Bundesnetzagentur

Annual Report 2016

Markets in the digital revolution

Another year in the service of regulation lies behind the Bundesnetzagentur. But what exactly does this mean? Regulation in the economic sense means that the state imposes restrictions on commercial activity through statutory provisions. The network-based industries, in particular, are regulated as their business models are essentially dependent on the presence and functioning of specific networks that often cannot be duplicated. Again in 2016 the Bundesnetzagentur has overseen the network infrastructure for the telecommunications, energy, postal and rail sectors, ensured competition in these sectors and encouraged the necessary investment. This makes it possible for consumers to continue to enjoy a wide variety of choice, frequent new offers, and stronger consumer protection. You can find out all the details in the following report.

Bundesministerium
für Wirtschaft
und Energie

A message from Brigitte Zypries, Federal Minister for Economic Affairs and Energy

A modern, efficient infrastructure is the lifeblood of our industrial society. The federal government is working hard at improving framework conditions for the necessary investment in this vital element. This is how we are making our infrastructure fit for the future.

To implement the energy transition, it is essential to make progress in network expansion. In 2016 the transmission system operators put forward proposals for possible route corridors for two important direct current (DC) projects; for the first time these projects will have to observe the legal requirement of giving priority to underground cable technology. The early inclusion of the general public with full information prior to the federal sectoral planning in 2017 gives reason to hope that the project will be completed quickly and reliably.

The public can expect an efficient and cost-effective implementation of the energy transition. The legislature has created the essential foundation for this with the 2017 Renewable Energy Sources Act. As part of its duties under the Renewable Energy Sources Act, the Bundesnetzagentur now also determines the feed-in tariff for wind power plants in auctions. Experience gained with the first auctions for ground-mounted solar PV systems provides grounds for optimism as the feed-in tariffs have constantly fallen when faced with competition. In the first joint auction at the European level held with Denmark, the Bundesnetzagentur co-operated very closely with our European neighbours in promoting renewable energy sources.

We have also made significant progress in digital infrastructure. This is crucial for an open internet, which is an indispensable building block in a digital society. An open internet offers people space for self-fulfillment and opens up new opportunities for growth and prosperity. In this respect, together with the Bundesnetzagentur, we have ensured a clear regulatory framework not only in Germany but also at the European level: Securing net neutrality creates excellent conditions of competition for the digital markets, infrastructures and platforms.

In the Telecommunications Transparency Ordinance we have created an important pre-condition for more consumer protection and more effective competition. In the future, fixed-line and mobile providers will be required to be more transparent when marketing their broadband connections. This is how we are strengthening the consumer's position when dealing with the provider. Consumers can now more readily see the data transmission rate that has been contractually agreed. They can also specifically check whether they really are able to surf the internet at the speed their providers have promised. This puts providers under considerable pressure to keep their promises.

The digital transformation is well under way. It is opening up opportunities for more quality of life, new business models and a more efficient economy. We are shaping this change through intelligent framework conditions and targeted promotion. Even the German postal market is undergoing fundamental change due to the dynamic development of e-commerce. Although it continues to hold a leading position in the European environment. We intend to reinforce this position with the support of the Bundesnetzagentur.

The efficient implementation of the energy transition, the digital revolution, net neutrality and consumer protection – in all of these the Bundesnetzagentur is making a vital contribution to the excellent development of our networks. It creates favourable general conditions for a modern infrastructure and thus for an excellent future for our country.

Your

Brigitte Zypries
Federal Minister for Economic Affairs and Energy

Bundesministerium
für Verkehr und
digitale Infrastruktur

Message from Alexander Dobrindt, Member of the German Bundestag, Federal Minister of Transport and Digital Infrastructure

Prosperity arises where infrastructure functions. That is a basic economic principle and a response to the question as to why Germany today leads the way internationally in growth, employment and value added creation.

To maintain and to build upon this, we have been giving our infrastructure a hefty upgrade during this legislative period and are investing at a record level. To roll out the infrastructure of the future, we are making four billion euros available for high-speed broadband. With our federal programme we are taking turbo internet to the regions and ensuring that everyone benefits from the digital revolution.

The Bundesnetzagentur is an important partner in this goal and indispensable in organising, coordinating and implementing our infrastructure upgrade. The Bundesnetzagentur is therefore gaining in importance through globalisation and the digital transformation. In this respect there are three main aspects:

1. We're strengthening rail competition!
The adoption of the new Rail Regulation Act has allowed us to strengthen rail competition. The new legislation means that the Bundesnetzagentur must approve any increase in charges for the use of the rail network and passenger stations before these charges are implemented by the operator. The Bundesnetzagentur's responsibilities in the rail sector have thus increased considerably.

2. We're making way for optical fibre!
The new law to expand the optical fibre network (the Digital Networks Act) provides that when any new residential or commercial developments are built and during any major construction work on the traffic infrastructure, optical fibre has to be laid at the same time. This means every construction site adds broadband. At the same time we are opening up existing and planned infrastructure of service operators for the digital network expansion and thus we are reducing the costs of expanding the network by billions. With the transfer of all key administrative tasks involving the Digital Networks Act to the Bundesnetzagentur, it is now more important than ever before.

3. We are taking the leap into the digital real-time era!
The next mobile radio standard, 5G, with maximum capacity and minimum latency periods is a key technology for innovations such as Industrie 4.0, automated driving and digital health applications. That is why we have started the "5G Initiative for Germany" and plan to be the first to offer the new mobile radio standard nationwide. Next year the Bundesnetzagentur will make some additional key frequencies available for this.

One thing, however, is certain: We are currently experiencing the most dynamic innovations phase in decades and this will decide whether we remain a country of growth or become a land of stagnation. I am delighted to have the Bundesnetzagentur as a partner at our side during these exciting times and I am convinced that together we will continue to secure Germany's leading position!

Your

Alexander Dobrindt
Member of the German Bundestag, Federal Minister of Transport and Digital Infrastructure

The President and Vice Presidents of the Bundesnetzagentur
Dr Wilhelm Eschweiler, Jochen Homann and Peter Franke (from left to right)

»The digital revolution is a discussion topic of the highest order for society and covers all the areas of responsibility of the Bundesnetzagentur. One of the questions we need to answer is how regulation will have to adapt to meet the needs of the digital transformation.«

The year 2016 was one of many developments and challenges for the Bundesnetzagentur in the sectors it regulates. The results for the year show a large number of equally important events in all the sectors in which we are active.

The digital revolution is a discussion topic of the highest order for society and covers all the areas of responsibility of the Bundesnetzagentur. Therefore a key question is the extent to which the regulated network infrastructure and regulation itself are affected by the digital transformation. Last year we examined this issue intensively and to this end hosted a high-level conference in Berlin in November, where we discussed how regulation will have to adapt to the digital change with the regulated network industries, the scientific community and political representatives.

Consumers should also enjoy the best possible benefits of competition in the future. With respect to regulatory proceedings in telecommunications, the intensity of the debates increased even more in 2016. However, it was possible to complete the regular review of the regulatory order for access to the local loop, which also contains rules on vectoring in proximity areas. During the procedure, the possibilities and limits of access regulation were questioned by the market and policymakers in a manner that has never been seen before. This topic will continue to occupy us to a great degree in the foreseeable future.

In the European Union we were able to play a key role in developments in the telecommunications sector, both in net neutrality and roaming as well as in the preparatory work for a review of telecommunications, due in no small part to our presidency of the Body of European Regulators for Electronic Communications. In the field of energy we also have our finger on the European pulse with a deputy chair on the Board of Regulators of the Agency for the Cooperation of Energy Regulators (ACER).

Consumer-friendly competition is only possible in transparent markets. The Telecommunications Transparency Ordinance of the Bundesnetzagentur helps customers see at a glance the conditions that their broadband contracts provide for. The Bundesnetzagentur's commitment to consumer advice for telecommunications, post and energy, to pursuing number misuse and unsolicited marketing calls, to data protection, market surveillance and standardisation bodies is simply a reflection of the fact that consumers and the protection of their rights lie at the heart of our activities.

As our representatives nationwide, our regional offices throughout the whole of Germany are for the most part a mainstay of our successful work and an advertisement for the Bundesnetzagentur, which I was very pleased to discover for myself last summer when I visited several of our locations in Germany.

»As our representatives nationwide our regional offices throughout the whole of Germany are a mainstay of our successful work.«

The energy sector was marked in 2016 by fundamental political discussion and decisions that had a direct impact on the Bundesnetzagentur's work and in which we were able to play an advisory role with respect to policies. The amendment to the Renewable Energy Sources Act (EEG 2017), for example, was discussed at length. The Renewable Energy Sources Act, however, is only one example of a revision; the Bundesnetzagentur had to implement new and amended legislation in other areas, including the Electricity Market Act, the new Incentive Regulation Ordinance and the Metering Operations Act ("digital technology in the energy transition"). One of the important decisions we have taken is on the future rate of return on equity for electricity and gas networks. Despite a difficult weighing of interests, we were able to prevail with our objective arguments and thus, based on the market environment, interest rates will be reduced in favour of the consumer yet at the same time investment in infrastructure will remain attractive.

The electricity grid expansion was marked in the year 2016 by a change in planning premises whereby priority is now legally given to underground cable technology. We have drawn up relevant position papers with public participation and have had lengthy discussions with the developers. In addition to the proceedings currently taking place, we are expecting applications this spring for more major projects for lines running north to south, and are planning a number of local scoping conferences.

The postal market is undergoing considerable change at present. Although the growth in digital technology primarily offers space for innovation and new concepts, it also puts traditional business models under pressure. We have been closely following the developments in the market and have pressed ahead with public discussion. Not least we have prevailed in stopping the dominant company on the market from offering anti-competitive products.

In the rail sector a new and wide-ranging basis for our work was created in 2016 with the Rail Regulation Act. We have now set up a ruling chamber for rail with extensive powers, which is conducting a number of proceedings on access and price regulation. At the beginning of 2017, for example, track access charges were approved on an ex ante basis for the first time. This includes cost examinations, incentive systems and a complex examination of charges according to the viability of individual traffic segments. Rail competition is a key concern for the Bundesnetzagentur.

We can only manage the many tasks and associated responsibility with the aid of an efficient organisational structure employing highly qualified staff – to which this report bears witness. And that is why I am delighted that once again this year we have been able to welcome a necessary number of new colleagues to the Bundesnetzagentur to work with us for the benefit of the consumer.

Jochen Homann
President of the Bundesnetzagentur

»One of the important decisions we have taken is on the future rate of return on equity for electricity and gas networks. The interest rates have been reduced in favour of the consumer.«

ENERGY

Energy transition is changing the power generation landscape

The decline in conventional energy generation, the feed-in of energy from renewable sources and the expansion of the electricity grid pose great challenges for the energy market. In light of these challenges, the Bundesnetzagentur is monitoring developments in competition, carrying out auctions for renewable installations and approving new power lines.

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At the end of September, network operators presented initial proposed routes for the SuedLink and SuedOst-Link direct current transmission line projects. The plans take into account legal changes that give priority to underground cable technology. The power lines are necessary to transport electricity generated from renewable sources in the Northern and Eastern regions of Germany to the consumption centres of Southern Germany in Bavaria and Baden-Württemberg. Moreover, these lines are important in light of the high costs associated with maintaining stability in the electricity grid. Last year alone, around one billion euros was spent to cover these costs, which will continue to rise in the future. Only after grid expansion is complete is it expected that costs for network and system security measures will go down.

The Bundesnetzagentur has reduced the future rate of return on equity for electricity and gas grid operators. Network operators and external investors achieve a return on equity when they invest in network infrastructure. The interest rate reduction reflects the low interest rates that have been observed in the capital markets for a long time. This development has been taken into account by the Bundesnetzagentur with the interests of consumers in mind. The future interest rate for new facilities will be set to 6.91%, at present the applicable rate is 9.05%. The future interest rate for old facilities set by the Bundesnetzagentur is 5.12% – currently, the applicable interest rate is 7.14%. The lower rates will apply from 2018 for gas network operators and from 2019 for grid operators.

Market watch

Consumers once again had better options when choosing an electricity supplier. In 2015, households could choose between an average of 115 suppliers in each network area. The trend towards greater choice of suppliers also strengthened in the gas market. In 2015, consumers had more than 50 gas suppliers to choose from in nearly 83% of the network areas. Consumers in over 31% of the network areas had a choice of more than 100 suppliers.

Conventional and renewable energy generation

Electricity generation has been marked by a decrease in generation from conventional sources accompanied by an increase in renewable electricity generation.

In total, net electricity generation in Germany increased by 11.1 TWh to 594.7 TWh in 2015. Despite this increase, as in the previous years, electricity generation from conventional sources is continuing to lose ground to electricity from renewable energy sources. Electricity generation from conventional power plants decreased by 15 TWh or 3.5% on the previous year. Nuclear and hard coal power plants recorded the largest decreases in electricity generation. The closure of Grafenrheinfeld nuclear power station alone led to a reduction in nuclear electricity generation of 6.7 TWh or 7.3%. In 2015, generation from hard coal was down 5.5 TWh or 4.9% compared to 2014 and generation from brown coal was 2 TWh or 1.4% lower.

Generation from renewable energy sources accounted for 31.4% of gross electricity consumption in 2015. The volume of electricity produced from renewable energy sources increased by 26.0 TWh from 155.1 TWh in 2014 to 181.1 TWh in 2015. This represents a year-on-year increase of over 16%. The largest increase in absolute terms was now in electricity generated from wind, with total generation at 79.1 TWh. Compared to 2014, onshore and offshore wind generation increased by 15 TWh and 6.7 TWh respectively. The volume of electricity generated by solar power was 35.2 TWh, a year-on-year increase of 2.2 TWh.

Some conventional power plant projects were implemented in 2015 which, despite the decommissioning of other conventional power plants, resulted in an increase in conventional generating capacity of 0.6 GW. However, existing overcapacity at conventional power plants will continue to be reduced in the future. Growth in capacity from renewables was once again strong, amounting to 7.6 GW. Onshore and offshore wind recorded the highest increases in generation capacity of 3.6 GW and 2.4 GW, respectively.

Total (net) installed generation capacity thus increased to 204.6 GW by the end of December 2015, of which 106.7 GW was non-renewable and 97.9 GW renewable energy capacity.

Household customers: supplier switches and prices

Household customers and electricity supply

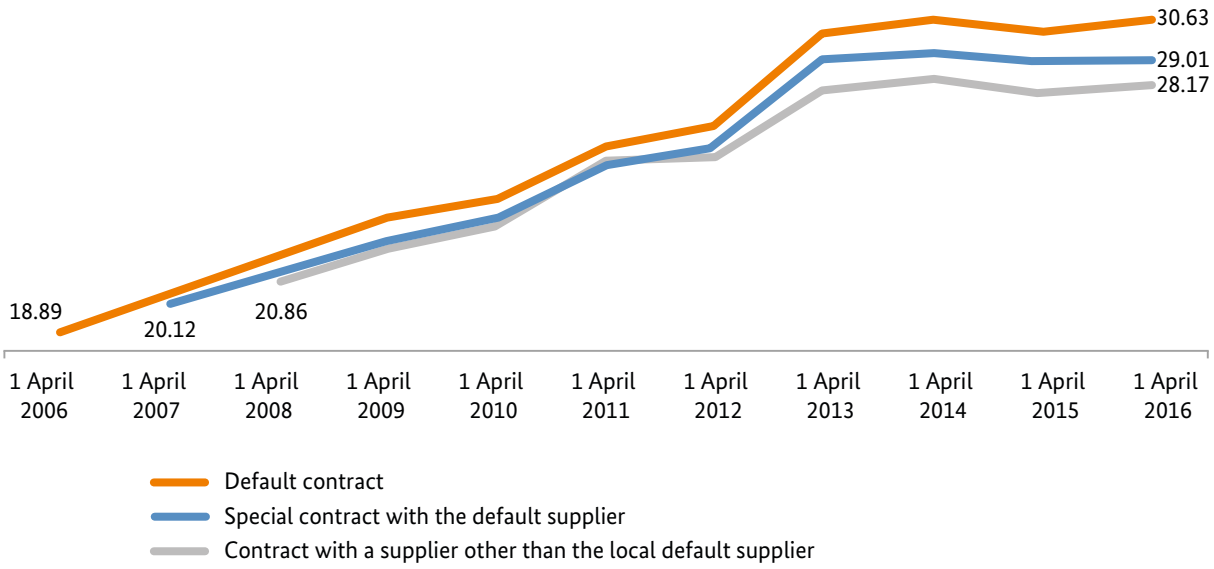
There was a further increase in the number of electricity suppliers available to retail customers. In 2015, final customers could choose between an average of 115 suppliers in each network area.

The number of household customers switching supplier has increased significantly since 2006. Some 43.1% of household customers signed a non-default contract with the local default supplier in 2015. The percentage of household customers under a default contract was 32.1%, representing another decrease compared to the previous year. Some 24.9% of all household customers are now under a contract with a supplier other than the local default supplier. There was a corresponding increase again in the percentage of customers who no longer have a contract with their default supplier. Though default suppliers continued to have an overall strong position in their service areas, it weakened once again in 2015.

Prices increased slightly for household customers across all three contract categories in 2016. The following figure shows how the household customer prices changed over time.

The average price in the consumption band 2,500 kWh – 5,000 kWh increased compared to 2015 by 0.69 ct/kWh and, as of 1 April 2016, is 29.80 ct/kWh.

Changes in household customer prices per contract category in the consumption band 2,500 kWh - 5,000 kWh per year (for previous years: consumption: 3,500 kWh/a)
in ct/kWh



Household customers and gas supply

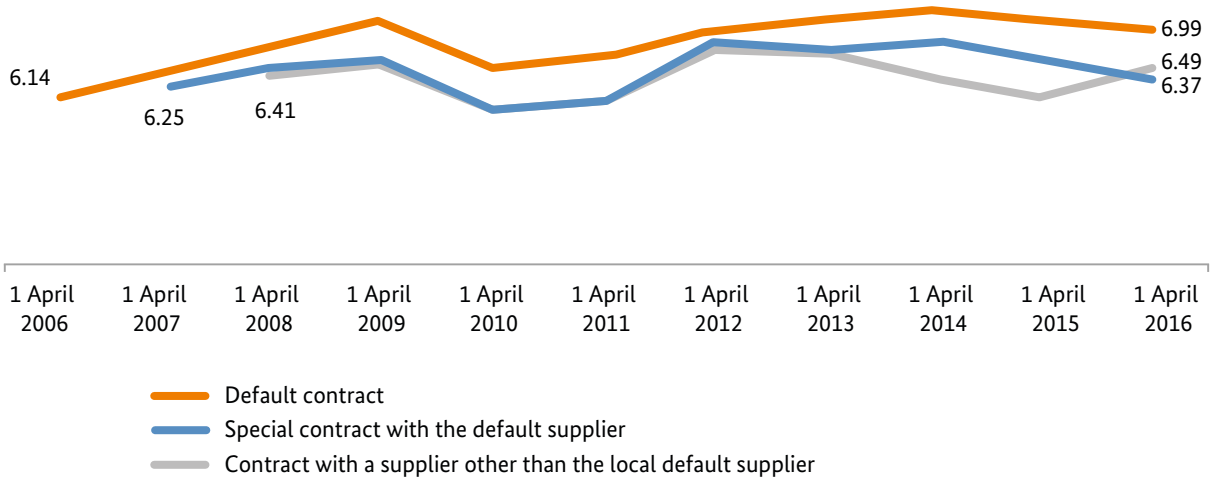
Since market liberalisation and the creation of a legal basis for a well-functioning supplier switch, there has been a steady rise in the number of active gas suppliers for all final consumers in the different network areas. In 2015, there was a choice of more than 50 gas suppliers in nearly 83% of the network areas. In fact, final consumers in over 31% of the network areas had a choice of more than 100 suppliers. On average, final consumers in Germany can choose between 90 suppliers in their network area; for household customers specifically this average comes out to 75 suppliers (these figures do not take account of company affiliations).

The majority of household customers were supplied by the local default supplier under a special contract. Just under one quarter of household customers were supplied under a default contract. The percentage of household customers who have a contract with a supplier other than the local default supplier once again increased and now stands at 22.4%.

The number of customers switching supplier rose again in 2015. More than 1.1m household customers switched gas supplier in 2015. In addition, almost half a million household customers have changed the gas tariff of their contract with their supplier.

The noticeable downwards trend in gas retail prices continued. The average price for household customers across all three contract categories decreased by about 2.1% and, as of 1 April 2016, was 6.54 ct/kWh. For an average level of consumption, default tariffs are about 0.6 ct/kWh more expensive than special contracts with the default supplier and about 0.5 ct/kWh more expensive than contracts with a supplier other than the local default supplier.

Household customer gas prices – consumption band II according to gas supplier survey
in ct/kWh



Expert opinion and market dialogue on the further development of German gas market areas

On 18 May 2016, the Bundesnetzagentur published an expert opinion concerning potential for further national or cross-border market integration and its implications for the German gas market. The expert opinion lists measures for the further improvement of German market areas NCG and GASPOOL. With improvements to competition and liquidity in the German wholesale markets in mind, the report presents potential internal market area measures as well as potential measures that cross market areas in the form of integration with neighbouring markets.

The report examined the two market areas according to the criteria of the gas market target model of the Agency for the Cooperation of Energy Regulatory Authorities (ACER) with regard to the state of competition. According to the report's conclusions, the requirements for a functioning wholesale market have already largely been met for short-term trading. Conversely, the expert opinion states that changes are still needed for mid and long-term trading. Concrete proposals are therefore being made for internal market measures that would contribute to increasing market liquidity. In the step that followed, a first assessment was made to estimate the potential for any possible forms of integration with neighbouring markets. In particular, gains through integration with the Dutch TTF trading hub are seen as an opportunity. In order to avoid any potential for discrimination among German market participants, both existing market areas must be included in any potential integration project.

On 20 September 2016 the Bundesnetzagentur launched a dialogue with the market in order to discuss the advantages and disadvantages of possible actions. Additionally, the Bundesnetzagentur organised a public workshop in which market dialogue issues were discussed. The deadline for submitting written statements was 18 November 2016. These statements have been published and will be analysed by the Bundesnetzagentur.

Market area conversion from L-gas to H-gas

After Stadtwerke Schneverdingen-Neuenkirchen in Lower Saxony successfully converted their L-gas supply area to H-gas in October 2015, conversion went ahead in the network area of Stadtwerke Böhmetal in the municipality of Walsrode. In the process, about 12,000 gas appliances were converted for operation with H-gas. In addition, the registration of gas appliances in Bremen began in mid-2016. All appliances must subsequently undergo technical adjustments. This generally requires an appliance's nozzles to be replaced. Rarely is it the case that a new appliance must be purchased.

The Bundesnetzagentur conducted a market area conversion forum for the first time in 2016. This forum is to serve as a platform for an exchange of information and experience among all market participants. It has been seen that proper communication between network operators, manufacturers of appliances, service providers for technical adjustments and authorities is crucial throughout the project to ensure market conversion goes smoothly. Another topic was the revision of section 19a EnWG, which regulates the regulatory modalities of the market area conversion. This is where the groundwork was laid for a future levy to pass on the costs of the market area conversion. The nationwide levy for 2017 amounts to €0.1339 per kWh/h consumed in that year. Furthermore, access rights for the network operators were legally defined for all stages of the conversion (registration of appliances, technical adjustments and quality control, where required). Additional information can be found at *www.bundesnetzagentur.de/marktraumumstellung*

Security of supply

Even though grid expansion is making progress, it still cannot keep up with changes in the power generation landscape. The number of measures implemented to maintain the reliable and secure supply of power has consequently increased in recent years.

Network and system security – interventions and costs

Development of redispatching and feed-in management measures

Changes in the power generation landscape are placing high demands on networks. On top of this, with the now large number of renewable energy installations, occurrences of stormy or enduring sunny weather lead to high feed-in peaks from wind power and photovoltaic installations. Planned grid expansion takes account of these developments. However, it still cannot keep up with changes in the power generation landscape. The scope of the measures introduced to maintain the security and reliability of the electricity supply system has increased considerably in recent years. A main distinction can be made between redispatching and feed-in management measures. Redispatching is used to intervene in the market-based operating schedule of generating units to geographically move power plant feed-in and to relieve overloaded network elements. Feed-in management involves temporarily scaling back feed-in from renewable energy and combined heat and power (CHP) plants if available network capacity is insufficient.

In 2015, the total volume of redispatching measures more than tripled compared to the previous year and amounted to 16,000 GWh. According to an estimate presented by the TSOs, the costs relating to these measures amounted to €411.9m. The sum of curtailed energy resulting from feed-in management in 2015 was approx 4,722 GWh, almost triple the figure for the previous year. Compensation payments in 2015 amounted to around €315m. Claims for compensation for 2015 are estimated at €478m. Information gathered from data reporting that documents these measures has been published quarterly since 2015 and is available at *www.bundesnetzagentur.de/systemstudie*.

Data for 2015

Measures in 2015 (GWh)	1st quarter	2nd quarter	3rd quarter	4th quarter	in total
Redispatching	3,422	1,831	3,336	7,411	**16,000**
Feed-in management	1,135	737	815	2,036	**4,722**

Reserve capacity guarantees stability

Powerful wind power stations in the north provide a lot of electricity, but grid expansion to the south has not yet made enough progress. TSOs need reserve capacity to securely operate transmission networks facing possible overloads. The Bundesnetzagentur identifies the volume of reserve capacity actually required.

The energy transition is mainly supported by the construction of a large number of powerful wind turbines in the northern part of Germany. However, demand for electricity in southern Germany and neighbouring southern countries is significantly higher than it is in the north. Since the sum of electricity feed-in must remain at a constant level to ensure the stability of the system as a whole, it is often necessary to restore the physical balance; this cannot be achieved through the electricity market alone.

That is why power plant "reserve capacity" must be kept available. This reserve capacity is provided by power plants in Germany that are actually identified for decommissioning, but are kept active because they are necessary for the secure operation of the transmission network and are therefore systemically relevant. Reserve capacity is supplemented by power plants from neighbouring southern countries. Using and keeping reserve capacity available incurs considerable costs.

This why the Bundesnetzagentur oversees the process of identifying reserve capacity requirements. The cost of reserve capacity is expected to reach €219m in 2015.

Reserve capacity, systemically relevant power plants and interest notification procedures

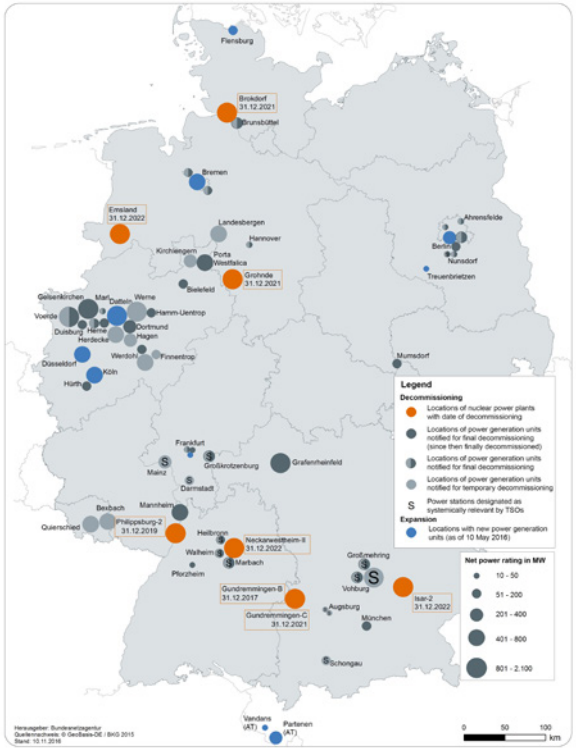
If power plant capacity available on the market is insufficient to remove network congestion, TSOs have to draw on the reserve capacity to provide for the required redispatching capacity. For this purpose, every year the TSOs determine reserve capacity requirements for specific periods of time, taking into account the extreme critical situations for network operation that have been previously defined in conjunction with the Bundesnetzagentur. These involve specific weather and consumption situations, such as full load and strong wind scenarios, which place particularly high demands on the secure operation of the network. The Bundesnetzagentur examines the relevant input parameters with regard to load, generation, trade and networks for Germany and its neighbouring countries and releases this information, after making any necessary adjustments, for the TSOs to make further calculations. Once the demand requirements have been identified, the results are checked by the Bundesnetzagentur and are defined as binding.

The Bundesnetzagentur's report on identifying the reserve power plant capacity requirements for the 2016/2017 winter and the 2018/2019 year was published on 29 April 2016. For the 2016/2017 winter, the reserve capacity requirements calculated by the Bundesnetzagentur amounted to 5,400 MW. The reserve capacity requirements for 2018/2019 amount to 1,900 MW, assuming that congestion management will be introduced at the German-Austrian border.

Reserve capacity comprises reserve power plants located in Germany and its neighbours that are deployed as needed by the TSOs to increase input capacity in order to ensure system reliability. German reserve power plants used for reserve capacity are power plants intended for closure that may not be shut-down because they are systemically relevant for the grid. The increase in input capacity from these power plants removes congestion in the extra-high voltage lines when wind power feed-in from northern and eastern Germany is high.

Of the power generation units notified for final decommissioning by 23 November 2016, so far 16 power generation units with a total capacity of 2,911 MW have been designated as systemically relevant by the TSOs and approved as such by the Bundesnetzagentur. These power plants will play an integral role in the provision of reserve capacity as of the date of the intended final decommissioning. Moreover, seven power plants that have total output of 1,870 MW, whose operators have submitted a provisional closure notification, have been designated as systemically relevant by the TSOs. These power plants will also play an integral part in providing reserve capacity as of the date of the notified provisional closure and will be available to the TSOs exclusively to ensure the system is operated securely.

Locations with completed and planned expansion and decommissioning of power generation units



The power plants outside of Germany, used to provide reserve capacity, are identified by means of interest notification procedures. At first, the capacity requirements identified or the range of the reserve capacity required for each period are examined, taking account of the already existing potential of German power plants in reserve capacity and the location of the power plants outside of Germany. The more relief from congestion that can be provided by the power plants put forward for the process, the less total power has to be contracted within the demand spread identified.

A reserve capacity procedure could be forgone for the 2016/2017 winter because the reserve capacity requirement for the 2016/2017 winter has already been met and a higher capacity requirement was not identified following repeated verification in April 2016. Assuming that congestion management measures will be established at the German-Austrian border in the course of 2018, reserve capacity required will decrease to the point that foreign reserves will not be used at all. An interest notification procedure for this period was therefore also unnecessary.

Reserve capacity is most often used in winter months when high feed-in from wind combines with a high consumption load. Reserve capacity has been increasingly called upon since the beginning of November 2015. The reason for this is the efficiency factor applied to the TSOs' weekly operations plan that gives priority to power plants that are better at correcting any shortages. This can result in foreign power plants, especially those located in Austria, being deployed before domestic power plants.

From 2011 to 2015, the total cost incurred by reserve capacity amounted to around €384m and included costs for both providing and calling upon reserve power in Germany and its neighbours. Of this total, the provisional costs for reserve capacity in 2015 alone amount to some €219m. This figure is provisional as the final calculation of the costs for the actual use of reserve capacity for 2015 has not yet been concluded. The costs for 2016 were not yet available at the time of print but can be found at *www.bundesnetzagentur.de/netzreserve* once they have been determined.

Costs incurred for measures to ensure security of supply
When power plant capacity is designated as systemically relevant, the operator of the power plant is entitled to compensation from the TSO. Compensation is determined according to the Reserve Capacity Ordinance (NetzResV). The costs for compensation payments are recovered through network charges. This requires the conclusion of a voluntary commitment.

The costs are then approved by the Bundesnetzagentur as procedure-regulated and are transferred to the TSOs' revenue cap as permanently non-controllable costs.

The following power plants were included in the reserve capacity in 2016:

Power plant generation unit	Closure	Power plant operator / TSO
Irsching 4	Temporary	Uniper Kraftwerke GmbH / TenneT TSO GmbH
Irsching 5	Temporary	GKI GmbH / TenneT TSO GmbH
GTKW Darmstadt	Temporary	Entega AG / Amprion GmbH
Power plant 2 in Mainz (steam section)	Temporary	Kraftwerke Mainz-Wiesbaden AG / Amprion GmbH
GTKW Thyrow	Permanent	Vattenfall Europe Generation AG / 50Hertz Transmission GmbH

If demand for power plant capacity cannot be covered by prohibiting closures in Germany, capacity is then contracted from abroad. These costs for measures to stabilise the network are also recovered through the TSOs' network charges.

Following the introduction of the Electricity Market Act, section 13g of the Energy Act (EnWG) has provided for the decommissioning of selected lignite-fired power plants to achieve German climate change goals. The closure of a plant is coupled with compensation payments to the power plant operator, as approved by the Bundesnetzagentur. Costs are passed down as permanently non-controllable costs.

The Buschhaus lignite-fired power plant has been temporarily closed since 1 October 2016 with compensation paid for four years from the moment of its temporary closure. Once this period of four years has passed, the power plant must be closed permanently. These costs are distributed horizontally across the TSOs on a nationwide level and are incorporated into their revenue cap as permanently non-controllable costs.

Congestion management measures for the German-Austrian border
In the reports assessing demand for reserve capacity for 2015 and 2016, the Bundesnetzagentur recommended the introduction of cross-border capacity management at the border between Germany and Austria and thus followed the recommendation issued by the Agency for the Cooperation of Energy Regulators.

On 28 October 2016, the Bundesnetzagentur requested the four German TSOs to make preparations to implement transport capacity congestion management at the German-Austrian border. The goal is to be able to ensure functional market coupling between Germany and Austria from 3 July 2018.

It is necessary from the point of view of the Bundesnetzagentur to implement congestion management at the German-Austrian border by the summer of 2018 because transmission networks in Germany, Austria, Poland and Czechia are, at present, not technically capable of fully transporting traded electricity and still would not have the technical capacity to do so in the long-term even after network expansion.

At present, TSOs have to carry out cost-intensive redispatching measures to maintain system security.

The capping of electricity trade between two countries based on available network capacity is in line with the requirements set out in European law. In fact, this cap is necessary, as current trade volumes between Germany and Austria lead to threats to system security in several countries and prevent other countries from participating in cross-border electricity trade.

The Bundesnetzagentur assumes that the introduction of congestion management between Germany and Austria will be confirmed by ongoing European procedures for the examination of bidding zones and the assignment of capacity calculation regions. If these procedures show that congestion management does not have a positive impact, the TSOs would then discontinue their preparations.

Further network expansion in Germany and Austria does not obviate the need to introduce congestion management measures, either. Both countries assume in their network development plans that exchange capacity will not be sufficient in the long term to safely transport peaks in trade from Germany to Austria.

In this context, the Bundesnetzagentur is holding talks with the regulators, market players and network operators directly affected. These talks aim to integrate the German-Austrian border into a large-scale flow-based market coupling system in central Europe.

Identification and verification of the need for installations that ensure network stability
The Electricity Market Act obliges TSOs to analyse whether, as an additional measure for the security of supply, new power plants of a maximum capacity of 2 GW are required to be built as special grid equipment. The task of the Bundesnetzagentur is to review and, if appropriate, confirm these analyses. This is why the Bundesnetzagentur expanded the inspection procedures established as part of the procedure to identify reserve power plant capacity demand. This makes it possible to take account of the increased uncertainty for longer planning horizons.

In 2016, the Bundesnetzagentur critically monitored the TSOs' processes and analyses. In this respect, the first step taken was a "long-term analysis" to provide information on the redispatching capacity required between 2021 and 2023. On the basis of the results submitted by the TSOs on 30 November 2016, further studies were launched to identify any potential need for new facilities.

The allocation of facilities that may have to be built is subject to review by the European Commission.

IT security requirements catalogue

Electricity and gas network operators are obliged to implement the Bundesnetzagentur's catalogue of IT security requirements by 31 January 2018. These requirements include, in particular, the introduction of an information security management system (ISMS) to protect those telecommunications and electronic data processing systems that are vital for secure network operation. The successful implementation of the catalogue of IT security requirements must be proven by presenting a certificate that can only be issued by a certification body with accreditation from the national accreditation body for the Federal Republic of Germany (DAkkS). This certification procedure for the catalogue of IT security requirements is a new procedure in the certification industry. This is why the Bundesnetzagentur developed a "conformity assessment programme" together with DAkkS in early 2016 that sets out the prerequisites to issue accreditation as a certification body for the catalogue of IT security requirements. The first accreditations were issued at the end of 2016, making it possible for approx 1,600 electricity and gas network operators to submit applications for certification.

Risk assessment was updated for the German natural gas market

In 2016, the Bundesnetzagentur updated the risk assessment report for the security of gas supply.

To ensure the secure and reliable supply of gas in Germany, it is critical that existing gas transport infrastructure connects the German market to a

relatively large number of sources of gas imports. In addition to "classic" pipeline gas that is mainly imported from Norway, Russia and the Netherlands, liquefied natural gas (LNG) arriving by ship in Belgium, the Netherlands and France is increasingly becoming available to the German market in the medium term.

It is also equally important that transport infrastructure in Germany is designed in a way that keeps multiple supply routes available, linking sources of imports to the German market. In this context, the Baltic Sea "Nord Stream" pipeline that provides a direct link between Russia and Germany can be used as an example.

It is considerably beneficial for security of supply that there are 40 underground storage facilities in Germany. With a working gas volume of around 25.7bn cubic metres, Germany has by far the highest storage capacity in the EU.

The network expansion measures of the TSOs boost security of supply in Germany and also lead to an increase in transport capacity at cross-border transfer points. Ongoing gas network expansion minimises risks to supply in the event that repeatedly unfavourable weather conditions occur along with unpredictable fluctuations of gas imports. The gas NDP, which has been developed jointly by TSOs every year since 2012 and every two years since 2016, ensures that network expansion is carried out in a coordinated approach.

Germany fulfils the infrastructure and supply standards prescribed by European law. As part of risk assessment, supply disruption scenarios are defined in which certain gas infrastructure installations are assumed to experience failure, in whole or in part, over a certain period of time. Even in these scenarios, the reliable and secure supply of gas is not under threat in Germany.

Network planning and expansion

The Bundesnetzagentur regularly assesses changes in electricity generation and gas production as well as developments in electricity and gas demand and confirms where exactly networks need to be reinforced and expanded. In the subsequent federal sectoral planning process the route corridors of specific power lines are defined. Federal sectoral planning has already begun for the hybrid line "Ultranet" that runs from Osterath to Philippsburg.

Expansion of the transmission network – identification of demand

The main goals of the energy transition remain the same even with the 2016 amendment of the Renewable Energy Sources Act. The share of renewable energies in Germany's electricity supply is to increase to 40 – 45% by 2025, to 55 – 60% by 2035 and to at least 80% by 2050. A total of 15 gigawatts of generating capacity is to be installed in the North and Baltic Seas by 2030.

In order to achieve the above-mentioned goals, more renewable energy installations need to be built for electricity generation at locations that offer favourable conditions. Consequently, the expansion of electricity transmission networks plays a central role, as the changing structure of electricity generation leads to a pronounced geographic separation between production and consumption.

The existing extra high voltage network was not designed to handle these transport requirements and is already reaching its limits (cf chapter on security of supply). Since 2011, the Bundesnetzagentur has been responsible for the routine process of identifying demand (which the "network development plan" or NDP sets out) as well as the subsequent administrative procedures for the implementation of grid expansion measures at the extra high voltage level that cross federal state and international borders.

In 2012, a new scheme for the expansion of transmission links to offshore wind farms was introduced and the offshore network development plan (ONDP) was created. The ONDP sets the required number of grid connection lines and determines the order of their implementation, ensuring that the line capacity required for the development of offshore wind energy will be available. These grid connection lines and their feed-in capacity are to be taken account of in the onshore NDP.

In a first step to establish requirements, the transmission system operators (TSOs) predict changes in electricity consumption and generation in the future by outlining a number of possible scenarios. The findings are put together in what is known as a "scenario framework", which the TSOs forward to the Bundesnetzagentur. The latter then verifies the findings, makes them available for public consultation and approves them.

The network development plan (NDP) is drawn up on the basis of the framework scenario. The NDP contains

all the measures necessary to ensure secure and reliable network operation in light of the expected changes. It also adheres to the "NOVA" principle according to which network optimisation potential must first of all be exhausted before grid reinforcement (Verstärkung) and only after that can grid expansion (Ausbau) be considered.

The TSOs first develop a draft NDP and then publicly consult it. They subsequently revise the draft and then submit it to the Bundesnetzagentur for review. The Bundesnetzagentur publishes its provisional due diligence findings and consults with public authorities and the general public. After evaluating the comments received and final checks, the Bundesnetzagentur confirms the NDP as required.

The NDP only lists the points of origin and destination of network measures between which the power has to be transported. Specific power line routes will first take shape during the subsequent planning approval procedure.

The exceptional case of the NDP 2025

On 29 February 2016, the TSOs submitted the revised draft of the NDP 2025 to the Bundesnetzagentur, which then began the examination of the measures proposed. The amendment of the Renewable Energy Sources Act (EEG2017), adopted by the German Bundestag on 8 July 2016, provided for changes to several framework conditions and, consequently, abandoned the implementation of the NDP 2025. The procedure was already in an advanced phase and it would not have been possible to adequately incorporate the changes set out in the EEG 2017 without causing delays. Among other things, the EEG 2017 brought changes in the development paths and the spatial distribution of renewable energy installations, particularly in the case of onshore wind energy and electricity generation from biomass.

2025 Offshore NDP

On 29 February 2016, the TSOs published the revised ONDP 2025 draft. Provisional due diligence findings were published by the Bundesnetzagentur on 14 June 2016 and were consulted with the public up to 9 August 2016. A total of 156 submissions were received in response to the consultation and were taken into account in the Bundesnetzagentur's final assessment. The issues referred to in all the responses were recorded and evaluated, and the arguments put forward were also taken into account in the decision making.

The Bundesnetzagentur confirmed the ONDP 2025 on 25 November 2016. The confirmed ONDP includes four grid transmission links in the North Sea and three in the Baltic Sea. The transmission links serve to take advantage of neighbouring sites with offshore wind farms ("clusters"), which were defined in the offshore federal sectoral plan by the Federal Maritime and Hydrographic Agency (BSH). The ONDP also specifies the order of the individual links, the date of their contracting and planned completion. NOR-3-3, NOR-1-1, NOR-7-1 and NOR-5-2 (in the North Sea) and OST-2-1, OST-2-2 and OST-2-3 (in the Baltic Sea) are the projects involved.

The ONDP 2025 also implements the provisions of the new Offshore Wind Energy Act for the 2021–2025 deployment corridor and includes transmission links for existing wind farm projects that will participate in the competitive auctions between 2021 and 2025. With the introduction of competitive auctions, a system has essentially been put into place that has the state implement a planning procedure and preliminary examination of areas as well as a competitive bidding procedure for those pre-examined areas (a "target model"). Since, however, some wind farm operators have already invested in offshore projects, in particular to have them pass approval procedures, the law allows competitive auctions in the years 2021 to 2025 for projects that are in an advance planning stage (through a "transitional system").

2017–2030 Scenario Framework

In the process of approving the scenario framework 2017–2030, the Bundesnetzagentur proactively took account of the amendments to the EEG on the basis of the relevant drafts. In the second half of 2016, TSOs developed a first draft of the NDP 2017-2030 and ONDP 2017-2030 on the basis of the updated framework conditions. After its review and submission for consultation by the Bundesnetzagentur, the NDP 2017-2030 is expected to be confirmed towards the end of 2017.

In contrast to previous years, the law sets out that the scenario framework is no longer to use "rigid" assessment periods of 10 years (or 20 years in the long-term scenario), but flexible periods from 10 to 15 or, for the long-term scenarios, 15 to 20 years. This makes it possible for the scenario framework to be synchronised with the European energy policy planning periods of the "Scenario Development Report" and the European Ten-Year Network Development Plan.

The scenario framework 2017-2030 describes probable changes in electricity generation capacity and power consumption in the target years between 2030 and 2035. It includes a conservative scenario, a transformation scenario and an innovation scenario. The individual scenarios differ in how much and how quickly the energy landscape would change.

In the conservative scenario A 2030, a large part of the energy supply is generated by conventional power plants. Expansion of renewable energy happens rather slowly and the coupling of the electricity, heat generation and transport sectors is weak. Conversely, in the C 2030 innovation scenario, a faster expansion of renewable capacity and stronger sector coupling is expected. The transformation scenario B 2030 represents a balance between these two scenarios. Additionally, the target year 2035 will be examined in a long-term scenario.

The requirements set out in the EEG amendment were included in all scenarios. The competitive bidding model for renewable energy sources and the amended growth rates for the individual energy sources were taken into account as well as the energy policy targets for energy efficiency and the emission of greenhouse gases. Moreover, for the first time, demands on the electricity grid were explicitly considered and identified that could result from the coupling of the heat, transport and electricity sectors. In the C 2030 innovation scenario, for instance, the rise in net electricity consumption caused by sector coupling is projected to be around 8.5% higher than the 2016 level.

The TSOs presented their draft of the scenario framework 2030 on 10 January 2016. The public then had the opportunity to submit written statements for five weeks and participate in workshops (on 2 February in Würzburg and 11 February in Berlin). In total, more than 1,000 participants gave their opinions during the consultation. After examining the arguments put forward, the Bundesnetzagentur approved the scenario framework on 30 June 2016.

Grid expansion area

Following the EEG amendment of 13 October 2016, the Bundesnetzagentur was assigned the task of issuing a Grid Expansion Area Ordinance. The purpose of this ordinance is to improve the integration of transmission network expansion with the expansion of renewable energies. According to the legislator the level of synchronisation has to increase here. If the expansion of the transmission network does not keep pace with RES expansion, feed-in from installations generating electricity from renewable sources will have to be scaled back, since otherwise more electricity would be produced than could be transported in line with requirements. The expansion of wind energy is one of the main drivers of these costly consequences (cf section on the development of redispatching and feed-in management measures). This is why onshore wind energy is to be temporarily controlled through the designation of a grid expansion area, which will apply up to 1 January 2020 at the least. This is a useful measure in areas where curtailment of feed-in from wind power plants is likely to be particularly high to relieve strain on the transmission network. According to the EEG 2017, annually, only 58% of the average newbuild between 2013 and 2015 may be awarded funding in the grid expansion area. The grid expansion area is to be designated as a geographically connected area covering a maximum of 20% of the territory of Germany.

In accordance with the provisions of the EEG 2017, the Bundesnetzagentur has defined the federal states of Schleswig-Holstein, Mecklenburg-Western Pomerania, Hamburg, Bremen and the northern part of Lower Saxony as a network expansion area based on the latest system analysis carried out in April 2016, and also defined the nominal ceiling for wind newbuild there based on the review carried out for the period between 2013 and 2015.

In competitive auctions for onshore wind energy, the Bundesnetzagentur will limit awards in the grid expansion area by taking bids for those regions only until the limit of 902 megawatts set for the grid expansion area has been reached. An evaluation of the Grid Expansion Area Ordinance in 2019 is prescribed by law.

Gas Network Development Plan 2016–2026

On 1 April 2016, the TSOs submitted their draft gas NDP 2016–2026 to the Bundesnetzagentur. In essence, this draft confirms the measures of the gas NDP 2015. Moreover, the gas TSOs are proposing a further 39 expansion measures up to 2026, largely on the basis of the required market area conversion as a result of the decline in L-gas imports from the Netherlands over the next few years, the need to take account of increased H-gas demand, and the increased capacity requirements for planned reserve gas fired power plants. Furthermore, individual measures can be attributed to the increased capacity requirements in the distribution network, particularly in southern Germany.

The draft gas NDP 2016-2026 includes two different options that each represent a different distribution of the sources of the additional H-gas required in Germany. One of the options assumes that the expansion of the Nord Stream pipeline will be implemented. The options differ significantly in terms of network expansion measures and expansion costs. The option assuming Nord Stream expansion will not take place has an estimated investment volume of €3.9bn by 2026, while the option with Nord Stream expansion would bring about six additional measures with an additional investment volume estimated at approx €500m.

The TSO's proposed NDP selected the Nord Stream expansion option. The measures amount to an investment volume of approx €4.4bn up to 2026 and comprise new lines with a total length of 802 km and an additional compressor capacity of 526 MW.

The Bundesnetzagentur has consulted the draft of the gas NDP 2016-2026 with the industry and discussed it in a public workshop. A total of 31 responses to the consultation were submitted. The Bundesnetzagentur evaluated the responses and held hearings with all of the TSOs that proposed expansion measures in the NDP. The next step planned was the decision of the Bundesnetzagentur on the draft NDP.

In the meantime, however, the Bundesnetzagentur committed itself to altering the confirmation of the scenario framework, which forms the basis of the NDP, in complaint proceedings at the Düsseldorf Higher Regional Court. This was due to complaints that further power plant projects had to be included in the NDP. Consequently, it is necessary for the TSOs to revise the gas NDP 2016-2026. The public will then once again be given the opportunity to submit comments before the Bundesnetzagentur makes a decision on the final draft NDP.

Grid expansion

Federal sectoral planning
The points of origin and destination of the future extra-high voltage lines are set with the adoption of the Federal Requirements Plan Act. In the next step of federal sectoral planning, the up to 1,000m wide route corridors in which the new power lines will later run are defined. More concise information on federal sectoral planning can be found here:
www.netzausbau.de/5schritte/bundesfachplanung/de

Application for federal sectoral planning for project no 2 of the Federal Requirements Plan Act (BBPIG) (Ultranet)
The TSOs Amprion and TransnetBW have submitted an application for federal sectoral planning to the Bundesnetzagentur for all five sections of the Ultranet project from Osterath to Philippsburg. The Bundesnetzagentur defined the scope of assessment for four sections. Application documents have already been submitted and are currently being complemented by the project promoter for one of the sections.

The application for section A between Riedstadt in Hessen and Mannheim-Wallstadt in Baden-Württemberg was submitted on 2 December 2014. A scoping conference was held on 24 February 2015 in Weinheim and on 3 March 2015 in Bingen. The Bundesnetzagentur held two scoping conferences to consider the choice between Bürstadt and Weißenthurm for an alternative and defined the scope of further assessments. The Bundesnetzagentur published its scoping on 25 June 2015, at the same time specifying the details required in the documents to be submitted by the project promoter. The project promoter submitted the required documents on 15 June 2016. With the Bundesnetzagentur's examination completed, the documents are at present being revised by the project promoter.

The TSO TransnetBW submitted its application for federal sectoral planning for section B of the project between Mannheim-Wallstadt and Philippsburg to the Bundesnetzagentur on 29 December 2014. The Bundesnetzagentur held a scoping conference in Hockenheim that covered the proposed route corridor as well as alternatives for this section, and, on this

basis, published the scoping for this section on 3 September 2015. The project promoter was given until 31 May 2017 to submit the necessary documents to the Bundesnetzagentur.

On 9 June 2015 the TSO Amprion submitted an application for federal sectoral planning for section C of the project between Osterath and Rommerskirchen, which was adapted on 9 October 2015 taking account of updated regional plans. A scoping conference for section C was held on 11 and 12 January 2016 in Neuss. The Bundesnetzagentur is currently setting the scope of assessment based on the results of the scoping conference.

On 29 October 2015, Amprion submitted an application for federal sectoral planning for section D of the project between Weißenthurm and Riedstadt. A scoping conference was held on 23 and 24 February 2016 in Mainz on the basis of which the Bundesnetzagentur defined the scope of the assessment on 24 June 2016. The project promoter was given until 24 February 2017 to submit the required documents.

Amprion submitted an application to the Bundesnetzagentur for federal sector planning for section E from Rommerskirchen to Weißenthurm on 18 December 2015; the relevant scoping conference was held in Siegburg on 19 April 2016. The Bundesnetzagentur used the findings of the scoping conference to define the scope of assessment on 22 August 2016 and gave the applicant up to 22 June 2017 to submit the required documentation.

Application for federal sectoral planning for projects nos 3 and 4 BBPIG (SuedLink)

"SuedLink", which combines project no 3 BBPlG from Brunsbüttel to Großgartach and project no 4 BBPlG from Wilster to Grafenrheinfeld, falls under the requirement to give priority to underground cable technology, which has been applicable since late 2015. On 27 September 2016, the TSOs first published proposals for possible route corridors on their project web pages and then involved the public. The two TSOs will subsequently apply for federal sectoral planning,

TSOs publish proposals for the SuedLink and SuedOstLink corridors

At the end of September 2016, network operators presented initial proposed routes for the important direct current transmission line projects SuedLink (TenneT/TransnetBW) and SuedOstLink (50Hertz/TenneT). The plans take into account legal changes that give priority to underground cable technology.

SuedLink runs from Brunsbüttel in Schleswig-Holstein to Großgartach near Heilbronn and from Wilster near Itzehoe to Grafenrheinfeld near Schweinfurt. The route of SuedOstLink begins close to Wolmirstedt near Magdeburg and leads to Isar near Landshut.

The power lines are necessary to transport electricity generated from renewable sources in the northern and eastern regions of Germany to the consumption centres of southern Germany in Bavaria and Baden-Württemberg. Furthermore, the DC power lines contribute to integrating the German transmission network into the European network and, in the case of SuedOstLink, prevent RES electricity destined for southern Germany from flowing through Poland and the Czech Republic and placing great strain on those networks.

These main arteries are important in light of the high costs associated with maintaining stability in the electricity grid. Last year alone, around one billion euros was spent to cover these costs, which will continue to rise in the future. Only after grid expansion is complete is it expected that costs for redispatching measures amongst others will go down.

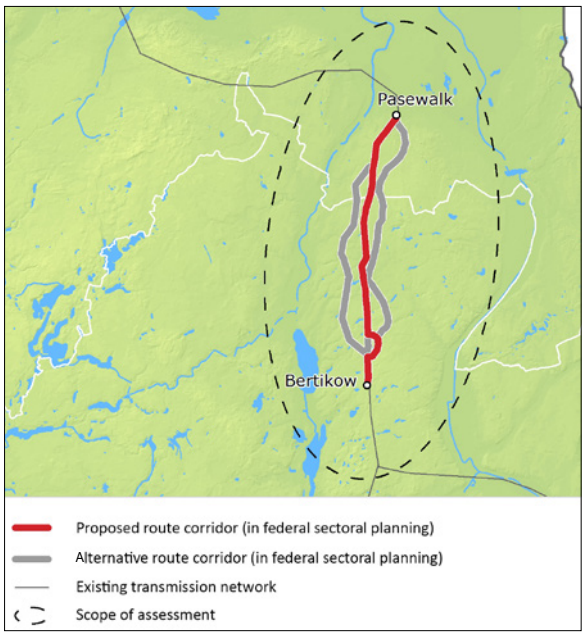
presumably in spring 2017. The formal federal sectoral planning procedure is opened with the submission of applications.

Application for federal sectoral planning for project no 5 BBPIG (SuedOstLink)

Project no 5 BBPlG from Wolmirstedt to Isar, known as "SuedOstLink", falls under the requirement that has been applicable since late 2015 to give priority to underground cable technology.

On 27 September 2016, the TSOs 50Hertz and TenneT published first proposals on possible route corridors and, at the same time, launched a public participation process. The two TSOs will subsequently apply for federal planning, presumably in spring 2017.

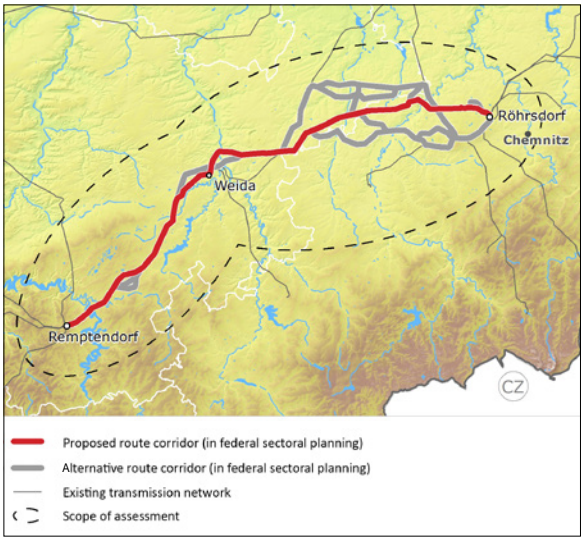
Application for federal sectoral planning for project no 11 BBPIG (Bertikow – Pasewalk)
In August 2014, the TSO 50Hertz submitted an application for federal sectoral planning for a power line from Bertikow to Pasewalk (no 11 of the BBPIG).



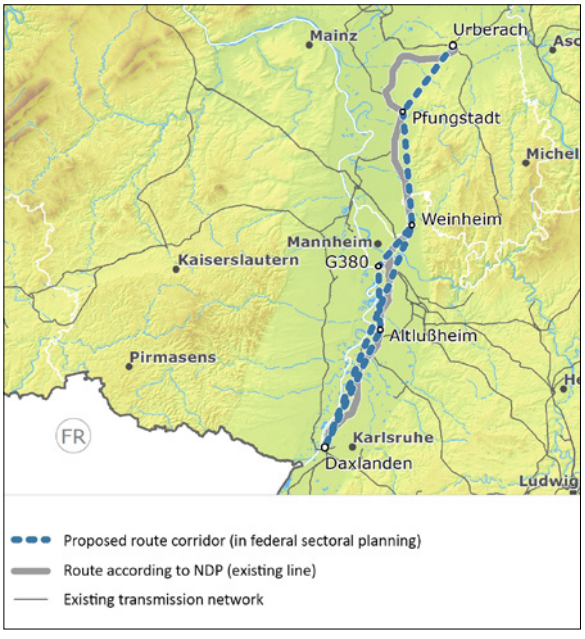
On 24 September 2014, the Bundesnetzagentur held a public scoping conference in Torgelow. On 14 November 2014 the Bundesnetzagentur established and published a scope of assessment. At the end of July 2015, 50Hertz submitted documents for the planning evaluation and the strategic environmental assessment of the route corridors. 50Hertz is currently revising its documentation.

Application for federal sectoral planning for project no 14 BBPIG (Röhrsdorf – Weida – Remptendorf)
On 26 September 2016, the TSO 50 Hertz applied for federal sectoral planning for the section between Weida and Remptendorf. After examination of the application documents, the Bundesnetzagentur has launched federal sectoral planning for this section and carried out a scoping conference on 22 November 2016. The scope of assessment was established by the Bundesnetzagentur on 19 December 2016.

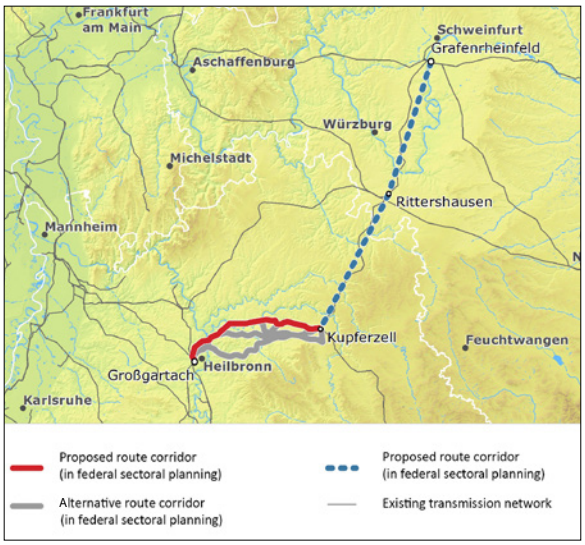
The application for federal sectoral planning for the second section from Röhrsdorf to Weida was submitted to the Bundesnetzagentur on 19 December 2016. The Bundesnetzagentur examined the application for completeness, opened the procedure and scheduled a scoping conference to take place on 21 February 2017.



Application for federal sectoral planning for the first section of project no 19 BBPlG (Urberach – Pfungstadt – Weinheim – G380 – Altlußheim – Daxlanden)
The application for federal sectoral planning for the first section of project no 19 BBPlG from Urberach to Weinheim was submitted to the Bundesnetzagentur on 8 February 2017. This application is currently being examined for completeness.



Application for federal sectoral planning for the third section of project no 20 BBPlG (Grafenrheinfeld – Kupferzell – Großgartach)
For the third section of project no 20 BBPlG from Kupferzell to Großgartach, the TSO TransnetBW submitted an application for federal sectoral planning to the Bundesnetzagentur on 23 December 2016. The Bundesnetzagentur will conduct a scoping conference in Weinsberg on 22 March 2017 on this topic.



Underground cables
With the "Underground Cabling Act", which came into force on 31 December 2015, the legislator considerably expanded the use of underground cables for extra high voltage lines.

The priority given to underground cable results in changed requirements regarding the contents of procedures and the methodological steps that must be taken into account in the TSOs' planning and in documentation.

The Bundesnetzagentur has consulted and, in April 2016, published a position paper for the application documents for direct current underground cable projects that TSOs have to prepare at the beginning of federal sectoral planning. The position paper may serve as guidance for the choice and presentation of the initial contents of the application and is intended to be of help in the process of preparing application documents.

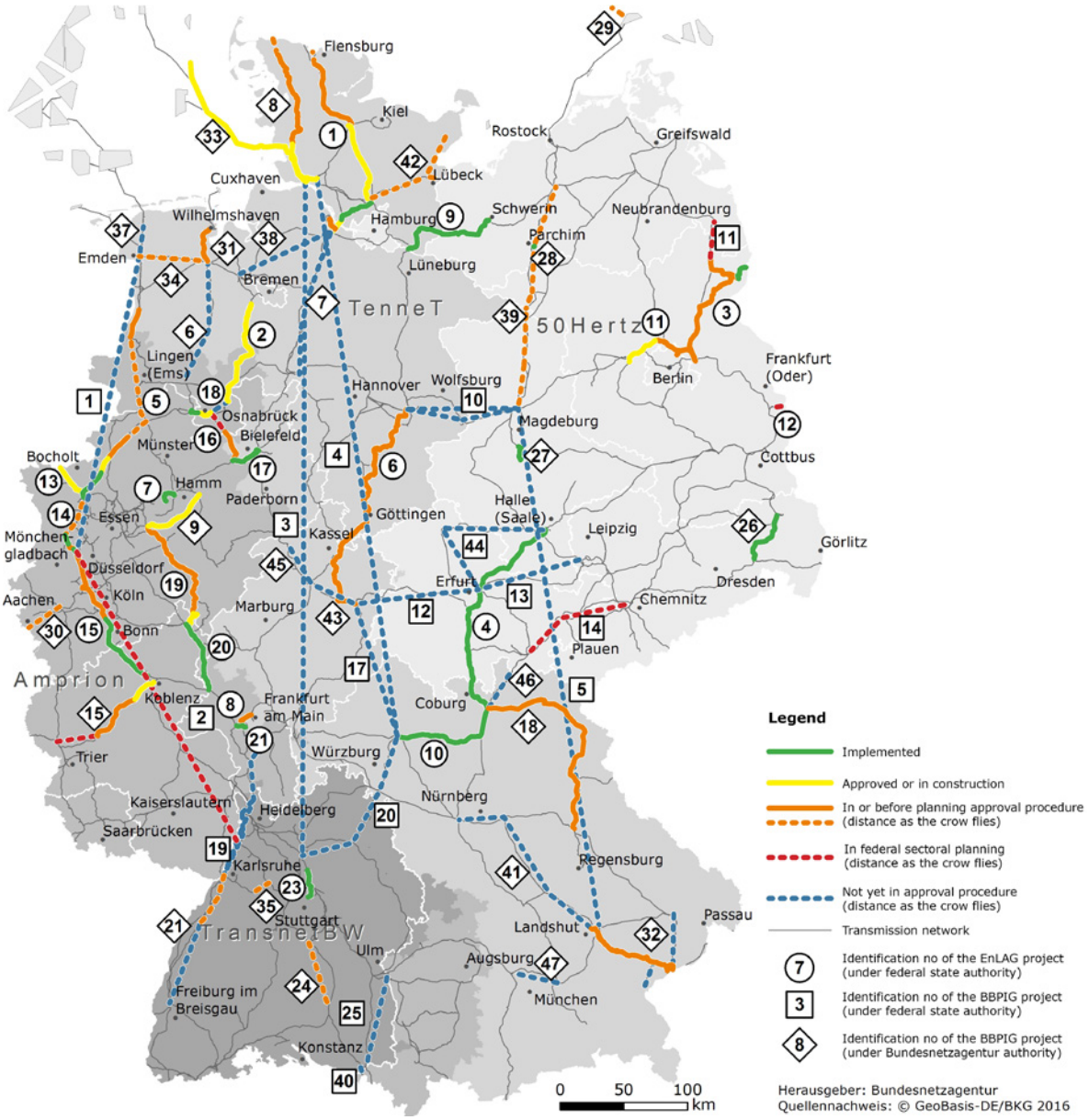
A further position paper is to define the requirements for the additional extensive federal sectoral planning documents, which are to be prepared by the TSOs in the course of the procedure. In this context, aspects relating to implementation, to the content and depth of analyses, as well as the comparison of alternatives need to be assessed as these are the aspects to which attention has to be paid when designating route corridors for the installation of direct current underground cable.

Monitoring – documenting network expansion
On a quarterly basis, the Bundesnetzagentur records the progress of expansion projects set out in the Power Grid Expansion Act (EnLAG) and the Federal Requirements Plan Act (BBPlG) and publishes data on the projects at *www.netzausbau.de/vorhaben*

Current state of Power Grid Expansion Act projects

Taking into account the fourth quarterly report for 2016, 650 km – or around 35% – of the total of about 1,800 km of power lines planned have been completed and around 950 km approved. The TSOs anticipate that some 45% of the lines will be completed by the end of 2017. So far, none of the underground cable pilot lines have been put into operation. The TSO Amprion is currently preparing tests under operating conditions for the first 380 kV underground cable pilot project in Raesfeld.

EnLAG project no 22 was deleted after a review was carried out during the process of drafting the NDP 2022. Because of alternative network solutions, in the NDP 2024, project no 24 was considered as no longer required to meet energy supply requirements by TSOs.



State of EnLAG and BBPIG projects in the fourth quarter of 2016

Current state of BBPIG projects
These projects currently comprise lines with a total length of around 6,100 km. Of the projects' total current length of 6,100 km, around 400 km have been approved and 100 km completed by the fourth quarter of 2016.

Eight of the 43 projects have been designated as pilot projects for low-loss transmission over long distances (high-voltage direct current transmission). Five direct current projects have been earmarked for priority underground cabling and five alternating current projects for partial underground cabling. In addition, one project is a pilot project using high-temperature conductors and two are submarine cable projects.

Participation and dialogue
Also in 2016, the Bundesnetzagentur organised the science and research dialogue for the fourth time in Bonn. From 22 to 23 September, this dialogue was a platform for scientific knowledge exchanges on the topic of electricity. These exchanges took on the form of introductory lectures and workshops. Presentations from the science and research dialogue event will be published in a conference report.

The consultation on the offshore network development plan for the target year 2025 was accompanied by an information event. On 28 June 2016 in Hamburg, the public had the opportunity to inform themselves about the preliminary results of the Bundesnetzagentur's verification of the ONDP 2025 and to discuss them with experts.

In addition to information and dialogue events, the Bundesnetzagentur offers a variety of brochures and flyers on various topics relating to network expansion. The films on network expansion uploaded on YouTube, the newsletter and the Twitter posts complement the information offered by the Bundesnetzagentur. Additionally, there is a dedicated web portal *www.netzausbau.de* which is a comprehensive source of information. The general public can also call or write to the grid expansion public liaison service with their questions.

Consumer protection and advice

In the past year, the Bundesnetzagentur's energy consumer advice service received a total of 15,000 enquiries and complaints. Some of the issues addressed were problems regarding billing, registering/de-registering when switching supplier as well as contractual disputes. In addition, there were enquiries related to grid connection and the associated costs, network charges and their price components as well as energy prices in general.

Energy consumer enquiries

The Bundesnetzagentur has established the energy consumer advice service as a first point of contact for problems and complaints. Bundesnetzagentur staff will handle consumer enquiries that reach them by phone, e-mail or letter. The consumer advice service on the Bundesnetzagentur's website offers additional information and support, and provides further possibilities of contacting relevant institutions authorities and companies.

In addition to classic consumer enquiries regarding contract types and energy bills, for example, the consumer advice service is increasingly handling current issues such as smart metering systems and the conversion from L-gas to H-gas. The Bundesnetzagentur monitors new trends and market developments, such as new electricity tariffs and models, and works to ensure transparency regarding energy price components.

Unlike in the telecommunications sector, in the energy sector the Bundesnetzagentur is not responsible for out-of-court arbitration of disputes between consumers and energy utilities, network operators or meter operators. Such disputes are handled by the Berlin-based energy dispute resolution panel – Schlichtungsstelle Energie e.V. – which was established in 2011 for redress as an alternative to taking their case to court. In 2016, this dispute resolution panel received over 6,100 requests to arbitrate between consumers and companies. Over 30% of these requests related to a single company or company group, which in the second half of 2016 did not sufficiently participate in the process of dispute resolution. Nevertheless, in approximately 61% of cases in total, the disputes were resolved by mutual agreement between the parties. On its website *www.schlichtungsstelle-energie.de*, the dispute resolution panel regularly publishes annual activity reports as well as its recommendations for dispute resolution. As a rule, dispute resolution proceedings are free of charge for energy consumers. Before engaging in dispute resolution proceedings, a consumer must have already attempted to settle his consumer complaint directly with the company, ie the contractual partner. Customers are legally entitled to receive an answer within four weeks. Should none of the above-described options lead to a satisfactory result, the final step is to seek legal assistance with the aim of resolving the matter in court.

The Bundesnetzagentur's energy consumer advice service has become a competent and reliable point of contact where consumers can receive information and support for their concerns and enquiries relating to energy.

In the past year, approximately 15,000 enquiries and complaints were submitted to the consumer advice service. This is approximately 50% more than in the previous year. The enquiries related to a variety of topics and companies, although in the year 2016 enquiries and complaints again focused on a small number of companies and company groups. Around 10,600 enquiries were sent by phone, 4,100 by e-mail and 315 by post.

The enquiries addressed a variety of topics related to the gas and electricity sector. The majority of enquiries revolved around the following topics: billing (eg incorrect bills, meter reading not correct, advance payment, advance payment amount, bill not received), switch of supplier and registration/de-registration, contractual disputes (eg contract terms, bonus payment, termination, balance). There also were some enquiries on grid connection and its costs, network charges and energy price components in general. In the past year, the use of new software helped to further improve and accelerate the processing of enquiries and complaints while maintaining existing standards of quality.

With the aim of further improving this service, the Bundesnetzagentur will optimise the website in a way that is more target group-specific and user-friendly, providing consumers with an additional avenue to contact the Bundesnetzagentur.

Care-Energy proceedings

In June 2015, the Düsseldorf Higher Regional Court ruled that Care-Energy Energiedienstleistungs GmbH Co. KG is obliged to file a notification of supplying energy to household customer s under section 5 EnWG. The company responded by announcing that it had transferred all contractual relationships with its energy customers to Care-Energy AG. Care-Energy AG first registered with the Bundesnetzagentur as a household customer supplier in October 2014 – at the time under the name EnUp AG.

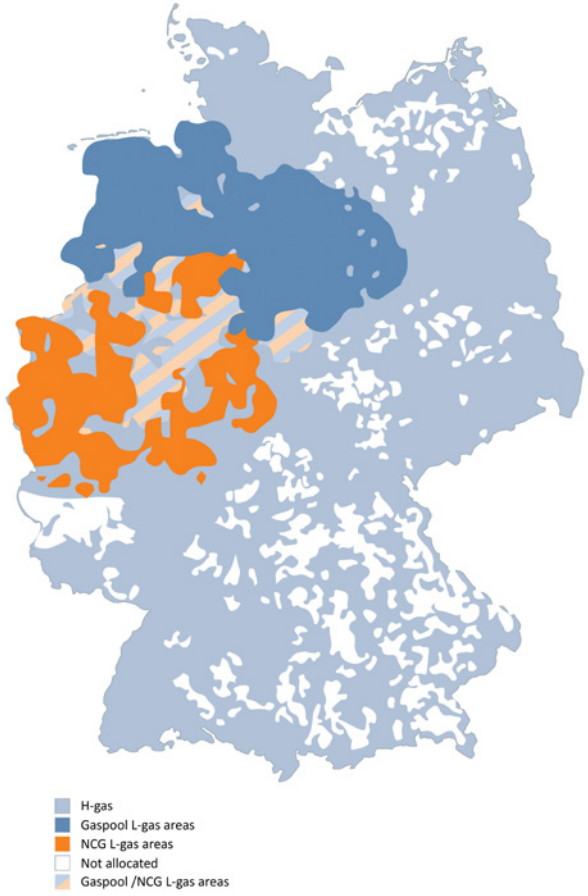
Following numerous complaints from customers in the period between December 2015 and February 2016, in particular about missed or late bills, or credit balances not being refunded by Care-Energy AG, the Bundesnetzagentur initiated preliminary investigations under section 5 EnWG in March 2016 and gave the company the opportunity to respond to the consumer complaints. In April 2016, Care-Energy AG sent a one-page reply stating that no customers had been transferred from Care-Energy Energiedienstleistungs GmbH & Co. KG to Care-Energy AG.

Between 30 May and 23 June 2016 all four transmission system operators informed the Bundesnetzagentur that they had warned Care-Energy AG that they would terminate the balancing group contract because the company had not made the advance payments due under the Renewable Energy Sources Act. On 21 June 2016 the Bundesnetzagentur was informed that Care-Energy AG, in numerous network areas in Germany, had retroactively ceased supplying energy to customers on account of their moving home. Numerous customers affected across the country contacted the Bundesnetzagentur to say that their supply contract had been terminated retroactively even though they had not moved home. Also in June 2016, the Federal Court of Justice upheld the decision of the Düsseldorf Higher Regional Court of June 2015 under which Care-Energy Energiedienstleistungs GmbH & Co. KG – which was by then operating under the name Expertos Unternehmens- und Wirtschaftsberatungs GmbH & Co. KG – as a household supplier was obliged to file a notification under section 5 EnWG. As a result, on 14 June 2016 the Bundesnetzagentur opened two supervisory proceedings against Care-Energy AG and Expertos Unternehmens- und Wirtschaftsberatungs GmbH & Co. KG.

The companies were required to provide information in response to questions about the reliability of their management, the financial capacity, existing customer contracts and the relationship between Care-Energy AG and Expertos, and were given a deadline and a warning of a €1m fine each. The statements submitted by the two companies are currently being reviewed.

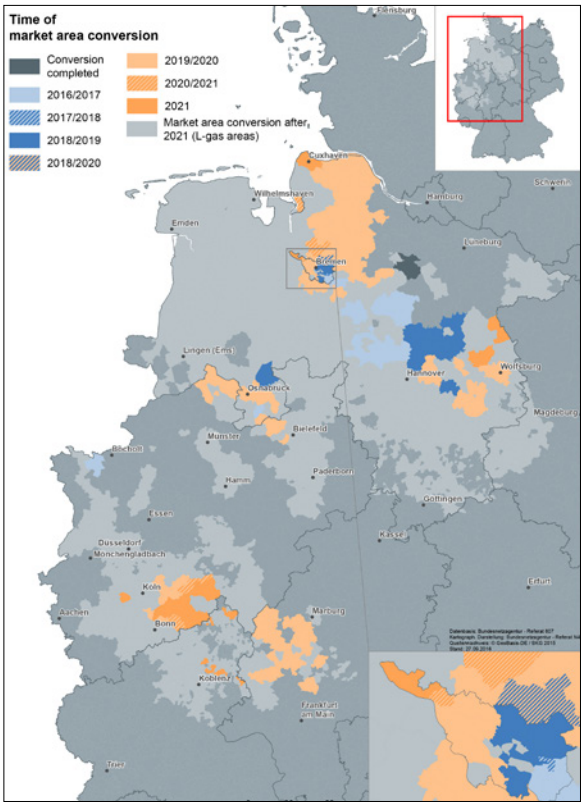
Conversion from L-gas to H-gas

The following map shows the parts of Germany supplied by L-gas, shown in dark blue and orange.



Already in 2015, smaller localities and their network areas in Lower Saxony had already begun to switch from L-gas to H-gas. By mid-2016, the registration of gas appliances had begun in the first larger city (Bremen).

The following map shows which areas will be affected in coming years. Areas scheduled for conversion after 2021 are not yet shown here.



Following the registration of all gas-fired consumer appliances in use in the area (eg heating boilers, condensing boilers, circulatory water heaters and gas stoves), all appliances must undergo technical adjustments to ensure operations with the new gas type. This generally requires the replacement of the appliances' nozzles. There will be no cost to the customer for this. In the rare case, however, that it is not possible to convert a gas appliance – for example due to the lack of replacement nozzles because of its age – then a new appliance will have to be purchased.

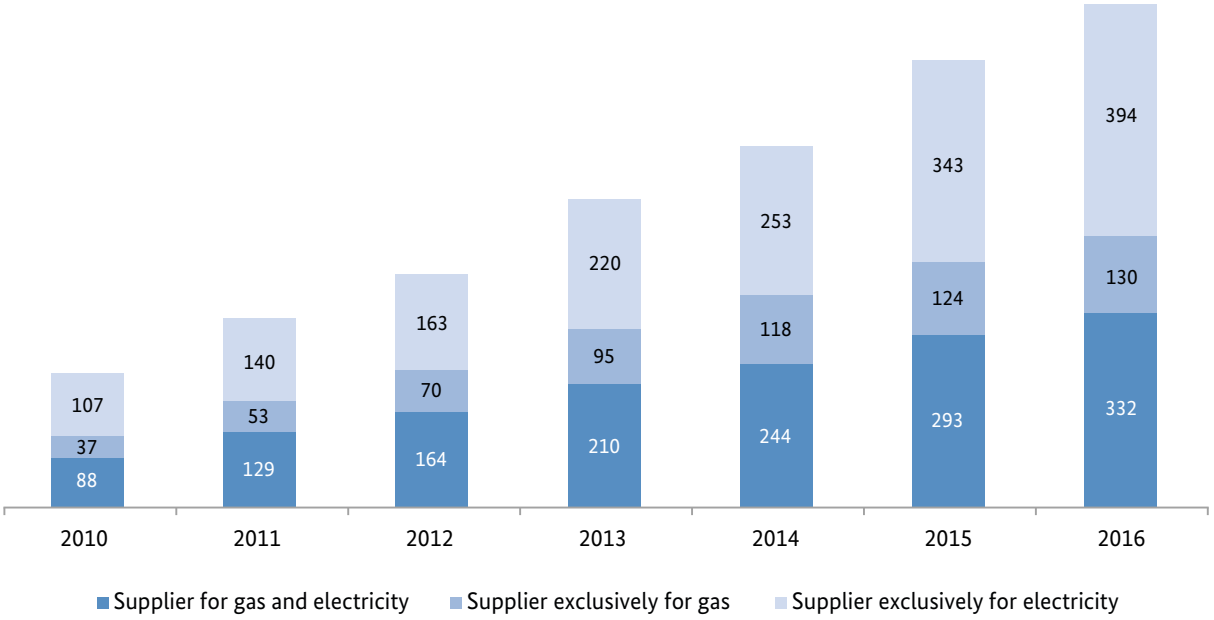
The Bundesnetzagentur has on its website a list of frequently asked questions on the topic of market area conversion and, as an additional service, has provided links to the websites of relevant network operators.
www.bundesnetzagentur.de/marktraumumstellung

Development of registered electricity and gas suppliers

Energy utility companies in Germany that want to supply household customers and that have begun operations after 13 July 2005 must register with the Bundesnetzagentur. The monthly updated lists of gas and electricity suppliers are available on the Bundesnetzagentur's website.

www.bundesnetzagentur.de/lft-energie

Number of suppliers registered with the Bundesnetzagentur



Rulings, activities and proceedings

The Bundesnetzagentur has lowered future rates of return on equity for operators of electricity and gas networks, thus reflecting the historically low interest rates in capital markets. It has also published a report on the network charge system that covers the increasing flexibility of demand, the legitimacy of network charges for electricity storage facilities or strategies to fight diminishing solidarity in network charges through self-supply at the low voltage level.

Setting of rates of return on equity capital

On 5 October 2016, prior to the start of the third regulatory period (electricity: 2019–2023; gas: 2018–2022), the Bundesnetzagentur set the rates of return on equity for that regulatory period for operators of electricity and gas supply networks. The rate of return on equity was set for all electricity and gas network operators in Germany. The rate for new facilities is 6.91% before corporation tax and after trade tax. For old facilities, the rate of return on equity is set for the third regulatory period at 5.12% before corporation tax and after trade tax.

Report on the pricing system for network use

The financing of electricity grids and the appropriate contribution of all network users were the reasons for intensive discussions relating to the pricing system for electricity. The Bundesnetzagentur compiled a report, which was published in 2016, on all current questions regarding electricity network charges. The report deals with questions such as the increasing flexibility of demand, the legitimacy of network charges for electricity storage facilities or other applications and strategies to fight diminishing solidarity in the area of network charges through self-supply at the low voltage level. The report outlined the current system and the purpose of the electricity network charges, addressed the numerous solutions under discussion, identified interdependencies between proposed solutions, and in many cases took a clear position on an issue. The report is available at: *www.bundesnetzagentur.de/netzentgeltsystematik*

Decisions on avoided network charges

Operators of microgeneration units are entitled to a charge from the operator of the distribution network into which they feed electricity. Since it is difficult to individually calculate the amount incurred through avoidance, the "avoidance charge" corresponds to the price of the respective amount of energy from the upstream network level. By 2016, payments amounted to approximately €2bn.

In 2015, the Bundesnetzagentur took three important decisions on avoided network charges, on which the Düsseldorf Higher Regional Court decided at first instance in 2016.

Return on equity for electricity and gas networks

In the autumn of 2016, the Bundesnetzagentur announced the rates of return on equity for electricity and gas network operators. It thereby creates reliable framework conditions for investments in the networks and provides relief for consumers.

The operation of energy networks is a capital-intensive business, and the energy transition comes at a cost for network operator companies as well. The expansion of the distribution networks will cost billions of euros. For such investments, the German network operators need a long-term planning horizon and reliable economic framework conditions.

Every five years, the Bundesnetzagentur sets the rate of return that network operators receive on their equity investment. It calculated an interest rate of 6.91% for new facilities and 5.12% for old facilities. Currently, interest rates are at 9.05% for new facilities and 7.14% for old facilities. The new rates that have been set reflect the historically low interest rates on capital markets. It was in the interest of consumers to take this development into account. The return on equity is the rate before corporation tax and is made up of a base rate, based on a ten-year average for risk-free investments, and an appropriate risk premium to reflect the entrepreneurial risk. The base interest rate was lowered from 3.8% to 2.49%, while the risk premium was set at 3.15%. The Bundesnetzagentur uses established methods to determine the interest rates. The rates guarantee that the network operators are in a position to take on the large investments required for the energy transition. Investing in the networks remains attractive. The new rates will apply from the beginning of the next regulatory period, which begins in 2018 for gas network operators and in 2019 for electricity network operators. The return on equity remains in place for the entire duration of the five-year regulatory period.

One case concerned the assessment of connection situations in which an extra-high voltage power line owned by a distribution system operator fed directly into the extra-high voltage level of the transmission system operator. According to the Bundesnetzagentur, in this case no claim can be made to the payment of avoided network charges. This position was confirmed by the Düsseldorf Higher Regional Court.

In the second case, the Bundesnetzagentur held that the determining factor for the calculation of avoided network charges is the upstream network or transformation level. In this case, another DSO was operating at the same voltage level upstream of the generating installation's network (so-called "pancaking"). In this constellation, the Düsseldorf Higher Regional Court did not concur with the Bundesnetzagentur.

A third decision concerned the role of the so-called "network reserve capacity" for the calculation of charges for distributed feed-in. Network reserve capacity is a price mechanism traditionally used by network operators with network users who have their own generating facility. It is meant to protect customers in the event of maintenance measures being carried out at generating facilities.

The dispute between a network operator and the owner of a microgeneration unit centred on the question of whether this "reserve capacity" can also be used to secure revenue from avoided network charges. The Bundesnetzagentur rejected this, and the Düsseldorf Higher Regional Court upheld this position.

Individual network charges

On 14 September 2016, the Bundesnetzagentur opened proceedings to change the determination on the proper calculation of individual network charges. At issue is a change of the threshold values to be consid-

ered in the agreement on individual network charges. On the basis of the results of the evaluation of statements made in the consultation procedure and the currently unpredictable outcome of possible pending legislative and regulatory procedures, which could have an effect on system of network charges, the final decision in these proceedings was delayed.

Abuse case under section 19(3) of the Electricity Network Charges Ordinance (StromNEV)

In 2015 and 2016, the Bundesnetzagentur completed three special abuse cases regarding the charges for operating resources used on a singular basis.

If a network user is the sole user of all equipment used in a network or transformation level, an appropriate charge must be agreed upon between the network operator and the network user for this individually used equipment. In all three cases, the disputed question was whether an upstream network operator, as user of the downstream network, has a claim to a charge for resources used on a singular basis. The Bundesnetzagentur decided that a charge must be determined separately if the resources used on a singular basis on the downstream side is connected to the busbar of another network operator, to which additional resources of the network operator is directly connected; the decisive question is whether additional network users are connected to the concrete equipment. In addition, no pooling across different network operators is granted; the upstream network operator does not change, but for billing purposes the network user is treated as if he is connected to the upstream network or transformation level.

Expansion factor for electricity

DSOs can apply (by 30 June of each year) for an adjustment of their revenue cap based on an expansion factor. The resulting adjustment of the revenue cap takes place on 1 January of the following year. As a result of the amendment of the ARegV, DSOs can apply for the expansion factor for the last time on 30 June 2017.

The purpose of the expansion factor is to ensure that the costs of expansion investments resulting from a lasting change in supply services during the regulatory period are taken into account when determining the revenue cap. Expansion investments that are made at the high voltage level can only be claimed within the framework of investment measures.

Costs for replacement investments are not covered by the expansion factor. In 2016, the Bundesnetzagentur received a total of 93 applications for approval of an expansion factor in the electricity sector.

Cost examination for gas network operators

On 22 April 2016, the Bundesnetzagentur issued guidelines for carrying out the cost examination to determine the base level for operators of gas supply networks during the third regulatory period. In these guidelines, gas network operators were obliged, as standard procedure, to submit all cost-relevant data to the Bundesnetzagentur by 1 July 2016; gas network operators taking part in a simplified procedure were obliged to submit all data by 1 September 2016. The Bundesnetzagentur has begun examining the data submitted in order to set the revenue caps that are to take effect as of 2018. For companies taking part in the standard procedure, these examinations also entail benchmarking procedures, which are carried out according to the rules of the Incentive Regulation Ordinance. Due to the complexity of the procedures, these examinations will last until the end of 2017.

Determination regarding horizontal cost allocation between gas transmission system operators

In June 2016 the Bundesnetzagentur issued a determination on an appropriate horizontal cost allocation between TSOs and for an appropriate allocation of costs to entry and exit charges. The determination prescribes a capacity-weighted entry-exit split which must be adhered to, including within the framework of validation. Subsequently, the costs assigned to the entry side must be allocated to all entry points in the respective market area. This results in a consistent, specific entry charge for a firm, freely allocable annual capacity in a market area. When deciding on this method of cost allocation, the Bundesnetzagentur took care to ensure that the method promotes non-discriminatory calculation of charges and conforms to the principle of causation in the structuring of charges. The Bundesnetzagentur had found that in recent years the TSOs had increasingly transferred costs to captive customers on the exit side, which as of a certain level contradicts the principle of non-discrimination. As a result of the entry-exit-split that has now been defined and of the resulting cost allocation process, the costs of gas transport across networks of multiple TSOs will be borne appropriately and proportionately by customers on both the entry

and the exit sides. The determination comes into effect on 1 January 2018 with binding force. The first implementation steps must be undertaken by TSOs in June 2017.

Investment measures in accordance with section 23 ARegV

In 2016 the Bundesnetzagentur undertook a change of the determination to calculate the capital and operating costs resulting from the approved investment measures. With regard to the setting of the revenue cap, the Federal Court of Justice ruled that when calculating the average value between beginning-of-year and end-of-year totals for new facilities that are acquired or completed within the course of the financial year, the full amount of the relevant acquisition and production costs must be applied for the beginning-of-year total, rather than a value of zero. The authority adjusted the determination on investment measures based on this ruling.

Transfer of networks

When within the framework of concession competition a new network operator takes over part of a network, the share of the revenue cap for the part of the network to be transferred must be appropriately set based on congruent application of the network operators. The revenue cap originally defined for the transferring operator is reduced by the share of the revenue cap to be transferred, while the revenue cap originally defined for the receiving operator is increased by that share. There is no new setting of the revenue cap for the transferring and the receiving network operators.

In the electricity sector, the Bundesnetzagentur received around 390 applications concerning network transfers for the years 2012-2016. In 2016, 90 rulings were issued. Gas network operators announced 212 network transfers for the years 2012-2016, of which 146 were decided upon, 112 in the year 2016 alone.

With the amendment of the 2016 Incentive Regulation Ordinance, a regulation for network transfers was introduced that does not require a congruent application on the part of the network operators involved. If the network operators do not submit a congruent application, the regulatory authority will set the transferred share of the revenue cap ex officio six months after grid operations begin. The new regulation also prescribes a calculation method for the event of an ex officio decision on the part of the regulatory authority. Accordingly, the share of the revenue cap for the second regulatory period is calculated out of the capital costs of the part of the network being transferred plus a lump sum for the remaining costs incurred for the part of the network being transferred.

Further development of tendering procedures on electricity system balancing markets

The increasing share of volatile feed-in from renewable energy installations into the electricity supply system and, as a result, the growing significance of a fluctuating energy feed-in for the security of the system mean that operators of such installations need to share in the responsibility of providing system services.

In order to promote the integration of intermittent source installations, controllable consumption and storage systems in system balancing energy markets, the Bundesnetzagentur opened two determination proceedings in 2015. In the year under review, extensive statements by associations, interest groups and companies on these proceedings were evaluated. In addition, a workshop was held in the summer of 2016 with the market partners, which provided a thorough examination of the key points and took into account the comments submitted.

The further development and optimisation of the tendering procedures and disclosure obligations for secondary balancing energy entails the following aspects in particular:

- switch from a weekly format to a calendar day format auction
- introduction of 4-hour products
- possibility for small suppliers to deviate from the minimum bid size of 5 MW
- designing the tendering procedure to take into account the TSOs' scheduling requirements on the one hand and the needs of the market with regard to an adequate timeframe between bid placement and adjustment on the other.

The starting points for an adjustment of tendering procedures and disclosure obligations for minute reserve include the following:

- switch from weekday format auctions to calendar day format auctions
- retention of 4-hour products, and thus a harmonisation of the product times of secondary balancing energy and minute reserve

- retention of the minimum bid size of 5 MW with the option of deviations under certain circumstances.

The Bundesnetzagentur intends to conclude the proceedings to determine the tendering procedures and disclosure obligations for secondary balancing energy and minute reserve in spring 2017.

Implementation and assessment of the determination on the gas balancing regime "GaBi Gas 2.0"

With the determination "GaBi Gas 2.0", which took effect on 1 October 2015, the Bundesnetzagentur implemented the European specifications from the network code on gas balancing. As of 1 October 2016, additional changes were introduced regarding information obligations, within-day obligations and the clearance of network accounts; these changes are now binding for market participants. In addition, in late 2016, market area managers submitted the first annual balancing energy report.

Gas capacity regulation

In 2016, the Bundesnetzagentur looked at national and international framework conditions for offering and awarding transport capacity in the gas supply networks. It decided on two applications by network operators who intended to allocate capacities to different interconnection points in their network by way of competing auctions. In the case of these mutually dependent auctions, the capacity that is to be allocated at the respective interconnection points is allocated to the shipping customer who is willing to pay the highest price. The Bundesnetzagentur also decided in an abuse case on the question of whether network operators are required under applicable law to offer intra-day capacities, ie capacities that are bookable within the course of a gas day and comprising less than a full gas day, at all entry and exit points in their networks. A legal obligation to do so was only affirmed for interconnection points, but not for other entry and exit points of a network such as gas storage facilities and power plants.

Auctions for ground-mounted photovoltaic systems (national, and with Denmark)

The auctions introduced in 2015 to determine the level of financial support for electricity from ground-mounted photovoltaic installations were successfully continued in 2016, and as a pilot project were opened to projects in neighbouring European countries. In the auctions, the level of financial support that had previously been set by law is now determined through competition.

In 2016 the Bundesnetzagentur carried out a total of three national auction rounds. Auctions were held for a total volume of 410 MW for new ground-mounted photovoltaic installations. The bids submitted comprised a total volume of 1,273 MW; all rounds were significantly oversubscribed. Due to the continuing high level of competition, the average amount of successful bids has declined steadily from 7.41 ct/kWh in April to 6.9 ct/kWh in December of 2016. The high demand and the declining price are indications that the auction model is successful.

The success of the auctions is also dependent on the rate of realisation. Because successful bidders have two years' time after receiving the contract to build their installations, it is still too early to draw final conclusions. Up to and including 1 December 2016, the Bundesnetzagentur received 33 applications to receive entitlement for financial support, comprising a total installed capacity of 188 MW.

For the first time in November 2016, an auction was carried out that was open to another EU Member State. Such auctions are intended to enable the bilateral cross-border support for electricity from renewable energy sources; European law allows for such auctions for 5% of the volume put up for auction nationally. In the first auction initiated, Denmark and Germany opened their national auctions for projects from the respective other country. In Germany, 50 MW of capacity was put up for auction. For this auction, 43 bids were submitted with a volume of 297 MW. The uniform price of the winning bid was 5.38 ct/kWh.

Guidelines for self-supply

Since August 2014, the EEG surcharge must be paid for any type of electricity consumption. This also applies to self-suppliers, who under the 2014 EEG are subject to a specific obligation to pay the EEG surcharge. Anyone who generates and consumes their own electricity, whether in a private home or in an industrial opera-

First joint PV auction with Denmark

In November 2016, the Bundesnetzagentur, in the first auction for ground-mounted photovoltaic installations also open to Danish bidders, accepted five bids totalling 50 MW at a winning bid price of 5.38 cents per kilowatt hour (ct/kWh).

The awarded price is thus nearly 2 ct/kWh below the average price of the bids accepted in the last national auction for ground-mounted photovoltaic installations, which stood at 7.25 ct/kWh.

All of the successful bids came from companies in Denmark and were for projects on farmland. This land category is currently not allowed for ground-mounted PV systems in Germany. An open auction cannot take into account and accommodate all the different local conditions. Sites with the most favourable conditions will be most successful in the auction procedure.

The auction that was opened to Danish companies was the first cross-border auction for electricity from renewable energy sources to take place in Europe.

It plays a key role as a pilot project to gain practical experience in implementing cross-border auctions with other EU Member States.

tion, is principally required to pay the EEG surcharge. Under certain exceptional circumstances, however, some self-suppliers pay no EEG surcharge, or only pay a reduced surcharge.

In June 2016, the Bundesnetzagentur published guidelines that lay out the obligations of self-suppliers with regard to the EEG surcharge. These guidelines set out the Bundesnetzagentur's basic understanding of the regulations on self-supply and clarify a number of practical questions pertaining to the EEG surcharge regulations.

The Bundesnetzagentur published a draft of the guidelines in October 2015. More than 60 comments on this draft were submitted by companies, citizens and associations, and were incorporated into the revision of the draft. The final version of the guidelines contains numerous further clarifications on the interpretation of the regulations and addresses additional practical questions that were brought up during the course of the consultation.

Registration of charging points

Since the entry into force of the Charging Station Ordinance (Ladesäulenverordnung), operators of public charging points for electric vehicles are required to notify the Bundesnetzagentur of the installation, switch of operator, decommissioning and start of public access of the respective charging points. Rapid charging points (charging capacity > 22 kW) must also be reported to the Bundesnetzagentur if they were operational before the Ordinance took effect. The purpose of the notification is to take stock of the existing charging stations in Germany. Since rapid charging stations are of particular significance for the further spread of electromobility, they are subject to a comprehensive stock-taking that also includes existing charging stations. Since 29 July 2016 an electronic notification form for charging points has been available on the Bundesnetzagentur website.

www.bundesnetzagentur.de/ladesaeulen

Monitoring of demand side management

For the first time, the Bundesnetzagentur is carrying out monitoring of demand side management in the electricity sector. The survey is intended to identify any load shifting potentials that can contribute to the security of supply of the electricity grids. In the survey of all network operators active in Germany, approximately 640 consumers were identified with an annual electricity consumption of at least 50 GW. In a second step to be carried out in 2017, these consumers will be queried as to their existing and future demand side management potentials. The results of the survey will then be included in the Federal Ministry for Economic Affairs and Energy report on security of supply.

EEG statistics

Also in 2016, the Bundesnetzagentur published its EEG statistics report, which contains the most important data on the expansion of renewable energies. It also includes evaluations by individual energy source and by federal states.

The published figures come from the Bundesnetzagentur's installations register and the photovoltaic registration portal on the one hand. On the other hand, the agency uses the data submitted under the EEG by TSOs, DSOs, electricity suppliers and self-suppliers within the framework of its monitoring of the nationwide EEG equalisation scheme.
www.bundesnetzagentur.de/eeg-daten

Introduction of the market master data register

With the market master data register (MaStR), the Bundesnetzagentur is building a comprehensive official register of the electricity and gas market, which can be used by authorities and market players in the energy sector (electricity and gas). Access to the market master data register will achieve a significant improvement in data quality and simplify many processes in the energy sector. In the future, the central registration will help to simplify and standardise many of the official reporting obligations.

So that energy market players can use the market master data register as extensively as possible, the concept was developed in a transparent process, with elaboration on numerous details. To this end, several workshops and many discussions with market players were carried out, and there was intensive cooperation and consultation with relevant stakeholders. In 2016, particular attention was given to which data must be reported by stakeholders and how this data should be defined.

The market master data register will be launched in March 2017.

Industry workshop and proposal for aggregator model

Aggregators bundle the capacity of microgeneration units as well as flexible final consumers, and market this capacity at the exchange or as balancing energy, for example. To make it easier for supplier-independent aggregators to access minute reserve and secondary balancing, the Bundesnetzagentur held a workshop in March 2016 on the topic of the "role of the aggregator", which was attended by all associations concerned. In the workshop, the associations agreed to develop a proposal for the provision of balancing capacity through aggregators. The Bundesnetzagentur participated in the process as a critical observer. By the end of 2016, industry stakeholders developed and submitted to the Bundesnetzagentur a corresponding proposal in the form of industry guidelines.

Evaluation of minimum generation
The Bundesnetzagentur is charged with investigating why conventional power plants produce electricity even when, at first glance, there is no economic incentive, ie when electricity prices at the exchange are negative.

Initial insights were provided by the study "Conventional minimum generation", commissioned by the transmission system operators and published in April 2016. It identified a conventional generation base of 25 to 30 GW that must be broken down in more detail.

The reasons why this generation capacity is kept on the grid, even when the electricity price is low, are in part to be found in the provision of redispatching, balancing power and reserve capacity. Additional factors of influence are power plant-specific self-supply, heat extraction and technology-specific minimum generation. However, the technical network-related minimum generation – ie the conventional minimum generation required to operate the electricity network – makes up a relatively small share of the observed base of 25 to 30 MW.

For the Bundesnetzagentur report, the TSOs provided data that for the most part was already available. Within the scope of their legal authority and in close cooperation with the Bundesnetzagentur, they also solicited additional data from power plant operators. This data is analysed for the selected time periods with regard to the composition of and the reasons why the conventional generation capacity remains on the grid. In its report the Bundesnetzagentur will provide, in addition to the status analysis, an outlook on the future development of minimum generation. The first report is to be published on 31 March 2017. The observation will be updated every two years.

Registration of market participants, REMIT data reporting, cases of suspicion

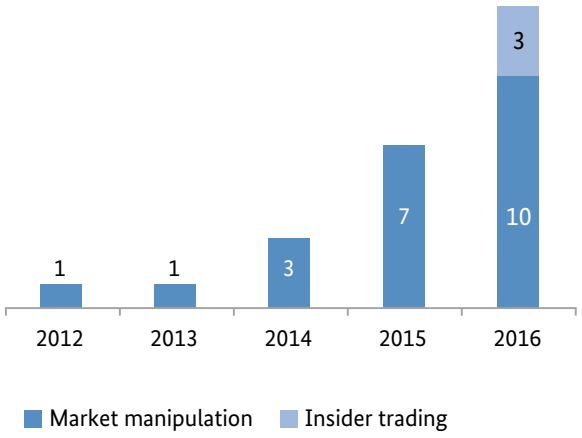
Market participants conducting transactions on the wholesale energy market which under REMIT must be reported are required to first register with the Bundesnetzagentur. For the registration, the Bundesnetzagentur uses the CEREMP registration portal, which is operated by the Agency for the Cooperation of Energy Regulators (ACER). After successful registration, market participants receive the identifying ACER code. There are currently a total of 3,899 registered market participants in Germany.[1] 1,331 market participants were registered in 2015, another 2,568 in 2016. The sharp increase in the number of registrations is not caused by an influx of new market participants. Instead, market participants only had to register in 2015 when standard contracts at organised market places were concluded. Data reporting has been required for standard contracts since 7 October 2015; as of 7 April 2016 it is also required for non-standard contracts that are concluded outside of organised market places. In the future, data reported to ACER is to be passed on to the Bundesnetzagentur's Market Transparency Unit for Wholesale Electricity and Gas Markets for its national market surveillance tasks.

The Bundesnetzagentur is the first point of contact for German market participants with questions concerning the interpretation of REMIT. In 2016, the Bundesnetzagentur answered more than 2,600 enquiries, in particular regarding the registration requirement and the necessity of data reporting.

The Bundesnetzagentur receives information on breaches of REMIT, mainly from organised market places, through the ACER Notification Platform. In 2016 the Bundesnetzagentur received 13 reports of suspicious transactions.[2] Three cases of suspicion concern a breach of the prohibition of insider trading; ten cases concern a breach of the prohibition of market manipulation. The Bundesnetzagentur's investigations are still underway in all 13 cases, six of which with cross-border relevance are being investigated together with the regulatory authorities of other European Member States. Extensive data analyses are needed for the investigation of these cases. The number of reported cases of suspicious activity has increased each year since the start of wholesale energy trading surveillance and the entry into force of REMIT in late 2011. This can be explained in particular by the fact that brokers, energy exchanges etc are showing more diligence in fulfilling their duties under REMIT since receiving clear assistance from ACER Guidance.[3]

The following diagram shows the number of cases of suspicion reported since 2012, divided into market manipulation and insider trading.

Overview of annual cases of suspected breaches



[1] As of 31 Dec. 2016
[2] As of 31 Dec. 2016
[3] 4th Edition, as of 17 June 2016

International cooperation

The Bundesnetzagentur was again actively involved in international cooperation in 2016, focusing its work on the development and implementation of the network codes and guidelines. Further progress was made on the realisation of the European internal electricity market and security of electricity supply in Europe.

Electricity network codes and guidelines

The Bundesnetzagentur was again actively involved in 2016 in the development and implementation of the network codes and guidelines, Its work focused on the following areas:

- grid connection
- capacity allocation and congestion management (GL CACM)
- forward capacity allocation
- system operation
- emergency and restoration of transmission network
- electricity balancing

In the relevant codification procedures, the Bundesnetzagentur provides support to the Federal Ministry for Economic Affairs and Energy, and subsequently supervises implementation in Germany. The guideline on capacity allocation and congestion management adopted at the end of 2014 entered into force on 14 August 2015 as Commission Regulation (EU) 2015/1222.

Implementation tasks in the electricity sector

TSOs and DSOs must draw up minimum technical requirements for the connection to their networks, taking into account network code specifications for grid connection. The Bundesnetzagentur supervises compliance with minimum technical requirements and, in exceptional cases, issues exemptions in accordance with specifications provided for in the network codes.

In 2015 the Bundesnetzagentur designated EPEX SPOT and NordPool as NEMO (nominated electricity market operator) within the meaning of GL CACM. The task of a NEMO is to perform market coupling and guarantee that the relevant criteria are met. The coordination of the European regulatory authorities is carried out in a special working group for the implementation of the capacity allocation and congestion management guideline (GL CACM), which the Bundesnetzagentur chairs together with Belgian and Italian colleagues.

In November 2016, ACER approved the establishment of the capacity calculation regions (CCR) based on a proposal put forward by all European TSOs. In these regions, the TSOs involved develop specific requirements, which are submitted to the national regulatory authorities for approval. Of particular relevance for the German market is the capacity calculation method that must be submitted for the new large capacity calculation region "CORE". This will be a further development of the flow-based method of capacity calculation in the Central Western Europe (CWE) region. The flow-based method takes account of the whole grid instead of only the cross-border transmission capacity. Better coordination between the TSOs involved is also essential, so that more capacity can be made available for cross-border trade.

Market coupling

In 2016, the coupling of the day-ahead electricity markets in Europe was extended to include the border between Slovenia and Austria. The Multi-Regional Coupling project (MRC) thus covers 85% of European electricity consumption. The Bundesnetzagentur supports the plans to progressively extend the market coupling project to cover further markets. Under the GL CACM, key joint decisions from all European regulatory authorities are anticipated in 2017 to gradually formalise the projects currently established on a voluntary basis.

Gas network codes

NC TAR

The network code on harmonised transmission tariff structures for gas (NC TAR), approved on 30 September 2016, sets harmonised rules for the formation of tariffs for gas transmission networks. The Bundesnetzagentur was involved, either directly or in an advisory function, in all phases of developing the NC TAR.

At the core of the network code are specifications on consultation and disclosure requirements regarding parameters that have an influence on the level of network charges. The code provides the national regulatory authorities with considerable latitude in setting tariffs, which is why the Bundesnetzagentur needs to make only small changes in the regulatory system.

However, the national regulatory authorities must publish all decisions related to the setting of tariffs, including justifications. In addition to the revenue cap, this can for example also include partial results in the review of the cost basis, such as capital costs or information on tangible assets. Under the code, the Agency for the Cooperation of Energy Regulators (ACER) is in charge of reviewing the consultation procedure to ensure completeness and the compatibility of the tariff formation method with other European requirements.

The code is currently going through the European legislative process. The Bundesnetzagentur will help shape the implementation of the code and provide active support in any questions that may arise regarding the interpretation of the regulation.

Supplement to the network code on mechanisms for capacity allocation in gas transmission networks (NC CAM)
In the context of allocating transport capacities in gas transmission networks, the Bundesnetzagentur worked actively on amending the network code on mechanisms for capacity allocation in gas transmission networks (NC CAM). The existing NC CAM, which entered into force in 2013, contains rules for the allocation of already developed capacity at interconnection points between countries and market areas. The rules are meant to ensure non-discriminatory access to gas transmission networks. At the end of 2013, on the basis of the ACER framework guidelines, proceedings were launched on amending the existing NC CAM. The aim was to supplement the rules for existing capacity with rules for calculating the demand at interconnection points and for the subsequent allocation of incremental capacity at those interconnection points (so-called procedure for new capacity). The regulation amendment was finally adopted in comitology procedure on 13 October 2016 and is expected to enter into force on 1 April 2017. The Bundesnetzagentur is also responsible for the implementation of the amended NC CAM. The new regulations in the NC CAM are, inter alia, an important contribution to network development planning in Germany, as the procedure for incremental capacity provides secure, market-based assumptions for additional capacity requirements at interconnection points, thereby avoiding unnecessary network expansion measures.

Amending Regulation EU 994/2010 on the security of gas supply

In 2016, the Bundesnetzagentur participated in the process of amending Regulation (EU) No. 994/2010 on measures to ensure the safe supply of natural gas.

Within the context of the Council of European Energy Regulators (CEER), it has submitted extensive recommendations with regard to the European Commission's proposal, and drafted a position of the European regulatory authorities. The proposals for improvement concern in particular the regional cooperation between Member States in the area of risk assessment, the prerequisites for declaring the respective crisis levels and establishing a uniform definition of the term "protected customer".

Cooperation of European regulators at CEER

In 2016 the Bundesnetzagentur, in its function as an active member of the Council of European Energy Regulators (CEER), focused its work on topics such as consumer protection, regulatory aspects of retail markets, promoting renewable energy and international cooperation. CEER regularly organises training courses for employees active in the energy sector. The Bundesnetzagentur actively participated in training courses on topics such as benchmarking, REMIT, PCIs and legal issues.

International cooperation

Florence School of Regulation (FSR)
Together with the Florence School of Regulation, the Bundesnetzagentur held its eighth joint forum on legal issues of energy regulation in October 2016. The main issues of discussion were electricity market design, capacity mechanisms, governance and switching behaviour of final consumers.

International delegations
The Bundesnetzagentur received numerous foreign delegations in 2016 as well. A total of 22 visiting groups from countries including Japan, Vietnam, Zimbabwe and Norway requested an exchange of information on issues relating to energy regulation. This year's focus was increasingly on the implementation of the energy transition, including the integration of renewable energy.

TELECOMMUNICATIONS

Transitioning to a gigabit society

The digital transition requires well developed, nationwide telecommunications infrastructures. Rapid broadband rollout in Germany continued to be an important goal for the Bundesnetzagentur in 2016. With appropriate investment incentives, it is supporting the transition to a gigabit society.

Contents

In 2016, the go-ahead was given for the introduction of vectoring technology near a main distribution frame. This means that the accelerated rollout of lines with a minimum speed of 50 Mbps can now begin. Vectoring delivers higher transmission rates in today's copper local loops than have previously been possible with VDSL, advanced though this is. This stands to benefit consumers.

The Bundesnetzagentur has issued a Transparency Ordinance requiring fixed-line and mobile providers to be more transparent when marketing their broadband connections in future. Consumers can now easily see the data transmission rate that has been contractually agreed. Using the Bundesnetzagentur's broadband measurement tool, consumers can check whether this transfer speed really is being delivered by their provider. This puts providers under considerable pressure to keep their promises.

In Berlin, the Bundesnetzagentur organised a conference on digital transformation in network-based sectors. The focus was on how to adapt regulation to allow advantage to be taken of the opportunities created by the digital transition. Another key topic was consumer and data protection in the digital economy, given that the collection and analysis of personal data on a large scale is providing increasingly detailed insight into consumer behaviour and habits.

Market watch

The number of broadband connections rose once again, and demand for super-fast connections increased. Data volumes in fixed and mobile networks also grew rapidly.

Telecommunications market as a whole

External revenue

According to the Bundesnetzagentur's preliminary calculations, external revenue in the telecommunications market amounted to around €56.7bn in 2016. This represents a year-on-year decrease of €0.7bn (1.2%).

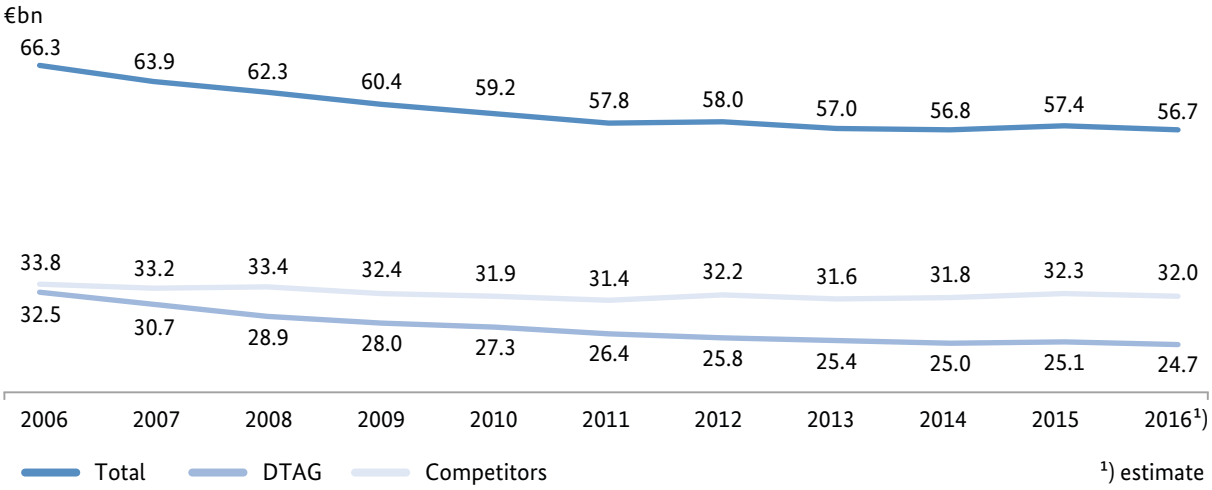
The external revenue of both alternative providers and Deutsche Telekom AG (DTAG) decreased. In the case of alternative providers, external revenue fell by €0.3bn on the previous year to €32.0bn. The external revenue of DTAG amounted to €24.7bn, €0.4bn below its 2015 level.

As in the previous year, alternative providers accounted for a market share of around 56% in 2016.

A breakdown of revenue by conventional telecommunications networks, hybrid fibre-coax (HFC) networks and mobile networks shows that the decrease in revenue is slowing in the conventional telecommunications network segment, which consists of networks based on copper and optical fibre cables. According to initial calculations, external revenue in 2016 fell by 1% compared with the previous year. By comparison, the year-on-year decrease in 2015 was 4%. The share of external revenue generated from retail business remained constant at 77%. Retail business includes external revenue generated from services for private, commercial and public sector subscribers. Wholesale services for fixed-network and mobile operators and service providers outside of the DTAG group accounted for over one fifth of external revenue. These services include wholesale products for voice traffic/telephony, broadband/internet and infrastructure services.

External revenue generated in HFC networks continued to grow. In 2016 it increased by almost 4% on the previous year to around €5.26bn. Its market share was still around 9% less than that of conventional telecommunications networks (38%) and mobile services (47%). The lion's share of this revenue (94%) was attributable to retail.

External revenue in the telecommunications market



In 2016 external revenue from mobile services is expected to have fallen by just under 2% to €26.46bn. This decrease is primarily due to the negative development of revenue from terminal equipment.

Mobile network operators generated external revenue of around €21.44bn in 2016, while service providers generated around €5.02bn. Service providers increased their share by more than 1% compared with the previous year to just under 19% in 2016.

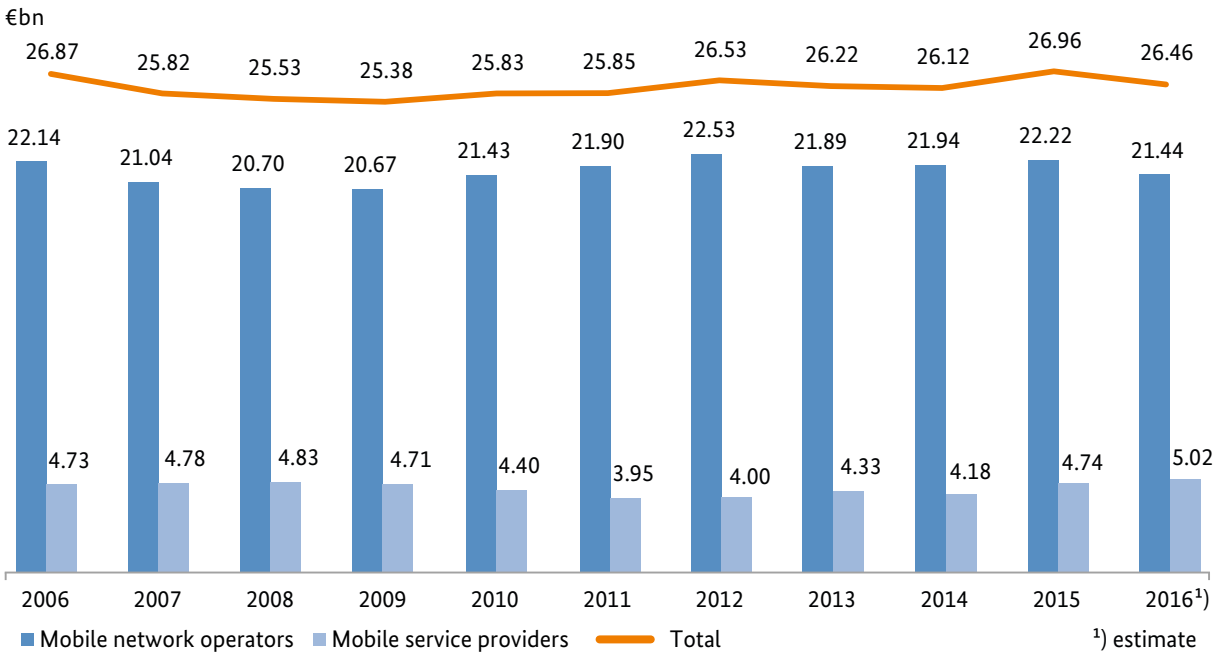
External revenue by segment

	2014		2015		2016[1)]	
	€bn	%	€bn	%	€bn	%
External revenue in the telecommunications market	**56.8**		**57.4**		**56.7**	
External revenue in conventional telecommunications networks	**23.19**	100[2)]	**22.15**	100	**21.82**	100
Via retail	17.97	77	17.02	77	16.81	77
Via wholesale	4.66	20	4.50	20	4.53	21
Other external revenue	0.56	2	0.63	3	0.48	2
External revenue in HFC networks	**4.77**	100	**5.07**	100	**5.26**	100
Via retail	4.41	92	4.73	93	4.92	94
Via wholesale	0.09	2	0.08	2	0.07	1
Other external revenue	0.27	6	0.26	5	0.27	5
External revenue from mobile services	**26.12**	100	**26.96**	100[2)]	**26.46**	100
Via retail (excluding terminal equipment)	18.48	71	18.54	69	19.06	72
Via wholesale	3.14	12	2.86	11	2.94	11
Via terminal equipment	3.44	13	4.22	16	3.33	13
Other external revenue	1.06	4	1.34	5	1.13	4
Other external revenue	**2.68**		**3.18**		**3.17**	

1) estimate

2) Totals may deviate from rounded cumulative figures.

External revenue of mobile network operators and service providers

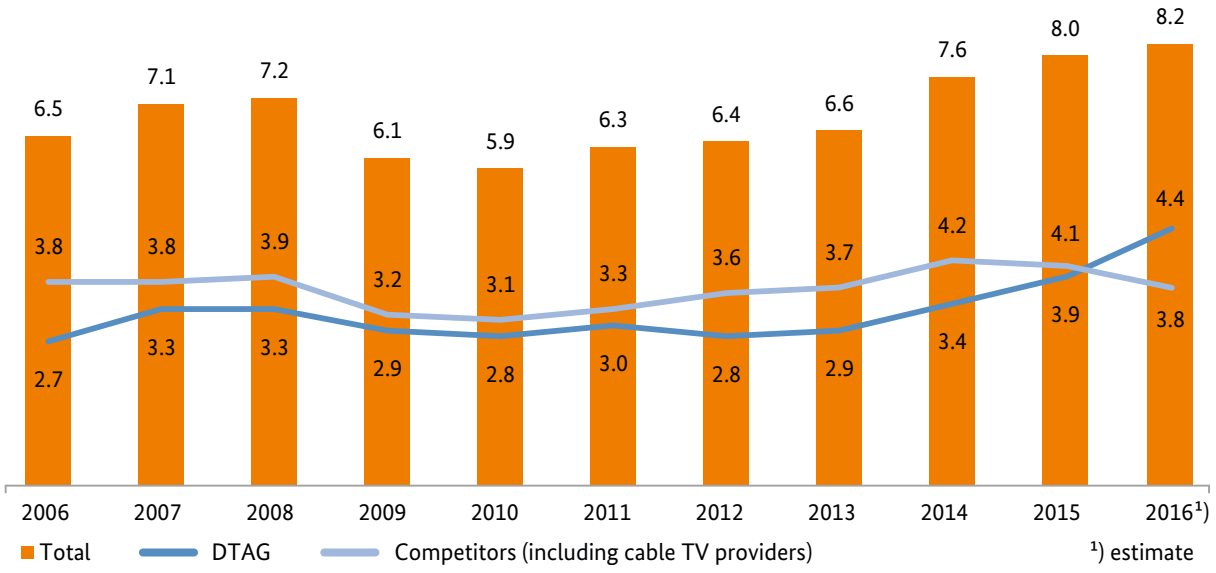


Investments in fixed assets

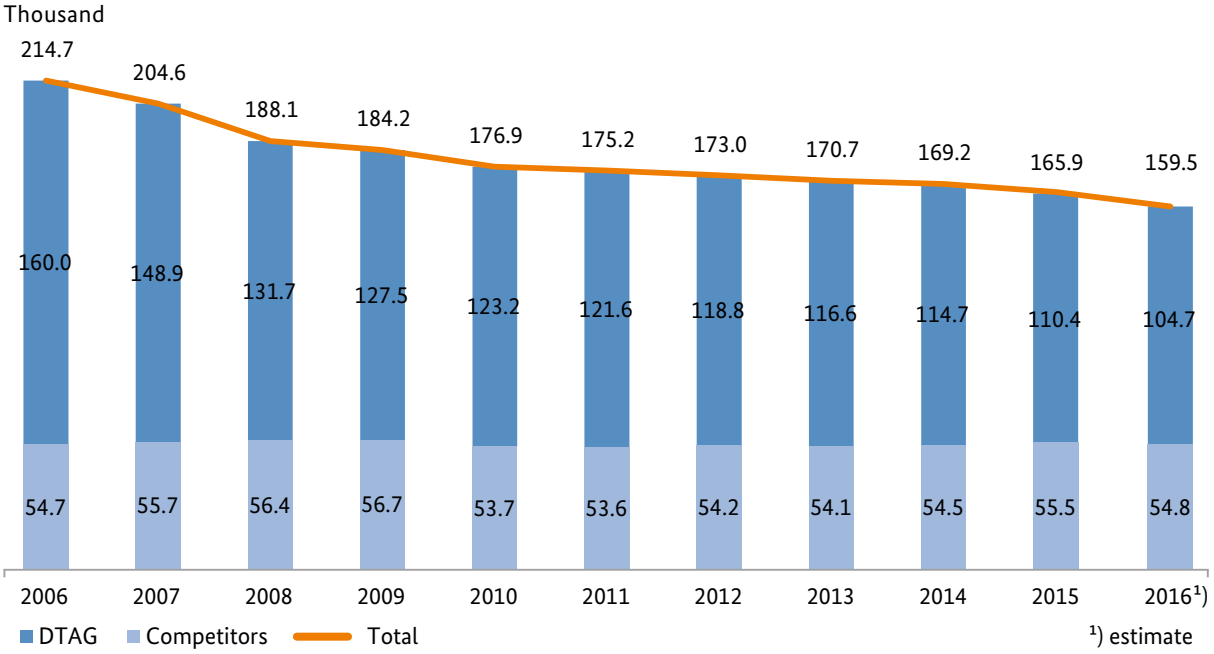
Investments in fixed assets in the telecommunications market increased once again in 2016, reaching €8.2bn according to initial calculations. This corresponds to an increase of €0.2bn compared with the previous year. This development was driven by higher investments by DTAG, which invested €4.4bn in 2016 compared with €3.9bn in 2015. Investments made by alternative providers fell by €0.3bn to €3.8bn. For the first time, the share of investments made by DTAG was therefore higher in the period under review than that of alternative providers.

Around €1.07bn was invested in the cable TV infrastructure in 2016 compared with €1.04bn in the previous year. In 2016 the share of investments in the cable infrastructure as a proportion of total investments in the telecommunications market remained constant year on year at 13%.

Investments in fixed assets in the telecommunications market



Employees in the telecommunications market



Companies invested mainly in the rollout of broadband and optical fibre networks, the changeover to IP-based networks and the rollout of LTE networks.

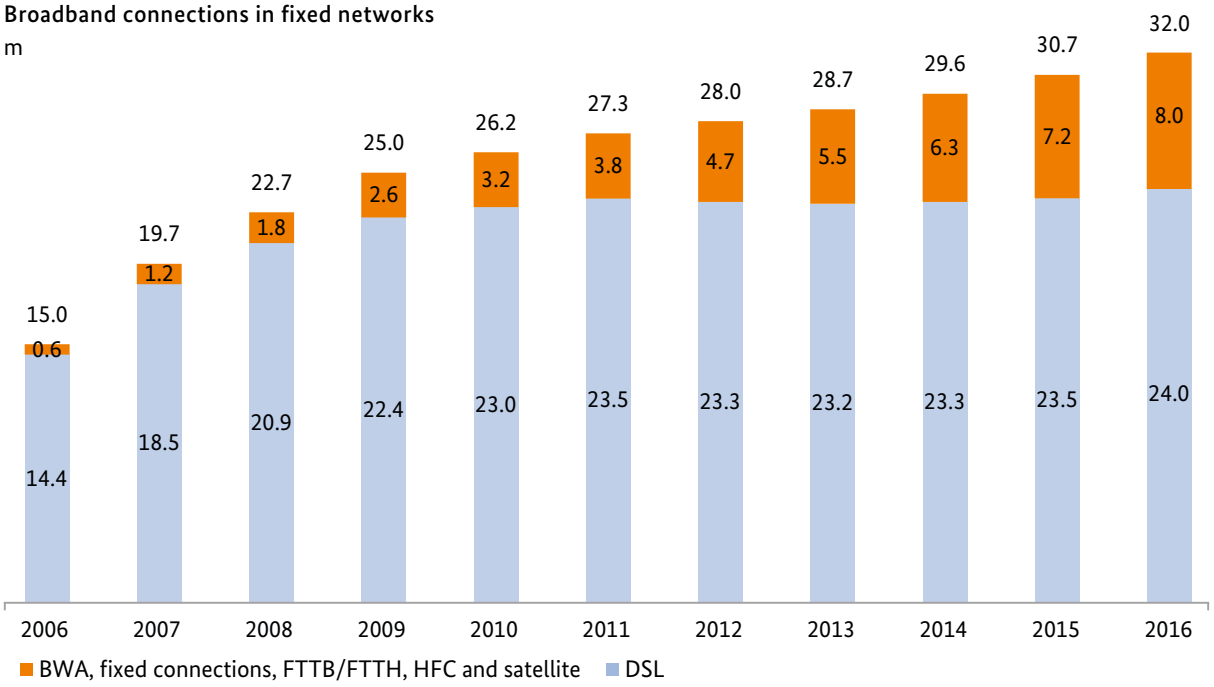
In the period from 1998 to 2016 a total of €136.4bn was invested in fixed assets in the telecommunications market. Of this amount, €71.2bn (around 52%) was invested by alternative providers and €65.2bn by DTAG.

Employees

Some 159,500 employees were employed by companies in the telecommunications market at the end of 2016, which is 6,400 or 3.9% less than at the end of 2015. The number of employees employed by alternative providers in 2016 fell by 1.3% to 54,800 compared with the previous year. Staff numbers at DTAG decreased by 5.2% year on year to 104,700 at the end of 2016.

These developments have been influenced by two factors. First, companies are being forced to realise efficiency potential due to increasing competition. Second, recent years have been characterised by technological advances, the innovative potential of which is best realised in a competitive investment. The investments made have enabled the provision of more telecommunications services of a better quality by fewer employees. This increase in productivity is particularly marked in the telecommunications sector and strengthens the competitiveness of the German economy.

Broadband connections in fixed networks



Fixed network

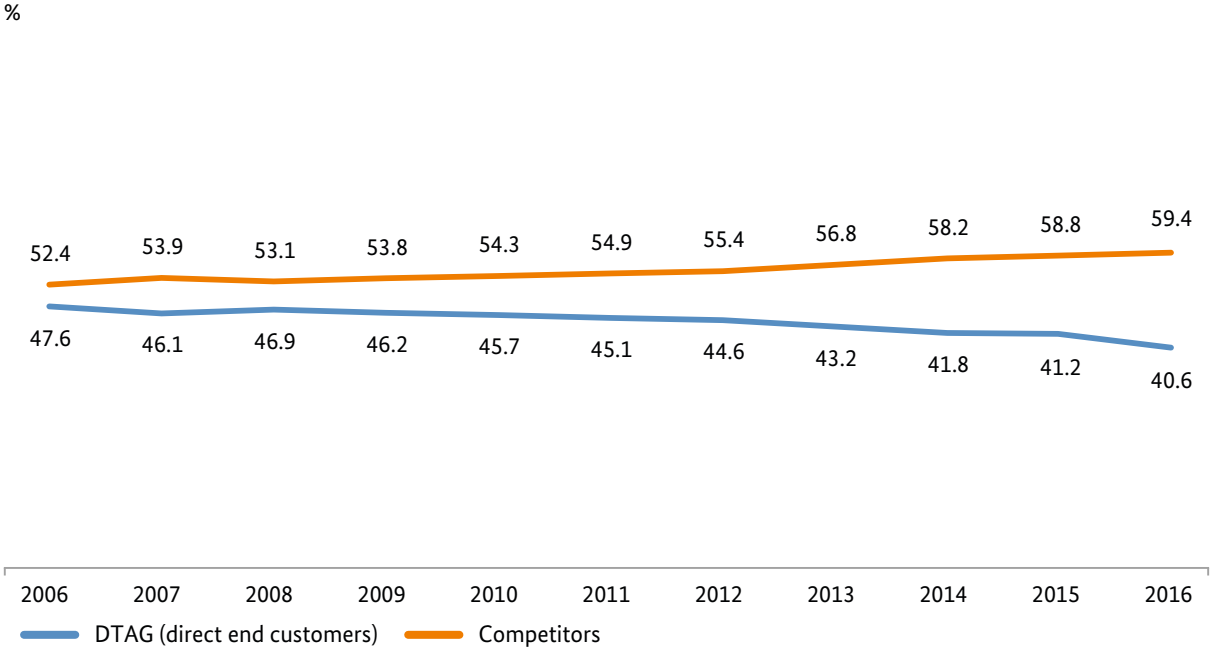
Broadband connections

The number of fixed-network broadband connections rose again in 2016 by approximately 1.3m to around 32m at the end of the year. This corresponds to a year-on-year increase of around 4%.

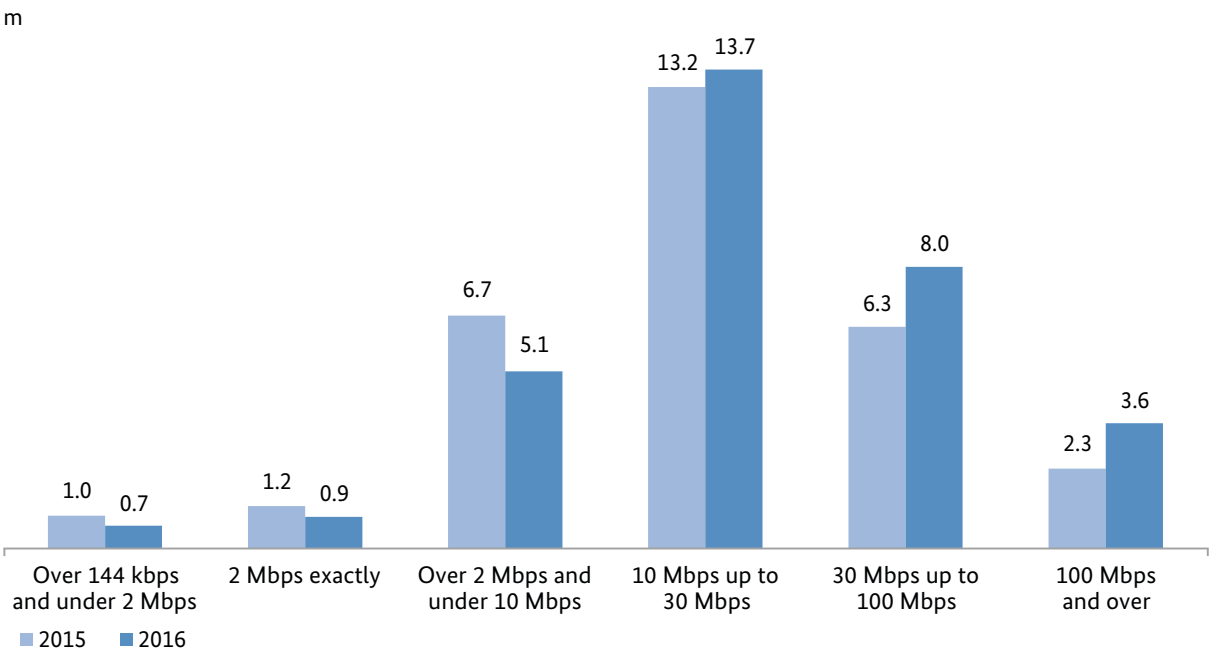
The majority (75%) of broadband connections are based on various DSL technologies.

Together, all other technologies accounted for approximately 8m connections. Most of these were based on HFC networks (7.2m), while around 0.6m were based on fibre-to-the-building (FTTB) or fibre-to-the-home (FTTH). The remaining 0.2m or so connections were broadband wireless access (BWA), fixed connections and satellite connections.

Share of broadband connections in fixed networks



Distribution of fixed-network broadband connections by speed



Due mainly to the market shares gained by HFC network operators, DTAG's competitors were able to expand their share of the broadband market slightly.

With regard to retail business, DTAG's competitors had achieved a market share of around 59% of all broadband connections by the end of 2016.

Transmission rates

The number of broadband connections with high nominal transmission rates increased again in the reporting period.

In particular, both the supply and demand of connections with speeds of at least 30 or 100 Mbps rose (by 33%) in 2016. By contrast, the number of broadband connections with speeds of less than 10 Mbps fell by 25%.

DSL connections

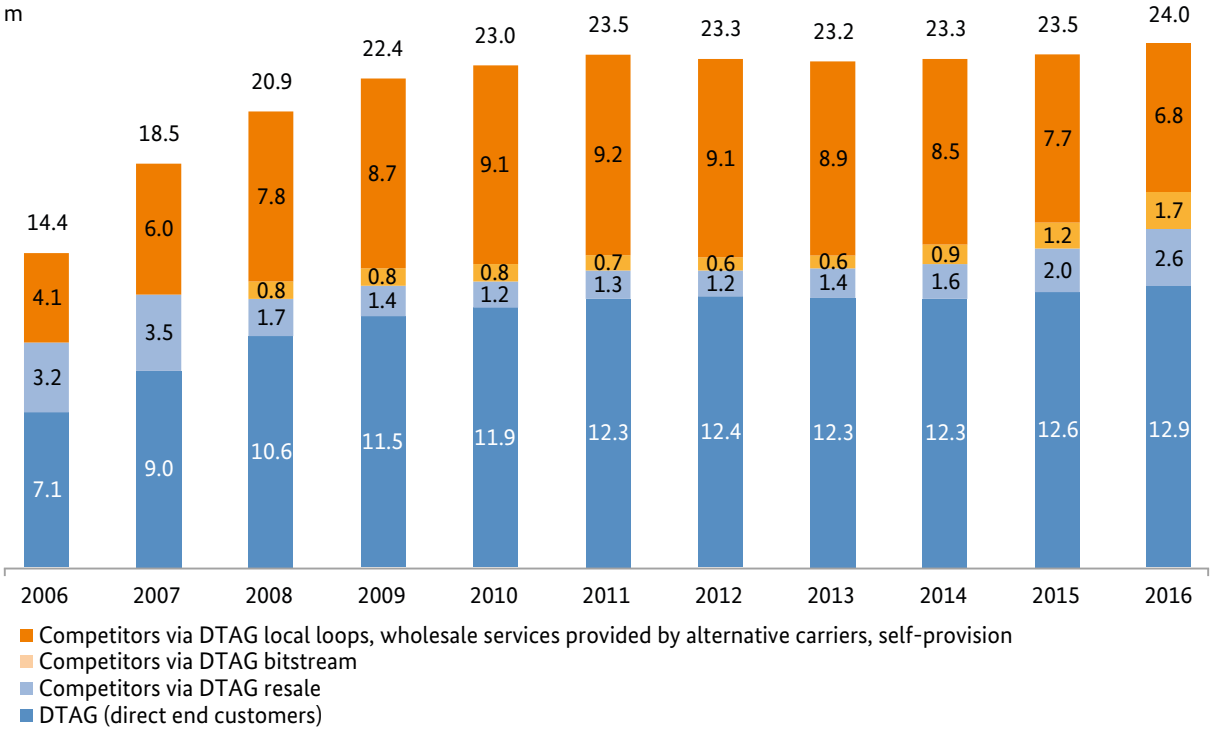
Following years of stagnation, a significant rise in the number of DSL connections was observed in 2016 (up 0.5m). In total, there were approximately 24.0m operational DSL connections at the end of 2016, around 12.9m of which were attributable to direct end customers of DTAG and around 11.1m to competitors, which primarily marketed DSL connections to customers on the basis of the specific wholesale products of DTAG and alternative carriers. Based on these figures, DTAG's competitors had achieved a market share of around 46% by the end of 2016.

In 2016 the growth of the DSL market was driven primarily by the positive development of the number of VDSL connections. With around 7.2m connections (up 50% on the previous year), VDSL accounted for a share of around 30% of all DSL connections at the end of 2016. Around 3.0m VDSL connections were provided by DTAG's competitors and around 4.2m by DTAG.

It is currently expected that vectoring technology will lead to a further rise in the importance and spread of VDSL. In theory, this technology currently enables transmission rates of up to 100 Mbps based on VDSL connections. According to preliminary calculations by the Bundesnetzagentur, around 6% of active VDSL connections were capable of such nominal data rates (100 Mbps) at the end of 2016. In total, an estimated 20% of active VDSL connections had a vectoring profile at the end of 2016.

At the wholesale level, the increasing significance of VDSL led to a considerable rise in demand for DTAG's

DSL connections

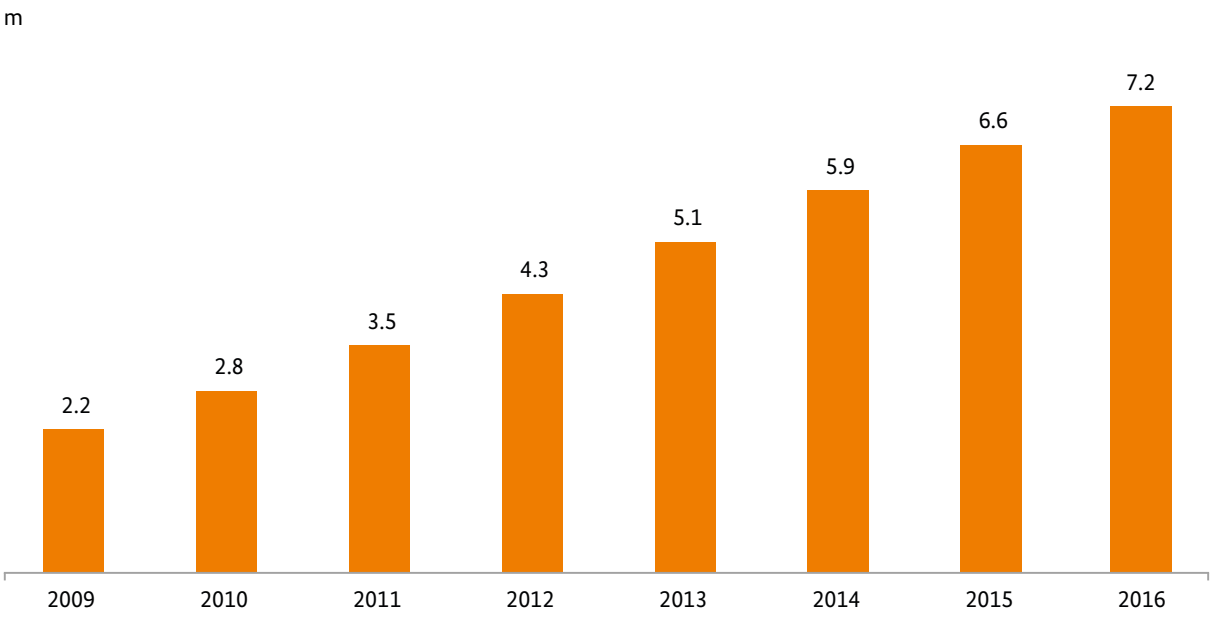


VDSL wholesale products. Here, demand for both bitstream and resale wholesale products increased considerably by 1.1m. By contrast, demand for DTAG's high bitrate, unbundled subscriber lines fell further in 2016.

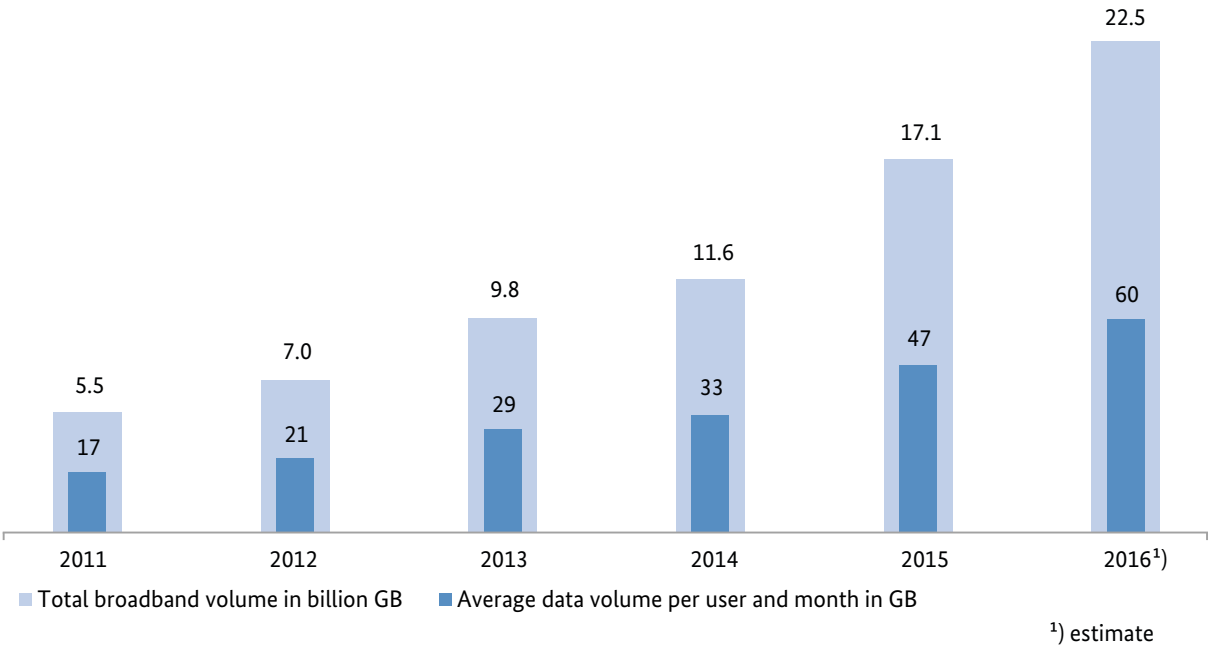
Broadband connections via HFC networks

At the end of 2016 there were around 7.2m connections via HFC networks, which represents a year-on-year increase of 600,000. Of these, almost 2.8m had delivering speeds of over 100 Mbps. These networks, based on optical fibre and coaxial cables, in conjunction with the DOCSIS 3.0 transmission standard, enable broadband services with download speeds of up to 400 Mbps.

Broadband connections via HFC networks



Broadband data volumes in fixed networks



Broadband connections via FTTB/FTTH

Thanks to their outstanding technical properties, optical fibres are considered to be the ideal infrastructure for data transport and the transmission medium of the future. Limited by geographical availability, demand for both FTTB and FTTH is still relatively low. At the end of 2016 there were just under 324,000 FTTB connections and around 252,000 FTTH connections. With around 2.4m connections available to customers, the potential offered by this infrastructure is much greater.

Satellite broadband connections

Satellite systems make it possible to access the internet from virtually any location. Just under 26,000 customers were using this technology at the end of 2016. User numbers remain low due to the price advantage and higher speeds of cable-based alternatives. However, satellite internet connections can make a contribution to ensuring full broadband coverage in regions where other technologies are not, or not sufficiently, available.

Data volumes

The data volume per fixed-network broadband connection has risen significantly in the last two years.[1] The total data volume at the end of 2016 was approximately 22.5bn GB, which corresponds to a monthly data volume per user of around 60 GB.

If these estimates are correct, the data volume per fixed-network connection will have almost doubled in two years. The data volumes shown do not include data volumes from DTAG's internet-based TV service.

Bundled products

Bundled products which, in addition to a broadband connection, include at least one other telecommunications service (fixed-network telephony, TV or mobile services[2]) are now offered as standard by companies. Consumers who enter into a fixed-network and mobile contract with the same network operator can also take advantage of additional discounts and exclusive offers by bundling the two contracts. By offering such measures, providers are seeking to increase customer loyalty to their products.

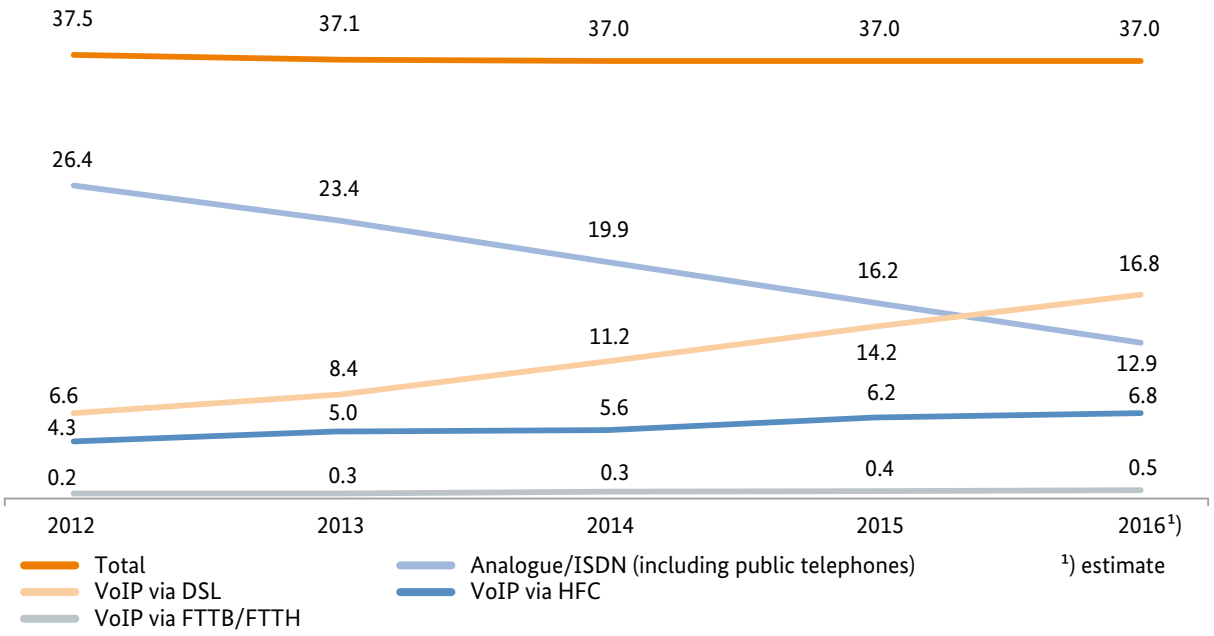
In mid-2016 DTAG and its competitors provided around 30m bundled products. With approximately 8.8m and 1.2m customers, respectively, the increase in the number of bundled products with three or four services was especially marked in the period under review. Bundled products consisting of three services usually include a TV component in addition to a broadband connection and telephone service. Packages with four services also include a mobile component. By contrast, the number of customers with packages consisting of two services fell to approximately 20m.

[1] Compared with previous publications, the data volumes for 2013 to 2015 have been adjusted to reflect new findings.

[2] No distinction is made between mobile voice and mobile data services.

Total number of telephone connections

m



Telephone lines and IP-based voice services

The last few years have seen contrasting trends in voice communication using conventional telephone lines (analogue/ISDN) on the one hand and access to IP-based voice services (VoIP via DSL, HFC, FTTB/FTTH) on the other.

While demand for IP telephony has increased, there has been a decline in the use of conventional telephone lines. Optical fibre telephony (FTTB/FTTH) continues to play only a marginal role. Overall, demand for voice communication services from fixed networks remained constant following years of decline.

In fixed networks, the number of DSL lines used for VoIP rose by 18% year on year to an estimated 16.8m at the end of 2016. This was mainly due to DTAG's switch to IP-based network technology. The number

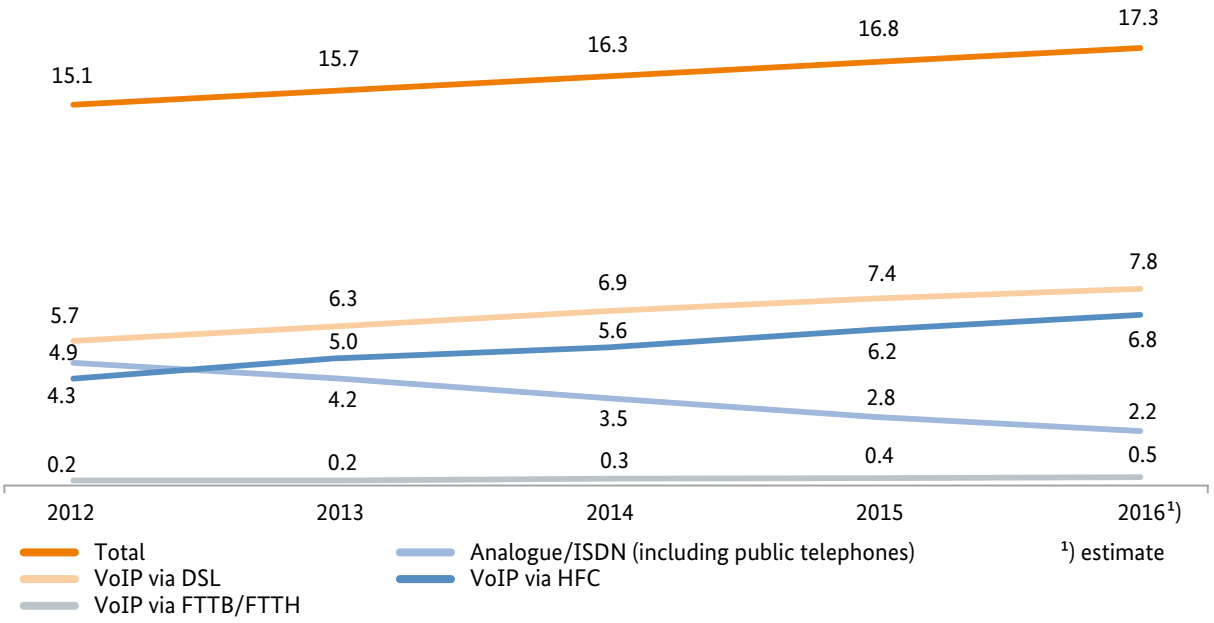
Telephone lines and IP-based voice services – competitors' shares

	2014			2015			2016[1)]		
	Total stock	Competitors' share		Total stock	Competitors' share		Total stock	Competitors' share	
	m	m	%	m	m	%	m	m	%
Analogue lines	**12.04**	1.01	8.4	**9.95**	0.81	8.1	**8.23**	0.63	7.7
ISDN basic rate lines	**7.72**	2.50	32.4	**6.13**	1.99	32.5	**4.57**	1.52	33.3
ISDN primary rate lines	**0.087**	0.03	34.5	**0.086**	0.03	34.9	**0.085**	0.03	35.3
Public telephones	**0.031**	0.001	3.2	**0.028**	0.001	3.6	**0.026**	0.001	3.8
VoIP via HFC	**5.62**	5.62	100.0	**6.21**	6.21	100.0	**6.82**	6.82	100.0
VoIP via FTTB/FTTH	**0.321**	0.300	93.5	**0.428**	0.393	91.8	**0.517**	0.461	89.2
VoIP via DSL	**11.21**	6.85	61.1	**14.21**	7.36	51.8	**16.79**	7.80	46.5
Total connections	**37.03**	**16.31**	**44.0**	**37.04**	**16.79**	**45.3**	**37.04**	**17.26**	**46.6**

1) estimate

Telephone connections from alternative subscriber network operators

m



of HFC connections used for telephony increased by approximately 10% to 6.8m. By the end of 2016 the number of voice lines in optical fibre networks had also risen to approximately 0.5m. At the same time, the number of conventional fixed-network analogue lines, ISDN basic rate lines and ISDN primary rate lines fell to around 12.9m. These lines are gradually being replaced by IP-based technologies, which now account for around 65% of connections. The total number of public payphones (coin- and card-operated) stood at around 26,000 at the end of 2016.

DTAG's competitors had an estimated 17.3m telephone lines and access points to IP-based voice services at the end of 2016. This represents a year-on-year increase of around 0.5m. While the number of analogue and ISDN basic rate lines provided by alternative subscriber network operators decreased further, their share of IP-based voice services continued to rise.

Relative to the number of fixed-network telephone connections provided by DTAG's competitors, DSL lines for VoIP accounted for a share of around 45% in 2016, which is significantly more than that of conventional analogue and ISDN lines (just under 13%).

At the same time, the share of DSL lines for VoIP was significantly higher than that of voice lines in HFC and optical fibre networks. Overall, around 87% of all competitors' lines were based on IP technologies at the end of 2016. For alternative subscriber network operators, conventional telephony via analogue and ISDN lines is now of little relevance.

The fixed-network voice communication services of alternative subscriber network operators are primarily operated on the basis of contracts on access to the DTAG local loop, or using the alternative providers' own local loops.

Call minutes in fixed networks

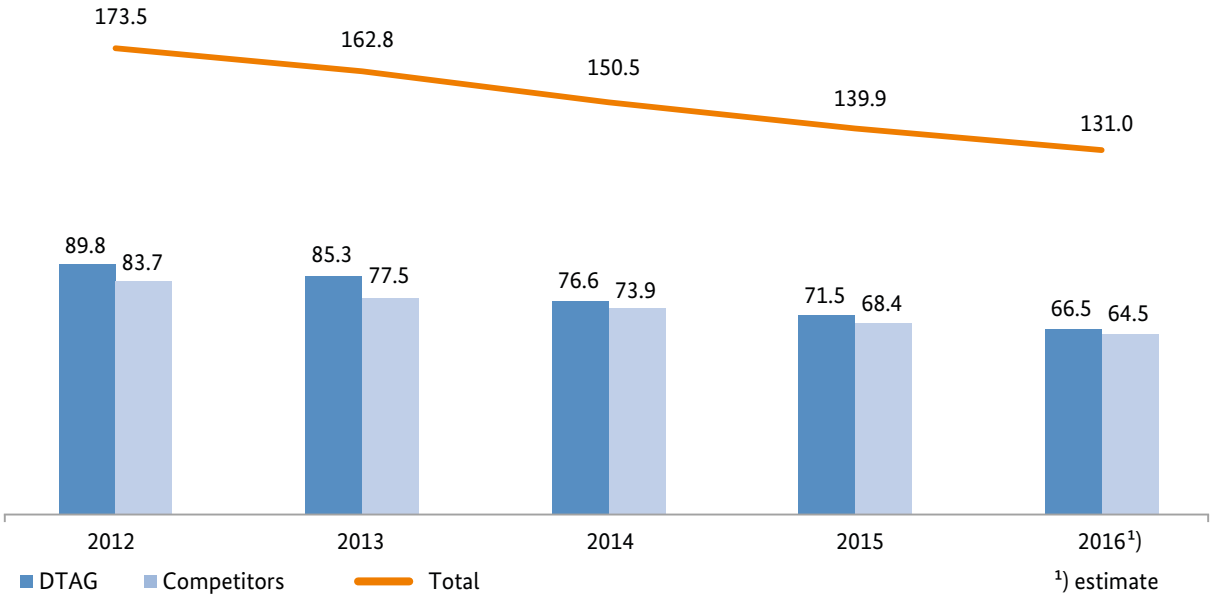
The volume of call minutes[3] within conventional telephone networks and IP-based networks continued to decrease. According to the Bundesnetzagentur's initial calculations, the total volume of call minutes in fixed networks amounted to around 131bn minutes in 2016.

This decrease is likely to be due, among other things, to the increasing use of internet-based mobile communication services (over-the-top services).

Calls within German fixed networks amounted to an estimated 111.9bn minutes in 2016. According to an initial forecast, around 78% of these were billed via flat

[3] Calls within Germany, international calls, and calls to German mobile networks.

Outgoing call minutes in fixed networks
bn



rates. In addition, calls to national mobile networks accounted for around 9.5bn minutes (around 19% flat rate) and calls to foreign fixed and mobile networks for an estimated 9.6bn minutes.

In total, around 64.5bn call minutes had been handled by DTAG's competitors by the end of 2016. The majority of these calls (51bn minutes) were made via IP-based networks. The volume of calls (9.8bn) made via conventional analogue or ISDN lines continued to fall.

Due, among other things, to DTAG's ongoing switch to IP-based network technology, this trend was also increasingly evident at DTAG. At the end of 2016 an estimated 40% of the 66.5bn call minutes handled by DTAG were handled via IP technology.

The Bundesnetzagentur estimates that almost 60% of all calls – ie more than half of all call minutes within fixed networks – were being handled via IP technology by the end of 2016.

Based on initial forecasts, indirect call-by-call and preselection calls handled by alternative providers accounted for a total of 3.7bn minutes – or around 6% – of all calls handled by competitors at the end of 2016, compared with approximately 7% in the previous year (see graph on page 57).

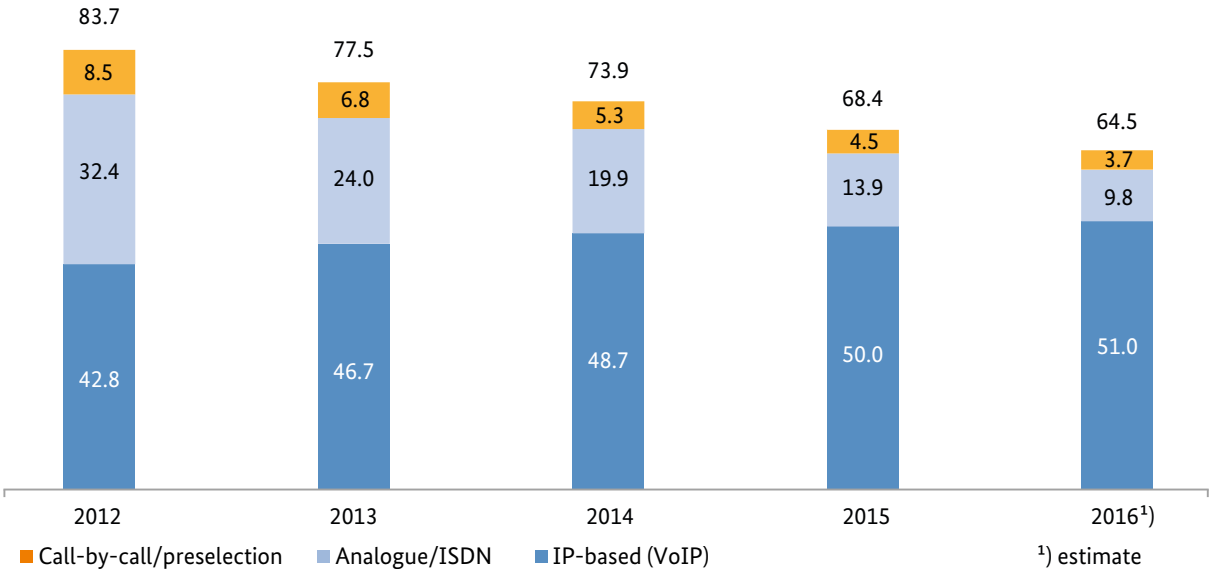
Despite a decrease in the number of lines with preselection in the DTAG network, preselection call volumes continued to exceed call-by-call. There were only just over 0.6m lines with preselection at the end of 2016, while an estimated 0.75m DTAG customers had an alternative provider set as their default provider at the end of 2015.

In general it should be noted when interpreting the above-mentioned call minutes that certain traffic volumes are not currently included in the Bundesnetzagentur's database. These primarily include voice transmission by over-the-top providers which do not operate their own fixed-network lines or telecommunications networks and which offer internet-based services independent of network infrastructure (eg DSL, HFC or optical fibre).

Subscriber lines

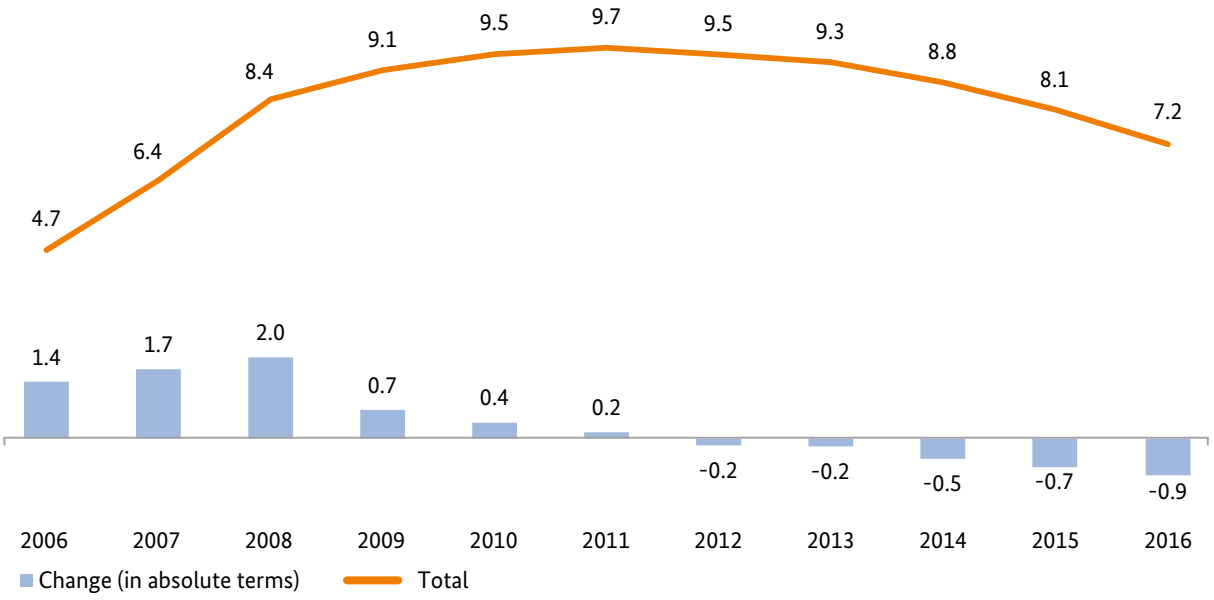
The number of local loops leased by DTAG's competitors in 2016 fell by approximately 0.9m year on year. In total, around 7.2m local loops were being leased at the end of 2016. Of these, an estimated 6.5m copper pairs were attributable to unbundled local loops and around 0.7m lines to the product variants known as local sub-loops from the sub-loop distribution frame to the end customer. The number of lines attributable to all other product variants remained marginal.

Call minutes via alternative providers
bn



Apart from the increase in local sub-loops, a significant overall decrease in the number of subscriber lines has been evident for several years. This is due to a shift in demand for wholesale services to DTAG's bitstream and resale products on the one hand and the fact that end customers are often using the services of cable providers on the other. Because cable providers have their own infrastructures for subscriber lines, they do not generally need to use DTAG's local loops.

Volume of leased subscriber lines
m



Mobile communications

Subscribers

At the end of 2016 there were 129.9m SIM cards activated by network operators.[4] A share of 7.7m SIM cards were used for data communication between devices (M2M) (end of 2015: 4.9m).

Statistically speaking, each inhabitant has around 1.6 SIM cards. However, the use of two or three devices means that these devices are not in constant use. If only active SIM cards are taken into account, the actual number is lower. SIM cards are defined as active if they have been used for communication in the last three months or if an invoice has been generated for the SIM card in this period. On this basis, data collected by the Bundesnetzagentur suggest that there were 115.2m active SIM cards at the end of 2016 (end of 2015: 111.7m), 22% of which were attributable to service providers (2015: 21%).

Around 730,000 SIM cards were used at a fixed location. The number of LTE SIM cards in active use had increased to around 39m by the end of 2016 (end of 2015: 27m). Active postpaid cards accounted for a share of 60% at the end of 2016 compared with 58% in the previous year.

Traffic volumes and usage

Mobile broadband

Mobile data volumes continued to rise sharply. In 2016 918m GB of data were transmitted via mobile communication networks (2015: 575m GB) (see graph 1 on page 59).

In order to use mobile data transmission services, the number of SIM cards being employed in UMTS- and LTE-enabled devices had risen once again to 63.1m by the end of 2016 compared with 58.5m in 2015 (see graph 2 on page 59).

Text messaging

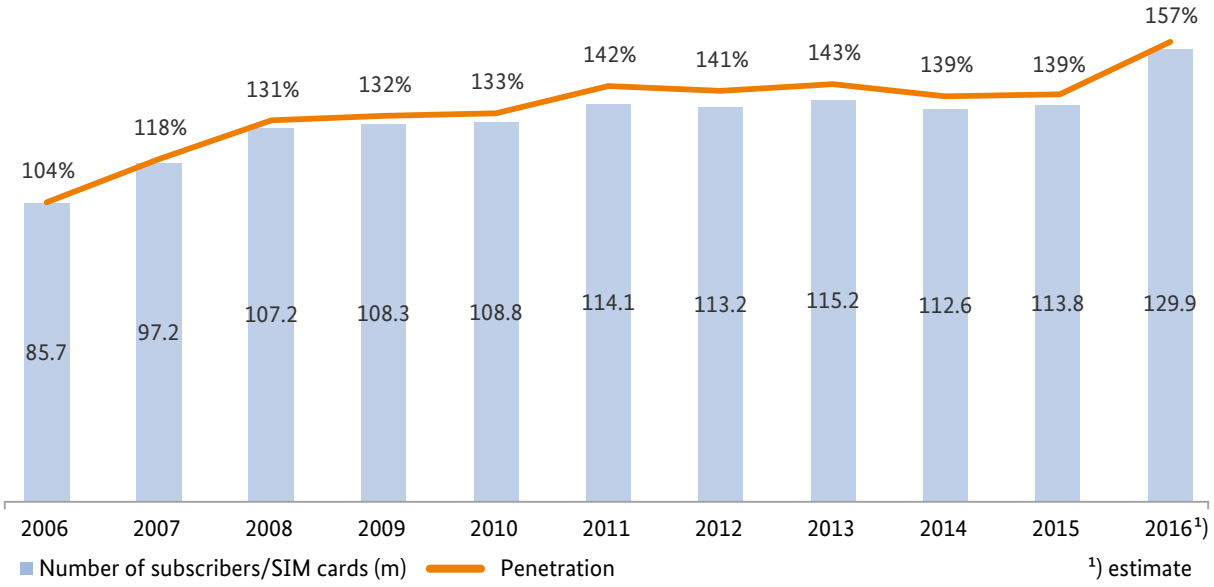
Another decline in the use of the Short Message Service (SMS) was observed in 2016. The number of text messages sent fell to 12.7bn in 2016 compared with 16.6bn in 2015. Owing to the growing number of smart phones, text messages are increasingly being replaced by messaging apps (see graph 1 on page 60).

Call minutes

Some 115bn minutes of outgoing calls were made by mobile subscribers in Germany in 2016. This is consistent with the volume in the previous year (see graph 3 on page 60).

In 2016 monthly revenue (excluding terminal equipment and VAT) per registered SIM card was around €13.[5] The average data volume used per month included in this amount has increased almost sixfold since 2012 (see graph 2 on page 60).

Subscribers and penetration in mobile communication networks

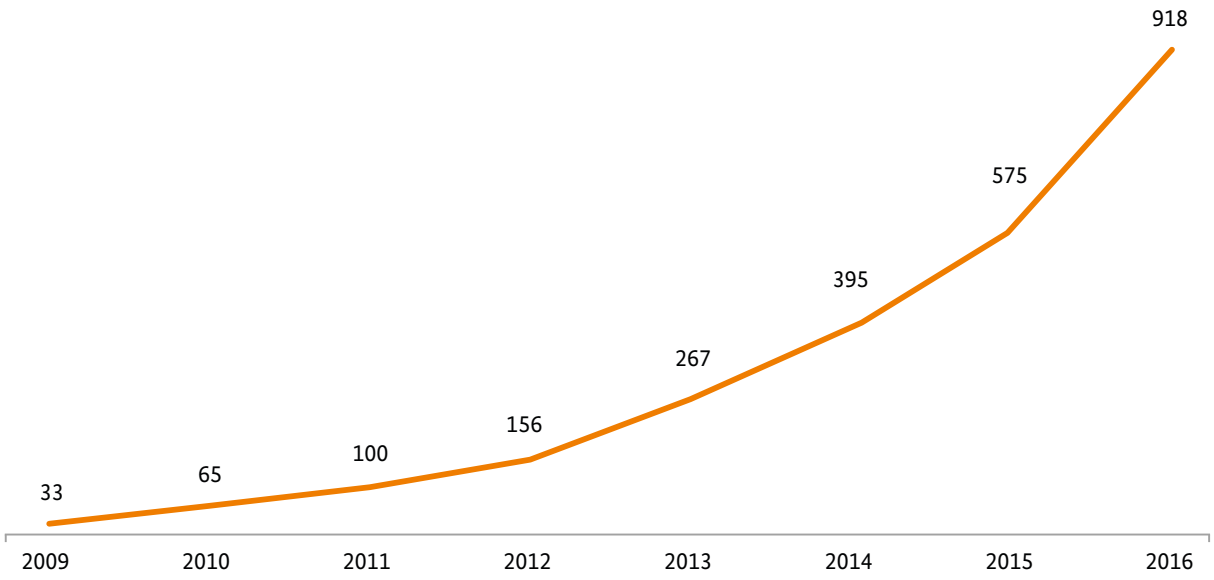


A significant share of the increase in registered subscribers in 2016 is due to changes in the counting method used by one provider.

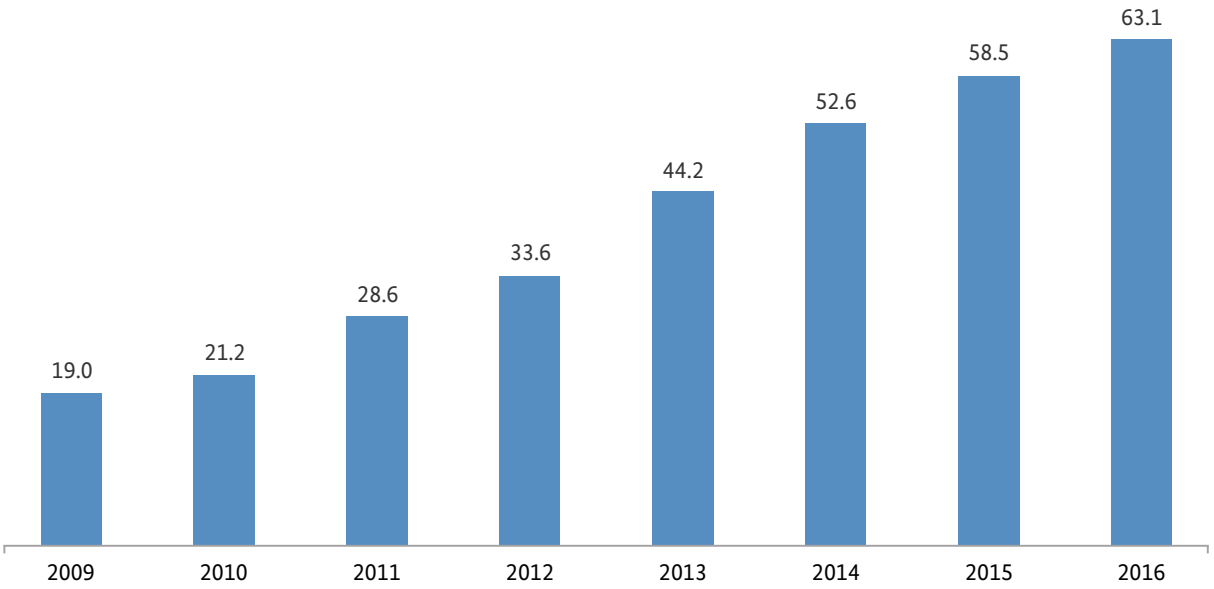
[4] There is no uniform definition of the number of SIM cards specified in the publications of network operators. Each company decides for itself how to count SIM cards and when adjustments are required.

[5] Owing to changes in the method used by one provider to count subscribers, a direct comparison of the data for 2016 and data from previous years is not possible.

Mobile data volumes
m GB

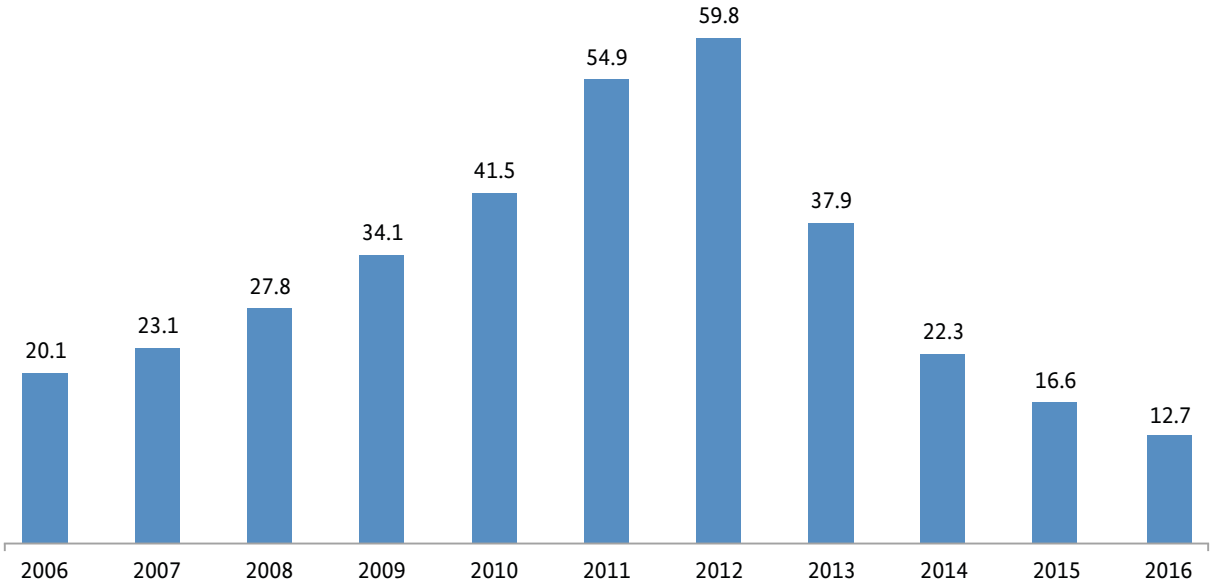


Number of regular UMTS and LTE users
m

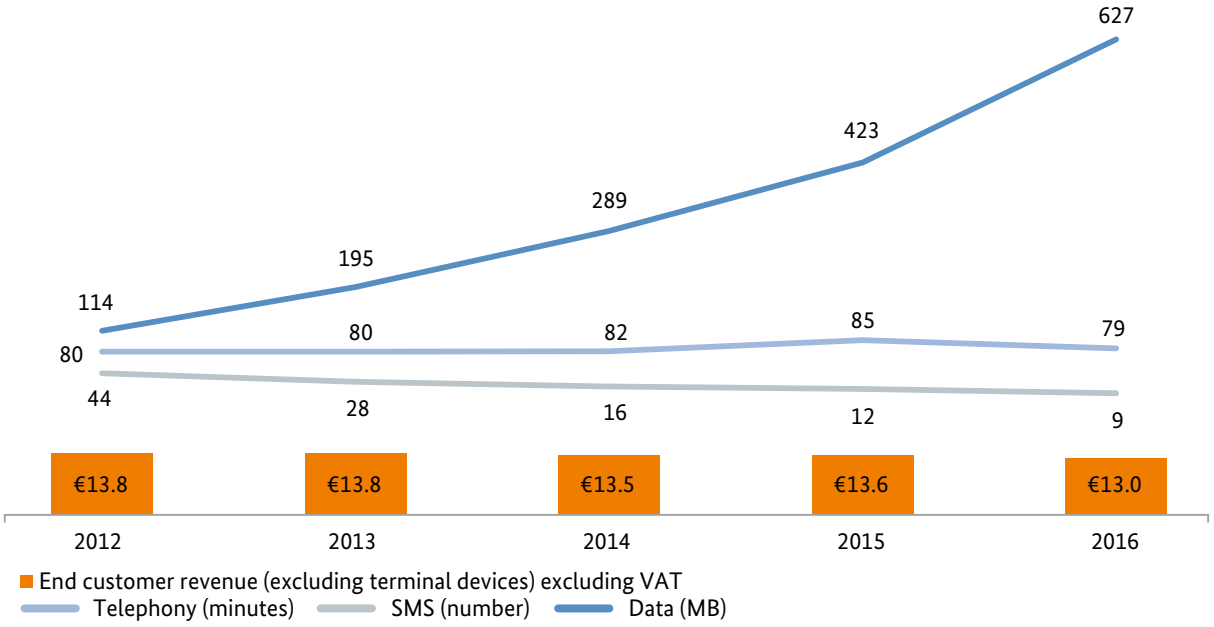


SMS sent

bn

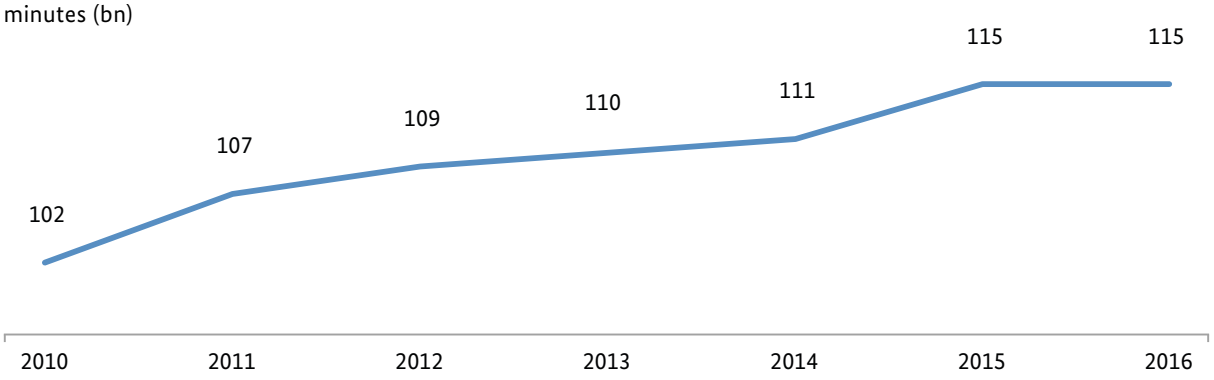


Revenue and services per SIM card per month



Outgoing call minutes in mobile networks

minutes (bn)



Infrastructure and network coverage

The LTE rollout continued at a brisk pace. At the end of 2016 there were 44,100 LTE base stations (2015: 40,900). DTAG had achieved LTE network coverage in relation to the population of 93% by the end of 2016 compared with 90% for Vodafone and 80% for Telefónica Germany.

Key figures and competitors' shares

The following table provides an overview of selected key figures and competitors' shares in the telecommunications market for the period from 2014 to 2016.

Key figures	2014	2015	2016
Revenue (€bn)	56.8	57.4	56.7 [1]
Investments (€bn)	7.6	8.0	8.2 [1]
Employees	169,200	165,900	159,500 [1]
Total fixed broadband connections (m)	29.6	30.7	32.0
– DSL	23.3	23.5	24.0
– HFC	5.9	6.6	7.2
– FTTB/FTTH	0.3	0.4	0.6
– Other	0.1	0.2	0.2
Broadband penetration rate (% of households) [2]	74	77	79
Total fixed telephone lines/access points (m)	37.0	37.0	37.0 [1]
– Analogue/ISDN (including public telephones)	19.9	16.2	12.9 [1]
– VoIP via DSL	11.2	14.2	16.8 [1]
– VoIP via HFC	5.6	6.2	6.8 [1]
– VoIP via FTTB/FTTH	0.3	0.4	0.5 [1]
DTAG leased subscriber lines (m)	8.8	8.1	7.2
Mobile subscribers (SIM cards in m) [3]	112.6	113.8	129.9
Mobile penetration rate (% of inhabitants) [3][4]	138.7	138.9	157.0

Competitors' shares %	2014	2015	2016
Revenue	56	56	56 [1]
Investments	55	51	46 [1]
Fixed broadband connections	58	59	59
DSL	47	46	46
Fixed telephone lines/access points	44	45	47 [1]

[1] Forecast figures

[2] Number of households according to Eurostat

[3] According to network operators' publications

[4] Number of inhabitants according to the Federal Statistical Office (DESTATIS)

Consumer protection and advice

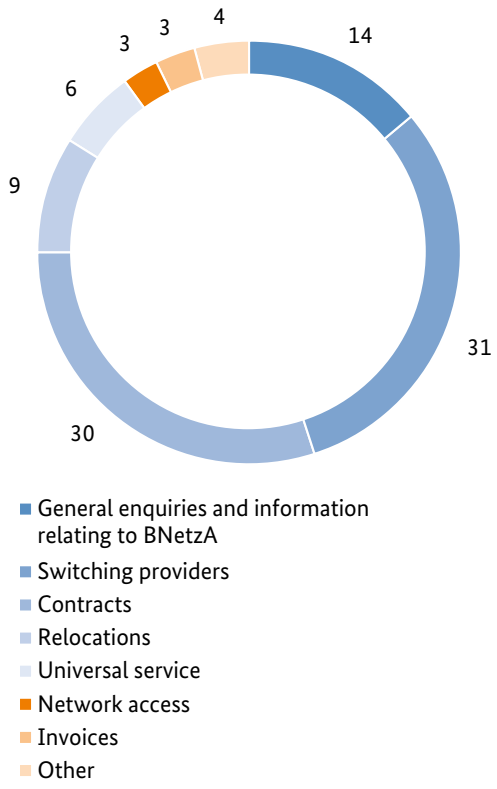
The Bundesnetzagentur's Consumer Advice Service received around 220,000 enquiries and complaints in connection with telecommunications this year. Once again, most of these related to problems switching providers and questions about the content of contracts. A rise in enquiries about the European Union's new roaming regulations was also observed from April. In 2016 fines totalling €895,849.00 were imposed due to unsolicited marketing calls and cold callers hiding their identity. The highest fine imposed in 2016 was €250,000. In 2015, the total amount was just €467,350.00.

General consumer enquiries and complaints

The Bundesnetzagentur's Consumer Advice service is an important point of contact for all consumer enquiries relating to telecommunications. It also acts as an intermediary between consumers, telecommunications companies and authorities. The number of enquiries and complaints rose once again in 2016. Nonetheless, around 83,000 consumer concerns were resolved. To ensure maximum consumer satisfaction, the Consumer Advice service focuses on addressing consumer enquiries quickly, competently and individually.

In addition to telephone enquiries, the majority of consumers chose to contact the Consumer Advice service in writing (mostly by e-mail). Consumers were also able to speak to the Consumer Advice service in person at its information stand at the German Federal Government's open day in Berlin in August 2016 and at the Deutschlandfest in Dresden on German Unity Day.

Main subjects of enquiries and complaints in connection with telecommunications
%



The main subjects of enquiries and complaints were the content of and compliance with telecommunications contracts, switching telecommunications providers, general enquiries relating to the Bundesnetzagentur and questions about the relocation of telecommunications services.

There were also a significant number of complaints about invoices and questions relating to network access and the universal service for consumers. The number of enquiries and complaints about broadband rollout almost tripled year-on-year (from 162 in 2015 to 466 in 2016). From April 2016 an increasing number of consumer enquiries relating to the European Union's new roaming regulations were also received.

The most commonly cited problem area in the contractual relationship between consumers and telecommunications companies is fault clearance in lines. Consumers also criticised the business practices and customer service of providers, in particular long call queues and long response times to complaints. More information is also clearly required with regard to the IP migration process.

Following a relocation, consumer complaints frequently related to the failure to provide a service or to changes in the content of contracts such as the contract term or data transmission rate. The number of consumer complaints regarding the realisation of agreed appointments with technicians was especially high. Those affected complained about technicians not turning up, about appointments being postponed at short notice and about receiving messages through their letterboxes.

Consumers also contacted the Consumer Advice service with questions about invoice items concerning call-by-call and premium SMS services as well as data and international calls. Further complaints related to invoice items for fee-based, third-party subscriptions where the consumer felt that contract conclusion was not transparent. Such cases cannot be assessed by the Consumer Advice service, as the conclusion of subscriptions is a matter of civil law. Consumers were not only dissatisfied with the lack of transparency but also with the way in which invoicing complaints were handled. They maintained that some companies failed to respond to their complaints and instead began issuing warnings straight away or involved debt collection agencies. Some complaints also related to line disconnection, even though the requirements for this under telecommunications law had not been met.

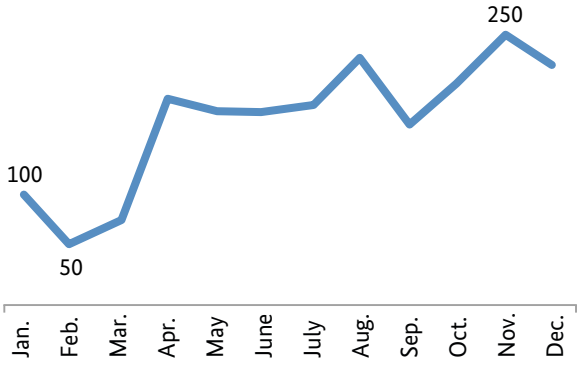
In general, it is clear that a lack of transparency regarding contractual arrangements, invoicing and communication with consumers has led to uncertainty. Against this backdrop, the Consumer Advice service's primary objective is to inform consumers of their rights and the obligations of telecommunications companies. The Consumer Advice service also works with companies to find viable solutions in individual cases and ensures that consumers can access telecommunications law in a straightforward and comprehensible manner. Because of the large number and wide variety of consumer enquiries it receives, the Bundesnetzagentur is also able to identify market trends and counteract problems at an early stage.

Dispute resolution

The Bundesnetzagentur's consumer dispute resolution panel acts as an intermediary within the scope of the TKG in disputes between customers and telecommunications providers. It aims to find a solution that is acceptable to both parties and thus avoid a legal dispute. Dispute resolution provides a fast, unbureaucratic and cost-effective alternative to civil proceedings. The Bundesnetzagentur's dispute resolution services are provided free of charge.

The Bundesnetzagentur received a total of 1,980 requests for dispute resolution in 2016. It also received 903 other enquiries and requests for assistance, in which informing consumers of their rights and assessing whether the facts presented could be resolved through conflict resolution were a key focus. The number of applications and requests therefore rose sharply again in 2016.

Dispute resolution applications in 2016



In 2016 the dispute resolution panel implemented the provisions of the Alternative Consumer Dispute Resolution Act (VSBG), which came into force in April 2016. As an official consumer arbitration body, it is one of the dispute resolution panels recognised by the European Commission.

Owing to the extensive media coverage of the Alternative Consumer Dispute Resolution Act and the Bundesnetzagentur's considerable efforts to raise awareness of dispute resolution, the number of applications for dispute resolution per month has more than doubled since April 2016. A similar trend can also be observed in the case of other enquiries and requests for assistance.

Of the applications for dispute resolution received in 2016, 1,614 proceedings were concluded by the end of the year. In the 366 proceedings still under way, the examination of applications or consultation with the parties concerned is not yet complete.

In the case of 766 applications, the prerequisites for initiating dispute resolution proceedings were met. In these proceedings, the parties reached an agreement in 64% of cases.

The percentage of proceedings in which the respondent chose not to take part in the dispute resolution proceedings, without offering a solution to the issue at hand, was 36%.

Disputes related in almost equal measure to fixed-network (including broadband cable connections) and mobile connections.

The percentage of dispute resolution cases pertaining to contractual matters was 46%. Most contentious matters related to the termination of contracts or the provision of contractually agreed performance levels, whereby lengthy periods of connection downtime and available data transmission rates were particularly common grievances.

The percentage of billing complaints was 25%. Most of these related to unreasonable call charges and subscription costs.

Some 13% of dispute resolutions proceedings were caused by technical problems, particularly the switch to IP technology and fault processing.

The remaining 16% of dispute resolution proceedings related mainly to line disconnection and difficulties switching providers and relocating.

Switching providers

When a switch of providers occurs, telecommunications providers and network operators have, for four years, had a legal obligation to ensure that there is no disruption to the service before the contractual and technical requirements for the switch have been met. Any disruption to the service must not last more than one calendar day.

In this connection, the Bundesnetzagentur has issued a determination on the "escalation of subscriber complaints relating to switching providers". The Bundesnetzagentur forwards consumer complaints directly to the relevant companies in each case if, in contravention of the statutory regulations, service is interrupted for more than one calendar day when switching providers. The companies should investigate each case together and bring the process to a successful conclusion within a short period.

In the event of a disruption to service, the Bundesnetzagentur provides a corresponding form for consumers to fill in on its website.

Since the third quarter of 2015, market-wide improvements in switching processes have given rise to a reduction in the number of complaints. This positive development continued in 2016, with a marked decrease in the number of complaints compared with the previous year. In 2016 the Bundesnetzagentur represented consumer interests in around 19,000 cases (including repeat enquiries). The number of escalation cases initiated also fell to around 3,000. However, it should be noted that telephone consultations on problems relating to switching providers are now recorded separately.

Despite the welcome decline in the number of complaints, efforts are still being made to further improve the switching process. To this end, the Bundesnetzagentur engages in continuous dialogue with companies and supports the ongoing automation of the switching process.

The Bundesnetzagentur will continue to channel all available legal resources into ensuring that the

regulations on switching providers are implemented in accordance with the law. In this context, the Bundesnetzagentur has fined four major companies a total of €300,000. These four providers account for around 70% of complaints received about switching providers. The appeals lodged by two of the companies are being heard by Bonn Local Court.

Transparency measures – publication of the Transparency Ordinance

On 19 December 2016 the Bundesnetzagentur issued the Telecommunications Transparency Ordinance (TKTransparenzV), which strengthens the information rights of end users vis-à-vis their fixed-network and mobile providers.

The Ordinance will – with a few exceptions – enter into force on 1 June 2017. Providers have six months to implement the new information and transparency obligations.

As a core element of the Transparency Ordinance for telecommunications, providers must draw up a product information sheet for every product that enables end users to access the internet. Consumers can therefore see the essential contractual provisions – including available data transmission rates, the duration of the contract, conditions for renewing and terminating the contract, and monthly costs – quickly and easily before concluding the contract. Customers are also made aware of which services form part of the contractually agreed data volume. In the fixed network, the minimum and maximum data transmission rates as well as the data transmission rate normally available must be specified.

To ensure that requirements are implemented consistently, the Bundesnetzagentur plans to publish a template for the product information sheet before the Transparency Ordinance enters into force.

Customers will also be informed on their monthly bills of the date upon which the contract began, the scheduled end of the minimum contractual period, the notice period and the last calendar day by which notice of contract termination must be received to prevent contract renewal. This makes it easier for consumers to switch providers.

According to the Ordinance, consumers have the right, from the connection date, to information on reliable measurement results for their internet connection, ie on the actual data transmission rate achievable. The

Telecommunications Transparency Ordinance

The Bundesnetzagentur's Transparency Ordinance improves the information which consumers must receive from providers of broadband connections. The new rights empower consumers and therefore improve competition in the telecommunications market.

On 1 December 2016 the Bundestag agreed to the Bundesnetzagentur's Telecommunications Transparency Ordinance. The Ordinance will – with just a few exceptions – enter into force on 1 June 2017. In the future fixed-line and mobile providers will be required to be more transparent when marketing their broadband connections.

The ordinance gives consumers the right to information on the actual data transmission rate which can be achieved. The service provider must therefore inform consumers of possible ways to test the speed. In future service providers must draw up product information sheets, where the consumer can quickly and easily see the essential contractual provisions before concluding the contract. The information sheet contains details of the data transmission rates available, the duration of the contract, the conditions for renewing and terminating the contract as well as the monthly costs.

service provider must therefore inform consumers of possible ways to test the speed, for instance by making them aware of the Bundesnetzagentur's measuring tool, which is available at *www.breitbandmessung.de*. It must be possible to save measurement results so that consumers can carry out several measurements and reliably document any discrepancies.

All consumers can, at no expense, find out which data transmission rate has been contractually agreed and what quality is actually being provided, and can inform their provider of any discrepancies between the actual and contractually agreed data transmission rate.

Measuring broadband speeds

The Bundesnetzagentur's test for measuring broadband speeds has been very well received by consumers since its launch in September 2015. Around 909,000 tests were carried out in the first year of the test, from 25 September 2015 to 25 September 2016. Around 520,000 of these were conducted using the broadband measurement app, and the majority of measurements were made via WLAN.

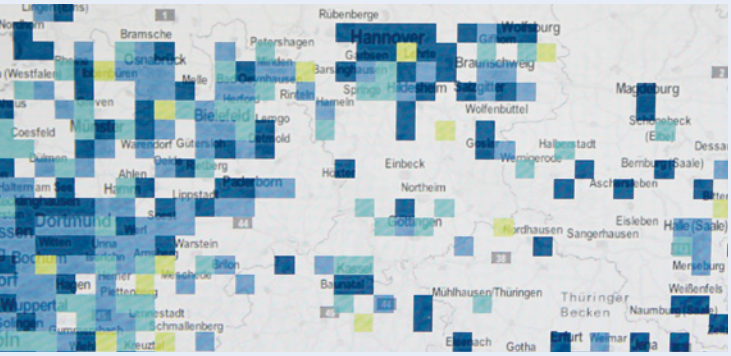
Using the broadband measurement test, consumers can quickly and easily measure the speed of their internet connection, regardless of provider or technology, and thus determine the performance of their fixed or mobile broadband connection. The test can be carried out free of charge for fixed connections at breitbandmessung.de. A free broadband measurement app is available for mobile connections. It can be downloaded for Android and iOS from the respective app stores. From a technical perspective, the actual measurement process is identical in both cases.

The individual measurement results can be saved electronically. End customers can carry out several measurements and compare these with each other. Many consumers use this option and take the broadband measurement test from time to time over an extended period to test the quality of their broadband connection.

The customer's tariff information is requested during the measurement process. Based on the specific tariff, the provider/tariff can be selected from a dialogue box. This greatly facilitates the assignment of

Measuring broadband speeds

Using the broadband measurement test, consumers can quickly and easily measure the speed of their internet connection, regardless of provider or technology, and thus determine the performance of their fixed or mobile broadband connection.



The Bundesnetzagentur's test for measuring broadband speeds, available at breitbandmessung.de, is provider and technology-neutral. It enables consumers to compare the actual data transmission rate of a broadband connection with the contractually agreed data transmission rate. The test results can be saved so that consumers can conduct several measurements and reliably document any discrepancies between the actual and the contractually agreed data transmission rate.

The aggregated results of successfully completed broadband measurements are published in the form of a map. This shows the data transmission rates measured for individual providers as well as the measured transmission rate as a percentage of the contractually agreed maximum data transmission rate. It is also possible to filter results by specific criteria, eg by provider and/or broadband category. Depending on the level of zoom, measurement results are shown in grids of varying size. Consumers can use the map to find out whether measurement results are available for their region and, if so, how they compare.

individual contract data. In conjunction with industry, further providers were added to the list in 2016. The list of tariff information is updated on an ongoing basis.

Numerous improvements have been implemented since the start of the second year of operation at the end of September 2016. For example, it is no longer necessary to install Java. The test therefore supports even more browsers. When measuring mobile broadband connections, it is now possible in the case of certain providers to request tariff information on an automated basis. Customer consent is required to do so.

In June 2016 the Bundesnetzagentur also published a map showing the broadband measurement results obtained through the test. With this map, the Bundesnetzagentur is helping to improve transparency in the telecommunications market. Customers can find out whether measurement results are available for their region and, if so, how they compare. The map shows the data transmission rates measured for individual providers as well as the measured transmission rate as a percentage of the contractually agreed maximum data transmission rate in aggregated form. The measurement results are published as a median in accordance with the relevant data protection regulations.

The broadband test was developed by Zafaco GmbH on behalf of the Bundesnetzagentur. The basis for measurement is provided by the transparency requirements of the Telecommunications Act (TKG) (sections 43a, 45n). End customers must be able to easily compare the level and quality of telecommunications services. The statutory regulations therefore state that the Bundesnetzagentur can either carry out its own measurements or develop tools which enable customers to carry out measurements themselves.

IP migration of DTAG

By 2018 DTAG wants to migrate its fixed network to IP-based telephony, where voice communication is transmitted in packet-switched mode. To achieve this, around 70,000 DTAG customers in Germany have been migrated to the new system every week since 2014. Other telecommunications companies in Germany are also focusing on IP technology and offering digital telephony via the internet.

For many DTAG customers, IP migration means change – not only due to the contractual implications. Contracts which, in some cases, have been in place for decades are being terminated by the company. It is also necessary to determine on a timely basis whether existing terminal equipment and special safety-related services (eg medical alarms, security alarms, fire alarms) still function in the IP world. Moreover, many consumers are concerned by the instances where the IP technology – and therefore the telephone service – has failed during the changeover phase.

The introduction of IP-based technology by DTAG is subject to very little regulatory control. Companies are free to decide what products they offer. No legal obligation exists to offer one or more specific types of connection, nor are companies obligated to seek approval from the Bundesnetzagentur for certain connection types.

With the aim of supporting the IP migration process and making this as consumer friendly as possible, the Bundesnetzagentur has engaged in structured dialogue with DTAG since 2015. The German federal states and the Federation of German Consumer Organisations are also involved in this process. Thanks to the great dedication of all involved, the Bundesnetzagentur has been able to initiate individual improvements for the benefit of consumers, particularly the establishment of a test centre at DTAG for special services. Here, tests can be conducted to determine, among other things, which medical alarm systems are compatible with IP technology. The service is used intensively by providers and industry. The Bundesnetzagentur has also succeeded in ensuring that DTAG takes a more transparent and consumer-friendly approach to communicating the contract termination process. In 2016 DTAG also introduced MSAN POTS cards, which translate analogue or ISDN telephony signals into IP signals. This means that consumers who only wish to use voice services, both now and in future, do not need to be actively migrated or have their contract terminated. As a complete substitute for existing analogue telephone services, the MSAN POTS card should also ensure the continued provision of telephone services in the event of a local power cut.

The Bundesnetzagentur believes that the steady reduction in the number of complaints regarding IP migration since 2015 is evidence of the fact that these and other results of the dialogue process contribute

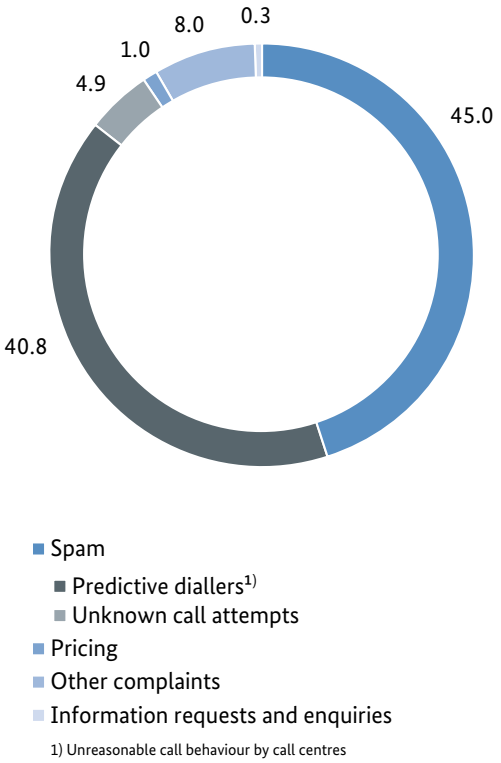
to higher acceptance of IP migration. Nonetheless, the Bundesnetzagentur will continue to monitor the migration process very carefully, with a view to minimising the impact of migration measures on customers wherever possible.

Combating number misuse

The TKG places responsibility on the Bundesnetzagentur for combating number misuse. This could involve the Bundesnetzagentur imposing fines for breaches of TKG consumer protection provisions, such as breaches of the rules on call price indication and pricing messages, or breaches of prohibitions on circumvention. It is also authorised to follow up on any breach of number use, particularly with regard to consumer and customer protection issues. In this connection, the Bundesnetzagentur consistently imposed fines for a wide variety of breaches of the Unfair Competition Act (UWG) once again in 2016. Most of the cases pursued in this context relate to regular, unreasonable disturbance caused by fax or SMS spam and misleading business practices. The primary aim of measures is to protect consumers and other market participants against disturbance and financial loss caused by number misuse.

In 2016 the Bundesnetzagentur received a total of 78,209 written complaints and queries about telephone number misuse. It also received 22,338 telephone enquiries and complaints about number misuse and unsolicited marketing calls. Compared with the previous year (77,772 and 22,085), the number of complaints therefore remained constant.

Main subjects of written complaints and enquiries in 2016
%



1) Unreasonable call behaviour by call centres

The Bundesnetzagentur opened 2,087 administrative proceedings in connection with number misuse last year. In 182 cases the Bundesnetzagentur ordered the disconnection of 3,128 phone numbers.[2] Billing and collection bans were also issued for 184 telephone numbers. A ban on billing means that the sums involved may no longer be charged. If consumers have already received an invoice but not yet paid it, the ban on collection applies. This prohibits the collection of relevant receivables, thus rendering number misuse economically unviable.

The Bundesnetzagentur also banned anti-competitive business models in three cases in 2016 and issued warnings in a number of cases.

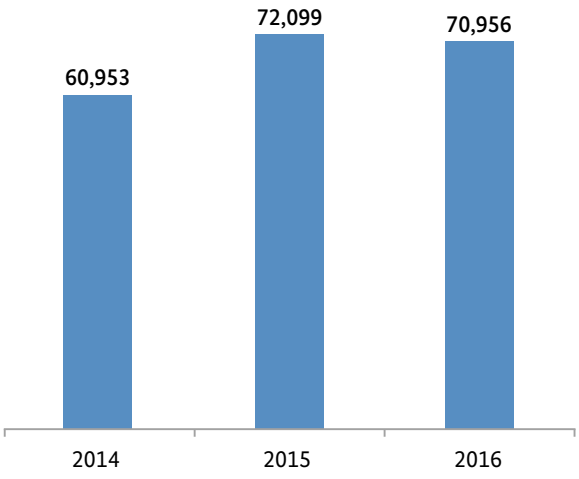
[2] In some cases, the Bundesnetzagentur also issued disconnection orders for legal reasons pertaining to numbering.

Spam

As part of its work combating number misuse, the Bundesnetzagentur is responsible for combating spam, whether telephone, fax or e-mail. The Bundesnetzagentur can only take action, however, if the spam can be related to a telephone number. Hence the criterion for intervention, even for email spam, is that a telephone number is given, perhaps as a contact number. Telephone spam covers spam texts, telephone prize scams, "missed call" scams and unreasonable telephone behaviour by call centres (predictive diallers).

For the first time, a separate category was created for "unknown call attempts". In such cases, complainants reported that, in their absence, they had received a missed call on their telephone display from an unknown number or that they had been called by an unknown number and therefore did not answer the call. In many such cases, there is a lack of the specific evidence of inappropriate behaviour required to open proceedings.

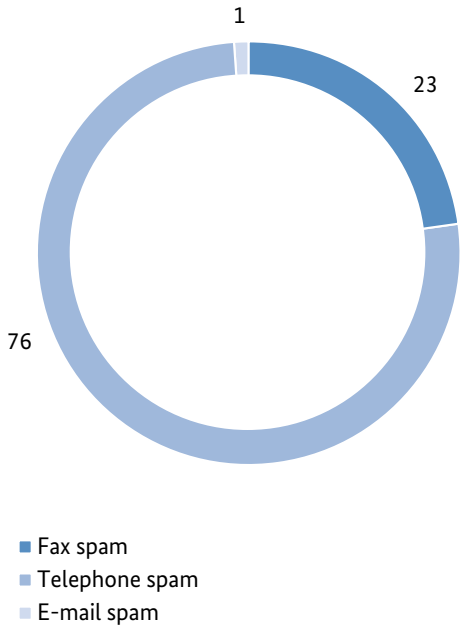
Written complaints about spam



The number of complaints relating solely to telephone number spam reached 70,956 in 2016. This represents a slight decrease in this category compared with the previous year (72,099).

Most complaints about call number spam received by the Bundesnetzagentur related to telephone spam (76%), followed by complaints about fax spam (23%) and e-mail spam with a related telephone number (1%).

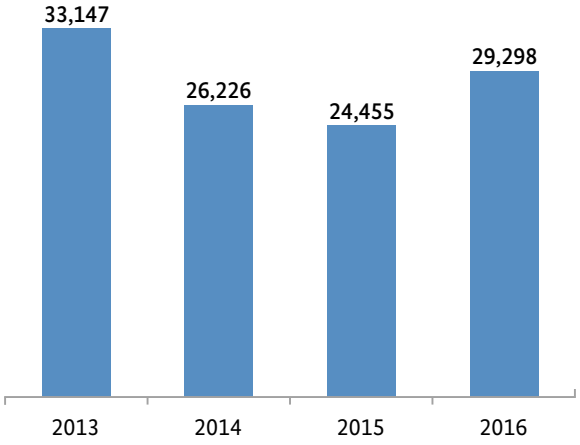
Breakdown of complaints about spam in 2016
%



Combating nuisance marketing calls

Cheaper gas or electricity, a new mobile phone contract, a free trial subscription or a particularly interesting financial product – in industries where competition is fierce, companies have to fight tooth and nail for each and every customer. Sometimes, they even resort to unfair practices, such as marketing calls without the consumer's express prior consent or marketing calls where the caller hides or even falsifies the telephone number. In addition to the above-mentioned 22,338 telephone enquiries and complaints about number misuse and nuisance marketing calls, the Bundesnetzagentur received 29,298 written complaints about unsolicited marketing calls and marketing calls from hidden numbers in 2016.

Written complaints about unsolicited marketing calls



The recent rise in the number of complaints shows that marketing calls are still very much an issue for the public and highlights how important it is for the Bundesnetzagentur to consistently take action against breaches of regulations in this area.

In 2016 97 regulatory offence proceedings were initiated. The Bundesnetzagentur also issued 23 fine notices due to unsolicited marketing calls and marketing calls from hidden numbers. Overall, fines totalling €895,849.00 were imposed. The highest fine imposed in 2016 was €250,000.

In the majority of cases, the declarations of consent presented by the relevant companies are invalid. These are often general declarations of consent which are inadmissible because they relate to a number of different industries, products and services. After consultation with the consumers, it also transpired in many cases that the data in the consent documentation presented (including dates of birth or email addresses) were invented and that consent had therefore not been given by the consumers concerned. Moreover, the marketing calls were not always customer friendly. One company in particular attracted negative attention through intimidating and aggressive marketing calls for pet food. In this case, the Bundesnetzagentur imposed a fine of €150,000 in 2016.

In 2016 the Bundesnetzagentur once again received a considerable number of complaints which related to criminal wrong-doing and therefore had to be handed over to the criminal prosecution authorities. In this context, the Bundesnetzagentur was able to, for example, attribute 1,469 complaints to an online scam known to target consumers through technical support calls. Particularly striking in this regard was the rapid rise in the number of complaints in a relatively short period.

As part of the evaluation of consumer protection regulations regarding unsolicited marketing calls, the Bundesnetzagentur continued to support the work of the Federal Ministry of Justice and Consumer Protection and factored the findings of fine proceedings into the evaluation process with a view to strengthening consumer protection. In this connection, the Bundesnetzagentur advocates greater market transparency and recommends the implementation of legally standardised documentation obligations for call centres and clients behind advertising campaigns. It believes that the core element of such documentation obligations should be the provision of detailed information regarding the form, duration and scope of campaigns. Such documentation should be submitted to the Bundesnetzagentur.

Universal service

Last year around 2,949 consumers wrote to the Bundesnetzagentur for support in matters concerning the provision of basic telecommunication services. Universal services are a minimum set of available services of a specific standard to which all end users, irrespective of their place of residence or work, must have access at an affordable price. DTAG provides the basic service in Germany on a voluntary basis.

For consumers, a large number of complaints submitted to the Bundesnetzagentur were prompted by delays in the provision of a telephone line. Here, the Bundesnetzagentur is regularly able to ensure a speedy and, in most cases, satisfactory solution for consumers.

The nationwide provision of public payphones and cardphones is likewise part of the universal service. At the end of 2016 an inventory of payphones and cardphones listed around 29,000 phones. At the same time, mobile communications have continued their extensive spread, now having reached more than 115.20 million SIM cards. The market developments in mobile telecommunications and the full coverage nationwide that has been attained with landlines have changed users' telecommunications behaviour and reduced demand for public telephones. Despite the measures adopted in the past, such as acknowledging the "basic telephone" as being a public pay telephone or cardphone, the number of extremely uneconomic locations of public telephones increased further in the period from January to November 2016.

Text and video relay service

Providers of publicly available telephone services must set up a text and video relay service for deaf and hearing-impaired people. The aim is to enable such individuals to have access to customary "voice" telephony. To do so, the deaf person sets up a video or data link to the text and video relay service, which then translates the message into spoken language. Conversely, the recipient's message is translated into sign language or written language. Through the text and video relay service, deaf people are able to make and receive calls to and from anybody participating in the service. The Bundesnetzagentur has been following this service since 2005 and since 2009 has put the regular operation of this service out to tender. Tess – Sign & Script – Relay-Dienste für hörgeschädigte Menschen GmbH has been commissioned to provide the service until the end of 2018. Due to rising user numbers and the associated increase in demand for sign language interpreters, the cost of financing the text and video relay service has also risen for companies. The Bundesnetzagentur therefore once again took appropriate measures in 2016 to ensure that the text and video relay service would also be financed by the telecommunications operating companies. Any remaining surpluses will be distributed in full to the telecommunications companies that were called upon to make payment.

eIDAS trust services – initial developments in the market

The European Regulation on electronic identification and trust services (eIDAS) came into force in all 28 EU member states on 1 July 2016. As a result of the eIDAS Regulation, the range of electronic services under German electronic signatures legislation has increased considerably. In addition to qualified electronic signatures and electronic time stamps, the new legislation covers electronic seals as company stamps for businesses and authorities and electronic registered delivery services for secure communication.

Remote electronic signature services are now permitted on the market for qualified electronic signatures. These provide a convenient, managed environment for signatories. The use of own equipment (such as card readers, signature cards or special software) is no longer required.

As the regulatory body responsible for the oversight of trust services, the Bundesnetzagentur enabled market access for a number of providers of registered delivery services in 2016. Demand for seal services and remote electronic signature services is high, and the first providers are set to enter the market soon.

The Bundesnetzagentur has actively contributed to shaping the legal framework for the eIDAS Regulation and laid the groundwork for national implementation. The Bundesnetzagentur is therefore helping to harness the economic potential of the services sector.

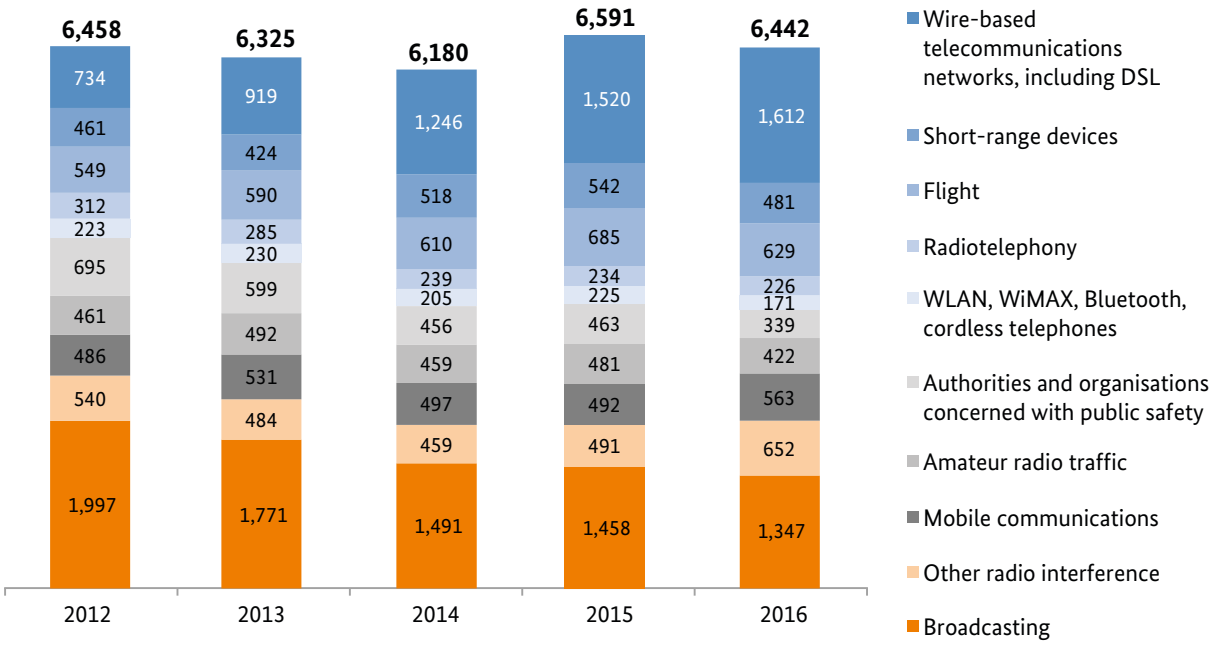
Investigating interference – the radio monitoring and inspection service

The Bundesnetzagentur also makes an important contribution to consumer protection through its radio monitoring and inspection service. An average of more than 6,000 cases of radio interference are investigated and eliminated on the ground by the radio monitoring and inspection service each year. As well as interference to safety-relevant radio applications, radio interference to the aeronautical service and interference to DSL connections, interference caused by pirate broadcasters such as pirate radio stations is also investigated and eliminated. In the area of radio piracy in particular, a significant rise in activity was observed in 2016. Thanks to its availability 24 hours a day, seven days a week and its nationwide presence in 19 locations throughout Germany, the radio monitoring and inspection service was able to respond quickly, identify the pirate broadcasters and, in conjunction with the Federal Agency for Technical Relief (THW), disconnect and dismantle the transmitters, some of which were very elaborate in design.

The number of interference cases reported to the radio monitoring and inspection service has remained relatively constant in recent years at an average of around 6,500. On closer analysis, however, significant changes are apparent in individual subject areas. The continuing decrease in cases of interference to broadcasting services is more than offset by the considerable increase in interference in wire-based telecommunications networks, including DSL, short-range devices and mobile services. Furthermore, due to continuous innovations in the radio sector the process of identifying and eliminating interference has become tangibly more complex, which is ultimately reflected in the increased outlay required to eliminate interference.

This trend is set to continue due to the ongoing broadband rollout and the introduction of further innovative radio applications in connection with, for example, the Industrie 4.0 initiative and autonomous driving.

Development of interference volumes by topic cluster from 2012 to 2016



Test purchases as a market surveillance instrument

The Bundesnetzagentur is the market surveillance authority responsible for electric and electronic devices and radio equipment. To this end, it conducts inspections throughout Germany and tests devices on a random basis.

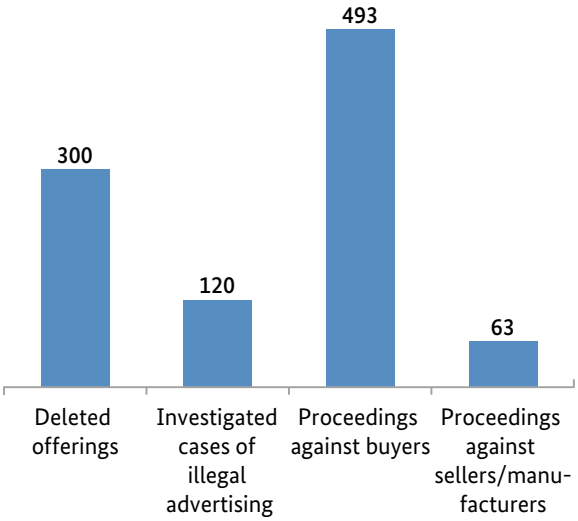
E-commerce is becoming an increasingly important sales channel. The recently amended Electromagnetic Compatibility of Equipment Act (EMVG) therefore enables the Bundesnetzagentur to conduct anonymous test purchases online as part of its market surveillance activities.

Experience so far shows that these test purchases help to make market surveillance even more efficient and target-oriented. Particularly noteworthy in this regard is the increased transparency with regard to the disclosure of the trading structures of the respective market players (manufacturers, retailers, importers and authorised representatives) and with regard to discrepancies between the description of a service and the product actually delivered. The role and involvement of fulfilment centres and B2B platforms in e-commerce are particularly important in this context.

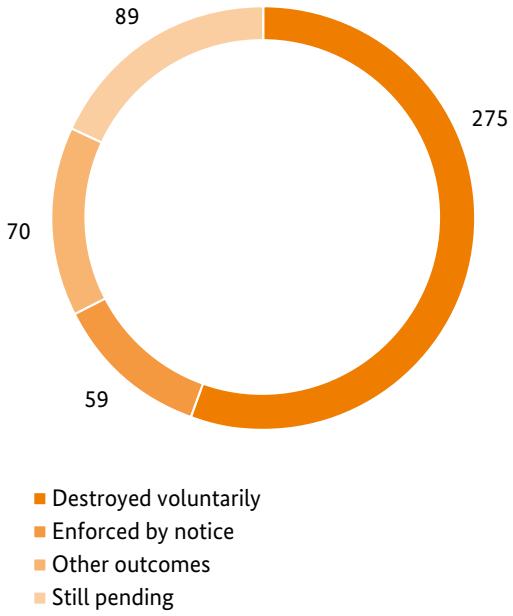
Misuse of transmitting equipment

Since the beginning of 2016, the Bundesnetzagentur has seen a rise in the unlawful possession and sale of espionage equipment. Such equipment includes cameras with a transmission function and bugging devices hidden in everyday objects. In addition, it is forbidden to advertise the fact that a device with a transmission function can be used for covert recordings. During the course of administrative proceedings, unlawful offerings and prohibited advertising are deleted from the internet, sales prohibited and existing devices destroyed. Failure to cooperate results in criminal charges. Consumers have been able to send the Bundesnetzagentur telephone or e-mail enquiries relating to this topic since mid-2016.

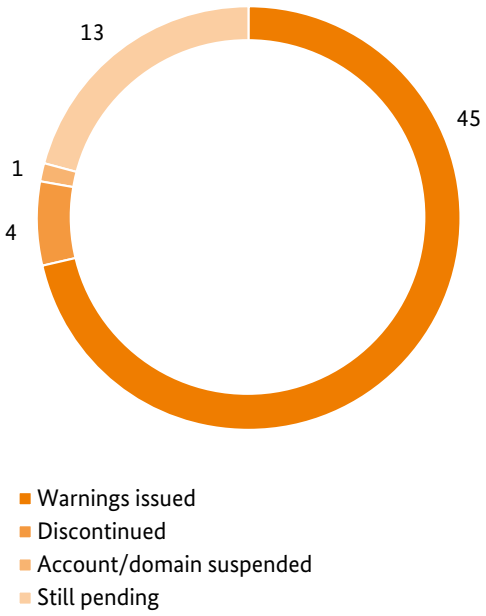
Misuse of transmitting equipment



493 proceedings against buyers



63 proceedings against sellers/manufacturers



Rulings, activities and proceedings

The Bundesnetzagentur published Points of Orientation for the provision of spectrum to promote the rollout of digital infrastructures. Suitable spectrum is to be made available at an early stage for the next generation of wireless mobile technology (5G). In doing so, the Bundesnetzagentur will be driving forward the rollout of digital infrastructures in Germany and enabling innovation in the context of smart cities, factories and homes.

Market regulation

Framework conditions for local loop access

Regulatory obligations

The local loop regulatory order issued on 1 September 2016 laid down the rules for the introduction of vectoring in proximity areas in the Telekom Deutschland GmbH network.

The order requires Telekom to continue to grant competitors access to unbundled local loops as a general rule. Telekom can refuse to grant competitors access to local loops in the direct environment of its main distribution frames (within 550 metres in terms of the length of the main cable running from the main distribution frame to the street cabinet), in other words in the proximity areas, if it using VDSL2 vectoring technology there to provide its lines. In that case, however, it must offer its competitors certain substitute products.

At the end of August 2016, prior to the order, Telekom had submitted a binding expansion and investment commitment, recorded by a notary, for the deployment of vectoring in proximity areas. Telekom committed itself to deploy vectoring in all the proximity areas in the country using its own resources.

Reference offers

Telekom Deutschland GmbH is required to publish its standard form of contracts for local loop access – the local loop reference offer – which is examined by the Bundesnetzagentur. As a result of the local loop regulatory order, Telekom had to amend its local loop reference offer in particular to take account of the planned introduction of vectoring in proximity areas. It also had to submit for examination a reference offer for the substitute VULA product to be provided at a street cabinet when vectoring is deployed.

These contracts lay down the technical, operational and legal details of the actual introduction of vectoring in a proximity area and also of a VULA product at the street cabinet.

The reference offers must meet the statutory criteria of completeness, reasonableness, fairness and timeliness and undergo a two-stage examination process. A minimum duration period is set for the final reference offer, which means that no changes may be made to the offer before the end of that period.

Vectoring – upgrading copper lines for faster internet

Vectoring is a technology that can be used to upgrade traditional copper telephone lines and increase line speeds by decreasing mutual interference between adjacent copper pairs.

After the European Commission, in mid-July, gave the go-ahead for the Bundesnetzagentur's decision and Telekom Deutschland GmbH submitted its binding expansion and investment commitments, the Bundesnetzagentur was able at the end of 2016 to close the regulatory proceedings on the deployment of vectoring in proximity areas.

One advantage of vectoring is that existing lines can be upgraded relatively quickly and cost-effectively. This can contribute to the Federal Government's goal of offering internet access with high speeds of at least 50 megabits per second to all households in Germany by the end of 2018. One disadvantage is that only one operator can deploy from any one cabinet.

The use of vectoring is key to rolling out broadband and securing fair competition for the benefit of the consumer. All companies are to continue to have fair and reliable conditions for their investments in modern broadband networks.

Charges

In the year under review, all the rates were finally set for the services provided in connection with local loop access. New monthly local loop rental charges were approved for the period from 1 July 2016 to 30 June 2019. The monthly charge for local loops accessed at a main distribution frame was set at €10.02 and for sub-loops accessed at a street cabinet at €6.77. Approval was also given for the one-off charges for the period from 1 October 2016 to 30 September 2018 for connection and cancellation and for extra services, such as provision at special times and fast repair. Lastly, new charges were approved for access by competitors to the passive access infrastructure of Telekom Deutschland GmbH. This includes sharing ducts and conduits, leasing dark fibre to connect street cabinets, and renting space in multifunction cabinets.

Layer 2 bitstream regulatory decisions

Bitstream access is a wholesale product combining broadband access and transport in the Telekom Deutschland GmbH network that enables competitors to provide ADSL, VDSL and in future fibre connections to their customers and offer broadband services, such as fast internet access, via these connections.

Layer 2 bitstream access provides a high-quality alternative for accessing local loops in network areas where vectoring is deployed. The Ruling Chamber's regulatory decision on layer 2 bitstream access has created balanced and reliable framework conditions that enhance future competition in the broadband market in the interest of the consumer.

Reference offer

Following thorough examination, extensive consultation with the competitors and completion of the EU consolidation procedure, Telekom Deutschland GmbH's reference offer for layer 2 bitstream access came into force, after the Ruling Chamber had made the necessary amendments to the draft submitted by the company. This standard contract sets out the specific administrative and operational conditions applicable to competitors seeking layer 2 bitstream access from Telekom. Competitors can conclude access contracts based on the standard form without first having to enter into lengthy negotiations. Competitors must offer a corresponding layer 2 bitstream product with essentially the same conditions when they themselves deploy vectoring at street cabinets outside proximity areas.

Charges

In addition to the access conditions, the rates for layer 2 bitstream access were approved. The rate approved for VDSL 16/25/50 Mbps was €18.56 and for VDSL 100 Mbps €19.10, while the monthly charge for ADSL was set at €15.17. Competitors committing to a minimum layer 2 bitstream access quota first make a one-off payment for the whole quota and are then entitled to a discounted price for the individual lines.

The charges also cover the transport of data traffic under bitstream access, known as "included traffic", which was calculated so as to accommodate the expected medium-term demand for bandwidth.

In addition to the key monthly access charges, approval was also given for the one-off charges for provision and cancellation of layer 2 bitstream access and the annual charges for the connection on the network side between Telekom Deutschland GmbH and the bitstream users.

Mobile call termination regulatory decisions

On 29 August 2016, the Bundesnetzagentur issued a total of seven regulatory orders relating to wholesale voice call termination on individual mobile networks. These orders reiterated, amended and set out various regulatory obligations for three mobile operators (Telekom Deutschland GmbH, Vodafone GmbH, and Telefónica Germany GmbH & Co. OHG together with its subsidiary E Plus Mobilfunk GmbH) and four virtual mobile operators (Lycamobile Germany GmbH, sipgate Wireless GmbH, OnePhone Deutschland GmbH [operating since 12 November 2015 as Voiceworks GmbH] and Truphone GmbH).

The operators were required to set their mobile termination rates using, for the first time, the pure LRIC model as recommended by the European Commission in its Termination Rates Recommendation, instead of the efficient operator benchmark previously used.

Following a detailed analysis of all the data and facts collected and assessment of the providers' interests and the regulatory aims set out in section 2(2) of the German Telecommunications Act, there had been – unlike in the last regulatory order – overriding reasons for introducing the pure LRIC standard for mobile termination rates in Germany, as had already been done in nearly all the other EU Member States. Unlike the full costing approach previously followed, the pure LRIC model only takes account of the incremental (ie purely supplementary) costs of providing call termination, resulting in lower termination rates.

On 30 November 2016, the Bundesnetzagentur, having received the applications from the companies concerned, provisionally approved the mobile termination rates to be applicable from 1 January 2016 to 30 November 2019, subsequently put out the rates for national consultation and then submitted them for comment to the European Commission, BEREC and the national regulatory authorities in the other EU Member States.

The mobile termination rate as from 1 December 2016 was set in each case at 1.10 ct/min. The rate is to decrease to 1.07 ct/min as from 1 December 2017 and then to 0.95 ct/min for the period from 1 December 2018 to the end of November 2019.

Fixed call origination and termination regulatory decisions

Following the President's Chamber determination on wholesale call origination and termination in public fixed telephone networks, the Bundesnetzagentur issued regulatory obligations for Telekom Deutschland GmbH for these markets. As in the case of mobile termination, Telekom was required to set its fixed termination rates in accordance with the European Commission's Termination Rates Recommendation, using the pure LRIC model instead of the efficient operator benchmark previously used.

Telekom's rates for fixed call origination and termination were subsequently approved. The call termination rate approved for the period from 1 January 2017 to 31 December 2018 was 0.10 ct/min. The call origination rate approved for routing calls from the Telekom network to competitors' networks – above all calls made on a call-by-call basis or using carrier preselection – was 0.23 ct/min. In addition to the basic call termination and origination rates, the charges based on these rates for routing calls to special rate numbers (0800, 0180 and 0900 numbers, etc) were also approved.

The Bundesnetzagentur also issued corresponding regulatory orders for 78 alternative access network operators for call termination in their networks. The President's Chamber had previously established that these access network operators had significant market power in the wholesale markets for call termination within their networks.

Framework conditions for VHF broadcast transmission
On 2 November 2016, the Bundesnetzagentur issued a regulatory order for Media Broadcast GmbH relating to the national markets for VHF transmissions and the (joint) use of VHF antennas.

The new order amended the existing regulatory rates provisions in light of developments in the first phase of opening up the market and in view of the forthcoming new approval period.

As a result, the wholesale rates for frequencies already in use were recalculated using the standard efficient operator benchmark, instead of the retail minus approach previously used. The order also amended the regulation of VHF end-user charges: as from 1 April 2017 the charges are no longer (partially) subject to approval but are solely subject to ex post abuse regulation.

The wholesale charges for more than 1,500 existing site/frequency combinations were subsequently approved with effect from 1 April 2017. Owing mainly to the new lease price model introduced by DFMG Deutsche Funkturm GmbH for antenna sites (and developed by DFMG in the course of abuse proceedings initiated by the Bundeskartellamt), there would have been considerable discrepancies between individual site/frequency combinations. The Ruling Chamber, in consideration of broadcasting interests, therefore capped the rate increase for each broadcaster to 15% and divided the remaining costs as a "common costs contribution" between all the other site/frequency combinations.

Rates for carrier leased lines
Telekom Deutschland GmbH is required to grant access to the terminating segments of leased lines with bandwidths of 2 Mbps to 155 Mbps (carrier leased lines), including access to the necessary collocation facilities and additional services. The access rates charged by Telekom are subject to approval. Telekom submitted follow-up applications for the annual charges for which approval was due to expire. Final approval was given with effect from 1 January 2017.

Regulatory order on wholesale call termination
The Bundesnetzagentur issued a regulatory order on wholesale call termination in the Telekom Deutschand GmbH network and call origination in public fixed telephone networks. The decision required Telekom to set its fixed termination rates using the more stringent pure LRIC model as recommended in the European Commission's Termination Rates Recommendation, instead of the efficient operator benchmark previously used.

Customer data
The Bundesnetzagentur examined several largely identical applications from publishers requesting dispute resolution proceedings. The publishers claimed that their cooperation partner Deutsche Telekom Medien GmbH (DeTeMedien) was charging them excessive costs for customer data for the joint publication of directories. No dispute resolution proceedings were initiated, since the matter is a case to be dealt with under civil law and thus not within the responsibility of the Bundesnetzagentur.

Investigation into Telekom Deutschland GmbH's winback activities
The Bundesnetzagentur investigated Telekom's activities to win back customers, following a report from a regional provider about alleged anti-competitive practices. A detailed investigation was carried out and no proceedings were initiated.

Spectrum management

"Frequenz-Kompass"
In July 2016, the Bundesnetzagentur published a "Frequenz-Kompass" document identifying the following areas for regulatory action in the field of spectrum management:

- spectrum distribution study,
- provision of spectrum at 2 GHz,
- provision of spectrum at 3.5 GHz and additional spectrum,
- service providers/MVNOs, and
- new entrants.

The rights of use in the 2 GHz and 3.5 GHz bands are set to expire at the end of 2020 and 2021/2022. This spectrum is needed for the rollout of digital infrastructures and the new generation of mobile communications. In particular the 3.5 GHz band is of special interest for the introduction of 5G, as there is a large amount of spectrum available in this band. The frequencies therefore need to be made available for re-use at an early stage to create legal and planning certainty for all market players.

But further bands – such as the 26 GHz and 28 GHz bands – are also to be looked at with a view to the future for viable broadband networks. Particularly large bandwidths could be made available in these higher frequency bands. This is a prerequisite for the success of Industry 4.0, automated driving, the Internet of Things and M2M.

The spectrum between 700 MHz and 2.6 GHz currently allocated for mobile communications can be used flexibly for 5G services as soon as the technology is available. The Bundesnetzagentur will provide the spectrum expected to be available for 5G applications in line with demand.

Consideration will be given, in providing spectrum, to the interests of new entrants as well, taking due account of the European Commission's measures accompanying the merger of the two mobile operators Telefónica and E Plus. The Commission's special measures for new entrants include enabling access to the merged company's spectrum assets in the 2 GHz and 2.6 GHz bands. The "Frequenz-Kompass" therefore also addresses the issue of whether, and to what extent, these measures need to be fleshed out or supplemented by regulatory action.

In addition to the provision of spectrum, the "Frequenz-Kompass" also raises the question of whether, and to what extent, it is necessary to address the issue of access rights for service providers and MVNOs beyond the year 2020. The current obligations to grant access to service providers will end when the rights of use in the 2 GHz band expire at the end of 2020.

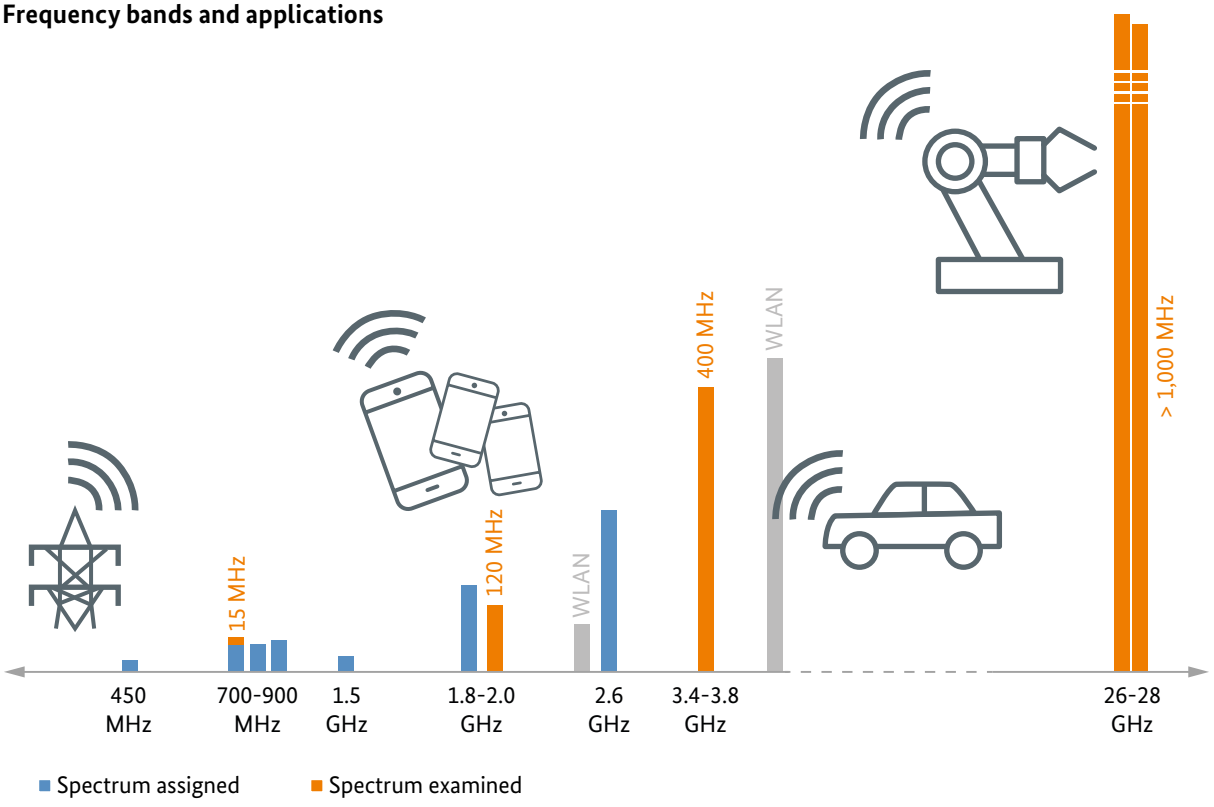
Points of Orientation

Points of Orientation for the provision of spectrum for the rollout of digital infrastructures were drawn up on the basis of the "Frequenz-Kompass" and were published for consultation in December 2016.

The Points of Orientation provide initial considerations on future frequency assignments as well as a detailed overview of the following frequency bands:

- 700 MHz centre gap,
- 2 GHz,
- 3.4–3.8 GHz,
- 26 GHz, and
- 28 GHz.

Frequency bands and applications



The rollout of 5G infrastructures will enable a large number of innovative applications and possible uses of the spectrum. These have an influence on the framework conditions for spectrum assignment. The Points of Orientation therefore invited companies to set out, in particular, their scenarios of use for the respective frequency bands.

Consideration must be given, in providing spectrum, to both the interests of the current mobile operators and those of new entrants, service providers and MVNOs, as well as small and medium-size enterprises and start-ups. Consideration must also be given to the interests of other user groups, especially current or adjacent spectrum users.

Clearance of spectrum in the 1800 MHz band accompanying the merger of Telefónica and E Plus
In 2014, the European Commission gave its approval under competition and antitrust law of the merger of the mobile operators Telefónica and E Plus.

The President's Chamber reached a parallel decision on the merger under telecommunications law. This decision stipulated in particular the return of spectrum in the 900 MHz and 1800 MHz bands by Telefónica/E Plus before expiry of the assignments and close in time to the reallocation of the "GSM spectrum" (2015 auction).

In September 2015, Telefónica and E Plus were granted specific approval to share their spectrum. At the same time, the company undertook to clear 2 x 24.8 MHz (paired) in the 1800 MHz band ahead of schedule.

Telefónica reported on a monthly basis on its progress in vacating the spectrum and was able to meet the deadlines to clear the spectrum at regional and national level by 31 December 2015 and 30 June 2016. The rights to use this spectrum were originally set to expire on 31 December 2016 and were not re-purchased by Telefónica in the 2015 auction.

It was therefore possible to assign the vacated spectrum to the competitors Telekom Deutschland GmbH and Vodafone GmbH in 2016, earlier than scheduled.

Spectrum distribution study
The President's Chamber, in its telecommunications law decision on the merger of the mobile operators Telefónica and E Plus (BK1 13/002), decided that there was no need for short-term action in terms of redistributing the spectrum in the 2 GHz band. However, taking into account all the facts – and especially the outcome of the spectrum auction held in 2015 – it was decided to carry out a study into the distribution of spectrum following the merger.

As a result of the auction in June 2015, some of the spectrum was redistributed among the mobile operators. A consultation with the operators and other interested parties on the post-merger distribution of spectrum, in particular in the 2 GHz band, was therefore held in 2016.

The Bundesnetzagentur sees no need for further clarification of the status quo. However, before the study can be completed, consideration must be given to the fact that a significant number of the rights of use in the 2 GHz band are set to expire at the end of 2020 and that the spectrum needs to be re-assigned in open, transparent and non-discriminatory proceedings.

Digital transformation

Comments on "Digital Platforms" Green Paper
With the presentation of the "Digital Platforms" Green Paper at the expert dialogue on a regulatory framework for the digital economy on 30 May 2016, the German Federal Ministry of Economic Affairs and Energy opened a public consultation procedure on rules and frameworks for digital platforms.

The Bundesnetzagentur took part in the consultation, submitting a detailed response to the twelve propositions and 52 questions set out in the Green Paper. In its response, the Bundesnetzagentur called for an investment and innovation-friendly regulatory framework to help promote the rollout of high-speed digital infrastructures. It also addressed the issue of a level playing field between providers of traditional telecommunications services and over-the-top players providing communication services, such as messaging services, over the open internet. The Bundesnetzagentur's response also placed focus on data protection and data sovereignty, consumer protection and the need for transparency, as well as procedural questions and institutional issues relating to, for instance, market surveillance, scientific support and appropriately allocating responsibilities between European and national level.

Managing the smart networking model regions project
The aim of the smart networking model regions funding programme launched by the Economic Affairs Ministry is to show how we can benefit from well-designed digital technology and smart networking projects and how we can use them in everyday life. The programme supports the Federal Government's cross-sectoral smart networks strategy.

The funding programme focuses on the systematic spread of digital technology in the five sectors of education, energy, health, transport and public administration, and on cross-sectoral networking between the players through the use of information and communication technology. The aim is to promote cooperation between players from industry, science and civil society as well as central, regional and local authorities.

The Bundesnetzagentur is responsible for managing the process and selecting the projects. In the first funding round providing up to €1.77m, approval was given for the first networking project. Further rounds will be held in 2017 and 2018 subject to the availability of funds.

Promoting machine-to-machine communications using public mobile networks

M2M communications refers to the mainly automated exchange of information between technical equipment and may be wireless or non-wireless. M2M applications are used primarily to automate industrial processes but are also found in the automotive industry (connected cars), consumer goods and households (smart homes), the energy sector, (smart meters), public infrastructures, and transport and logistics. They are seen as a growth area and many are intended for use in more than one country or even globally. The terminal equipment required for the applications is usually produced for the world market.

If M2M applications use mobile networks, both mobile numbers and IMSIs, which are required to address the mobile terminal equipment, are needed.

To promote such M2M commmunications, the Bundesnetzagentur issued rules allowing for IMSIs with Germany's country code to be used for M2M applications in other countries and for equipment with foreign IMSIs to be marketed in Germany. This means less administrative work and lower production costs for the telecommunications industry, insofar as other countries issue similar general or individual authorisations under their own legislation. The new rules are expected to provide a stimulus for growth, and increasingly more useful M2M applications are expected to take hold. Consumers and enterprises will benefit from the spread of innovative IT services and products. This will make a significant contribution to future phases of the digital revolution. As there are at present hardly any rules in place worldwide for the extra-territorial use of IMSIs, the Bundesnetzagentur – with its rules explicitly allowing this in Germany – has taken on an internationally leading role.

Until recently, IMSIs were programmed on interchangeable SIM cards. Now they are stored on e SIM cards – non-removable cards that are embedded in a device. The Bundesnetzagentur is working closely with market players and the Bundeskartellamt to ensure that the introduction of this new technology does not have a negative impact on competition or consumer interests.

"Digital transformation in network-based sectors" conference

The digital revolution is fundamentally changing our world and even today is significantly shaping our daily lives. And this development is also impacting on the network-based sectors regulated by the Bundesnetzagentur. In the postal market, for example, more and more products and services are being replaced by electronic substitutes, whilst the boom in e-commerce is driving strong growth in parcel volumes. In the energy sector, the spread of digital technology and networking processes are becoming increasingly important, especially in light of the growing need to integrate volatile feed-in from photovoltaic and wind power plants into the electricity grid. Digital technology also provides new opportunities for the rail sector, for instance through the use of intelligent IT applications at different levels of the value chain. In the context of this process of change, the telecommunications sector is taking on a key enabler role, without which many developments would not be possible.

Against the backdrop of the digital transformation, the Bundesnetzagentur held a high-ranking conference in Berlin on 9 November 2016. The idea behind the event was to bring together representatives from all the regulated sectors to identify forthcoming challenges.

In his opening speech, Mr Jochen Homann, Bundesnetzagentur President, made it clear that ensuring fair competition, consumer protection and the rollout of high-speed network infrastructures would remain as important as ever in the digital world.

In the first of three panel discussions, Dr Frank Appel (Deutsche Post AG), Mr Thorsten Dirks (Telefónica Deutschland Holding AG), Mr Timotheus Höttges (Deutsche Telekom AG), Mr Stefan Kapferer (German Association of Energy and Water Industries – BDEW), Dr Manuel Rehkopf (Deutsche Bahn AG)

and Mr Homann discussed the changes in the markets and the consequences for the electricity, gas, telecommunications, postal and rail sectors. The discussion showed that numerous issues arising from the digital revolution affect all the regulated sectors alike. These include the importance of open platforms and standards, the role of data, and the changes in the regulated markets and any consequent need for regulatory action.

The members of the second panel discussion were Professor Thomas Ehrmann (University of Münster), Dr Roman Friedrich (PwC Strategy& (Germany) GmbH), Professor Christian Kille (University of Applied Sciences Würzburg-Schweinfurt), Dr Matthias Lang (Bird & Bird LLP) and Mr Peter Franke (Bundesnetzagentur). The panel members discussed the potential of cross-sectoral business models and the need for increased investment in all the sectors.

In the third panel discussion, Professor Justus Haucap (Heinrich Heine University Düsseldorf), Mr Peter Schaar (European Academy for Freedom of Information and Data Protection), Mr Stefan Schnorr (Federal Ministry for Economic Affairs and Energy), Professor Heike Schweitzer (Freie Universität Berlin) and Dr Wilhelm Eschweiler (Bundesnetzagentur) discussed the role of data, the challenges for data protection legislation, and future regulatory approaches, such as industry self-regulation or co-regulation.

These discussions were accompanied by three keynote presentations spotlighting the process of digital transformation in practice. Professor Boris Otto (Fraunhofer-Gesellschaft and TU Dortmund University) presented the digital revolution as the driver behind business in the networked industry. Mr Lars Nennhaus (Duisburger Hafen AG) highlighted the potential efficiency gains from the spread of digital technology in the port transport and logistics sector. In the final keynote presentation, Mr Mario Pieper (BSH Hausgeräte GmbH) described the innovative opportunities already created by open platforms as seen in the domestic appliance sector.

Dr Eschweiler, Bundesnetzagentur Vice President, closed the conference by summing up the opportunities offered by a digital networked economy as pinpointed in the discussions. Cross-sectoral approaches are needed that will require cultural change within technology, business and society and at the same time create incentives to invest in the digital age. Evaluating and pooling data also represents an issue of significance across all the sectors.

Infrastructure atlas

The infrastructure atlas has been managed by the Bundesnetzagentur since 2009. It contains data from more than 1,000 data suppliers on infrastructure that can be jointly used for broadband purposes, such as ducts, fibre optic cables, cabinets and masts. Since 2012, it has been possible to access the data using the infrastructure atlas web GIS application.

The idea behind the infrastructure atlas is to encourage existing infrastructures to be used as economically as possible in the interests of accelerating broadband rollout, by providing central access to data on the infrastructures. Anyone proving to be part of a specific broadband rollout project can gain access to the infrastructure atlas. Each year, around 1,600 requests for access are received.

The EU Broadband Cost Reduction Directive also aims to facilitate and incentivise the rollout of broadband networks as efficiently as possible. The Directive was transposed into national law by the German Digital Networks Act, which entered into force on 10 November 2016. In terms of the EU Directive, the infrastructure atlas forms part of a single information point for the deployment of digital networks. At the same time, it is a fundamental element in increasing transparency in the broadband rollout process.

The single information point for the rollout of digital networks as provided for by the Digital Networks Act will be based at the Bundesnetzagentur. According to section 77a of the revised Telecommunications Act, the central element of this single information point is already in place with the infrastructure atlas, which has proven itself as an essential information tool in the broadband rollout process.

The legislative intent is for the Bundesnetzagentur to develop the infrastructure atlas into a portal providing an extended range of information for broadband rollout. The current infrastructure atlas will gradually be supplemented by information about passive infrastructure in public supply networks, standard contracts for sharing infrastructure, information about civil works in public supply networks, and information on the procedures and general conditions applicable to civil works.

The Bundesnetzagentur intends to work closely with the market in developing the atlas.

Public safety

Automated information procedure
The Bundesnetzagentur's information procedure represents a significant contribution to ensuring public safety in Germany. Authorised bodies – mostly security and criminal prosecution authorities – can send requests to the Bundesnetzagentur for customer data, such as names, addresses and telephone numbers, via an automated and highly secure system 24 hours a day. The Bundesnetzagentur passes on the requests to the telecommunications companies and forwards the responses received from all the companies contacted to the authorities. At present, 107 authorities are registered as authorised bodies, with 116 companies taking part in the scheme.

In 2016, as in the previous year, there was a substantial increase in the number of requests received. The latest statistics and further information can be found at *www.bnetza.de/aav*.

Telecommunications intercepts and provision of information
The Bundesnetzagentur's activities relating to the technical implementation of intercepts are a valuable contribution to public safety.

In 2016, the Bundesnetzagentur carried out checks on the technical facilities and organisational arrangements to be put in place by Wi-Fi hotspot providers to enable interception measures to be implemented, in other words to enable authorised bodies to intercept communications transmitted via the hotspots.

The relevant Technical Directive, setting out the technical details for implementing legal measures for the interception of telecommunications and the provision of information of traffic data, was updated in line with the latest developments in telecommunications (version 6.3), in consultation with the authorised bodies and in cooperation with the professional associations and manufacturers.

Technical safeguards
Protecting the privacy of telecommunications and personal data, protecting systems against faults or interference, and managing the risks to the security of telecommunications networks and services are the key objectives of section 109 of the Telecommunications Act. In 2016, the Bundesnetzagentur examined 101 new and 175 revised security concepts for compliance with the statutory provisions and carried out 143 spot checks. From the total of 19 security incidents reported to the Bundesnetzagentur in 2016, 14 were classified as security violations within the meaning of section 109(5) of the Act.

Storage of traffic data
The Act introducing a storage obligation and a maximum retention period for traffic data of 10 December 2015 led to the inclusion of a number of new sections (sections 113a to 113g) in the Telecommunications Act. Under the new provisions, providers of publicly available telephone and internet access services for end-users are required as from 1 July 2017 to store traffic data for a period of ten weeks and to store location data for a period of four weeks. The service providers must guarantee a particularly high standard of security and quality for the data stored. In this connection, the Bundesnetzagentur – in consultation with the German Federal Office for Information Security and Federal Commissioner for Data Protection and Freedom of Information – drew up a catalogue of requirements to ensure this particularly high standard. The catalogue was published on 23 November 2016.

New regulation on collecting prepay customer data
The Act improving information exchange in the fight against international terrorism, which entered into force in July 2016, resulted in a revision of section 111 of the Telecommunications Act. Under the new provision, prepaid mobile service providers are explicitly required as from 1 July 2017 to check new prepay customers' details by requiring certain proof of identity. This addresses the subject of a number of administrative proceedings carried out in recent years by the Bundesnetzagentur, with the aim of ensuring the verification of customer data through specific measures and thus guaranteeing a valid basis for information requests from security authorities. The Bundesnetzagentur was subsequently tasked with issuing an administrative order identifying further suitable procedures for verifying customer data. The order was published on 21 December 2016, following consultation with the parties concerned. The order rules, for example, that the postal and video-based processes "PostIdent" and "VideoIdent" are as equally suited as submitting identity documents directly to a service provider and are therefore also admissible.

Technical regulation

Mobile network standards into the 5th generation – 5G
The fifth generation of mobile technology is set to bring considerable improvements and better levels of performance compared to LTE technology. The main focus of standardisation is on features such as higher data rates, lower latency and improved reliability.

In 2016, ITU R refined the key elements for the development of 5G. On this basis, 3GPP launched its 5G standardisation work and agreed on the new performance requirements. The Bundesnetzagentur was actively involved in the standardisation activities within both ITU R and 3GPP.

Interoperability in broadcast transmission
The market for broadcasting receiving equipment is marked by considerable fragmentation and, in some cases, by proprietary approaches that result in lock-in effects for both platform operators and consumers. This forms the background to the Bundesnetzagentur's activities within the European standards organisation ETSI.

The Bundesnetzagentur is working together with key value chain players within an ETSI group on a series of specifications to create a framework for a software-based exchangeable ecosystem for conditional access/digital rights management. The work also accommodates the convergence of traditional broadcasting services and broadband access services. In 2016, key parts of the core specification were completed, including in particular details of the API, a secure environment for several independent CA/DRM systems, and an advanced security system to create a trust environment in conjunction with a trust authority.

The technical characteristics provide a framework promoting the interoperability of services, networks and terminal equipment in the long term.

The Bundesnetzagentur has also been supporting the work within ITU T on developing recommendations for software-based CA/DRM systems, in cooperation with the market players.

Progress in intelligent transport system standardisation
Increased road safety, efficient traffic management, and individualised and hence improved information for transport users and drivers – these aims can be achieved with the help of intelligent transport systems. The radio technologies developed for ITS systems are currently being standardised and made ready for the market. Broad market introduction of these safety-relevant systems by the automobile manufacturers is expected for 2019.

In 2016, the Bundesnetzagentur supported the German automobile industry in their work on standardising technical parameters for the safety-relevant radio systems and also pushed for the parameters to be included in the harmonised European standard ETSI EN 302 571. At the same time, groundwork was laid to enable the standard to be applicable to 5G mobile systems as well.

International cooperation

The definitive abolition of roaming charges is drawing near. From summer 2017, most customers travelling within Europe will no longer have to pay surcharges. The Bundesnetzagentur will be responsible for ensuring compliance with the requirements and that all providers implement the rules consistently.

Committee work

One focus of the Bundesnetzagentur's international cooperation activities is BEREC, which brings together representatives of the Bundesnetzagentur and the regulatory authorities of the other Member States. BEREC's objective is to guarantee independent, consistent and high-quality regulation of the electronic communications markets.

In fulfilling this objective, BEREC supports the European Commission and the national regulatory authorities in implementing the EU regulatory framework for electronic communications, with the aim of creating an internal market within Europe. BEREC advises the European institutions, at their request or on its own initiative, and examines measures drafted by the national regulatory authorities for compliance with the EU Directives.

BEREC's specialised work on various issues is carried out within a number of working groups that include numerous experts from the Bundesnetzagentur. This enables the Bundesnetzagentur to contribute from its many years of experience and at the same time ensure that German regulatory approaches are taken into account when common positions are adopted.

The Bundesnetzagentur is also a member of IRG, an independent group of European national telecommunications regulatory authorities. Within the group, the regulatory authorities collaborate on issues outside BEREC's responsibility.

In addition, the Bundesnetzagentur is involved in the work of groups within the CEPT and ITU on issues of spectrum management and technical regulation.

BEREC/IRG Chair 2016

Dr Wilhelm Eschweiler, Bundesnetzagentur Vice President, was Chair of IRG and BEREC in 2016. Dr Eschweiler chaired BEREC's four ordinary plenary meetings as well as an extraordinary plenary meeting to adopt the Net Neutrality Guidelines. Other focal points of BEREC's work included producing various documents on roaming issues and preparing an opinion on the review of the regulatory framework for telecommunications.

At the first plenary meeting in 2016, various documents were approved for publication. The report adopted on OTT services categorises the services on the basis of a detailed analysis and addresses the implications of OTT services in the electronic communications sector. The report adopted on enabling the Internet of Things concludes that, in general, the current regulatory framework – which was primarily designed for voice telephony – is also suitable for M2M and IoT applications, and that special rules are only necessary for roaming, switching and number portability. In addition, a report relating to the European Commission's review of the wholesale roaming market was approved. BEREC also published revised guidelines aimed at ensuring a consistent application of the new European roaming rules. The plenary meeting was preceded by an internal workshop on net neutrality that was attended by high-level experts from the field. The workshop focused on issues relating to BEREC's Net Neutrality Guidelines, such as the reliability of certain commercial practices (including zero-rating), traffic management, and specialised services.

The second plenary meeting centred on the draft Net Neutrality Guidelines. The draft was published and a public consultation launched at a subsequent press conference. Three documents on NGNs were also approved for publication or consultation:

- Draft BEREC Common Position on Layer 2 Wholesale Access Products (for consultation),
- Draft BEREC Report on challenges and drivers of NGA rollout and infrastructure competition (for consultation), and
- Input paper on Potential Regulatory Implications of Software-Defined Networking and Network Functions Virtualisation.

BEREC held an extraordinary plenary meeting to approve the final Net Neutrality Guidelines, having evaluated the responses to the public consultation. The Guidelines were submitted to the European Commission on 30 August 2016, the deadline set in the EU Regulation, and presented at a press conference. The extraordinary meeting also addressed the planned implementing acts on a fair use policy and on the methodology for assessing the sustainability of the abolition of retail roaming surcharges. At the following ordinary plenary meeting, BEREC adopted an input paper setting out its opinion on the planned acts.

The third plenary meeting dealt with BEREC's opinion on the newly published legislative proposals for a review of the regulatory framework for telecommunications. The draft BEREC Work Programme 2017 was also approved for public consultation and published. In addition, the plenary approved BEREC's Common Position on Layer 2 Wholesale Access Products and the report entitled "Challenges and drivers of NGA rollout and infrastructure competition".

One of the central issues of the fourth and final plenary meeting in 2016 was the adoption of BEREC's first high-level opinion on the European Commission's legislative proposals for a review of the regulatory framework for telecommunications. This first opinion was to be followed by a detailed opinion on each of the comprehensive issues at the beginning of 2017.

In its opinion, BEREC first deals with the main subjects of the proposals, namely regulatory objectives, spectrum management, universal service, and end-user protection. BEREC then addresses the proposals relating to access regulation, the scope of the regulatory framework (OTT services), and the institutional set-up. BEREC emphasises its welcome and support for the strategic connectivity goals for the period up to 2025. At the same time, BEREC believes that the national regulatory authorities must retain sufficient flexibility to choose the appropriate means of competition-oriented regulation for their national markets. BEREC welcomes the inclusion of OTT services in the scope of the legal framework, in particular in the context of data protection and security. BEREC also takes a positive view of the proposed harmonisation of competences for national regulators and the strengthening of their independence. However, it is critical of the proposals to transform BEREC into an EU agency and to extend the European Commission's veto powers to regulatory decisions under Article 7a of the Framework Directive.

Another main issue of the meeting was the adoption of BEREC's work programme for 2017. A key priority will be the analysis of the proposed review of the regulatory framework for telecommunications and the provision of input in BEREC's advisory role to the European Commission. Other important areas of work will be monitoring implementation of the Net Neutrality

Guidelines and defining BEREC's mid-term strategy for the period from 2018 to 2020. This strategy will pave the way for BEREC's future activities and focus of work.

Finally, BEREC elected Johannes Gungl (RTR, Austria) as Chair for 2018 and Alejandra de Iturriaga (CNMC, Spain) and Steve Unger (Ofcom, UK) as Vice Chairs for 2017. The five members of the Board in 2017 will also include Sébastien Soriano (ARCEP, France) as Chair for 2017 and Dr Wilhelm Eschweiler as outgoing Chair.

The year under the Chair of Dr Eschweiler was seen as busy and productive, with a successful conclusion.

Article 7 and 7a procedures

BEREC plays a central role in the procedures under Articles 7 and 7a of Directive 2002/21/EC (Framework Directive). These procedures aim to ensure that measures planned by the national regulatory authorities are not contrary to European law. Where the European Commission has serious doubts as to the compatibility of a draft measure with the law, it can open what is known as a "Phase II" investigation. In this case, experts from the national regulatory authorities form an ad hoc working group within BEREC to re-examine the draft measure in depth. Within a very short timescale, BEREC must adopt the working group's final report by a majority decision. The Commission must then take utmost account of the report when making its recommendation or decision, in which it may ask the national regulatory authority to amend or withdraw the measure. Recommendations issued under Article 7a of the Framework Directive are to be seen in legal terms as such: the national regulatory authority may decide not to amend or withdraw its draft measure, but must then provide a reasoned justification for its decision.

There has been a progressive decrease in the number of Phase II investigations opened in the last few years. In 2016, for instance, only four reports were drawn up in such investigations. In each case, BEREC generally shared the Commission's serious doubts, but also agreed with some of the arguments put forward by the regulatory authorities concerned.

One case involved the Bundesnetzagentur's planned measure related to fixed termination rates. As in a number of previous Phase II investigations, the Commission expressed doubts about the costing methodology used by the Bundesnetzagentur. The Bundesnetzagentur had decided within its scope of discretion to deviate from the Termination Rates Recommendation (2009/396/EU) and base the rates on the efficient operator benchmark instead of the pure LRIC model. In its opinion, BEREC shared the Commission's serious doubts, but the Bundesnetzagentur chose to retain its methodology in its final decision.

The Bundesnetzagentur's draft decision on the deployment of vectoring in proximity areas was also the subject of a Phase II investigation. The Bundesnetzagentur withdrew its draft before completion of the BEREC report. The draft measures were amended and re-notified and were then successfully implemented.

Digital Single Market: revision of the regulatory framework for electronic communications

On 14 September 2016, the European Commission presented its proposals for a revision of the European regulatory framework for electronic communications. The proposals form a central part of the Commission's Digital Single Market strategy. The core of the package of proposals comprises the European Electronic Communications Code, which brings the four sector-specific Directives (Framework, Access, Authorisation and Universal Service) all under a single Directive. The package also includes a proposal for a new Regulation establishing BEREC, an action plan for 5G, and a WiFi4EU initiative. The legislative package aims to pave the way for the Digital Single Market in Europe in light of the spread of digital technology.

The main issues addressed by the proposed Code are

- access regulation,
- spectrum management,
- extension of the scope to cover OTT communication services,
- universal service,
- consumer protection, and
- institutional set-up.

The Bundesnetzagentur contributes from its regulatory experience to the review of the telecommunications framework through its work with the Economic Affairs Ministry and the Federal Ministry of Transport and Digital Infrastructure. It was also able to present its ideas under the BEREC Chair in 2016 in intensive exchanges with the European institutions and the various market players (see above).

Telecoms single market: international roaming, net neutrality

International roaming

Regulation (EU) 2015/2120 provides for the abolition of roaming charges from 15 June 2017. Customers are to generally pay the same price as at home for calls, texts and mobile data wherever they are in the EU. Roaming providers may still apply capped roaming charges in the period between April 2016 and the introduction of the roam like at home principle. In such cases, the surcharge and the domestic retail price together may not exceed a set maximum amount. Since the beginning of the transitional period, the Bundesnetzagentur has been monitoring compliance with the regulations very closely and, where necessary, has taken enforcement action.

In 2016, the European Commission supplemented the Regulation with rules on a fair use policy and the sustainability of the abolition of roaming surcharges. The Implementing Regulation was published on 15 December 2016, and the provisions apply from 15 June 2017. As from mid-June, customers will generally no longer have to pay additional roaming charges. Mobile operators will still be able to apply small surcharges, however, if they provide evidence that use was not in compliance with the applicable fair use policy. The terms and conditions of fair use policies must be included in contracts with customers and must be notified to the competent national regulatory authority. The rules also allow mobile operators to apply for authorisation to apply a roaming surcharge if they provide evidence that roam like at home would undermine the sustainability of their domestic charging model.

The Bundesnetzagentur obtained data on roaming from the national mobile operators in 2016 as part of its regular data collection. The roaming data was used in the reports drawn up by BEREC in connection with an analysis of the European roaming market.

Net neutrality

On 30 April 2016, a set of European rules to ensure net neutrality came into force. BEREC drew up Guidelines for the implementation of the obligations, as required by the Regulation laying down the rules. The Guidelines provide specific guidance on practical implementation of the rules and ensure consistent application of the Regulation across Europe. BEREC held a public consultation from 6 June to 18 July 2016 on the draft Guidelines. The consultation met with an enormous response, with a total of some 482,000 contributions.

Respondents from civil society, in particular, wanted the principles of the freedom of expression and information – as recognised in the Charter of Fundamental Rights of the European Union – to be more firmly embedded. BEREC makes explicit reference to this aspect in the final version of the Guidelines.

BEREC makes it clear that some practices are prohibited – those where all applications, except for the zero-rated applications, are blocked or slowed down once the data cap is reached. BEREC provides for other zero-rating practices to be assessed against different criteria on a case-by-case basis.

BEREC also considers services that restrict access to certain services or applications (eg banning the use of VoIP or video streaming) or enable access to only a certain part of the internet (eg access only to particular websites) to constitute an infringement of the Regulation.

The Regulation requires internet service providers to treat all traffic equally, and thus enshrines net neutrality as a fundamental principle. The Guidelines allow traffic management measures to be used to differentiate between individual categories of traffic, provided that traffic management is based on objectively different technical quality of service requirements, as in the case of voice telephony. Traffic management may not reflect commercial interests,

Net neutrality on the internet versus specialised services

Net neutrality essentially means the equal, or neutral, treatment of data traffic transmitted over the internet. Different services can, however, have varying transmission requirements. The European regulators have drawn up guidelines to provide guidance about this.

The Regulation on net neutrality adopted by the European legislature establishes rules to safeguard the equal treatment of data traffic transmitted over the internet and non-discriminatory access for users of data networks. The fundamental aim is to ensure that all internet service providers treat all data traffic equally when transmitting traffic, irrespective of the sender and receiver, the content or the application.

At the same time, the legislator allows specialised services to be offered under certain conditions, as with, for instance, VoLTE, live TV broadcasting services such as EntertainTV, or remote surgery, when telecommunications technology is used in surgical procedures. As a rule, these services need more bandwidth or freedom from interference than e-mail services, for example, and can be provided as chargeable specialised services subject to certain rules. These specialised services may only be offered if network capacity is sufficient, so as to ensure that the availability or quality of other internet access services is not degraded.

At the end of August 2016, BEREC produced guidance expanding on the Regulation – for instance, which services can be considered as specialised services and which not, and how exactly they can be treated. The Bundesnetzagentur will ensure and monitor compliance with the rules and transparency measures and the continued availability of internet access services.

and providers are not allowed to charge for special traffic categories. Exceptions are made for exceptional traffic management measures taken to comply with legislative acts, court orders or orders by public authorities, to protect the integrity and security of the network, or to prevent impending network congestion or mitigate the effects of network congestion occurring temporarily or in exceptional circumstances.

The Regulation also provides scope for the provision of specialised services, subject to strict conditions. Providers are free to offer specialised services other than internet access and to charge users for the services, where an optimisation of data transmission is objectively necessary in order to meet the requirements of the content, applications or services. This may be the case when the service requires guaranteed and stable transmission conditions. The examples of specialised services provided in the BEREC Guidelines include VoLTE, IPTV and remote surgery. Such services would not be allowed if they could also technically be provided over the internet. Nor may specialised services be offered if this would degrade the internet access services. In addition, network capacity must be sufficient to accommodate both types of service.

The Regulation introduces various transparency requirements for providers, for instance it requires them to provide information about the speeds that

each end-user can expect to receive. The Guidelines give as an example the requirement that the maximum speed for fixed services must be achievable at least some of the time, for instance at least once a day.

The Regulation requires the Bundesnetzagentur to monitor and ensure compliance with the rules, implement the transparency measures, and promote the continued availability of internet access services. The Bundesnetzagentur must also publish a report on an annual basis regarding its monitoring and findings, with the first report to be completed by 30 June 2017.

In view of the practical implementation of the rules established in the Regulation, the Bundesnetzagentur held a workshop with providers on 12 December 2016 about the providers' general terms and conditions. The workshop focused on the transparency requirements laid down in the Regulation and obvious infringements of the Regulation, such as banning the use of VoIP or instant messaging.

International spectrum management
As part of its international cooperation activities, the Bundesnetzagentur supported numerous developments, especially those in mobile broadband, and continued its successful work within bodies of the CEPT, the EU and ITU R.

In 2016, the Bundesnetzagentur's spectrum management activities at both national and international level centred on the following:

M2M communication, Internet of Things, Industry 4.0
Study groups within ITU R began work on IoT as part of the preparatory work for WRC 19. Within the CEPT, the Bundesnetzagentur participated in a review of the suitability and possible need for amendment of the regulatory framework to accommodate M2M communications (IoT). This concerns both network-based radio systems (mobile broadband, PMR/PTMR) and SRDs. Comprehensive studies on revising the European framework for SRDs were conducted and the conclusions presented to the European Commission.

The Bundesnetzagentur also played an active role in the studies undertaken on the provision of additional spectrum for WLAN, both within the CEPT and as part of the preparations for WRC 19.

Digital Dividend 2
In April 2016, the Bundesnetzagentur published a revised spectrum plan providing additional spectrum for radio applications on the basis of international decisions. In this context, the international studies into the provision of additional spectrum for wireless microphones in the 1300–1350 MHz and 1492–1518 MHz bands were concluded. The Bundesnetzagentur has since implemented the measures set out in the studies, thereby fulfilling the Federal Government's commitment to make additional spectrum available for wireless microphones in connection with the provision of the 700 MHz band for mobile broadband applications. The 2010–2025 MHz band was harmonised internationally for wireless cameras, and a study was made to explore the technical conditions for the possible usage by wireless cameras of the 2700–2900 MHz band currently used on a primary basis by radars.

The CEPT completed its studies into mobile broadband and the 700 MHz band to support work on an EU decision for spectrum harmonisation. The binding Implementing Decision was subsequently adopted with input from the Bundesnetzagentur.

Broadband public protection and disaster relief systems
The Bundesnetzagentur actively contributed to the development and approval of ECC Decision (16)02 on the pan-European harmonisation of frequency bands for broadband public protection and disaster relief systems. The Decision provides 2 x 8 MHz of internationally harmonised spectrum outside the 2 x 30 MHz of spectrum auctioned in Germany in 2015 for use by BB PPDR systems, subject to conditions protecting the other radio applications in the 700 MHz band. Whether and, if so, to what extent this spectrum will be used by the German PPDR organisations for their systems depends on a decision pending from the interior ministries of the Federation and the federal states.

Future spectrum requirements and new bands for mobile broadband applications (5G)
The Radio Spectrum Policy Group, a high-level advisory group that assists the European Commission in the development of radio spectrum policy, developed an opinion on a strategic roadmap for the swift introduction of 5G in Europe with the participation of the Bundesnetzagentur and other EU Member States.

The RSPG recommends the 26 GHz band as a pioneer band for swift availability for 5G above 24 GHz. This provides opportunities for synergy, as the band is

adjacent to the 28 GHz band favoured by the USA as a pioneer band, in turn facilitating early equipment availability.

The need to protect existing applications and safeguard the possibility for future development was also considered and highlighted. This strategic approach met with wide approval at a CEPT workshop on 5G organised by the Bundesnetzagentur in November 2016.

The Bundesnetzagentur actively assisted in work within the CEPT and ITU on the future fifth generation of mobile technology. Activities included preparations for compatibility studies for potential new spectrum between 24 GHz, 25 GHz and 86 GHz for mobile/fixed communications networks. Final decisions on the worldwide harmonisation of spectrum for MFCN are expected to be taken at the next WRC in 2019.

5G is also discussed in connection with the so-called vertical sectors, where radio applications based on 5G technology – such as transport (including future rail) and M2M applications – are used. The Bundesnetzagentur is keen to have a compatible regulatory framework for 5G at European level as well to support future opportunities for development.

Parallel to this, the possibility of introducing 5G in the current mobile broadband frequency bands was also investigated. The activities included a detailed study of possible sharing scenarios in the 3600–3800 MHz band and a report on verifying mobile coverage.

Digital Single Market and review of the European regulatory framework

The European regulatory framework also shapes spectrum management in Germany. The Bundesnetzagentur's active participation in developing the RSPG's opinions on the implementation of the Radio Spectrum Policy Programme, and its revision, and on the Digital Single Market and the review of the regulatory framework helps to influence the debate at an early stage, with the aim of retaining legal and investment certainty in Germany even given changes to the European regulatory framework.

The RSPG also published reports on the results of WRC 15, spectrum awards, and its experience with the "good offices" process in the case of difficulties in bilateral cross-border coordination negotiations for the introduction of mobile services in the 800 MHz band.

European Joint Initiative on Standardisation

The Joint Initiative on Standardisation was formed to deliver a modern standardisation system for businesses, consumers and society at large. The Bundesnetzagentur has been participating in the actions on the optimisation of operational aspects of Regulation (EU) 10125/2012 and on standardisation to support the digital transformation of European industry.

In February 2016, work began on a European Catalogue of ICT Standards for Procurement. Four pilot areas were selected, for which recommendations are being developed for possible implementation in public procurement processes.

On account of its participation within these groups and projects, the Bundesnetzagentur recently joined the group of standardisation coordinators.

Harmonised European standards in light of the new European Radio Equipment Directive 2014/53/EU

The European Commission requested the European standardisation organisations CENELEC and ETSI to produce the harmonised European standards within the scope of the new Radio Equipment Directive (2014/53/EU), which entered into force on 13 June 2016. Owing to the growing number of radio applications in all areas of life, a number of issues arose during the year in connection with the application of the new Directive – both administrative questions relating to the implementation of the Directive and questions

arising in the course of the standardisation work. The Bundesnetzagentur was actively involved in the standardisation processes within ETSI and CENELEC (revising 110 harmonised European standards in 2016) and in the work of the competent European bodies (TCAM, TCAM WG and AdCo RED) on developing practical solutions. This gives the manufacturers guidance for when placing their products on the market as well as planning certainty for new developments, at the same time ensuring the efficient and interference-free use of the spectrum.

POST

Digital transformation in the postal markets

The postal markets are changing. Revenues are growing, especially in the parcels sector. E-commerce is spreading to new categories of goods such as heavy electrical appliances, DIY products, and food. This poses a challenge to postal operators and logistics services – creative thinking is called for and the range of services is expanding.

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In the course of last year, the Bundesnetzagentur noticed a tendency among trading companies to integrate delivery or logistics into their own value chain. One example is online retailer Amazon which has already established several delivery stations in Germany from where orders are delivered by subcontractors.

Companies also tended to align their product offerings more to customer needs, leading parcel operators to adjust their services to changing market requirements and to diversify their delivery options (such as specified-time service or delivery to a specified location). Transport companies stepped up their efforts to provide same-day delivery, unlocking new growth opportunities.

The Bundesnetzagentur has responded to these dynamic developments by redirecting its market watch and by shifting its focus to the new areas of activity. Fair competition and a nationwide, highly efficient infrastructure continued to be closely monitored in 2016. A rise in the number of citizens dissatisfied with the postal services induced the Bundesnetzagentur to redouble its efforts. New legal provisions on dispute resolution meant an increase in the demands placed on the Bundesnetzagentur in its function as postal dispute resolution panel.

Market watch

The letters market remained stable against the trend elsewhere in Europe. The CEP market expanded and was rewarded by an increase in revenues and volumes. The parcels sector was definitely at the top of the league.

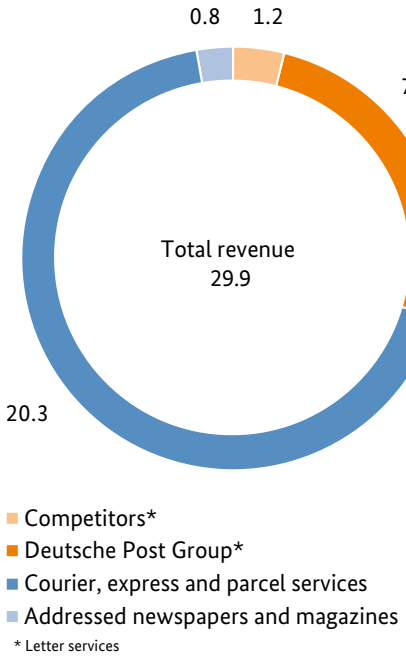
Postal markets

The overall positive development in the postal markets continued. In 2015 revenues totalled €29.9bn, representing a year-on-year increase of about 4.0%.

Of this, around €20.3bn were accounted for by courier, express and parcel (CEP) services. This corresponds to a year-on-year increase of approximately 5.2% (2014: €19.3bn).

The CEP market's share of the overall market continued to grow in 2015. In view of booming e-commerce market players developed new business models and endeavoured to optimise their delivery processes. The CEP market is gradually evolving into the postal markets' main pillar.

Revenues in the postal markets: 2015
€bn



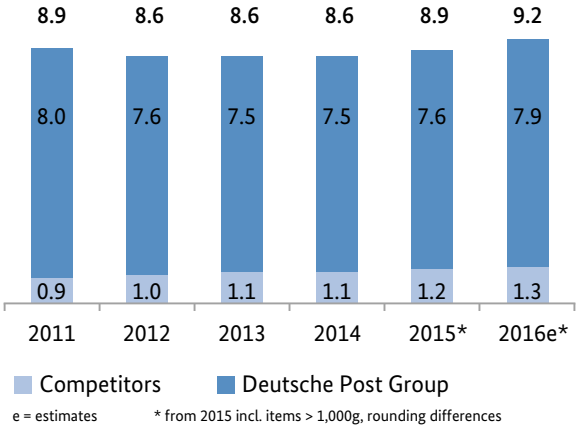
Letter services

Revenues and volumes

Revenues in the letters market and from the delivery of addressed newspapers and magazines remained more or less stable year-on-year. The Bundesnetzagentur had requested information on letter mail revenues and volumes, including letters weighing more than 1,000 grammes. With a share of about 0.7% of overall revenues and approximately 0.1% of overall volumes, items weighing more than 1,000 grammes represented only a very small proportion of the overall letters market and hence did not have a significant impact on market conditions.

Letter mail revenues totalled approximately €8.9bn, representing a year-on-year increase of about 2.6% (2014: €8.6bn). The companies surveyed anticipate a modest increase in revenues in 2016 (forecast figure: c. €9.2bn).

Letters market revenues
€bn

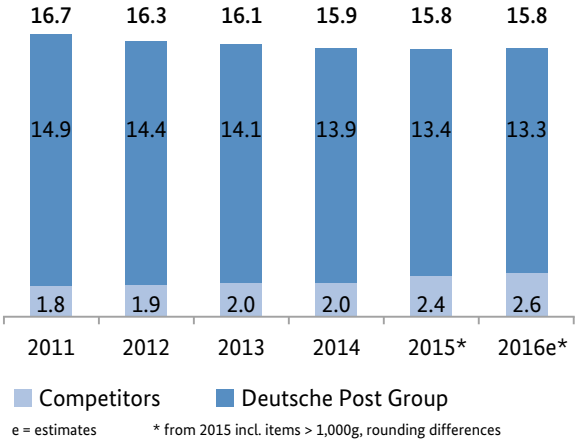


e = estimates * from 2015 incl. items > 1,000g, rounding differences

Volumes remained stable year on year (2014: c. 15.87bn items, 2015: 15.83bn items). The effects of increasing e-substitution hence tended to be very moderate in Germany.

In 2015 shifts in volume benefitted competitors: Deutsche Post Group volumes declined by about 3.4% whereas competitors reported an increase of approximately 21.6%. Deutsche Post Group's decrease translated in large part to competitors' volume growth. These shifts will have been the result of the postal strike and it remains to be seen whether they will prove to be of a permanent nature.

Letters market volumes
Billion items



e = estimates * from 2015 incl. items > 1,000g, rounding differences

Market shares

The 2015 volume decrease has not affected Deutsche Post Group's dominant market position. In terms of volume the Group's market share fell to 84.9% in 2015 (2014: 87.6% items weighing up to 1,000 grammes). This trend is expected to continue in 2016 albeit at a slightly lower rate. Competitors' market share rose to about 15.1% in 2015, also as a result of the postal strike, and their share is expected to increase in 2016. In terms of revenue competitors' share rose to around 13.9% in 2015 (2014: c. 12.2%). Competitors anticipate another slight increase to 14.4% in 2016.

Market shares in the letters market
(%)

Year	2010	2011	2012	2013	2014 [2]	2015 [3]	2016 [4]
Revenues							
Deutsche Post Group	89.6	90.0	88.5	87.7	87.8	86.1	85.6
Competitors	10.4	10.0	11.5	12.3	12.2	13.9	14.4
Volumes [1]							
Deutsche Post Group	89.8	89.4	88.6	87.7	87.6	84.9	83.8
Competitors	10.2	10.6	11.4	12.3	12.5	15.1	16.2

1) Deutsche Post Group volumes include all access mail items
2) Rounding differences
3) From 2015 incl. items weighing more than 1,000g
4) Estimates

Competitive structure

The number of competitors active in the market in 2015 remained stable. Roughly 1,000 companies are in possession of a valid licence but the number of companies generating revenues in the letters sector is much lower. Around 574 operators other than Deutsche Post AG provided their own letter services. The proportion of small operators with an annual revenue of up to €500,000 remains high. Some of the best-performing operators were able to consolidate their position. 35 companies reported an annual revenue exceeding €10m in 2015 (2014: 27 companies).

In 2015 the ten largest competitors to Deutsche Post AG generated around €0.6bn in revenues (2014: c. €0.5bn) and handled about 1.2bn items (2014: c. 1.1bn items). This is approximately 46% of the total revenues generated and around 48% handled by all of Deutsche Post AG's competitors. Most of these operators have improved their infrastructure, enabling them to respond flexibly to market changes at short notice, thereby increasing volumes and revenues.

Deutsche Post Group's competitors derive their volumes and revenues largely from business customers. In 2015 volumes and revenues from the business customer segment averaged 98%. Deutsche Post Group still serves nearly all residential customers.

Licensed letter service operators by revenue*
(without Deutsche Post Group)

Revenue	Up to €100,000	> €100,000 € to €500,000	> €500,000 to €1m	> €1m to €10m	> €10m	Total number
2010	~ 330	108	44	93	20	595
2011	~ 330	117	42	90	22	601
2012	~ 350	113	36	103	28	630
2013	~ 350	94	42	94	26	606
2014	~ 325	97	28	92	27	569
2014	~ 325	102	26	86	35	574

* This breakdown only covers companies active in the market.

Access services

The majority of letter mail is handled via access to the dominant operator's incidental services. In 2015 Deutsche Post Group handled approximately 10.1bn access mail items, representing a year-on-year decrease of around 4.0% (2014: c. 10.5bn items).

Access mail revenues totalled approximately €4.6bn in 2015, a decrease of about 2.9% year on year (2014: c. €4.7bn). Competitors again generated around €0.1bn in revenues, Deutsche Post Group's revenue fell slightly to about €4.5bn (2014: c. €4.6bn). Deutsche Post Group anticipates similar revenues for 2016.

Stamp prices

The stamp price for standard letters rose to €0.70 on 1 January 2016. The price for a maxi letter rose to €2.40.

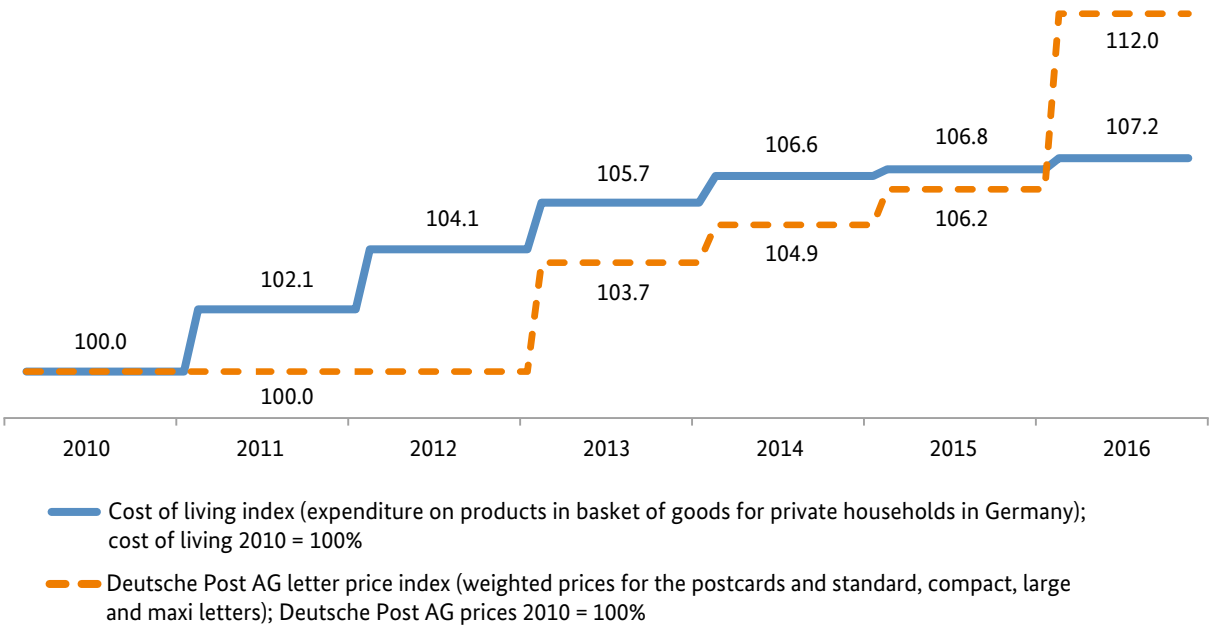
As a result of the price increases, the letter price index significantly exceeded the cost of living index for the first time since base year 2010.

Stamp prices for letters* 2010 to 2016
(€)

Year	2010–2012	2013	2014	2015	2016
Standard letter up to 20 g	0.55	0.58	0.60	0.62	0.70
Compact letter up to 50 g	0.90	0.90	0.90	0.85	0.85
Large letter up to 500 g	1.45	1.45	1.45	1.45	1.45
Maxi letter up to 1,000 g	2.40	2.40	2.40	2.40	2.60
Postcard	0.45	0.45	0.45	0.45	0.45

* Prices as at 1 January each year

General price trend and DPAG letter prices



Workforce development
The licensed letter service operators had a total number of employees in 2016 of 168.844, around 88% of whom were employed by Deutsche Post Group. The employment level remained stable year-on-year. Structural changes in the value chains and in the business models across the letters sector and the logistics business make it difficult to draw an accurate line between activities in the letters sector and in associated areas.

Courier, express and parcel services

Digitisation has for years been having a profound effect on the workings of the CEP services. The steady growth in e-commerce resulted in a significant rise in revenues and volumes, especially in the parcels sector.

As in the previous year, revenues rose steeply to around 5.2% in 2015. Volumes increased to about 5.8% over the same period. In 2015 revenues in the CEP market totalled approximately €20.3bn (2014: €19.3bn), with volume totalling around 2.8bn items (2014: 2.7bn items).

Revenues and volumes CEP markets 2014–2015

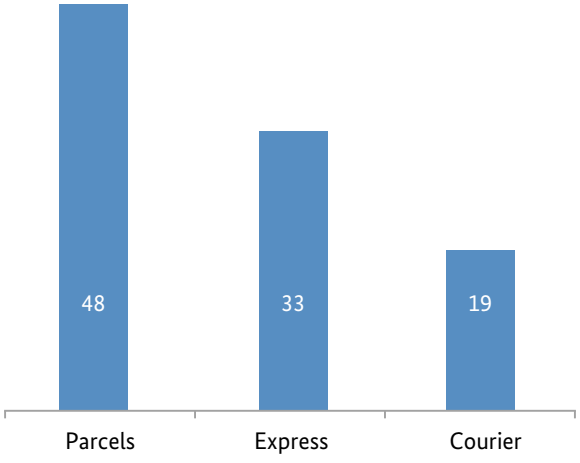
	2014	2015	Percentage change
Revenue (€bn)	19.3	20.3	+ 5.2%
Volume (billion items)	2.7	2.8	+ 5.8%

Source: MRU GmbH

The CEP market traditionally focused on transactions between businesses (B2B). The rapid growth in e-commerce has led to a noticeable shift in revenue and volumes to the B2C market (business sells directly to consumers) in which parcel operators are the main players.

In recent years the parcels sector has grown in comparison with the courier and express markets. Parcel services accounted for the largest share of the revenues in 2015 with 48%. This compares to courier services 19% and express services 33%.

Revenue shares: 2015
(%)



Source: MRU GmbH

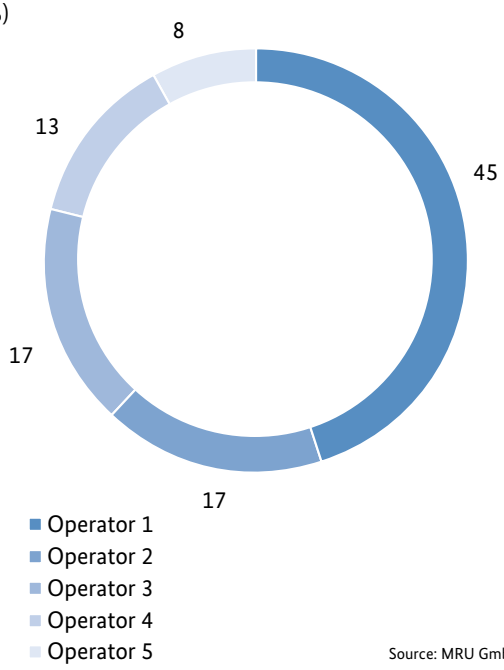
The parcels sector accounted for 46% of the revenues in 2014. Parcel services' volumes totalled approximately 82% in 2015. This compares with courier services' share of around 8% and express services' share of approximately 10%.

Market structure

Unlike the letters market, the parcels sector is highly competitive. Several enterprises have established their own countrywide delivery network and a checkerboard of access points. The leading companies are DPD, DP DHL, GLS, Hermes and UPS.

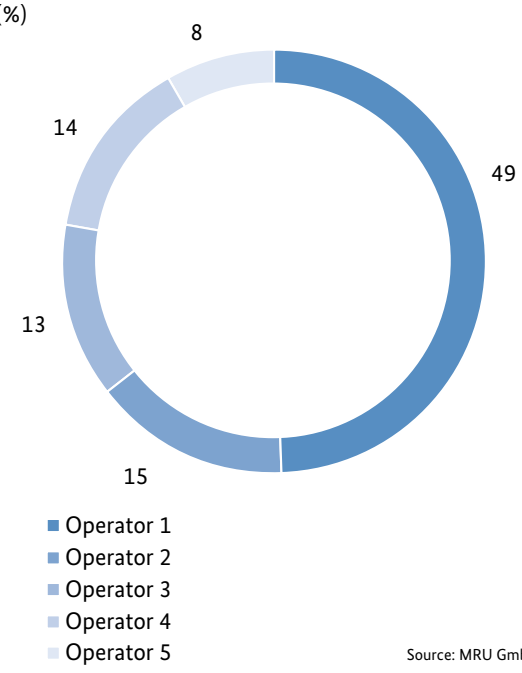
The five largest companies' market shares in terms of revenues and volumes remained stable year on year.

Parcel services revenue shares: 2015
(%)



Source: MRU GmbH

Parcel services volumes: 2015
(%)



Source: MRU GmbH

Many small untertakings are active as couriers largely specialised in particular geographical regions, although some of these companies have joined forces to establish delivery networks.

The express market is much more diverse. There are the global enterprises (eg DHL Express, GO! and FedEx). Then there are the medium-sized enterprises, some of which have merged to form larger associations. Several German hauliers offer express services. It is estimated that more than 13,000 companies are currently active in the CEP market.

Impact of digitisation
Trade via the internet is expanding. This will lead to a further increase in revenues and volumes, especially in the B2C market. E-commerce is also embracing a greater variety of goods. Sales of large, heavy electrical appliances, DIY products, and food are rising. Postal services and logistics businesses which have been operating with largely standard processes face a huge challenge in transporting and delivering these articles. These companies are also turning their attention to recipients' requirements (residential customers). The parcel services are continuously adapting their product portfolio to changing market needs and now offer customised delivery options such as specified-time service or delivery to a specified location.

Operators who had in the past focused on the B2B or other markets are now entering the B2C market with new business models and product-specific delivery solutions. This leads to growth potential in these markets. There are also signs that trading companies are keen on integrating logistics and delivery into their value chain. Amazon, for example, has already opened several delivery stations in Germany from where subcontractors deliver orders to end customers.

The movements between the traditional CEP markets and associated sectors as outlined above will inevitably have a long-term effect on market conditions and competitive practises, particularly in the parcels sector.

Incidental services, PO box facilities and change-of-address information

Incidental services
In 2016 Deutsche Post AG replaced the incidental service contracts for its dialogue marketing product "Infopost" by incidental service contracts for "Dialogpost". 19,886 new contracts were concluded with Deutsche Post AG (of which 18,627 for franking and 558 for electronic franking). Competitors concluded 37 contracts for incidental services (outward letters, inward letters, inward Dialogpost items), end customers concluded 253 for incidental services (outward letters, inward letters, inward Dialogpost items). 347 contracts were concluded with end customers for cooperation in conveying Dialogpost items.

DPIHS letter services
Deutsche Post InHaus Services GmbH (DPIHS), 100% owned by Deutsche Post AG, offers customers incidental services. Being a Deutsche Post AG subsidiary, its access contracts must be submitted to the Bundesnetzagentur. Following the Cologne Administrative Court's judgment of 1 December 2015, DPIHS presents its access contracts to the Bundesnetzagentur. These contracts are not standard contracts but contracts that are negotiated with customers on a case-by-case basis. 292 access contracts were concluded and submitted in 2016.

Market access

Licensing
Since 1998 the Bundesnetzagentur has issued licences for the conveyance of letters up to 1,000 grammes to 3,060 companies and individuals. In 2016 108 new licences were issued (2015: 53 new licences) and 120 licensed operators withdrew from the market (2015: 13 withdrawals). The relatively high number of new licences compared with the previous year is partly due to new business models. For example, traders along the border to Switzerland act as shipping adddress for postal customers. Swiss citizens place orders for articles with German online retailers and have them shipped to a parcel shop at the border where they may pick them up themselves. Many German online retailers do not ship their products to Switzerland or only do so at a higher price. The parcel shops accept the consignments and hand them over to their Swiss customers against payment of a fee. These parcel shops require a licence as some of the items they handle are letters weighing up to 1,000 grammes.

The high number of market withdrawals compared with the previous year was the result of a check of registered operators. Nearly all licensed operators were asked to confirm and submit evidence of their commercial activity. Many operators no longer offering letter services returned their licence. In a few cases licences were withdrawn. In 2016 approximately 1,000 traders were in possession of a valid licence and were offering licensed letter services. However, only about 570 of these companies reported substantial revenues from their services.

Should companies or individuals operate services without the required licence, the Bundesnetzagentur may initiate administrative fines proceedings. In eight cases administrative fines totalling around €3,500 were imposed for breaches of the licensing requirement or the notification obligation and in ten minor cases the Bundesnetzagentur issued a warning. 20 administrative offence proceedings were initiated. Foreign companies transporting parcels across borders were mostly responsible for breaches of the notification obligation. Such breaches are discovered by the police during traffic checks.

Cooperation with the Central Customs Authority

The Central Customs Authority and the Bundesnetzagentur signed an agreement in 2016 on closer cooperation to combat illegal employment in the postal sector. The two bodies will exchange information about violations and irregularities und in certain instances will jointly investigate companies.

The agreement ensures full long-term cooperation between the Central Customs Authority and the Bundesnetzagentur. The goal is to secure adherence to the provisions in the Minimum Wage Act on remuneration in the postal sector. If a postal operator refuses to pay the statutory minimum wage, the Bundesnetzagentur will refuse to issue a licence or may revoke one already issued.

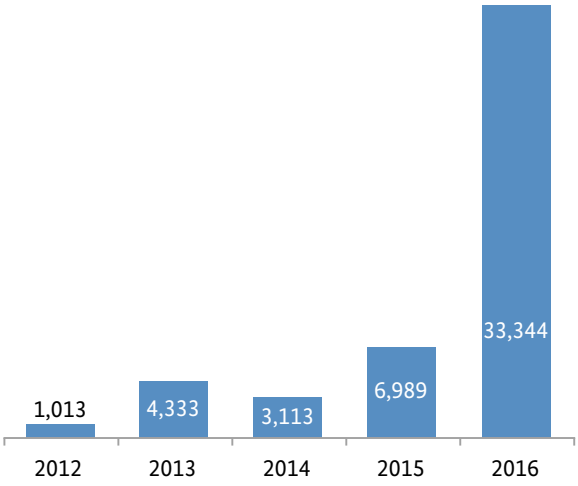
Notification obligation

Operators of licence-exempt postal services are required to notify the Bundesnetzagentur in writing and within one month when they commence, change or cease operations.

In 2016 the Bundesnetzagentur again identified a number of breaches of the notification obligation stipulated in the Postal Act. In many cases the operators had been unaware of their obligation. Owing to online trade the market is undergoing a rapid change and many new parcel shops start working for one of the major parcel carriers without notifying their commercial activity. As in the previous year, the Bundesnetzagentur launched an information campaign to advise operators of their notification obligation. The campaign was targeted not just at sole traders primarily providing postal services but more specifically at parcel shops providing postal services merely as a by-product.

The campaign resulted in a steep rise in notifications. In 2016 the Bundesnetzagentur confirmed 31,528 new notifications, raising the number of notified postal operators to a total of 54,720 by the end of the year.

Notifications received 2012–2016



Postal market checks/data protection

The Bundesnetzagentur carried out checks at a number of postal operators' premises in 2016 to verify compliance with the statutory provisions for postal secrecy and data protection and with the notification obligations under Section 36 of the Postal Act. 787 routine checks were carried out. 120 checks were prompted by specific circumstances.

In the period under review, the Bundesnetzagentur focused on parcel shops and shipping address services. The latter offer customers abroad a German address primarily for the delivery of their orders. Customers then pick up their parcels themselves or ask them to be forwarded to their home address. A key element was to check subcontractors' handling of personal customer data.

Checks revealed that parcel storage at pick up locations often failed to comply with the statutory provisions for postal secrecy and data protection.

Clarifying discussions with the operators usually resolved the problem.

During the 2015/2016 festive season it had been brought to the Bundesnetzagentur's attention that postal sacks with letter mail had been left unattended in public spaces during the run-up to Christmas 2015. The Bundesnetzagentur had taken immediate steps to investigate the matter. In December 2016 it carried out spot checks to determine whether the 2015 incidences had been singular occurrences or whether increasing mail volumes in the period preceding Christmas gave rise to the same phenomenen. Extensive investigations revealed that the situation had improved but there were indications of a structural problem which is now being examined by the Bundesnetzagentur.

In 2016 the annual information exchange between the Bundesnetzagentur and the Federal Commissioner for Data Protection and Freedom of Information focused on data protection aspects of new postal services. Discussions centred on parcel delivery by robots and drones and on the way in which bar codes on postal items are handled from a data protection perspective.

Consumer protection and advice

In 2016 complaints about parcel conveyance and delivery for the first time exceeded those about letter conveyance and delivery. All in all there has been a steep rise in the number of complaints about postal services and in the number of requests for dispute resolution.

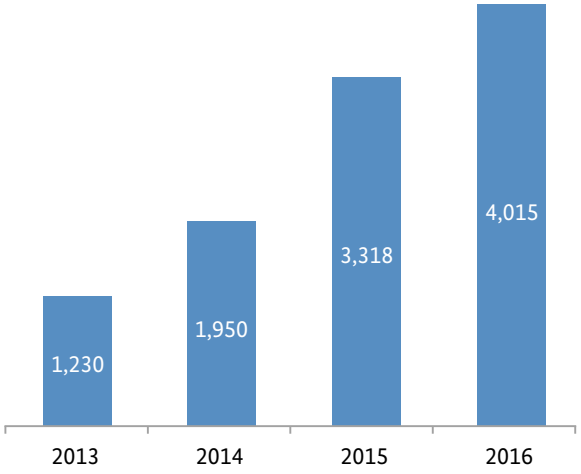
Consumer advice

In 2016 the Bundesnetzagentur consolidated its role as port of call and provider of advice for consumers. The postal consumer advice team is committed to helping consumers as well as small and medium-sized enterprises. This also enables the Bundesnetzagentur to gain an insight into quality aspects of the nationwide provision of basic postal services (the universal service). The team examines every complaint and may ask postal operators for feedback. The team endeavours to find long-term solutions within the shortest possible time. The Bundesnetzagentur as a state institution is much likelier to obtain satisfactory answers and solution proposals from postal operators.

Complaints

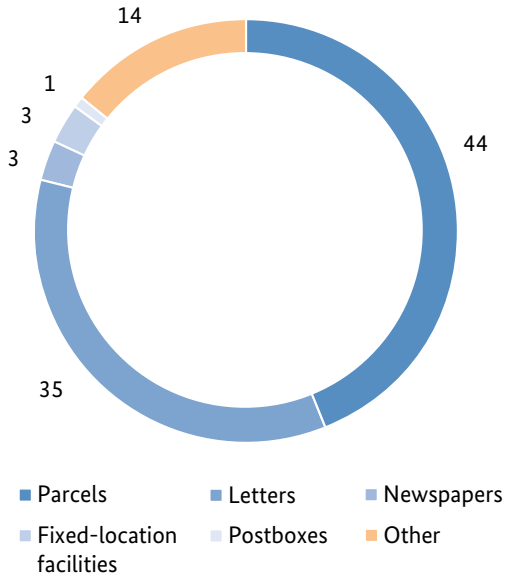
2016 was the second year in succession that the number of complaints increased significantly. A total of 4,015 complaints were received online, by fax or post, up 21% on 2015 when 3,318 complaints had been received. The Bundesnetzagentur also dealt with close to 1,800 calls from postal consumers in 2016 (as in 2015). In most cases complaints related to several issues such no delivery, item returned to sender for no proper reason, damage or loss.

Written complaints



For the first time, shortcomings in parcel conveyance and delivery accounted for most of the complaints received by the Bundesnetzagentur (44%). 35% concerned letter services. Of the remaining complaints 3% related to newspapers, another 3% to fixed-location facilities (post offices, agencies, parcel shops), 1% to postboxes and approximately 14% to other issues.

Reasons for complaints: 2016
(%)

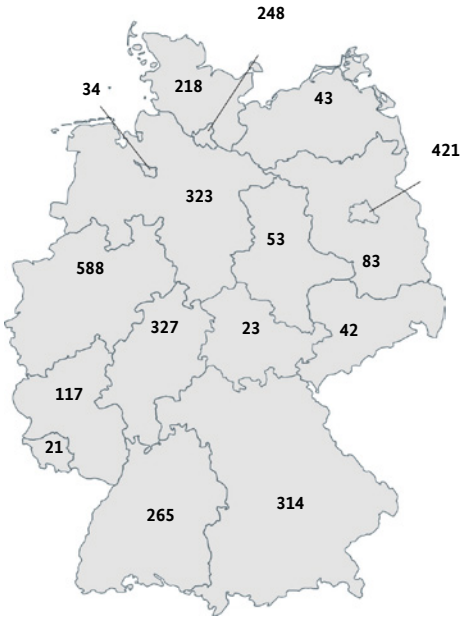


There was a noticeable difference in the reasons for complaints received from the two biggest cities in Germany. 55.9% of the complaints from the greater Hamburg area concerned letter delivery whereas 58.25% of the complaints from Berlin and its surroundings related to parcel delivery.

A comparison by federal state reveals that as in the previous year the majority of complaints (588) came from North Rhine-Westphalia, followed by Berlin with 421 complaints and Hesse with 327 complaints. As in the preceding two years the smallest number of complaints came from Saarland (21).

Putting the number of complaints in relation to the population of the federal states yields a different picture. With 1.4 complaints per 10,000 inhabitants Hamburg takes the lead, followed by Berlin with 1.2 complaints per 10,000 inhabitants. Schleswig-Holstein comes third with 0.8 complaints. Hesse (0.5 complaints/10,000) and North Rhine-Westphalia (0.3 complaints/10,000) sent in fewer complaints.

Complaints by federal state*: 2016

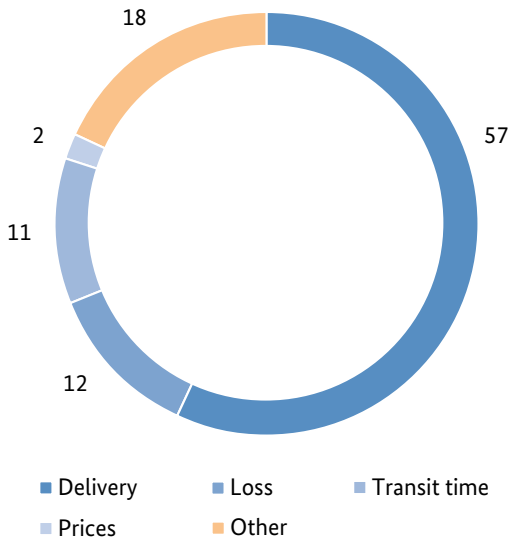


* 866 complaints could not be allocated to a federal state (eg no address had been supplied).

Letter services

As in previous years the majority of complaints about letter services concerned delivery. Customers complained especially about a lack of delivery on Mondays and Saturdays, a recurring lack of delivery over a longer period of time, letters being delivered to alternative or wrong addresses, and letters being returned without any obvious reason. This was followed by complaints about "lost" letters, transit times, redirection services, registered post, stamp prices and damaged letters.

Reasons for complaints – letter deliveries: 2016
(%)



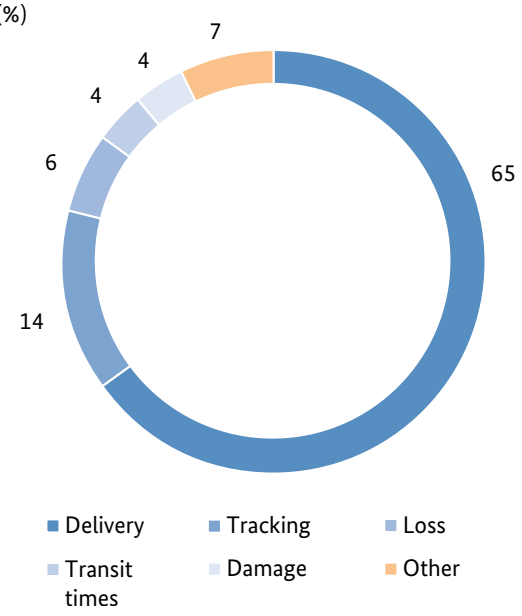
Customers in Hamburg and surrounding areas noticed a deterioration in delivery frequency and quality, starting in autumn 2016. This was reflected in the number of complaints reaching the Bundesnetzagentur and was also widely reported on in the local media. The Bundesnetzagentur's complaints data do not indicate that there are any serious or long-term irregularities in letter deliveries.

Parcel services

The number of complaints about parcels rose steadily in 2016. Most of them related to delivery problems. Many consumers complained that parcels had been delivered to neighbours or dropped at a post office for pick up although they had been at home. In some instances they had not received a delivery card so that parcels had been returned to senders if the recipient had not discovered by other means that their parcel had been delivered elsewhere.

Complaints also increased about incorrect, misleading or ambiguous information in the parcel tracking systems and about parcels not being delivered at the specified time. Tracking systems have improved transparency but have also increased consumers' expectations of correct and reliable information.

Reasons for complaints – parcel deliveries: 2016
(%)



Provision of universal postal service

The Bundesnetzagentur keeps a close eye on the nationwide provision of adequate, affordable postal services. The Postal Universal Service Ordinance specifies the content and scope of this basic service provision (universal service). The Ordinance designates specific postal services as universal services and defines certain quality standards for letter and parcel services. One of these is the requirement that there must be one delivery per working day. In 2016 the Bundesnetzagentur frequently received complaints about – sometimes persistent – shortcomings in delivery, especially in the letter services. A great many complaints to this effect were received from Hamburg and surrounding areas. Massive problems in letter delivery by Deutsche Post AG had already been reported in preceding years. Deutsche Post AG repeatedly claimed that these shortcomings were caused by high absentee levels due to sickness and unexpected high letter volumes. Apart from these shortcomings, the requirement to provide basic services throughout the country is met.

Another requirement is that there must be at least 12,000 fixed-location facilities in Germany where customers can conclude contracts for the conveyance of letters and parcels. In 2016 Deutsche Post AG alone operated a total of 13,023 post offices/agencies for letter and parcel services (as at 31 December 2016). In many towns and districts customers could also use fixed-location facilities operated by other postal operators for letter and parcel conveyance.

Unexpected temporary closures in 2016 of Postbank-Finance Centers were a frequent cause of complaint. These closures were usually due to Postbank staff shortages. The closures did mean restricted access to Deutsche Post AG services offered by Postbank in its finance centers. In its feedback Deutsche Post AG informed the Bundesnetzagentur that both companies were working closely to resolve the problem and lessen the impact. According to Deutsche Post AG, in such cases notified items are transferred to other post offices. Although such closures may frustrate customers, they do not necessarily have a direct negative impact on the availability of the universal service, provided that there are other postal facilities in the vicinity.

The infrastructure for collecting and transporting parcels remained stable in 2016. According to data supplied by the five major parcel carriers (Deutsche Post DHL, DPD, GLS Germany, Hermes Logistik Gruppe and UPS) the number of parcel shops operated in Germany in 2016 totalled more than 39,000.

Sufficient postboxes must be provided in Germany so that customers in urban areas are, as a rule, within 1,000 metres of a postbox. In 2016 Deutsche Post AG alone had 110,876 postboxes across the country. This number has more or less remained unchanged since 2008. At the start of 2016, Deutsche Post AG reduced its Sunday collection which prompted complaints. Mail is now collected from only 2,559 instead of formerly 10,888 postboxes. This reduction is within statutory limits and there was therefore no reason for the Bundesnetzagentur to intervene. In addition, in several towns and districts postboxes are provided by competing operators.

At least 80% of national letters must be delivered on the working day after deposit (D+1). 95% of national letters must be delivered within two working days. Deutsche Post AG commissions an external independent quality and market research institute certified by TÜV Rheinland to measure its transit times. The results are presented to the Bundesnetzagentur on a quarterly basis. Despite the increase in the number of complaints about transit times, Deutsche Post AG met the delivery targets in the period under review.

Dispute resolution

The parcel containing the expensive newly engraved engagement ring gets lost during transit, the one containing the porcelain dish gets damaged and the dish is broken or fragments are missing – these are

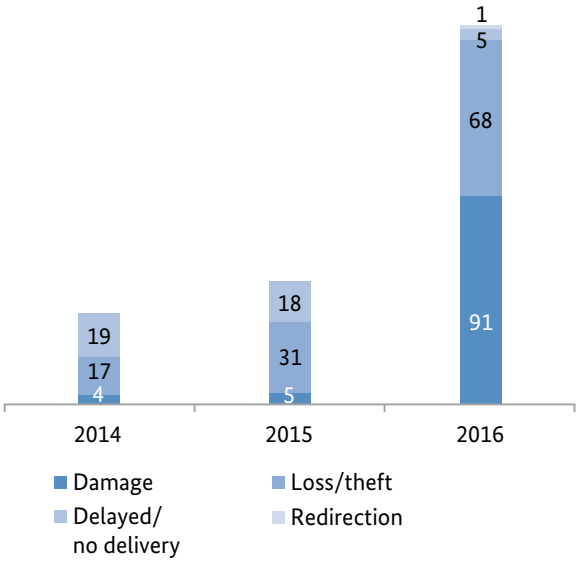
examples of cases in which customers can submit a request for dispute resolution to the Bundesnetzagentur. One condition is that they must have first tried – and failed – to settle the issue with their postal operator. Another is that their operator must be willing to cooperate in the proceedings.

In spring 2016 the Bundesnetzagentur published Postal Dispute Resolution Rules which entered into force at the beginning of April 2016. These rules define the formal dispute resolution procedure from the request for dipute resolution to the formal end of the procedure. The Postal Act had to be modified to entitle the Bundesnetzagentur to issue such rules. The rules also take due account of the new Act on Alternative Dispute Resolution for Consumer Disputes.

Where possible, the Bundesnetzagentur's dispute resolution panel suggests a way for the two parties to settle the dispute amicably. The parties are not obliged to follow the Bundesnetzagentur's suggestion and are free to end the voluntary process at any time (see "Free postal dispute resolution – new Act on Alternative Dispute Resolution for Consumer Disputes" in the box below).

In 2016 the Bundesnetzagentur received 235 requests for dispute resolution, up 279% on the previous year's figure of 62. The Bundesnetzagentur rejected 36 requests that did not meet the preconditions. 15 requests were withdrawn prior to start of the proceedings. In 19 cases the postal operator concerned refused to cooperate. The remaining 165 cases went before the panel for extrajudicial settlement. 87 cases had met with success by the end of the year, the other cases are still pending. Providers reimbursed their customers with on average around 76% of the amount under dispute.

Reasons for dispute resolution requests



Free postal dispute resolution– new Act on Alternative Dispute Resolution for Consumer Disputes

The Act on Alternative Dispute Resolution for Consumer Disputes came into effect on 1 April 2016. It promotes extrajudicial dispute settlement. The Bundesnetzagentur's dispute resolution panel now offers its services free of charge.

The postal dispute resolution panel has been a port of call for consumers for many years. In many cases it resulted in successful mediation between the parties involved (c. 70%). The transparent and impartial procedure is a cost-effective alternative to lengthy and possibly judicial disputes. The new Act strengthens extrajudicial settlements. With its entry into force, dispute resolution in the postal sector became free of charge. This led to a dramatic increase in the number of requests received by the Bundesnetzagentur. In the postal sector most disputes relate to damage or loss of a parcel whilst in transit. Dispute resolution is a voluntary procedure and is initiated by the consumer. The Postal Dispute Resolution Rules define the formalities of the procedure. Decisions are taken by a mediator who is an employee of the Bundesnetzagentur. As a rule, the procedure is carried out by e-mail, fax or letter. Verbal contacts are rare and only take place if the mediator considers it essential and if both parties agree to it. The postal dispute resolution panel is a State dispute resolution entity within the European Economic Area and is recognised by the European Commission as such.

Rulings, activities and proceedings

The digital transformation is having a growing impact on Ruling Chamber proceedings for postal services. A decision was needed on whether – in the light of email and internet advertising – Deutsche Post's Impulspost charges should still be regulated. The E-Postbrief and Prio services also have close links with the digital sector.

Ruling Chamber decisions

Ban on Impulspost designed for new customer mailings
The Bundesnetzagentur ruled on 28 June 2016 that the prices charged by Deutsche Post AG for its Impulspost service were below cost and discriminatory. It therefore ordered the company to bring the prices in line with the Postal Act with effect from 30 June 2016.

Deutsche Post AG's Impulspost service was designed for addressed direct mail; the prices offered to businesses for mailings to new customers were considerably lower than for mailings to existing customers. The prices for mail to new customers – at 14 cents and 24 cents – were half or less than half the price for comparable direct mailings. The service was market tested with individual businesses in the first half of 2016 and was due to be introduced for all businesses in 2017.

The Bundesnetzagentur's investigation found that the prices were well below the costs of an efficient operator. It also showed that businesses using the new service for mailings were being given undue preferential treatment. Deutsche Post AG maintained that its service was part of an advertising market comprising physical and digital forms of advertising. It was not in a dominant position in the market, it said, and was therefore not subject to control by the Bundesnetzagentur under the Postal Act.

The Bundesnetzagentur found that Deutsche Post AG's service was part of a business letter mail market in which the company still holds a dominant position. The company was therefore subject to statutory control and needed to consider the interests of its competitors when setting prices. The market was defined in close cooperation with the Bundeskartellamt, which explicitly approved the narrow definition.

Deutsche Post AG continued to offer its service unchanged despite the Ruling Chamber's decision, claiming that the statutory requirement to bring prices and conditions into line "without undue delay" still allowed its customers to use up their quota of five mailings in 2016 beyond the market test period.

The Ruling Chamber thus issued its first ever decision on the second step of the escalation ladder. The decision banned Deutsche Post AG from continuing to provide its Impulspost service at the discriminatory prices and ruled that the prices were invalid. Deutsche Post AG filed appeals with Cologne Administrative Court against the orders requiring the company to change its prices and conditions and banning it from continuing to provide its service unchanged, and applied for an interlocutory injunction from the Court. The Court rejected the company's request to suspend the immediate enforceability of the Bundesnetzagentur's decisions.

E-Postbrief service

On 14 December 2016, the Ruling Chamber approved the follow-up application submitted by Deutsche Post E-POST Solutions GmbH, a Deutsche Post AG subsidiary, for its E-Postbrief mit klassischer Zustellung service with effect from 1 January 2017.

E-Postbrief letters are posted electronically by senders pre-registered with Deutsche Post AG and delivered either electronically (if the addressee is also registered) or physically. The letters delivered physically are first printed, folded and inserted into envelopes by Deutsche Post E-POST Solutions GmbH or a subcontractor. They are also franked with the postage for the corresponding standard Deutsche Post AG product, for example 70 cents for a standard letter. The letters are then passed on to Deutsche Post InHaus Services GmbH (DP IHS), a mail consolidator that hands them over to Deutsche Post AG, for delivery to the addressee.

The prices put forward for approval by Deutsche Post E-POST Solutions GmbH are the charges for physically transporting the letters, which is just part of the service provided by the company, and are therefore not the full rates payable by the customers. Senders also have to pay the costs for electronically posting and producing the letters as well as the applicable VAT. The current price payable by private customers for a standard E-Postbrief is not the approved rate of 44.5 cents but 70 cents. The current rates are valid until 31 December 2017.

Price approval for Prio service

On 1 February 2017, Deutsche Post AG launched a market test for its special Prio service for letters. The new Prio service essentially offers proof of posting and priority handling in parts of the postal process for single piece letters (standard, compact, large and maxi letter formats, and postcards). The price for the service, which is payable in addition to the applicable postage for the item and which was approved on 2 January 2017, is 90 cents.

The service is to be market tested in branches with electronic payment systems across the country from 1 February until 31 December 2017. The service will initially be tested with postcards, standard letters and compact letters, and in a second stage with large and maxi letters as well.

Customers wishing to use the Prio service must post their items at a Deutsche Post AG branch. Priority handling aims to increase the probability of items being delivered the next working day, but does not guarantee next day delivery. Customers can track the progress of their items online. The service does not provide confirmation of delivery, however: customers can only see when their items were scanned at the inward mail centre prior to delivery and if an item could not be delivered.

Charges for access to change of address information

The Ruling Chamber also ruled on an application from Deutsche Post AG for approval of its charges for access to change of address information. Deutsche Post AG is subject to a condition requiring it to offer other postal operators access to the change of address information sourced from its redirection service, and may charge for this. Having access to the information makes it easier for alternative postal operators to deliver incorrectly addressed mail to the right recipients.

On 21 October 2016, the Ruling Chamber approved a charge of 20.3 cents per address match for the period from 1 January 2017 to 31 December 2019. This is well below the proposed charge of 24 cents per match.

When the charges were last approved, technological developments had already enabled the information to be retrieved using encrypted transmission protocols instead of smart cards. It was therefore no longer necessary – unlike in previous cases – to approve any costs of hardware.

Charges for access to PO boxes
On 28 October 2016, the Bundesnetzagentur approved Deutsche Post AG's charges for competitors' access to its PO box facilities for the period from 1 January 2017 to 31 December 2018.

Deutsche Post AG is subject to a statutory condition requiring it to enable alternative operators to deliver items that are addressed to PO boxes. This in turn allows the competitors to deliver all items from their customers. Without access, competitors would need to sort out their customers' PO box addressed items from the other items and deliver them to Deutsche Post AG with the full postage paid. With access, competitors can deliver the items to the relevant PO box point and Deutsche Post AG staff then sort them into the correct boxes. Access to PO box facilities is thus an important element in promoting competition in the postal market.

Deutsche Post AG is entitled to charge for the work involved, and the rates must be approved in advance by the Bundesnetzagentur. The rates comprise an acceptance charge, which is payable for each delivery for the activities entailed in accepting the items, and an item-related sorting charge for placing the items in the boxes.

The rates approved were slightly higher than those approved in 2013, with the sorting charge up from 3.6 cents to 3.7 cents per item and the acceptance charge up from 98 cents to €1.00 per delivery, still considerably lower than the per delivery rate of €3.59 proposed by Deutsche Post AG.

Charges for service of documents
Charges for the service of documents are different in that all companies offering formal delivery services – and not just the dominant company – must have their charges approved by the Bundesnetzagentur. This is because Deutsche Post AG and its competitors are granted special sovereign powers to issue certificates of service.

In 2016, 15 applications were made for the approval of charges for the service of documents, around the same as in the previous year (13 in 2015). Applications were made for both sliding scale and individual charges, with the majority applicable to regional but some also to nationwide delivery. The highest charge approved was €4.00 and the lowest €1.80.

On 1 September 2016, Deutsche Post AG introduced VAT on its delivery service, contrary to previous practice. The move was a response to decisions by the Fiscal Courts of Cologne and Baden-Württemberg (17 August 2015), and the senate responsible at the Higher Regional Court of Düsseldorf for state and federal authorities' procurement procedures (6 February 2013), ruling that the service of documents does not meet the requirements for VAT exemption.

Deutsche Post AG's decision to charge VAT does not affect the Bundesnetzagentur's approval procedures, since it only approves the net charges exclusive of any applicable VAT. The fiscal authorities are responsible for ensuring that VAT is applied correctly. The Federal Central Tax Office is responsible for establishing that a company is providing a universal postal service, which is a requirement for exemption from VAT.

Access to advertising partnerships
Deutsche Post AG concludes advertising partnership agreements with individual customers under which the customers agree to print "Delivered by" and the Deutsche Post AG logo on their envelopes in return for payment from Deutsche Post AG. Postcon Konsolidierung GmbH, an alternative operator offering consolidation services, applied to the Bundesnetzagentur for an order requiring Deutsche Post AG to conclude such an agreement to enable the competitor to also benefit from the payments for advertising. The Ruling Chamber turned down the application in its decision of 15 February 2016. Postcon then filed an appeal against the decision with Cologne Administrative Court.

The Ruling Chamber's decision reiterated and expanded on its established ruling practice regarding proceedings for orders under the Postal Act. Such proceedings are applicable only when applicants seek access to partial services and not when applicants already have access but still see themselves disadvantaged. In such cases, proceedings for the special control of anti-competitive practices under section 32 of the Postal Act are applicable, and not proceedings for regulatory orders under section 31(2) of the Act. The advertising partnerships do not constitute a partial service – a fact that was not disputed by the parties concerned.

Postcon's application had also advanced the idea of initiating special anti-competitive proceedings. The Ruling Chamber would then have the scope to generally prohibit the conclusion of anti-competitive advertising partnership agreements. In 2015, the Bundeskartellamt ruled in another context that the advertising partnerships were being used as target price agreements in breach of the law. Two particular factors will play a role in the assessment of the case: whether the printed words and logo have advertising value and whether irrelevant considerations are taken into account in the decision to enter into an advertising partnership.

International cooperation

In international bodies the Bundesnetzagentur supports the work on improving cross-border postal services. The postal sector and the logistics services, trade and consumers reap the benefits of uniform arrangements.

ERGP

The Bundesnetzagentur is a member of the European Regulators Group for Postal Services (ERGP). The ERGP facilitates the dialogue between regulatory authorities and the development of common positions in joint reports and position papers. One of its main tasks is to advise and assist the European Commission in consolidating the internal market for postal services. In this context, the ERGP is particularly concerned with the consistent application of the regulatory framework for postal services across all Member States. The Group is composed of the regulatory authorities of the EU Member States, the European Economic Area and EU candidate countries, with the European Commission participating as an observer and providing secretarial services. Only the representatives of the EU Member States' national regulatory authorities are entitled to vote, with each authority having one vote.

In 2016, Bulgaria's regulatory authority CRC chaired the ERGP. The 2016 plenary meetings of the Group, during which fundamental decisions – for instance reports and position papers developed by the various working groups – are adopted, took place in Pravets/Bulgaria in early July and in Naples/Italy in late November. An open Stakeholder workshop to define the contents of a strategy for the next three years was held the day before the plenary meeting in Pravets.

In 2016, the ERGP's work programme was managed by five sub-groups dealing with the following issues: (1) accounting and price regulation, (2) implementation and evolution of the universal service obligation, (3) end-user satisfaction and monitoring of market outcomes, (4) cross-border parcels delivery for e-commerce purposes, and (5) end-to-end competition and access regulation. The Bundesnetzagentur and the French regulatory authority ARCEP jointly chair the sub-group for cross-border parcels delivery. The sub-group on access regulation is chaired jointly by the Bundesnetzagentur and the Lithuanian regulatory authority RRT.

Another ad-hoc group was established in 2016 to draw up a strategy for the ERGP's work for the next three years (Medium Term Strategy). The group also held a workshop to elaborate the contents of the strategy.

The strategy spanning the period 2017 to 2019 will be based on the following three pillars: (1) promoting sustainable provision of a universal service, (2) promoting a competitive EU postal single market, and (3) empowering and protecting end-users.

The reports and common position papers produced by the sub-groups in 2016 included a Report on the Comparative Working Methods for Considering Efficiency of Postal Operators and a Report on Universal Services in light of changing postal end users' needs. The annual reports on quality of service, on consumer protection and complaint handling, and on core indicators for monitoring the market in 2016 were updated. In yet another report the ERGP examined the EU wide impact of the ECJ's 2015 judgment on access and end-to-end competition.

The draft regulation on cross-border parcels delivery services published by the European Commission was of particular interest to the work done in 2016 by the sub-group dealing with cross-border parcels delivery. The draft regulation aims to promote cross-border parcels delivery, especially in e-commerce. The sub-group has thoroughly analysed both the draft and the assessments of European regulatory authorities. The results are presented in an ERGP position paper published on the ERGP's web site in November 2016. The ERGP will continue to monitor the responses to the draft in European bodies.

European and international standardisation

The European Committee for Standardization (CEN) tasks include developing standards for the postal sector. European standards and technical specifications are drawn up by CEN/TC 331, a technical committee specifically established for this purpose. The standardisation work focuses on harmonising technical methods at EU level for the external measurement of quality of service performance within the universal service, and on improving interoperability between postal industry stakeholders.

CEN/TC 331's working groups include representatives from postal operators and logistics services, courier, express and parcel operators, online retailers and industry, as well as regulatory authorities, professional associations and consumer organisations who are also members of their national standardisation bodies (in Germany: DIN). In 2016 the relevant DIN committee was chaired by the Bundesnetzagentur. At European level, the Bundesnetzagentur was nominated at the end of 2016 to chair CEN/TC 331. The Bundesnetzagentur places great emphasis on aiding competitors by eliminating barriers to market entry resulting from closed standards, on promoting transparency in standardisation, and on improving open communication with all market players.

In 2016 the European Commission issued a new mandate to CEN (TC 331) for the development of standards. This task has been incorporated in the committee's work programme. The mandate consists of eleven projects relating to quality of service, interoperability, digital postal services, and physical process and associated data.

One quality of service project has already been completed. The method for measurement of parcel transit time for cross-border parcels within the European Union and EFTA using tracking and tracing was published as CEN/TS 15472:2016. In another project a method is being developed for measuring the transit time of cross-border letter streams using real postal items. Yet another project deals with standardising tools for assessing and handling complaints about postal items that have been damaged, delivered late or have been lost.

In the interoperability project CEN/TC 331 also deals with the requirements of handling reversed envelopes and with the standardisation of digital parcel stations which are optionally connected to the internet and to which carriers and consumers should have unrestricted access. The work of DIN Working Group "Nutzeroffene Übergabeeinheit" is thereby raised to European level. The goal is to standardise digital parcel stations which are optionally connected to the internet and to which carriers and consumers have unrestricted access.

An important task in the project on physical process data relates to the marking and the exchange of data on cross-border parcels between online retailers and logistics services. In 2016 Global Standards One (GS1), which has developed a worldwide management system and whose product identifications are of vital importance to cross-border e-commerce, was also involved in the work. The aim is to eliminate barriers to cross-border parcel delivery by developing uniform interfaces between the postal sector, logistics services and retailers. The work will probably be completed mid-2017.

Universal Postal Union

The international highlight of 2016 was the Universal Postal Congress which took place in Istanbul from 19 September to 7 October to define the road map for the Universal Postal Union's activities in the next four years. The UPU, a specialised agency of the United Nations, is the international body responsible for postal matters. Its bodies define the legal and operational framework for worldwide mail. The Bundesnetzagentur contributed its expertise under the leadership of the Federal Ministry for Economic Affairs and Energy at the Istanbul Congress and does so at the annual UPU meetings as well.

43 meetings and a Ministerial Conference took place during the Congress to lay the foundation for the UPU's work in the next four years. Agenda items included revision of the Universal Postal Convention, reform of the Union, and expenditure. The German delegation was able to achieve important goals in all areas.

The focus of the Congress was on the Union's reform. During the last four years the Council of Administration had been working on a proposal to merge the two Councils so as to create a single UPU Council. Germany and France expressed concerns about regulatory and operational tasks not being clearly separated. Member States agreed by consensus to retain the two Councils for the present, generally accepting Germany's alternative proposal.

Another German core issue concerned the consolidation of the UPU's finances. Significant progress was made. Congress adopted an annual ceiling of about 60% of its income. The UPU will finance the remaining 40% through voluntary contributions, reimbursements, and the sale of services. The work programme was trimmed by setting priorities.

Other improvements are the adoption of a new terminal dues system for letters and small parcels, and the adoption of a new integrated product plan which includes separating postal items into documents and goods.

Germany was re-elected with a broad majority both to the Council of Administration and to the Postal Operations Council, ensuring that its views will carry weight in future UPU decisions.

The Council of Administration's principal task in the next two years will be to establish a final draft for a viable reform proposal for adoption at the extraordinary congress scheduled for 2018 in Ethiopia. The next regular Congress will be hosted by the Ivory Coast in 2020.

Universal Postal Union – Rules for the worldwide postal system

A parcel sent from China to South Africa only reaches its destination because international standards form the backbone of the global postal service. Major decisions taken within the UPU facilitate the flow of mail across vast distances.

Established in 1874, the Universal Postal Union (UPU) is the second oldest international organisation worldwide. In 1948 it became the specialised agency of the United Nations responsible for international mail exchange. The UPU's membership extends to 192 member countries. Its meetings are attended by governments, regulatory authorities and postal carriers. As a member of the German delegation under the leadership of the Federal Ministry for Economic Affairs and Energy, the Bundesnetzagentur regularly takes part in meetings.

Every four years, the Congress draws up a roadmap for the UPU's next four-year cycle. Activities are formulated by the Council of Administration, which as supervisory body is responsible for the UPU's budget and oversees political and regulatory matters, and by the Postal Operations Council which deals with operational aspects. Both Councils meet annually. The International Bureau, under the authority of a Director General, takes care of preparatory work for the two Councils and of day-to-day business between Universal Postal Congresses.

The UPU's main mission is to secure and enhance the global postal service. In recent years the UPU has also been paying greater heed to electronic mail as an alternative to conventional letters and to the global opportunities offered by e-commerce.

RAIL

Rail and Competition

The Rail Regulation Act (Eisenbahnregulierungsgesetz) entered into force in September 2016, creating a sound new legal basis that will enhance legal certainty. At the same time, the Bundesnetzagentur established Ruling Chamber 10 for rail regulation and instituted several proceedings.

Contents

The volume of traffic in the rail freight segment in 2016 is expected to remain steady year-on-year. The share held by Deutsche Bahn's competitors in the transport performance rose to 41% in 2015 and is expected to climb further to 43% in 2016.

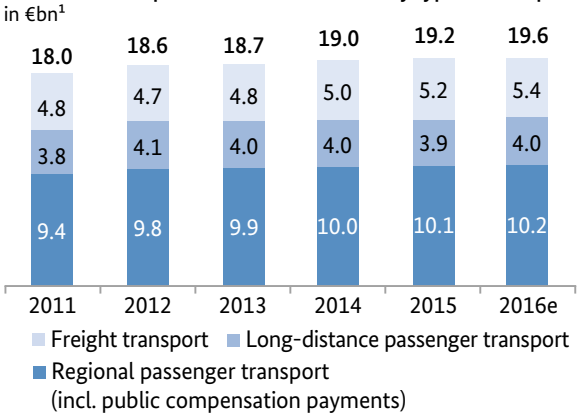
Regional passenger transport is also expected to increase slightly in 2016. The share held by competitors will continue to show a positive development in 2016. Whereas Deutsche Bahn AG undertakings accounted for around 83% of rail transport in 2011, they will only account for approx. 75% in 2016. One reason for the rise in transport services provided by competitors was the entry into the market of WestfalenBahn, National Express and Abellio Rail Mitteldeutschland which took over some of the services offered by Deutsche Bahn AG when the 2016 working timetable was introduced.

Market watch

The situation in the rail market has improved slightly. This change can be attributed to improvements made in the categories "Tariffs and sales" as well as "Access to tracks". Positive changes year-on-year were also recorded in the ratings given to the categories "Non-discriminatory charging systems", "Price-performance ratio of the IMs (infrastructure managers)" and "International access".

Key trends

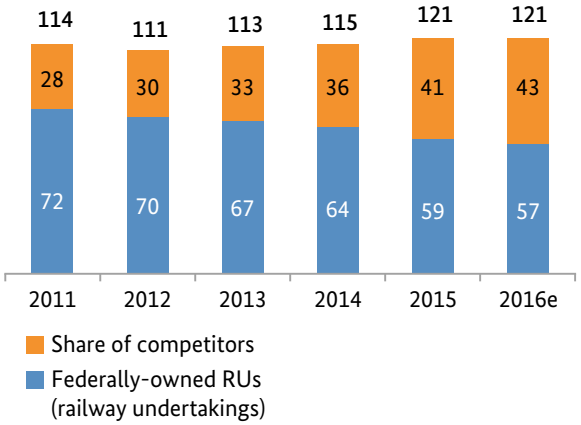
Revenue development in the rail market by type of transport
in €bn[1]



Revenue is expected to grow year-on-year in all transport services in 2016. Total revenue is likely to rise by more than 2% from €19.2bn to €19.6bn. Revenue from regional passenger transport including public compensation payments is expected to increase slightly in 2016 from €10.1bn to €10.2bn. Revenue generated in the long-distance passenger segment is expected to rise by slightly more than 2.5% from €3.9bn to €4bn. Revenue from the rail freight segment is also expected to rise from €5.2bn to €5.4bn in 2016, which is equivalent to an increase of around 4%.

[1] Annual figures marked with an "e" are estimated values. It is not possible to determine the actual values at the present time.

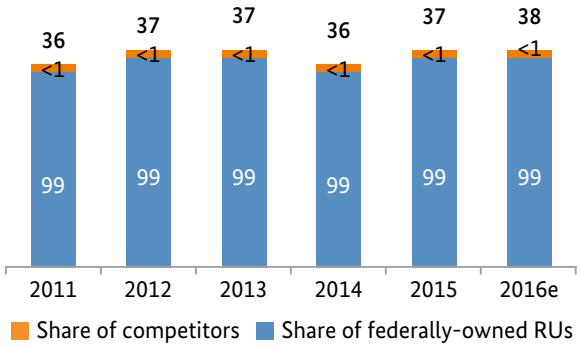
Competition in rail freight transport
By transport performance, percentage shares



At 121bn tonne kilometres, rail freight transport performance in 2016 is likely to remain steady compared to 2015. The share of the Deutsche Bahn AG's competitors in rail freight transport rose to 41% in 2015 and is expected to increase further to 43% in 2016.

Rail transport performance rose by more than 6% between 2011 and 2015. Road freight transport rose by more than 3.7% during the same period. Inland waterways transport decreased by more than 11% between 2011 and 2015. Since 2000, the share of rail freight transport in the modal split[2] has risen from 16.1% to 17.5%.

Competition in long-distance passenger transport
By transport performance, percentage shares

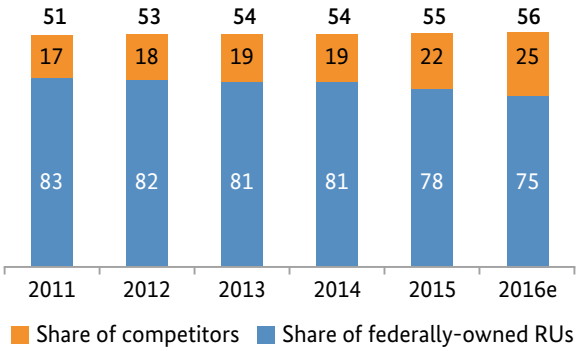


At 38bn passenger kilometres, long-distance passenger transport performance will have risen by approx. 3% year-on-year in 2016. Once again, the vast majority of transport services – more than 99% to be precise – were provided almost exclusively by Deutsche Bahn AG undertakings. Looking at the domestic market, none of Deutsche Bahn AG's competitors provided a greater number of train movements every day of the year 2016 on a self-sustaining basis. However, towards the end of 2016 there were signs of a slight upturn in

[2] Transport volume allocated to the different modes of transport

the market for independently operated passenger transport services with the entry of Locomore to the market (which provides a daily long-distance rail service between Stuttgart and Berlin) and RDC (which provides car train transport to the island of Sylt).

Competition in regional passenger transport
By transport performance, percentage shares



At 56bn passenger kilometres, the regional passenger transport performance is expected to rise slightly in 2016. The positive trend in the share held by competitors in regional passenger transport is set to continue in 2016. Whereas Deutsche Bahn AG undertakings accounted for around 83% of regional passenger transport in 2011, they will only account for around 75% in 2016. One reason for the increase in transport services provided by competitors is the launch of regional transport services by WestfalenBahn, National Express and Abellio Rail Mitteldeutschland which took over some of the services provided by Deutsche Bahn AG for the 2016 working timetable. Since 2000, the share of regional passenger transport in the modal split has risen from 7.2% to 7.9%.

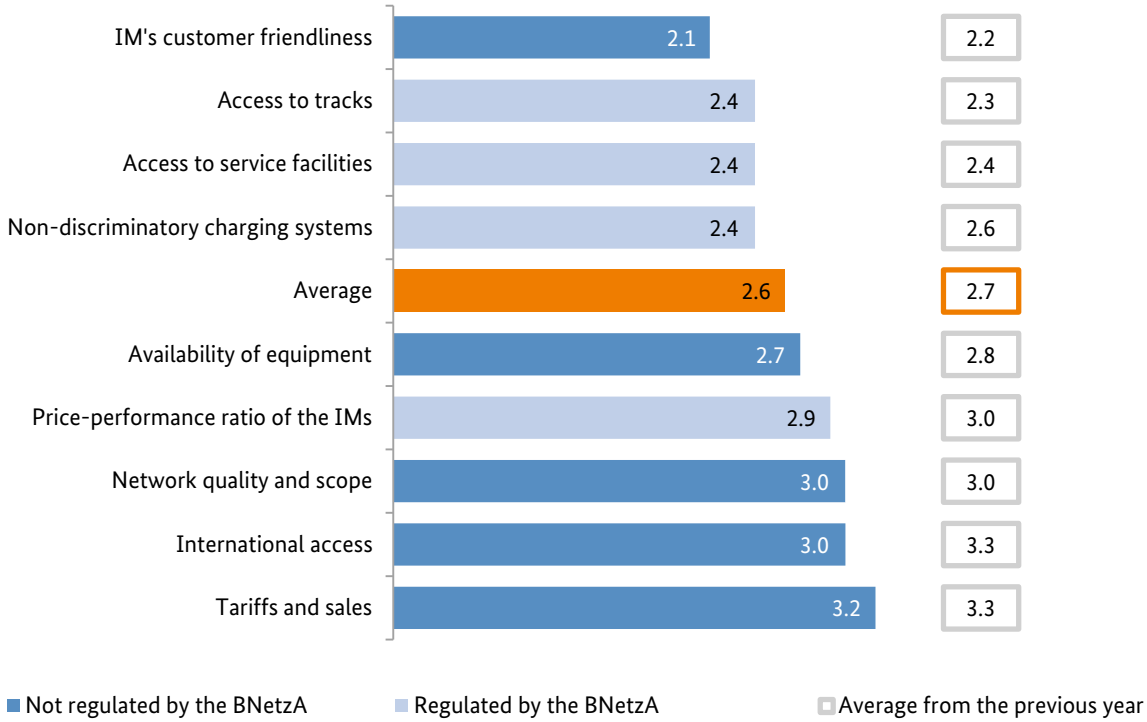
Market assessment

Factors influencing the rail market

In the annual survey on the factors influencing the rail market, railway undertakings were asked to assess the categories listed in the chart by giving a rating of between 1 which stands for "very good" and 5 meaning "inadequate".

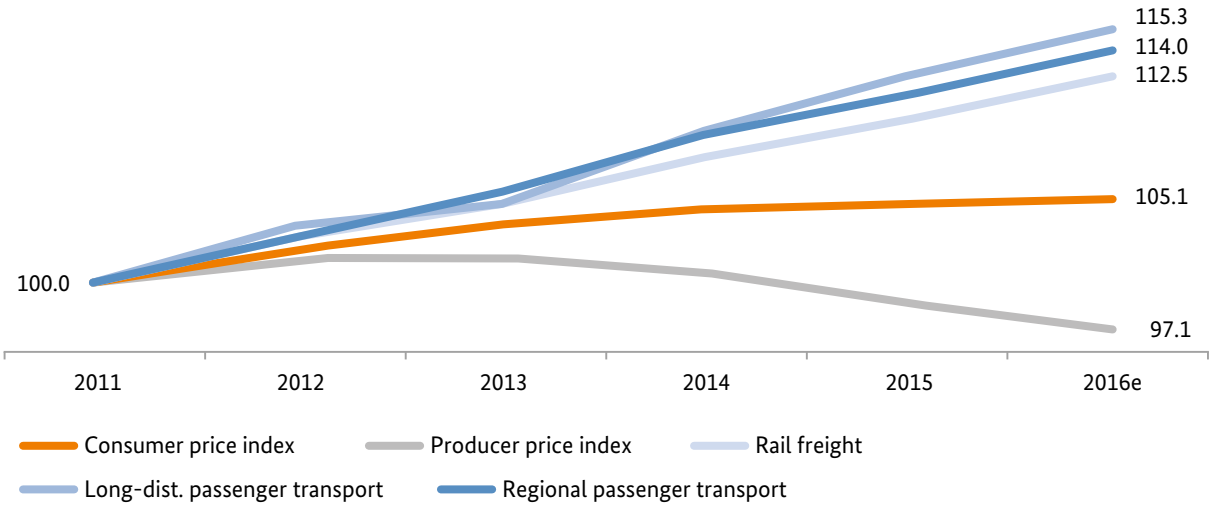
According to the RUs, the situation in the rail market has improved slightly in all categories. The average rating improved from 2.7 to 2.6. This change can be attributed, inter alia, to improvements made in the categories "Tariffs and sales" and "Access to tracks". Ratings in the categories "Non-discriminatory charging systems", "Price-performance ratio of the IMs" and "International access" also improved year-on-year.

Factors influencing the rail market
based on an average rating of 1 (very good) to 5 (very poor)



Average track access charge per train path kilometre (indexed)
Whereas the consumer price index rose by more than 5% between 2011 and 2016, track access charges rose by approx. 13% in the rail freight segment, by around 14% in the regional passenger segment and by more than 15% in the long-distance passenger segment. By contrast, the producer price index for industrial products dropped by almost 3% during the same period.

Average track access charge of IMs
indexed; 2011 = 100

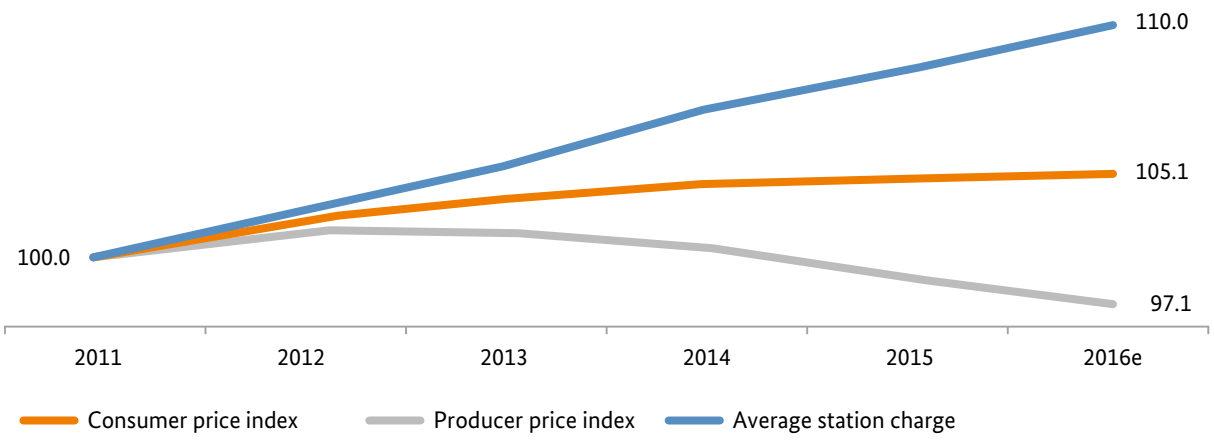


Average revenue per station stop (indexed)
The average charge for use of passenger stations has risen by around 10% since the base year 2011. At 5.1%, this rate of increase is way above the increase in the consumer price index and the producer price index for industrial products (which fell by almost 3%).

Operating results of the railway undertakings
Compared to 2014, the railway undertakings saw their revenue fall in all transport segments in 2015.[3]

Measured in terms of passenger kilometres, the long-distance passenger segment reported an average operating result of 0.46 cents per passenger kilometre in 2015, a slightly lower operating result than in 2014.

Average station charge of IMs
indexed; 2011 = 100



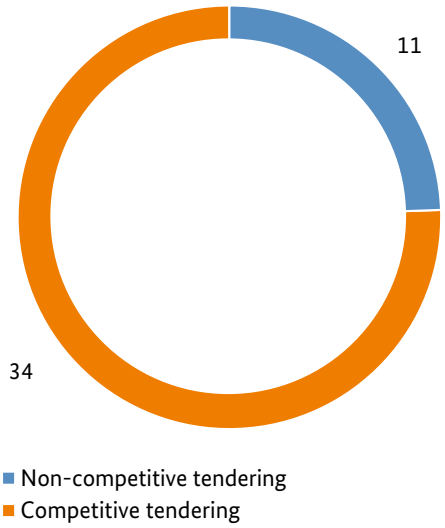
In the regional passenger segment, the average operating result was 1.20 cents per passenger kilometre travelled in 2015, also less than in 2014 when the operating result was 1.38 cents.

The railway undertakings reported an average loss of 0.17 cents per tonne-km in the rail freight segment in 2015. In 2014, the average result per tonne-km reflected a loss of 0.07 cents.

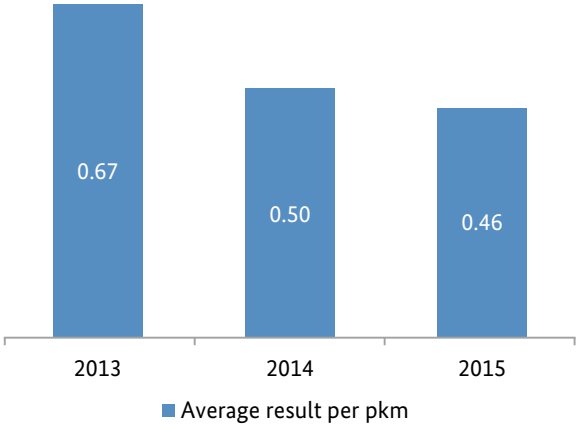
Contracts for regional passenger services

Regional transport authorities order regional transport services from railway undertakings. The public sector is responsible for awarding contracts and for the operational handling of transport contracts. In 2015[4], regional transport authorities awarded 45 transport contracts. Of these 45 transport contracts totalling 91.4m train kilometres on average per year, 95.7% of the total traffic volume was awarded in a competitive procedure. 11 transport contracts, above all interim transport services for the restructuring of routes or the bridging of bottlenecks, were not awarded in a competitive procedure. This corresponds to 4.3% of the total traffic volume.

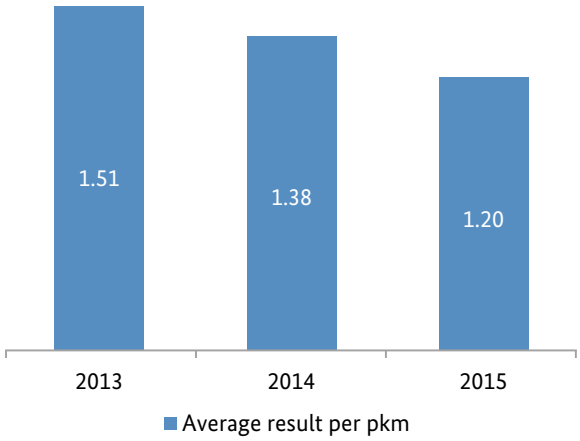
Number of transport contracts awarded in 2015



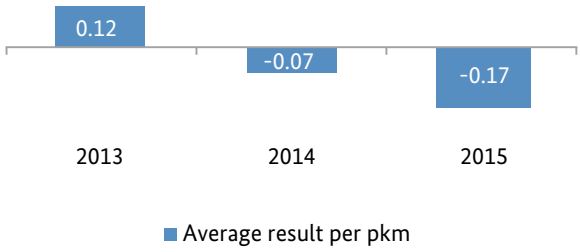
Specific results of RUs in long-distance passenger transport
Cents per passenger-kilometre



Specific results of RUs in regional passenger transport
Cents per passenger-kilometre



Specific results of RUs in rail freight transport
Cents per tonne-kilometre



[3] There is no data available yet for 2016.
[4] There is no data available yet for 2016.

Rulings, activities and proceedings

The entry into force of the Rail Regulation Act created a sound new legal basis for the rail market that will enhance legal certainty. The Bundesnetzagentur also improved competition in the rail segment in a number of proceedings.

Rail Regulation Act

The Rail Regulation Act (Eisenbahnregulierungsgesetz – ERegG) entered into force on 2 September 2016, creating a sound new legal basis for the rail market that will enhance legal certainty.

The Bundesnetzagentur established Ruling Chamber 10 for rail regulation. Final appointments to the Ruling Chamber will be made in 2017.

Since it was established, Ruling Chamber 10 has instituted a number of legal proceedings that can be broken down into three areas:

- access-related issues including an ex-ante review of amendments to or redrafting of network statements and network statements for service facilities,
- price approval proceedings, and
- exemption applications.

The introduction of Ruling Chamber proceedings made it necessary to reorganise administrative procedures within the Bundesnetzagentur. New procedural issues requiring a timely response arise at regular intervals. The Rail Regulation Act also raises new material issues. This reflects the normal course of events after a new law has entered into force.

Track access

Network statement

On 7 October 2016, DB Netz AG and DB RegioNetz Infrastruktur GmbH notified the Bundesnetzagentur for the first time, in accordance with the provisions set forth in the new Rail Regulation Act, of their intention to amend their network statements. The Bundesnetzagentur had six weeks to review the intended amendments, exercising its right of refusal on three issues on the basis of the hearing held on 2 November 2016.

- The undertakings were planning to limit their liability for damages in cases involving simple negligence to damages ensuing from "substantial violation of an important contractual obligation". The Bundesnetzagentur considered this to be a breach of the transparency requirement because neither the undertakings' policy nor the law or case law indicates unequivocally what service obligations represent important contractual obligations.
- Furthermore, DB Netz AG and DB RegioNetz Infrastruktur GmbH were only willing to accept liability for material damages resulting from negligence. This intended amendment was deemed

to be unreasonable because the clause did not offer reciprocity with regard to access beneficiaries and did not offer any explanation that could justify the deviation from the statutory concept.
- The third clause that was rejected involved a regulation governing the acceptance period for train path requests regarding non-scheduled train services. The two undertakings wanted to set an acceptance period of 24 hours rather than the statutory acceptance period of one working day.

Although some amendments were viewed with criticism, there was not sufficient evidence to reject them. This applies in particular to the new definition of the criterion of "traffic that is integrated into the railway network". If conflicts arise, this criterion will determine what transport services need to be prioritised in the procedure involving the allocation of train paths. Since a definition for the criterion has not been available so far and according to current understanding nearly all transport services are "integrated into the railway network", it was not possible to take a decision based on the criterion at the initial stage of prioritised access. This explains why a practicable definition of the criterion "integrated into the railway network" is needed. The Bundesnetzagentur has therefore decided to observe the application of the clause for the duration of the working timetable period to begin with and subsequently to assess the experience gained in order to establish whether and to what extent the definition needs to be adapted. This would be the case, in particular, if it emerged that, all things considered, the clause was placing rail freight transport at a disadvantage.

Operations and Engineering Works working group
In view of the large number of problems that arose in connection with construction measures and the large number of stakeholders affected, the Bundesnetzagentur set up a working group in 2015 with interested railway undertakings from the passenger transport and rail freight segments, transport authorities and DB Netz AG.

The aim of the working group was to eliminate existing problems and to identify the respective objectives of the stakeholders. A report on the results of the working group was published on 21 June 2016, describing the measures to be taken in the problem areas identified (database, communication, cancellation of construction measures, coordination between railway undertakings, standardisation in the respective regional areas and costs incurred by disruptions). They also include time horizons within which measures are to be implemented.

Some solutions need to be implemented at short notice such as the notification of changes in important operational information (for instance, timetable adjustments due to construction work). Many far-reaching enhancements (eg planning of construction measures based on up-to-the-minute data, filter possibilities, presentation of multiple implications) will only be achieved as part of an IT system revamp. However, the new IT system is unlikely to be introduced before 2020. Until the restructuring has been completed, access beneficiaries will be provided with new IT tools in the modular system on an ongoing basis. They will also be involved in the development of these tools. This will gradually improve the information base for access beneficiaries.

The emerging trend of initiating the coordination process with the access beneficiaries at an earlier stage, especially when major construction measures are involved, is also seen in a positive light. The sooner access beneficiaries are involved, the easier it will be to find mutually acceptable solutions.

By submitting the envisaged amendments to its network statement in October 2016, DB Netz AG began making the adjustments to Guideline 402.0305 agreed by the working group.

The Bundesnetzagentur will monitor the further implementation of the announced measures. The dialogue can be resumed within the framework of the working group at any time, if need be.

Quality improvements and incentive system
For around two years, the Bundesnetzagentur has been receiving a growing number of complaints about major quality-related problems with the management of transport services provided by DB Netz AG and its undertakings. Operational quality and punctuality in DB Netz AG's network are important for all transport services and indeed influence end customers' choice of transport services. Unless quality improvements are made, rail transport is at risk of falling behind in intermodal competition. The core objectives of regulation to raise the share of rail-bound passenger and freight transport in the transport sector as a whole, to ensure there is effective competition in the railway markets and to safeguard consumer interests depend in no small measure on a high level of operational quality being reached.

In order to achieve maximum operational quality and punctuality, monetary incentives need to be created to ensure the number of disruptions is reduced and performance of the rail network is enhanced. Incentive systems need to be developed, in particular, integrating access beneficiaries, that cover the IMs' entire infrastructure and are linked to the average delays and quality requirements transport services are expected to meet.

The incentive system introduced by DB Netz AG with the 2009/2010 working timetable envisaged access beneficiaries selecting trains whose punctuality would be used as a benchmark for an incentive payment over the course of the year. As such, either the railway undertaking or the infrastructure manager were held accountable for delays, depending on who caused them. The volume of penalties taken into account in the incentive system was limited to around 0.02% of the total access charges.

The Bundesnetzagentur, DB Netz AG, regional transport authorities and railway undertakings initiated a dialogue in early 2016 on how to implement the specifications. The core aspects of implementation relate to involving access beneficiaries in developing the incentive system and in monitoring any actual and sustainable impact. Themes were identified as the first interim goal that can be checked and, if necessary, addressed in order to achieve a high level of operational quality. A discussion about the cornerstones of creating transport service-specific incentives will follow in a next step.

The ongoing dialogue has revealed that the level of current incentive payments has had little or no impact. The amounts are too low to encourage the railway undertakings to adopt a certain code of conduct. It was also evident that a large number of transport services are not eligible for the incentive payment. Concrete problem scenarios were also identified, for instance, the effects of badly planned construction sites and delays of subsequent trains.

While the discussions were underway, DB Netz AG submitted a slightly modified incentive system, which the Bundesnetzagentur will take a decision on in the price approval procedure in connection with the 2018 network statement.

Access to service facilities

"Harmonisation" project

Train paths also involve the use of capacity at service facilities. The usage periods at service facilities must correspond to the train paths used. In the past, problems have arisen in this regard as train paths and usage times at service facilities were allocated independently of each other and frequently by a different IM.

The Bundesnetzagentur entered into a dialogue with various IMs, railway undertakings and rail associations in order to learn how plans could be harmonised. The vast majority of them said they were, in principle, satisfied with the legal framework for awarding train paths and usage times at service facilities, conceding that there was some room for improvement in the actual infrastructure in individual cases.

The Bundesnetzagentur summed up and published its evaluation of the market consultation in a report.

Conflicts over the use of service facilities

DB Netz AG notified the Bundesnetzagentur of its intention to reject nine requests for use of service facilities for the 2017 working timetable.

In one case, DB Netz AG was going to reject a request for use of service facilities because no contract had been concluded for the use of train paths. Priority is given to the use of a service facility that is essential for the use of an agreed train path. The Bundesnetzagentur objected to the envisaged rejection on the grounds that the unsuccessful party requesting access had actually concluded a contract with DB Netz AG while the review was being carried out by the Bundesnetzagentur.

The Bundesnetzagentur instructed DB Netz AG to reconsider its decision. The decision taken by the Bundesnetzagentur was reaffirmed by way of temporary relief by Cologne Administrative Court. The parties have meanwhile managed to find a mutually acceptable solution. However, the question what point in time is relevant for the decision will need to be clarified by the courts.

In another lawsuit, an access beneficiary requested that a bid submitted late in the procedure whereby priority is given to the highest bidder be taken into account as the delivery agent had delivered the bid to the wrong address. However, the Bundesnetzagentur refused to do so as a highest bid procedure generally rules out restoration of the status quo.

Review of network statements
DB Netz AG is planning to reintroduce long-term contracts with a maximum term of five years for the vast majority of its service facilities. Many access beneficiaries are in favour of this change which is one of the reasons why the Bundesnetzagentur leveraged its discretion not to file an objection for the time being. Notwithstanding this, the Bundesnetzagentur still has reservations about long-term, almost nationwide contracts particularly with regard to access possibilities for train path requests filed at short notice or in the scheduled timetable and will continue to keep a close eye on developments.

Furthermore, DB Netz AG expanded the area of application of the guideline "Coordinating and communicating changes in the working timetable owing to construction measures" partially also to construction measures at service facilities. The Bundesnetzagentur welcomes this as an initial step towards enhancing transparency and increasing involvement of the market.

In 2016, the Bundesnetzagentur reviewed the envisaged amendments to DB RegioNetz Infrastruktur GmbH's network statement and charges for passenger stations. The company operates its own passenger stations that form part of its infrastructure. The important focal points of the review included the obligation to notify stakeholders of disruptions. The network statement entered into force in December 2016.

Car trains to Sylt/ use of ramps
After some initial difficulties, RDC Deutschland GmbH launched its car train service to and from the island of Sylt in the autumn of 2016 in competition with DB Fernverkehr AG. It requires access to asphalted areas in front of loading ramps in Niebüll and Westerland where vehicles have to wait before driving onto the train. To this end, a contract under public law was concluded with DB Fernverkehr AG in 2015 as the operator of these areas in order to ensure competitors had non-discriminatory access and to prevent protracted litigation. The contract was converted into a unilateral commitment undertaken by DB Fernverkehr AG from December 2016. The company will also offer a standard contract reviewed by the Bundesnetzagentur governing the use of areas. This will ensure asphalted areas can continue being used by vehicles in future.

Trimodal terminals
According to previous and current law, freight terminals belong to service facilities that are subject to regulation. In the Bundesnetzagentur's opinion, they include service facilities catering for the transport of cargo by rail, road and water (trimodal terminals).

A number of operators of trimodal container terminals object to the service facilities they operate being classified as part of the rail infrastructure. In the judicial dispute with Duisburg Intermodal Terminal GmbH focusing on the regulatory classification of trimodal terminals, the Higher Administrative Court of North Rhine-Westphalia confirmed the Bundesnetzagentur's view in the second instance. In particular, it dismissed the plaintiff's view that the regulatory classification of terminals depends on which mode of transport the service facility caters for first and foremost.

The Bundesnetzagentur has also instituted similar proceedings against J. Müller Agri + Breakbulk Terminals GmbH & Co. KG (J. Müller), a bulk cargo terminal at Brake port.

Infrastructure charges

Review of DB Station&Service AG's station charges
The Bundesnetzagentur instituted proceedings to review station charges set by DB Station&Service AG for stops at its passenger stations nationwide. At present, charges are subject to distinctions by regional transport authority area and by seven station categories.

The price review covers the costs and revenue generated in connection with the operation of passenger stations. As such, it is important to specifically delimit the company's infrastructure in terms of costs from the sales area (eg shops and outlets at passenger stations). In parallel, the Bundesnetzagentur reviews individual price sub-categories[5] and railway stations at random in order to determine if the charges levied for access and services do not exceed the costs of the provision of services plus a reasonable profit.

Cancellation of the public contract on the transport service factor
With the cancellation of the public contract concluded in 2012 on 8 November 2016, the Bundesnetzagentur has placed the future development of the station pricing system on a clear legal footing. The so-called transport service factor in DB Station&Service AG's pricing system will no longer apply in its current form under the new Rail Regulation Act. Any contractual arrangements that do not comply with the new statutory regulations have therefore been cancelled.

[5] Price sub-categories refer to the above-mentioned individual prices for the various station categories per regional transport authority.

Now that the cancellation contract has been concluded, the transition to the new legal situation and the future design of the station pricing system can be oriented exclusively to the Rail Regulation Act.

Charges levied for use of tracks at short notice
At the instigation of one railway undertaking, the Bundesnetzagentur reviewed DB Netz AG's rules for the event that requests for use of sidings needed could only be made at very short notice or that sidings could only be allocated by dispatchers during regular operations. In cases where this occurred, DB Netz AG asked railway undertakings to issue retroactive notification of the usage. If they failed to do so, DB Netz AG imposed a penalty, sometimes amounting to one-month's charge for use of the track.

In the proceedings, DB Netz AG said it was willing to amend this rule. In future, it will not impose any penalties on access beneficiaries requesting track usage at short notice. If a track is allocated by a dispatcher without prior notification, users failing to issue retroactive notification will receive a written warning to begin with. Only if access beneficiaries repeatedly fail to meet their obligations will DB Netz AG impose a penalty.

Review of price levels in DB Netz AG's 2011 track access charging system
The Bundesnetzagentur completed the review of charges levied by DB Netz AG in its 2011 track access charging system last year. The Bundesnetzagentur subsequently asked DB Netz AG to implement measures to enhance transparency and the quality of its cost accounting. In 2016, the Bundesnetzagentur monitored and reviewed the implementation of measures by DB Netz AG. The calculation and presentation of costs incurred by the provision of service subject to regulation has become noticeably more transparent and valid. The measures imposed in the notice issued on 20 August 2015 have been fully implemented. DB Netz AG subsequently withdrew its objection against the notice issued with the result that the above-mentioned notice became final.

Review of charges levied by the "Special purpose association for public transport in the Ammer Valley"
The Bundesnetzagentur carried out a review of the charges levied by the infrastructure manager "Zweckverband ÖPNV im Ammertal" at the request of a company that intended to shift the transport of its manufactured goods from road to rail. The background to this is that no freight transport whatsoever has taken place on this route up to now and the charge levied is significantly higher than the charge levied for passenger transport. An external expert was consulted in view of the route-specific features who arrived at the conclusion that the additional freight traffic would not incur higher maintenance costs for the route. The Bundesnetzagentur will assess the expert's report and bring the procedure to a conclusion.

DB Netz AG's 2018 track access charging system
In 2016, the Bundesnetzagentur continued to monitor the development of a new track access charging system that had been introduced by DB Netz AG the previous year. In the market consultation process launched by DB Netz AG, the Bundesnetzagentur saw it as its task, not only to provide its expertise, but also to act as the "eyes and ears" of the market players at local level and to ensure there is an actual exchange of opinion and information between the market players and DB Netz AG. One challenge posed by the new track access charging system is to make the adjustment from infrastructure-based pricing to demand-based pricing. To this end, track access charges will in future consist of a marginal cost component and a component estimated to cover the remaining full costs. The latter will be calculated based on relative price reactibilities of the market segments emerging with the new system.

Price reviews took place within the framework of an approval procedure for the first time in 2016. The procedure was used to determine the price cap based on the criterion of the costs of the minimum access package plus a reasonable return. The Bundesnetzagentur also reviewed tarification. In addition, a public oral hearing was held on 14 and 15 November 2016 for this comprehensive review. The information gained from the comments are reflected in the Bundesnetzagentur's decision. Leveraging the administrative option of extending the procedure once only – bearing in mind the costs incurred –, the Bundesnetzagentur has determined that the procedure will be brought to a conclusion on 6 February 2017.

Additional activities

Market consultation on exemptions and legal exceptions in the Rail Regulation Act
Section 2 of the Rail Regulation Act contains several exemptions and legal exceptions from the area of application of certain provisions governing the allocation of capacities and the levying of charges for infrastructure managers. In addition, section 15 of the Rail Regulation Act contains several exemption possibilities for the operators of industrial railways.

The Bundesnetzagentur published five position papers on various aspects of exemptions, describing the respective provisions and scope of application and outlining the requirements infrastructure managers have to meet. The documents are intended to help infrastructure managers to decide whether or not to file an application for exemption on the one hand and to simplify administrative procedures on the other.

The Bundesnetzagentur launched the market consultation process on the various exemptions and exceptions on 22 September 2016 and published the documents so that stakeholders could submit their comments. The comments were subsequently assessed and were incorporated into the position papers. The Bundesnetzagentur published the final key elements on its website.

Exemptions and exceptions are of paramount importance to infrastructure managers. By 8 December 2016, the Bundesnetzagentur had received a total of 21 exemption applications.

2016 Railway Law Research Days

For the 22nd time, experts on railway law met with scientific, judicial and practical experts in September 2016.

The Rail Regulation Act was the key topic at the event. Other topical issues were discussed over the course of the two-day event such as the commitment undertaken by Deutsche Bahn AG regarding abuse relating to tariffs and sales, problems arising from the scarcity of capacity owing to construction sites and network congestion as well as the allocation of train paths on congested parts of the track.

The event "Current railway law issues" will be held once again in Regensburg on 27 and 28 September 2017.

Ruling Chamber for Railways

The Rail Regulation Act entered into force in September 2016. The Bundesnetzagentur set up a ruling chamber for railways to implement the new rules.

The ruling chambers guarantee that the decisions taken by the Bundesnetzagentur are transparent and independent. The establishment of the new Ruling Chamber 10 for railways is based on the new Rail Regulation Act. With the establishment of the Ruling Chamber, the organisation of rail regulation is following what has proven to be successful in the other segments.

Decisions by the ruling chambers are taken in quasi-judicial proceedings, giving due consideration to all the relevant aspects. This generally involves organising a public oral hearing with the participation of all market players. The further development of competition in the rail transport segment is now based on clear and reliable rules.

International cooperation

International cooperation has been further expanded in the area of rail regulation. The most recent legal amendments at European and national level have also promoted cross-border cooperation in the field of rail regulation.

Working groups at IRG-Rail and ENRRB

International cooperation in the area of rail regulation has gained further momentum with the most recent legal amendments at European and national level. Key bodies of independent regulatory authorities grew to 27 members in 2016, namely the Independent Regulators' Group IRG-Rail[6], and the European Network of Rail Regulatory Bodies (ENRRB) which is headed by the EU Commission. Regular work meetings were also established with the European Commission and the infrastructure manager organisation PRIME as well as with the European Commission and the railway undertakings.

The work of IRG-Rail focused on drawing up position papers as a contribution toward legislative processes at EU level and the exchange of regulatory practices.

The position papers drawn up by IRG-Rail in 2016 included opinions about the European Commission's Fourth Railway Package, in particular the "Competitive tendering of public transport contracts" backed by IRG-Rail and on the independence criteria of infrastructure managers and network operators as well as the transparency of financial flows.

Another important range of topics involved the freight corridors as the focus of the work performed by the "Access regulation" working group. Within the framework of the TenT Days organised by the European Commission in June 2016, a statement was issued on the development of freight corridors and a declaration of intent was issued to foster competition and to safeguard non-discriminatory access to the corridors. This included, inter alia, consolidation participation of numerous IRG-Rail members in a consultation process launched by the European Commission about issues relating to the amendment to Regulation (EU) 913/2010 concerning a European rail network for competitive freight.

The exchange of regulatory practices in 2016 focused above all on the provisions set forth in the Recast of the 2012 Railway Package that was to be transposed into national law by 2015 and on which the Rail Regulation Act – which entered into force on 2 September 2016 – is based. This Act strengthens the regulatory control by the Bundesnetzagentur in the railway market and, for instance, assigns the responsibility for monitoring the unbundling provisions and the powers to grant exemptions from regulation to the Bundesnetzagentur. Approval was introduced in the area of charges levied. The Bundesnetzagentur is also responsible for monitoring compliance with statutory incentives. With a view to the Recast, the IRGRail members organised workshops and forums to compare transposition of the law in the Member States, to exchange experience and to identify changes or changing regulatory practices based on the new legal situation.

The Bundesnetzagentur was actively involved in all IRG-Rail working groups and chaired several of them. It also participated in ENRRB meetings and attended various sub-group meetings of the Single European Railway Area Committee (SERAC) on the rail freight corridors and on RMMS (market monitoring at European level).

The Bundesnetzagentur was heavily involved in drawing up working papers in the area of the working group on "Charges" and the sub-group "Charges levied for service facilities". In 2016, comparative documents providing an overview of track access and station pricing systems of the IRG-Rail members were, inter alia, drawn up, an overview of methods used to calculate the direct costs incurred by train movements was prepared and a paper was drawn up on the methods used to define market segments and mark-ups.

Implementing acts of the European Commission pursuant to Directive 2012/34/EU

Directive 2012/34/EU makes provision for the introduction of so-called implementing acts adopted by the EU Commission that spell out in more concrete terms the individual sections of the Directive. The European Commission therefore worked on relevant legal texts.

[6] http://www.irg-rail.eu

In 2016, the Implementing Act on Framework Contracts in the Railway Sector was adopted after lengthy negotiations which the Bundesnetzagentur was also actively involved in. Implementing acts on access to service facilities and services and on the introduction of the European Railway Traffic Management System (ERTMS) have not yet been implemented. The IRG-Rail positions and comments on the implementing acts will be published in the form of IRG-Rail discussion papers. They have already been or will be incorporated direct into the communication and consultation process with the European Commission.

Fourth Railway Package

On 14 December 2016, representatives of the European Parliament and Council of Ministers reached agreement on the policy-related part of the Fourth Railway Package. The EU Commission had published its proposals for a Fourth Railway package back in January 2013 in view, inter alia, of the sluggish implementation of market liberalisation and the ongoing links between national infrastructure managers and railway undertakings. These proposals consist of a "technical" pillar and a "policy" pillar. Whereas agreement was reached promptly on the "technical pillar", the "policy pillar" proved to be much more controversial and was negotiated subsequently in initial amendment proposals put forward by the European Parliament under three different Council presidencies. The Fourth Railway Package focuses, inter alia, on improving railway competitiveness, facilitating market access through non-discriminatory terms and conditions for access, reducing barriers to access and opening national passenger transport markets. A limited separation was made between infrastructure and operations not least owing to political pressure exerted by individual Member States. However, it continues to be at the discretion of the Member States to leave rail transport infrastructure and operations in one integrated group. Notwithstanding this, measures aimed an enhancing the transparency of financial flows and at preventing cross-finance have been enshrined in the Fourth Railway Package. All EU railway undertakings are to be able to provide rail transport services throughout Europe from 2020 onwards. Direct awarding of contracts will continue to be permissible for the time being provided certain performance criteria (such as punctuality and quality) are met.

The competent IRG-Rail working group that is jointly chaired by the Bundesnetzagentur and the British regulatory authority ORR has developed and submitted several position papers on the relevant areas under discussion; most recently a position paper on the version of the recently adopted "policy pillar".

Access-related issues and rail freight corridors

The issue of trans-European rail freight corridors has been the focus of intensive further development, the integration and functioning of which needs to be consolidated in the system of the national and European framework. A potential recast of Regulation 913/2010 concerning a rail network for competitive freight that has hitherto provided the framework for the regulatory review is being considered. To this end, the EU Commission implemented a comprehensive consultation process in 2016. Relevant contributions were coordinated in the IRG-Rail "Access" working group that is chaired by the Bundesnetzagentur; regular meetings facilitating the exchange of information were also held between the corridor operators. Relevant cooperation agreements provide the basis for cooperation between the regulatory authorities. The working group has also developed an overview of obstacles to competition in international rail transport, specifically on "construction site planning/construction site management" and on the "performance regimes" in the various Member States.

At present, preparations are underway for the drafting of a new opinion on the Implementing Act on the range of topics involving "Access to service facilities" by the competent IRG-Rail working group that is chaired by the Bundesnetzagentur. The European Commission intends to adopt it before the end of 2017. The key topics based on a recent Commission draft include access criteria, allocation of capacity and transparency.

Market monitoring at European level

The activities undertaken by the IRG-Rail "Market Monitoring" working group once again focused on developing common indicators for collecting data on the European rail market. Revising the existing monitoring guidelines aimed at creating ever-greater comparability of data collected at national level was another important step in the process. Another key focus of the working group was to publish the annual marketing monitoring report that provides market players with detailed data analyses on changing key topics. The regular exchange with the other regulatory authorities provided the basis for effective and transparent cooperation between the Member States.

The Bundesnetzagentur’s core tasks and organisation

The Bundesnetzagentur requires a highly efficient organisational structure to carry out its diverse tasks, enabling it to safeguard competition in the regulated sectors for the benefit of the consumer.

Tasks and structure

The Bundesnetzagentur, originally known as the Regulatory Authority for Telecommunications and Post, was set up on 1 January 1998 as a separate higher federal authority under the then Federal Ministry of Economics and Technology. It took over the responsibilities of the former Federal Ministry of Post and Telecommunications and the Federal Office for Post and Telecommunications. In 2005, on being assigned responsibilities under the Energy Act and the General Railway Act, the Regulatory Authority for Telecommunications and Post was renamed the Bundesnetzagentur für Elektrizität, Gas, Telekommunikation, Post und Eisenbahnen.

First and foremost, the Bundesnetzagentur's remit is to promote competition through regulation in the energy, telecommunications, postal and rail sectors and to guarantee non-discriminatory network access. Alongside regulatory measures in the energy sector, as the national planning authority the Bundesnetzagentur is also responsible for electricity transmission lines crossing national or federal state borders in the context of the energy transition. In the telecommunications and postal sectors it ensures appropriate, adequate and nationwide services and, on the basis of various pertinent laws and ordinances, provides regulations for the use of frequencies and numbers.

Furthermore, the Bundesnetzagentur is the competent authority under the Electronic Signatures Act (SigG).

The Bundesnetzagentur's tasks are complex and highly diversified. They range from cases addressed in quasi-judicial proceedings in regulation areas, to reporting requirements and planning authority responsibilities, consumer protection and information activities in the regulated sectors, right down to the nationwide presence for investigating and processing frequency interference complaints.

Below the management level the Bundesnetzagentur comprises ruling chambers and departments. The President's Chamber takes decisions in specific cases, in particular on award proceedings for scarce radio spectrum resources and the imposition of universal service obligations. In the telecommunications sector it determines which markets require regulation and which companies have significant market power in these markets. On the basis of these determinations, the ruling chambers then decide on the regulatory measures to be imposed on companies with significant market power. This is how decisions on specific details of obligations are reached, for example in the field of network access conditions or ex ante or ex post price reviews. In the postal sector the ruling chamber focuses on (ex ante and ex post) rates approval and the control of anti-competitive practices, including

the regulation of access to the postal network. In the energy sector the Energy Act gives the ruling chambers decision-making powers on general and individual issues regarding access to electricity and gas networks and network tariffs.

The departments perform specialised and central administrative functions. These include economic and legal policy issues in the various areas of regulation and the relevant international coordination, as well as technical aspects of frequencies, standardisation, numbering and public safety. The Bundesnetzagentur is involved in international standardisation bodies, cooperating in the development of next-generation networks and new radio systems.

In the energy sector the Bundesnetzagentur has been assigned key market supervisory tasks from gas and electricity network development planning, from the Market Transparency Unit for Wholesale Electricity and Gas Markets set up in 2013, and from its responsibility for safeguarding security of supply. A major departmental function is to give ruling chambers specialist assistance in their decision-making. All relevant rail regulation tasks are performed by the rail department, as the legislation does not yet provide for a ruling chamber.

All of the Bundesnetzagentur's responsibilities have a strong international element. Coordination at European level, in particular, has always been an important aspect of its regulatory activity. This is reflected by the fact that the international activities are mostly concentrated and dealt with in one department.

In the telecommunications sector the Bundesnetzagentur is mainly responsible for the key decisions and objectives that promote investment, innovation and competition for the benefit of all citizens. In the context of Industry 4.0, ideas are being developed to promote the spread of digital technology and internetworking in key future-oriented fields. The economic opportunities offered by the digital revolution and internetworking are being assessed with respect to growth, employment and competitiveness in the national economy.

Consumer protection remains another key focus area in the telecommunications sector. For this purpose, emphasis is placed on investigating problems that hinder a smooth change of supplier. In addition, the Bundesnetzagentur continues to vigorously combat misuse as regards unlawful use of telephone numbers, anti-competitive behaviour and cold calling. In protecting the consumer, particular attention is given to preventing the illegal billing of call queues. Another primary function is to ensure transparency of consumer contracts, in particular with respect to the bandwidth guaranteed in the contract. The Bundesnetzagentur also maintains a database of sites of fixed transmitters operating above a specified power level. Also of particular importance for consumers are the resolution of radio interference, the dispute resolution procedure under section 47a of the Telecommunications Act and section 10 of the Postal Services Ordinance (PDLV), and general consumer services. Under Part 7 of the Telecommunications Act, the Bundesnetzagentur plays an important role in ensuring public safety. Its tasks include checking the technical protection measures for critical telecommunications infrastructure, protecting personal data and telecommunications privacy, the technical implementation of interception measures, and implementing and safeguarding information procedures.

In the energy sector it is the Bundesnetzagentur's duty to create and secure the basis for efficient competition in the electricity and gas markets. This is done in particular through unbundling and regulating non-discriminatory access to the energy networks, including rates regulation. In addition, the statutory decision in 2011 to phase out nuclear power as part of the energy transition and the continued expansion of renewable energy require state measures with respect to the various market players. These include, for instance, monitoring the electricity and gas wholesale markets, supervising the redistribution mechanism under the Renewable Energy Sources Act, registering photovoltaic systems to determine the progressive reduction in the EEG-regulated feed-in tariff and any interventions necessary to safeguard security of supply, for example if system-relevant power plants are to be decommissioned. The latter task is statutorily limited in duration to 2017. The Bundesnetzagentur also monitors the development of upstream generation and import markets along with consumer markets.

One of the major tasks for the Bundesnetzagentur in the context of the energy transition is the fast, large-scale expansion of the electricity transmission networks. To achieve this, the Bundesnetzagentur has been given wide-ranging authority in network development planning and in approving network expansion measures. This includes implementing the federal sectoral planning for extra-high voltage lines crossing federal state and national borders and, as of 2013, their planning approval. As a part of network development planning, key decision-making infor-

mation was prepared and presented to the legislator as a basis for determining the priority needs of network expansion set by the energy sector. Following the adoption of the Federal Requirements Plan in 2013, planning procedures for extra-high voltage lines crossing federal state and national borders take place as part of the federal sectoral planning process and the subsequent approval procedure. As part of the statutory planning process, the network development plan is constantly being updated to take account of the latest developments. This also involves network planning and connection in the offshore sector.

In rail regulation the Bundesnetzagentur monitors compliance with the legislation on rail infrastructure access. A core task here is to ensure non-discriminatory use of the rail infrastructure by railway undertakings and other access beneficiaries. The term rail infrastructure includes the infrastructure and services connected with both tracks and service facilities (eg stations, freight terminals). Rates regulation includes the examination of the level and structure of infrastructure charges and of other charges levied by the infrastructure managers.

A nationwide presence is vital for the Bundesnetzagentur to perform its duties well. To ensure consistency the Bundesnetzagentur's regional offices, the contact point with consumers and the industry, are managed and coordinated centrally by a single department.

The regional offices are mainly responsible for technical matters. They provide information, for instance, on compliance with the Telecommunications Act, electromagnetic environmental compatibility provisions and the Electromagnetic Compatibility of Equipment Act (EMVG). They are also in charge of frequency assignment, for instance for private mobile radio systems, for granting site certificates and for sampling equipment under their market surveillance duties. Another important area is the investigation and processing of radio interference using state-of-the-art measuring equipment, monitoring compliance with regulations generally and carrying out radio monitoring and inspection orders under the Telecommunications Act and the Electromagnetic Compatibility of Equipment Act.

Additional executive tasks are carried out by specific regional offices. In particular, this involves activities in number administration, number misuse and cold calls, consumer protection and information, the registration of photovoltaic systems and the registration of railway infrastructure. Moreover, the offices also carry out some personnel management functions for other government bodies and institutions, primarily those falling under the Federal Ministry for Economic Affairs and Energy.

Human resources management

Human resources management is a top priority at the Bundesnetzagentur. It is important both to assign staff optimally and to recruit new qualified staff. This is only possible when human resources management takes account of work requirements and staff skills and preferences in equal measure. Only a combination of proactive and appropriate staff deployment and motivated employees will allow the Bundesnetzagentur to perform its responsibilities in an efficient and cost-effective way even in times of tight budgets. Aspiring to modern human resources management, the Bundesnetzagentur offers not only corporate health schemes, but also models for balancing work and family life.

In recruiting new staff the Bundesnetzagentur requires not only excellent specialist knowledge, but also the ability to structure and address complex new tasks in an interdisciplinary team quickly and with a flair for practical solutions.

Given its diverse areas of activity, the Bundesnetzagentur attaches particular importance to an interdisciplinary work approach. In total the Bundesnetzagentur employs about 3,000 specialists, including legal experts, economists, engineers and scientists from various fields, to ensure the efficient, proper performance of tasks in all areas.

The Bundesnetzagentur has been offering apprenticeships since 1999. In view of the recruitment of future staff and the challenges of demographic change, the training qualifications offered by the Bundesnetzagentur have become ever more diverse. Vocational training is available for office management trainees, electronic equipment and systems trainees, and for IT trainees in system integration and applications development. Since 2011, the Bundesnetzagentur has also offered a work-study programme enabling students (Bachelor of Engineering/Electrical Engineering and Bachelor of Science) to work as electronic equipment and systems technicians at the Bundesnetzagentur. In 2016, the Bundesnetzagentur introduced a similar programme with two places for computer science students (Bachelor of Science) in combination with posts as IT trainees. Moreover, since 2012 two civil servants preparing for the rank of Regierungsinspektor are selected annually to take a university degree in IT in public administra-

tion. Vocational training courses are offered at a total of eight Bundesnetzagentur locations, in particular at the regional offices.

In 2016, a total of 181 trainees and students were trained at the Bundesnetzagentur in various occupations. Of the 31 trainees who successfully completed their training in 2016, 27 decided to stay with the Bundesnetzagentur. Additionally, eight students graduated in 2016 from the Bundesnetzagentur's work-study programme: two graduates in IT in public administration and six electrical engineering graduates took posts at the Bundesnetzagentur at higher intermediate level.

Budget

The Bundesnetzagentur's income and expenditure is budgeted for in the federal budget in the departmental budget of the Federal Ministry for Economic Affairs and Energy.

The table below shows the income for 2016 (target and performance) and 2017 (target).

Type of income	Target 2016 €'000	Performance 2016 €'000	Target 2017 €'000
Fees, contributions and other charges in the telecoms sector	62,787	74,955	61,069
Fees and other charges in the postal sector	6	65	40
Fees and other charges in the rail sector	62	214	62
Fees and other charges in the energy sector (electricity and gas)	4,760	10,344	2,405
Fees and other charges under the Grid Expansion Acceleration Act	16,303	3,360	26,760
Other administrative income, eg fines and rental and sale income	984	3,703	1,218
Administrative income	**84,902**	**92,641**	**91,554**

The higher than expected income generated in the telecommunications sector is mainly due to contributions for the protection of interference-free frequency usage being collected for 2012, 2013 and 2014. Additional income was again generated in the energy sector in 2016. This is also due to fees being collected from previous years. The income generated under the Grid Expansion Acceleration Act (NABEG) was lower than expected. Since the collection of fees depends on progress in expansion planning at transmission network level, delays in projects result in lower income in the Bundesnetzagentur's budget.

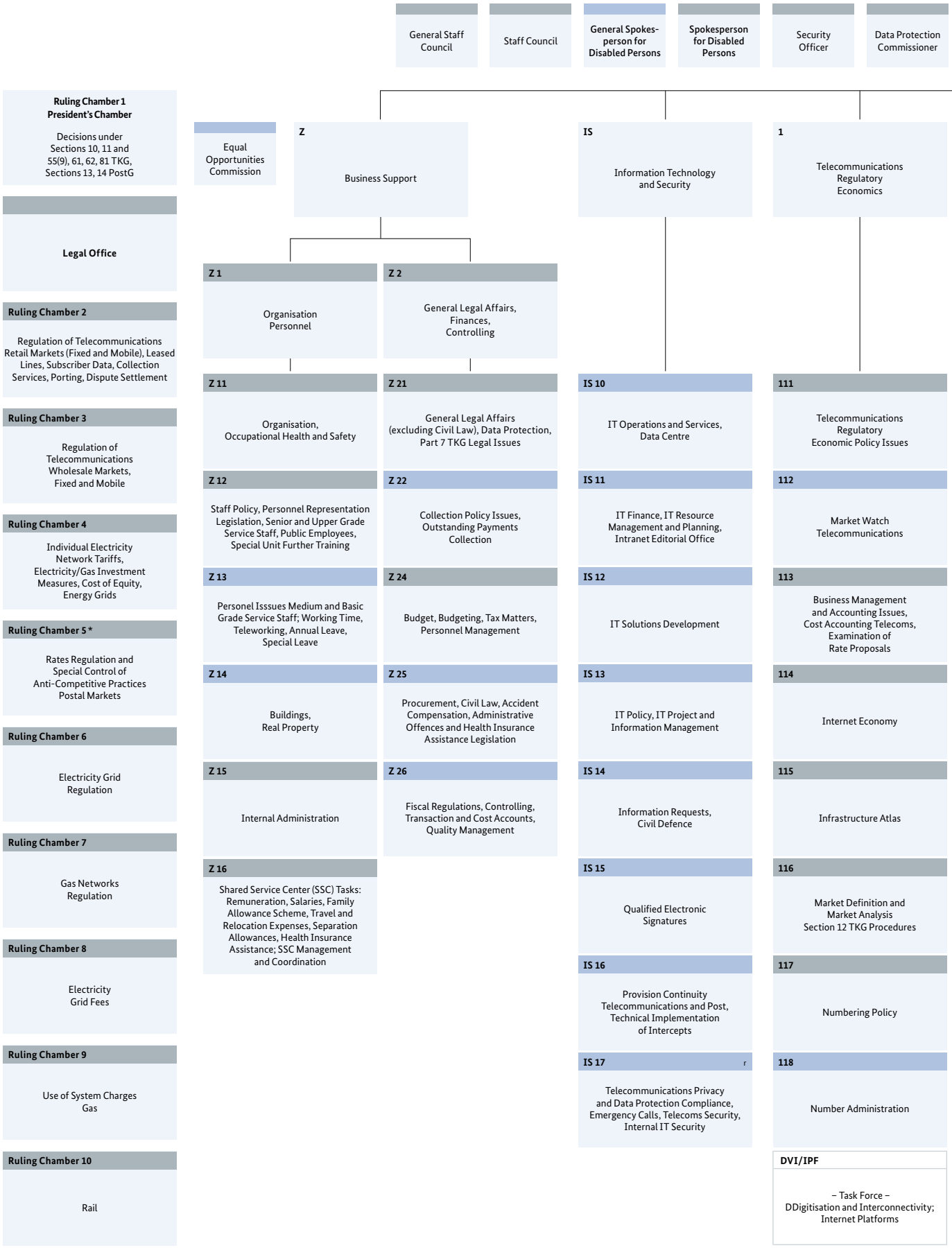
The table below shows the expenditure for 2016 (target and performance) and 2017 (target).

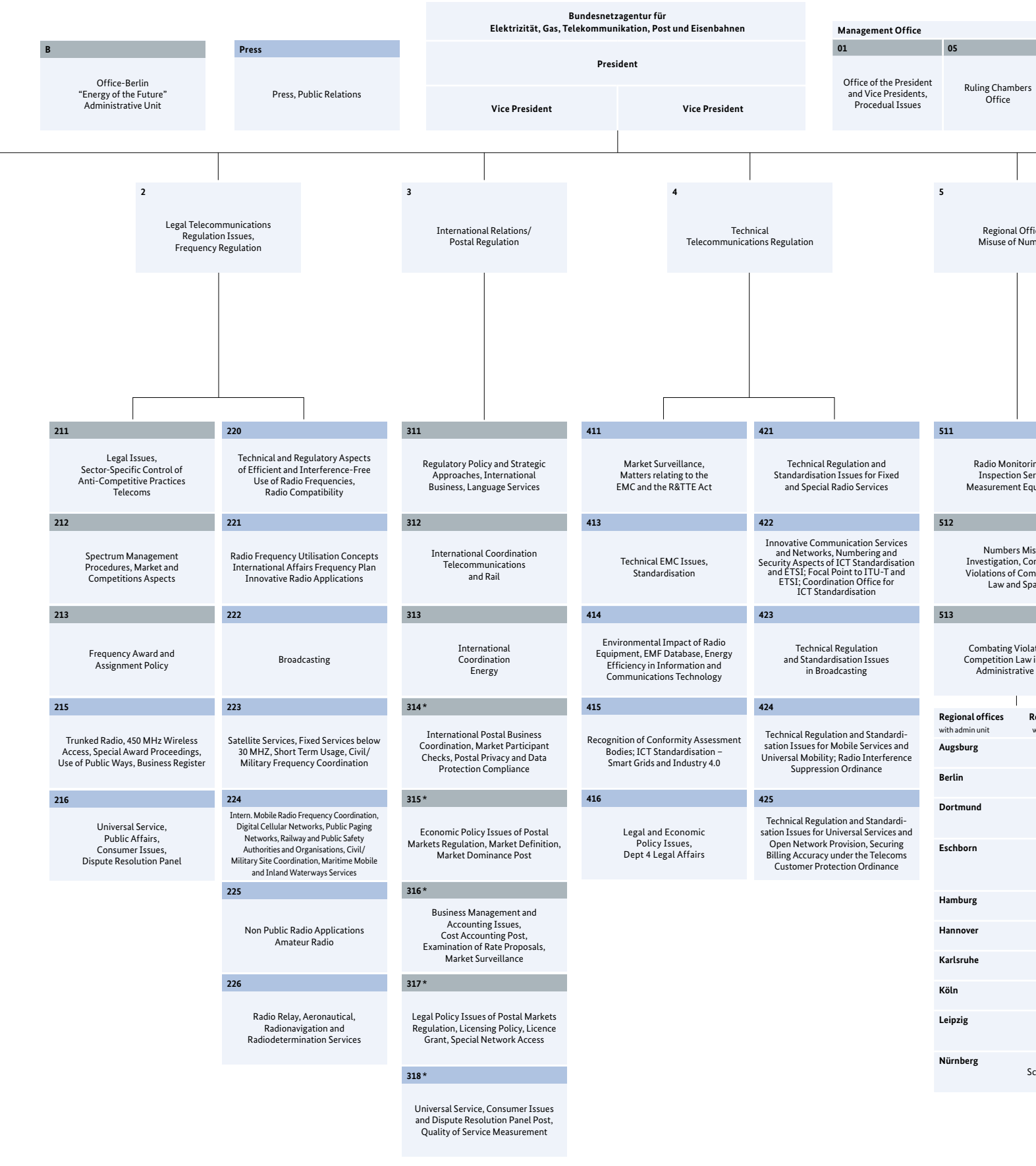
Type of expenditure	Target 2016 €'000	Performance 2016 €'000	Target 2017 €'000
Staff costs	138,694	132,450	134,075
General administrative expenditure, appropriations and special financing expenditure	57,580	50,154	68,424
Investment	17,416	15,504	15,201
Total expenditure	**213,690**	**198,108**	**217,700**

The lower than expected expenditure was also mainly due to delays in network expansion projects. The rather low number of applications received from network operators has meant that some of the planned posts for network expansion have not yet been filled and consequently both staff and infrastructure costs were lower than expected.

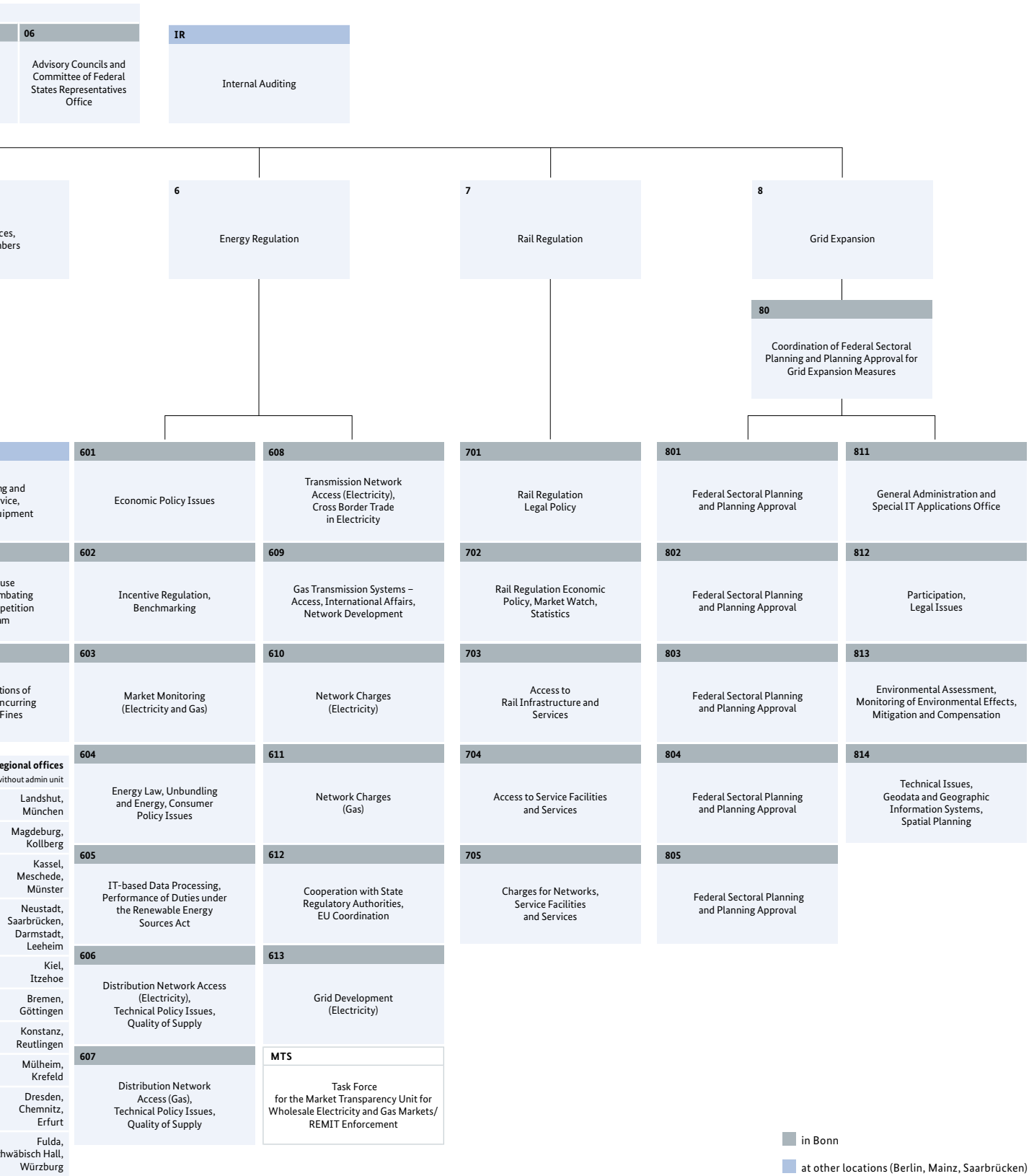
Organisation Chart

1 October 2016





* The Chair of Ruling Chamber 5 will be in charge of Department 3's tasks for Sections 314-318 until further notice.



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List of abbreviations

3GPP 3rd Generation Partnership Project

5G 5th generation of mobile communications; 5th generation of wireless systems

A

ACER Agency for the Cooperation of Energy Regulators

AdCo RED Administrative Cooperation Group Radio Equipment – Directive 2014/53/EU

ADSL Asymmetric digital subscriber line

AG Stock company

All-IP Switch from traditional telecommunications transmission technologies to systems based on the Internet Protocol (IP)

API Application programming interface

ARCEP French regulatory authority

ARegV Incentive Regulation Ordinance (Anreizregulierungsverordnung)

B

B2B Business-to-Business

B2C Business-to-Consumer

BBPIG Federal Requirements Plan Act

BB PPDR Broadband public protection and disaster relief

BDEW German Association of Energy and Water Industries

BdS Railway Line Infrastructure Operators

BEREC Body of European Regulators for Electronic Communications

BfDI Federal Commissioner for Data Protection and Freedom of Information

BGBl. Federal Law Gazette

BITKOM German Association for Information Technology, Telecommunications and New Media

BK Ruling chamber of the Bundesnetzagentur

BMWi Federal Ministry for Economic Affairs and Energy

bn Billion

BNetzA Bundesnetzagentur

BOS Public protection and disaster relief agencies

BSH Bosch and Siemens Home

BSI Federal Office for Information Security

BVerwG Federal Administrative Court

BWA Broadband Wireless Access

C

CA UPU Council of Administration

CA/DRM Conditional access/digital rights management

CEER Council of European Energy Regulators

CEN European Committee for Standardization

CENELEC European Committee for Electrotechnical Standardization

CEP Courier, Express, Parcel

CEPT European Conference of Postal and Telecommunications Administrations

CEREMP ACER portal for registration (Centralised European Register for Market Participants)

CRC Bulgarian regulatory authority

ct/kWh Cents per kilowatt hour

ct/min Cents per minute

D

DAkkS Germany's national accreditation body

DB AG Deutsche Bahn AG

DESTATIS Federal Statistical Office

DigiNetzG Act to facilitate the deployment of high-speed digital networks

DIN German Institute for Standardisation

DIT Duisburg Intermodal Terminal GmbH

DIY Do It Yourself

DOCSIS Data Over Cable Service Interface Specification

DP-Gruppe Deutsche-Post group

DPIHS Deutsche Post InHaus Services GmbH

Dr. Doctor

DSL Digital Subscriber Line

DTAG Deutsche Telekom AG

DVGW German association for gas and water supply (Deutscher Verein des Gas- und Wasserfaches e. V.)

E

e Estimate

e. V. Registered association

ECC Electronic Communications Committee

ECJ European Court of Justice

eCommerce Electronic commerce

EEG Renewable Energy Sources Act

EFTA European Free Trade Association

eg For example

EMF Electromagnetic fields

EMVG Electromagnetic Compatibility of Equipment Act

EN European standard

EnLAG Power Grid Expansion Act

ENTSOG European Network of Transmission System Operators for Gas

EnWG Energy Act

ERegG Rail Regulation Act

ERGP European Regulators Group for Postal Services

eSIM Embedded subscriber identity module

ETSI European Telecommunications Standards Institute

EU European Union

Eurostat Statistical office of the European Union

F

FTTB Fibre to the building FTTH Fibre to the home

FU Free University

G

GasNEV Gas Network Charges Ordinance

GASPOOL Gas market area cooperation of the companies GASCADE GmbH, Gastransport Nord GmbH, Gasunie Deutschland Transport Services GmbH, Nowega GmbH, ONTRAS Gastransport GmbH

GHz Gigahertz

GIS Geographic information system

GmbH Limited liability company

GSM Global System for Mobile Communications;

GW Gigawatt

H

HaftPflG Liability Act

HEN Harmonised European Standard

HFC Hybrid-Fibre-Coax

H-Gas High calorific gas

I

IBV Interest notification procedure

ICT Information and communication technology

IM Infrastructure manager

IMSI International mobile subscriber identities

IMT-2020 International Mobile Telecommunications for 2020 and beyond

Ing. Engineer

incl. Including

int. International

IoT Internet of things

IP Internet protocol

IPTV Internet protocol television

IRG Independent Regulators Group

ISDN Integrated Services Digital Network

ISG ECI Industry Specification Group for exchangeable Embedded Common Interface

IT Information technology

IT security requirements catalogue Catalogue of security requirements drawn up by the Bundesnetzagentur and the BSI to protect the telecommunications and electronic data processing systems required to ensure safe network operations

ITS Intelligent transport system

ITU International Telecommunication Union

ITU-R International Telecommunication Union, Radiocommunication Sector

ITU-T International Telecommunication Union, Telecommunication Sector

K

KG Limited partnership

kWh Kilowatt hour

KWK Co-generation

L

L-Gas Low calorific gas

LLP Limited Liability Partnership

LNG Liquefied natural gas

LRIC Long run incremental cost

LSV Charging Station Ordinance

LTE Long Term Evolution

M

M2M Machine-to-Machine

MaStR Market master data register

MHz Megahertz

m Million

Mbps Megabits per second

MFCN Mobile/fixed communications network

MHz Megahertz

MRU Manner-Romberg Unternehmensberatung GmbH

MSAN Multi-service access node

MVNO Mobile virtual network operator

MW Megawatt

N

NABEG Grid Expansion Acceleration Act

NC CAM Network code on capacity allocation mechanisms in gas transmission networks

NC TAR Network code on harmonised transmission tariff structures for gas

NCG NetConnect Germany – Gas market area cooperation of the TSOs bayernets GmbH, Fluxys TENP GmbH, GRTgaz Deutschland GmbH, Open Grid Europe GmbH, terranets bw GmbH and Thyssengas GmbH

NDP Network development plan

NetzResV Grid Reserve Ordinance

NGA Next generation access

NGN Next generation network

O

ONDP Offshore network development plan

OTT Over the top

P

p Forecast

PCI Project of Common Interest

PDLV Postal Services Ordinance

pkm Passenger kilometer

PMx Primary rate multiplex

PostG Postal Act

POTS Plain old telephone service

PMR Private mobile radio

Prof. Professor

PUDLV Postal Universal Service Ordinance

PwC PriceWaterhouseCooper

R

RDCD Railroad Development Coorporation Deutschland GmbH

REMIT Regulation on wholesale energy market integrity and transparency

RES Renewable energy sources

RNI DB Regio Netz Infrastruktur GmbH

RRT Communications Regulatory Authority of the Republic of Lithuania

RSPG Radio Spectrum Policy Group

RU Railway undertaking

S

SigG Electronic Signatures Act

SIM Subscriber identity module

SMS Text message service

SoS-VO EU Regulation no 994/2010 concerning measures to safeguard security of gas supply

SRD Short range device

StromNEV Electricity Network Charges Ordinance

T

TAL Subscriber line

TC Technical Committee (CEN)

TCAM Telecommunication Conformity Assessment and Market Surveillance Committee

TCAM WG TCAM Working Group

TK Telecommunications

TKG Telecommunications Act

tkm Tonne-kilometre

TKTransparenzV Telecommunications Transparency Ordinance

TSO Transmission system operator

TTF Title Transfer Facility (virtual Netherlands gas trading hub)

TV Television

TWh Terrawatt-hour

U

UMTS Universal Mobile Telecommunications System

Univ. University

UPU Universal Postal Union

V

VDSL Very high speed digital subscriber line

VG Administrative court

VHF Very high frequency

VoIP Voice over internet protocol

VoLTE Voice over long term evolution

VSBG Alternative Consumer Dispute Resolution Act

VULA Virtual unbundled local access

VZBV Federation of German Consumer Organisations

W

Wi-Fi Wireless Fidelity

WIMAX Worldwide Interoperability for Microwave Access

WLAN Wireless local area network

WRC-19 World Radio Conference 2019

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