



BREKO BroadbandStudy19

Market survey among BREKO network operators

Prof. Dr. Jens Böcker

Agenda

1. Evolution of the data volume
2. Ratio mobile / fixed networks
3. Evolution of the broadband demand
4. Investments in the telecoms market
5. Available connections and subscriptions
6. Economically viable and publicly funded expansion
7. Summary

For the BREKO MarketStudy19, 183 BREKO network operators have been interviewed in Germany. In addition, data from publicly available sources were used for verification and to determine the total market figures. The market data research and the analysis of the study results were conducted jointly by the strategy consultancy BÖCKER ZIEMEN Customer Insight Consultants and BREKO.

German Broadband Association (BREKO)

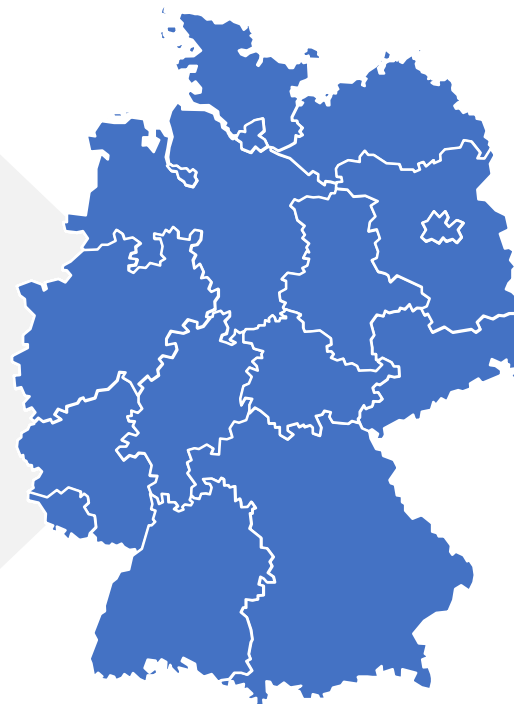
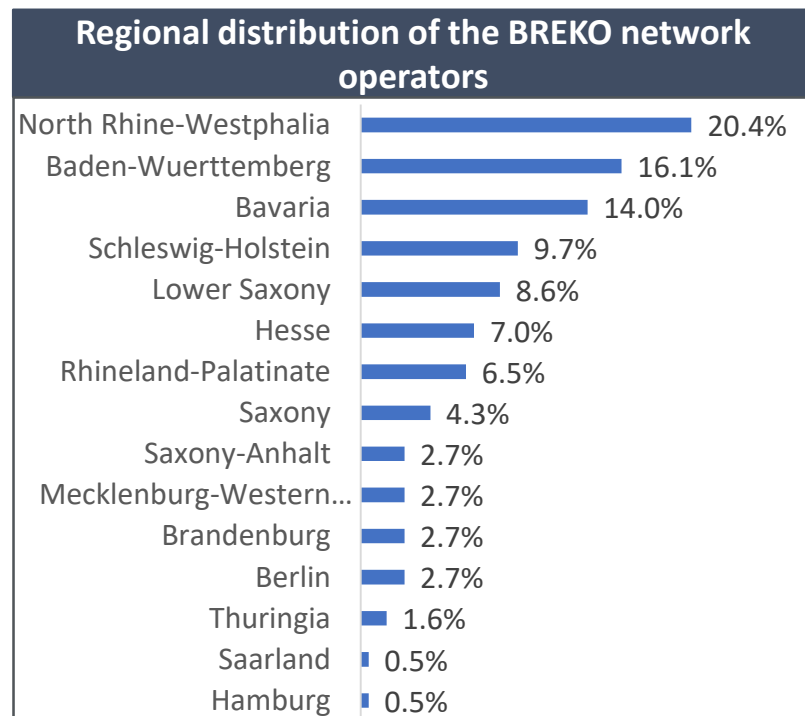
BREKO was founded in 1999 and has 336 members. BREKO thus represents over 80% of the broadband network operators in Germany.

BÖCKER ZIEMEN Customer Insight Consultants

BÖCKER ZIEMEN is a management consultancy with a focus on market analyses and growth strategies in the telecoms market.

183 BREKO network operators have been interviewed throughout Germany in May and June 2019. The interviewees are executives of telecommunications companies.

BREKO represents over **80 %** of the broadband network operators in Germany



Revenue of BREKO network operators
in 2018 : **€ 7.6 billion**

Investments by BREKO network
operators in 2018: **€ 2.5 billion**

FTTB/H subscriptions of BREKO network
operators in 2018: **1.2 million**

Available FTTB/H connections of BREKO
network operators in 2018: **2.8 million**

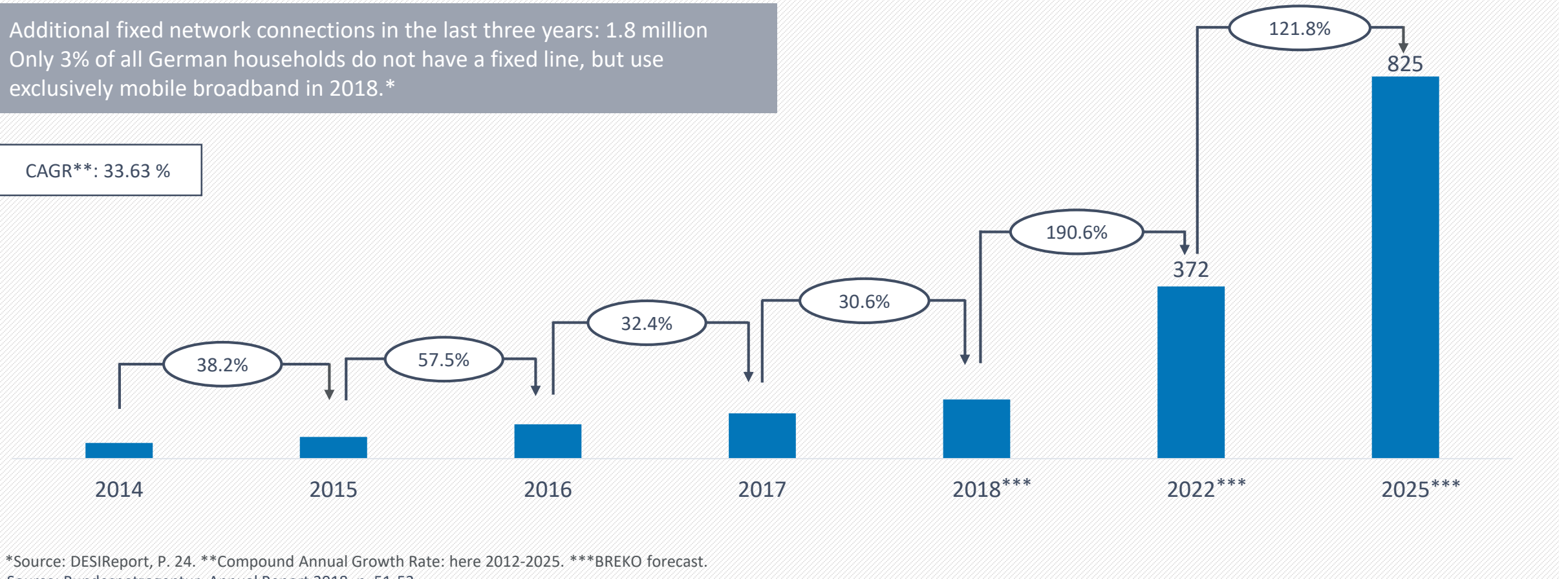
Evolution of the data volume

A strong increase in data volume is expected in the fixed networks, with an annual growth of 30.5% between 2018 and 2025.

Average data volume of fixed networks per connection and per month in gb over time (incl. TV and streaming services)

Additional fixed network connections in the last three years: 1.8 million
Only 3% of all German households do not have a fixed line, but use exclusively mobile broadband in 2018.*

CAGR** : 33.63 %

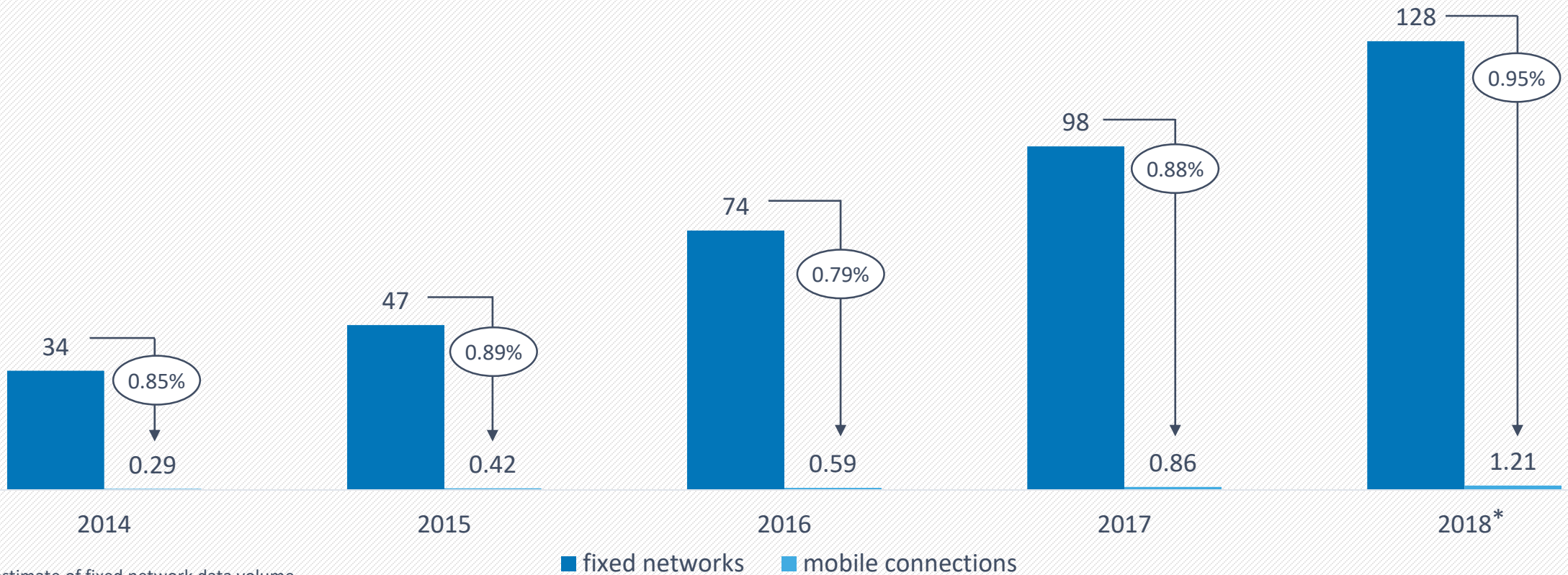


*Source: DESIREport, P. 24. **Compound Annual Growth Rate: here 2012-2025. ***BREKO forecast.
Source: Bundesnetzagentur, Annual Report 2018, p. 51-52.

Ratio mobile / fixed data volume

No significant changes in the relationship fixed / mobile data volumes, and not expected with 5G either.

Ratio mobile / fixed data volume on average per user and per month in gb



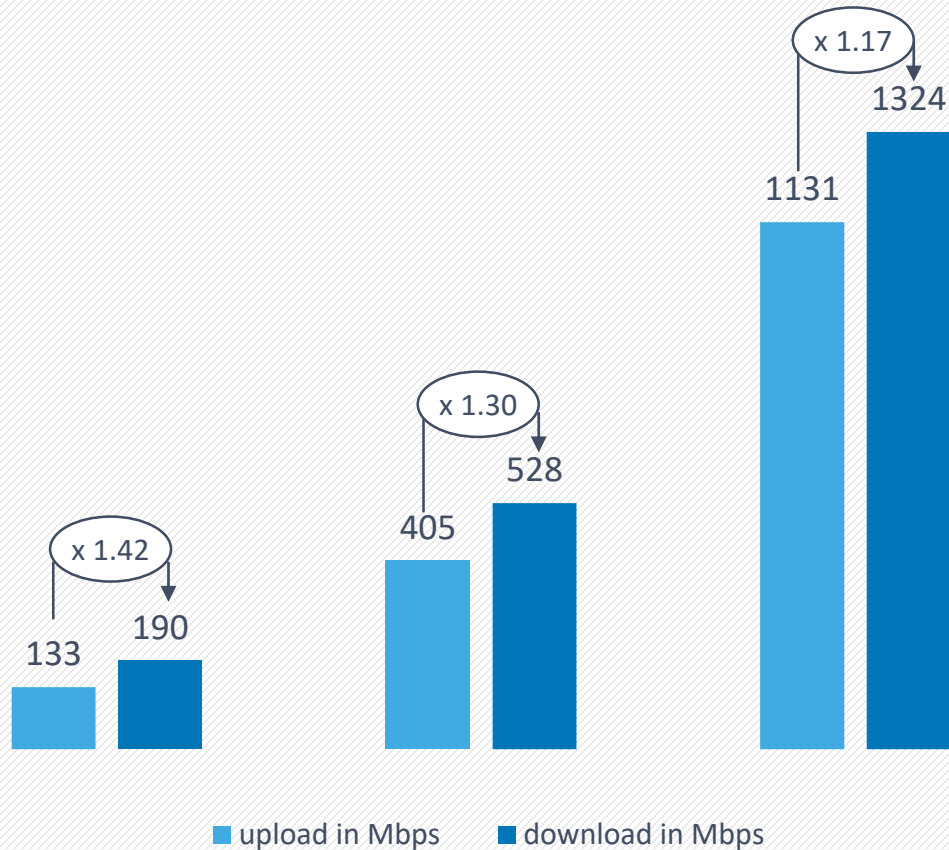
*BREKO estimate of fixed network data volume.
Source: Bundesnetzagentur, Annual Report 2018, p. 51, 57.

Expected broadband demand

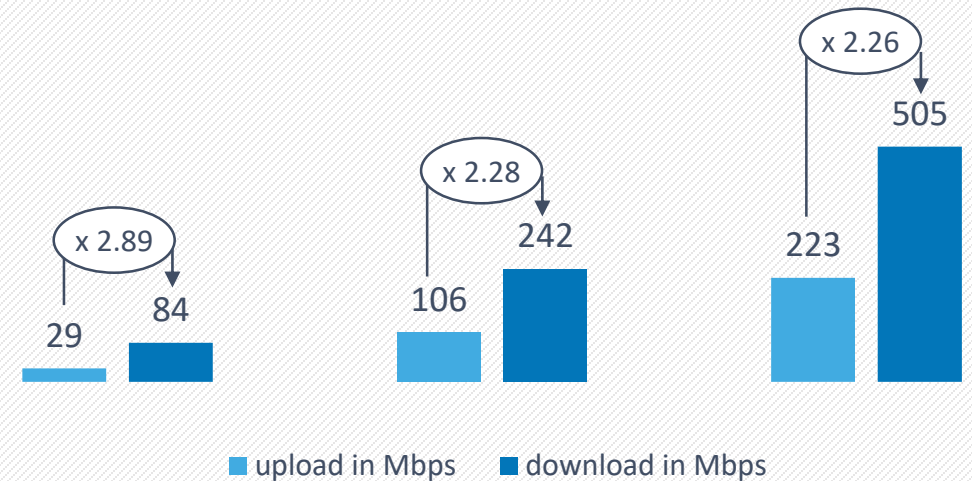
Symmetrical bandwidth is standard for corporate clients. For private customers symmetrical bandwidth is also becoming increasingly important.

Corporate clients

Question: How will the demand for download and upload bandwidth develop for corporate clients and private customers in the next years?



Private customers



Source: survey of network operators (n=39-41).

August 2019

Symmetrical bandwidth among private customers

The demand for symmetrical bandwidth among private customers will increase: approximately 40% of respondents rate symmetrical bandwidth in 2022 as important to very important.

Importance of symmetrical bandwidth among private customers over time (assessment by network operators)

Importance \ Year	2019	2022*
very high	0%	7%
high	11%	33%
low	36%	49%
very low	52%	12%

- At present, only 11 % perceive symmetrical bandwidth as important.
- The demand for symmetrical bandwidth will increase noticeably by 2022, i.e. in the short to medium term.

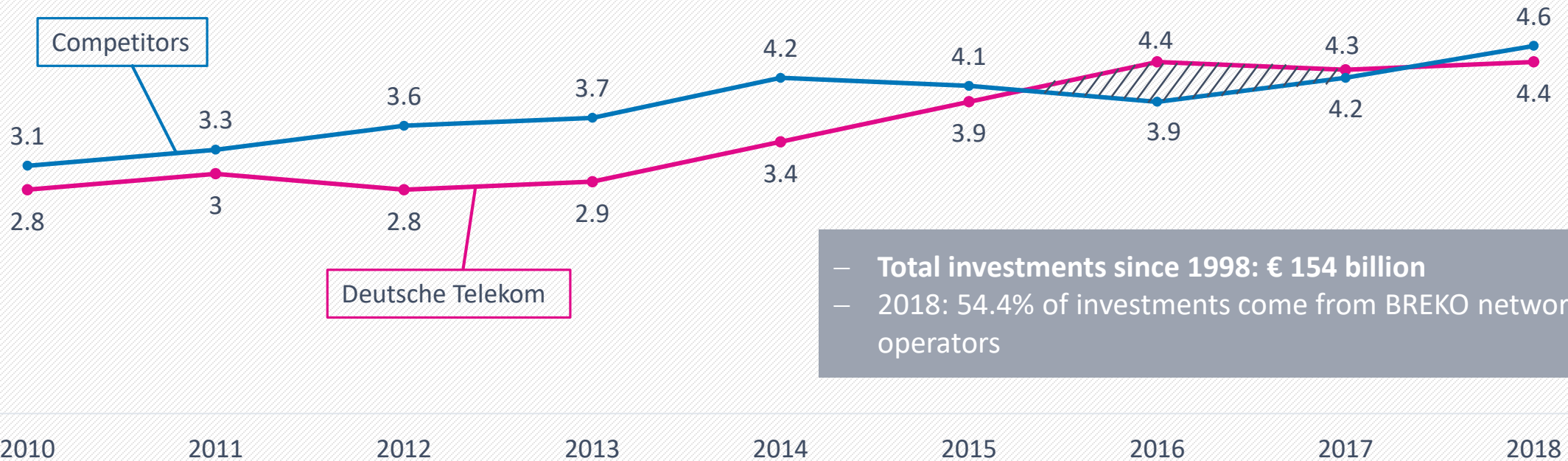
Source: survey of network operators (n=43-44).

Question: Please assess the current and future importance of symmetric bandwidth for private customers.

Total investments in broadband network infrastructure

The investments increased by 6% to € 9 billion in 2018. For the first time since 2015, competitors are investing more than Deutsche Telekom.

Investments in broadband network infrastructure* in the telecoms market in € billion



- Total investments since 1998: € 154 billion
- 2018: 54.4% of investments come from BREKO network operators

*Investments in predominantly new, but also in existing broadband networks infrastructure

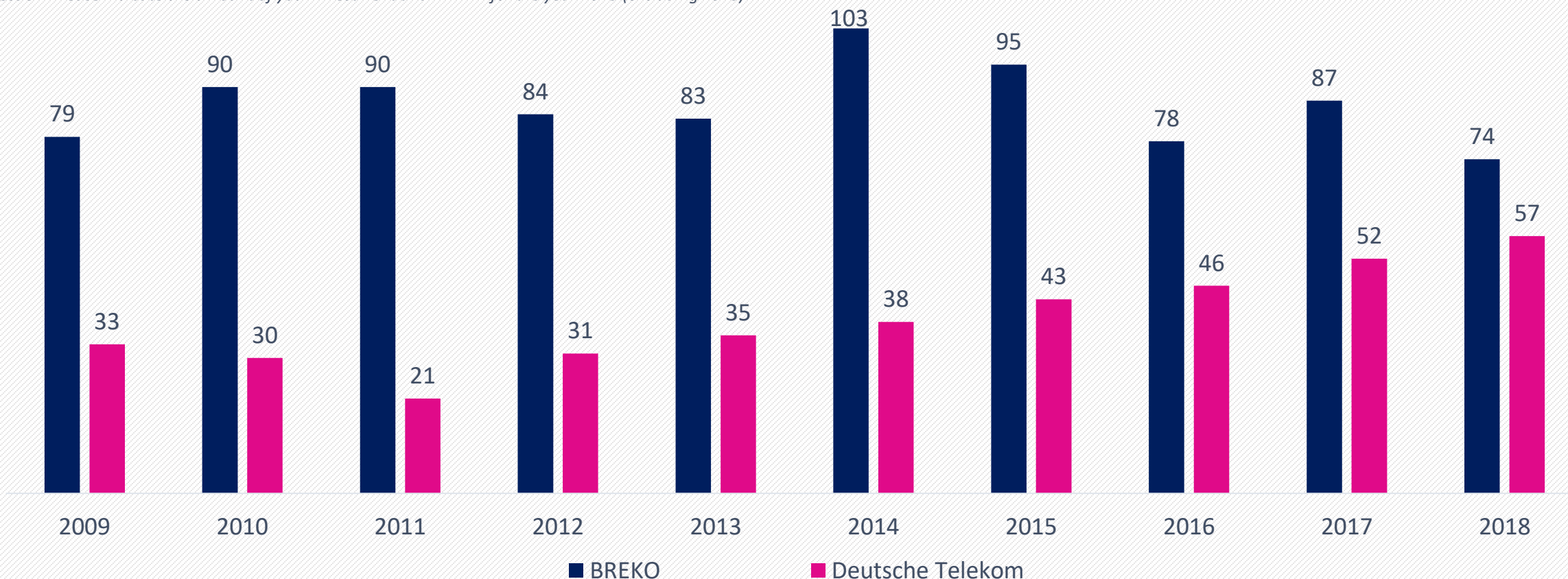
/// Vectoring dent triggered by the vectoring decision of the German national regulator „Bundesnetzagentur“

Source: Bundesnetzagentur, Annual Report, p. 46 f.

BREKO network operators' readiness to invest is much higher than Deutsche Telekom's :

Share of investments in EBITDA in % over time

Question: Please indicate the amount of your investment and EBITDA for the year 2018 (excluding 2018).

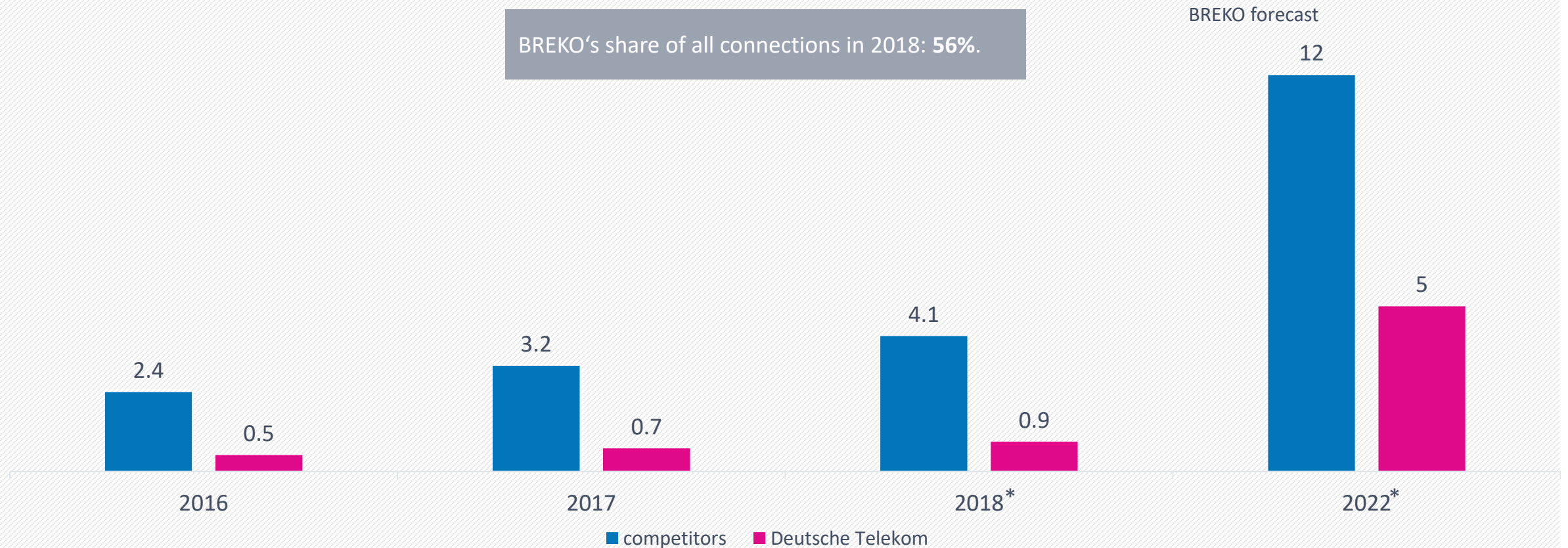


Source: survey of network operators (n=50); Bundesnetzagentur, Annual Report 2018, p. 46 f; Deutsche Telekom business report 2018, p. 61.

Available FTTB/H connections

The total number of available FTTB/H connections will increase by 28% in 2018. The share of FTTB/H connections from alternate network operators will remain at approximately 82% in 2018.

Number of available FTTB/H connections in millions over time: alternate network operators vs. Deutsche Telekom



*BREKO forecast.

Source: BREKO Research; Deutsche Telekom, Blog from 18/07/2019.

Available broadband connections by technology

For the first time, in 2018 more households were connected with ≥ 50 Mbps via VDSL/DSL than with cable; no increase in CATV; marginal increase in VDSL/DSL and FTTB/H.

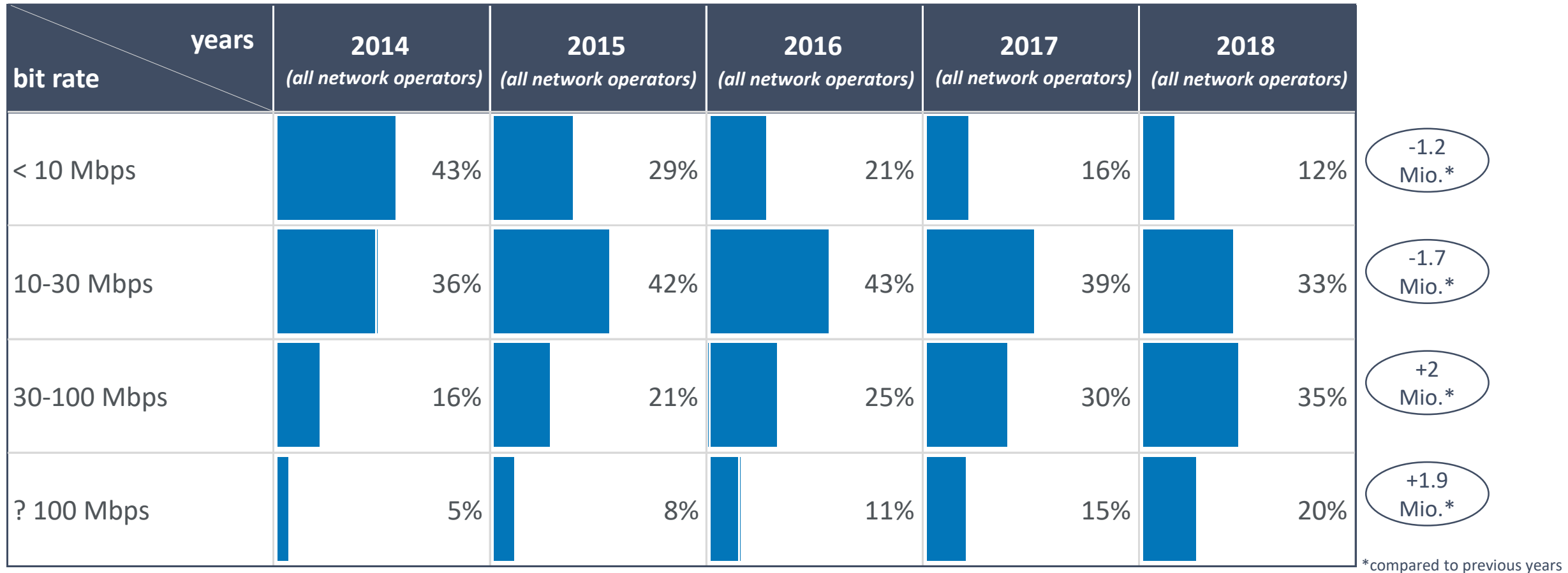
technology \ years	2014	2015	2016	2017	2018
CATV	61.6%	63.3%	63.4%	63.9%	63.9%
VDSL/DSL	17.1%	26.5%	44.9%	59.7%	65.8%
FTTB/H	4.4%	6.7%	7.5%	9.0%*	11.2%*

* Value based on BREKO estimates (deviation from primary source).

Source BMVI, Broadband Atlas 2018, p. 7. data refer to homes passed, which means finished and available connections.

Available connection by bit rate

Increase in connections with high bit rates : every fifth connection faster than 100 Mbps in 2018

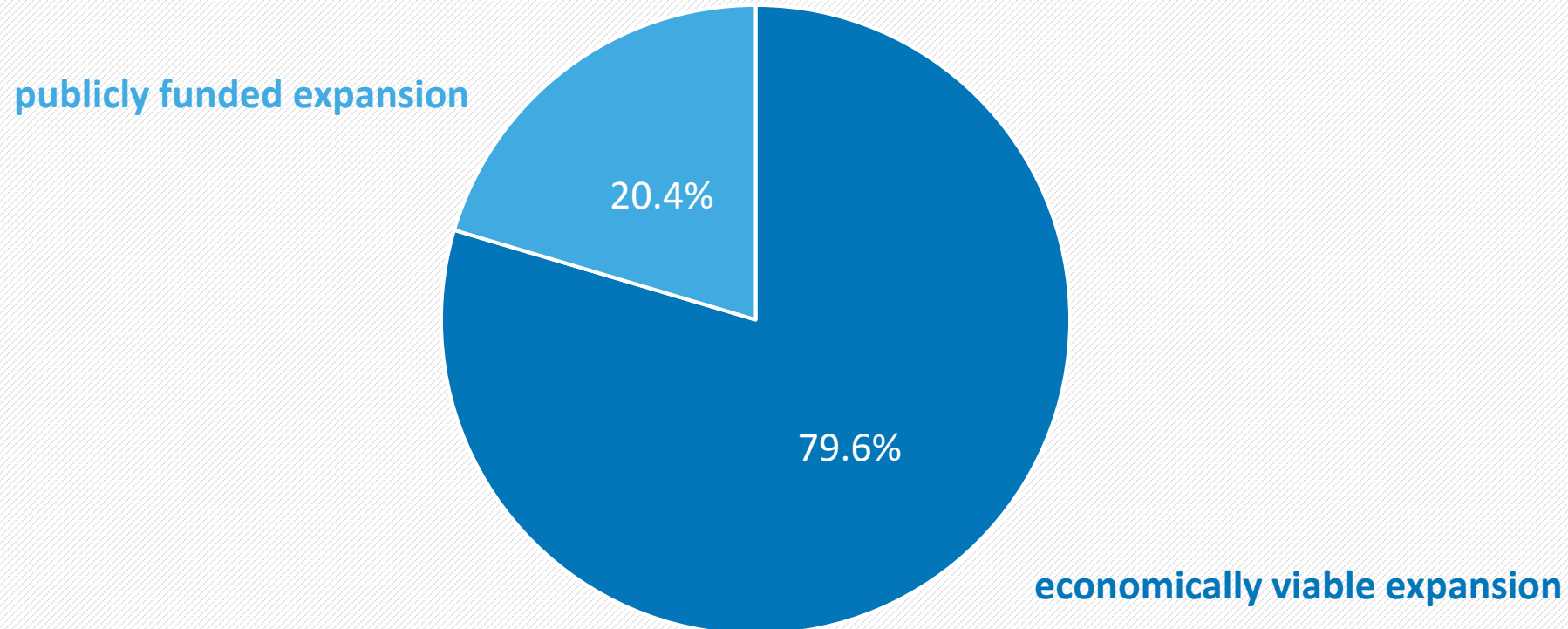


*compared to previous years

Economically viable and publicly funded expansion

BREKO network operators primarily expand their networks economically viable.

Percentage of economically viable and publicly funded network expansion



Source: survey of network operators (n=41).

August 2019

Question: Please provide the following information on your network expansion: percentage of network expansion that was achieved through a) economically viable expansion or b) state aid (in %).

Summary

BREKO BroadbandStudy19 - summary:

Fixed networks continue to boom and mobile networks remain marginal – even with 5G

- The data volume continues to rise around 30% p.a. Increasingly higher bandwidth are requested in the market: demand follows supply.
- Fixed networks continue to play an essential role for the data transfer in Germany. The relation in data transport fixed / mobile networks remains stable – only 3% via mobile networks.
- 80% of BREKO's members' fibre networks are built without public funding: 2.5 billion EUR investments in 2018, 1 million new fibre connections, take-up rate: 43%. Average take-up rate: 30%.
- For newly constructed buildings, fibre connections are standard.