BREKO Broadband Study 2017

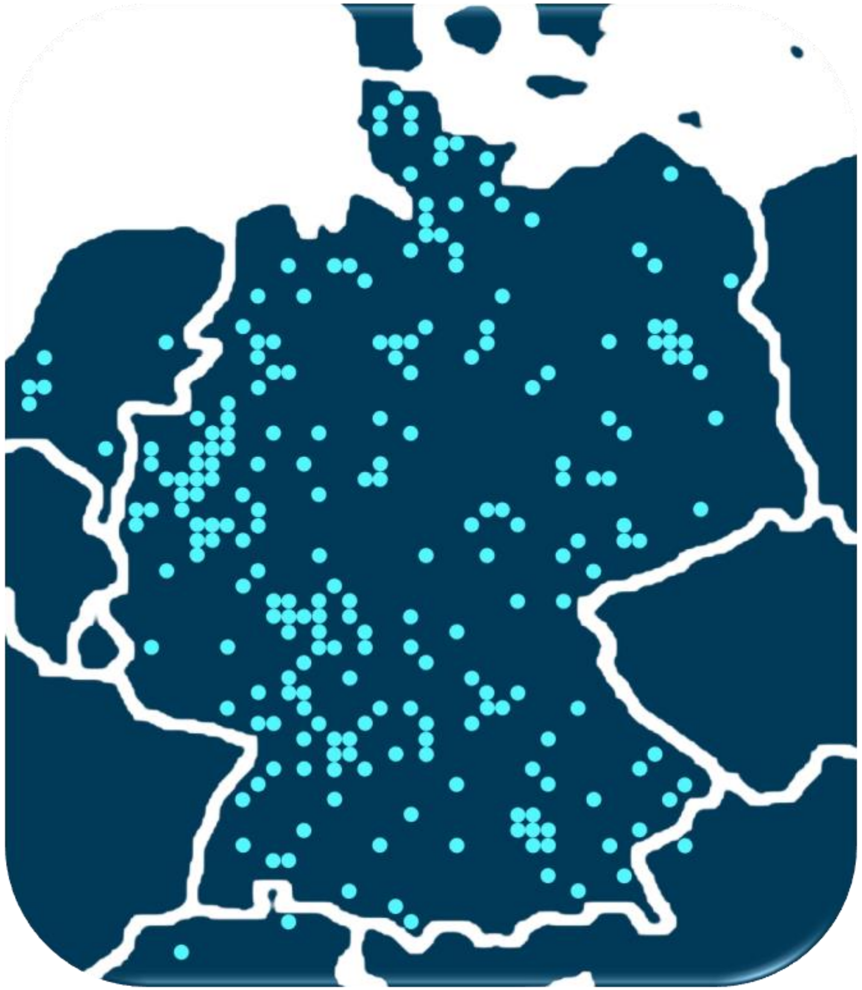
Market survey among BREKO members

For the BREKO Broadband Study 2017, all BREKO network operators were interviewed (nationwide). The study comprises data from around 90% of all BREKO network operators. In addition, data from publicly available sources was used for verification and determination of total market figures. The source of the data used is indicated at the end of each respective graph. The figures refer to the end of 2016, if not indicated otherwise.

BREKO member survey representative for the fixed broadband market in Germany

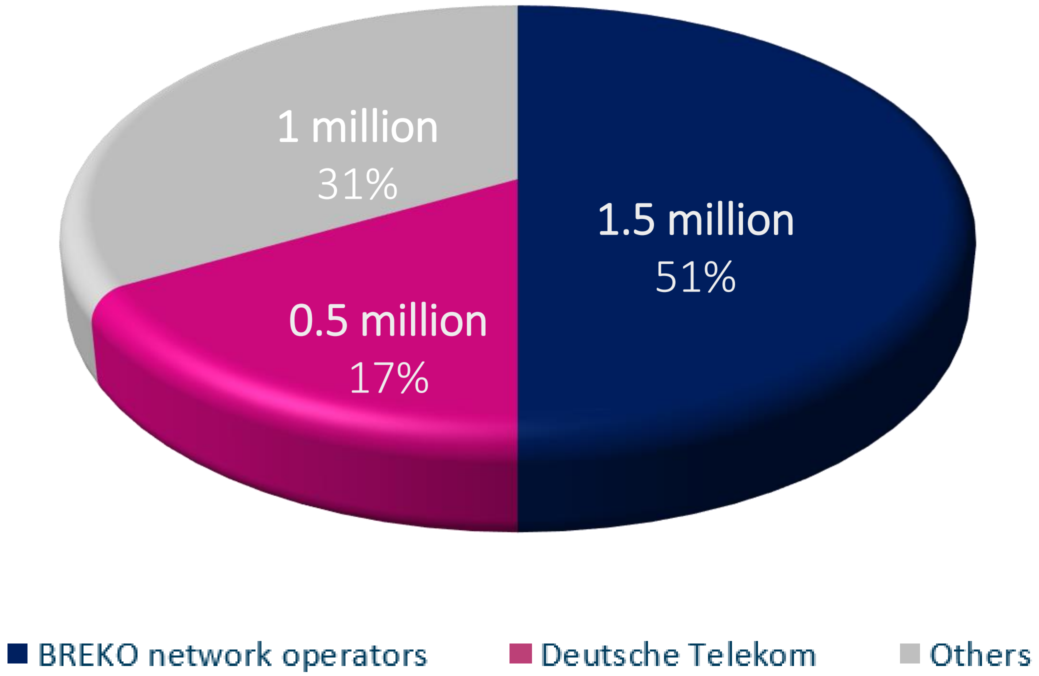
BREKO German Broadband Association

- ✓ **172 network operators** (300 members in total)
- ✓ **BREKO unites more than 80% of broadband network operators in Germany** and thus represents „the voice of competition“
- ✓ **The leading fibre association in Germany**: 60% of competitive FTTB/H deployment by BREKO network operators
- ✓ **Deploying fibre networks**: strong partners for cities and municipalities!



Status quo FTTB/H deployment in Germany

FTTB/H total availability (mid-2017):
3 million households



82%

of FTTB/H

development by

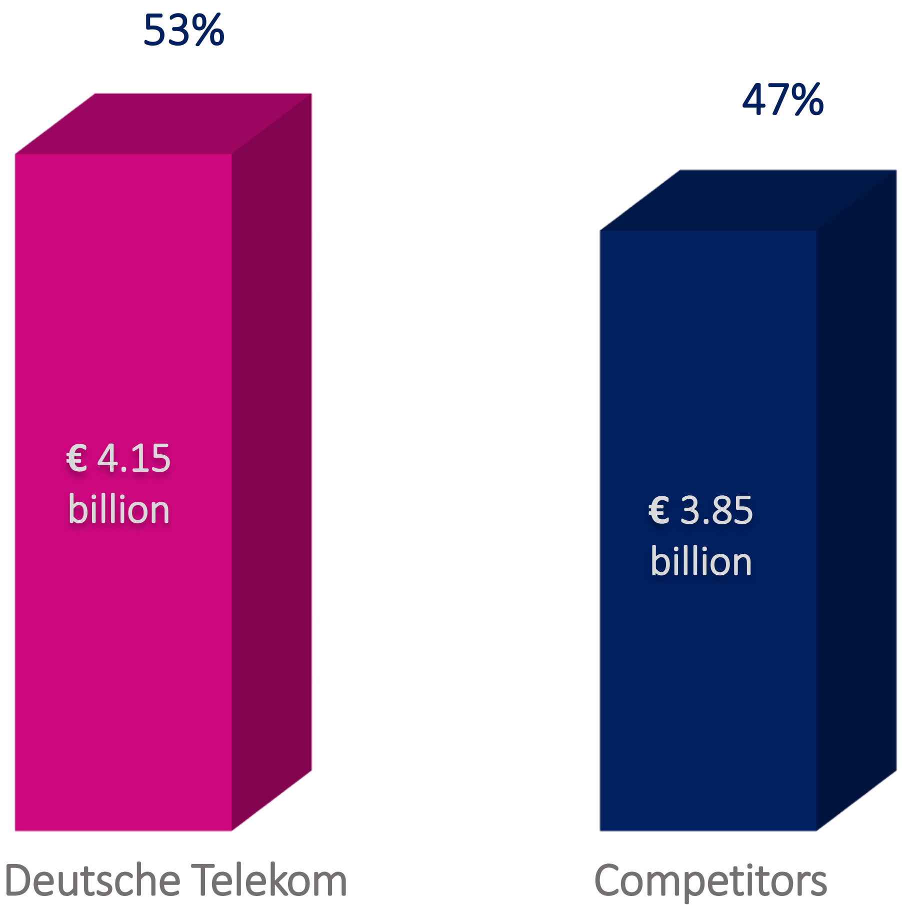
alternative network

operators

Source: Federal Network Agency (BNetzA), BREKO Research

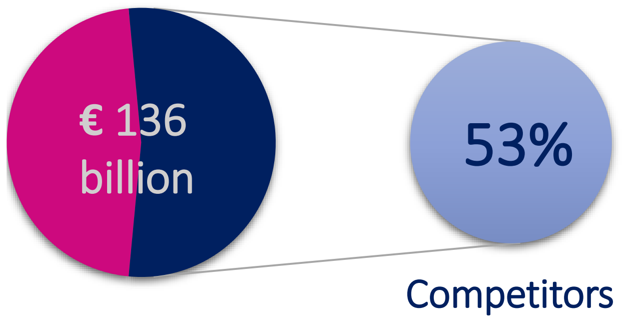
BREKO German Broadband Association

Alternative network operators: Enablers of the Gigabit Society



Investments made within the scope of 'operator models' not yet considered (municipality builds but rents out operations)

Total investments since 1998



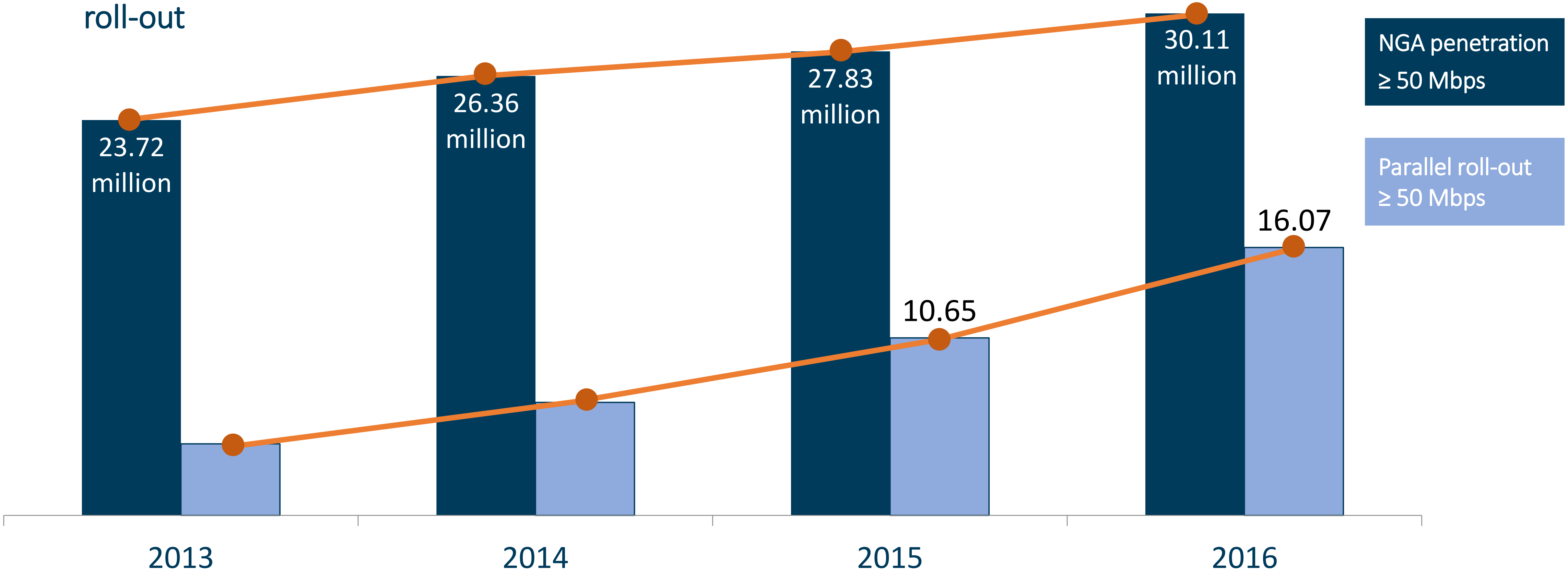
Source: BNetzA, BREKO Research

Progress in broadband deployment?

Households with connections ≥ 50 Mbps

BREKO
German Broadband Association

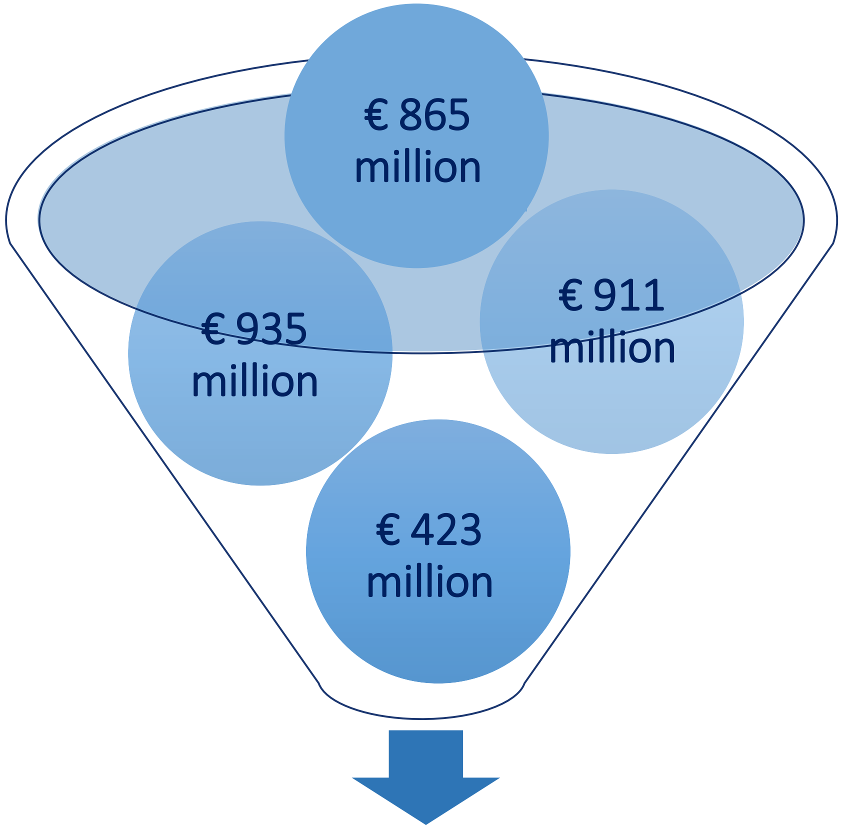
More than two-thirds of investments in 2015 and 2016 did not contribute to the Federal Government's broadband targets but have led to bad investments as a result of parallel roll-out



Source: TÜV Rheinland, BREKO Research

Federal funding programme

BREKO German Broadband Association



Awarded (2015-2017): 2.2%

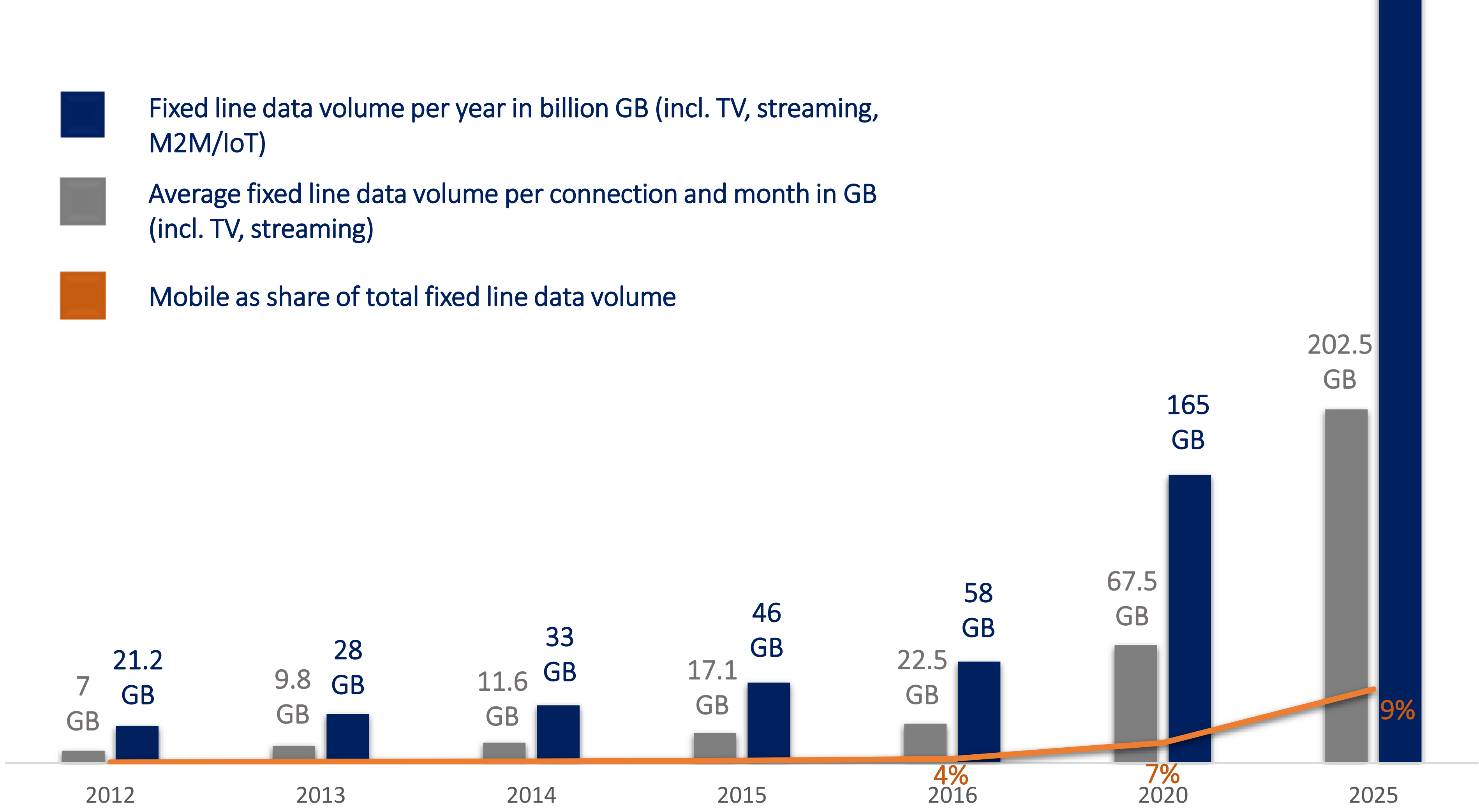
- € 3.1 billion federal funding
- 545 grants confirmed

  Examples:

  - 93 Mecklenburg-Vorpommern
  - 91 Bavaria
  - 85 Saxony
  - 17 Baden-Württemberg
  - 8 Hesse
- Grants from the 5th tranche have not yet been awarded

Fibre networks: Enablers of digitisation

BREKO
German Broadband Association



95% (76% in 2014, 80% in 2015) of mobile internet usage takes place in **Wi-Fi networks**
(Source: Mobidia, Independent)

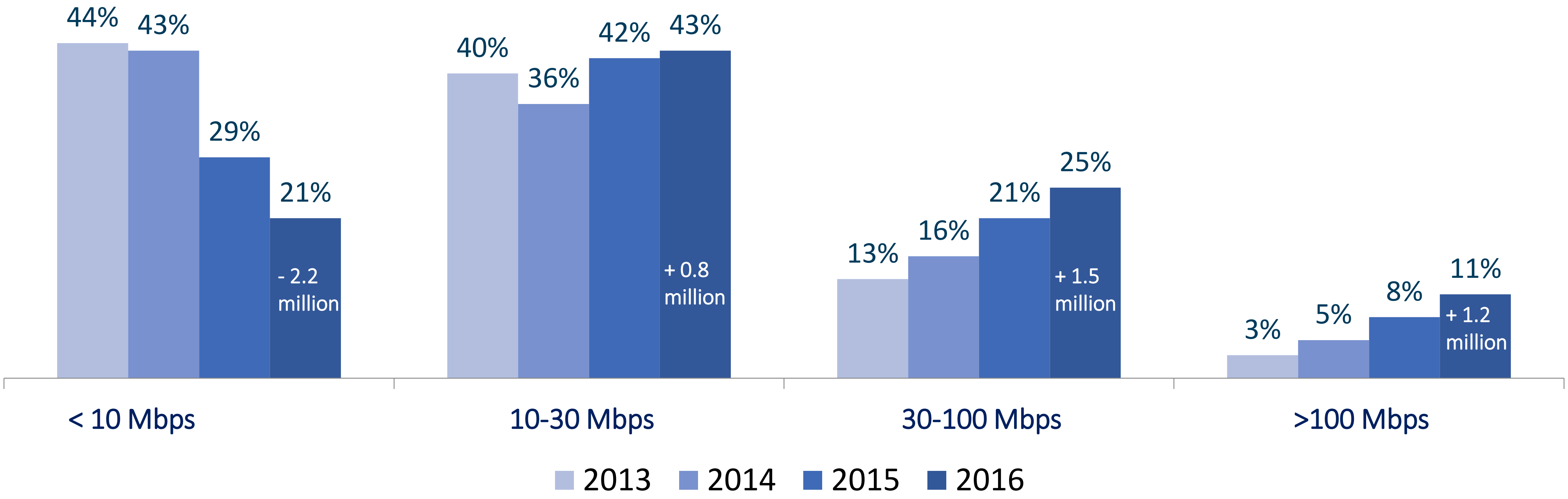
85% of the population does not want to do without fixed (only 65% in 2012)
(Source: D21)

Data volume grows annually by about 30%
(Source: Cisco)

Source: BNetzA, BREKO Research

Take-up of high bit-rates is increasing significantly

32 million broadband connections (80% of premises) in fixed line networks by the end of 2016 (+1.3 million)

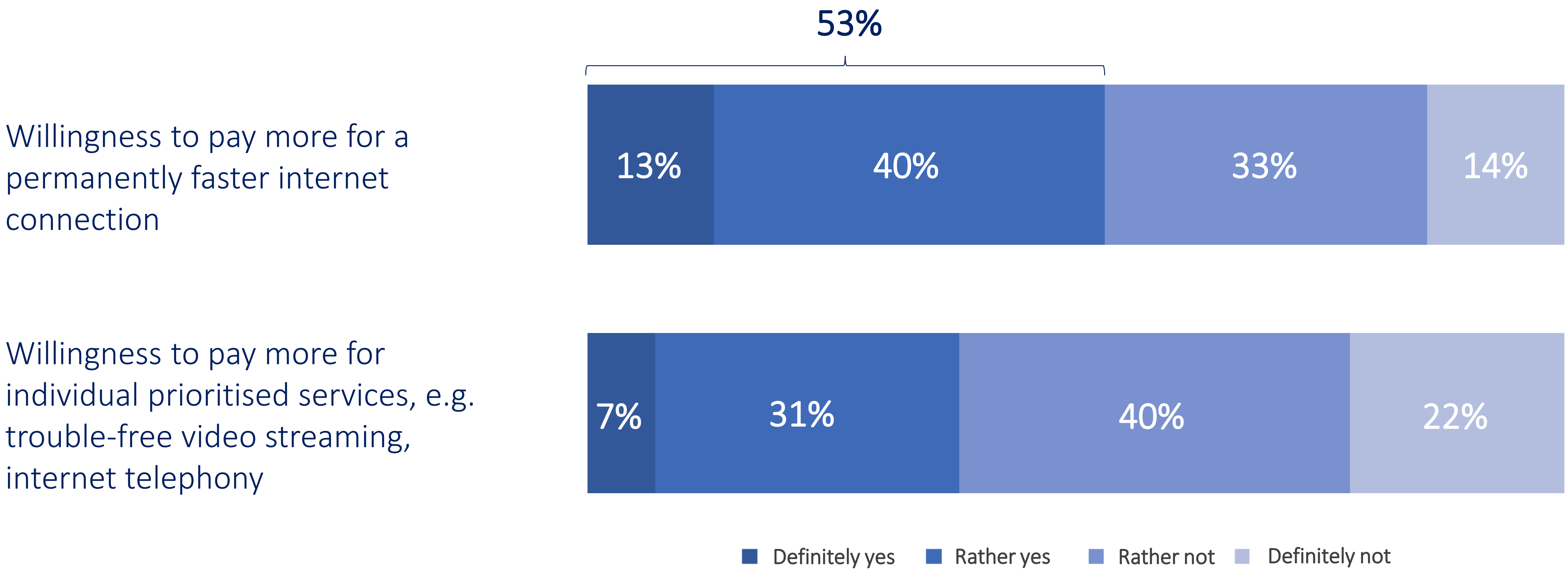


Source: TÜV Rheinland, BREKO Research

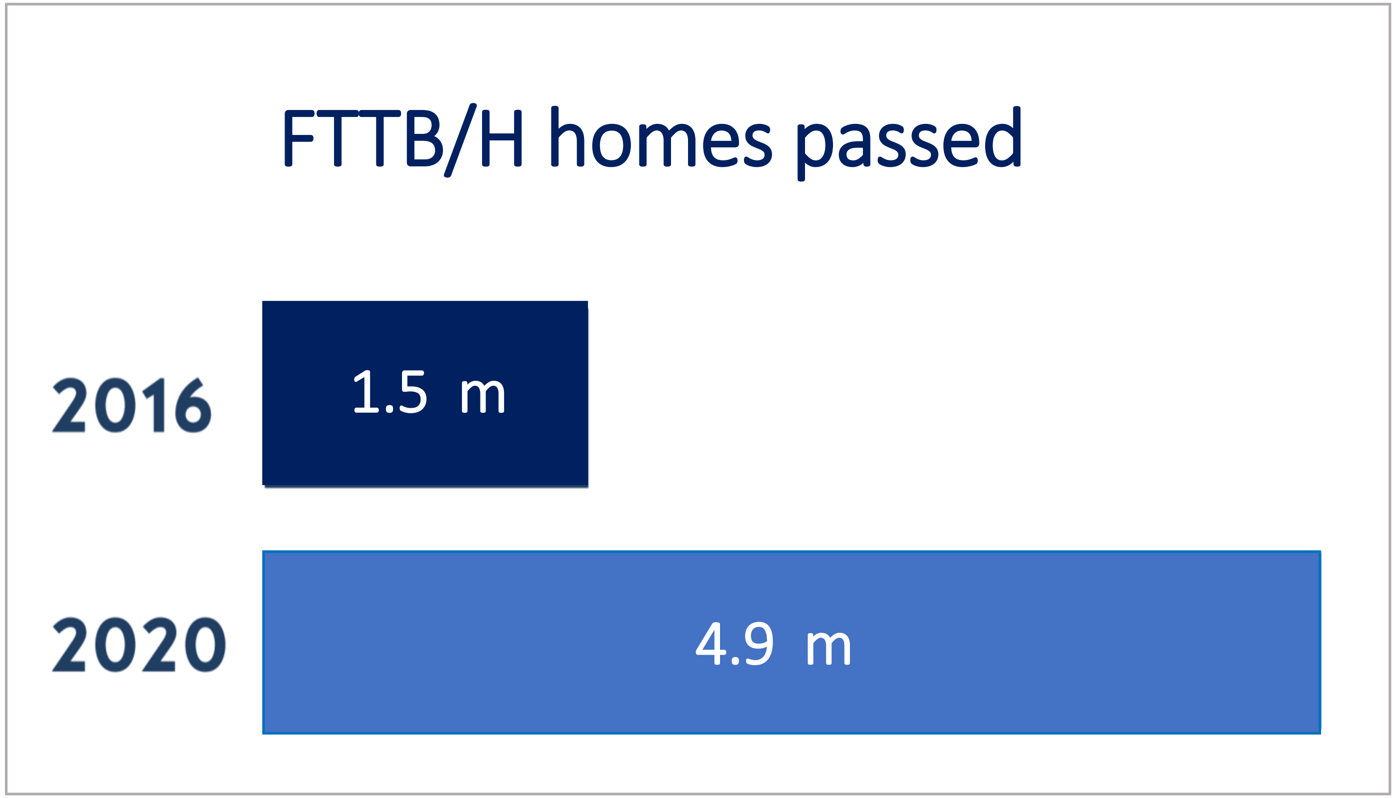
Willingness to pay increases

BREKO German Broadband Association

More than half of all German citizens would in principle be prepared to pay more for a faster internet connection



Investments in fibre networks



Examples for FTTB/H deployment:

EWE: € 1.2 billion investments in FTTH networks

KommPaktNet (Kommunaler Pakt zum Netzausbau): FTTB/H networks of 8 districts + 230 municipalities

SWN (Stadtwerke Neumünster): Cover 25% of Schleswig-Holstein with FTTH until 2020

BREKO carriers build the basic infrastructure for Germany's Gigabit Society

Indicators of BREKO network operators in 2016

Turnover: € 8.4 billion (+5%)

EBITDA: € 2.3 billion
EBITDA margin: 27%

Investment rates:
of Turnover: 19% (Deutsche Telekom 18%)
of EBITDA: 70% (Deutsche Telekom 46%)

Investments: € 1.6 billion

8.7 million NGA fixed line connections (+3%)

- Indicators do not include mobile
- € 11.4 billion invested since 2010

- Depending on the framework conditions, BREKO network operators predict a further **increase of the 2016 investments by 40%**

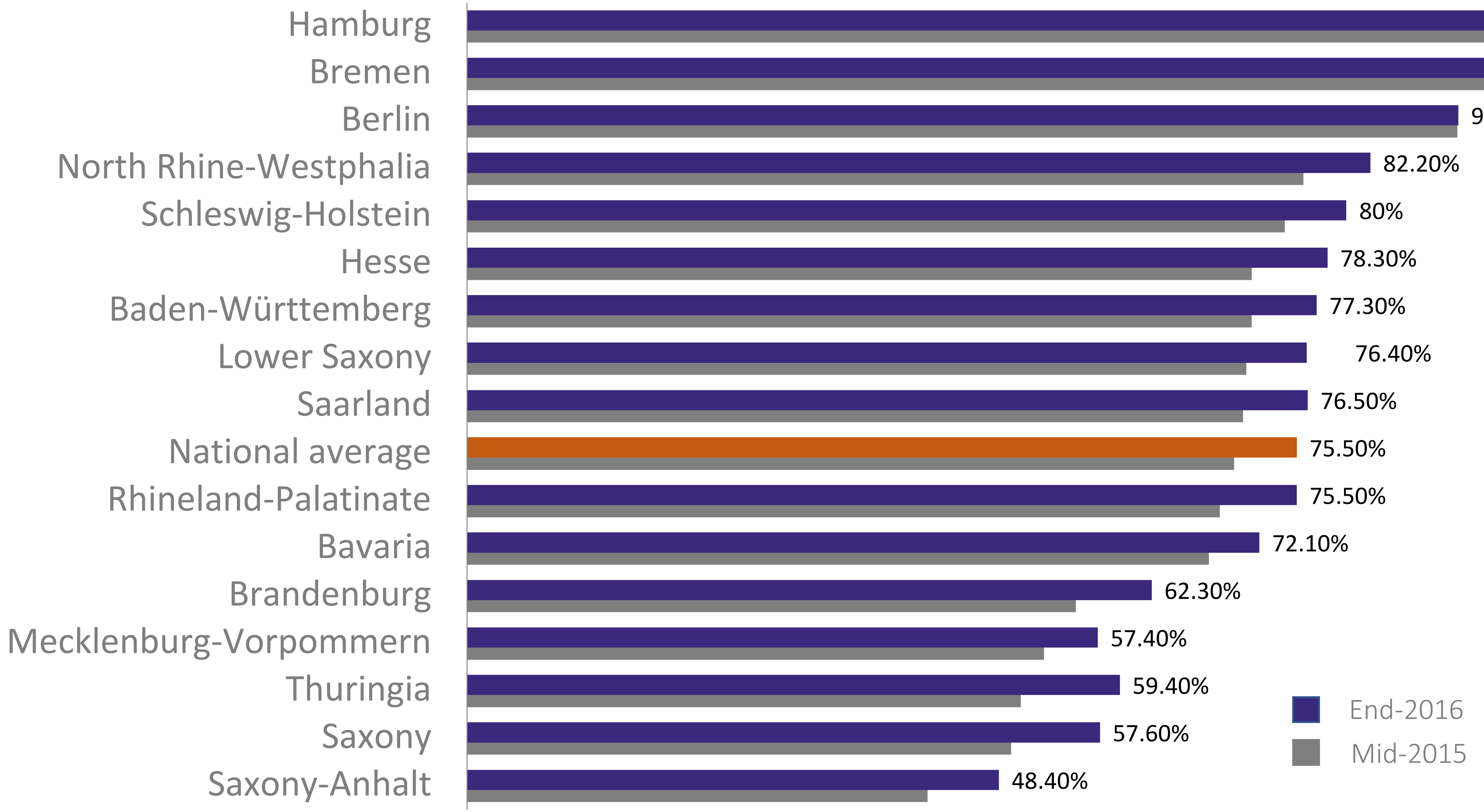
Public funding in the Federal States

Federal State	First Call	Second Call	Third Call	Total
Mecklenburg-Vorpommern	24	53	15	92
Saxony	1	18	25	**44**
Bavaria	3	8	30	**41**
Lower Saxony	6	15	13	**34**
North Rhine-Westphalia	4	3	20	**27**
Schleswig-Holstein	2	2	11	**15**
Rhineland-Palatinate	2	3	9	**14**
Brandenburg	0	1	7	**8**
Hesse	2	3	2	**7**
Baden-Württemberg	3	1	0	**4**
Berlin	0	1	0	**1**
Hamburg	0	0	1	**1**
Saarland	1	0	0	**1**

Source: BMVI, BREKO Research

Broadband availability ≥ 50 Mbps in Federal States for households (fixed network)

BREKO German Broadband Association



Percentage increase TOP 3:

1. Thuringia
2. Saxony
3. Saxony-Anhalt

Absolute increase TOP 3:

1. North Rhine-Westphalia
2. Baden-Württemberg
3. Bavaria

Source: TÜV Rheinland, BREKO Research

Bandwidth demand 2025

BREKO
German Broadband Association

Ca. 40.7 million households

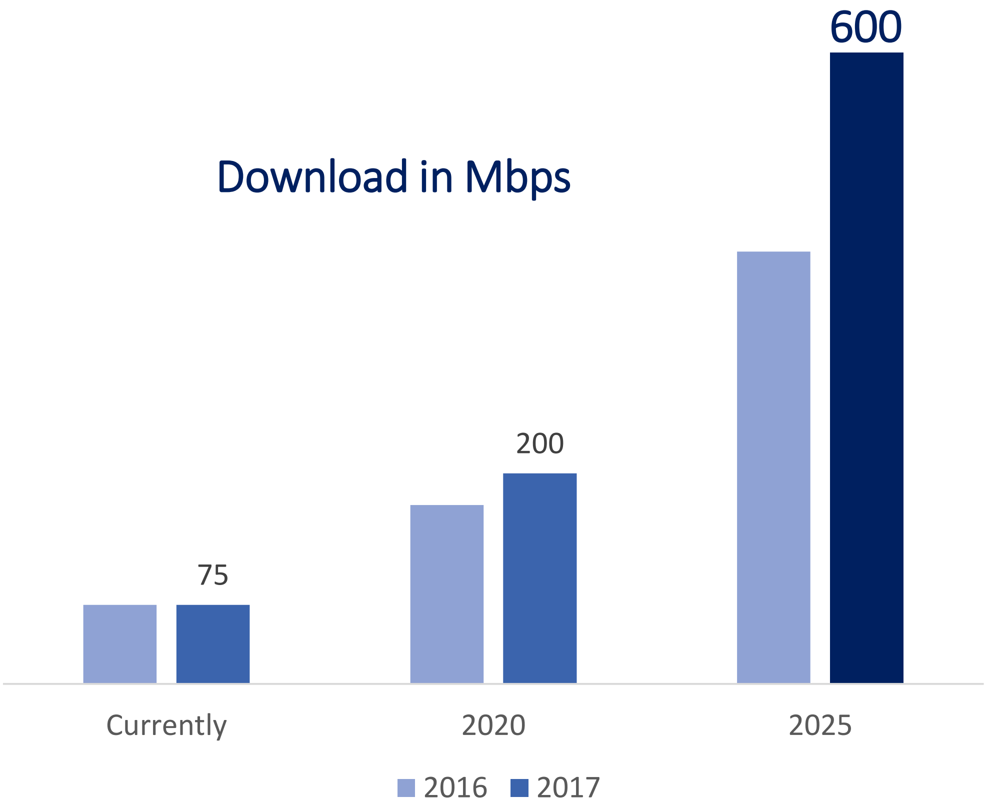
Share	Demand	Households / businesses
29.7%	**“Top-Level” demand:** 1 Gbps and more downstream, 600 Mbps and more upstream	Ca. 12.1 million households Ca. 300 000 businesses
46.6%	**“High-Medium” demand:** 500-1000 Mbps downstream, 300-600 Mbps upstream	Ca. 19 million households
8.7%	**“Medium” demand** 150-500 Mbps downstream, 100-300 Mbps upstream	Ca. 3.5 million households Ca. 2.7 million businesses
7.5%	**“Low-Level” demand:** Up to 150 Mbps downstream, up to 100 Mbps upstream	Ca. 3.04 million households Ca. 590 000 businesses
7.5%	No broadband / Refusal	Ca. 3.06 million households

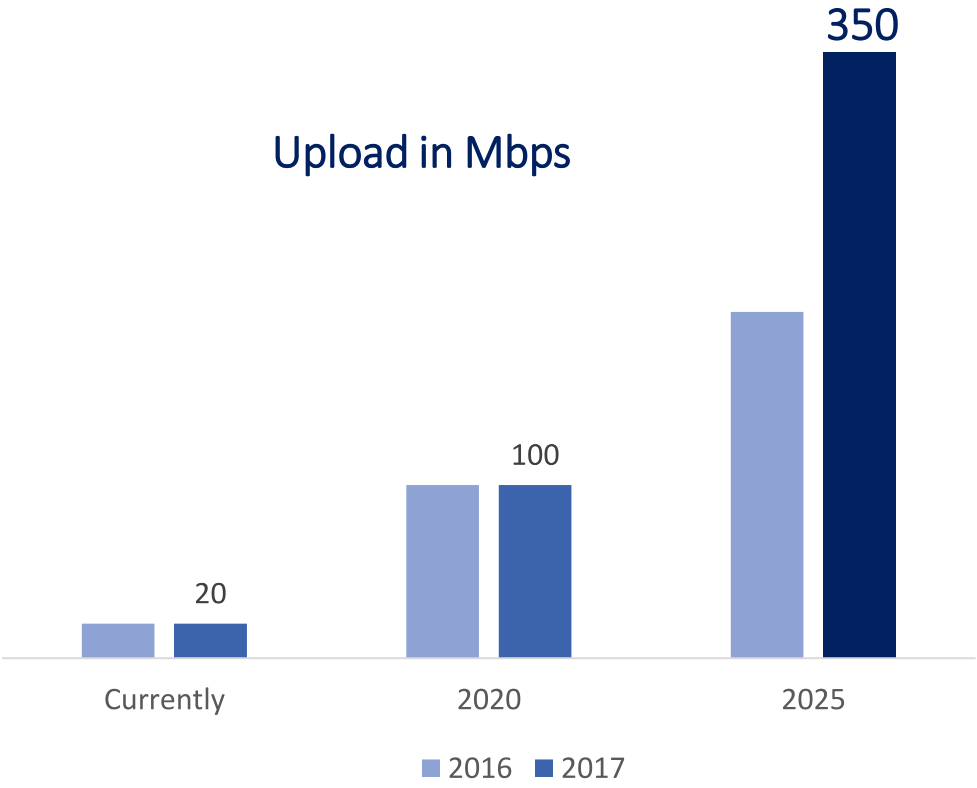
More than **75% of households** will demand bandwidths higher than 500 Mbps by 2025

Source: WIK

Demand for high bit-rate connections increases significantly

BREKO members expectations of average broadband demand by 2025





Current sample offers on the market:

EWE TEL
Vereinigte Stadtwerke:
1 Gbps symmetrical

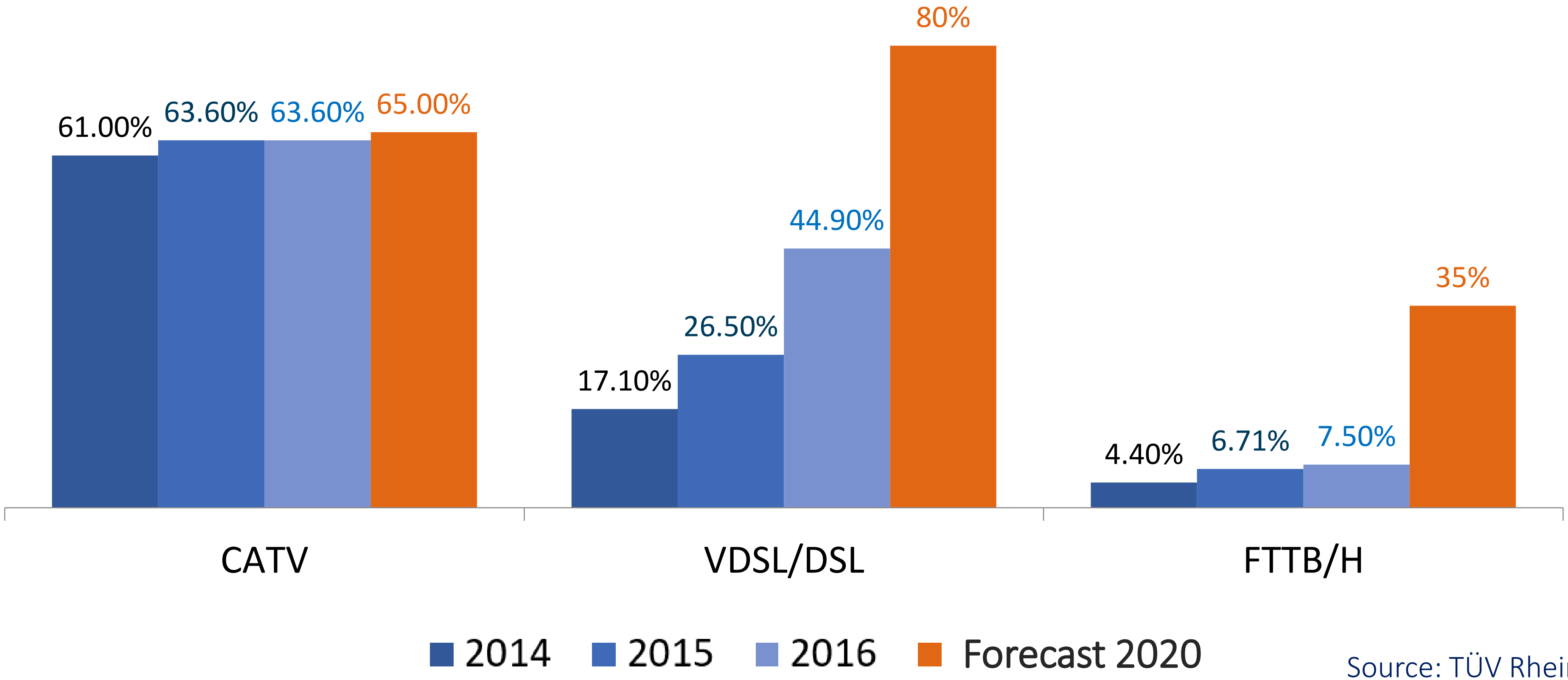
Deutsche Glasfaser:
1 Gbps download

RFT kabel:
400 Mbps download

1&1 Versatel:
1 Gbps symmetrical for business customers

Is Germany on the way towards the Gigabit Society?

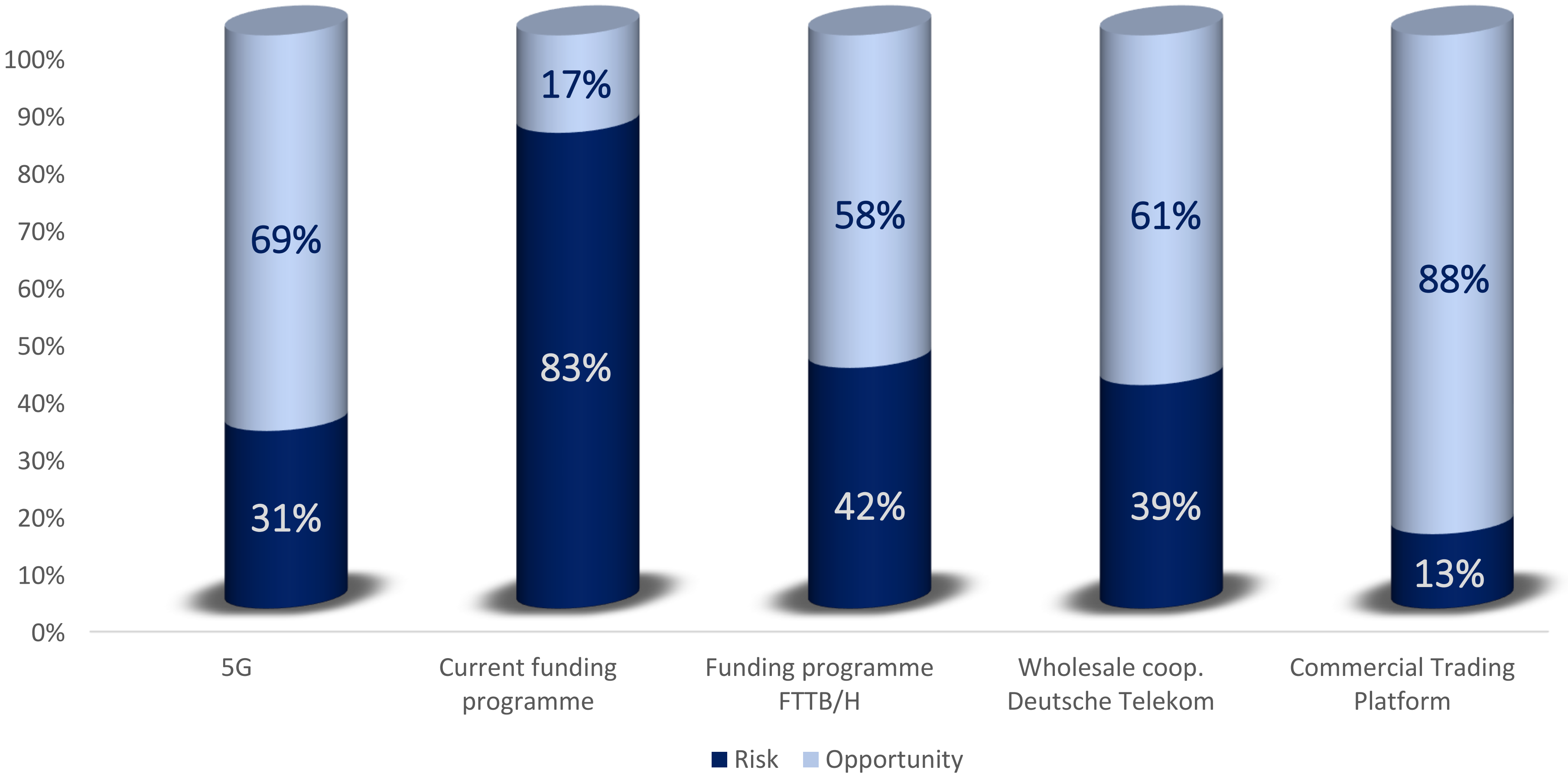
Households with available connection bandwidths ≥ 50 Mbps



Source: TÜV Rheinland, BREKO Research

The forecast is based on optimal conditions, such as a funding programme focused purely on FTTB/H, wholesale access cooperation instead of overbuild, and co-investment models on the passive infrastructure level.

The current funding programme is clearly a RISK for fibre deployment



Challenges for BREKO network operators in 2017

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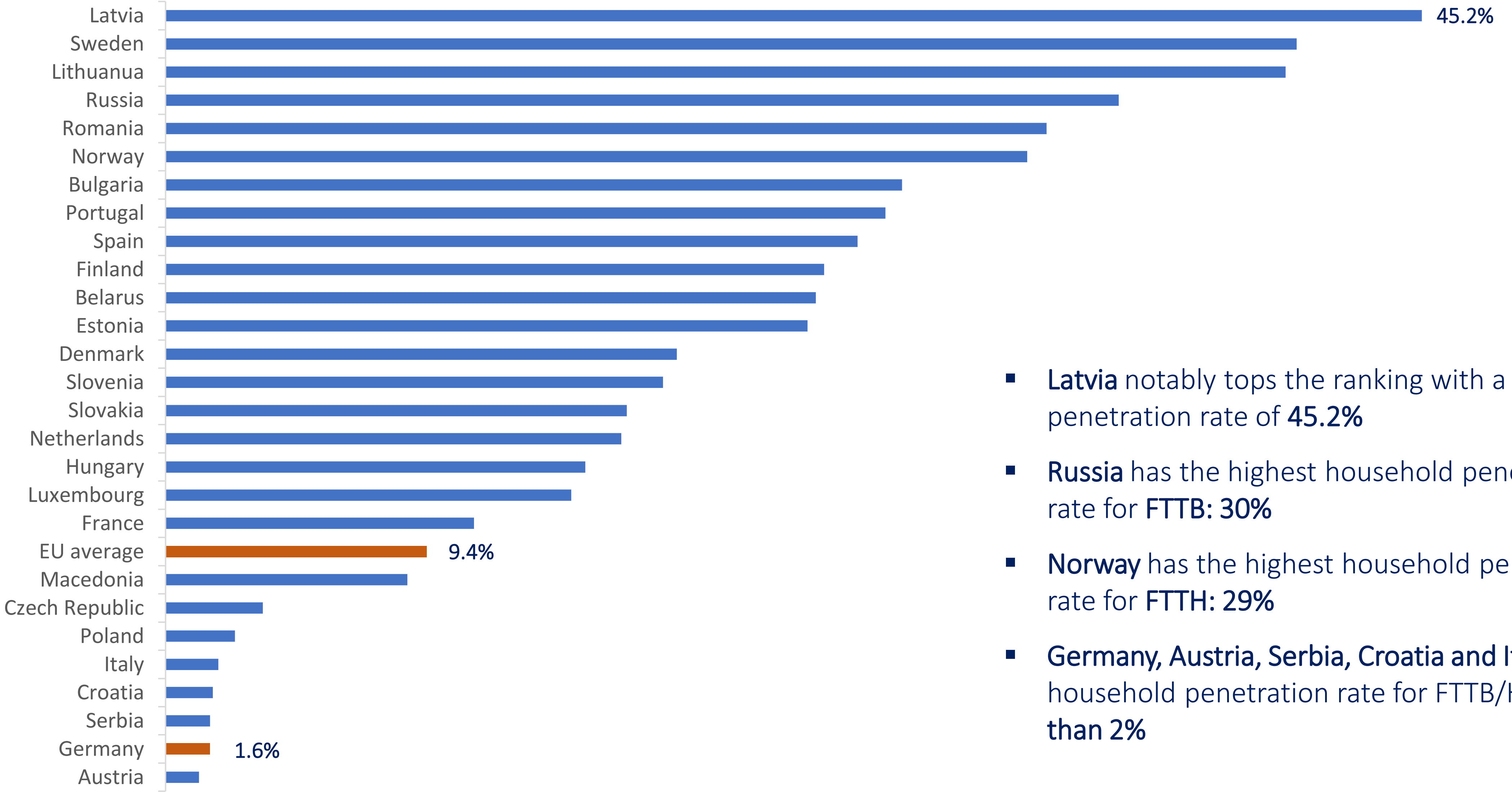
1. Federal funding programme
2. Vectoring and overbuild
3. Implementation of regulatory requirements (Broadband Cost Reduction Directive, etc.)
4. Civil engineering costs
5. Price competition

European ranking of household penetration (FTTB/H)



- **Latvia** notably tops the ranking with a household penetration rate of **45.2%**
- **Russia** has the highest household penetration rate for **FTTB: 30%**
- **Norway** has the highest household penetration rate for **FTTH: 29%**
- **Germany, Austria, Serbia, Croatia and Italy** have a household penetration rate for FTTB/H of **less than 2%**

Source: FTTH Council Europe

How “good” is broadband?

Sustainable development of broadband infrastructures

Application	Bandwidth	Delay/ Latency	Jitter	Packet Loss
Email	Low	Low	Low	Medium
File Sharing	High	Low	Low	Medium
Web Access	Medium	Medium	Low	Medium
Remote Login	Low	Medium	Medium	Medium
Audio on Demand	Low	Low	High	Low
Video on Demand	High	Low	High	Low
Telephony	Low	High	High	Low
Videoconferencing	High	High	High	Low

Quantity

- Maximum speed
- Up- & download
- Average speed

Quality

- Delay/Latency
- Jitter
- Packet Loss
- DNS Response Time
- Reliability
  (QoS: Quality of Service)

Source: WIK

The BREKO Broadband Study shows:

- ✓ Demand and willingness to pay are clearly present
- ✓ Alternative network operators shoulder more than 80% of fibre deployment
- ✓ Join forces: need for an infrastructure target
- ✓ Promote competition