



Germany's Broadband Future

German broadband initiative 2006/2007

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Foreword



Dear readers:

Information and communications technologies (ICT) are drivers for more innovation, growth and employment. Today, approximately 40 percent of total economic growth can be traced back to the use of ICT. ICT also affect growth accelerators for many other industries. The ICT industry itself, with sales of approximately EUR 135 billion, is among the largest industries in Germany. Approximately 750,000 people are employed in this sector. An additional 650,000 specialists work in user areas.

In order to strengthen the ICT location Germany, we must modernise the legal and technical framework. To do this, we also need quick and discrimination-free access to the Internet. Quick access via the broadband infrastructure has become a decisive factor for attracting businesses to Germany. According to a study by the German Federal Ministry for Economic Affairs and Technology conducted in 2006, in the next five years in Germany, with broadband we could support total economic growth of nearly EUR 50 billion and create more than 250,000 new jobs in the ICT industry and in the service sector.

Today there are still white spots on the broadband map, and thus far, competition between the various broadband technologies has developed insufficiently. By 2008, broadband Internet access should be available to 98 percent of all German households via fixed line networks, cable networks or terrestrial radio technologies. On November 8, 2006, we codified

this goal in the new action program of the German Federal Government, "Information Society Germany 2010" (or iD2010 for short). We are thus implementing nationally what the European Union pushed in the Lisbon strategy for expansion of the knowledge-based economy and with the "i2010 program". During the German EU Council Presidency in the first half of 2007, we will develop strategies to increase broadband area coverage together with our EU partners.

In order to achieve our goal, we need the engagement of all players from economy, politics and society. The Initiative D21 is well positioned to make a substantial contribution in this respect.

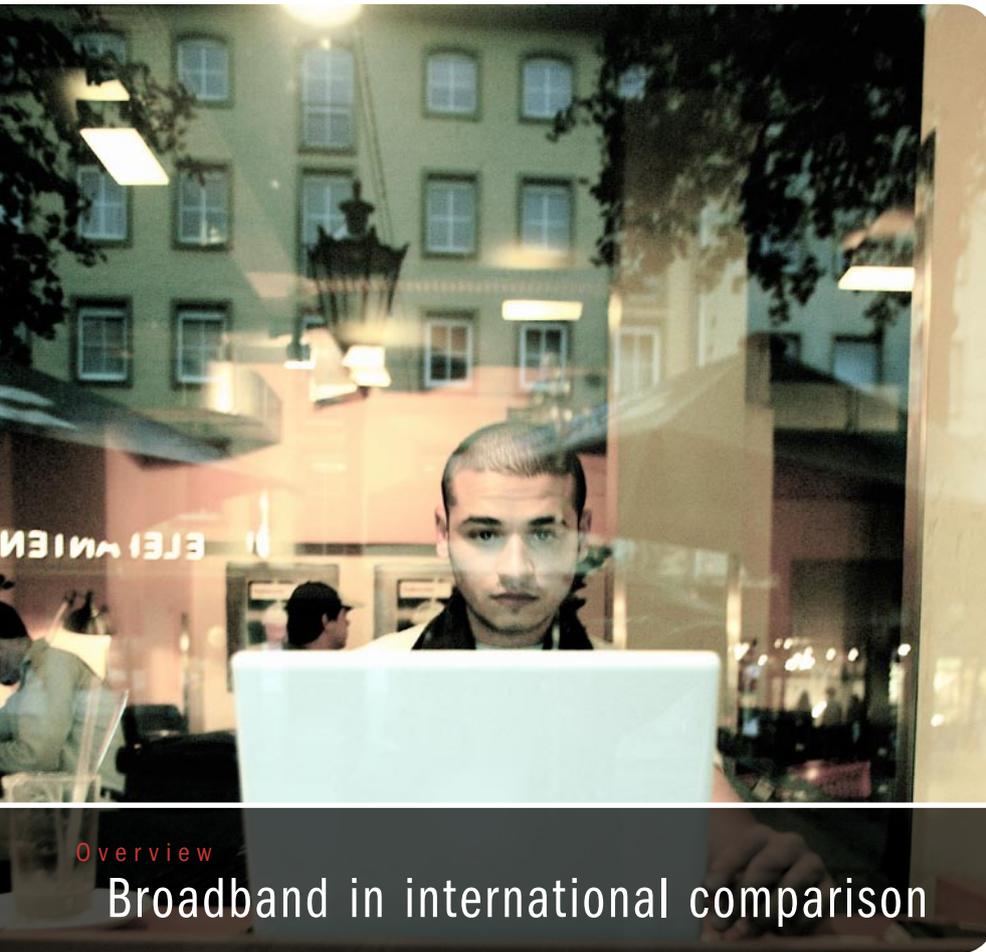
I wish you interesting reading,

Michael Glos
Federal Minister for Economic Affairs
and Technology

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Overview

Broadband in international comparison

Diversity of access is the key to success when it comes to broadband. The networks are used especially intensively in countries where different technologies are in stiff competition with each other.

South Korea is the champion - at least when it comes to intensive use of broadband technologies. According to information provided by the Organisation for Economic Co-operation and Development (OECD), in June 2006, approximately 80 percent of all households have an appropriate Internet connection. The approximately 12.8 million broadband connections have moulded society. Hardly any films are borrowed from video stores, instead, video-on-demand services are popular. Many South Koreans take advantage of online training. And in competitions among professional online gamers, gamers from South Korea are among the best.

This development has also left traces on the urban landscape. The more than 20,000

"PC-Bangs", Internet cafes with broadband access, are full day and night. One million people visit them each day. 30 percent of all worldwide WLAN hotspots are in South Korea; more than 11,000 subscribers use them. For many years, all schools have been equipped with broadband Internet connections.

Result of an advancement policy

The fact that the 50 million people in South Korea use broadband networks much more intensively than people elsewhere is the result of an intensive promotion policy.

The deregulation of the telecommunications market began in 1990. In particular, the

country invested EUR 10 billion in its IT infrastructure after the 1997 economic crisis - in fibre optic cable and copper networks. The latter serve as carriers for the Digital Subscriber Line technology (DSL). A competition between access types resulted, attractive prices and offers were the consequence. Something more than half of South Koreans have DSL today, the rest have other types of access.

The world is changing

Structural factors such as high population density with a large number of easy-to-connect multi-family houses also play a role here. At the same time, businesses and public administrations ensured with sophisticated entertainment, information and e-government services that the population had good reasons to try out broadband applications. The result is a society which is optimally prepared for the digital age. "Broadband is increasingly an important tool for entertainment and information in private households, companies and organisations around the world", according to Michael Brusca, Chief of the global industry association DSL Forum.

Thanks to technology, the networked world has drawn closer together. According to details provided by the DSL Forum, in the last year alone, the number of DSL connections has grown by 38 percent to 164 million worldwide. Thus a development shapes global economy - and this not only because new industries arise and nearly five billion Euros are earned from computer games in South Korea today. Traditional companies are also more closely networked with one another. They exchange complex data from parts lists to construction drawings in seconds, they shop, search for suppliers and develop products on the network.

The technological and social phenomena which are summarised under the term "Web 2.0" are changing the world - such as the

way people are communicating with one another and the way information arises. Without broadband technology, countless digital photos from all over the world would not be published via platforms such as flickr.com, quirky videos would not be exchanged on youtube.com and millions of telephone calls would not be made with Skype.

USA and Japan are at the top

Many of the network innovations come from the USA. After intensive competition among the various types of access, this country has developed into a broadband giant. 56.5 million broadband connections were in operation in mid-2006; nearly 40 percent of households are connected to the worldwide data network this way.

The old TV cable companies still matter

In Japan, access providers are also competing. Former music broadcasters match themselves as providers with back-channel capabilities, TV lines, and compete with the formerly state-owned telephone company NTT, which is marketing DSL, and the Fiber To The Home connections (FTTH) of the network provider KDDI. Lower prices were also a consequence of this technology competition. Nearly half of all Japanese households have high-performance Internet connections. Three-quarters of the approximately 20 million broadband households use DSL, three million households are connected to the worldwide network via fibre optic cables.

China catches up

While broadband usage has stabilised on a high level in South Korea, Japan, the USA and many countries in Europe, other nations are catching up. In worldwide comparison, China has even overtaken the USA when it comes to DSL with 33 million DSL lines. There too, people have discovered the future potential of broadband technology.

Europe

Germany still has great potential

In European comparison, Germany is right in the middle of the pack when it comes to the number of broadband connections per person. To ensure the success of the promising developments achieved so far, politics and business must do their part.

The number of broadband connections in Germany has increased sharply. In June 2006, the European Commission counted nearly 13 million broadband connections; in 2003 there were not even 4 million. With a broadband penetration rate of 15.2 percent, the Federal Republic of Germany is slightly above average for the 25 EU member states.

In other European countries, the number of high-performance connections has grown still faster: there are nearly 70 million in the EU. The Netherlands and Denmark have made the greatest progress in recent years. These countries have, measured by the number of households, the second or third highest number of broadband connections according to the European Information Technology Observatory.

Germany is a DSL country

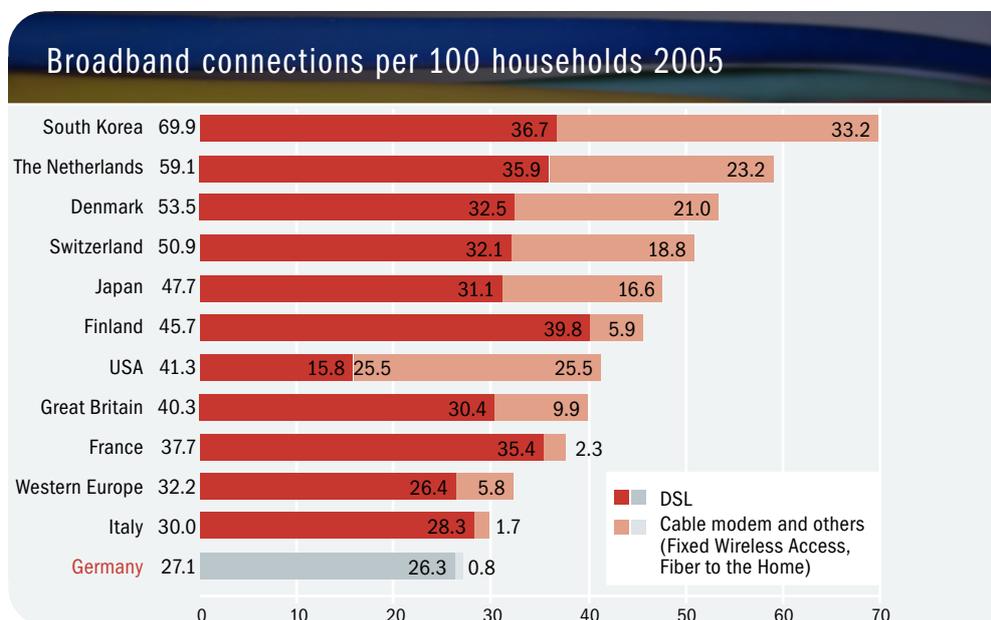
In countries such as Sweden, Belgium, Finland, France and Great Britain, broad-

band penetration is much higher; there the technology shapes economic and social development more than it does in Germany. "All of these countries have the advantage that there is pronounced competition between TV cable networks and DSL," says Franz Büllingen of the Wissenschaftliches Institut für Infrastruktur und Kommunikationsdienste (Scientific Institute for Infrastructure and Communication Services) in Bad Honnef.

By contrast, Germany is a DSL country. Especially when it comes to this technology, broadband penetration in Germany has made clear progress in recent years. 97 percent of broadband surfers use DSL. In contrast to the leading European industrialised nations, Germany thus has the smallest share of alternative broadband infrastructures.

Thin network outside of the urban centres

Since not all households in Germany can be connected with DSL and alternative access



Source: European Information Technology Observatory (EITO)

technologies are not yet being used intensively, the availability of broadband Internet is far from assured in all regions. Accordingly, the Broadband Atlas in which the Federal Ministry for Economic Affairs and Technology documents the spread of access technology, still features some white spots in broadband supply.

"Up to now, alternatives to the dominant DSL technology were offered almost exclusively in the already well-supplied urban centres. An improvement in availability in the area can thus hardly be achieved," explains Arne Koerdt of Plan Online GmbH, which observes broadband development in Germany by request of the Federal Ministry.

Especially in rural regions, consumers and companies are lacking corresponding provision. The telecommunications providers often explain to them that providing the service does not pay off in these regions.

There are many alternatives

Indeed, communities without DSL connections do not have to settle for being uncoupled from the development. "There are many alternatives which can be deployed immediately," says the Managing Director of the Association for the German Internet Business, Harald A. Summa. Communities, companies and citizens in DSL-undersupplied regions should look around for alternative technologies.

The region of Osterholz-Scharmbeck is a leading example. Software companies and other companies had settled in the "NETZ - Centre for Innovative Technologies" in this community near Bremen, which is largely well-supplied with DSL. In 2003, the community faced the problem that these young companies needed broadband connections, but precisely the centre in which they had settled could not get DSL.

Economic development officials in the community sought technical alternatives - and found them in February 2005: the technology centre was connected to the data highway via radiolink antennae. The bits and bytes travel 12.5 kilometres across the air to an access point in Bremen. "The renters in our building use the signal," explains NETZ Managing Directory Per Beiersdorf. "Companies in the neighbourhood are also networked via an encrypted radio network."

The people of this region in Lower Saxony want to share their experiences with alternative technology with other regions by setting up a broadband competence centre. The exchange of knowledge is necessary, for in many places communities and companies are still lacking the corresponding expertise.

The funds are there

Often the financing of broadband initiatives is also an open question. The resources of the communities and federal states differs greatly according to region, but there are

also funds available from the European Union. It makes available money from the EU Structural funds for the promotion of broadband infrastructures.

Especially with the new funding period starting in 2007, in which the strategic focus lies on communications technologies, this procedure opens up new financial opportunities for communities. "For 2007 to 2013, funds in the amount of EUR 70 billion are available for rural development; this does not include the funds of the member states," according to the EU Commissioner for Rural Development, Mariann Fischer Boel.

In order to be able to access these resources, the local authorities must formulate a community assistance concept with the EU based on their development plans. As a complement to the project budgets of the communities and participating companies and any contributions from the state and federal government, the EU offers co-financing of up to 80 percent of the project. Interested companies and communities can contact the EU representative for their federal state or region.

The German broadband initiative

The German broadband initiative is a discussion platform for representatives from business, politics and administration. It was started on March 20, 2002 by request of the federal government, within the Initiative D21, Europe's largest partnership for the information society.

This broadband initiative is largely supported by the German Federal Ministry for Economic Affairs and Technology (BMWi) as well as by numerous companies, including telecommunications companies, Internet service providers, hardware and software companies and producers of content and applications. The broadband initiative also works closely to-

gether with various interest groups.

The broadband initiative publishes documents such as this one and sponsors workshops and professional events for the expansion and use of broadband technology. "Here we are pursuing two goals: on the one hand, we want to support an intensive and constructive exchange of experience. On the other hand, we want to link the network of interest groups more closely and bundle their forces. For the success of broadband will depend on having all participants from business and politics pulling together," according to Peter Hellmonds (Siemens Networks), Leader of the German broadband initiative.

EU goals

Co-ordinated action of the players

The i2010 initiative of the European Union (EU) supports companies and countries conceptually in the development of the digital economy.

"The EU countries are currently doing too little to develop the economy in the era of broadband networks," complains EU Commissioner Viviane Reding, who is responsible for information society and media. In early 2006, Reding presented the first annual report from her EU initiative, which is supposed to eliminate this deficit: the initiative "i2010 - A European Information Society for Growth and Employment". It is a core element of the modified Lisbon strategy for growth and employment, which is supposed to reinforce the original ten-year strategy on which the EU members agreed in 2000.

Innovations should create work

Its goal is to make the EU the most competitive and dynamic knowledge-based scientific area in the world. Through targeted encouragement of innovations, more and better jobs should be created in Europe. The expansion of a financially-feasible and secure broadband infrastructure in Europe takes centre stage here. So that EU institutions, governments and companies pull together, the i2010 initiative is pursuing the goal of evaluating and providing conceptual support for the activities of all participants in this area. In her first i2010 annual report, Viviane Reding documented to what extent the member states have followed up on their announcements about becoming active in these fields with actions in the past year.

Her conclusions are ambivalent. The investments in networks in 2004 and 2005 continued to increase. The number of broadband connections once again increased sharply and is now nearly 70 million. 15 percent of the EU's population has high-performance Internet access.

However, the share of IT in productivity growth in Europe declined as compared to the second half of the 1990s. It is only approximately half as high as in the USA. The EU also lost ground with respect to investments in IT research. According to Reding, the USA invests twice as much in the basics of communications technology. Her conclusion: "Europe has made some progress on the path to the digital economy, but this progress is not nearly sufficient."

In order to ensure additional impetus for the development of digital infrastructure and business models, the EU member states must create the political and regulatory prerequisites. But that alone is not enough, according to the EU Commissioner. "Only with the help of larger research investments and effective border-spanning competition will we be able to make use of the powerful potential of information and communications technology and improve our competitive position in all sectors of the economy."

Flagships and procurement bodies

Initiative i2010 supports countries and companies by eliminating technical, organisational and legal hurdles. The experts constantly observe and analyse technological trends and evaluate to what extent political or regulatory measures make sense. In this context, Viviane Reding initiated a discussion about a more efficient spectrum usage and administration.

Another field of action of the i2010 initiative is reinforcement of the demand for innovative products and solutions like the one demanded by an EU expert group chaired by the Finn Esko Aho in January 2006. The flagship actions include the

areas of "ICT for independent living in an ageing society," "intelligent autos," "digital libraries" and "ICT for sustained growth".

Public procurement plays a large role here. In Asia as in the USA, the public hand frequently acts as first user of innovative solutions and/or products, and not just in the defence sector, but also in civil sectors such as energy, transport, public health and safety.

Domestic market for digital content

It is a gargantuan task for the EU to unify the patent and trademark laws in all European countries sufficiently that interesting, Europe-wide digital provision can arise. The co-operations which develop, e.g. for the construction of online music portals between media companies, software suppliers and network operators, are typical of the new broadband business world. Companies from industries which previously had differing interests thus become partners. "We have the chance for industries which traditionally were separated from one another to work together and profit from this," says Viviane Reding.

Viviane Reding



Viviane Reding has been the EU Commissioner for Information Society and Media since 2004. Previously, she was EU Commissioner for education, culture, youth, media and sports.



Access

Hope for growth

The expansion of the broadband infrastructure ensures additional growth and new jobs. Therefore, it is important to remove existing hurdles as quickly as possible.

According to a study by Micus Management Consulting, in the next five years, total economic growth of EUR 46 billion is possible if we take the right decisions when it comes to broadband infrastructure. In this case, approximately 265,000 new jobs could be created by 2010.

Decisive for the success will be how quickly the number of fast connections increases, for the providers can only earn money with special services if the basic infrastructure is in place.

Meanwhile, overall in Germany there are more than 200 companies offering broadband connections. The lion's share concentrate on DSL; 97 percent of all high-

speed connections are based on this technology. In 2004, 95 percent of all participants' connections were through Deutsche Telekom.

Currently, customers are profiting from the ever-greater competition between DSL providers; in the past few months, prices have fallen across a broad front. However, the discussion about Deutsche Telekom's conditions for resellers of their DSL products has also shown that not all questions with respect to competition have been clarified.

That businesses and private households in remote areas get access to broadband Internet is primarily the concern of local

politics. In the end, nobody wants to be left behind in the local competition. The problem is that approximately nine percent of German households are cut off from a DSL connection, because the technical prerequisites do not exist in the affected regions and expanding the structures does not pay off for the providers.

However, small communities without DSL access certainly have technical alternatives such as wireless connection via radio link systems, WLAN or WiMAX. The chip manufacturer Intel, which recently acquired a portion of the German WiMAX company DBD Deutsche Breitband Dienste GmbH, is very engaged in this topic

Alternatives are available

Another alternative is Internet connection via satellite. This technology has the particular advantage that it is available absolutely everywhere. "We can supply all of Europe, from the Urals to the Canary Islands," according to Andreas Krueger, Managing Director of the Berlin company TELES SkyDSL GmbH. The disadvantage is that a fixed line network telephone is required for the back channel and this back channel cannot therefore truly be called broadband. With UMTS radio cards for laptops, this should change; in addition, the Internet connection via satellite thus becomes mobile.

In addition to these possibilities, there is also high-speed connection via TV cable, a technology which is spreading much more slowly in Germany than in other countries: first of all, not all cable connections in Germany are technically suited for surfing; secondly, the providers are lacking the so-called "last mile". This means that they do not have direct access to many of the households to which they would like to sell their services, and instead they must negotiate contracts with each building owner.

Market participants

New players in the field

Several hundred companies offer broadband access in Germany. For customers, the market is not easy to understand.

Naturally the diversity of the market is an advantage for customers, but comparing the offer is not easy. An example: the prerequisite for a DSL contract with Freenet is a Deutsche Telekom telephone connection. The customer's total price is thus composed of the rates of two different companies.

The market is complicated because the competitors of Deutsche Telekom work with different business models. The majority of them use the DSL infrastructure of the established leading player. This happens either directly - witness Freenet - or indirectly as with United Internet. This company purchases a lot of line capacity from Deut-

sche Telekom and markets DSL products under its own brand names Web.de, gmx and 1&1.

By contrast, HanseNet, Versatel, Arcor and QSC operate with their own infrastructure. All of them must pay rental fees to Deutsche Telekom for the subscriber connection line, the so-called "last mile". Recently these fees, which must be approved by the regulatory authority, have been causing conflict. HanseNet and Co. believe they are too high. At the same time, through large quantity rebates, the ex-monopolist helps its own resellers such as United Internet to offer lower rates, they say.

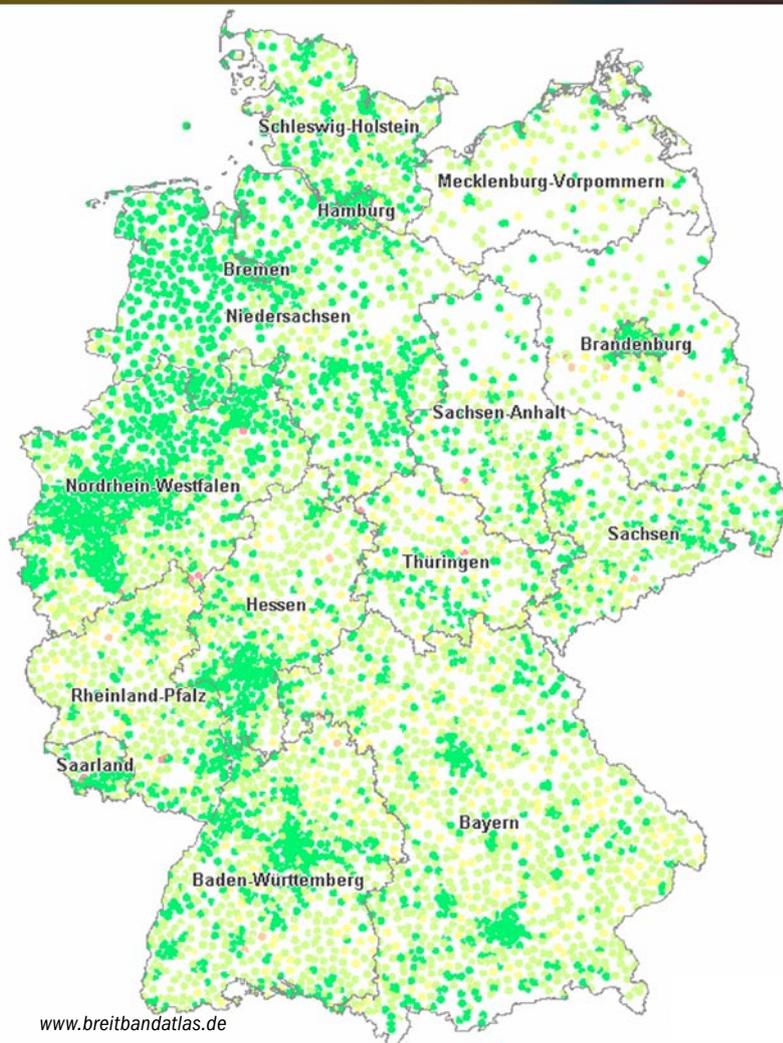
Cellular telephone companies are entering the market

However, whether the competition is actually hindered to the detriment of the customers by these so-called resale services is a matter of controversy. According to Deutsche Telekom, through the resale of its own capacities, the market is also opened up. There is actually proof of this: Arcor, for example, has been marketing its DSL service nearly everywhere in Germany since the middle of 2004 - with the help of the Telecom infrastructure. Via its own network, it was previously possible to reach only 38 percent of all households. From the customer's point of view, the variety of options has increased due to the practice of reselling. Meanwhile, the DSL market is even attracting cellular telephone companies: O2 and Vodafone started making their own services for high-speed Internet available in 2006. "We want to develop from a cellular telephone company into an integrated communications supplier," says Lutz Schüler, Managing Director of Product Marketing at O2. "DSL is a growth market of which we want to have a piece".

New customers thanks to Triple Play

The German market for alternatives to DSL is currently still limited. Kabel Deutschland, the largest TV cable network operator in the Federal Republic of Germany, also offers high-speed Internet access and telephony at prices which are comparable to current DSL and fixed line network services. "With our service, we are also winning over customers who previously had no cable connection," says Christof Wahl, Speaker of the Management Board of Kabel Deutschland GmbH. Of course there are still other companies which offer Internet via TV cable; these include iesy, ish and ewt. However - measured by the numbers - they are not true competitors with Telekom and Co.

Broadband supply in Germany (broadband atlas)



Positions

Struggling to find the best way

On no topic in telecommunications are there so many different opinions as on the question of regulation in the area of high-performance data networks. Is competition sufficient to improve broadband penetration in Germany? Or must measures be taken in order to increase it? If so, what measures should be taken? The answers are as varied as the positions of the most important players in this field.



Dr. Bernd Pfaffenbach
State Secretary in the Federal Ministry
for Economic Affairs and Technology

Broadband competition has increased rapidly recently. Penetration in Germany continues to increase. At the same time, usage becomes ever cheaper for customers. The regulatory practices of the German Federal Network Agency have clearly supported this positive development.

Today, broadband supply in Germany generally happens via DSL. For the further improvement of broadband supply, competition between access technologies must also contribute to increased usage of radio technologies and cable networks. This way, Germany will further improve its good position in international comparison.

Important is also that there should be an area-wide offering of broadband access as soon as possible. In particular, the use of radio technologies can contribute to this. With the upcoming distribution of frequencies for broadband wireless network access, the prerequisites for the emergence of new broadband radio networks and for the closing of still existing supply gaps will be created.

The federal government believes it is realistic that 98 percent of all households will have access to broadband Internet access via fixed line networks, cable networks or terrestrial radio technologies by 2008. In order to achieve this goal quickly, additional joint efforts by the state, business and users are required.



Matthias Kurth
President of the German Federal Network Agency

With more than four million new broadband connections, in the past year Germany was the most dynamic market in the EU when it comes to absolute numbers. The competitors had a large share of this. This had a positive effect on the penetration rate. However, the significance of alternative connection technologies such as cable or satellite is still quite small.

The basic regulatory conditions must be designed so that they can also exploit their potential. The German Federal Network Agency is currently distributing frequencies for broadband wireless access which can cause a greater spread of wireless connections.

With respect to the dominant DSL technology, attention must be paid that suitable input products such as bitstream access are made available. The IP bitstream access was arranged by the German Federal Network Agency for the first time this year. Telekom, which is obligated to this, must now present a standard offering. If this is designed so that it can be accepted by the competitors in the short term, it may have a positive effect on broadband penetration.



Viviane Reding
EU Commissioner
for Information Society and Media

The competitive situation in the German broadband market has improved in recent years, but the former monopoly company still controls approximately 70 percent of the DSL connections. A true infrastructure competition through activated cable networks which offer broadband connections is emerging only slowly. In European comparison, therefore, when it comes to broadband penetration, Germany is only just above the EU average thanks to the inclusion of the new member states.

Essentially, competitors must be guaranteed appropriate access to infrastructure bottlenecks of the market-leading company. In particular, there is still no bitstream offering of the former monopoly company with respect to its competitors. "Bitstream access" permits competitors to create their own products, that is, to create greater added value than through mere reselling. However, a bitstream obligation has been dragged out across years by regulators in Germany and was not imposed until recently.

Germany is currently in the process of changing the telecommunications law in order to exempt so-called "new markets" from regulation. The commission has opposed this regulation because it violates EU law and because regulatory holidays could negate the competition achieved thus far. Furthermore, the question of (non-) regulation of "new markets" has a European dimension and should not be regulated solely by one member state.



Wolfgang Kopf

Director of Political Interest Representation and Regulation Principles at Deutsche Telekom AG

Broadband development in Germany is marked by great dynamics. Decisive is the availability of high bandwidths on the mass market. For us, the average bandwidth is much higher than in other large countries such as Italy and Spain. And our price level for the most common variant (2Mbit/s) with flat rate is among the lowest in Europe. More than 80 percent of new business goes to the competitors. There is backlog demand not on the supply, but on the demand side. According to (N)ONLINER Atlas 2006, there are still 23 million German non-users of the Internet who do not intend to use it. And 30 percent of the households do not even have a computer, reported BITKOM recently.

With triple play via VDSL, Deutsche Telekom brings interactive multimedia applications into your living room. For this, it is preparing a massive expansion of the fibre optics in the connection network. It is the task of politics to stem interventions of telecommunications and media law which prevent investments. The current changing of the telecommunications law (TCL) is a first important step in this direction.



Harald Stöber

Chairman of the Executive Board of Arcor AG & Co. KG

In terms of supply with high-speed Internet, Germany is moving slowly out of the middle of the pack in the EU comparison. In the previous six years, Arcor and other competitors of Deutsche Telekom have invested more than EUR 10 billion in the construction of broadband infrastructure and forced competition on the DSL market with attractive fixed-price packages. The progress thus achieved may not be gambled away. In Germany, we need broadband for all.

Precisely in rural regions, there are still white spots when it comes to broadband supply. Instead of investing billions exclusively in the construction of a high-speed network in cities, Telekom should also advance the DSL expansion in areas not yet supplied. At the same time, a reduction of the input service prices which new suppliers pay to the ex-monopolist for access to customer connections would further accelerate DSL expansion in the area.

For the development of the location Germany, broadband services are of immense significance. Meanwhile, a vital competitive landscape has unfolded for DSL. This future market may not be left out of regulation. Regulatory holidays would establish a two-class competition with Telekom as the new high-speed monopolist in cities. Only the basic supply would remain for the competition.



Christof Wahl

Speaker of the Management Board Kabel Deutschland GmbH

The cable network operators are predestined to appear as infrastructure competitors to the ex-monopolist on the telecommunications market. By the beginning of 2009, Kabel Deutschland will invest at least EUR 500 million in the modernisation of its cable networks. So that true infrastructure competition develops from this, some remaining structural and legal barriers must be cleared away.

Essential for the development of sustainable competition is legal and planning security. The regulation should therefore grant infrastructure competition precedence over pure service competition. In the TV cable sector, moreover, the artificial separation of the network levels must be done away with. It hinders not just the quick and efficient equipping of the networks, but also the marketing of Internet products to end customers.



Services

The call for speed

With broadband technology, many new multimedia services can be implemented and existing services get another, unsuspected quality.

Internet users are demanding and impatient; nobody likes it when each holiday picture takes a minute until friends and family can see it on an online platform. Only since the advent of broadband have business with digital cameras and related services really taken off. This example shows that established applications only become more attractive with a high-speed connection to the Internet.

With speed comes the boom

This also applies to the "killer application" of the online era: e-mail communication. Today, no employee of a company thinks twice about whether a presentation might be too large in order to send it over the lines. Flat rate and "always on" are stand-

ard, therefore instant messaging also continues to spread.

In the music industry, the entire sales structure is changing with broadband communications. Since downloading has become easier and less problematic with more speed on the network, a true boom has resulted: according to information provided by the industry association BITKOM, in the first half of 2006 there were more than 11.7 million fee-based music downloads - an increase of 36 percent as compared to the same period in the previous year. However, the future depends not just on the capabilities of the lines, but also on the question of whether the industry will succeed in offering customers easy solutions and simultaneously protecting intel-

lectual property rights efficiently.

Online gaming and so-called streaming audio services have experienced growth rates similar to those of the digital trade in music. Each week, new radio broadcasters pop up on the Internet. And what is right for sound is good for images too: anyone whose line is fast enough doesn't have to bother going to the video store anymore.

Or Internet telephony: for years, the technology was used almost exclusively by adventurous computer tinkerers; meanwhile, countless companies and private households are also using such solutions.

Apart from the lower costs, Internet telephony also makes communication very comfortable; unified messaging solutions are easy to implement. Each employee can handle and manage their communications via fax, e-mail and telephone via a single platform.

Telemedicine: a booming industry

Telemedicine is also developing into a booming industry. Hardly any other area profited as much in the past year from increased transmission speeds. Imaging procedures in diagnosis and therapy produce large quantities of data, which must be exchanged between different clinics and between private doctors and hospitals in the shortest possible time via broadband networks.

Broadband technology also offers new, revolutionary possibilities for the education and training of doctors. This way, a few months ago, it was possible for 130 urologists in India to watch Andreas Gross at work: the chief doctor at the urology clinic of the Asklepios Klinik in Hamburg Barmbek broadcast an operation live to Asia via videoconference. Gross also uses the same technology in order to ask advice from doctors around the world to whom he

has previously sent online moving pictures of a patient.

Better diagnosis and therapy

Another e-health application based on broadband communication will also ensure better care and treatment of sick patients: digital patient records. With their help, a family doctor can inform him or herself on screen as to why a particular patient, who had only a small procedure, is still in the hospital after a week. This is still music of the future, but the Asklepios Klinik in Hamburg-Barmbek, for example, is already sending operation reports to family doctors via mail. "Many things which we would otherwise have to do twice will happen only once in the future," says Chief Doctor Andreas Gross. "This way, we save a lot of money." For example, a doctor draws blood from a patient, examines it, and transfers the patient to the hospital. There, blood is drawn from the patient again. In the future, the doctor will be able to log into our system and transmit the values to the clinic online."

"We are just beginning with many projects, but these open up countless really exciting possibilities for the patients," says Volker Hüsken, Acting President of the Aesculap IT Foundation, a foundation headquartered in Osnabrück. It wants to promote the exchange of digital information in health care.

Working from home

Networking is also becoming more perfect in your own office. Many people do part of their work from a home office; via broadband connections, they are connected easily with the corporate network. Or, of course, after close of business, with a networked gaming partner who has just gone online in the South of France. Online gaming has also become a growth industry. According to a study by the consulting com-

pany PriceWaterhouseCoopers, this sector will earn USD 2.5 billion in Germany alone. Women over 40 are becoming ever more important for the industry; this is a target group which was neglected for a long time. Providers of online gaming portals such as the Spill Group, have determined that it is not just young people who are using their platforms. Many adults are also bustling there where thinking and strategy games are an increasing part of the possibilities.

Learning is quality of life

People who use the network playfully are also not afraid to try out new forms of learning on the computer. This applies especially if the learning content places value on playful elements. Here there is still a backlog in the implementation, criticises Franz Gerstheimer, Managing Director of the Tübingen e-learning supplier Inmedia: "Previously, it was mainly text services which were transmitted one-to-one on the

Web."

Today, the possibilities are endless: animations and short films, even elements from the world of online gaming, will in the future find a place on e-learning platforms.

Such new forms of learning open up new life perspectives for many people: Sabine Doretz-Axt, for example, invested in a textbook, a flat rate DSL connection and course fees. Online courses at oncampus, the e-learning platform of the Fachhochschule Lübeck, helped the 47-year-old single mother to find a new job.

Technology and content must match: the example of Belgium



Unlike in Germany, in Belgium there is hefty competition between TV cable and DSL providers. Anyone who wants to get ahead in the competition must score with exciting services. Therefore, Belgacom, the successor to the former state-run telecommunications provider, entered into co-operation with TV providers at a time when the high-speed DSL network was not yet under construction. For example, Belgacom acquired the broadcast rights to the first football league and has been broadcasting the images via TVoDSL since fall 2005. With great success: within just two months, the company won over 20,000 customers; by the end of September 2006, more than 100,000. According to figures supplied by Belgacom, the average receipts per customer in the first nine months of 2006 were EUR 11.6. Thus overall, IPTV supplied an important impulse to the country's broadband Internet market.

Convergence

Departure for the fourth dimension

The growing together of Internet and TV is opening up previously-unknown worlds of entertainment and shopping.

Even if the discussions surrounding the VDSL expansion of Deutsche Telekom are still well underway, triple play is already reality in Germany. Hansenet, for example, offers its DSL customers telephony, high-speed surfing and TV via Internet - called IP-TV - with approximately 100 programmes from a single source. With T-Home, Deutsche Telekom has also entered the entertainment and communications business of the future, as has Kabel Deutschland. The advantages are clear: apart from the broader variety than with classic TV and the outstanding digital image quality, the built-in digital video recorder allows you to see your favourite programmes when you come home, even if they are not on right then.

Bundled packages are in demand

Such packages for multimedia communications are awakening more interest among viewers than individual applications; this was the conclusion of a recent study by Lucent Technologies. According to the study, twice as many consumers and companies are ready to spend an additional amount for integrated packages than for a bundle of separate services. Researchers estimate the market volume for bundled services in the five most important Western European markets at USD 14 billion until 2011.

Forrester Research also states customers' great interest in such services. However, according to a study on this topic, European consumers are extremely price-conscious. With broadband triple play, lower prices would be most likely to motivate people to use the technology.

Here companies are facing the task of developing and implementing functioning business models. If the services are

too cheap, no expensive content can be financed. However, if there is no premium content, it is difficult to win over new customers. The suppliers are aware of this problem, and Deutsche Telekom has determined the direction with the purchase of broadcast rights for the football Bundesliga: only providers who can offer something unusual will succeed in the triple play market.

Shopping with new possibilities

But naturally the idea of a combination of Internet and TV only makes sense if interactive elements are added to the mega entertainment. There are a lot of ideas about this; not yet solved is the question of input devices: a remote control does not offer the same possibilities as a computer keyboard. On the other hand, nobody wants to sit in the living room with their computer keyboard. However, innovative software and cleverly-designed user menus could solve this dilemma.

The interactive TV world might then look like this: while images from Kenya flicker across the screen, viewers can transmit their opinions about this programme directly to the broadcaster - or even book a trip there online. The combination of Internet and TV also offers new possibilities for payment procedures. Customers can transmit their credit card numbers without

leaving their recliners, and payment of purchases can be handled via the set-top box and associated bank account with a TV or telecommunications provider.

From triple to quadruple play

The virtual societies which are enjoying increasing popularity in young target groups will also profit from triple play in the future. "In Scandinavia, there are places where 90 percent of the young people subscribe to an Internet community," explains Harald Rösch, Managing Director of HanseNet. "There is certainly also a backlog in Germany in this area."

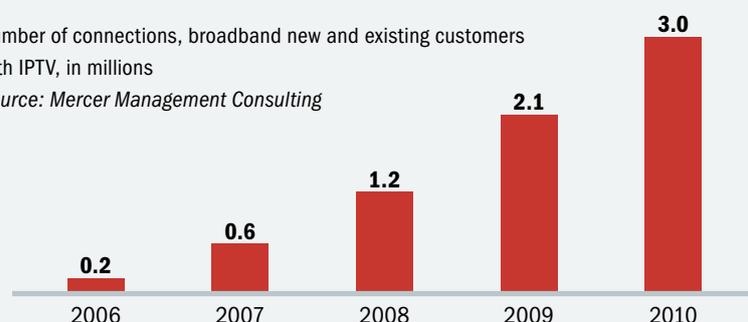
Young target groups will probably be the first ones to warm up to quadruple play, the enhancement of triple play with mobility elements. Network providers such as Nortel and Alcatel-Lucent are concerning themselves extensively with this topic. And in the summer, Siemens and Nokia announced their joint company Nokia Siemens Networks. The goal is to continue developing the promising fourth dimension of convergence. In the future, users should be able to call up Internet or TV content everywhere without media breaks.

Experts disagree about whether providers will be able to earn money with such packages. Success or the lack thereof will depend on whether customers can be convinced that the new services will provide them with real added value.

Expected IPTV customers on the broadband market

Number of connections, broadband new and existing customers with IPTV, in millions

Source: Mercer Management Consulting



Web 2.0

The boundaries are blurring

Web 2.0 would not work without broadband - and at the same time it shows how, through the users themselves, innovative services emerge for the new infrastructure.

The most successful Web 2.0 platforms succeed in serving as meeting places, attracting people to the network. Sites such as YouTube, MySpace and Flickr motivate their visitors to contribute content themselves instead of just consuming it. In combination with new programming technologies, this social phenomenon creates the success of the Web 2.0 phenomenon.

In Web 2.0, users are the most important part of a network platform, the boundaries between broadcaster and receiver blur. MySpace, Flickr and YouTube would not function if millions of people did not publish their ideas there in the form of photos, videos and texts every day. They grow regardless of the offerings of media providers and other established companies.

Consumers become producers

The example of the online encyclopaedia Wikipedia shows the high quality of some of this content. There you can find professional knowledge for free worldwide - and this knowledge is comparable to the contents of some multi-volume reference works. Experts and interested laypeople compose the entries, readers develop them by adding to them and making comments. Thus they are always up to date in a way that no bound reference work can be - even if opinions of the quality of the contributions vary widely.

The blog technology, which also permits the quick establishment of Web pages and commenting on articles, has motivated many professionals and laypeople to become authors themselves. Thanks to the Web logs, it's no longer just newspapers, radio and television broadcasters who spread current news, but also private individuals.

At the same time, virtual communities have emerged: old school friends find one another through networks such as stayfriends.de or classmates.com, businesspeople network through the Xing platform, which became popular under the name openBC.

New entertainment options such as Second Life live from a mixture of chat functions and graphic animated elements. Thanks to the incorporation of a virtual currency, Linden dollars, which can be transferred into real US dollars, the virtual world is incorporated into the real economy. Surfers hear DJ sets in virtual clubs, buy their digital characters chic clothing and build their dream house online. Companies such as Adidas have already discovered Second Life as an advertising platform. At the same time, the online versions of fantasy role-playing games such as Everquest fascinate tens of thousands of subscribers.

Not just the operators of these platforms earn money: on the auction platform Ebay,

dealers sell virtual equipment and complete characters. According to a report from the New York Times, a regular supplier industry has arisen for online worlds. More than 10,000 young Chinese play computer games in shifts and sell the points they have won or trophies to other Internet users.

Business in the billions

The developers of these services are implementing new ideas about communication, for play or informational purposes - or for advertising. The search engine company Google recently paid USD 1.6 billion for the video platform YouTube. This sum shows that the Californians ascribe enormous business potential to this new Web service as an advertising platform of the future.

Without fast networks, this development and the formulation of new business models would be inconceivable. If self-produced videos are publicised over the network at YouTube, gigantic collections of digital photos exhibited at Flickr or these two elements combined with personal profile at MySpace, the transmission rate must be right.

Online role-playing game World of Warcraft





Society

Equal chances for all

The digital divide in Germany is less a technical than an educational problem. Especially in professional life, computers are becoming more important.

In Germany, more and more people are using the Internet - and the surfers are increasingly coming from all social classes and age groups. The over 50-year-olds, for example, have caught up in the last year when it comes to network usage, and the number of network users grew faster in East Germany than in West Germany for the first time since 2001.

These results are in the (N)ONLINER Atlas 2006, presented by the Initiative D21 and TNS Infratest. Overall, 37.8 million people over 14 years of age are surfing today, two million more than last year. Especially groups which previously did not use the network much are included now. "The digital divide is closing slowly, in particular

more women and older people are surfing the net," says Bernd Bischoff, Chair of Initiative D21. "Nevertheless, we are observing that the digital divide has remained just as deep as before in some places."

Not everyone is well-prepared

Precisely the broadband technology, which should be the basis for new business, learning and work models, has the potential to increase further the social divide into "information owners" and "the ignorant", a fact which sociologists have long been bemoaning.

This is in part because well-educated people and better earners often familiarise

themselves more easily with the possibilities of the broadband world than poorer and less educated people.

Media researchers have long observed that not everybody in society profits equally if the information offer increase. The introduction of personal computers and Internet access have intensified this development, explains Lutz P. Michel, Managing Director of the MMB Institut für Medien- und Kompetenzforschung in Essen. "Insufficient access to broadband connections could contribute to further growth of the knowledge gap."

Initiative D21 has therefore set itself the goal of supporting the digital integration of offliners with concrete services for various user groups. With good reason, since people who use the broadband network can access information and e-government services quickly and easily, make purchases as e-commerce customers, earn money as online dealers or even become media producers themselves as bloggers or MySpace users.

Telework gains in importance

The professional world is also changing. Increasingly teleworkers, who work on their computers from home, are connected to their employer's corporate networks via encrypted connections. While in the industrial society physical presence at the conveyor belt was required, in the modern knowledge society, workers can work anywhere - also from home. They have more opportunities than ever before to combine work, recreation and family under one roof, thus broadband contributes to a better work-life balance

People who have learned to use computers and the Internet are thus well-prepared for the changes which the digital era is bringing. They can take the chances which life in the knowledge society offers them. This

world remains largely closed, however, to people who do not use the Internet.

To counteract this, more is required than technical measures such as the area-wide supply of the country with broadband access. The digital divide is especially a social and pedagogical problem. 23 million people, that is, 36 percent of the population, are among the offliners who neither use the internet nor have the intention of so doing. They are especially people with less education and lower income. Many avoid using the network because they have not learned how to use it.

This phenomenon can be observed worldwide. In less developed countries, for example, the number of Internet connections is constantly increasing, the prices for network access are falling quickly. But many people there do not know what opportunities the worldwide data network offers them, although the countries of the third world are catching up with the construction of their Internet infrastructures as compared to industrialised nations, as the International Telecommunication Union (ITU) has observed.

Last but not least, for this reason two World Summits on the Information Society (WSIS) have concerned themselves with the digital divide in 2003 and 2005. Many organisations and initiatives are working on concepts to overcome it, such as the UN ICT Task Force and the Global Alliance for ICT and Development.

The world is growing together

In addition to technical expansion measures, these concepts often also include social and education-related projects in order to lead users into the digital world. This approach appears to be succeeding. The software company Internet Security Systems observed in the summer of 2006 that the number of newly-registered Inter-

net domains increased sharply on the African content in the previous twelve months. That ever more network sites in Africa are registered is an indication that people are increasingly recognising and using the chances which the worldwide data network offers them.

In the course of this development, the distance between the developed and less-developed nations is becoming smaller. People in Germany are no longer in global competition with well-educated professionals in other highly-developed countries. Dynamically-growing Asian nations such as China and India as well as innovative climbers in the countries of Africa or Latin America can offer their ideas and services to a networked world around the globe.

More schools on the network

This does not mean that each person in Germany must absolutely be interested in the possibilities of broadband technology and all aspects of the Internet. For older people, the network at least offers chances for information, entertainment and the maintenance of contacts. However for younger people, knowledge of computers and the Internet is becoming mandatory for employment.

The expansion of broadband and other types of Internet access around the world increases the international division of labour. This makes it critical for a high-technology and export-oriented economy such as Germany to always be completely up to date, or even better: to be ahead of the competition. For this reason, in the future people in Germany will encounter computer-supported learning along nearly all educational paths and in nearly all professions, and they will have to know how to use innovative IT-supported business applications.

"This is why programs such as 'schools on

the net' are so important," says the media researcher Michel. For the last ten years, the German federal and state governments and Deutsche Telekom have been encouraging learning with digital media in school. Precisely in an era shaped by high technology and multimedia, children and young people must have the opportunity to acquire critical skills and key qualifications in the handling of media during their schooling. This is important as it ensures that all young people start out on an equal footing in the labour market in terms of their skills in the use of digital media. It also allows them to become familiar with this type of technology, enabling them to keep up with important developments in the world of work.

German teachers need help

But even if ever more schools are connected to the network, it is not sufficient just to provide technology - even if it's good news that surfing the Web has become a daily affair in European schools. According to a survey by the European Commission, 96 percent of all schools in Europe have an Internet connection; two-thirds of these are broadband connections. In Germany, for example, more than 20,000 of the 34,000 schools are equipped with a broadband connection - and the trend continues.

However, there are still deficits in Germany in the educational usage of technology. At the request of the EU, the market researchers of TNS recently determined that nearly half of the teachers in Germany do not understand how students benefit from computers in instruction. Nowhere else in Europe do teachers have so little sense of the chances of digitalisation. The transmission of digital expertise is therefore one of the most important fields of action for the Initiative D21.

Forecast

The white spots are disappearing

Each region can find the broadband solution which suits it. However once the technology is in place, the work has just begun.

When the mayor of Kalletal, Klaus Fritze-meier, thinks about the topic of broadband, there isn't a single, large challenge for him, but rather many small tasks which must be mastered. In his governmental area in the Lippisch highlands, there are sixteen small towns along the Weser scattered across 112 square kilometres. For the 16,000 inhabitants and two commercial areas, it is true that the closer your location is to a larger city, the better supply via a fast DSL line functions. "The further you go in the direction of the towns along the Weser, the worse the situation gets," he reports.

Variety and creativity are required

The situation in other regions of Germany is just as complex. The solution: technological variety and creativity, for the problems of the individual regions are fundamentally different. In one place, the DSL network operator cannot make money, elsewhere, the right cables aren't there, and in still other places, mountains prevent the transmission of data via radio link. Therefore, a single technical solution cannot provide the answer to the various problems.

To master the problem, there are more technical possibilities than ever available to economic sponsors, representatives of communities, local companies and interested citizens in the Kalletal and elsewhere in order to provide even remote corners with individual access solutions. "The TV cable operators are investing massively in their networks, broadband via UMTS is increasing and other wireless connections are becoming an option," says Franz Büllingen of the Wissenschaftlichen Institut für Infrastruktur und Kommunikationsdienste (WIK). In December 2006, for example, there was an auction of frequencies for data transmission via WiMAX, which

promises additional innovative impulses. The connection of private households directly via fibre optic cables (FTTH) is also becoming more important; the largest German urban network operator NetCologne will invest EUR 250 million in Cologne in the coming three years. "In the next few years, we will see significantly fewer white spots on the map," believes Franz Büllingen.

A look into the future

Increasing competition among the providers will certainly cause additional price decreases, to the benefit of consumers; but it will also cause an additional consolidation wave in the provider industry predicts the British magazine *The Economist*. Even today, the trend is emerging that the total expenditures of households for communications and media services are no longer growing as quickly as in the 1990s. Quite the opposite: the curve has flattened out in recent years and in the past few months it has even fallen, as *The Economist* has established. While consumers can count on a larger selection at lower prices, there will be significantly more nuanced gains and losses on the provider side.

The company with the right "nose" and the right business model will stay ahead, even with increasing competition. Many providers are hoping that consumers will continue to be willing to spend more for triple play and quadruple play; however since many consumers prefer a flat rate for everything, it remains an open question whether the providers' expectations will be met. The excuse that there aren't enough access opportunities will no longer do, for after the technical networking, the work has just begun. Now ideas are required which help to further develop the economy



and society in the Federal Republic of Germany for the digital age. The transition to the knowledge society marks a paradigm shift with which there will be winners and losers. Qualifications and innovative business ideas prepare a society optimally to benefit from the chances of this development.

All political players must therefore now develop more strategies than before to increase the media expertise of people in their region and the acceptance of the new technologies. These must include, among others, the expansion of e-government services and co-operation between communities and educational institutions.

Companies, in turn, must consider how they can adapt old business models to the digital age and what new ideas present themselves. Precisely here is where Martin Fornefeld, Managing Director of Micus Management Consulting in Düsseldorf, sees the greatest backlog. "It is no accident that, for example, the video exchange platform YouTube was developed in the USA," he says. "In Germany, the concern is too often access technology and not broadband as the basis for new services."

However, the chances are not bad that a multitude of new services will also emerge in Germany, services which earn money based on the new technology and therefore will endure long-term in a world connected with broadband.

Initiative D21 is Europe's largest partnership between politics and business (public private partnership). Its members form a network of 200 companies and organisations from all industries, which together employ more than one million people in the Federal Republic of Germany. The goal of this non-profit association is to improve training, qualification and the ability to innovate in Germany; to stimulate economic growth; and to secure jobs for the future. Together with political partners, D21 supports practice-oriented and interdisciplinary projects, as information and communications technologies play a decisive role in the future of Germany.