Report

on

Information Networks

Survey of present network services in Bulgaria in terms of Internet, mobile phone and fix telephone services

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In this report I will present some of the most popular Bulgarian Internet providers and companies offering telecommunication services.

Internet

Nowadays in Bulgaria many companies offer internet access at home and also business solutions via different media and type of connection. The most popular of them are Telecom Partners Network, Orbitel, Neterra, Bulgarian Telecommunication Company, Specter Net, Digital Systems, InterBGCom etc.

Telecom Partners Network **(**http://www.tpn.bg**)**

The Network of Telecom Partners Network (TPN) is convergent and based on MPLS technology using digital transmission environment (SDH, ATM, Frame Relay). The Network is built using “state of the art” technologies including equipment from Cisco Systems, the most advansed transmition techniques and different kinds of customer access: leased line, Frame Relay, redundant fiber optic and wireless channels. TPN has POPs in 35 cities in Bulgaria, in Hameln, Germany and in Budapest, Hungary.

TPN has international Internet connectivity for direct connection with three independent Internet providers. This allows alternative routes and maximize the reliability as well as services' redundancy. TPN is a member of Local Exchange Point with all leading Internet providers in Bulgaria.

TPN offers various kind of IP VPN connection, depending on the purpose for creating it: transferring only www, mail, data or business critical applications or transferring data, voice and video applications the type of the created network could be different, with or without prioritizing the traffic.

For building VPDN TPN offers max 57.6 kbps (V.90 analog), 64 kbps (ISDN – 1B),

128 kbps (ISDN - 2B).

As TPN is one of the biggest internet providers it offers as well options of TPN IP Direct Service that are orientated towards the needs of corporate business Customers.

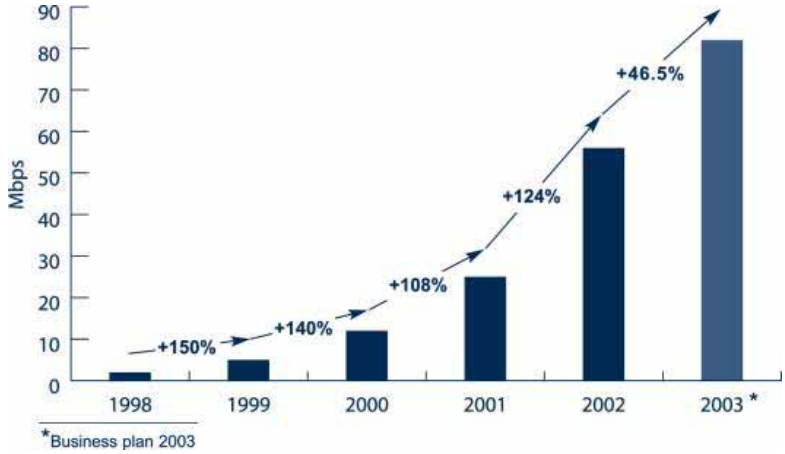
TPN IP Direct Service provides the Customer with high quality Internet Access. Service is ISPs requirements orientated, Information Providers, Corporate and Business Clients as well as all retail companies. The Quality of Service guarantees: - time delay – 40 ms;- time delay to first CE provider in Europe 100 ms; in America 200 ms; - packet loss - 0.2%; - availability – 99.8%.

Orbitel (http://www.orbitel.bg/en)

Orbitel's IP managed digital network provides for service access to 60% of the Bulgarian population. All district centres, generating 75% of GDP, are covered. The network centre in London serves international interconnections. The network's construction is envisioned to provide constant quality for both data and voice services, thus meeting the global business standards of effective network structure and management, real time monitoring system and dedicated support team available at every point of presence.

Orbitel offers data and voice services to both corporate and residential customers, and voice traffic termination to Bulgaria to international partners. The figures show that Orbitel's innovations have paved the way for continual and stable leadership:

The improvement in the quality this company serves is shown in their business plan for 2003:



Since 1999, Orbitel has been operating in the field of voice traffic termination to Bulgaria. The company is interconnected with more than 18 telecoms, among which are - France Telecom, OTE, MCI, Global Crossing, iBases. Currently they serve about 30% of the incoming traffic to Bulgaria. Orbitel is providing the service via its Multi-Protocol Label Switching (MPLS)-based network, which uses class of service traffic management to provide partners with applications such as voice – delivered securely, reliably and with high quality. Cisco powered IP network with fibre-optics backbone, non-stop monitoring system and dedicated support team are the key features that help the company in answering the demanding needs of first tier global carriers.

Orbitel offers also VPN services and since it was the first company introduced this technology in Bulgaia in 2000, now it serves more than 400 points in the country and abroad.

As dial-up is still the most popular residential service on the Bulgarian Internet market, due to the lack of ADSL and proper cable network coverage. More than 150 companies are competing on this segment and at present Orbitel is number one dial-up provider in terms of number of users, twice bigger than the second best brand in the segment.

Other services by Orbitel are Internet access via ISDN or telephone, wireless connection, personal and business e-mail access, e-business hosting and domain registration.

Spectrum Net (http://www.spnet.net/en)

Spectrum Net is the first Bulgarian Internet company that started to integrate the Internet services industry. Since 1999, Spectrum Net merged with several smaller ISPs: Asi Company, BuSoft, OmegaCom, Triada, Inet; in November 2001 the company acquired one of

the most popular Internet dial-up services provider - Prolink.

Spectrum Net is the leading supplier of complex Internet solutions and undisputed leader in providing:

- Internet connectivity,
- Internet telephony,
- building virtual private networks (VPN) and
- network consulting services.

It offers as well:

- Internet access via leased (via Lucent DSLPipe modem) lines with cpacity up to 2.3Mb/s,
- Internet access from ISDN line by terminal adapter via telephone line.with speed of the connection is up to 128 Kb/s;
- Dial-up Internet access
- web services and domain registration.

Spectrum Net is in the backbone of the Bulgarian national Internet traffic. 80% of it flows through Spectrum Net's network. This company emphasizes on providing products and services for business and corporate customers. At the moment, more than 200 large corporate clients and their offices use their services. After the acquisition of ProLink, the largest dial-up ISP, Spectrum Net made a decisive step into the market for internet services to end users. At the end of 2001, Spectrum Net already won the trust of more than 15,000 dial-up customers.

The other Companies offer similar solutions:

1. **Neterra** (http://www.neterra.net/index_eng.html) offers satelite Internet, point to point connection, wireless connection and leased lines. Some innovation is offering Intercity MAN service. It includes setup of virtual local area networks (VLANs) for data transfer accross the country. The client is allowed to dynamically allocate traffic within the VLAN among ports with assigned capacity. The service is designed for ISPs, VoIP operators and companies with offices throughout the country. Since May 1, 2004, the Intercity MAN service is available at the cities of 4 cities in Bulgaria. The service is provided with client interface 100BaseT Ethernet, RJ-45, protocol 802.1q VLAN.
2. **Bulgarian Telecommunication Company** (http://www.btk.bg/en/) is the fix phone monopole company in Bulgaria. It provides also Internet services, such as data transferring, VPN building, Internet at home via ISDN, or telephone, ADSL, dial-up access, WAP, e-mail and hosting.
3. **InterBGCom** (http://www.interbgc.com/index.html) offers Internet via optics, VLAN building, WEB-hosting, co-location, corporative e-mail, dial-up Internet connection, e-mail services and VoIP.
4. **Digital Systetems** (http://www.digsys.bg/) offers Dial-up connection, Leased line connection, cable Internet (speed of 33.6 Kbps;), ISDN and Mobile Access and Web

Services. Other new technologies are Wireless Network, IP telephony, VPNs.

The most of the companies offer their own equipment and installation and rely on advanced monitoring system in order to provide users with customer care support, gathering statistical data, monitoring TPN application servers, customer's accounting and billing.

The number of companies offering these services at present is quite large that is why I introduced only several significant ones which have great importance at the moment. As for such a small country like Bulgaria those companies are quite a lot and the competition makes the quality they serve better by each day. Of course there is much work to be done and many technologies to be implemented in order to obtain faster and more secure communication.

Mobile Telephone Communications.

At present in Bulgaria there are 3 mobile telephone operators: MobilTel, Globul and Mobikom. Since February this year the last one is possessed by the national fix phone monopole company Bulgarian Telecommunication Company. Mtel and Globul are GSM operators and Mobikom has analogue system that uses the NMT 450i standard.

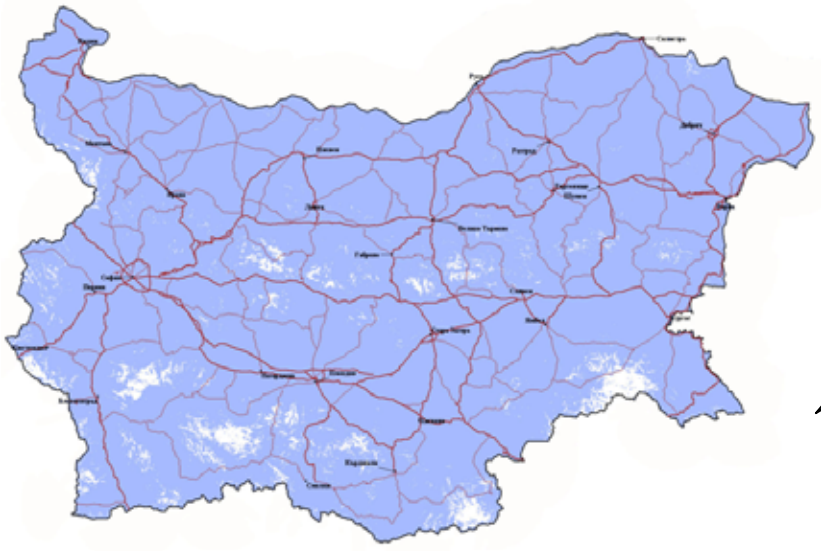
Mobikom (http://www.mobikom.com/en)

First on the Market appeared Mobikom. The service was put on the market at the close of 1993 with Mobifon currently having over 100,000 subscribers countrywide. The network covers more than 95% of Bulgaria's territory, all big cities and towns, roads and resorts. Mobipage RTC Mobikom's paging network uses the POCSAG 1200 standard. This service was offered in 1994 and currently Mobipage numbers over 25,000 subscribers all over the country. The network covers 65% of Bulgaria's territory, all big cities and towns, roads and resorts. Mobikom offers also voicemail services for users of Mobifon and Mobipage, also Internet access, electronic mail and VoIP.

Much more advanced are the GSM companies in Bulgaria. They offer more services and their competition encourages improvement in their work. As a part of privatization of Bulgarian Telecommunication Company this year it obtained a license for third GSM operator in Bulgaria but the implementation of the network haven't started yet

MobilTel (http://mtel.net)

MobilTel is a full member of the World GSM organization and it is one of the biggest private companies in Bulgaria. On September 21st, 2004, M-Tel has registered its 3rd millionth subscriber and became already the biggest telecommunications operator in Bulgaria. It has the best network and full national coverage. On March 2004 M-Tel reached 100% signal coverage of the Sofia Subway. The coverage map of Mobiltel's GSM Network is based on a computer model where the input standard levels of electro-magnetic field intensity are harmonized with the recommendations of the Electronic Messages Committee. These requirements are also adopted by the Communications Regulation Commission.



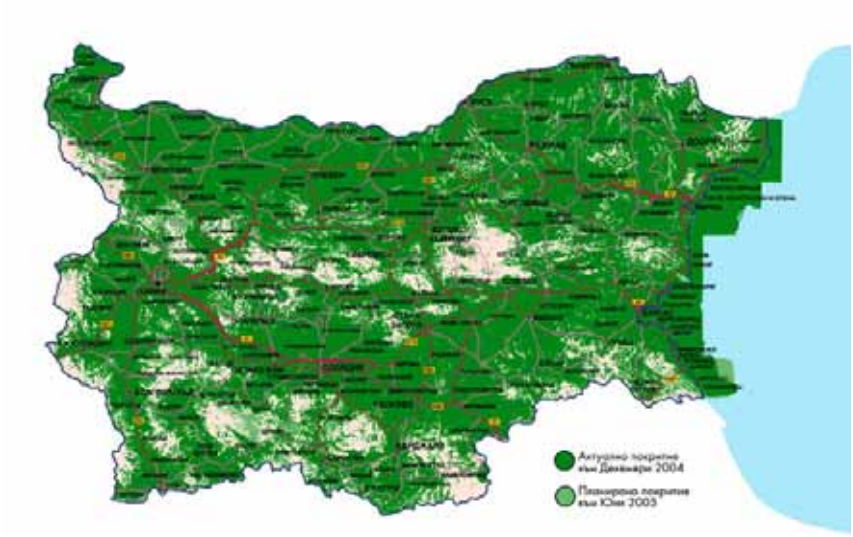
In October 2003 M-Tel launched the GPRS technology in its entire network. On February 2004 M-Tel launched Mobile Internet and WAP over GPRS. The subscribers use the full range of services allover Bulgaria. Later on September subscribers became able to use services through GPRS even being in roaming, which became possible thanks to the partnership of 22 mobile operators from Europe and the US.

Since the beginning of this year Mtel supports EDGE (Enhanced Data Rates for Global Evolution). EDGE is a 3G technology that delivers broadband-like data speeds to mobile devices that is similar to the speed in the UMTS networks. It allows M-tel subscribers to send and receive data, including digital images, web pages and photographs, three times faster than possible with an ordinary GSM/GPRS network. EDGE enables M-tel to offer high-speed mobile-data access, serve more mobile-data customers, and free up GSM network capacity to accommodate additional voice traffic. The users will recognize the higher EDGE effectiveness in using business solutions – such as Internet access, m-office, e-banking, VPN access etc. The effective EDGE data transfer speed reaches 240Kbits (in comparison with 56Kbits when using the fixed-line dial-up access).

At the end of March this year Mtel obtained the license for building 3G network in Bulgaria and they will immediately start with the construction. Till end-2006, 3G mobile services will be in operation in Bulgaria's 5 biggest cities. UMTS (Universal Mobile Telecommunication System) is a technology, combining mobile communications and Internet. The basic technological difference between GSM and GPRS to UMTS is the unique radio-technology, which not only gives possibility for voice telephony, but is developed especially for applications, based on high-speed data transfer. This allows the receiving and sending of video files in real time, such as video call, video conference and video message. The 3G network enables the TV watching on the mobile phone's screen, the using of high-speed Internet etc. As an instance of comparison – the UMTS data transfer is about seven times faster than if using EDGE and approximately twenty times if using GPRS.

Globul(http://globul.bg/)

Globul is has been created at 2001. At present it covers 98% of the people and 85% of the territory of Bulgaria. It offers roaming in 121 countries in the world thanks to already 262 roaming partners. Globul subscribers are already more than 1 625 000 and their number keep on increasing



Bulgarian territory coverage by Globul

Globul offers standard services as:voice, sms,mms,data. It offers the following data services.GPRS, WAP, mobile Internet via GPRS, data and FAX, information services. The fast development of Globul orders it in a leading position among the mobile operators in Europe.

Fix Telephone Network

Bulgarian Telecommunication Company (BTC) is the absolute monopole company offering fix telephone services in Bulgaria. 20 000 professional workers are employed in there. It has 2,9 million telephone posts installed and their number keep on increasing. Bulgaria is on of the countries in Central and East Europe with the highest percent of stationary telephone posts – 85% of all households.

As a single company offering fix phone services BTC has advanced digital equipment, transmission equipment, radio-television transmitters, ground satellite station. Their systems use:

- Already created optical system with length 2900km
- Digital radio relay lines with length 1500km
- Nets for data transmitting and Internet in the whole country
- Telecommunication net of the company is directly connected with 45 foreign operators in this count 28 European countries.

As a developing country the telecommunication technologies in Bulgaria are still on a level which needs to be improved but there is much effort being done at the moment. The development is going quite fast and hopefuly in near future we can work with the newest technologies.