legal framework of ICT as the most significant and powerful instrument for State intervention.

The state policy in the field of IS development is based on two main documents, adopted by the Government:

- **Strategy on Information Society Development of the Republic of Bulgaria adopted in October 1999.** The Strategy defines the national priorities for transition to IS at legislative, technological, economical and social levels and outlines the basic related activities. It combines the IS concept of the European Union with the national interests and the specific realities of the country: consolidation of the democratic system, European and Euro-Atlantic integration, market economy development, and currency board. The document takes into account the European Union Strategy, national strategies and programs for transition to IS of a number of European countries as well as political and legal documents of the European Union, the Council of Europe and other international organizations.
- **National Program on Information Society Development of the Republic of Bulgaria adopted in October 1999 and updated in April 2001.** The Program is based on the adopted Strategy and specifies in details the measures to be undertaken and the governmental body responsible for their implementation.
- **National Strategy for E-Commerce** adopted in June 2000.

### VIII.1. Access to Information

The development of IS depends to a great extent on the legal regulation of the *access to information* and the *protection of citizens' communication rights*. The basis for the establishment of an effective legal framework for dissemination of information has been already created with the adoption of the new Constitution in 1991. The detailed regulation in this field has to be provided in three separate laws concerning the access to public information, the personal data protection and the confidential information:

- **The Law on Access to Public Information was adopted in July 2000.** It defines the term "public information" and declares the principle of free and unlimited access to such information. The Law also specifies the procedures for obtaining public information and the authorities responsible for its provision.
- **The Law on Personal Data Protection was adopted in December 2001.** It corresponds to Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regards to the processing of personal data and on the free movement of such data and is considered as a prerequisite for the ratification of Convention No. 108 of the Council of Europe for the Protection of Individuals with regard to Automatic Processing of Personal Data, signed by Bulgaria in June 1998. The Law

specifies the obligations of the persons dealing with personal data processing, the protection of such data, and the terms and procedures for providing access to personal information and also envisages the establishment of an independent Commission on Personal Data Protection.

- **The Law on Protection of Classified Information is still in process of adoption.** The development of legal and institutional framework in the field of confidential information protection is a strategic priority of the Government in the process of NATO integration and a key element in the NATO Membership Action Plan adopted in Washington in 1999. The Draft presented to the Parliament by the Council of Ministers envisages the establishment of a modern legal framework in conformity with the NATO policy and standards and specifies the principle and procedures for the protection of classified information as well as the responsible specialized authorities and their powers. The Draft also provides for the establishment of a State Commission on Security of Information to carry out the overall organization, coordination and control in this field.

## VIII.2. Telecommunications

The legal regulation of telecommunications is provided by the Law on Telecommunications adopted in 1998. In 2001 substantial amendments to the Law have been introduced, which will enter into force on February 5, 2002. The Law defines the terms "telecommunication" and "telecommunication activity" and specifies the regimes for operation of the telecommunication operators.

The Law envisages a number of *authorities* exercising powers in the field of telecommunication:

- **The Council of Ministers** determines the state policy in the field of telecommunications by adopting Sector Policy for the Telecommunications. The Sector Policy lays down the strategy, the principles and the stages of development of sector "Telecommunications".
- **The Minister of Transport and Communications** implements the telecommunications policy on the basis of the Law on Telecommunications and the Sector Policy and also adopts the respective secondary legislation.
- **The Council for the National Radio Frequency Spectrum** at the Council of Ministers carries out the state policy on the radio frequency spectrum (the spectrum including the frequencies between 3 kHz and 3000 GHz).
- **The Commission for Regulation of Communications** [32] as an independent specialized state authority implements the sector policy by regulating and supervising the implementation of telecommunications.

The legal framework of the competent authorities follows the principle of dividing the functions related to the state governance (assigned to the Ministry of Transport and Communications) and the ones related to the regulation of the telecommunication market (assigned to the Commission on Communications Regulation) and provides

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[32] Until the establishment of the Commission for Regulation of Communications the overall regulation and control of telecommunications will be exercised by the currently operating State Telecommunications Commission.

clear differentiation between the powers and responsibilities of the institutions dealing with telecommunications.

According to the Law on Telecommunications the telecommunication operators perform their activities on the basis of three different *regimes*. Clear and transparent criteria for the application of these regimes are provided following the overall objective of gradually removing the regulatory barriers in front of the telecommunication activities. The general legal framework for the issuance of licenses for telecommunication activities performance follows the European Union regulatory framework outlined by Council Directive 97/13/EC of 10 April 1997 on a common framework for general authorizations and individual licenses in the field of telecommunications services. The following regimes are currently applied, regulated by Ordinance 13 of the Ministry of Transport and Communications

- **Individual licensing.** Individual licenses are needed for the performance of several telecommunication activities explicitly listed in the Law. The individual licenses are personal and are issued by the Commission on Communications Regulation either with or without a tender or a competition. Limitations are envisaged for the transfer of the individual licenses issued. With few exceptions they could not be transferred to third parties within a certain period after their issuance (three years if the license has been issued with a tender or a competition and one year in the other cases). After the expiration of this period the licenses could be transferred following a prior consent of the Commission on Communications Regulation. The term of validity of the individual licenses is twenty years with a possibility for extension with the total duration not exceeding thirty-five years. The issuance of individual licenses is not free and state fees are collected depending on the type of the telecommunication activity.
- **General license registration.** The general licenses determine the conditions under which everybody who wishes and meets these conditions could carry out telecommunications activity. The scope of application of this regime is also explicitly determined by the Law and state fees are collected for the registration.
- **Free regime.** The free regime applies for all the cases that do not fall under the scope of application of neither the individual licensing nor the registration under general license.

According to the Law the *telecommunication services prices* are freely determined by the telecommunication operators according to the demand and offer on the home market and providing equality of the users. The prices of the services provided by operators who have established dominating position on the market as well as of the services for which it is established that they are provided by abusing the dominating position or disloyal competition in the context of Bulgarian protection of competition legislation are regulated by the Commission on Communications Regulation. The regulation is performed through determining the price limits, rules and principles for price formation and concrete prices for a period of six months to one year.

In accordance with the Constitution the Law on Telecommunications has established *state monopoly* on the submission of fixed voice services (urban, interurban, international and transit) between end points of fixed telephone network, the renting

of lines under publicly announced conditions and the implementing of cross-border transmission of voice in real time for the purpose of conceding international voice services by the public telecommunication operators. The activities subject to state monopoly are performed by the state-owned Bulgarian Telecommunication Company on the basis of a special license. The monopoly will be effective till December 31, 2002.

## VIII.3. Electronic media

The Law on Radio and Television adopted in 1998 and substantially amended in 2001 regulates the radio and television activities performed by the radio and television operators on the territory of Bulgaria. The operators are divided into two main groups: *commercial operators* and *public operators*. Bulgarian National Television is the national public television operator and Bulgarian National Radio is the national public radio operator. They both have specific status according to the Law and are partially funded by the state budget.

The rest of the radio and television operators perform their activities on the basis of either *licensing* or *registration regime* depending on the technological means of broadcasting. The licensing as well as the registration is performed by the Council on Electronic Media as an independent state authority responsible for the overall regulation of and control over the radio and television operators' activities. Both the licensed and the registered operators are obliged to pay initial and annual state fees in the amount determined by the Government.

## VIII.4. Electronic Document and Electronic Signature

The newly adopted Law in Electronic Document and Electronic Signature is effective since October 7, 2001. The Law corresponds to the main principles of Directive 1999/93/EC of the European Parliament and of the Council of 13 December 1999 on a Community framework for electronic signatures.

The Law defines the terms "electronic statement" and "electronic document", envisaging provisions on the signatory, the owner, the addressee, and the intermediary of an electronic statement as well as on the determination of the time and place of sending and receiving electronic statements. The Law also stipulates that with the composition of an electronic document the written form is considered observed.

Three types of electronic signatures are specified (simple, advanced and universal) depending on both the technological means used for their creation and their legal validity. The simple and the advanced electronic signatures have the effect of the handwritten signatures except for the cases where the owner or the addressee of the electronic statement is a central or local state authority, while the universal electronic signatures have the same effect also in the public sphere.

The status of the certification-service-providers and their relations with the owner and the signatory are also regulated. A registration regime is envisaged for the providers issuing certificates for universal electronic signatures. The registration is performed by the Commission on Communications Regulation.

Initially the electronic document and electronic signature will be applied in the commercial turnover, while additional legislative changes or governmental acts are needed to expand their implementation in the operation of public administration and other state institutions.

The effective implementation of the Law depends to a great extent on the *timely adoption of the respective secondary legislation*. Unfortunately the deadline for its preparation and adoption was not observed by the responsible state institutions – the State Telecommunications Commission[33] and the Council of Ministers. However in the very end of 2001 the State Telecommunications Commission successfully finished its work on the preparation of the draft regulations and presented them to the Government for adoption, although it is expected that they will not be adopted before the establishment of the Commission on Communications Regulation.

## VIII.5. Copyrights

Copyrights are regulated by the Law on Copyrights and Related Rights adopted in 1993. The Law includes special provisions concerning the *protection of copyrights on computer programs and data bases* specifying in details the types of operations the user of the program is permitted to perform. The free copying of computer programs for personal use is explicitly prohibited. Sanctions under the form of fines are envisaged for illegal possession, reproduction, distribution or use of computer programs and seizure of the subject of the violation is also provided.

The Law also contains provisions on the use of works subject to either copyrights (works of literature, art, and science) or related rights (records and movies) by providing access to them through wireless means, cable or other technology, for unlimited number of persons, allowing this access to be obtained from a place and in a time, individually chosen by each of them. Such use requires a prior permission by the author, the performer or the producer and imposition of fines is provided for violation of this requirement.

## VIII.6. Computer Crimes

The Criminal Code regulates the criminal offences and the penalties imposed for their commitment. However special rules concerning computer crimes are not envisaged. A part of the existing provisions could be applied to some of the offences usually committed in cyber space such as unlawful disclosure of information, pornography, fraud, etc. Nevertheless the introduction of modern legal framework related to computer crimes is desperately needed. In July 2001 a Draft Law on amendments to the Criminal Code was submitted to the National Assembly, containing mainly provisions on computer related crimes. The Draft introduces *new criminal offences* such as unlawful access to computer resources, unauthorized copying or use of computer data, unauthorized damaging or deleting of computer programs, entering of computer viruses within a computer of information network, dissemination of computer or system passwords followed by the disclosure of personal data or state secret, etc. The Draft also provides *definitions of some computer crimes related terms*

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[33] After the entry into force of the last amendments to the Law on Telecommunications on February 5, 2002, the State Telecommunications Commission is to be replaced by the newly established Commission on Communications Regulation.

such as computer, computer resources, information network, computer virus, computer program, computer data, etc.

**APPENDIX 1.**

**Definitions of Bulgarian E-readiness Assessment Model, indexes and indicators**

The Bulgarian E-readiness Assessment Model is defined as an average value of the following indexes: *Network Access, E-learning, E-society, E-economy.*

**I. Network Access**
The Network access index is an average value of Network Access Technology Penetration, Network Connectivity, Network Access Affordability,

**Indicator 1: Network Access Technology Penetration** is defined as follows:

**Network Access Technology Penetration = 9/14 hard data + 5/14 survey data**

**Hard Data**

1. The teledensity (number of telephone lines per 100 people) *Source:* BTC Annual Report
2. The percentage of households that have a phone line installed *Source:* BTC Annual Report, NSI Data
3. Percentage of digital phone lines (56 kbps capable) as of all phone lines *Source:* BTC Annual Report
4. Percentage of ISDN phone lines (128 kbps capable) *Source:* BTC Annual Report
5. Percentage of households, which have access to cable TV *Source:* BTC Annual Report, NSI Data
6. Percentage of failures of dial-up attempts/connections because they are busy or interrupted *Source:* BAIT, BG Online
7. Failures of the attempts to reach local web sites (servers inaccessible) *Source:* BAIT, BG Online
8. Percentage of the Internet users, who have experienced security related problems (viruses, hacking etc.) *Source:* BAIT, BG Online, VR
9. Number of domains registered under the country's TLD *Source:* Digital Systems

Survey Data

10. Percentage of the population currently having access to the Internet via the cable network
11. Percentage of the population using mobile phones
12. Percentage of the households, which have at least one mobile phones
13. Percentage of the population using mobile Internet access
14. Percentage of households having computers (assuming that every computer, even if not-so-modern, is capable for Internet access)

**Indicator 2: Network Connectivity** is defined as follows:

**Network Connectivity = average of Hard data.**
**Hard Data**

15. Total international bandwidth per capita, bps *Source:* BAIT, BG Online

16. Total national bandwidth per capita, bps *Source:* BAIT, BG Online
17. Number of users per dial-up access point *Source:* BAIT, BG Online
18. Average bandwidth of a leased line, kbps *Source:* BAIT, BG Online

**Indicator 3: Network Access Affordability** is defined as follows:

**Network Access Affordability = 3/5 hard data + 2/5 survey data**

**Hard Data**

19. Percentage of the average price of 1 hour of Internet access of the minimum monthly wage
20. Percentage of the average price of 1 hour of public Internet access (Internet cafes) of the minimal monthly wage *Source:* BAIT, NSI
21. Percentage of the average price of 1 hour local phone call of the average monthly wage
22. Average price (USD) of 1 hour Internet access through mobile service, *Source:* Mobiltel
23. Percentage of the average price of 1 hour Internet access through mobile service of the average monthly wage *Source:* Mobiltel, NSI
24. Percentage of the telecom expenses in the overall expenses for Internet (ISP price + telecom price)

**Survey Data**
25. Average prices (USD) of 1 hour of dial-up Internet access, *Source:* BAIT, BG Online
26. Average prices (USD) of 1 hour of public Internet access (Internet cafes etc), *Source:* BAIT, BG Online
27. Average price of unlimited dial-up Internet access, USD per month. *Source:* BAIT, BG Online
28. Percentage of the average price of unlimited dial-up Internet access of the average monthly wage *Source:* BAIT

## II. Networked Learning / E-Education

**E-Education is defined as an average value of Technical facilities /IT infrastructure in schools and universities, Teachers, Internet sites, Training policy and IT education.**

**Indicator 1. Technical facilities /IT infrastructure in schools and universities**

**Technical facilities = average of Hard data.**

**Hard Data**

1. Percentage of schools (primary and secondary) which have computer labs
2. Percentage of schools (primary and secondary) which have access to the Internet
3. Percentage of universities which have access to the Internet
4. Percentage of schools (primary and secondary) which have Intranet
5. Percentage of universities which have Intranet

**Indicator 2. Teachers**

**Teachers = average of Hard data**

**Hard Data**

6. Percentage of teachers using computers
7. Percentage of teachers who use Internet (at work/at home)

**Indicator 3. Internet sites**

**Internet sites = average of Hard data**

**Hard Data**

8. Percentage of schools, which have own Internet site
9. Percentage of universities which have own Internet site

**Indicator 4. Training policy**

**Training policy = average of Survey data**

**Survey Data**

10. Percentage of schools which have some computer/IT education of the curricula
11. Initiatives to integrate the Internet and IT technology in education and training policy.
12. Initiatives taken by business to increase access of schools to the Internet.
13. Cooperation between educational institutions and businesses to develop up –to-date curricula.
14. Distance education usage in the education.

**Indicator 5. IT education**

**IT education = 3/5 Hard data + 2/5 Survey Data.**

**Hard Data**

15. Percentage of students of schools in IT specialities / % of all students
16. Percentage of students of universities in IT specialities / % of all students
17. Percentage of post-graduated students of universities in IT specialities / % of all students

**Survey Data**

18. Percentage of population with education in the field of IT
19. Percentage of population who have attended computer courses

### III. Networked Society – E-Society

E-Society is defined as an average value of Users of computers, Users of Internet, Internet services, Internet users' habits and Public Institutions.

### Indicator 1. Users of computers

**Users of computers = average of Survey data**

**Survey Data**

1. Percentage of total population who has access to computers
2. Percentage of total population using computers at home
3. Percentage of total population using computers at school or university
4. Percentage of total population using computers at work
5. Percentage of total population using computers at public places (libraries, Internet cafes)

### Indicator 2. Users of Internet

**Users of Internet = average of Survey data**

**Survey Data**

6. Percentage of total population using the Internet
7. Percentage of total population using Internet at home
8. Percentage of total population using Internet at schools and universities
9. Percentage of total population using Internet at work
10. Percentage of total population using Internet at public places (libraries, Internet cafes)
11. Percentage of population who use e-mail at least once per week

### Indicator 3. Internet services

**Internet services = average of Survey data**

**Survey Data**

12. Percentage of population who use most often Internet sites in Bulgarian language
13. Percentage of population who use online services
14. Average Internet usage, hours per capita monthly

### Indicator 4. Internet users' habits

**Internet users' habits = average of Survey data**

**Survey Data**

15. Percentage of population who use Internet more than 1 hour per day (only for users who use Internet every day)

16. Percentage of population who have used Internet up to 1 year
17. Percentage of population who use Internet for news
18. Percentage of population who use Internet for shopping
19. Percentage of the population who have access to computers but cannot afford Internet access
20. Percentage of the population who has access to computers but cannot use Internet due to technological and/or computer literacy reasons

## Indicator 5. Public Institutions

**Public Institutions = average of Survey data**

**Survey Data**

21. Percentage of national media which have Internet sites
22. Percentage of hospitals and clinics which have own Internet sites
23. Percentage of public institutions (libraries, museums, etc ) which have own Internet sites

## III.    E-Economy

The E-economy index is defined as an average value of: *Computers usage in business, Internet usage in business, Internet usage in business, Web space usage by business, Availability of e-payment instruments, ICT employment opportunities and E-government.*

## Indicator 1: Computers usage in business

**Computers usage in business = average of Survey data**

**Survey Data**

1. Percentage of companies using computers
2. Percentage of workplaces having computers
3. Main use of computers in business.
4. Percentage of companies having Intranet

## Indicator 2: Internet usage in business

**Internet usage in business = average of Survey data**

**Survey Data**

5. Percentage of companies having Internet access
6. Percentage of staff having Internet access
7. Main use of Internet in business.

## Indicator 3: Web space usage by business

**Web space usage by business = average of Survey data.**

    **Survey Data**

   8. The intensity of web space usage by business
   9. Percentage of the companies having their own web site

**Indicator 4: Availability of e-payment instruments**

**Availability of e-payment instruments = 1/3 Hard data + 2/3 Survey data**

**Hard Data**

   12. Percentage of the population using debit/credit cards Source: Borika

**Survey Data**

   10. Is the technology infrastructure of commercial financial institutions capable of supporting online authorization and settlement of e-commerce transactions?
   11. Do financial institutions issue credit cards to consumers?

**Indicator 5: ICT employment opportunities**

**ICT employment opportunities = average of Survey data**

**Hard Data**

   13. Percentage of jobs, which require ICT skills
   14. Salaries, which get IT workers on average Source: IDG 2000
   15. Salaries, which get specialized IT workers (programmers, developers) on average
   16. Ratio Spending on ICT/GDP per capita Source IDC

**Indicator 6: E-government**

**E-government = 3/6 Hard Data + 3/6 Survey data.**

**Hard Data**

1. Percentage of workplaces in government institutions having computers
2. Percentage of PCs in government institutions which are connected to the Internet
3. Percentage of government institutions which have own web sites

*Survey data*

4. Percentage of population who use the Internet to visit government websites
5. Percentage of businesses who use the Internet to visit government websites
6. What best describes the level of online sophistication of government website?

**APPENDIX 2.**

## INTERNET USERS IN BULGARIA

**TABLE 3. FOR WHICH OF THE FOLLOWING PURPOSES DO YOU USE THE INTERNET? (%)**

|  | *September 2000* | *October 2001* |
|---|---|---|
| Recreation / games | 1,9 | 2,8 |
| Research | 3,3 | 5,3 |
| News | 3,1 | 4,2 |
| Investments | 0,4 | 1,5 |
| Work related activities | 5,1 | 6,7 |
| Chat / discussion groups | 1,9 | 3,9 |
| Information search and queries | 5,1 | 7,8 |

Source: Vitosha Research Survey (Random Route Sample), October 2001

### *ACCESS TO COMPUTERS*

**TABLE 4. DO YOU HAVE ACCESS TO A PERSONAL COMPUTER AT HOME, AT WORK OR AT ANOTHER PLACE? (BY SEX) (%)**

|  | *Male* | *Female* |
|---|---|---|
| **At home** | | |
| Yes | 6.6 | 8.2 |
| No | 93.4 | 91.8 |
| **At work** | | |
| Yes | 8.3 | 6.2 |
| No | 91.7 | 93.8 |
| **At other place** | | |
| Yes | 3.1 | 3.9 |
| No | 96.9 | 96.1 |

Source: Vitosha Research Survey (Random Route Sample), October 2001

**TABLE 5. DO YOU HAVE ACCESS TO A PERSONAL COMPUTER AT HOME, AT WORK OR AT ANOTHER PLACE? (BY EDUCATION) (%)**

|  | *Basic* | *Secondary* | *Semi-higher* | *Higher* |
|---|---|---|---|---|
| **At home** | | | | |
| Yes | 0.4 | 5.5 | 7.5 | 29.7 |
| No | 99.6 | 94.5 | 92.5 | 70.3 |
| **At work** | | | | |
| Yes | 0.4 | 5.5 | 7.5 | 27.0 |
| No | 99.6 | 94.5 | 92.5 | 73.0 |
| **At other place** | | | | |
| Yes | 0.0 | 5.7 | 1.9 | 6.1 |
| No | 100.0 | 94.3 | 98.1 | 93.9 |

Source: Vitosha Research Survey (Random Route Sample), October 2001

**TABLE 6. DO YOU HAVE ACCESS TO A PERSONAL COMPUTER AT HOME, AT WORK OR AT ANOTHER PLACE? (BY AGE) (%)**

|  | *18-30* | *31-40* | *41-50* | *51-60* | *60+* |
|---|---|---|---|---|---|
| *At home* | | | | | |
| Yes | 9.0 | 12.9 | 16.1 | 5.1 | 1.3 |
| No | 91.0 | 87.1 | 83.9 | 94.9 | 98.7 |
| *At work* | | | | | |
| Yes | 7.3 | 17.4 | 13.7 | 5.6 | 0.0 |
| No | 92.7 | 82.6 | 86.3 | 94.4 | 100.0 |
| *At other place* | | | | | |
| Yes | 11.3 | 6.8 | 2.5 | 0.6 | 0.0 |
| No | 88.7 | 93.2 | 97.5 | 99.4 | 100.0 |

Source: Vitosha Research Survey (Random Route Sample), October 2001

**TABLE 7. DO YOU HAVE ACCESS TO A PERSONAL COMPUTER AT HOME, AT WORK OR AT ANOTHER PLACE? (BY TYPE OF SETTLEMENT) (%)**

|  | *Large town* | *Small or middle sized town* |
|---|---|---|
| *At home* | | |
| Yes | 15.6 | 3.3 |
| No | 84.4 | 96.7 |
| *At work* | | |
| Yes | 12.8 | 6.5 |
| No | 87.2 | 93.5 |
| *At other place* | | |
| Yes | 6.0 | 4.3 |
| No | 94.0 | 95.7 |

Source: Vitosha Research Survey (Random Route Sample), October 2001

## USERS OF E-MAIL

**TABLE 8. HOW OFTEN DO YOU USE E-MAIL? (%) (BY SEX )**

|  | *Male* | *Female* |
|---|---|---|
| Several times a day | 12.9 | 2.4 |
| At least once a day | 14.5 | 8.5 |
| At least once a week | 21.0 | 19.5 |
| At least once a month | 4.8 | 4.9 |
| Less often | 14.5 | 17.1 |
| Never | 21.0 | 23.2 |
| Do not have E-mail | 4.8 | 20.7 |
| *Don't know / No answer* | 6.5 | 3.7 |
| *Total* | *100.0* | *100.0* |

Source: Vitosha Research Survey (Random Route Sample), October 2001

**TABLE 9. HOW OFTEN DO YOU USE E-MAIL? (%) (BY EDUCATION)**

|  | *Basic* | *Secondary* | *Semi-higher* | *Higher* |
|---|---|---|---|---|
| Several times a day | 0.0 | 3.2 | 11.1 | 10.3 |
| At least once a day | 0.0 | 4.8 | 11.1 | 17.6 |
| At least once a week | 0.0 | 16.1 | 11.1 | 26.5 |
| At least once a month | 33.3 | 8.1 | 0.0 | 1.5 |
| Less often | 33.3 | 12.9 | 11.1 | 19.1 |
| Never | 0.0 | 35.5 | 11.1 | 13.2 |
| Do not have E-mail | 0.0 | 14.5 | 33.3 | 11.8 |
| *Don't know / No answer* | 33.3 | 4.8 | 11.1 | 0.0 |
| *Total* | *100.0* | *100.0* | *100.0* | *100.0* |

Source: Vitosha Research Survey (Random Route Sample), October 2001

**TABLE 10. HOW OFTEN DO YOU USE E-MAIL? (%) (BY AGE)**

|  | *18-30* | *31-40* | *41-50* | *51-60* | *60+* |
|---|---|---|---|---|---|
| Several times a day | 4.5 | 8.6 | 4.8 | 16.7 | 0.0 |
| At least once a day | 13.6 | 14.3 | 9.5 | 5.6 | 0.0 |
| At least once a week | 20.5 | 20.0 | 23.8 | 16.7 | 0.0 |
| At least once a month | 6.8 | 5.7 | 4.8 | 0.0 | 0.0 |
| Less often | 18.2 | 17.1 | 16.7 | 11.1 | 0.0 |
| Never | 18.2 | 22.9 | 19.0 | 27.8 | 60.0 |
| Do not have E-mail | 11.4 | 8.6 | 19.0 | 16.7 | 20.0 |
| *Don't know / No answer* | 6.8 | 2.9 | 2.4 | 5.6 | 20.0 |
| *Total* | *100.0* | *100.0* | *100.0* | *100.0* | *100.0* |

Source: Vitosha Research Survey (Random Route Sample), October 2001

**TABLE 11. HOW OFTEN DO YOU USE E-MAIL? (%) (BY TYPE OF SETTLEMENT)**

|  | *Large town* | *Small or middle sized town* |
|---|---|---|
| Several times a day | 8.4 | 4.3 |
| At least once a day | 13.1 | 4.3 |
| At least once a week | 22.4 | 13.0 |
| At least once a month | 4.7 | 8.7 |
| Less often | 15.0 | 26.1 |
| Never | 21.5 | 26.1 |
| Do not have E-mail | 13.1 | 17.4 |
| *Don't know / No answer* | 1.9 | 0.0 |
| *Total* | *100.0* | *100.0* |

Source: Vitosha Research Survey (Random Route Sample), October 2001

## USERS OF INTERNET

**TABLE 12. HOW OFTEN DO YOU USE THE INTERNET? (%) (BY SEX)**

|  | *Male* | *Female* |
|---|---|---|
| Several times a day | 14.5 | 4.9 |
| At least once a day | 14.5 | 9.8 |
| At least once a week | 29.0 | 22.0 |
| At least once a month | 4.8 | 9.8 |
| Less often | 16.1 | 14.6 |
| Never | 9.7 | 23.2 |
| Do not access to the Internet | 4.8 | 12.2 |
| *Don't know / No answer* | 6.5 | 3.7 |
| *Total* | *100.0* | *100.0* |

Source: Vitosha Research Survey (Random Route Sample), October 2001

**TABLE 13. HOW OFTEN DO YOU USE THE INTERNET? (%) (BY EDUCATION)**

|  | *Basic* | *Secondary* | *Semi-higher* | *Higher* |
|---|---|---|---|---|
| Several times a day | 0.0 | 3.2 | 11.1 | 14.7 |
| At least once a day | 0.0 | 6.5 | 0.0 | 19.1 |
| At least once a week | 33.3 | 29.0 | 22.2 | 22.1 |
| At least once a month | 0.0 | 8.1 | 0.0 | 8.8 |
| Less often | 33.3 | 17.7 | 11.1 | 13.2 |
| Never | 0.0 | 22.6 | 22.2 | 13.2 |
| Do not access to the Internet | 0.0 | 8.1 | 22.2 | 8.8 |
| *Don't know / No answer* | 33.3 | 4.8 | 11.1 | 0.0 |
| *Total* | *100.0* | *100.0* | *100.0* | *100.0* |

Source: Vitosha Research Survey (Random Route Sample), October 2001

**TABLE 14. HOW OFTEN DO YOU USE THE INTERNET? (%) (BY AGE)**

|  | *18-30* | *31-40* | *41-50* | *51-60* | *60+* |
|---|---|---|---|---|---|
| Several times a day | 4.5 | 11.4 | 9.5 | 16.7 | 0.0 |
| At least once a day | 15.9 | 14.3 | 7.1 | 11.1 | 0.0 |
| At least once a week | 29.5 | 22.9 | 23.8 | 27.8 | 0.0 |
| At least once a month | 11.4 | 11.4 | 2.4 | 5.6 | 0.0 |
| Less often | 15.9 | 17.1 | 14.3 | 5.6 | 40.0 |
| Never | 9.1 | 14.3 | 28.6 | 16.7 | 20.0 |
| Do not access to the Internet | 6.8 | 8.6 | 9.5 | 11.1 | 20.0 |
| *Don't know / No answer* | 6.8 | 0.0 | 4.8 | 5.6 | 20.0 |
| *Total* | *100.0* | *100.0* | *100.0* | *100.0* | *100.0* |

Source: Vitosha Research Survey (Random Route Sample), October 2001

**TABLE 15. HOW OFTEN DO YOU USE THE INTERNET? (%) (BY TYPE OF SETTLEMENT)**

|  | *Large town* | *Small or middle sized town* |
|---|---|---|
| Several times a day | 11.2 | 4.3 |
| At least once a day | 13.1 | 4.3 |
| At least once a week | 28.0 | 21.7 |
| At least once a month | 6.5 | 17.4 |
| Less often | 15.0 | 17.4 |
| Never | 17.8 | 17.4 |
| Do not access to the Internet | 7.5 | 13.0 |
| *Don't know / No answer* | 0.9 | 4.3 |
| *Total* | *100.0* | *100.0* |

Source: Vitosha Research Survey (Random Route Sample), October 2001