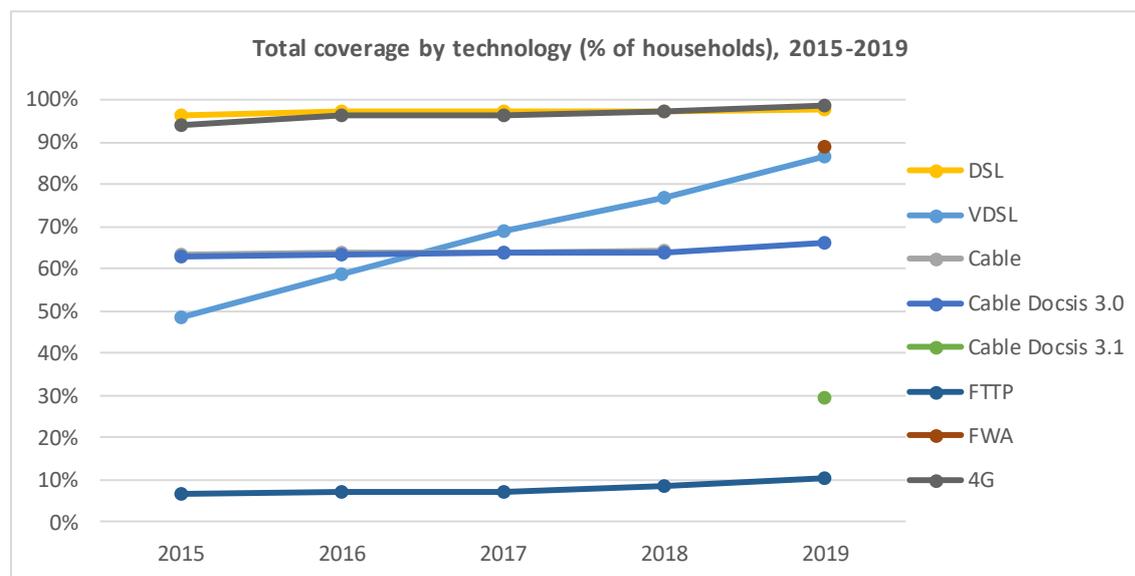
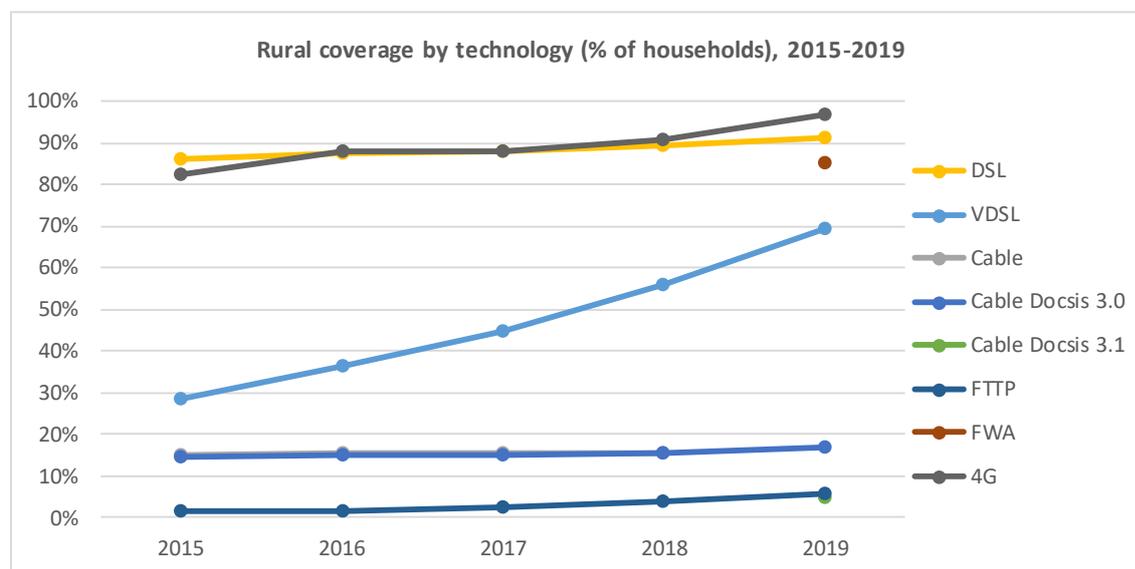


Germany



Source IHS and Point Topic, *Broadband coverage in Europe studies*

In terms of fixed coverage¹, Germany outperforms in DSL (98% of all households versus an EU average of 91%), VDSL (87% versus 59%) and cable. The increase in VDSL coverage over the last 5 years stands out in particular. VDSL2 vectoring coverage (not included in the chart) stands at 65%, against an EU average of 28%. On the other hand, Germany lags some way behind in fibre to the premises (FTTP) coverage (11% versus an EU average of 34%) and annual progress is slow (2% of households added per year, compared to 3% to 5% in the EU). Aggregate 4G coverage² is approximately the same as the EU average (99%).

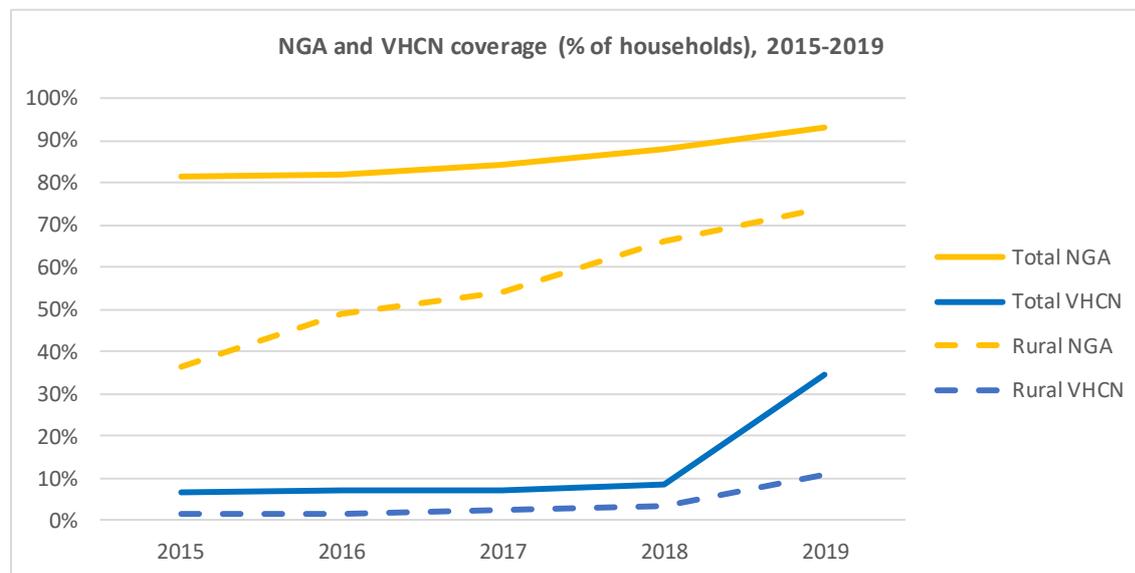


Source IHS and Point Topic, *Broadband coverage in Europe studies*

¹ Source for charts – unless otherwise indicated - HIS and Point Topic.

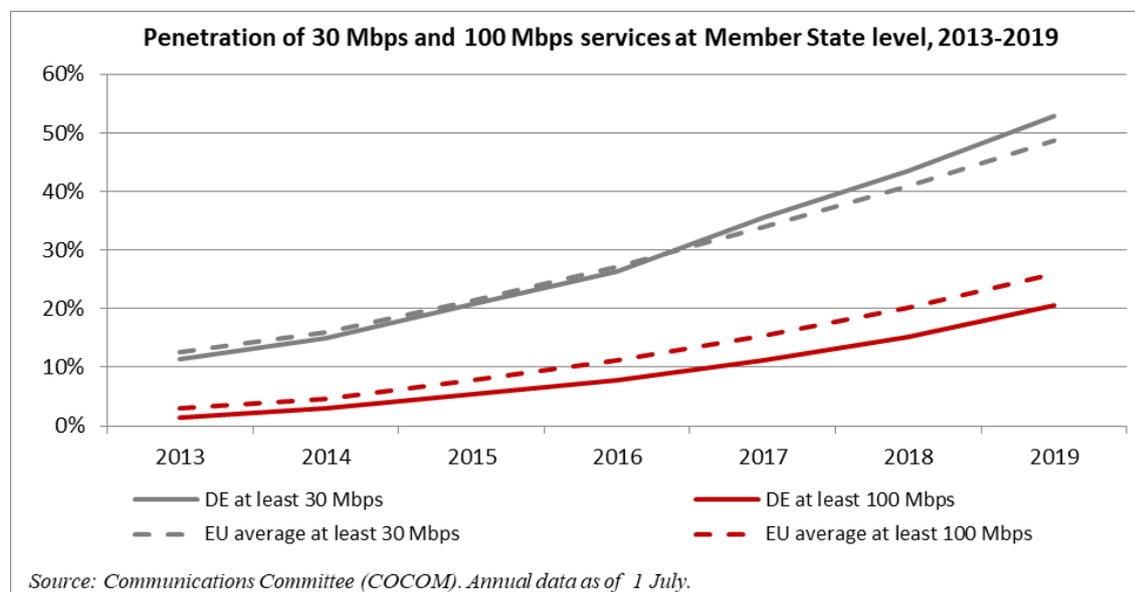
² The 4G coverage indicator used here in the country chapter differs from the DESI indicator for 4G coverage. The former is an aggregate indicator, i.e. measures the coverage of all operators together. The latter is an average indicator, i.e. the sum of all coverages divided by the number of operators. Because of this difference, the two indicators may produce different results.

Germany performs well in rural DSL and VDSL coverage, but rural FTTP coverage is a mere 6% (versus an EU average of 18%). Aggregate rural 4G coverage of 97% is almost on a par with the EU average of 98%. Rural VDSL2 vectoring coverage (not included in the chart) is 41%, against an EU average of 11%.



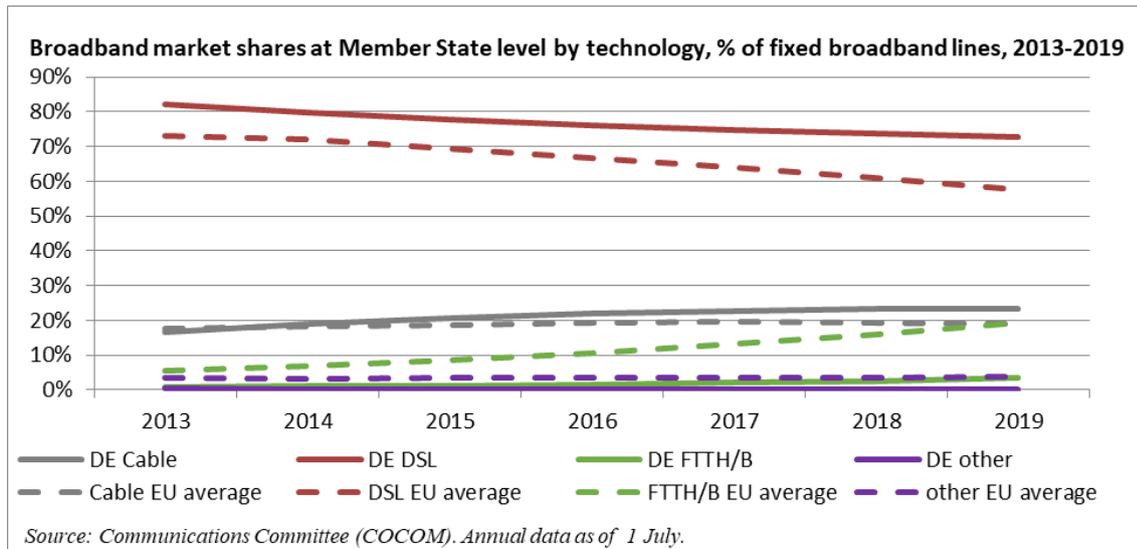
Source IHS and Point Topic, *Broadband coverage in Europe studies*

Next generation access (NGA) coverage in Germany remains very high (92% of households in total and 75% rural, versus an EU average of 86% in total and 59% rural). While the gap between total and rural NGA coverage has narrowed, it remains significant. At the same time, fixed very high capacity network (VHCN) coverage – including FTTP and DOCSIS 3.1 – is relatively low (33% in total and 10% rural, compared with an EU average of 44% in total and 20% rural). As VHCN figures for 2019 include DOCSIS 3.1 for the first time, they cannot be directly compared with figures for previous years.

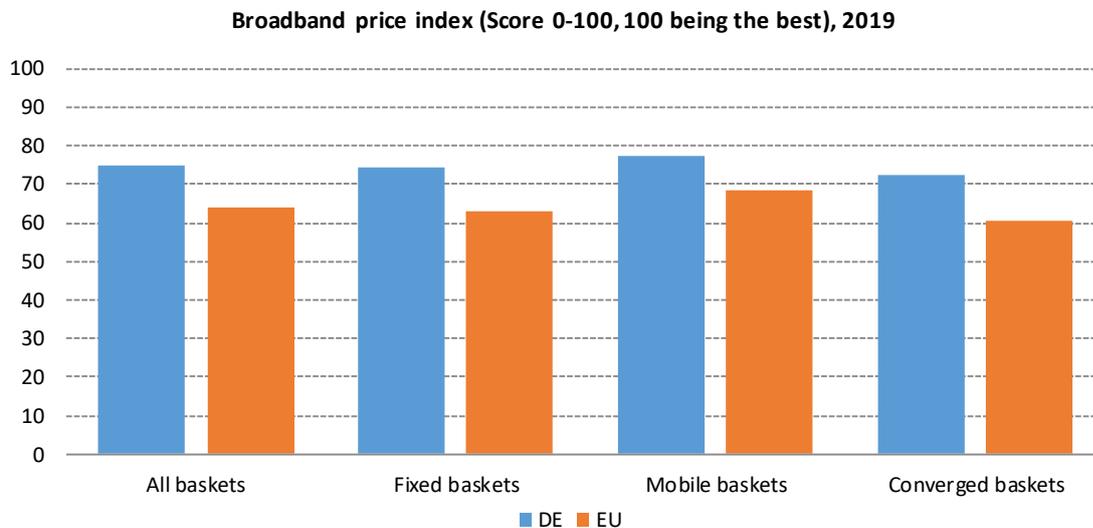


Source: Communications Committee (COCOM). Annual data as of 1 July.

In the fixed broadband market, Germany performs well on broadband take-up for capacities of at least 30 Mbps (53% of all households compared to an EU average of 49%), whereas take-up for capacities of at least 100 Mbps is relatively low (21% compared to an EU average of 26%).



DSL³ take-up continues to predominate, albeit with a shrinking market share (73% in July 2019, compared to 74% a year ago). Cable market share is almost flat at 23%. Germany currently has approx. 1 million fibre (FTTB/H) subscriptions up and running. The market share of FTTH/B has increased by one percentage point (3.62%, compared to 2.6% a year ago), following increased supply, but remains increasingly well below the EU average (19.3 %, compared to 16% a year ago). In the mobile market, there are 85 subscriptions per 100 people, significantly below the EU average of 100 subscriptions per 100 people.



Source: European Commission services based on Empirica (retail broadband prices studies)

Broadband prices in Germany are substantially lower than the EU average for all speeds and types of product. This is reflected in the broadband price index, where Germany ranks 8th among the EU Member States with a broadband price index of 75 (versus the EU average of 64). It ranked 7th for mobile broadband prices.

³ Including VDSL.

1. Progress towards a Gigabit Society⁴

The German government set the political objective of providing nationwide full gigabit network coverage by 2025. Commercial fibre roll-out has continued. Vodafone took over the cable operator Unitymedia in July 2019 and committed to grant Telefonica access to its merged cable network for providing broadband subscriptions to end-users.

Industry structure in the provision of funded fibre connections is highly heterogeneous and involves among others an increasingly high number of small operators. In one of the large *Länder* alone there are 13 municipalities⁵, 5 operators in parts of municipalities, 6 operators covering full municipalities, 1 regional operator and 1 national operator, with the regional and the national operator in a joint venture. In some small rural areas fibre has been rolled out, but no service provider uses the infrastructure.

All four mobile network operators (MNOs) have signed an agreement with the government for extended coverage obligations, in exchange for a pay-as-you-use plan for the 2019 auction payments. The government adopted a national strategy in November 2019 and considers several measures to improve mobile infrastructure supply in poorly served areas. These measures may include among others a subsidy programme for areas with no coverage, a strategy on how to streamline permit procedures and how to facilitate access to state-owned real property for extending and for densification of mobile networks⁶.

In August 2019, the government launched a 5G competition to promote implementation of the 5G mobile broadband standard. Winning projects will receive during the concept phase €100,000 each and up to €4 million in the implementation phase. 5G is being trialled by MNOs and verticals. Telekom Deutschland GmbH (TDG) and Vodafone have launched commercial offers at their first 5G sites. Various research projects for automated driving (including in urban test fields and on motorways) and for integrating 5G into industrial communications networks are currently ongoing.

2. Market developments

In the fixed broadband market, competitors of the incumbent TDG increased their market share by a small margin. It has been above 60% since 2017.

Cable operators are investing in DOCSIS 3.1, TDG in a technology mix that still includes super-vectoring. Around 80% of the commercial fibre roll-out is based on GPON⁷ topology.

Vodafone took over the cable operator Unitymedia in July 2019 and committed to grant Telefonica access to its merged cable network so it can provide broadband subscriptions to end-users. Telefonica has a similar cable wholesale access agreement with another operator.

The Bundeskartellamt (national competition authority) approved the joint venture on fibre roll-out between TDG and EWE-Tel. The company Glasfaser Nordwest was been created in January 2020 and will start rolling out fibre in parts of Lower Saxony and in Bremen.

⁴ It is noted that statements regarding planned or potential State aid measures record intentions declared by Member States and do not pre-judge or pre-empt the assessment of such measures by the Commission under the relevant state aid rules. The DESI report is not meant to provide any assessment of the compliance of such measures with state aid rules and procedures.

⁵ Directly acting as operators.

⁶ At the regional level, in Bavaria, a state aid scheme funding passive mobile infrastructure had been approved by the Commission in November 2018, see document C(2018) 7540 final.

⁷ Gigabit passive optical network: It has a point-to-multipoint architecture where passive splitters in the fibre distribution network enable one single feeding fibre to serve multiple subscribers.

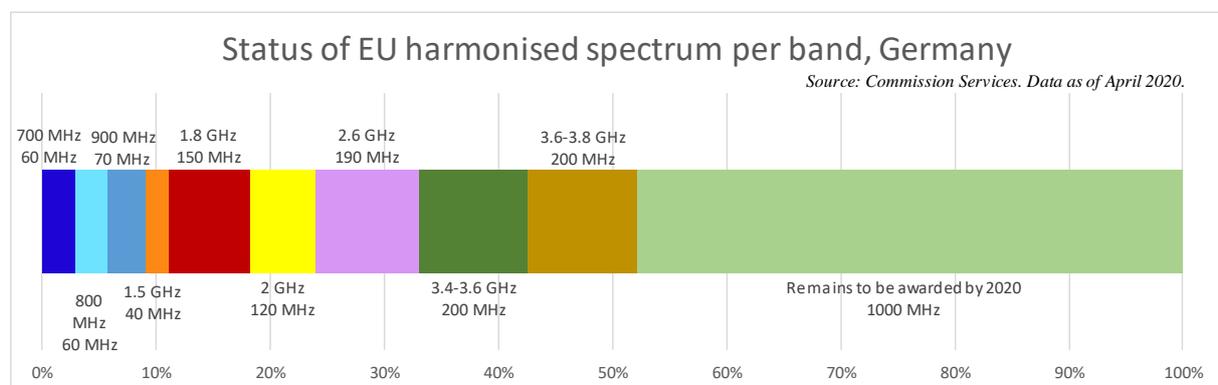
Since 2013, the size of the business market segment has shrunk by 10% in absolute terms and now represents 36% of the telecommunications services sector⁸. The demand structure in this segment is increasingly multi-dimensional (including not only mere bandwidth, but also parameters such as packet loss, latency, data security, fault repair times, redundancy). This is matched not only by roll-out of new physical connections but also by increased flexibility of networks as regards Ethernet technology, slicing, software defined networks and network function virtualisation.

Fixed and mobile broadband are currently seen as complements rather than as substitutes as streaming typically requires a fixed broadband subscription because unlimited mobile data plans are still rare and expensive (80€/month with TDG).

The three incumbent MNOs have agreed to share new-to-be-built sites in white spots.

3. Regulatory developments

3.1. Spectrum assignment



In Germany, 52% of the total 2090 MHz spectrum harmonised at EU level for wireless broadband has been assigned. Germany ranks first in the 5G readiness indicator. It auctioned spectrum in the 700 MHz band in 2015, which is available for 5G use. A second auction took place between March and June 2019, where the frequencies in the 2 GHz and 3.6 GHz bands were assigned. The three incumbents and one future new MNO (currently operating among others as service provider on incumbent mobile networks) successfully acquired spectrum. In the 3.7-3.8 GHz sub-band, property users can apply since November 2019 for frequencies to create their own local 5G networks on factory grounds or other types of property for several use cases. These include factory automation and campus networks but exclude provision of public communication networks.

The 24.25- 27.5 GHz band should be awarded by the end of 2020. This includes the option of assigning directly to industrial users with the possibility of spectrum sharing with other users (such as MNOs) outside industrial sites.

3.2. Regulated access (both asymmetric and symmetric)

In December 2019, BNetzA (Federal Network Agency) deregulated the market for access to the fixed telephone network⁹.

⁸ See https://www.vatm.de/wp-content/uploads/2018/12/VATM_TK-Marktstudie-2018_091018_f.pdf and https://www.vatm.de/wp-content/uploads/2018/12/VATM_TK-Marktstudie-2018_091018_f.pdf

⁹ Market 1 of Commission Recommendation of 17 December 2007, on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communications networks and services (OJ L 344, 28.12.2007, p. 65–69).

BNetzA is preparing a decision on TDG's rental fees for wholesale terminating segments of leased lines for its Synchronous Digital Hierarchy (SDH) products and its Ethernet-over-SDH products¹⁰). In its comments, the Commission invited BNetzA to review the pricing methodology to ensure that it provides appropriate incentives for efficient investments and innovation. For TDG's corresponding new "pure" Ethernet 2.0 products, BNetzA plans to consult nationally the draft pricing decisions in the first half of 2020. The Commission asked BNetzA to consolidate market analysis and corresponding remedies to allow full and comprehensive insight into regulatory concerns and the respective remedies considered.

BNetzA approved new mobile and fixed termination rates based on a pure bottom-up long run incremental cost (BU LRIC) approach, setting a glide-path for 2019-2021 (or until adoption of the Eurorate, expected at the end of 2020) based entirely on internal cost model calculations¹¹. Moreover, it removed access and price control obligations for mobile calls originating from outside the European Economic Area (EEA). This is subject to the condition that the mobile termination rate applied by the relevant German MNO does not exceed the rate charged for a comparable termination service in the relevant non-EEA country.

In September 2019, BNetzA notified its new draft market analysis for the market for wholesale local access provided at a fixed location (market 3a/2014 of the 2014 Recommendation on Relevant Markets). BNetzA proposed, among others, to define the relevant geographic market as national. In its comments, the Commission urged BNetzA to improve and further substantiate the indicators used for the analysis of competitive conditions, in particular the coverage of alternative networks and the evolution and distribution of market shares. It called on BNetzA to consider differentiating remedies on a geographic basis, in order to take into account differences in conditions of competition in the different geographic areas. In a parallel proceeding, BNetzA started reviewing TDG's regulatory obligations on this market and published key considerations and discussion points in summer 2019.

Furthermore, BNetzA approved TDG's prices for additional services for SDH and Ethernet leased lines and approved changes in the standard offer for Layer-2-Bitstream-'Super-Vectoring'. As regards prices for wholesale local access (market 3a/2014), BNetzA notified draft decisions on new monthly rates for access to the local loop, rates for collocation at the street cabinet, rates for access to ducts and dark fibre and for various rates for its virtual unbundled local access (VULA) products provided at the street cabinet. It is currently finalising these decisions.

The DigiNetz-Gesetz (law on facilitating the efficient expansion of digital high-speed networks), which transposed the Broadband Cost Reduction Directive 2014/61/EU into national law, amended the Telekommunikationsgesetz (German telecommunications law)¹². Since March 2017, 44 cases have been referred to BNetzA for dispute resolution to, 21 of which involved infrastructure sharing. BNetzA has issued 25 decisions so far, allowing it to establish certain principles. For example, in case of co-use of physical infrastructure of communication operators, the extra-costs caused by co-use have to be covered by the access seeker, the project-related costs are shared and a share of common costs is added. For the co-use of utility infrastructure the extra-costs caused by co-use have to be covered by

¹⁰ Market 4 of the Commission Recommendation of 9 October 2014, on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communications networks and services (OJ L 295, 11.10.2014, p. 79–84).

¹¹ The Commission did not comment on the proposed fixed termination rates, but challenged the appropriateness of price control for call origination (market 2/2007 of the 2007 Recommendation on Relevant Markets).

¹² By adding article 77(a) pp.

the access seeker, plus an extra amount which is required by national legislation and had been fixed by BNetzA at 20% of the market price for use of ducts. For the co-ordination of physical works, the applicant has to cover any extra costs caused by co-ordination. Other investment costs related to planned physical works can be shared by the cooperating parties. In accordance with these principles, decisions are taken on a case-by-case basis.

4. End-user matters

a. Complaints

The number of complaints remained high: BNetzA received 109,574 complaints and questions in 2019 (as per 31 October 2019) on misuse of numbers and another 49,685 written complaints on illicit telephone advertising. For both, BNetzA received 18,758 calls via its hotline. BNetzA established rules on the conditions under which MNOs may bill services from third parties. Customers are protected by classical interventions such as switching off numbers and administrative orders that prohibit illicit billing and liquidation. Other complaints were related to ping calls, hacking and nuisance calls.

b. Open Internet

BNetzA's decision of 15 December 2017 prohibiting the use of video throttling as part of the zero rating product "StreamOn" could not be enforced for almost 20 months due to TDG's urgent appeals before German administrative courts. BNetzA finally prevailed in the interim proceedings¹³ and TDG abandoned video throttling in August 2019.

Other major activities by BNetzA related to connectivity problems due to the lack of provision of publicly available IPv4 addresses with the use of network address translation and to traffic management measures by Internet access service providers. These cases could largely be resolved by internet service providers coming up with alternative connectivity solutions for the users concerned. Moreover, BNetzA examined several tariffs in which providers imposed traffic management measures. It found that these did not lead to the unequal treatment of data traffic within a tariff. A few end-user complaints concerned the restricted usability of services due to restrictions in terminal equipment. The provider concerned has meanwhile removed these restrictions.

c. Roaming and Intra EU calls

In 2019 several emergency court rulings and court orders fully backed the orders that BNetzA had issued in 2017 on TDG's zero-rated 'StreamOn' offer and in 2018 on the 'Vodafone Pass'. Subsequently, TDG has made 'StreamOn' available for roaming in the EEA since September 2019 and consumers can use the zero-rated offer like at home subject to the application of a fair-use policy. Vodafone Pass has also been available for roaming in the EEA since December 2019. In both pending main proceedings, the administrative court referred questions to the European Court of Justice for a preliminary ruling.

Consumer complaints and inquiries mainly addressed the lack of welcome SMS (especially in non-EEA countries), inadvertent roaming in the border region with Switzerland and lower quality of data services than at home. BNetzA urged the mobile service providers concerned to comply with the roaming provisions. In addition, it emphasised that the transparency requirements also apply for roaming outside the EEA. As a result, the number of complaints about the lack of welcome SMS has fallen. On quality of service, BNetzA is investigating the market and tracking the number and type of complaints and enquiries.

¹³ Higher Administrative Court Münster, decision of 12 July 2019 - 13 B 1734/18.

Mobile operators are not obliged to send detailed pricing information to customers while roaming in networks operated on ships or planes. Due to an increase in complaints and enquiries, in 2019, BNetzA took action together with the Federal Ministry of Economics to make pricing information more transparent for customers, especially on ships. As a result, most German roaming providers send pricing information to roaming customers or – if roaming on ships is not blocked anyways – interrupt data usage after a certain financial limit is reached while roaming in networks operated on ships.

BNetzA launched several formal proceedings against call-by-call providers¹⁴ to ensure compliance with the pricing rules on intra-EU calls. Subsequently, the providers adapted their tariff plans to bring them in line with the Regulation. In some cases the providers also changed to their charging interval, extending it to 300 seconds. BNetzA reported that following its request, call-by-call providers have adjusted the charging interval back to 60 seconds¹⁵.

d. Emergency communications – 112

The Commission sent a letter of formal notice to Germany in July 2019 for incorrect application of Art. 26(4) of the Universal Service Directive. This involved the failure to ensure equivalent access for users with disabilities. Germany informed the Commission that preparations are on schedule for the introduction of an emergency call app targeted at people with hearing and speech impairments and including the required transmission of user location data to the emergency services and are expected to go live in the 3rd or 4th quarter of 2020. Germany has implemented Advanced Mobile Location for emergency calls thanks to the HELP 112 II project financed by the EU.

e. Universal service

German authorities have not designated any provider for the minimum set of services of specified quality permitting among others functional Internet access, to which all end-users have access, at an affordable price. The incumbent Deutsche Telekom provides the universal service on a voluntary basis. In case of complaints, the right for subscribers, that reasonable requests for a fixed connection are met is addressed by the consumer department of BNetzA.

5. Conclusion

While progress is being made on the policy for encouraging demand for 5G services, and regulation will focus on implementation of the coverage and rollout obligations in the spectrum licences, Germany continues to face challenges on the fixed and mobile markets. There is still a significant urban-rural digital divide in terms of fixed NGA coverage and the proportion of fibre connections is increasing, but still very low. Although new funding approvals under the federal broadband scheme were granted exclusively to fibre, incumbents rely on a technology mix where the role of fibre could be extended and better defined.

¹⁴ With the call-by-call procedure, available in Germany and other Member States, fixed subscribers can dial a prefix to use another service provider to handle a voice call. A similar procedure for mobile subscribers is called “callthrough”.

¹⁵ BNetzA also informed several regional and city carriers about the pricing rules on intra-EU calls and asked them to adjust their tariffs in line with the intra-EU provisions. In the meantime, all of the regional and city carriers who have been contacted amended or stated that they were about to amend their tariff plans to bring them in line with the Regulation.