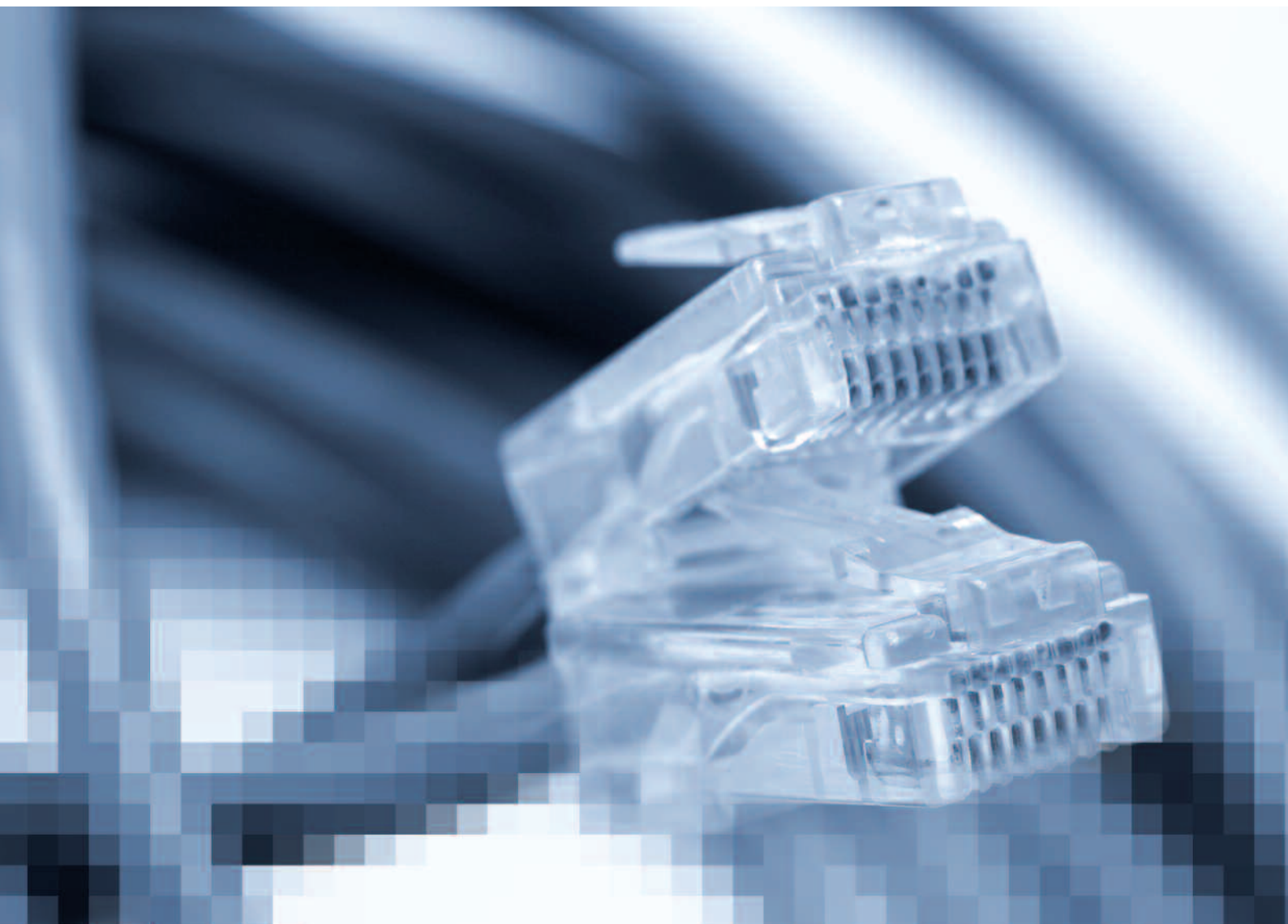




Federal Ministry
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Innovation policy, information society, telecommunications

The Federal Government's Broadband Strategy

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The Federal Government's Broadband Strategy

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Joining forces for Germany's future: The route to high-speed Internet access in every home



Working together with the federal states (Länder), local authorities and industry, the Federal government intends to give a massive boost to the development of the broadband network in Germany. This will be achieved by capitalising on synergies in the construction of infrastructure, using the "digital dividend", formulating regulation that fosters investment and growth, and through financial support.

- ▶ The aim is to have nationwide capable broadband access by no later than the end of 2010.
- ▶ A total of 75 percent of households should have high speed broadband access with transmission rates of at least 50 MB/sec by 2014. The government's goal is to deliver nationwide access with this high-speed broadband as soon as possible.

1

Broadband networks – essential for economic growth



High-speed broadband networks that enable the rapid exchange of information and knowledge are crucial for economic growth. Nowadays, these networks are as important for our economic and social development as road and rail networks, rivers and canals, or gas, water and electricity distribution networks. Access to a high-speed broadband infrastructure provides a basis for innovative broadband services offering high economic returns, e.g. in the eWork, eGovernment, eHealth and eLearning sectors. Broadband connections vastly accelerate knowledge transfer, while opening up an ever broader and richer range of audiovisual media content and infotainment services.

Rural areas stand to gain especially from broadband and the opportunities it offers. Since broadband access is an important factor for companies and families in deciding where to locate, it is critical for safeguarding jobs and making rural areas more attractive and financially viable. However, numerous "white spot" areas without broadband still exist, many in parts of eastern Germany.

Cable and telecommunication companies are investing heavily to expand their broadband networks (up to 50 billion euros in the next few years, according to estimates). If we are to have access to higher-performance broadband connections that will act as a central nerve pathway within the German economy, now is the time to create the right general framework. Such measures will encourage the efficient development of broadband networks and facilitate the rollout of broadband access to every home in the country.

2

Laying the foundations for success

Germany currently has good broadband penetration that compares well against international levels. Over 98 per cent of all German households have broadband with transmission rates of at least 384 kbit/s. Based on the currently accepted broadband definition of at least 1 megabit per second (Mbit/s), penetration amounts to approx. 92 per cent. Well over 70 per cent of households have access to transmission rates of at least 2 Mbit/s, while some 20 per cent can avail of high-speed Internet access through VDSL connections with up to 50 Mbit/s. These values are well ahead of comparative European figures.

In the period between 30 September 2006 and 31 December 2007¹ alone, the number of available connections with at least 384 kbit/s rose by approximately 400,000. Reports from local authorities and federal states (Länder) indicate that this growth has continued.

“White spots“ in Germany are shrinking rapidly, partly due to ongoing investment by the network operators. The reduction has also largely been achieved thanks to the host of action programmes offered by the Länder, local authority broadband initiatives in the areas affected, nationwide activities of associations – such as the German Association of Internet Enterprises (eco), Association of the Providers of Telecommunications and Value-Added Services (VATM), Association of Towns and Municipalities (DStGB) – and various measures implemented by the Federal government.

With its broadband portal (www.zukunftsbreitband.de) and Broadband Atlas, the Federal Ministry of Economics has helped plug information gaps and provided advice on broadband alternatives and recommended action. By doing so, it has raised broadband awareness among communities who have had few or no services, while highlighting the range of local alternatives available.

However, the citizens and industry are demanding ever higher standards: services that would only recently have been considered adequate no longer make the grade. This particular trend reflects the number of solutions now available – essentially it is the result of extremely positive broadband growth in

Germany. The faster the overall market development and the more attractive the options on offer to customers, the more pressing the need to fill the broadband gaps outside metropolitan areas.

By the end of 2008, nearly 60 per cent of households were using broadband services. Germany is therefore a global leader in terms of broadband use when compared to other major economies. Generally speaking, businesses and private households here can choose between several mobile and fixed-line broadband services and a range of different price packages. Some 21 million of the 23 million broadband connections in service today are DSL lines operating through the standard telephone network. Of that number, 10.6 million connections are supplied by Deutsche Telekom and the other 10.4 million by competitors. At the end of 2008, roughly two million households were accessing alternative broadband. An estimated 1.8 million households were using a TV cable connection for broadband Internet access. Other forms of access were supplied via technologies such as satellite, fibre optics, WLAN or powerline broadband. The exceptionally high growth of broadband use via cable connections is an encouraging development. In many areas, this means that the German TV cable network can offer a genuinely competitive alternative to DSL networks. The minimum broadband requirement can also be catered for with satellite networks available nationwide. Approximately 30,000 customers have currently opted for this solution. Once satellite operators implement their development plans, this sector will offer further potential for growth (see Appendix 1).

¹ Data on broadband penetration for 2008 is being compiled; it will be available in April 2009.

3 Federal Government sets ambitious targets



Overall broadband development in Germany has been positive to date. However, the process must be expedited for the following reasons:

- ▶ Many households are still unable to avail of broadband Internet services and
- ▶ Investment decisions that are vital for the country's economy are now underway, determining the expansion of higher-speed networks with transmission rates upwards of 50 MBit/s.

The Federal Government wishes to provide further impetus to broadband development. It has thus defined the following ambitious targets:

1. **Gaps in broadband penetration are to be eliminated and capable broadband access made available nationwide by the end of 2010.**
2. **A total of 75 percent of households are to have Internet access with transmission rates of at least 50 MB/sec by 2014. This level of high-speed broadband access is to be rolled out nationwide as quickly as possible.**

These targets have been defined following intensive discussions with the telecommunications sector and the Länder. The Federal Government is fully aware that the targets are ambitious. However, it also believes the targets are realistic, provided that the measures proposed by all stakeholders are implemented in line with these targets.

Clearly these targets can only be achieved by applying a combination of technologies within a competitive environment. This applies both to the elimination of "white spots" and the development of high-speed networks.

Given their different features, the various technologies all help to achieve the targets in different ways:

- ▶ DSL, cable networks, radio/satellite connections and some powerline networks enable immediate provision of blanket coverage with capable broadband connections. Such connections are currently defined as having transmission rates of at least 1 MBit/s.

► Cable networks, VDSL, fibre optic networks and, looking ahead, emerging mobile technologies such as LTE (Long-Term-Evolution), all provide a basis for high-speed Internet connections (upwards of 50 MBit/s).

Similar ambitions pursued by other economies

Other economies also plan initially to make broadband networks widely available, also in rural areas, and then to upgrade these to high-speed networks.

In **France**, it is planned that by early 2010, every citizen will have access to broadband speeds of at least 512 kbit/s at a maximum cost of 35 euros a month (including the cost of broadband installation). The planned measures to achieve this objective include: creation of a Broadband Atlas, establishment of broadband centres of excellence, examination of public investment in local authority broadband networks and the use of frequencies yielded by the digital dividend (790 to 862 MHz) for broadband services.

In **Japan**, it is planned that all households will have broadband Internet access by the end of March 2011, some 90 per cent of which will be through high-speed Internet connections. Finland has similar targets.

The **USA** is also planning to increase its commitment on broadband development. President Barack Obama has announced initiatives designed to extend nationwide broadband coverage and quickly build a next-generation broadband network. The appropriate legislative procedure is already in preparation.

As business locations compete internationally, a country can gain a particular economic advantage with new infrastructural technologies that are developed more rapidly and consistently than elsewhere. Locations that either fail, or are slow, to implement these technologies will fall behind.

Quick decisive action is thus required: we need to offer the right incentives now to encourage investment in broadband infrastructures that will deliver high rewards for the economy as a whole.

4 Four-pillar strategy

To achieve the ambitious short-term and long-term goals, the Federal Government is proposing an incentive-oriented approach that will

- ▶ capitalise on **synergies in the construction of infrastructure**
- ▶ guarantee **supportive frequency policies**
- ▶ commit to **growth and innovation-gear regulation**
- ▶ provide appropriate **financial support**

Measures to achieve the **short-term target** of achieving blanket coverage with capable broadband access will focus mainly on sustaining and expanding financial support for local authorities and using instruments to improve financing options available to companies. In addition, there will be more planning certainty with regard to regulation, while the digital dividend and the various Länder initiatives will also apply.

The **long-term goal** of developing high-speed networks nationwide will be achieved by applying in addition more incentivised elements within the European regulatory framework. Apart from offering financial support, the package of measures will also provide stimulus to use synergies from infrastructure projects.

Major efficiencies are forecast as a result of the concerted support provided to infrastructure projects and coordination of all stakeholders. The process will generate further investment. Ideally, it will be able to avoid duplicated and bad investments, increase market transparency and promote the collaborative use of existing infrastructure. Successfully developing and expanding broadband infrastructure to such an efficient degree will greatly enhance the overall economic benefits of the Internet.

The Federal Government has proposed a total of 15 measures, which it plans to implement within the next three months.

4.1 Capitalising on synergies from infrastructure projects

Billions worth of investment will be required to eliminate white spots in rural areas and in particular to develop high-speed networks for the future. Up to 70 per cent of the costs of developing broadband infrastructure in the fixed-line network are excavation costs. These costs may be reduced significantly if the various infrastructure providers become more open to collaboration and allowing third-party access to their own systems. This openness would create many win-win situations for businesses, while reducing costs for the economy as a whole. If there is broad support for the measures, thus reducing the infrastructure costs for expanding broadband infrastructure within the fixed-line network by just ten per cent, we can achieve a saving of approximately three billion euros in the next few years.

- ▶ **How can we use existing public and private systems within the telecommunications sector and other infrastructure sectors to close broadband gaps and rapidly develop high-speed networks in Germany? And to what extent?**

The more efficiently existing infrastructure is pooled, the faster high-speed networks can be developed and remote areas connected to broadband Internet. Within the public sector, this infrastructure is the preserve of Federal and state authorities and the local authorities. Electricity and energy suppliers and telecommunication companies also have many passive (e.g. conduits, radio masts) and active infrastructure resources (fibre optic cables) that can be shared voluntarily while networks are expanded.

We can expedite the rollout of broadband if local authorities maintain an open attitude to possible models of cooperation. For example, they could allow third parties access to local authority sewers to allow relatively inexpensive installation of fibre optic cables. Alternatively, they could provide locations for radio installations for the purpose of building broadband networks.

Furthermore, many backbone networks (information highways) operated by large service suppliers already pass through areas that have little or no broadband. In effect, this means that simple "feeder lines" can often be used to provide connections rapidly in white spots.

In Germany, there are also well over 70,000 wireless sites run by different operators. Many of these wireless sites offer potential for shared use by third parties (in return for charges) to improve broadband coverage.

Measure 1: Optimise shared use of existing infrastructure and facilities

- ▶ The Federal authorities will do its utmost to support the development of broadband in Germany, provided that this does not affect the actual remit of the authorities and that safety considerations are appropriately covered. This consideration particularly applies to partial pooling of existing infrastructure – for example, as present in the business areas of the Federal Ministry of Transport, Building and Urban Affairs (BMVBS), the Federal Ministry of Defence (BMVg) and Federal Ministry of the Interior (BMI), on condition that fibre optic cables or transmission facilities are not involved.
- ▶ The Federal Government calls on Länder and local authorities to ensure their own authorities are willing to cooperate in terms of using existing facilities and infrastructure.

It is also essential that companies maintain a cross-network data basis so they can optimise their own processes and incorporate useable infrastructure in their planning. In addition to existing information policy measures such as the Federal Ministry of Economics and Technology's Broadband Atlas, the

Federal Government will establish a platform providing information on existing infrastructure available for shared use and relevant construction measures. Similar initiatives are underway in the US, for example, where considerable resources are to be pumped into a "Broadband Inventory Map".

Measure 2: Compile an infrastructure atlas

- ▶ The German Federal Network Agency will start work soon on an infrastructure atlas, in association with the Federal Ministry of Economics and Technology. Where possible, the agency will include the conceptual groundwork already completed by industry and broadband initiatives from the Länder. It is hoped that the first edition will be available by Autumn 2009.
- ▶ The Federal Network Agency, as a highly trustworthy top-level Federal Authority, will be assigned the task, while maintaining and guaranteeing maximum confidentiality, of ensuring that only infrastructure components that are actually suitable for pooling are included in the atlas. To achieve the required confidentiality, it will be necessary to differentiate between information that is either publicly available or only to selected users and information that should only be provided by the infrastructure providers themselves.

▶ How can we fill knowledge gaps about building new infrastructure, reduce development costs and enhance cooperation regarding the installation of new infrastructure projects?

To achieve significant reductions in the construction costs for broadband connectivity, telecommunication companies must be given the opportunity to include their new infrastructure projects as part of road construction projects already planned. To that end, the companies must be given adequate notice of scheduled relevant road construction projects.

Measure 3: Compile a database of construction sites

- ▶ In conjunction with the top local authority associations (German County Association, German Association of Cities and German Association of Towns and Municipalities) and the Länder, the Federal Government will discuss the next steps in setting up a central database for all relevant road construction projects. The database is to be integrated with the infrastructure atlas at a later stage.
- ▶ The Federal Ministry of Transport, Building and Urban Affairs regularly provides up-to-date information on roadworks sites on the country's autobahns for the infrastructure atlas. This information is based on data obtained from the Länder regarding construction work scheduled to last eight days or longer. In general, the information is updated for each state every three months.

In the event of doubt, information policy measures alone will not suffice to drive rapid broadband development. If there is lack of cooperation among market players, selective intervention by the government will be necessary. For example, if installing conduits or creating suitable access points (ducting etc.) during the construction work would greatly facilitate the connection of broadband for individual local authorities or communities at a later stage, such measures should be carried out, even if no service supplier will shoulder this cost at the time of the construction work. Local authorities must have the option of raising the costs of such measures through suitable support programmes.

Another means of expediting progress would be the joint installation of cable systems by providers of public telecommunications networks and public authorities. In the past, telecommunication companies and the Waterways and Shipping Administration of the Federal Government (WSV) have successfully cooperated on some national waterways. All parties involved benefited from this cooperation – resulting in fewer planning requirements and lower costs. The costs were borne proportionately by the service suppliers and the WSV.

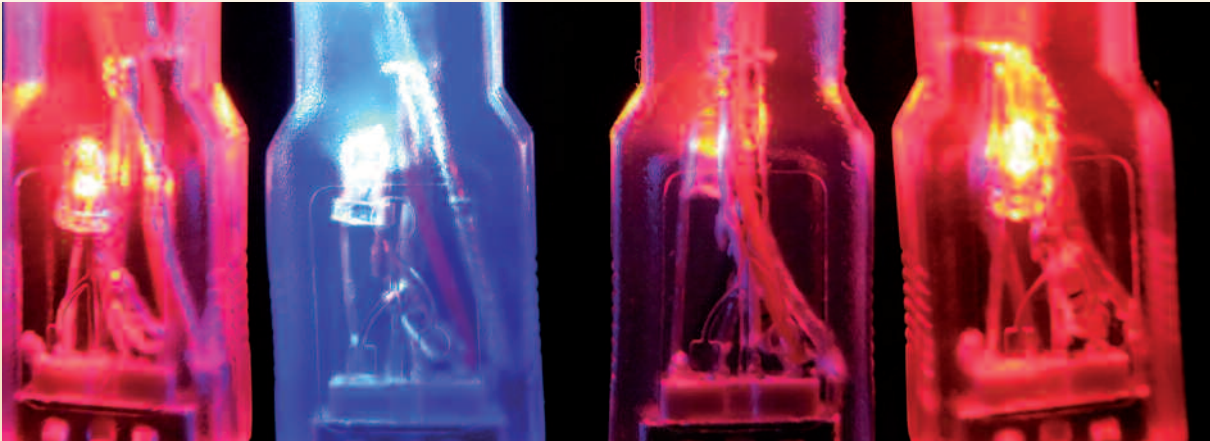
Measure 4: Needs-based collaboration on installing ducting and joint creation of infrastructure

- ▶ Collaborating on installing empty conduits and providing access to cable ducting etc. during the course of construction work will encourage the development of broadband infrastructure. Greater financial support will be made available to local authorities for this purpose in future (see measure 8).
- ▶ All possible efforts should be made to intensify and promote any collaboration in creating infrastructures (as carried out by the WSV). These efforts will generate synergies for all parties involved.

▶ What conditions must be in place to encourage individuals to participate in needs-based broadband rollout in every home?

If we are to achieve long-term growth of efficient infrastructure, broadband measures must not stop at the front porch. Setting up broadband connections in apartments and houses at an early stage is an efficient way of establishing the requirements for emerging eWork or eHealth applications. It also enhances property values and gives people an opportunity to be autonomous and work for longer in a familiar environment. The Federal Government is therefore taking action to equip houses and apartments for the future.

Tax deductions may be claimed for invoices from tradespeople for laying cable connections to homes (on private property), under the terms of § 35a of the German Income Tax Act (EStG). The scope of these provisions must be extended – with fewer references to specific technology – to further the development of new infrastructure.



Measure 5: Improve broadband uptake in the home

The scope of the described provision in § 35a of the German Income Tax Act (EStG) will be rapidly extended to all forms of broadband diffusion in buildings. In future, tax concessions will be applicable to any installations connecting broadband to buildings and distributing the broadband connections within the house or apartment units.

4.2 Supportive frequency policies

The Federal Government's broadband strategy objectives can only be achieved if high-performance mobile technologies are also deployed in addition to modern wireline networks, and if efficient use is made of the frequency spectrum. Mobile broadband services already play an extremely important role, both in terms of closing broadband gaps remaining outside the wireline supply and as an addition to fixed-line connections.

- ▶ **How can frequency policies help improve broadband access generally among the population in the medium and long term?**

Our frequency policies aim to make optimum use of radio frequencies. These are a limited resource. The Federal Government supports the approach taken by the Federal Network Agency, which seeks to involve all affected sectors and the technical community in maximising the flexibility of frequency use and removing its dependence on particular technologies. For example, the agency is currently collecting views on the future possible use and distribution of the existing GSM spectrum to cater for next-generation mobile technologies. Today's broadband mobile networks mainly service densely populated areas. This coverage will be improved. In future, it will be possible to apply the frequency bands of 900 MHz used to date for the GSM networks for all types of wireless network access – irrespective of particular technology requirements.

Preparations on allocating additional frequency resources are nearly complete. The specific auction rules are being drafted and will be submitted for comment. In 2010 an auction will be held for the largest spectrum ever available. No restrictions will apply regarding the use of particular technologies and the frequencies will be made available for broadband applications nationwide. By taking this step, the Federal Network Agency is consistently pursuing its objective of supplying frequencies that are as technology-neutral and service-neutral as possible for wireless access.

However, most of this spectrum is found within the frequency range above 1,000 Megahertz (1.8 GHz, 2 GHz, 2.6 GHz). Developing mobile networks within this range would therefore be a very costly exercise – the expectation is that only a small proportion of the spectrum would be used to supply less densely populated areas.

Although mobile technologies generally offer less bandwidth than wireline networks, their role in supplying long-term blanket broadband coverage with high-speed Internet access should not be underestimated. Currently, UMTS mobile networks already offer download speeds of up to 7.2 Mbit/s, and by 2012 up to 14.4 Mbit/s will be possible. Using WiMAX, speeds of 3 to 6 Mbit/s (upstream and downstream) can be achieved today, while speeds of 50 to over 100 Mbit/s (up-stream and downstream) are predicted by 2012. The first commercial LTE (Long-Term-Evolution) chip set modules have been launched for mobile end devices. These modules are designed for transmission speeds of up to 100 Mbit/s for downlink services and up to 50 Mbit/s for uplink services.

► **How can mobile technologies improve broadband services in rural areas in the short to medium term?**

In future, parts of the frequency spectrum currently used for analogue radio and the military forces will be available to improve the accessibility of mobile broadband Internet connections in rural areas. Due to its physical wave propagation capabilities, this spectrum is particularly suited for supplying large areas with broadband using a small number of transmitter masts. It also offers good building penetration. The digital dividend generated by digitalising terrestrial radio will mean, for example, that basic provision of broadband services can be rolled out quickly and economically to sparsely populated areas. This dividend will also enable the expansion of sustainable and efficient infrastructure. The Federal Government, the Länder and current users (the military forces and users of wireless production technology such as microphones) have backed this plan, even if some issues remain to be clarified. Some shifts may be required, especially in the cultural sector.

Within some Länder, there are plans to exploit the unused resources from the digital dividend in the immediate future to improve Internet access via mobile wireless solutions. The state media authorities in Berlin-Brandenburg and Baden-Württemberg are testing connections in rural regions with this in mind. The Federal Government is encouraging interim solutions, where possible. The radio sector was assured that it would retain use of the frequency range up to 790 MHz, and that no limits would apply to further expansion or development of radio transmission in this range. Plans to provide Internet access upwards of channel 60 will go ahead as soon as possible.

Measure 6: Rapidly reaping the benefits of the digital dividend

- ▶ The Federal Cabinet has noted the proposal (Appendix 2) for rapid use of a portion of the digital dividend. On 4 March 2009 it will adopt the Frequency Band Allocation Plan Ordinance (Frequenzbereichszuweisungsplanverordnung). The amendment makes provision to free up the range between 790 and 862 MHz for broadband mobile applications. It requires that the frequency spectrum be used primarily to provide access to areas that are currently without broadband.
- ▶ Provided that the Bundesrat (federal council) approves the ordinance before the summer break, the Federal Network Agency will be able to proceed with a frequency allocation plan in 2009 and start allocating frequencies. The digital dividend could thus be used by as soon as early 2010, at least in some regions, to ensure coverage with capable broadband.

The Federal Government is therefore in step with other European countries that have already decided to free up the frequency range from 790 to 862 MHz for wireless transmission. Plans have been drafted in Sweden, Finland, France and Switzerland.

If all parties involved take joint decisive action, it may even be possible to combine low and high frequency ranges during the next frequency allocation. This would increase the likelihood that resources from the digital dividend with favourable propagation properties would actually be used to fill gaps in broadband coverage.

4.3 Financial aid

Experience has shown that in many cases, there is poor immediate broadband uptake in rural areas without government support. The government must therefore provide incentives in these areas through support programmes. Such programmes enable Internet access with transmission speeds of at least 1 Mbit/s to be rolled out in households that do not yet have such broadband access.

It is also critical to lay a good foundation now for rolling out high-speed networks. For at least 60 per cent of the population, this foundation will be laid in metropolitan areas as a result of competition. However, there are also areas where modest government subsidies could be used to promote preparations for broadband rollout.

Every possible effort should be made to stimulate growth by granting financial concessions to businesses involved in broadband rollout.

The support available to foster broadband is designed in a manner which does not impede competition, avoids free-rider effects and stimulates additional investment.

▶ How can we promote access to high-speed broadband by 2010, especially in areas neglected by the market?

Local authorities can avail of various support programmes provided by the Länder and the government. A total of over 150 million euros can be accessed through these programmes (the government share for the "joint task for the Improvement of Agricultural Structures and Coastal Protection", GAK, amounts to 30 million euros by 2010).

All Länder excluding the city states are to apply the broadband aid as part of the GAK. In areas assisted by the GRW ("Joint Task for the Improvement of Regional Economic Structures"), all broadband investments made by industry can be financed with the GRW funds under the existing provisions. In future, GRW assisted areas will also receive increased funds from the GRW as part of infrastructure development.



GAK funds can be used to fund rural communities in Germany that are either without broadband or have broadband speeds of less than 1Mbit/s. The maximum government subsidy per project is 200,000 euros. At present, up to 60 per cent of the profit gap is being subsidised. This gap is defined as the difference between the investment costs and the profitability threshold for supplying rural areas with broadband services comparable to those in metropolitan areas. The decision to select a particular service supplier must not be biased towards a particular technology. In general, the operator selected must guarantee all suppliers equal, non-discriminatory access to electronic communication at the wholesale level on its network.

Measure 7: Improved conditions of funding in the Joint Tasks

- ▶ The GAK and GRW Joint Tasks are already making funds available to accelerate the rollout of broadband with a bandwidth of at least 1 Mbit/s in areas currently without services.
- ▶ The broadband initiative already launched in 2008 by the Federal Ministry of Food, Agriculture and Consumer Protection (BMELV) as part of the GAK is soon to be enhanced: in future, up to 90 per cent of the "profit gap" will be eligible for funding.
- ▶ It is expected that as of March 2009, local authorities in the GRW assisted area will receive support in providing capable broadband access (at least 2 Mbit/s) at affordable prices. The support will fall under the heading of business-related infrastructure. Up to 90 per cent of the profit gap will be eligible for subsidies. In addition, up to 100,000 euros may be granted to local authorities in receipt of planning and consulting services from third parties. GRW funds for financing broadband access will not be tied to particular projects. The Federal Government assumes that by 2013, approximately 60 million euros of GRW funds will be spent on developing broadband access.

- ▶ **What support can we provide to local authorities that wish to use minimum funding to create a basis for rolling out high-performance networks (where the market does not provide this basis)?**

High-speed networks must be established now – this is vital. Government funding is to be made available for this purpose if a financial stimulus is required.

Measure 8: Additional finance for the expansion of infrastructure

- ▶ According to the German law on investing in the future (ZuInvPG), the Länder can allocate funds to their local authorities in 2009 and 2010 for the purpose of developing broadband infrastructure. These funds can subsequently be made available to companies that wish to expand or operate broadband networks. Several Länder have already signalled their intention to invest part of the additional funds received under the Government's second economic stimulus package in developing broadband infrastructure.
- ▶ The installation of conduits is specified as a new object eligible for funding in the German joint tasks GAK and GRW (limited to assisted regions).

The Federal Government plans to launch an initiative in spring 2010 to encourage innovative projects by promoting pilot schemes. This initiative will support local authorities that have developed exceptionally innovative solutions. It is hoped that these "broadband beacon projects" will encourage businesses to pursue best-practice solutions.

- ▶ **How can we further incentivise businesses to invest in broadband development?**

Small and medium-sized telecommunications companies, in particular, can borrow funds at terms that are in line with market conditions and with adequate risk-pricing through Germany's state-owned development bank's (KfW) corporate financing programme for 2009.

The European Investment Bank (EIB) also provides loans to the value of half the project size for broadband projects. These loans particularly attractive thanks to the long-term repayment periods of typically up to 15 years and interest rates that are more favourable than normal borrowing rates. Larger projects, worth in the region of 100 million euros, are handled directly by the EIB, while companies can apply to the numerous German EIB Correspondent Banks for smaller projects.

Businesses investing in broadband include large firms and small and medium-sized companies. It is therefore necessary to design financial instruments tailored to meet different requirements. In any event, the existing and modified federal and state loan guarantee scheme is generally available to companies in the telecommunications sector to prevent economically desirable broadband projects from failing due to a lack of suitable finance. With these programmes, the Länder or the Federal Government and Länder together assume up to 90 per cent of the risk of default for project financing.

4.4 Regulation geared to growth and innovation

Customers have greatly benefited from the deregulation of the telecommunications market and the introduction of sector-specific regulation. The prices of telecommunication services have dropped sharply, while the quality of available services has improved considerably. These services are being offered by numerous companies operating regionally and nationally.

The experiences and successes of the last ten years have taught us that innovation and increased efficiency can ultimately only be achieved through efficient competitive processes. These competitive processes, which are supported by sector-specific regulation, not only deliver cost and price efficiencies but also generate essential dynamic pressure, i. e. extensive investment and innovation within the economy.

Regulation that is pro-growth and pro-innovation can support the rollout of ubiquitous high-speed broadband access and the development of high-performance networks. It is critical that companies are offered adequate incentives to invest in expanding and developing fixed and mobile telecommunications networks. If regulation can expedite this process, the required conceptual framework must be formulated without delay.

► **Based on the existing regulatory framework, what measures are possible to ensure that companies have planning certainty?**

Two important objectives of the Telecommunications Act (TKG) are to promote efficient investment in modern infrastructure and support innovation.

Section 21, paragraph 1, item 3 of the TKG, for example, explicitly states that "the initial investment by the facility owner, bearing in mind the risks involved in making the investment" must be taken into account when determining whether and which access obligations should be imposed. Furthermore,

the requirement outlined in section 21, paragraph 1, item 4 of the TKG, aims to promote competition in infrastructure by considering the aim of incentivising efficient investment in facilities, within the context of regulation decisions.

Where the Federal Network Agency imposes specific access obligations based on the specified criteria, in addition to the regulatory aim outlined in section 2, paragraph 2, item 3 of the TKG (to encourage efficient investment in infrastructure and promote innovation), it must also take into account the service-specific risks of equity capital employed (section 31, paragraph 4, item 3 of the TKG) within the context of rates regulation. In this regard, it can, for example, make provision for particular risks by applying premiums when setting interconnection rates.

Furthermore, the "consistency requirement" specified in section 27, paragraph 2, of the TKG addresses the aim of giving companies planning certainty with regard to rates regulation. Through a consistent, unambiguous and coherent decision-making process, the Federal Network Agency must ensure that the rates it sets are coordinated to prevent any distortion of competition caused by price/cost gaps, for example.

In addition, the provision on regulating new markets, added to the Telecommunications Act in 2007, (section 9a), specifically addresses the objective of creating incentives for investment and promoting innovation. This amendment was made in the interests of promoting investment in broadband networks. The purpose of the provision is to ensure that new markets are tapped and risk-bearing investments given due consideration in regulation decisions. The specification in section 9a, paragraph 2, of the Act provides the legal requirements for new markets to be regulated in line with directive law. In exceptional cases, ex-ante regulation for specific sectors (network access, rate approval obligations) can be disregarded entirely provided this does not distort competition.



Measure 9: Improved planning certainty for companies

The existing regulatory framework fundamentally offers adequate flexibility for planned investments and development of new broadband infrastructure. However, there have been calls for greater planning certainty. The Federal Government is therefore considering whether it is feasible in the short term to extend the existing validity period for market analyses from two to three years.

► **Is there any remaining scope within the existing regulatory framework to include regulatory models geared to growth and innovation?**

The existing regulatory framework already covers all possible regulatory options that favour growth and innovation. There are calls from market players to the Federal Network Agency to provide clarification on the question of a long-term regulatory perspective so that we can eliminate as much uncertainty as possible about future regulation measures. The Federal Government supports this request, but points out that specific, single-case decisions cannot be made in advance based on these position papers. Such decisions can only ever be made on foot of individual consideration of each case by the Federal Network Agency.

Measure 10: Define the main features of regulation geared to growth and innovation

The Federal Network Agency will compile key issues on general regulatory conditions for the further expansion of modern telecommunications networks and the creation of a capable broadband infrastructure. The agency will make these issues available for public discussion. In the Federal Government's view, they must address the following points:

- ▶ Economic and planning certainty (e. g. regulation periods) with regard to the typical planning horizon for these investments;
- ▶ An appropriate rate of return on equity if regulated rates apply to access services and facilities to allow for specific risks if necessary;
- ▶ Appropriate, competitive sharing of infrastructure that may allow for the reduction of relevant risks;
- ▶ Transparency requirement regarding the planned reconstruction of the network by the market players.

If agreement is sought between individual market players on developing infrastructure and the ideas discussed take on a more definite form, the Federal Network Agency and Federal Cartel Office will clarify the fundamental regulatory and competition law issues with the parties involved as soon as the appropriate documents have been submitted. On the basis of these clarifications, a general summary of ideas and positions must then be drafted, which can be used to clear a path for future cooperation between other parties.

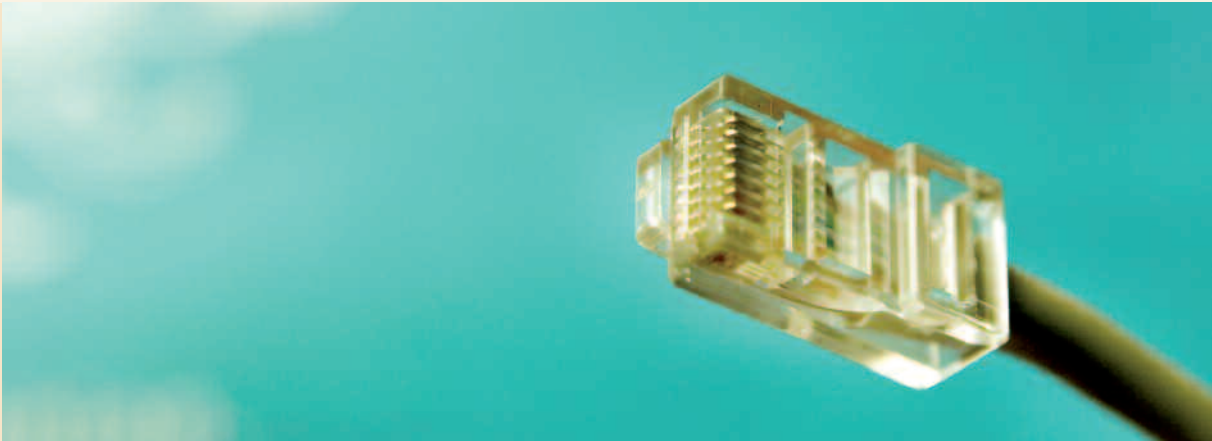
The Federal Network Agency will also forge ahead with drafting basic principles for consistent rates regulation, with a view also to encouraging efficient infrastructure investment. These principles will be discussed with the stakeholders.

▶ What changes are necessary to European requirements to provide a supportive climate for investment in next-generation networks?

To date, the proposals on market regulation drafted by the European Commission (as part of its examination of the European regulatory framework for telecommunications), have not yet adequately tackled the need for a telecommunication policy designed to foster growth and innovation. Nor do the proposals adequately address the impact of the crisis in the financial market.

These shortcomings in the current EU package must be resolved. By amending the European regulatory framework for telecommunications, the correct foundations must be laid for the imminent development and expansion of high-speed networks. From an investor's point of view, two obstacles in particular prevent rapid expansion of the infrastructure. These are: first, the high risks associated with investments in infrastructure; second, the lack of planning certainty because of possible discontinuities in regulation policy methods.

In discussing amendments to the regulatory framework and in formulating recommendations by the Commission, the Federal Government will seek to prioritize methods of regulation that are stimulus-oriented, promote investment and have a neutral effect on competition, while ensuring that companies are not overburdened.



Measure 11: Requirements related to incentives and investment stimulus in the EU regulatory framework

At a European level, the Federal Government is seeking clarity within the EU telecommunications regulatory framework in order to achieve speedy and reliable modernisation of networks.

► The additions sought to the framework directive should offset the investment risk by enabling innovative and intelligent cooperation mechanisms that will adequately spread the investment risk among the network operators and between the network operators and businesses requiring network access. The Federal Government will campaign at European level and among Member States for this type of incentive mechanism and the creation of an investment-friendly environment. Once these factors are in place, it will be

possible to generate enormous sums that must be made available in the coming years for modernising telecommunications networks. In the interests of competition, the Federal Government will monitor the incentive mechanisms to ensure that network access is available to all and that the principle of non-discrimination is preserved. The regulations must not be allowed to distort market competition.

► The Federal Government is also advocating long-term planning certainty and consistent regulatory policy. Specifications made by the regulatory bodies must be guaranteed to be valid for more than three years and thus endure longer than the validity of a market analysis, if necessary. A stable regulatory climate is crucial for the necessary investment in next-generation networks.

5 Information and transparency

Notwithstanding the range of information policy measures implemented by the associations, Länder and the Federal Government, lack of knowledge about possible ways of rolling out broadband often remains a problem on the ground. Ultimately, the local authorities and the public must also be attracted to new broadband measures. There is also a general need for a targeted public relations campaign to highlight the importance of infrastructural projects.

Measure 12: Active and participatory public relations

The Federal Ministry of Economics and Technology (BMWi) will further develop its broadband portal www.zukunft-breitband.de. Apart from the Broadband Atlas and best-practice examples, this portal also currently includes checklists for local authorities and information on financial support. A database is being compiled: local authorities will be able to upload broadband-relevant data to this database, thus reducing market entry costs for potential suppliers.

In addition to the individual broadband centres within the Länder, there is a need to set up a one-stop shop at national level, which would handle all important issues related to broadband rollout for all Länder. Its role would cover issues of standardisation, consulting, cooperating on initiatives with other countries, testing and evaluating various models designed to create high-performance networks or support the local authority bodies managing the rollout of broadband.

Measure 13: Set up a broadband centre of excellence

The concept of centralising administrative contacts already has a proven track record in the Länder. In the Federal Government's view, there is also a need for a "Broadband Centre of Excellence" at a national level. This centre would act as a centre for advice and information, and make proposals on the actual implementation of measures. As part of its broadband strategy, the Federal Government is to set up or commission a one-stop shop ("Broadband Centre of Excellence") in the near future, with responsibility for these operational tasks.

A number of the implementation issues connected to the government's broadband strategy can only be dealt with through efficient cooperation with the Länder. This cooperation must be based on a solid foundation.

Measure 14: Set up a Government-Federal States taskforce

The Federal Ministry of Economics and Technology (BMWi) regularly holds meetings with representatives from the Länder (federal states) working group on Telecommunication, IT and Post to discuss current issues in the area of telecommunications and regulatory policy. This panel should be drawn upon to form a taskforce comprised of representatives from the Federal government and the Länder: the taskforce would discuss and develop solutions to any of the issues raised in this strategy document that require resolution through collaboration. Experts from the relevant government and Länder departments would be called upon to participate in this process.

The Broadband Strategy is a complex schedule of measures that must be implemented step by step. Measures implemented must be carefully documented to ensure the strategy is sustainable.

Measure 15: Draft an annual monitoring report

The Federal Government is to draft an annual monitoring report in order to document in detail measures already implemented, identify further steps and present new action requirements. The first report will be made available to the public by the government in Spring 2010.

Over the past few years, the Länder have been extremely proactive in closing existing gaps in broadband coverage. The Federal Government welcomes their commitment. It is now time to intensify these measures and further expand the rollout of high-speed networks, so we can move closer to achieving our targets.

6 Outlook



With data traffic on the Internet growing by more than 50 per cent annually, powerful access technologies are vital. New technologies and trends on the Internet, such as peer-to-peer technologies or the dramatic increase in Internet users through the "Internet of Things" will place higher demands on the capacity of current access networks. To address this challenge, the Federal Government is supporting the "100GET" innovation alliance and "Broadband Access Networks for the Next Generation" as part of the "Optical Technologies" and "ICT 2020" support programmes. The 100GET innovation alliance is developing technologies for a high-speed, reliable and secure Internet of the future and includes all network operators active in Germany. By promoting the research and development of "Broadband Access

Networks for the Next Generation", the Federal Government is helping German enterprises and research institutes to develop innovative solutions in line with its objectives. The support initiative is designed to help companies tap into the enormous market potential of Internet-based technologies and become global leaders among international competitors, thus driving innovation and growth in Germany.

This Broadband Strategy (aims and proposed measures) focuses exclusively on enhancing the availability and quality of broadband infrastructure in Germany. Questions concerning the development and use of the Internet that fall outside the scope of this strategy are addressed within the Federal Government's ongoing ICT policy and the IT Summit.

Appendix 1: Technologies and opportunities

Current technologies can be used to expand the broadband network in various ways – all of them will enhance the network's potential over the coming years, through a combination of technological advances, increased capacity and the adoption of new developments.

- ▶ **Satellite Internet** is primarily an option for locations that do not have access to terrestrial broadband, in particular those outside interconnected settlement areas. However, its benefits – widespread, immediate access – are compromised by certain technological restrictions in terms of capacity and by high monthly charges. In particular, the upload rate via satellite Internet is very low and, because it takes a relatively long time for the radio signals to be sent and received (latency period), this broadband technology has limited suitability for realtime-critical applications. Nevertheless, download rates of 1–2 Mb/s and higher ensure access to all core Internet services (excluding online gaming). Existing capacity restrictions, which currently enable simultaneous usage by just 10,000 users nationwide, are expected to increase significantly as of 2010, once the planned use of "spot beam" technology to provide satellite broadband services has been implemented.
- ▶ **WLAN-based** wireless access has proven to be a successful and cost-effective temporary alternative in many local areas, particularly in rural locations, where no other form of broadband access is available. WLAN is well suited to transmission over short distances. It is mainly used within apartments or building complexes. Antennae are mounted to create small wireless networks (hotspots) with a range of approximately 100 metres. The maximum bandwidth available (up to 54 Mb/s) within a WLAN cell must be shared by all users, which reduces the amount of bandwidth available to each user.
- ▶ The transition to mobile radio technologies such as LTE or **WiMAX** is imminent: the better the underlying general conditions, the faster these technologies will be developed. Pilot projects are currently underway to test the technical suitability of mobile radio technologies in broadcasting frequency ranges. The frequency spectrum currently used for analogue broadcasting in the frequency range 470 – 862 MHz is particularly suited to ensuring coverage over large areas. Its physical wave propagation capabilities provide satisfactory building penetration and only a small number of transmitter masts is required. The digital dividend yielded as a result of the introduction of digital TV enables faster and more efficient basic access to broadband services in sparsely populated regions. It also creates a base for the creation of sustainable, high-capacity infrastructure. Provided that the necessary policy framework is in place within the projected timeframe, it is estimated that we will be able to capitalise on the digital dividend in the frequency range 790 to 862 MHz as of 2011 and, in some regions, even earlier.
- ▶ **Point-to-point radio solutions** can ensure rapid connection of local networks. With this technology, broadband services are usually provided as hybrid solutions combining point-to-point radio and other wireless solutions (WLAN etc.) or wireline local area networks. However, point-to-point also allows individual companies to connect to the network directly. Setting up point-to-point radio links is a relatively inexpensive solution; it offers high data transmission rates and can be implemented quickly.
- ▶ Mobile network operators are further upgrading their networks with HSPA for the maximum transmission rates that can currently be achieved, i.e. 7.2 Mb/s (download) and 1.45 Mb/s (upload). By the end of 2007, Germany already had 8.7 million UMTS users, a figure which is on the increase. The next generation of mobile wireless broadband technology – Long Term Evolution (LTE) – is set to emerge in the coming years. LTE will be capable of providing high-speed Internet services with high, doubledigit data transmission rates. At present, mobile wireless broadband networks mainly service urban regions and play only a minor role in ensuring widespread coverage. However, we can expect this situation to improve. In future, the frequency bands around 900 MHz, which are currently used by GSM networks, are to be freed up to all forms of wireless network access, regardless of the technology employed. In addition to upgrading wireless interfaces for high-speed Internet access,

mobile network operators will also focus on investing in fibre-optic connections for mobile wireless base stations over the coming years. High synergies may be obtained by simultaneously expanding mobile wireless networks and fixed-line networks.

- ▶ In rural areas, concerted efforts are being made to replace copper links with fibre-optic connections to overcome the coverage problems associated with **DSL** and ensure access to broadband connections with speeds of at least 1 Mb/s. This upgrading of DSL by Deutsche Telekom and their competitors (a commercially driven project) will extend to many local network areas in future.

- ▶ German **TV cable network operators** are upgrading their networks for high-speed Internet access. By mid-2009, it is planned that 24 million households will be able to connect to broadband Internet via their cable network. Capable Internet access via cable TV would thus be available to 60% of all households in Germany. The introduction of the new IP standard for cable networks (DOCSIS 3.0), which is scheduled for 2009/2010, will enable broadband connections at speeds of over 100 Mb/s for all households. TV cable networks operate in large and medium-sized towns and cities, but also in many small and miniscule communities.

- ▶ Deutsche Telekom is currently expanding its local networks in many urban areas for high-speed **VDSL** access. Deutsche Telekom is also forming partnerships with other network operators to extend these networks to other towns and cities. With VDSL technology, networks of fibre-optic cables are brought closer to users than conventional DSL. As a result, data can be transmitted faster along shorter distances of copper cabling to achieve bit rates of up to 50 Mb/s. Experts predict that VDSL technology will enable bandwidths in the order of 100–200 Mb/s.

- ▶ In some local areas, mainly in large cities, regional network operators like NetCologne, M-Net or Hansenet have begun implementing fibre-optic networks with lines connecting directly to individual buildings (**FTTB**) or individual apartments (**FTTH**). Fibre-optic networks are currently considered to

deliver the highest performance among broadband infrastructure types. These networks are not subject to capacity restrictions in the foreseeable future, and are capable of offering users high-speed Internet access with transmission rates extending into the gigabit range (≥ 1000 Mb/s). Current business models for FTTB projects require a high population density in the broadband rollout zones and long-term investment over 20 to 30 years.

Appendix 2: Allocation of the Digital Dividend for Broadband

Extract from the Draft Second Ordinance to Change the Frequency Band Allocation Plan Ordinance

In accordance with § 53 Par. 1 of the Telecommunications Act of 22 June 2004 (Federal Law Gazette I pg. 1190), the Federal Government decrees the following:

Article 1

The Frequency Band Allocation Plan Ordinance of 28 September 2004 (Federal Law Gazette I pg. 2499), amended by the Ordinance of 23 August 2006 (Federal Law Gazette I pg. 1977), is to be changed as follows:

- 1. § 2 is to be changed as follows:**
 - a) In Par. 1, the comma and the phrase "which also refer to the frequency usages in and along conductors" are to be omitted.
 - b) Par. 3 is to be changed as follows:
 - ba) In Number 3, the comma is to be replaced by the word "and".
 - bb) Number 4 is to be omitted.
 - bc) Number 5 will become Number 4.
- 2. In § 3 Par. 1 Sentence 2, the word "continuous" is to be deleted.**
- 3. The appendix is to appear as follows:**

Extract from the Appendix to the Frequency Usage Plan with Usage Conditions

Part A: Table			
No.	Frequency range (MHz)	Allocation to Mobile Radio Services	Usage
225	470 – 790 D149 D291A D306 3 5 21 31	<ul style="list-style-type: none"> • BROADCASTING SERVICES 6 14 • TERRESTRIAL MOBILE BROADCASTING SERVICES D296 	civ.
226	790 – 862 3 5 31 36	<ul style="list-style-type: none"> • FIXED BROADCASTING SERVICES • MOBILE SERVICES excluding aeronautical radio services D317A • BROADCASTING SERVICES 22 	civ.
Part B: Usage Conditions			
22	Usage by broadcasting services is being phased out		

Note: some of the remaining footnotes/provisions governing usage are still undergoing co-ordination.

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