

# RTR INTERNET MONITOR

2020 Annual Report



Online Report:

<https://app.23degrees.io/embed/3Qp5HNqa7u4t3n1a-report-rtr-internet-monitor>

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# Preface



## Preface

Dear Reader,

we look back on an unusual year. It was unusual because, for many of us, workplace activities were moved to our homes. It was unusual because, all of a sudden, schooling was also taking place at home. In this context, it was also unusual to experience how rapidly digitalisation all of a sudden began taking over every aspect of our lives. The rate of change was exponential, and almost as steep as all of those infection curves presented to us at the beginning of each new wave. We witnessed how sharply retail customer data volumes rose during 2020. Demand for internet access supporting higher bandwidths also increased sharply. But the primary consideration here was not the technology offered but connection speed, and how easily connectivity can be implemented in a private setting. It comes as no surprise then that our RTR-NetTest also saw heavy demand in this period.

Since the 2017 annual report, the RTR Internet Monitor you now have before you has been providing quarterly summaries of current developments in the fixed and mobile broadband markets. In this issue, presenting the 2020 annual report, we once again provide the familiar quarterly data. To highlight trends and seasonal effects, we have also prepared charts showing changes in various categories for the first time. These charts are explained in the accompanying notes.

*Section 1 on Broadband in Austria* presents an overview of the fixed and mobile broadband markets in Austria, along with data on the number of connections and subscriptions, data volumes used and the revenues generated from these services. Market data are presented in more detail in section 2 Fixed broadband and section 3 Mobile broadband. These sections are based on data surveyed each quarter in accordance with the Communications Survey Ordinance (KEV). The data are available to you at: [https://www.rtr.at/rtr/service/opendata/OD\\_Uebersicht.de.html](https://www.rtr.at/rtr/service/opendata/OD_Uebersicht.de.html) (in German).

*Section 4* details changes in retail prices for *fixed and mobile broadband services*. The price information derives from research conducted each quarter into the broadband rates charged by Austria's major providers, with these data converted into separate fixed and mobile broadband indices. These indices allow retrospective observations on how various price baskets have changed over time.

*Section 5 Monitoring internet access quality* looks into internet access in Austria, focusing on quality of service and performance. As part of the analysis, aggregated data covering measured download and upload speeds are presented, classified by bandwidth category, technology, hour of the day and region. The data are available at: <https://www.netztest.at/en/Openata>

For the first time, the RTR Internet Monitor series is supplemented by a section 6 on Broadband access – supply and demand in geographical terms. The information here relates to current broadband coverage and demand for such services in Austria. The underlying database is compiled for the Single Information Point for Broadband Coverage (ZIB). Like all other data included in this annual report, the German version can be viewed interactively in the online RTR Internet Monitor, accessible at: <https://www.rtr.at/TKP/aktuelles/publikationen/Uebersichtseite.de.html>

This information summary is intended to provide you with an informed perspective of changes in the Austrian broadband market as well as of the current market status. The ultimate aim is to enhance transparency and broaden the knowledge base available to inform decisions that impact participation in the economy and society.

On behalf of my team of experts, whose skills and knowledge have been fundamental for enabling this report, I hope you and everyone find stimulating insights and enlightening discoveries here, providing all of us with a glimpse at least of the immediate digital future from today's perspective, and enabling future regulatory or investment decisions that are based on solid data.

Vienna,  
June 2021

Klaus M. Steinmaurer

Managing Director  
Telecommunications and Postal Services Division  
RTR

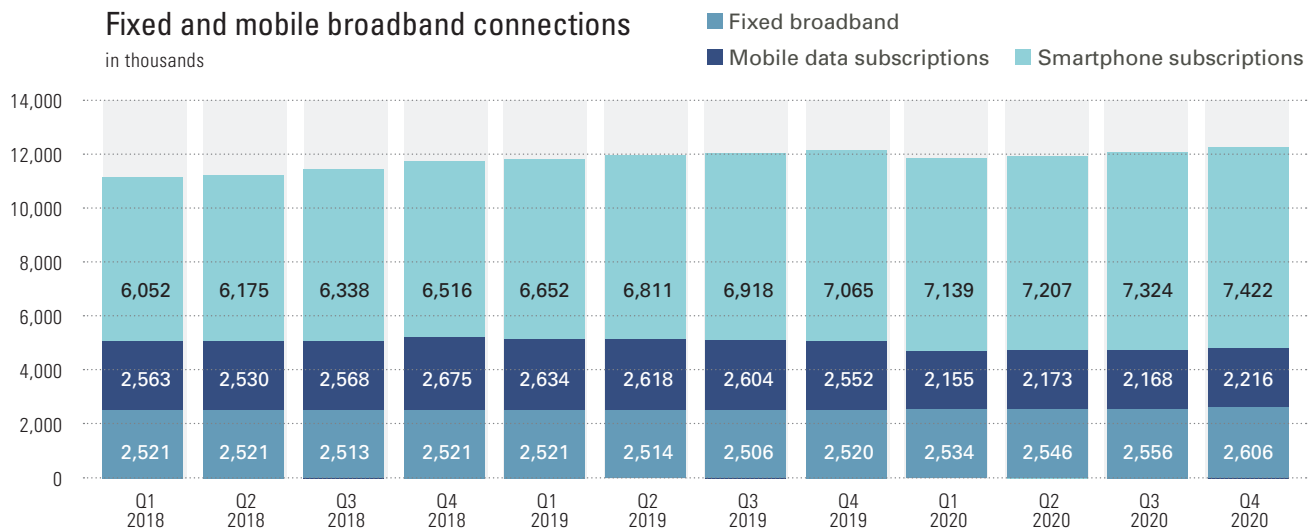




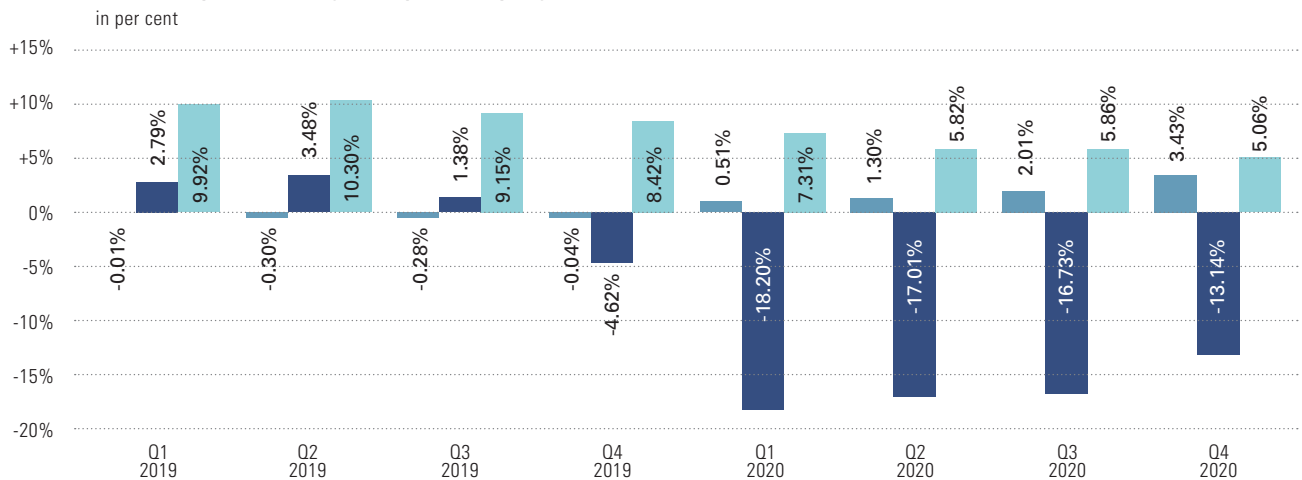
# Broadband in Austria

## Fixed and mobile broadband connections

### Significant rise in smartphone subscriptions by end of 2020



### Year-on-year change in quarterly figures



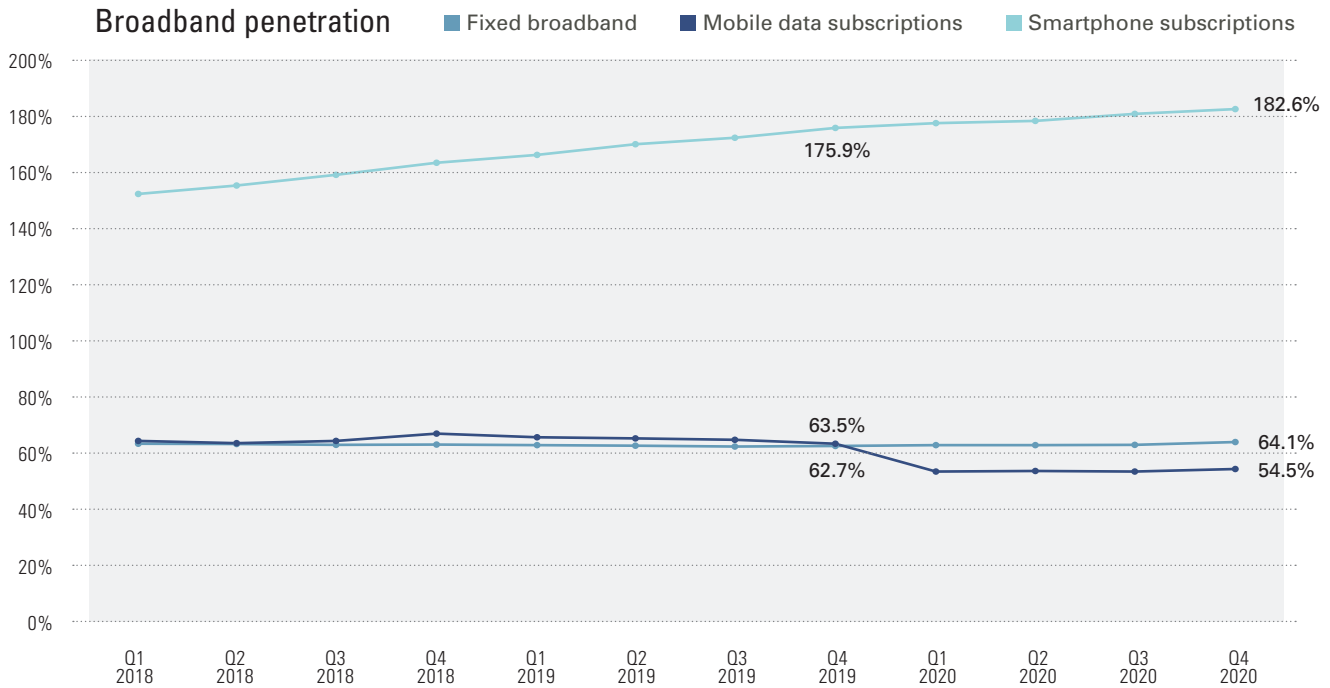
- Total retail connections rose by 0.9 per cent, from 12.1 million at the end of 2019 to 12.2 million at the end of 2020. The pronounced drop in connections in Q1 2020 is attributed to data corrections reported by one provider.
- Compared with the same quarter in the previous year, fixed broadband connections rose by 3.4 per cent in Q4 2020. The drop in mobile data subscriptions, which fell by 13.1 per cent from 2.6 million to 2.2 million in Q4 2020, is attributable to a correction made by one operator at the beginning of 2020.
- At around 60.6 per cent, smartphone subscriptions made up the majority of total fixed and mobile broadband connections at the end of 2020. Around 7.4 million were registered overall. That is a gain of 5.1 per cent compared with year-end 2019 and 1.3 per cent compared with the previous quarter.

The chart above shows the total number of fixed and mobile broadband connections. Within mobile broadband, a distinction is made between mobile data subscriptions (without minutes and texts included) and smartphone subscriptions (with minutes and texts included). M2M SIM cards are not shown in the chart. 'Broadband connections' is defined in the glossary at the end of the report.



## Broadband penetration

### Upward trend in smartphone subscriptions continues



Source for number of households: Statistics Austria

- Smartphone subscriptions continue to show the widest distribution and biggest gains, rising from 175.9 per cent at the end of 2019 to 182.6 per cent at year-end 2020.
- Penetration figures for fixed broadband and mobile data subscriptions remained largely unchanged in Q4 2020, compared with both the previous quarter and year. The penetration rate is 64.1 per cent for fixed broadband and 54.5 per cent for mobile subscriptions. The significant drop in mobile data subscriptions in Q1 2020 can be ascribed to corrections made by one operator.

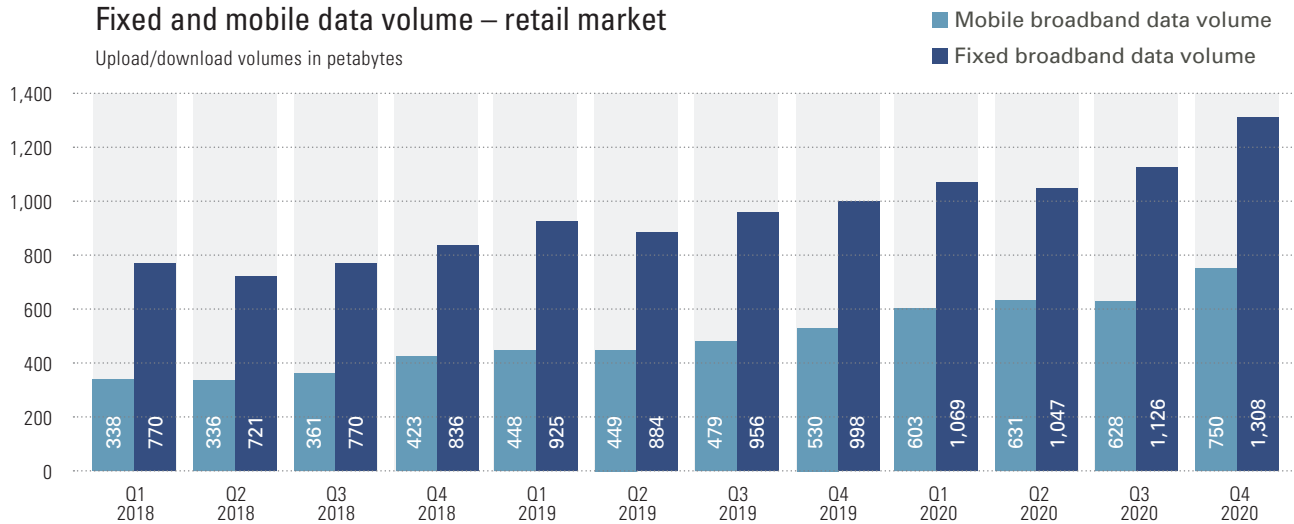
Broadband penetration refers to the ratio of fixed and mobile broadband connections to the total number of households in Austria. The penetration rate also takes into account broadband connections used by businesses.

## Fixed and mobile data volume – retail market

### Much greater volumes of data consumed during the pandemic

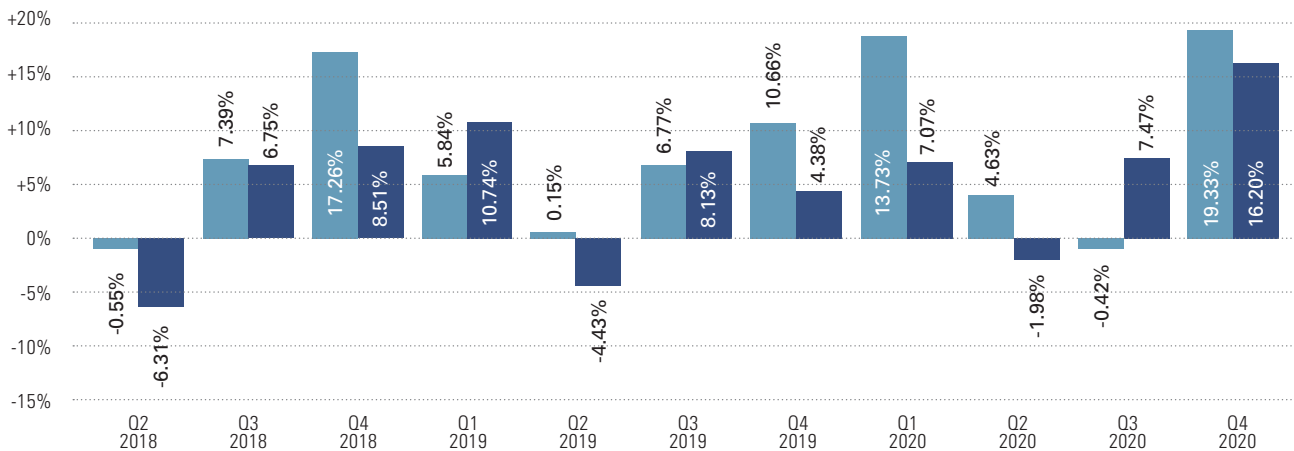
#### Fixed and mobile data volume – retail market

Upload/download volumes in petabytes



#### Quarter-on-quarter change

in per cent

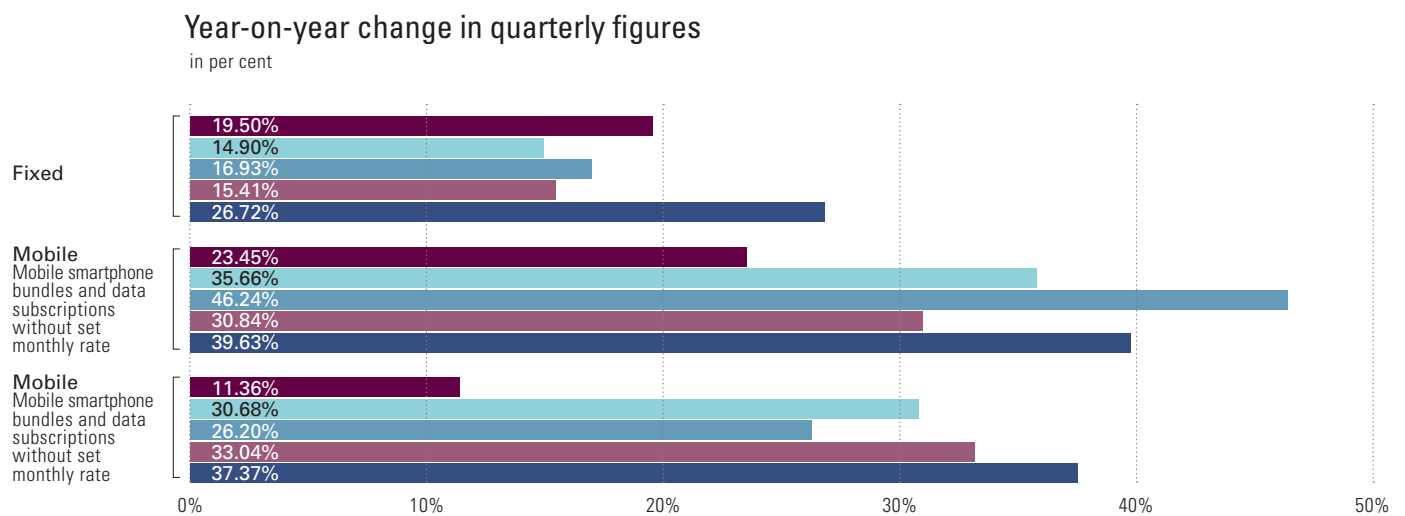
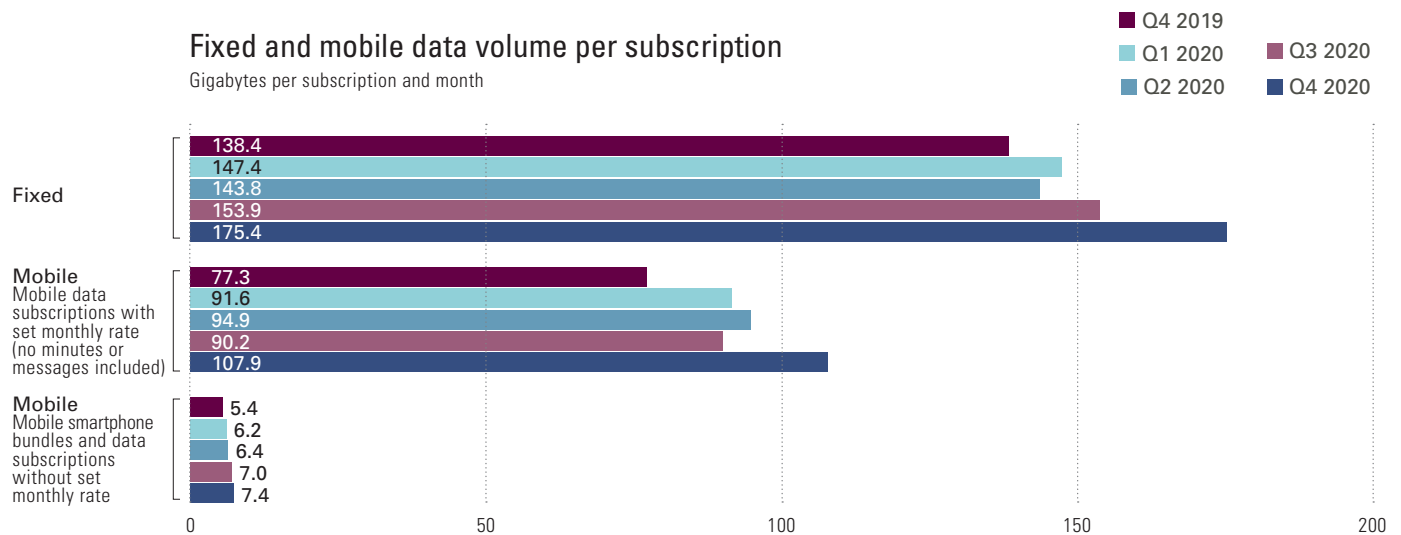


- Fixed and mobile data volumes continue their persistent upward trends. In 2020 the increase in data consumption was driven by the outbreak of the coronavirus pandemic, which forced many people to work from home.
- In the fixed networks, data volumes rose from 3,764 petabytes for 2019 as a whole to 4,550 petabytes in 2020 (an increase of 20.9%). In Q4 2020 data consumption in this category achieved a new peak value of 1,308 petabytes. This represents a 16.2 per cent increase from 2018.
- In mobile networks, data volumes rose year on year by 37.0 per cent to total 2,612 petabytes for 2020 as a whole. At year-end 2020 a total of around 750 petabytes was consumed, representing a rise in mobile data volume of 19.3 per cent compared with Q3 2020.

The chart above shows the upload/download volumes used in the fixed and mobile network retail market in petabytes (1 petabyte = 1,024 terabytes = 1,048,576 gigabytes = 1,073,741,824 megabytes).

## Fixed and mobile data volume per subscription

### Year-on-year data consumption figures rise sharply in fixed and mobile networks



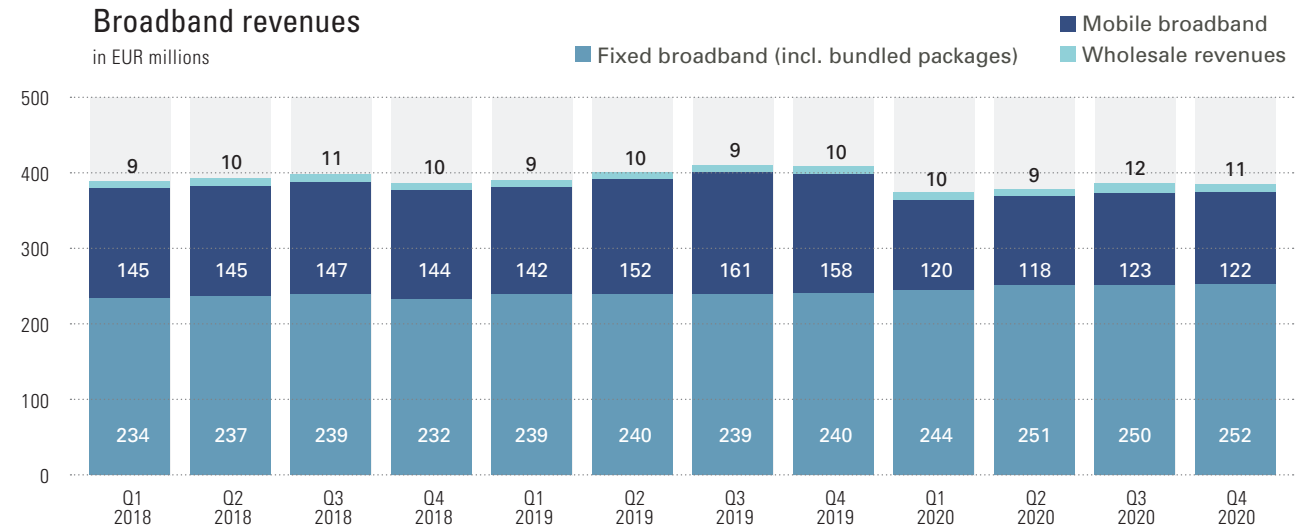
- The significant increase in data usage is also reflected in the average figures per month and per user. At year-end 2020, an average of around 175.4 GB had been consumed in the fixed networks, a quarter-on-quarter rise of around 14.0 per cent and around 26.7 per cent more than at year-end 2019.
- In mobile networks, the equivalent increase is even more pronounced: for data subscriptions with a fixed monthly fee, 107.9 GB per month and user in Q4 2020 is a gain of 39.6 per cent compared with the same quarter in the previous year.
- In data subscriptions without a fixed monthly fee (smartphone subscriptions), the volume of data consumed monthly rose by 37.4 per cent year on year, to 7.4 GB per month/user at year-end 2020.

The chart shows the volume of uploaded and downloaded data consumed in the fixed and mobile retail markets, in gigabytes per connection and month. The figures are obtained by dividing the quarterly data volume in each case by the number of connections that customers used to access the internet at least once in that quarter (and then dividing by three to obtain a monthly value).

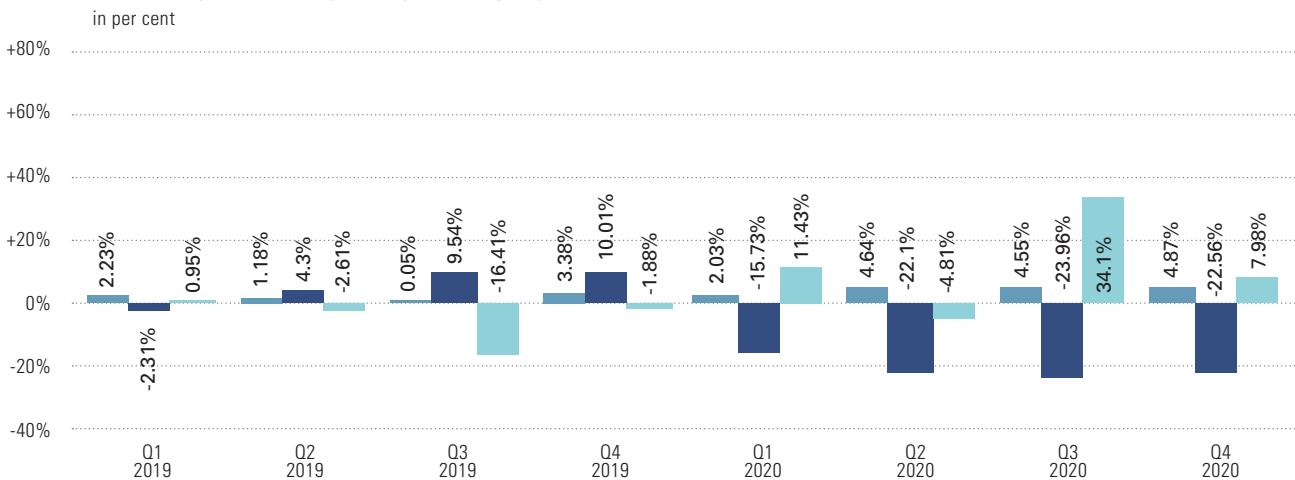


## Broadband revenues

### Slight dip in mobile broadband revenue growth only due to data correction



### Year-on-year change in quarterly figures



- Total revenues with broadband products amounted to EUR 1.5 billion in 2020. Although this marks a 5.4 per cent decrease from 2019, this can be largely attributed to a retroactive data correction on the part of one mobile broadband provider.
- Revenues from fixed broadband rose year on year by 4.9 per cent to EUR 251.8 million at the end of 2020. Within the same period, wholesale revenues also posted growth of around 8.0 per cent, rising to around EUR 10.6 million.
- Mobile broadband revenues, in contrast, fell by 22.6 per cent to around EUR 122.4 million from the end of 2019 to the end of 2020. This trend was not the result of falling demand, however, but can be ascribed to the fact that one major provider had re-assigned the revenues communicated to RTR from the 'Data-only subscriptions' category to the 'Other subscriptions' category. As a result, the 'Data-only subscriptions' category – which is used to calculate mobile broadband revenues – now shows significantly lower figures from Q1 2020 onwards. The provider justified the reassignment by citing changes in its group-internal reporting rules.

The chart shows revenues from broadband connections, broken down by fixed broadband revenues (including bundle revenues), revenues from mobile broadband and wholesale revenues (bitstream and resale).

Table 01: Fixed and mobile broadband connections (in millions)  
[> see page 8](#)

|         | Fixed broadband | Mobile data subscriptions | Smartphone subscriptions |
|---------|-----------------|---------------------------|--------------------------|
| Q1 2018 | 2.521           | 2.563                     | 6.052                    |
| Q2 2018 | 2.521           | 2.530                     | 6.175                    |
| Q3 2018 | 2.513           | 2.568                     | 6.338                    |
| Q4 2018 | 2.521           | 2.675                     | 6.516                    |
| Q1 2019 | 2.521           | 2.634                     | 6.652                    |
| Q2 2019 | 2.514           | 2.618                     | 6.811                    |
| Q3 2019 | 2.506           | 2.604                     | 6.918                    |
| Q4 2019 | 2.520           | 2.552                     | 7.065                    |
| Q1 2020 | 2.534           | 2.155                     | 7.139                    |
| Q2 2020 | 2.546           | 2.173                     | 7.207                    |
| Q3 2020 | 2.556           | 2.168                     | 7.324                    |
| Q4 2020 | 2.606           | 2.216                     | 7.422                    |

Table 02: Broadband penetration (Percentage of households)  
[> see page 9](#)

|         | Fixed broadband | Mobile data subscriptions | Smartphone subscriptions |
|---------|-----------------|---------------------------|--------------------------|
| Q1 2018 | 63.5%           | 64.5%                     | 152.4%                   |
| Q2 2018 | 63.4%           | 63.7%                     | 155.4%                   |
| Q3 2018 | 63.1%           | 64.5%                     | 159.2%                   |
| Q4 2018 | 63.2%           | 67.1%                     | 163.5%                   |
| Q1 2019 | 63.0%           | 65.8%                     | 166.3%                   |
| Q2 2019 | 62.8%           | 65.4%                     | 170.1%                   |
| Q3 2019 | 62.5%           | 64.9%                     | 172.4%                   |
| Q4 2019 | 62.7%           | 63.5%                     | 175.9%                   |
| Q1 2020 | 63.0%           | 53.6%                     | 177.6%                   |
| Q2 2020 | 63.0%           | 53.8%                     | 178.4%                   |
| Q3 2020 | 63.1%           | 53.6%                     | 180.9%                   |
| Q4 2020 | 64.1%           | 54.5%                     | 182.6%                   |

Table 03: Data volume (in petabytes)  
[> see page 10](#)

|         | Mobile broadband data volume | Fixed broadband data volume |
|---------|------------------------------|-----------------------------|
| Q1 2018 | 338                          | 770                         |
| Q2 2018 | 336                          | 721                         |
| Q3 2018 | 361                          | 770                         |
| Q4 2018 | 423                          | 836                         |
| Q1 2019 | 448                          | 925                         |
| Q2 2019 | 449                          | 884                         |
| Q3 2019 | 479                          | 956                         |
| Q4 2019 | 530                          | 998                         |
| Q1 2020 | 603                          | 1,069                       |
| Q2 2020 | 631                          | 1,047                       |
| Q3 2020 | 628                          | 1,126                       |
| Q4 2020 | 750                          | 1,308                       |

Table 04: Data volume per connection and month (in GB)  
[> see page 11](#)

|         | Fixed data volume per fixed broadband line | Mobile data volume per active mobile data subscription with set monthly rate | Mobile data volume per other mobile subscription (smartphone subscriptions and tariff plans without a set monthly rate) |
|---------|--|--|---|
| Q4 2019 | 138.4                                      | 77.3   | 5.4   |
| Q1 2020 | 147.4                                      | 91.6   | 6.2   |
| Q2 2020 | 143.8                                      | 94.9   | 6.4   |
| Q3 2020 | 153.9                                      | 90.2   | 7.0   |
| Q4 2020 | 175.4                                      | 107.9  | 7.4   |

Table 05: Broadband revenues (in EUR millions)  
[> see page 12](#)

|         | Fixed broadband (incl. bundled packages) | Mobile broadband | Wholesale revenues |
|---------|--|------------------|--------------------|
| Q1 2018 | 234                                      | 145              | 9                  |
| Q2 2018 | 237                                      | 145              | 10                 |
| Q3 2018 | 239                                      | 147              | 11                 |
| Q4 2018 | 232                                      | 144              | 10                 |
| Q1 2019 | 239                                      | 142              | 9                  |
| Q2 2019 | 240                                      | 152              | 10                 |
| Q3 2019 | 239                                      | 161              | 9                  |
| Q4 2019 | 240                                      | *158             | 10                 |
| Q1 2020 | 244                                      | *120             | 10                 |
| Q2 2020 | 251                                      | 118              | 9                  |
| Q3 2020 | 250                                      | 123              | 12                 |
| Q4 2020 | 252                                      | 122              | 11                 |

\*Note: The jump in this data series can be attributed to a reassignment on the part of one provider.





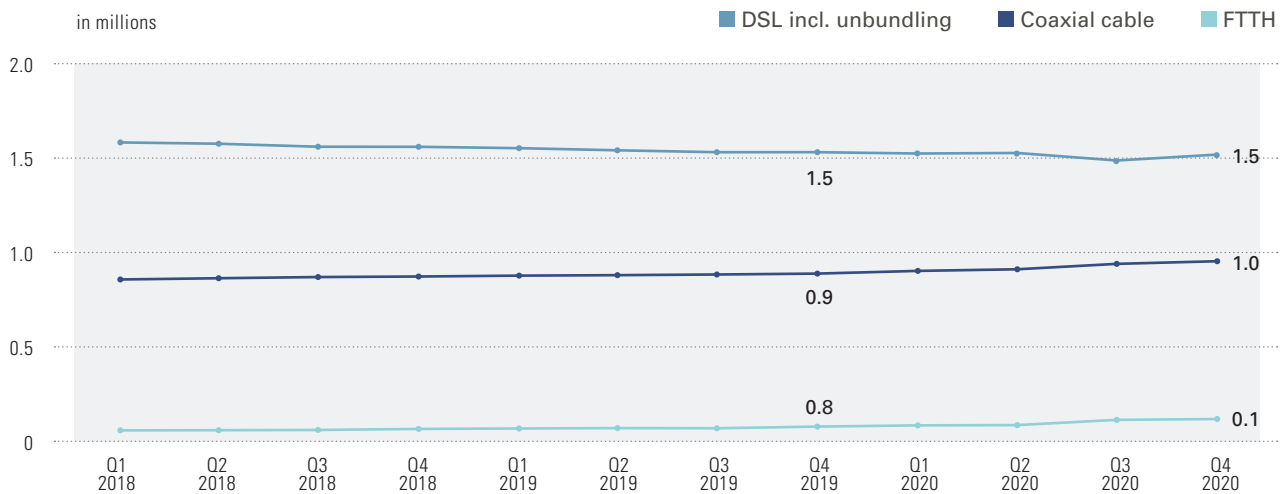
# Fixed broadband

## Retail fixed broadband by infrastructure

### Coaxial cable and FTTH broadband connections once again post year-on-year gains

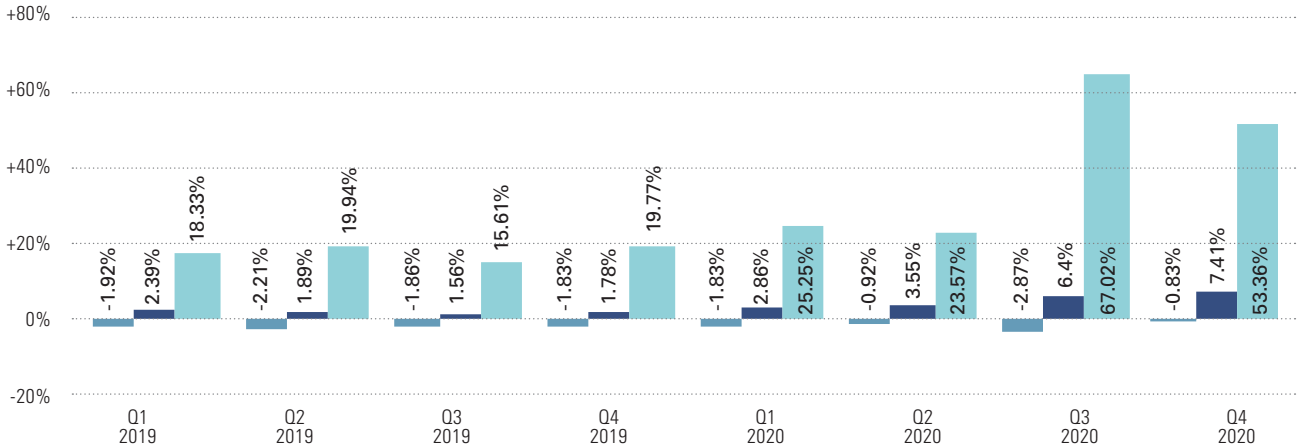
#### Retail fixed broadband by infrastructure

in millions



#### Year-on-year change in quarterly figures

in per cent



- With growth of 2.1 per cent compared with the previous quarter, there were around 1.5 million DSL connections including unbundled lines by the end of 2020. While this equates to a slight downturn of 0.8 per cent, this category still accounts for 58.7 per cent and therefore the largest proportion of retail fixed broadband connections.
- Around 36.8 per cent of fixed broadband connections were provided via coaxial cable at the end of 2020. Totalling around 952,000 connections, this represents year-on-year growth of 7.4 per cent.
- The Austrian market reported around 115,500 active FTTH connections at the end of 2020, which represents growth of about 53.4 per cent compared with the previous year. This is also an increase of 4.0 per cent compared with the previous quarter.
- In the retail segment, there were around 20,000 FWA connections in Q4 2020, a figure some 5.3 per cent higher than in Q3 2020. Year on year, this represents a loss of 8,000 connections (not shown in the figure).

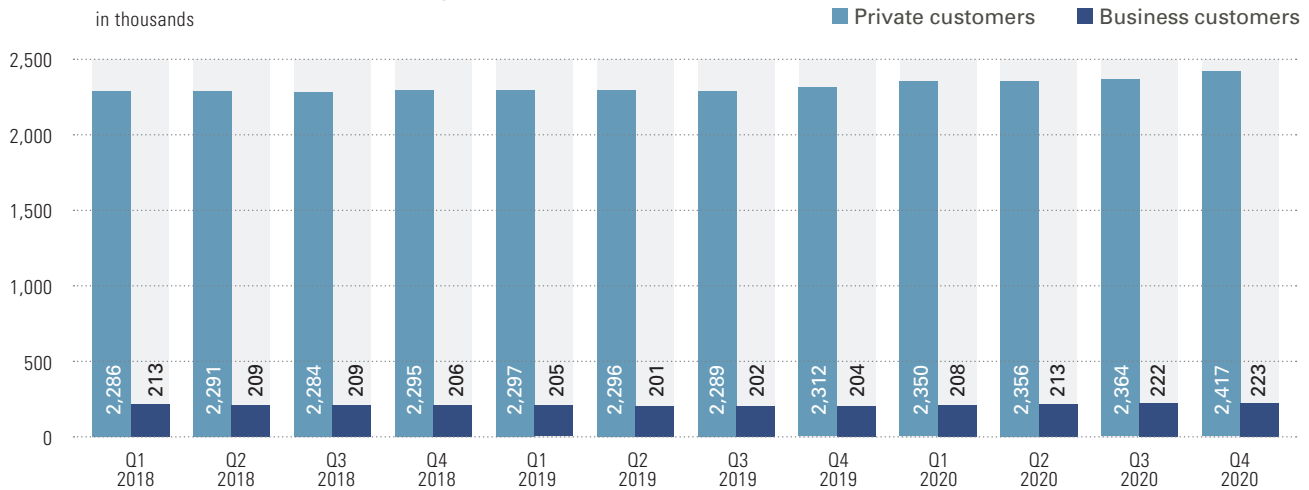
The chart shows the number of fixed broadband connections, broken down by infrastructure. With hybrid products, data traffic normally runs via a fixed connection (usually based on DSL) and additionally via a mobile network when required. Because they are based on fixed broadband, hybrid products are included in the chart under DSL connections. The 'unbundled' category shown on this chart includes data both from physical and virtual unbundling.

## Retail fixed broadband by customer category

### Growth continues in retail broadband connections

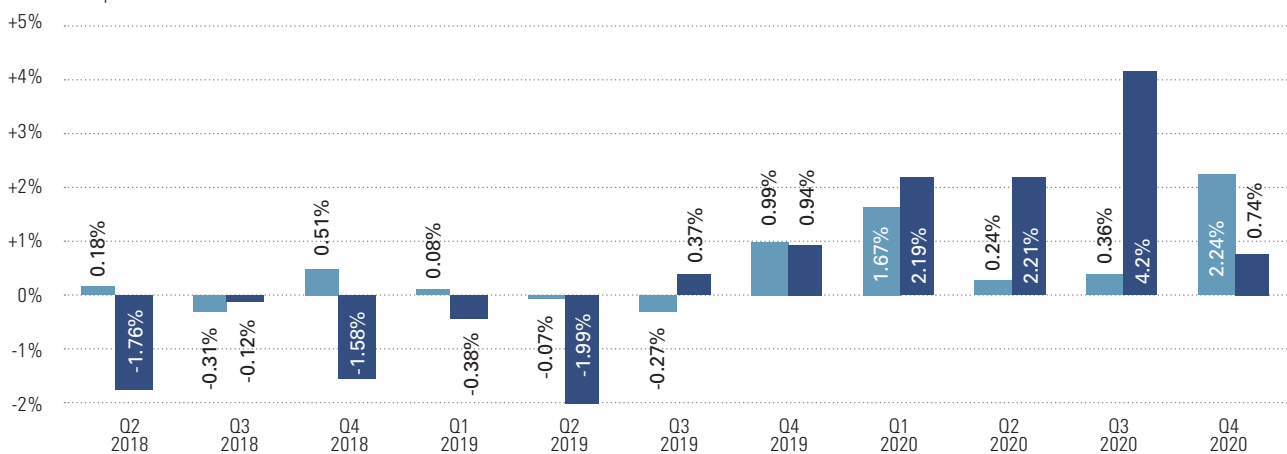
#### No. of connections/subscriptions

in thousands



#### Quarter-on-quarter change

in per cent



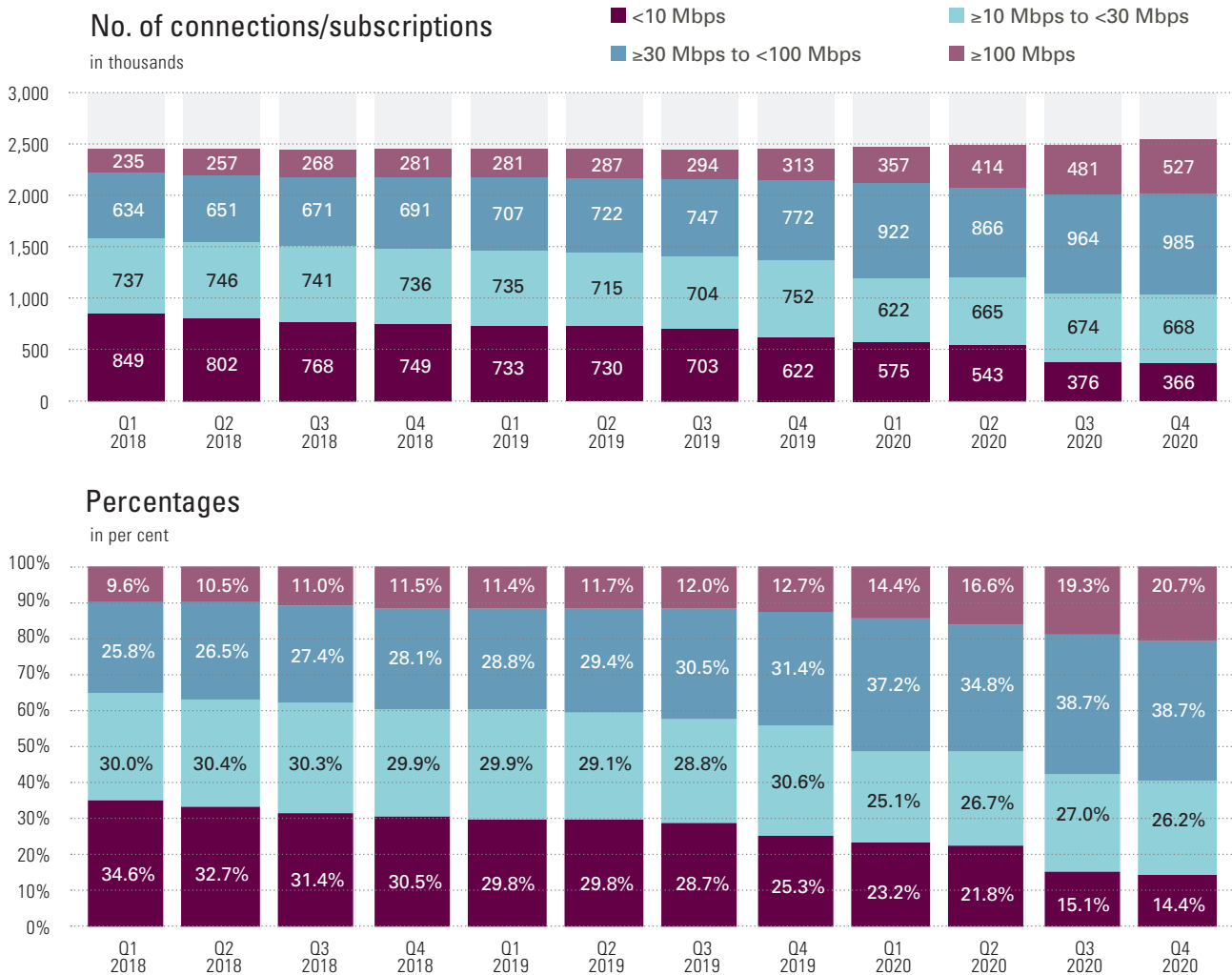
- Corresponding to a year-on-year increase of about 5.0 per cent, the total number of retail broadband connections rose by around 2.6 million at the end of 2020.
- Most of these were private customer connections (91.6%). In Q4 2020 connections in this category totalled 2.4 million, an increase of 4.6 per cent compared with year-end 2019 and 2.2 per cent compared with the previous quarter.
- At year-end 2020 the total figure for fixed business customer broadband connections had risen by almost 20,000 connections year on year. Compared with Q3 2020, the segment posted growth of around 0.7 per cent, rising to just over 223,000 connections.

The chart shows the number of fixed broadband connections, broken down by customer category. Categories are differentiated according to product type. When sold as a private customer product, a connection is classified under the private customer segment, even if purchased by a business customer. Refer to the Glossary for the precise definition.



## Retail broadband connections by bandwidth category – fixed network

### Substantial growth in high bandwidths

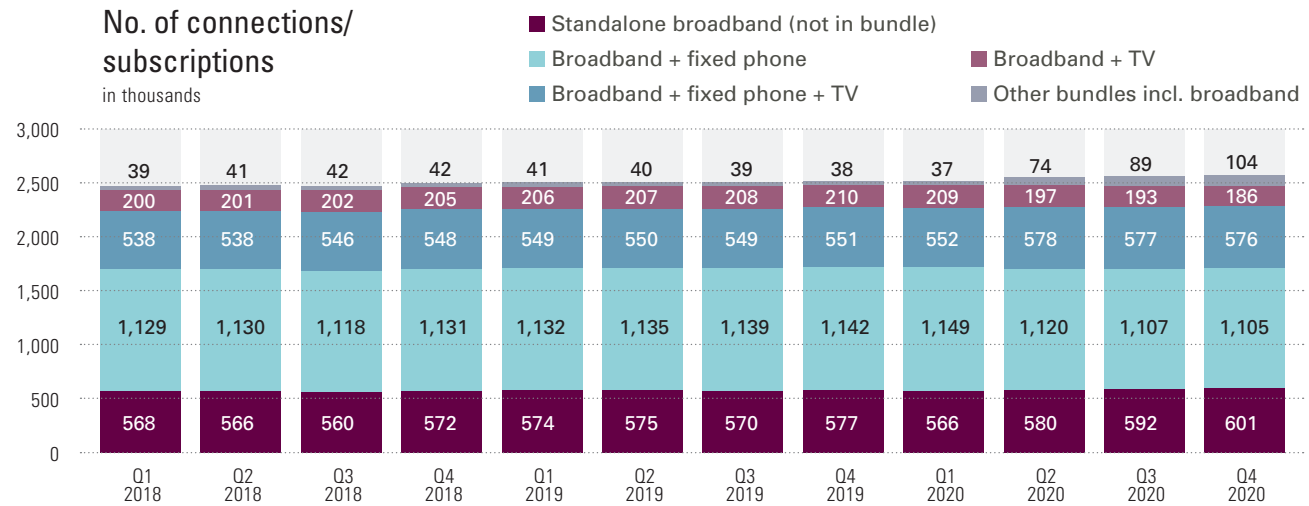


- As a metric, bandwidths presented a familiar picture: the number of connections based on own infrastructure or unbundled lines – which are used to provide lower bandwidths – declined, while those providing higher bandwidths continued to increase in number.
- At the end of 2019 connections <10 Mbps still made up just over a quarter of fixed-network retail broadband connections. A year later, however, this proportion had fallen to around 14.4 per cent or 366,000 connections. The decrease compared with the previous quarter was 2.7 percent.
- In contrast, the number of connections supporting more than 100 Mbps rose strongly from 12.7 per cent at year-end 2019 to around a fifth of fixed customer broadband connections in Q4 2020 (roughly 527,000).
- At the end of 2020 the largest proportion of retail fixed broadband connections was to be found in the ≥30 Mbps to <100 Mbps category, at 38.7 per cent (985,000 connections). A year before the figure for this category had been only a little over 30 per cent.

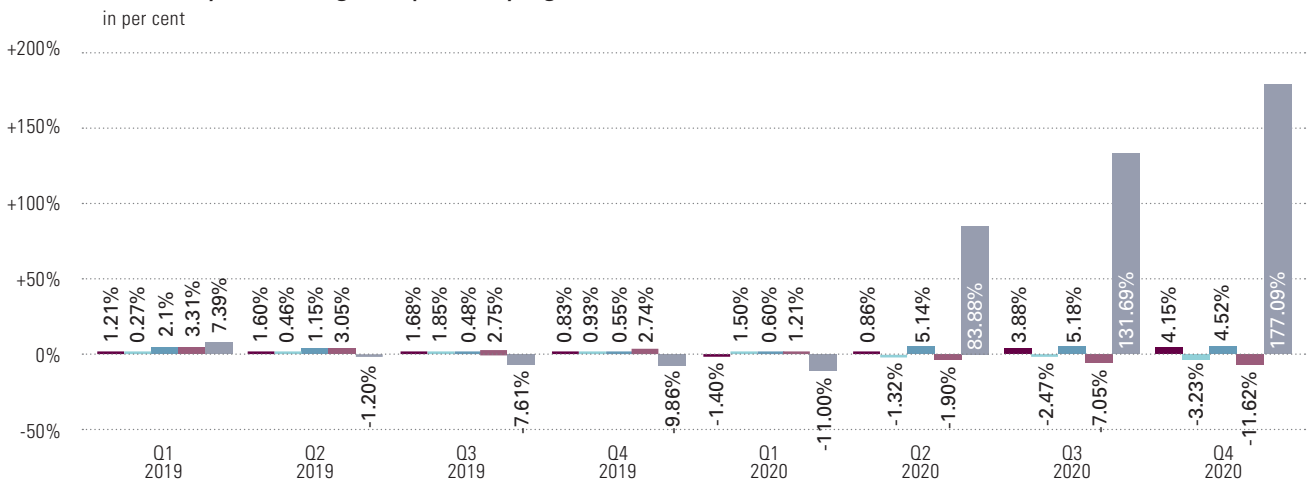
The chart depicts the number of fixed broadband connections grouped by bandwidth category. The figures include connections based on provider-owned infrastructure or (physically or virtually) unbundled lines, but not on other infrastructure purchased in the wholesale market. All connections supporting low bandwidths of <10 Mbps are subsumed under one chart category.

## Retail broadband connections by bundle category – fixed network

### Bundles responsible for roughly half of broadband



### Year-on-year change in quarterly figures



- At the end of 2020 the combination of fixed broadband with fixed telephony was responsible for most (43.0%) of the roughly 2.6 million retail fixed broadband connections. Connections in this category totalled 1.1 million at the end of 2020 – some 3.2 per cent fewer than in Q4 2019.
- The figure for broadband connections not sold as part of a bundle with other products ('standalone broadband') was roughly 601,000 in Q4 2020 and therefore about 4.2 per cent higher than in Q4 2019.
- Bundles offering broadband with fixed telephony and TV totalled roughly 576,000 connections in Q4 2020, which also marks a rise in comparison with the previous year (+4.5%).
- 'Other bundles with broadband' play a less important role at 4.1 per cent, even though this category grew year on year by some 177.1 per cent, rising to around 104,000 by the end of 2020.

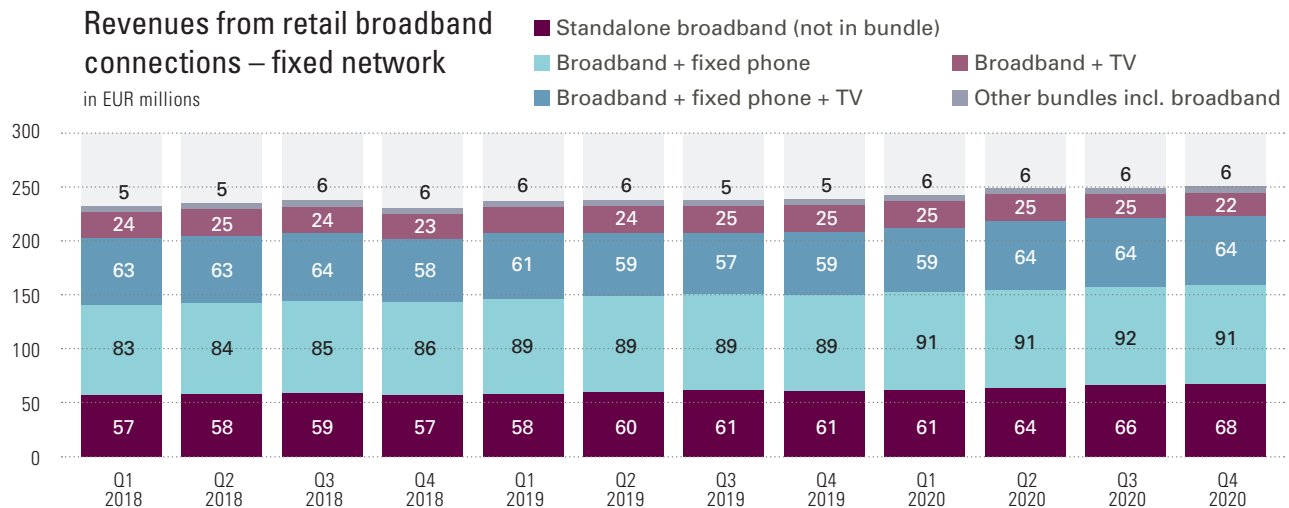
The chart shows the number of broadband products sold to retail customers, where the products are based on the provider's own infrastructure or (physically or virtually) unbundled lines and not on other additionally purchased infrastructure. Broadband products may be fixed broadband products sold without any other product (standalone), or a combination of fixed network and broadband with one or more other products (bundled product).

## Revenues from retail broadband connections – fixed network

### Strong revenue growth in fixed-network broadband products

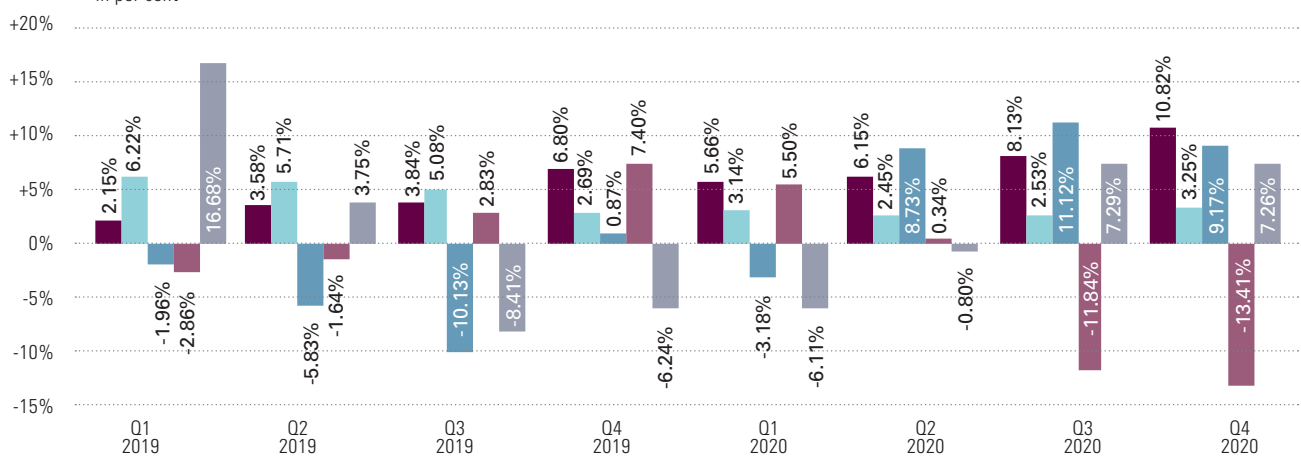
#### Revenues from retail broadband connections – fixed network

in EUR millions



#### Year-on-year change in quarterly figures

in per cent



- Revenues for fixed broadband products totalled around EUR 992.2 million for 2020 as a whole. This marks a gain of 4.1 per cent compared with 2019.
- Compared with Q4 2019, revenues rose in the categories of standalone broadband (+10.8%), broadband and fixed network telephony (+3.2%), broadband, fixed network telephony and TV (+9.2%), and 'Other bundled products with broadband' (+7.3%).
- A year-on-year decline was recorded for the combination of fixed broadband with TV (-13.4%), however.
- Standalone broadband products plus combinations with fixed network telephony and/or TV account for 97.7 per cent of revenue overall, with other bundles with fixed broadband playing only a very minor role.

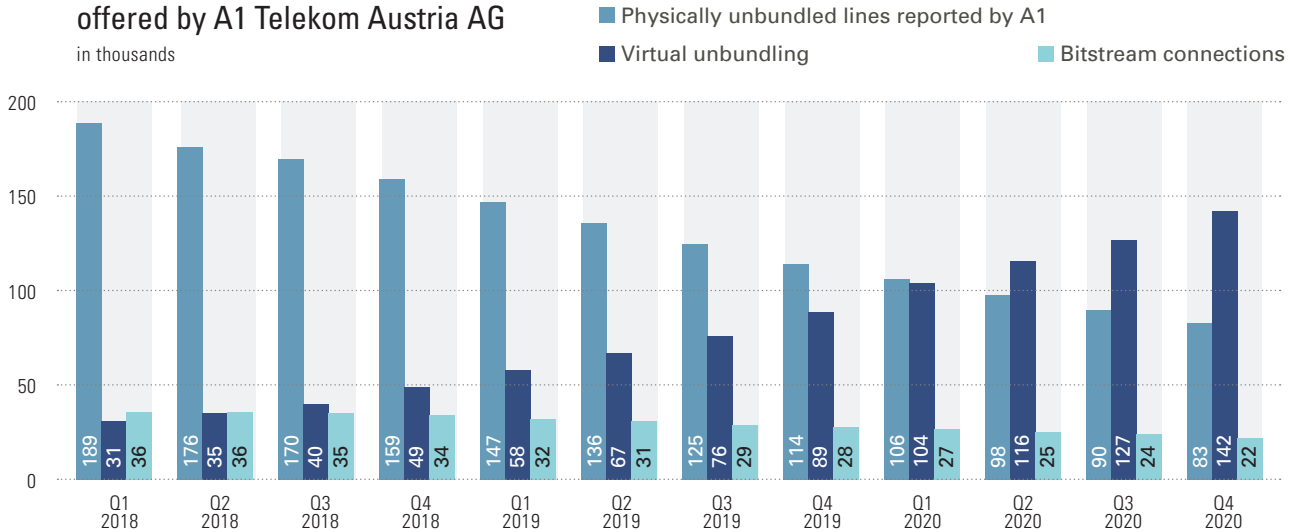
The chart shows the revenues from broadband access sold to retail customers, for connections based on provider-owned infrastructure or (physically or virtually) unbundled lines. This includes both standalone broadband products and bundled products, the latter referring to broadband offered in combination with another product (voice telephony and/or TV and/or other products).

## Wholesale broadband products offered by A1 Telekom Austria AG

### Virtual unbundling shows continued strong upward trend

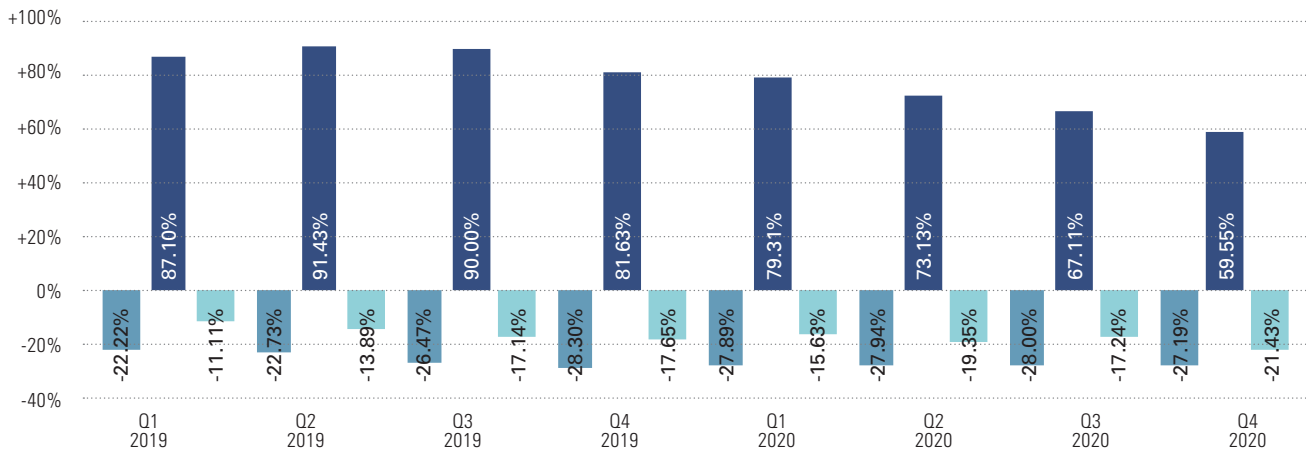
#### Wholesale broadband products offered by A1 Telekom Austria AG

in thousands



#### Year-on-year change in quarterly figures

in per cent



- In 2020 the growth trend seen to date for wholesale products from A1 Telekom Austria continued from where it had left off the previous year, with significant losses seen in physically unbundled lines (-27.2%) and bitstream connections (-21.4%) while connections using virtual unbundling posted dramatic growth (+59.6%).
- At a figure of 142,000, the latter category now accounts for the majority of connections. In comparison, physical unbundling claimed around 114,000 connections at year-end 2019 and still led virtual unbundling by a significant margin.

The chart shows the total number of physically unbundled lines, virtually unbundled connections and bitstream connections provided by A1 at wholesale level.

Table 06: Retail fixed broadband by infrastructure (in thousands)  
[> see page 16](#)

|         | DSL incl. unbundling | Coaxial cable | FTTH | FWA |
|---------|----------------------|---------------|------|-----|
| Q1 2018 | 1,581                | 855           | 55   | 28  |
| Q2 2018 | 1,574                | 862           | 56   | 28  |
| Q3 2018 | 1,559                | 868           | 57   | 28  |
| Q4 2018 | 1,558                | 871           | 63   | 28  |
| Q1 2019 | 1,551                | 875           | 65   | 28  |
| Q2 2019 | 1,540                | 878           | 67   | 28  |
| Q3 2019 | 1,530                | 881           | 66   | 28  |
| Q4 2019 | 1,530                | 886           | 75   | 28  |
| Q1 2020 | 1,523                | 901           | 82   | 28  |
| Q2 2020 | 1,526                | 909           | 83   | 28  |
| Q3 2020 | 1,486                | 938           | 111  | 19  |
| Q4 2020 | 1,517                | 952           | 115  | 20  |

Table 07: Retail fixed broadband by customer category (in thousands)  
[> see page 17](#)

|         | Private customers | Business customers |
|---------|-------------------|--------------------|
| Q1 2018 | 2,286             | 213                |
| Q2 2018 | 2,291             | 209                |
| Q3 2018 | 2,284             | 209                |
| Q4 2018 | 2,295             | 206                |
| Q1 2019 | 2,297             | 205                |
| Q2 2019 | 2,296             | 201                |
| Q3 2019 | 2,289             | 202                |
| Q4 2019 | 2,312             | 204                |
| Q1 2020 | 2,350             | 208                |
| Q2 2020 | 2,356             | 213                |
| Q3 2020 | 2,364             | 222                |
| Q4 2020 | 2,417             | 223                |



Table 08: Retail broadband connections by bandwidth category – fixed network (in thousands)  
[> see page 18](#)

|         | <10 Mbps | 10 Mbps to <30 Mbps | 30 Mbps to <100 Mbps | ≥100 Mbps |
|---------|----------|---------------------|----------------------|-----------|
| Q1 2018 | 849      | 737                 | 634                  | 235       |
| Q2 2018 | 802      | 746                 | 651                  | 257       |
| Q3 2018 | 768      | 741                 | 671                  | 268       |
| Q4 2018 | 749      | 736                 | 691                  | 281       |
| Q1 2019 | 733      | 735                 | 707                  | 281       |
| Q2 2019 | 730      | 715                 | 722                  | 287       |
| Q3 2019 | 703      | 704                 | 747                  | 294       |
| Q4 2019 | 622      | 752                 | 772                  | 313       |
| Q1 2020 | 575      | 622                 | 922                  | 357       |
| Q2 2020 | 543      | 665                 | 866                  | 414       |
| Q3 2020 | 376      | 674                 | 964                  | 481       |
| Q4 2020 | 366      | 668                 | 985                  | 527       |

Table 09: Retail broadband connections by bundle category – fixed network (in thousands)  
[> see page 19](#)

|         | Standalone broadband (not bundled) | Broadband + fixed phone | Broadband + fixed phone + TV | Broadband + TV | Other bundles incl. broadband | Other bundles w/o fixed broadband (from Q4/17) |
|---------|------------------------------------|-------------------------|------------------------------|----------------|-------------------------------|--|
| Q1 2018 | 568                                | 1,129                   | 538                          | 200            | 39                            | 16   |
| Q2 2018 | 566                                | 1,130                   | 538                          | 201            | 41                            | 16   |
| Q3 2018 | 560                                | 1,118                   | 546                          | 202            | 42                            | 16   |
| Q4 2018 | 572                                | 1,131                   | 548                          | 205            | 42                            | 16   |
| Q1 2019 | 574                                | 1,132                   | 549                          | 206            | 41                            | 16   |
| Q2 2019 | 575                                | 1,135                   | 550                          | 207            | 40                            | 16   |
| Q3 2019 | 570                                | 1,139                   | 549                          | 208            | 39                            | 15   |
| Q4 2019 | 577                                | 1,142                   | 551                          | 210            | 38                            | 15   |
| Q1 2020 | 566                                | 1,149                   | 552                          | 209            | 37                            | 12   |
| Q2 2020 | 580                                | 1,120                   | 578                          | 197            | 74                            | 12   |
| Q3 2020 | 592                                | 1,107                   | 577                          | 193            | 89                            | 12   |
| Q4 2020 | 601                                | 1,105                   | 576                          | 186            | 104                           | 13   |

Table 10: Revenues from retail broadband connections – fixed network (in EUR millions)  
[> see page 20](#)

|         | Standalone broadband (not bundled) | Broadband + fixed phone | Broadband + fixed phone + TV | Broadband + TV | Other bundles incl. broadband | Other bundles excl. broadband |
|---------|------------------------------------|-------------------------|------------------------------|----------------|-------------------------------|-------------------------------|
| Q1 2018 | 57                                 | 83                      | 63                           | 24             | 5                             | 1                             |
| Q2 2018 | 58                                 | 84                      | 63                           | 25             | 5                             | 1                             |
| Q3 2018 | 59                                 | 85                      | 64                           | 24             | 6                             | 1                             |
| Q4 2018 | 57                                 | 86                      | 58                           | 23             | 6                             | 1                             |
| Q1 2019 | 58                                 | 89                      | 61                           | 24             | 6                             | 1                             |
| Q2 2019 | 60                                 | 89                      | 59                           | 25             | 6                             | 1                             |
| Q3 2019 | 61                                 | 89                      | 57                           | 25             | 5                             | 1                             |
| Q4 2019 | 61                                 | 89                      | 59                           | 25             | 5                             | 1                             |
| Q1 2020 | 61                                 | 91                      | 59                           | 25             | 6                             | 1                             |
| Q2 2020 | 64                                 | 91                      | 64                           | 25             | 6                             | 1                             |
| Q3 2020 | 66                                 | 92                      | 64                           | 22             | 6                             | 1                             |
| Q4 2020 | 68                                 | 91                      | 64                           | 22             | 6                             | 1                             |

Table 11: Wholesale broadband products offered by A1 Telekom Austria AG (in thousands)  
[> see page 21](#)

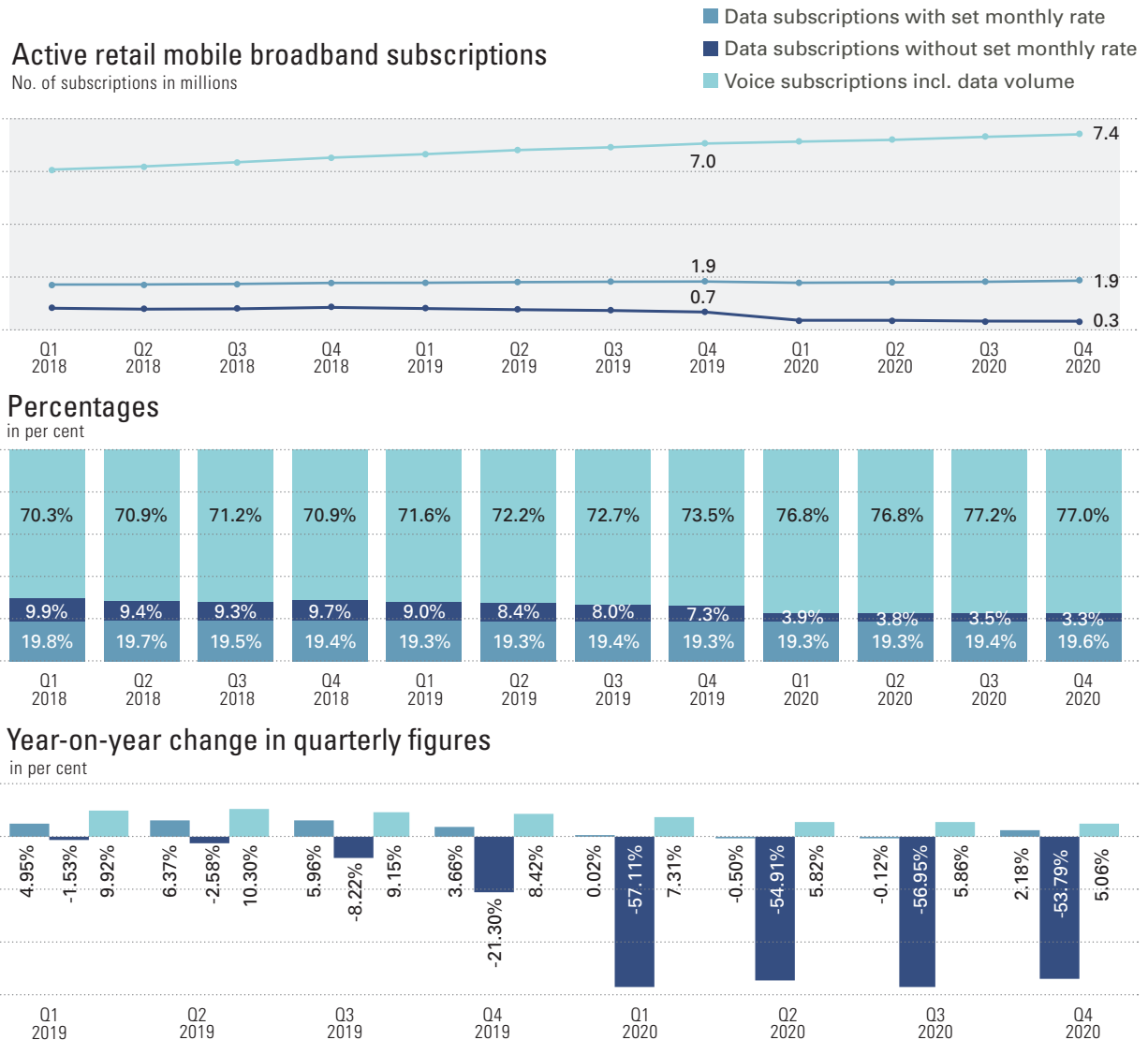
|         | Physically unbundled lines according to A1 | Virtual unbundling | Bitstream connections |
|---------|--|--------------------|-----------------------|
| Q1 2018 | 189  | 31                 | 36                    |
| Q2 2018 | 176  | 35                 | 36                    |
| Q3 2018 | 170  | 40                 | 35                    |
| Q4 2018 | 159  | 49                 | 34                    |
| Q1 2019 | 147  | 58                 | 32                    |
| Q2 2019 | 136  | 67                 | 31                    |
| Q3 2019 | 125  | 76                 | 29                    |
| Q4 2019 | 114  | 89                 | 28                    |
| Q1 2020 | 106  | 104                | 27                    |
| Q2 2020 | 98   | 116                | 25                    |
| Q3 2020 | 90   | 127                | 24                    |
| Q4 2020 | 83   | 142                | 22                    |



# Mobile broadband

## Active mobile broadband subscriptions – retail

Smartphone subscriptions accounted for more than three-quarters of mobile broadband connections at year-end 2020



- There were around 9.6 million active retail mobile broadband subscriptions in Austria at the end of 2020. This is an increase of around 1.5 per cent compared with the prior quarter.
- At 77.0 per cent (7.4 million) of all mobile broadband connections, smartphone subscriptions held the lion's share of this segment in Q4 2020.
- Compared with the prior quarter, data connections based on subscriptions with a fixed monthly fee recorded growth of 2.9 per cent. Year on year this represents growth of 2.2 per cent or around 40,500 new broadband connections in this category.
- Slipping 1.5 per cent compared with the prior quarter, the number of retail broadband subscriptions without a fixed monthly fee was around 323,000 at year-end 2020. Corresponding to a year-on-year fall of 53.8 per cent, these subscriptions now make up only 3.3 per cent of all active mobile broadband subscriptions.

The chart shows the number of active mobile broadband subscriptions (excluding M2M), broken down according to data subscriptions with a set monthly rate, data subscriptions without a set monthly rate and smartphone subscriptions (voice call plans including data volumes). The definitions are explained in detail in the Glossary at the end of the report.

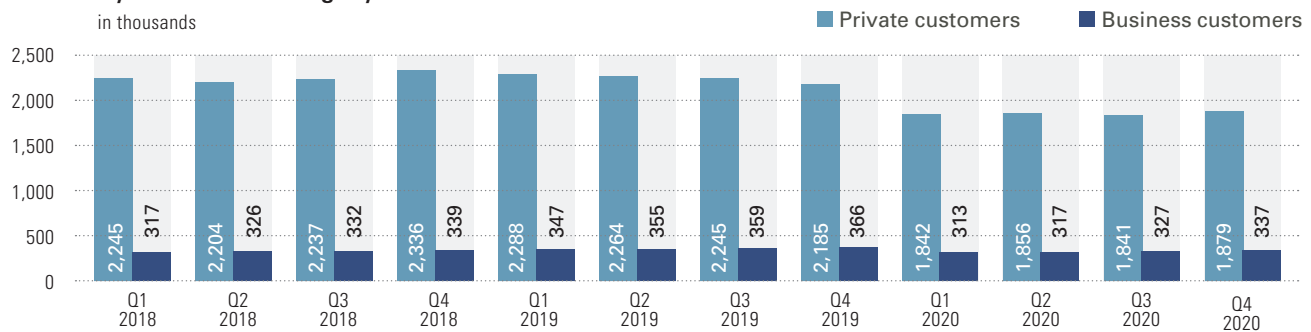


## Active mobile broadband subscriptions by customer category

Around 85 per cent of all active mobile broadband subscriptions (excl. smartphones) are private customer products

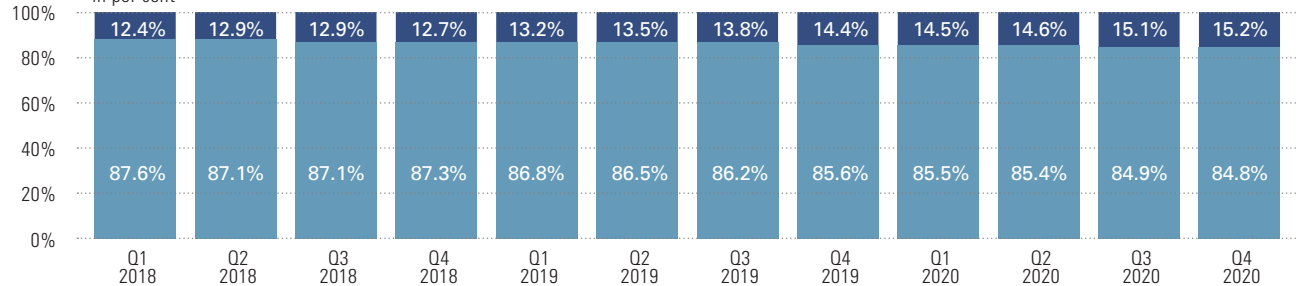
### Active mobile broadband subscriptions by customer category

in thousands



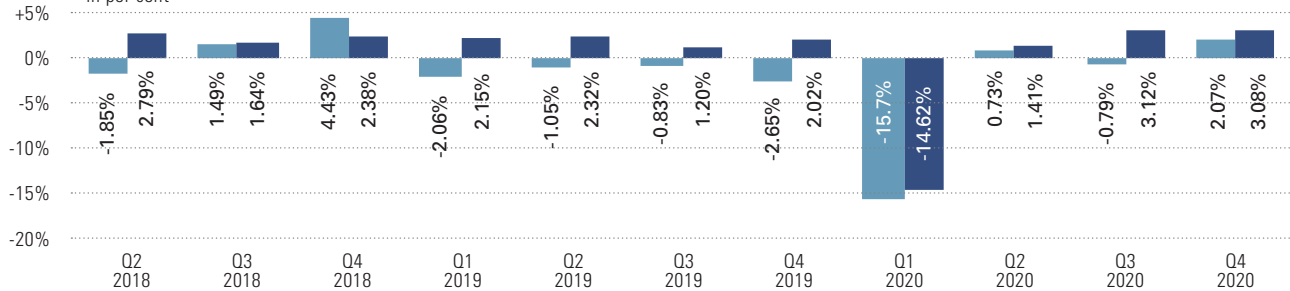
### Percentages

in per cent



### Quarter-on-quarter change

in per cent



- In Q4 2020 customers used the roughly 2.2 million mobile broadband connections (data subscriptions with or without a fixed monthly fee) in Austria to access the internet on at least one occasion. This represents growth of around 2.2 per cent compared with the previous quarter.
- Since Q3 2020 the number of private customer products has risen by around 2.1 per cent to about 1.9 million connections in all. Connections in this category account for 84.8 per cent of all mobile broadband connections with and without a fixed data volume.
- In the business customer segment, mobile broadband connections recorded growth of around 3.1 per cent, rising to about 337,000 connections in Q4 2020.
- The pronounced drop in the number of active broadband connections in Q1 2020 can be attributed to a subsequent data correction on the part of one provider.

The chart shows the number of active mobile broadband subscriptions (both with and without a set monthly rate), broken down by customer category. Unlike with fixed broadband, subscriptions are classified as falling into the private customer or business customer segment on the basis of the type of customer and not on the product.

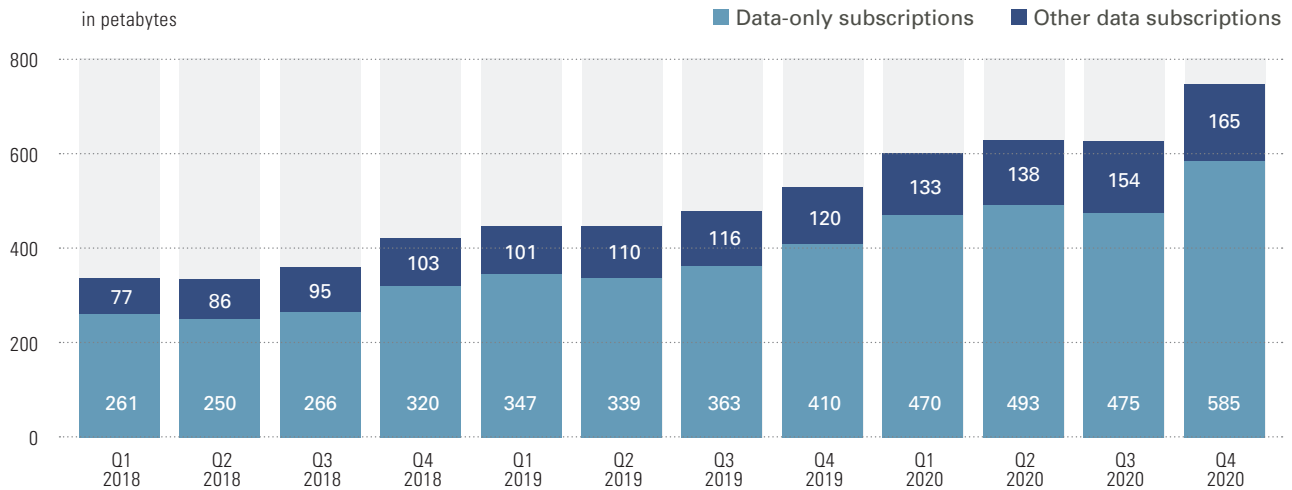


## Retail data volumes in mobile networks

### Marked rise in data volumes consumed via data-only subscriptions

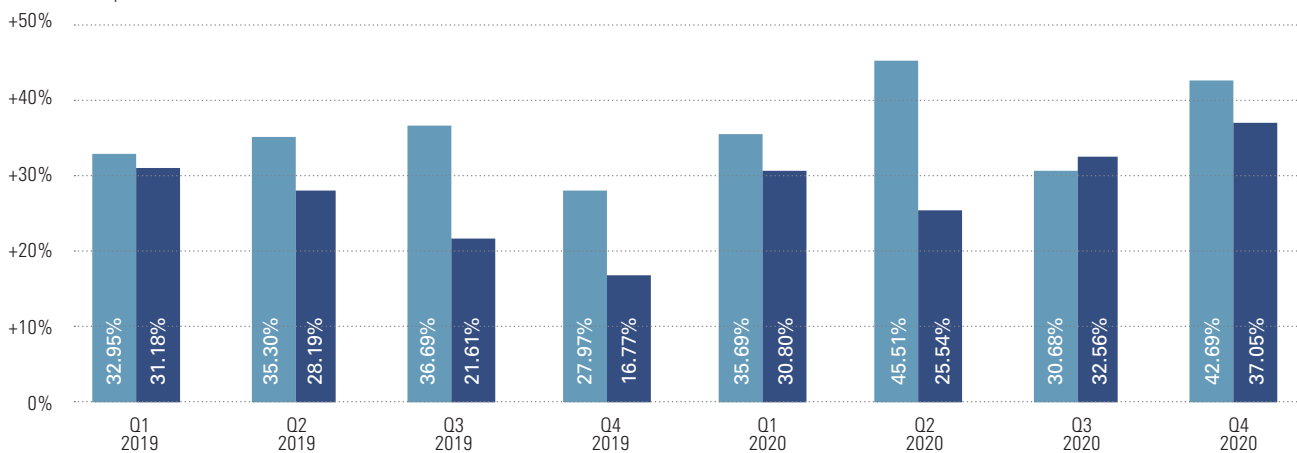
#### Retail data volumes in mobile networks

in petabytes



#### Year-on-year change in quarterly figures

in per cent



- In Q4 2020 the volume of mobile data consumed in the retail market increased quarter-on-quarter by 19.3 per cent to pass the 750 petabyte mark for the first time. Compared with Q4 2019, a significant, roughly 41.4 per cent increase in total mobile data volume used can be observed.
- Compared with Q3 2020 total data volume in smartphone bundles and other subscriptions with voice/texts rose by around 7.5 per cent to 165 petabytes. This equates to growth of 37.1 per cent compared with the previous year.
- During Q4 2020 around 585 petabytes of data volume were consumed via data-only subscriptions, a figure some 42.7 per cent higher than in the same quarter of the previous year. The data volume used via these subscriptions accounted for around 78 per cent of total mobile data volume in Q4 2020.

The chart above shows the upload/download volumes consumed in the mobile network retail market in petabytes (1 petabyte = 1,024 terabytes = 1,048,576 gigabytes = 1,073,741,824 megabytes). The figures do not include text or multimedia messages.

Table 12: Active mobile broadband subscriptions – retail (in thousands)  
[> see page 26](#)

|         | Data subscriptions with set monthly rate | Data subscriptions without set monthly rate | Voice subscriptions incl. data volume |
|---------|--|---|---------------------------------------|
| Q1 2018 | 1,710                                    | 853   | 6,052                                 |
| Q2 2018 | 1,715                                    | 816   | 6,175                                 |
| Q3 2018 | 1,739                                    | 829   | 6,338                                 |
| Q4 2018 | 1,788                                    | 888   | 6,516                                 |
| Q1 2019 | 1,794                                    | 840   | 6,652                                 |
| Q2 2019 | 1,824                                    | 795   | 6,811                                 |
| Q3 2019 | 1,843                                    | 761   | 6,918                                 |
| Q4 2019 | 1,853                                    | 698   | 7,065                                 |
| Q1 2020 | 1,795                                    | 360   | 7,139                                 |
| Q2 2020 | 1,815                                    | 358   | 7,207                                 |
| Q3 2020 | 1,840                                    | 328   | 7,324                                 |
| Q4 2020 | 1,894                                    | 323   | 7,422                                 |

Table 13: Active mobile broadband subscriptions by customer category (in thousands)  
[> see page 27](#)

|         | Private customer segment | Business customer segment |
|---------|--------------------------|---------------------------|
| Q1 2018 | 2,245                    | 317                       |
| Q2 2018 | 2,204                    | 326                       |
| Q3 2018 | 2,237                    | 332                       |
| Q4 2018 | 2,336                    | 339                       |
| Q1 2019 | 2,288                    | 347                       |
| Q2 2019 | 2,264                    | 355                       |
| Q3 2019 | 2,245                    | 359                       |
| Q4 2019 | 2,185                    | 366                       |
| Q1 2020 | 1,842                    | 313                       |
| Q2 2020 | 1,856                    | 317                       |
| Q3 2020 | 1,841                    | 327                       |
| Q4 2020 | 1,879                    | 337                       |

Table 14: Retail data volumes in mobile networks (in petabytes)  
[> see page 28](#)

|         | Data-only subscriptions | Other subscriptions |
|---------|-------------------------|---------------------|
| Q1 2018 | 261                     | 77                  |
| Q2 2018 | 250                     | 86                  |
| Q3 2018 | 266                     | 95                  |
| Q4 2018 | 320                     | 103                 |
| Q1 2019 | 347                     | 101                 |
| Q2 2019 | 339                     | 110                 |
| Q3 2019 | 363                     | 116                 |
| Q4 2019 | 410                     | 120                 |
| Q1 2020 | 470                     | 133                 |
| Q2 2020 | 493                     | 138                 |
| Q3 2020 | 475                     | 154                 |
| Q4 2020 | 585                     | 165                 |



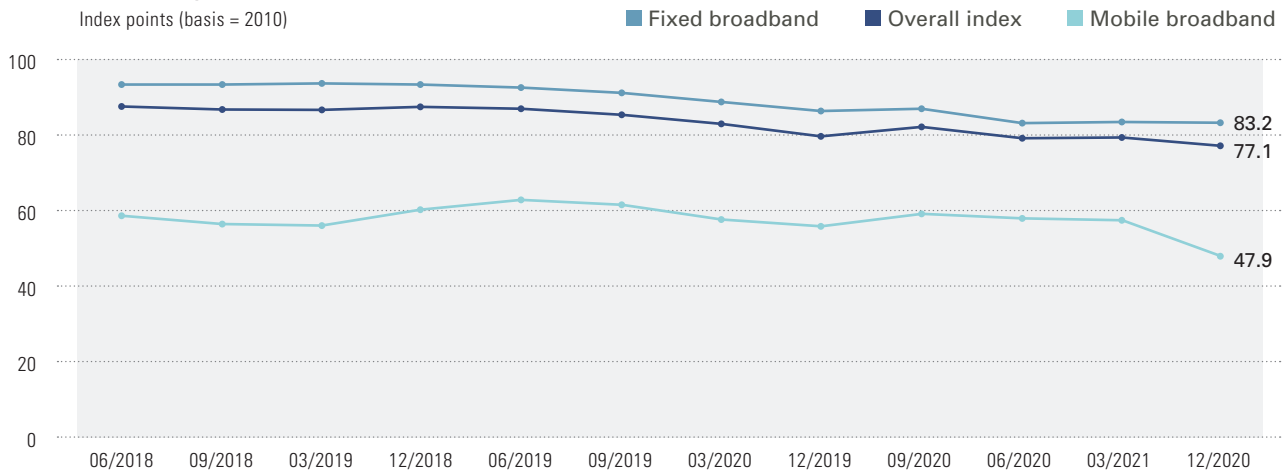
# Broadband prices

## Hedonic price index for broadband

### Broadband again more affordable year on year

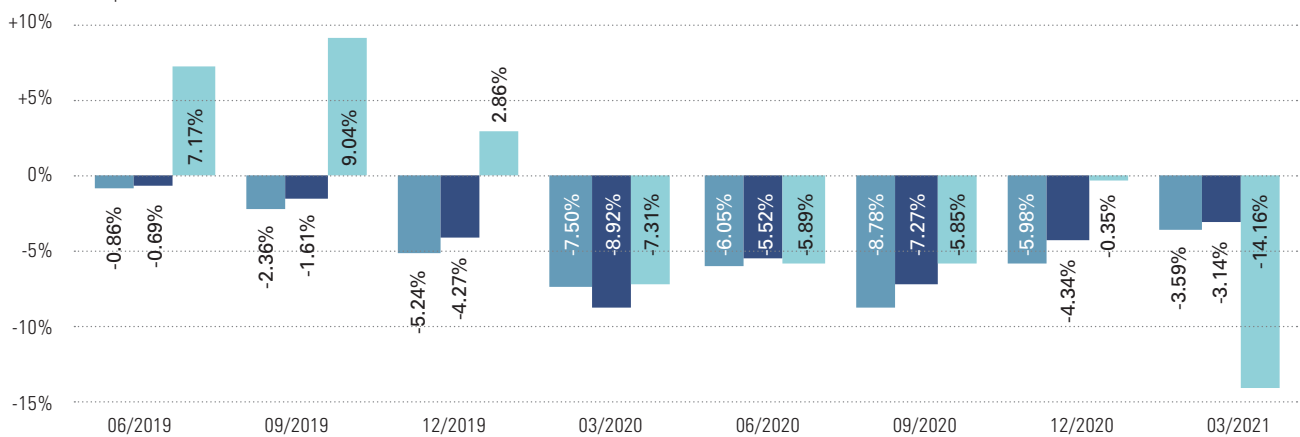
#### Hedonic price index for broadband

Index points (basis = 2010)



#### Year-on-year change in quarterly figures

in per cent



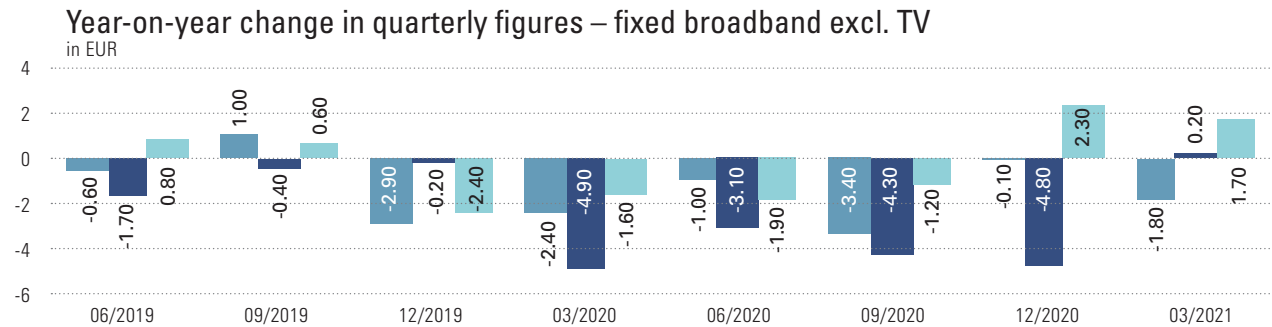
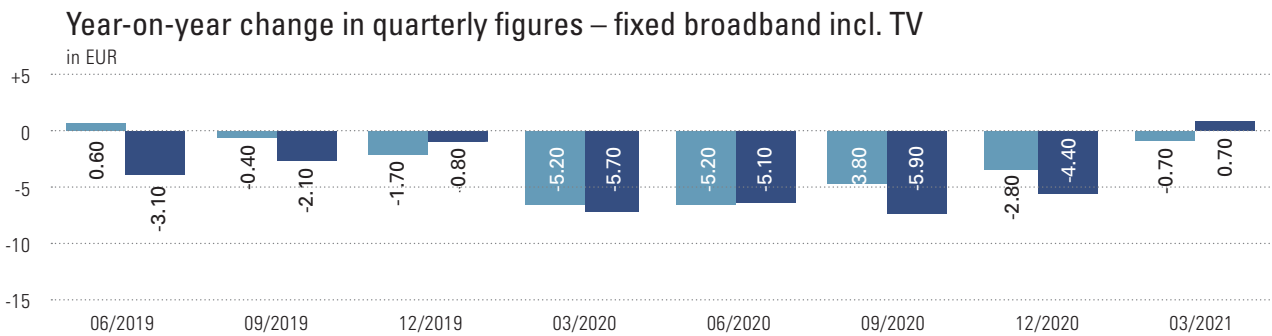
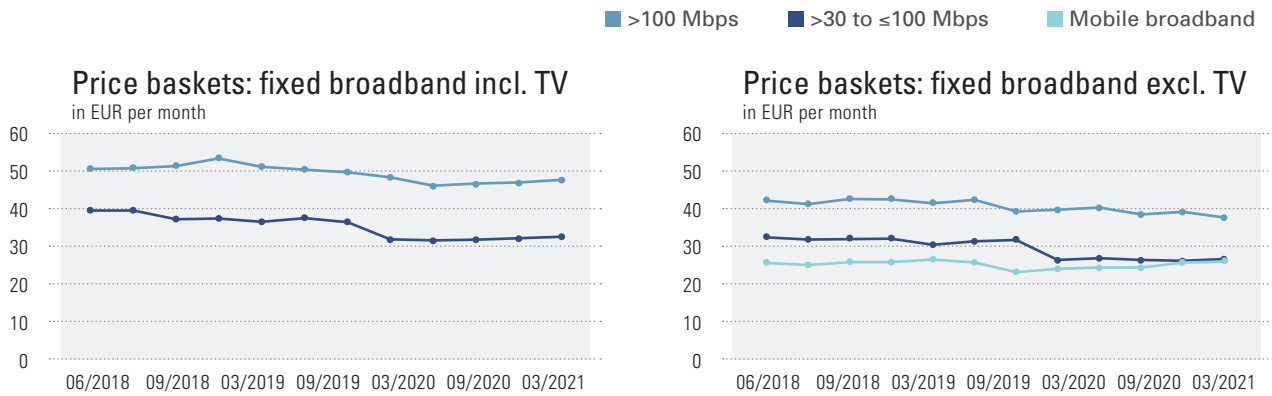
- Compared with the prior quarter, the hedonic index for fixed broadband changed only marginally in the first quarter of 2021 (-0.2%). In a year-on-year comparison, a decline of 3.6 per cent, from 86.3 to 83.2 points, can be observed for Q1 2021.
- Pricing for mobile broadband products proved to be much less stable, however. Between December 2020 and March 2021, the index for mobile broadband products fell by 16.6 per cent, from 57.4 to 47.9 points. Year on year, the figure decreased by 14.2 per cent.
- From Q1 2020 to Q1 2021, the overall index slipped back from 79.6 index points to 77.1 points. As a result, both fixed and mobile broadband products have become less expensive over the last twelve months.

The broadband index is a hedonic price index for fixed and mobile broadband products. 'Hedonic' refers to the fact that both price changes and changes in product characteristics (in particular download rate and download volume) are taken into account. The reference base is 2010. Refer to the Glossary for details on methodology.



## Price baskets for fixed broadband – with and without TV

Fixed broadband without TV: subscriptions in the ≤30 Mbps broadband category almost as costly as those in the >30 to <100 Mbps category



- Compared with the same quarter in the previous year, in Q1 2021 the basket price of fixed broadband with TV in the >100 Mbps broadband category was EUR 47.50, having fallen by EUR 0.70. Over the same period, the price for the >30 to ≤100 Mbps category rose slightly from EUR 31.70 to EUR 32.40.
- Compared with Q1 2020, in Q1 2021 the basket price of fixed broadband without TV in the >100 Mbps broadband category had risen by around EUR 1.80 to EUR 37.10/month.
- The price basket for fixed broadband without TV in the ≤30 Mbps broadband category became more expensive in the course of the previous year, rising about EUR 1.70 to EUR 26.70 in Q1 2021 – a figure almost as high as the basket price for broadband without TV in the >30 to ≤100 Mbps category (around EUR 27.10).

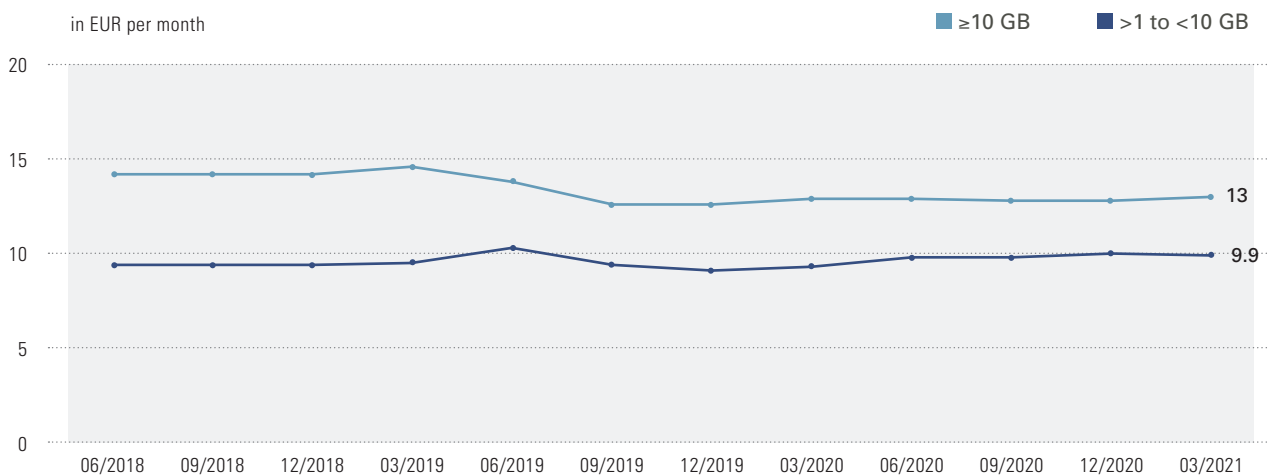
Five fixed broadband price baskets are shown, for each of the bandwidth categories of >30 to ≤100 Mbps and >100 Mbps, with each broken down in turn according to products including or not including TV. In response to the low number of products offered, the ≤30 Mbps category is no longer analysed (not even retroactively) for fixed broadband with TV but only for fixed broadband without TV. The basket price is based on the least expensive product from each operator that can be included in the respective basket. Operators are weighted according to the respective shares held in the fixed broadband connection market overall.

## Price baskets for mobile broadband – limited data volumes

Figures generally stable for price baskets  $\geq 10$  GB and  $>1$  to  $<10$  GB

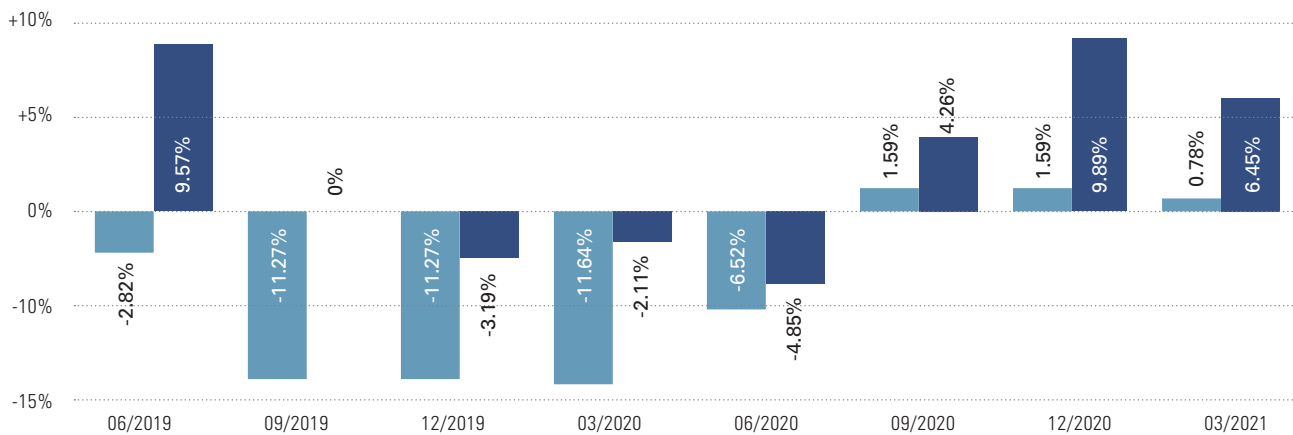
### Price baskets for mobile broadband – limited data volumes

in EUR per month



### Year-on-year change in quarterly figures

in per cent



- For mobile broadband with limited data volumes, a slight increase was recorded in the  $\geq 10$  GB category, the price of which rose from around EUR 12.80 in Q4 2020 to around EUR 13.00 in Q1 2021. Year on year, the basket price in Q1 2021 rose by around 0.8 per cent.
- Subscriptions in the  $>1$  to  $<10$  GB category also rose year-on-year by around 6.5 per cent to about EUR 9.90 in the first quarter of 2021. Quarter on quarter, this basket ticked down by EUR 0.10.
- From Q1 2020 subscriptions with and without a user device are used to calculate the respective baskets. This change in the calculation method is also valid retroactively. Previously, only subscriptions including a user device were considered, which means that basket comparisons with previous quarters are possible only in the time series shown above and not with preceding charts.

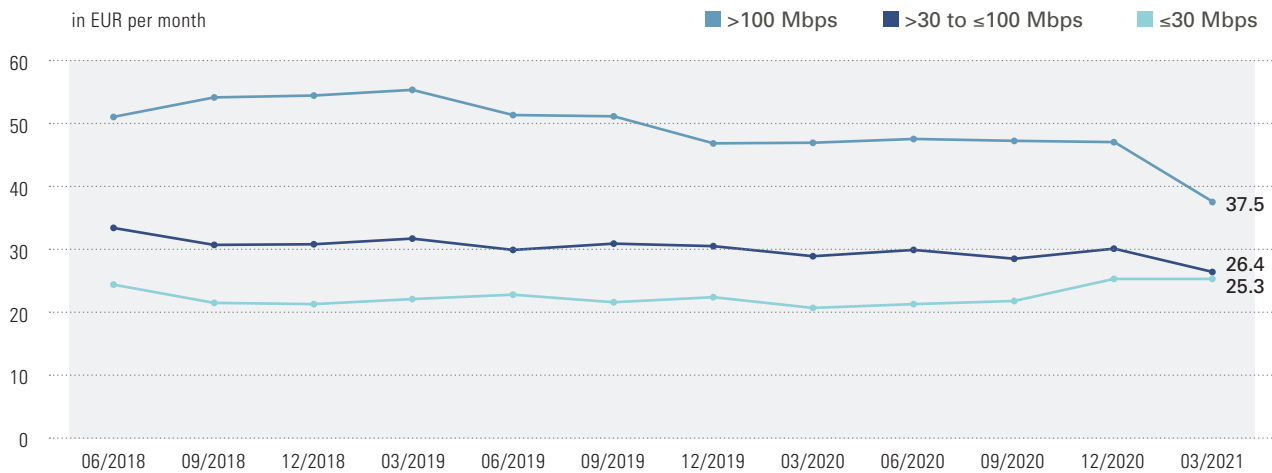
The chart shows two price baskets for mobile broadband with limited data volumes, differentiated on the basis of the amount of data included. The first basket includes  $>1$  to  $<10$  GB and the second  $\geq 10$  GB. The basket price is based on the least expensive product from each operator that can be included in the respective basket. From Q1 2020 subscriptions with and without a user device are used (also retroactively) to calculate the respective baskets. Operators are weighted according to the respective shares held in the mobile broadband connection market overall (excluding smartphone subscriptions).

## Price baskets for mobile broadband – unlimited data volumes

Basket for unlimited mobile data volume (>100 Mbps) around 20 per cent cheaper year on year

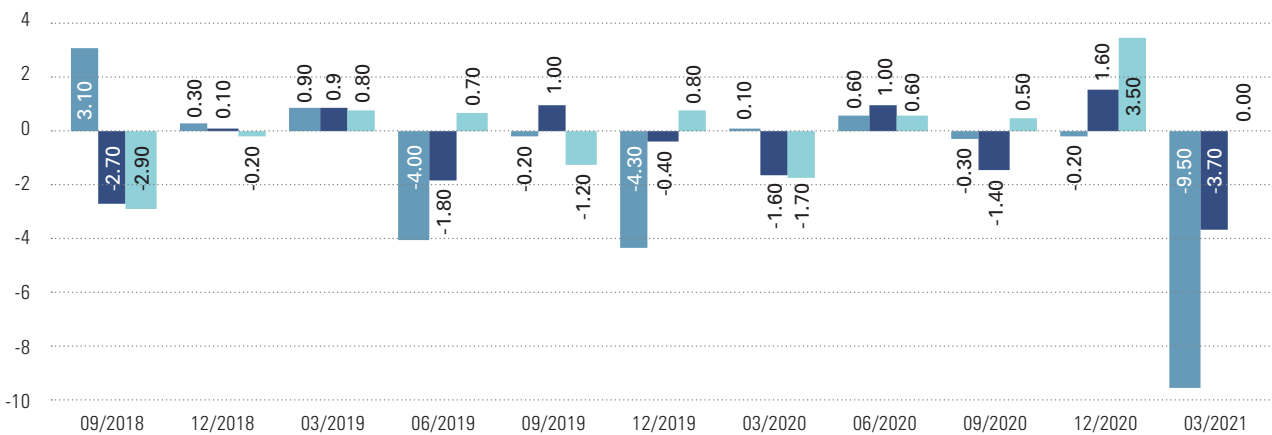
### Price baskets for mobile broadband – unlimited data volumes

in EUR per month



### Quarter-on-quarter change

in EUR

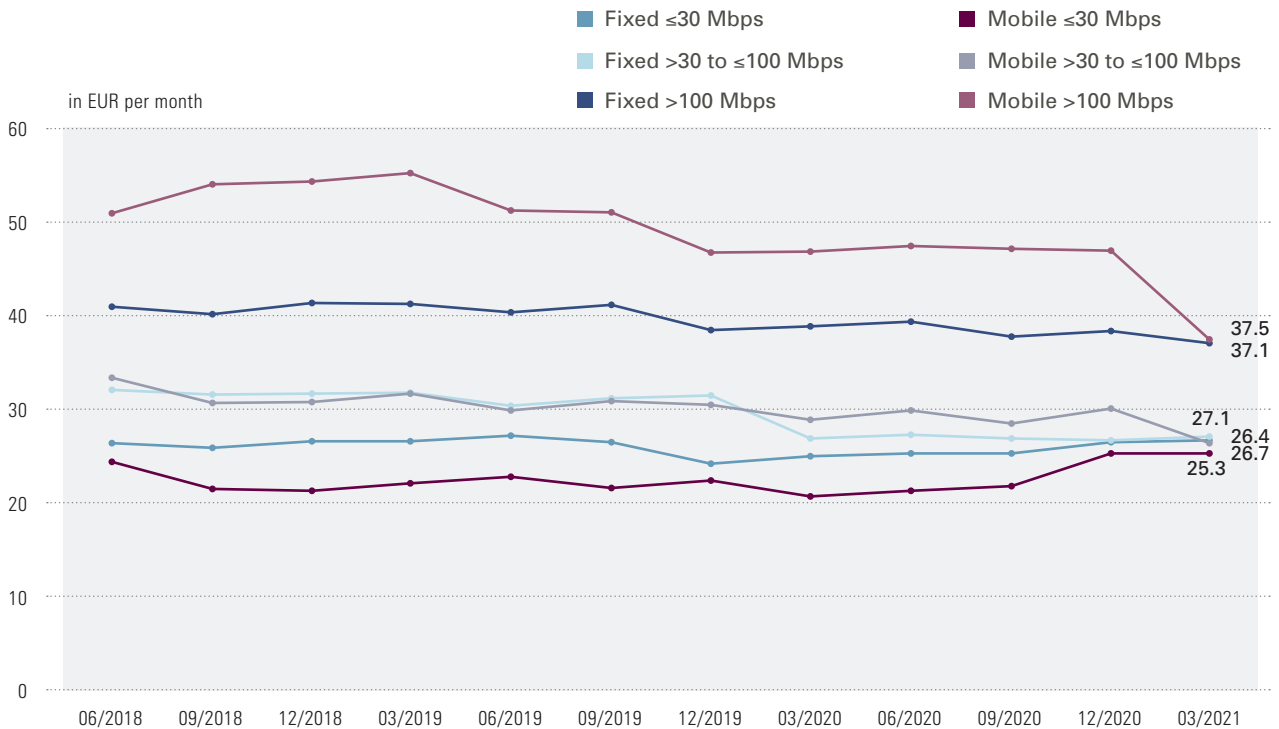


- During Q1 2021 subscriptions for mobile broadband with unlimited data volume in the >100 Mbps category fell in price by around EUR 9.50 when compared with the previous quarter. Over the same period, the basket value for mobile broadband with unlimited data volume in the >30 to ≤100 Mbps category also dropped from EUR 30.10 to EUR 26.40.
- An opposing trend was seen in the ≤30 Mbps category, where mobile broadband with unlimited data volume became around EUR 4.60 more expensive year on year. In Q1 2021 the basket price for this category was EUR 25.30.

Three price baskets for mobile broadband are shown, with the categories distinguished according to three bandwidths: ≤30 Mbps, from >30 to ≤100 Mbps, and >100 Mbps. Each basket value is calculated on the basis of the price of the least expensive product relevant to that basket that each operator offers, including the user device (for example a WiFi modem/cube). Operators are weighted according to the respective shares held in the mobile broadband connection market overall (excluding smartphone subscriptions).

## Price baskets: fixed vs. mobile broadband

### Fall in prices for mobile broadband supporting >30 Mbps and above



- While prices for mobile internet at bandwidths >100 Mbps had still been some 20.6 per cent higher than for fixed broadband in this category in Q1 2020, the difference had shrunk to just 1.1 per cent by Q1 2021. Recent prices were around EUR 37.50 and EUR 37.10 for mobile broadband and fixed broadband, respectively.
- In the >30 to ≤100 Mbps category, prices for mobile internet were slightly higher than those for fixed broadband in every quarter in 2020. In Q1 2021 the price for fixed internet was around EUR 27.10, meaning EUR 0.70 higher than for mobile broadband.
- With broadband in the ≤30 Mbps category, the basket price for fixed broadband was again higher than for mobile internet, with recent prices being around EUR 26.70 compared with EUR 25.30, respectively.

The chart contrasts the three price baskets for fixed broadband (each without TV; the figures include products both with and without voice telephony) with the three price baskets for mobile broadband (with unlimited data volume). In both cases, the broadband categories differentiated are ≤30 Mbps, >30 to ≤100 Mbps, and >100 Mbps. The basket price is based on the least expensive product from each operator that can be included in the respective basket, weighted by market share (excluding youth plans).

Table 15: Hedonic price index for broadband (index points, basis = 2010)  
[> see page 31](#)

|                | Fixed | Mobile | Fixed and mobile |
|----------------|-------|--------|------------------|
| March 2018     | 96.1  | 56.6   | 89.1             |
| June 2018      | 93.3  | 58.6   | 87.5             |
| September 2018 | 93.3  | 56.4   | 86.7             |
| December 2018  | 93.6  | 56.0   | 86.6             |
| March 2019     | 93.3  | 60.2   | 87.4             |
| June 2019      | 92.5  | 62.8   | 86.9             |
| September 2019 | 91.1  | 61.5   | 85.3             |
| December 2019  | 88.7  | 57.6   | 82.9             |
| March 2020     | 86.3  | 55.8   | 79.6             |
| June 2020      | 86.9  | 59.1   | 82.1             |
| September 2020 | 83.1  | 57.9   | 79.1             |
| December 2020  | 83.4  | 57.4   | 79.3             |
| March 2021     | 83.2  | 47.9   | 77.1             |

Table 16: Price baskets: fixed broadband (in EUR per month)  
[> see page 32 + 33](#)

|                | Without TV |                  |           | With TV          |           |
|----------------|------------|------------------|-----------|------------------|-----------|
|                | ≤30 Mbps   | >30 to ≤100 Mbps | >100 Mbps | >30 to ≤100 Mbps | >100 Mbps |
| March 2018     | 26.2       | 31.8             | 42.4      | 36.7             | 52.7      |
| June 2018      | 26.4       | 32.1             | 41.0      | 39.6             | 50.5      |
| September 2018 | 25.9       | 31.6             | 40.2      | 39.6             | 50.7      |
| December 2018  | 26.6       | 31.7             | 41.4      | 37.2             | 51.3      |
| March 2019     | 26.6       | 31.8             | 41.3      | 37.4             | 53.4      |
| June 2019      | 27.2       | 30.4             | 40.4      | 36.5             | 51.1      |
| September 2019 | 26.5       | 31.2             | 41.2      | 37.5             | 50.3      |
| December 2019  | 24.2       | 31.5             | 38.5      | 36.4             | 49.6      |
| March 2020     | 25.0       | 26.9             | 38.9      | 31.7             | 48.2      |
| June 2020      | 25.3       | 27.3             | 39.4      | 31.4             | 45.9      |
| September 2020 | 25.3       | 26.9             | 37.8      | 31.6             | 46.5      |
| December 2020  | 26.5       | 26.7             | 38.4      | 32.0             | 46.8      |
| March 2021     | 26.7       | 27.1             | 37.1      | 32.4             | 47.5      |



Table 17: Price baskets: mobile broadband (in EUR per month)  
[> see page 34 + 35](#)

|                | Limited data volumes |        | Unlimited data volumes |                  |           |
|----------------|----------------------|--------|------------------------|------------------|-----------|
|                | >1 to <10 GB         | ≥10 GB | ≤30 Mbps               | >30 to ≤100 Mbps | >100 Mbps |
| March 2018     | 9.5                  | 13.2   | 23.6                   | 32.6             | 49.6      |
| June 2018      | 9.4                  | 14.2   | 24.4                   | 33.4             | 51.0      |
| September 2018 | 9.4                  | 14.2   | 21.5                   | 30.7             | 54.1      |
| December 2018  | 9.4                  | 14.2   | 21.3                   | 30.8             | 54.4      |
| March 2019     | 9.5                  | 14.6   | 22.1                   | 31.7             | 55.3      |
| June 2019      | 10.3                 | 13.8   | 22.8                   | 29.9             | 51.3      |
| September 2019 | 9.4                  | 12.6   | 21.6                   | 30.9             | 51.1      |
| December 2019  | 9.1                  | 12.6   | 22.4                   | 30.5             | 46.8      |
| March 2020     | 9.3                  | 12.9   | 20.7                   | 28.9             | 46.9      |
| June 2020      | 9.8                  | 12.9   | 21.3                   | 29.9             | 47.5      |
| September 2020 | 9.8                  | 12.8   | 21.8                   | 28.5             | 47.2      |
| December 2020  | 10.0                 | 12.8   | 25.3                   | 30.1             | 47.0      |
| March 2021     | 9.9                  | 13.0   | 25.3                   | 26.4             | 37.5      |



# Monitoring internet access quality

## RTR-NetTest

Developed by RTR, the NetTest allows users to check the speed and quality of an internet connection, reliably and independently of the provider. The RTR-NetTest is available as a mobile app for Android and iOS as well as a browser test, at <https://www.netztest.at/>.

The RTR-NetTest measures a number of parameters of the internet connection. These include:

- Download speed
- Upload speed
- Ping time (latency)
- Signal strength (depending on the user device)

The results displayed by the RTR-NetTest additionally include:

- Network type, that is, mobile network (2G, 3G, 4G, 5G), WiFi or browser
- Location where measurements were taken
- Provider of fixed or mobile internet access

All of the results described in this section are based on RTR-NetTest Open Data (see section 5). The following measurements are not used:

- Measurements taken outside of Austrian territory
- Measurements for which the location can only be determined to within 2 or more km, or without any location details
- Repeated or implausible tests

The results shown are based on actual measurements, which depend on factors such as the available technology or network coverage at the particular location, the user's tariff plan, network traffic level, and the test environment (including device performance and operating system). As RTR-NetTest is therefore based on a crowd-sourced method, while the test environment is not consistent over time, nor are conditions controlled.

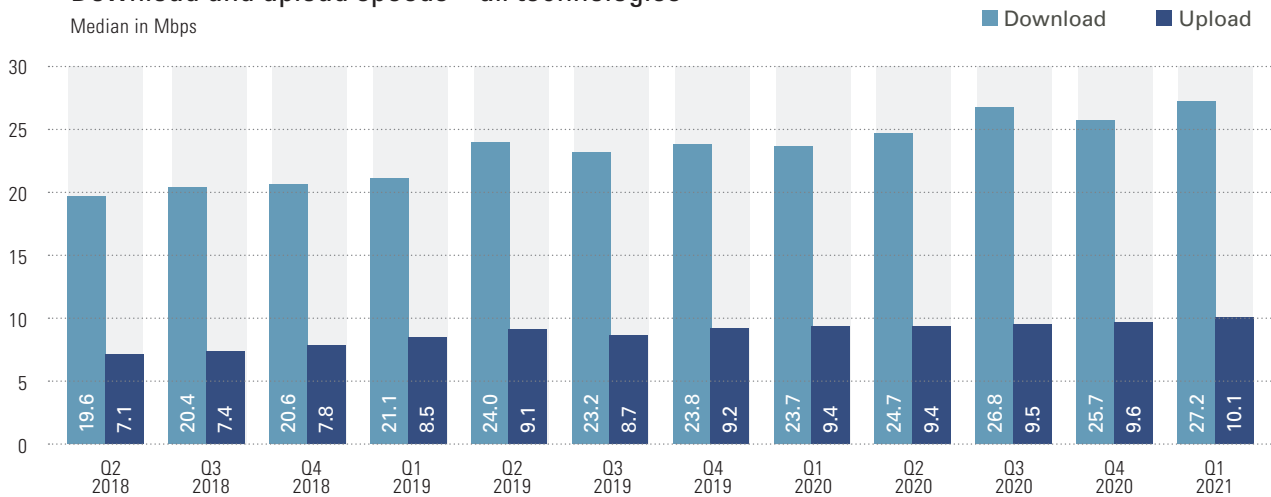
Due to subsequent modification, results can differ from those previously published.

## Download and upload speeds (all technologies)

### Record figures for download and upload speeds

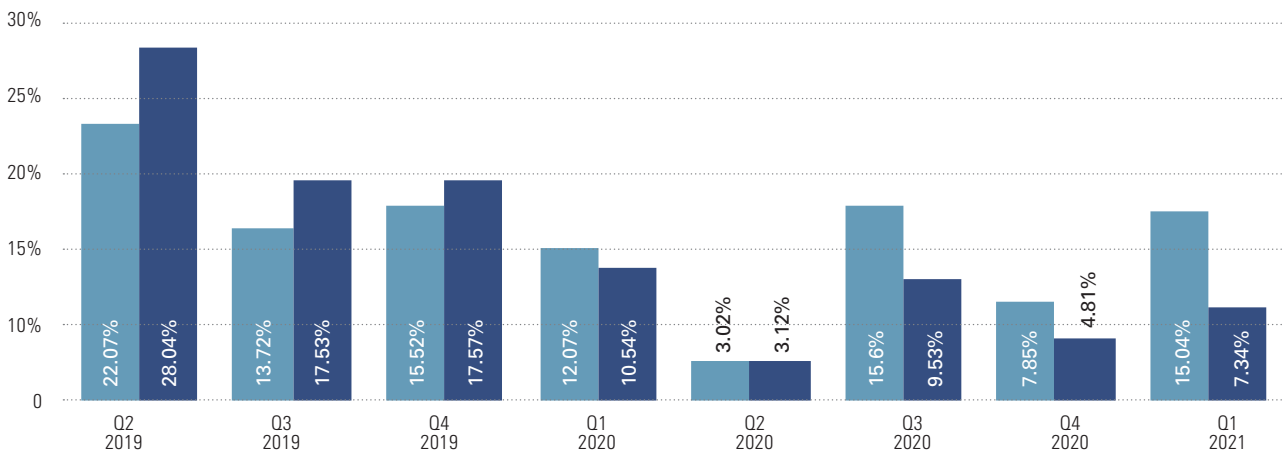
#### Download and upload speeds – all technologies

Median in Mbps



#### Year-on-year change in quarterly figures

in per cent



- In Q1 2021 the median value for download speeds was 27.2 Mbps, 15.0 per cent higher than the figure recorded a year previously.
- During the same period, the median upload speed climbed 7.3 per cent to 10.1 Mbps.

Expressed in megabits per second (Mbps), internet access speed represents the amount of data transferred per second. Downloading refers to data transfers from the internet to a user. Uploading refers to data transfers from a user to the internet. The speeds shown are the rates actually measured (and not potential maximum or advertised speeds).

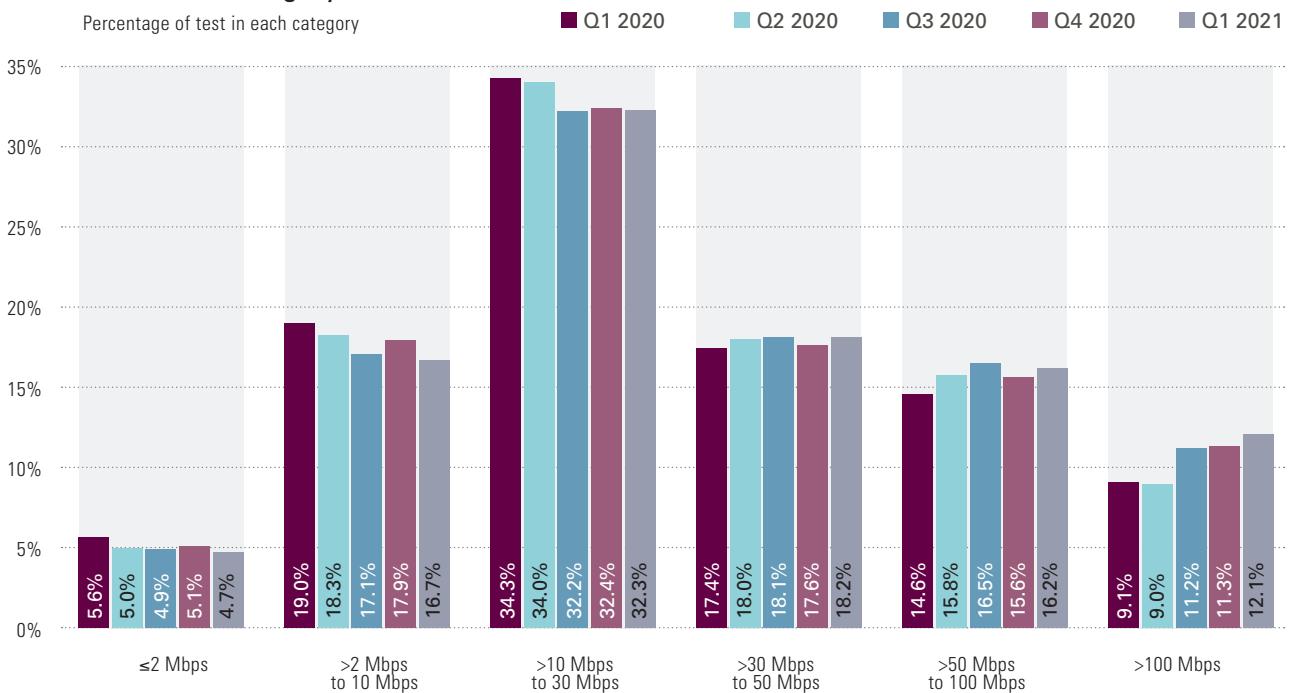
The median is the value at the exact midpoint of a list sorted according to magnitude.

## Download speed by bandwidth category

Almost 50 per cent of tests were over 30 Mbps

### Download speed by bandwidth category

Percentage of test in each category



- A download speed of >100 Mbps was achieved by around 12.1 per cent of the tests completed in Q1 2021. One year previously this speed had been attained by only around 9.1 per cent of all tests.
- In Q1 2021 about 32.3 per cent of tests achieved download speeds of between 10 Mbps and 30 Mbps. While this category continues to account for most of the tests taken, its percentage is now on the decline.
- Speeds of up to 10 Mbps were measured during roughly a fifth of the tests in Q1 2021. This figure had been almost 25 per cent a year earlier.
- The proportion of tests in the broadband categories >30 Mbps to 50 Mbps and >50 Mbps to 100 Mbps increased only slightly during the course of Q1 2021.

The chart above displays the percentage of tests falling under each of the bandwidth categories. The bandwidth categories correspond largely to those listed in section 2 of this Monitor ('Fixed broadband'). While section 2 lists nominal (advertised) bandwidths, here the actual bandwidths that were measured for fixed and mobile connections are shown.

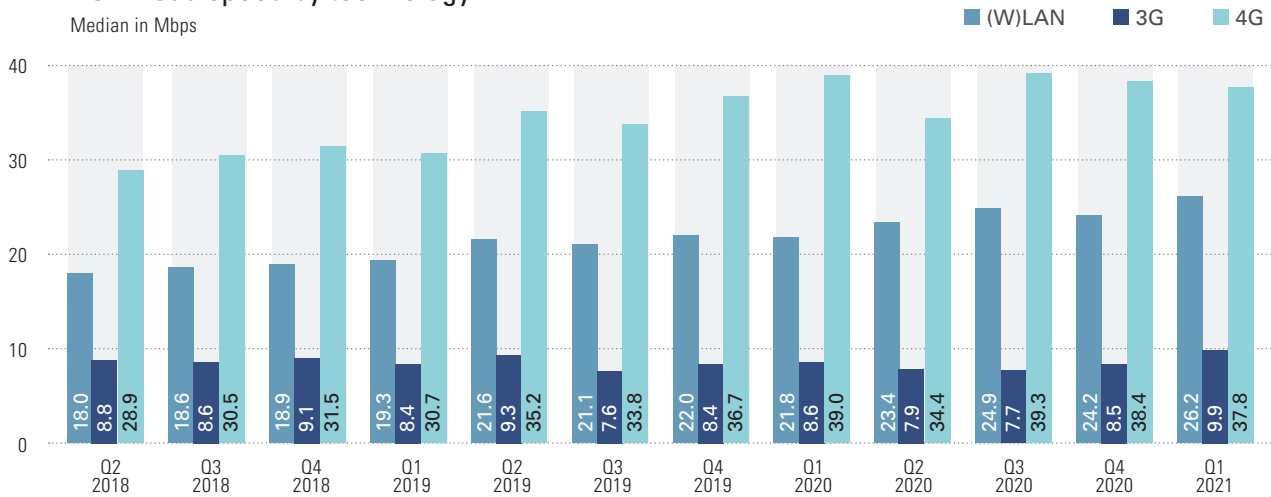


## Download speed by technology

### Significant gains in download speeds for (W)LAN tests

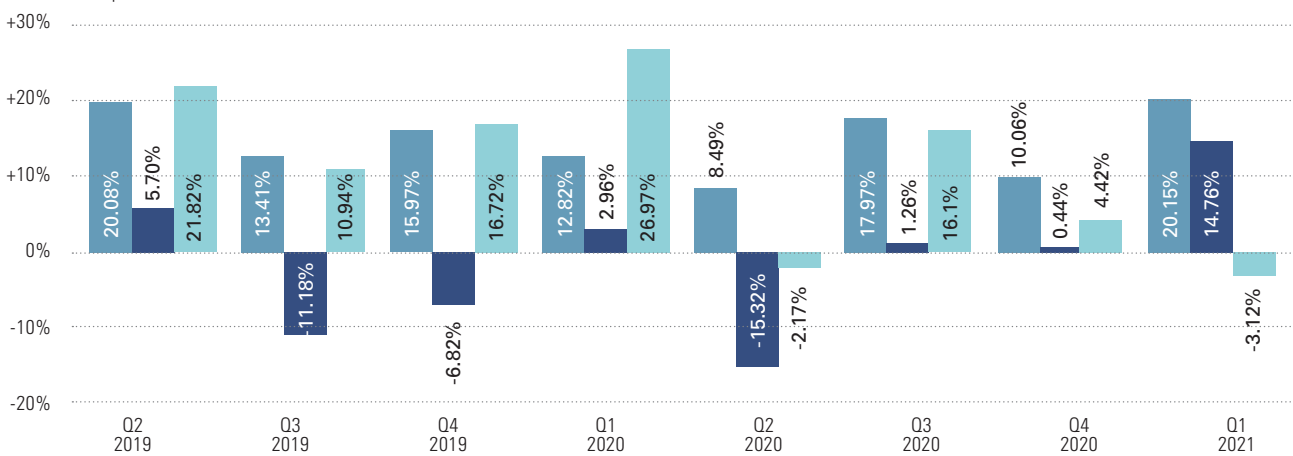
#### Download speed by technology

Median in Mbps



#### Year-on-year change in quarterly figures

in per cent



- The median download speed in 4G networks has fallen consistently over the last three quarters. In Q1 2021 the median was 37.8 Mbps and therefore below the value recorded a year previously (39.0 Mbps).
- The median for tests via (W)LAN is on an upward trend, however. The figure of 26.2 Mbps for the first three months of 2021 represents a year-on-year increase of no less than 20.2 per cent. This is probably attributable to a greater proportion of fibre-based broadband connections and the use of more modern (W)LAN systems.
- The median figure for 3G tests also rose by 14.8 per cent over the same period (increased use of 4G), although at 9.9 Mbps in Q1 2021 it still lags significantly behind the values for (W)LAN and 4G.

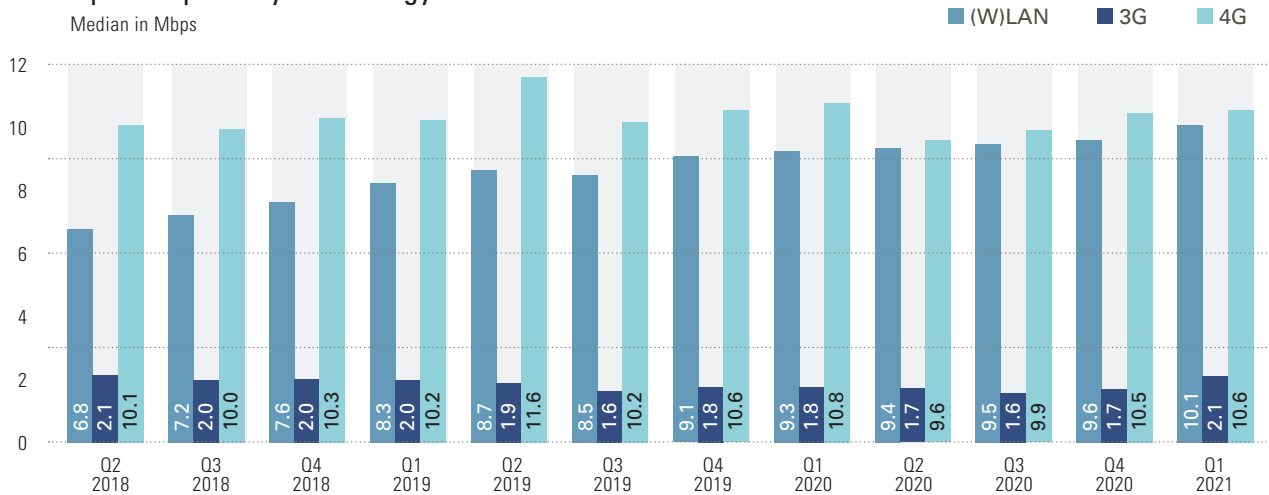
Internet access speed depends on factors including the technology implemented. Distinctions are made between 2G (GPRS, EDGE), 3G (UMTS, HSPA), 4G (LTE) and 5G, as well as on the basis of measurements of various fixed and mobile technologies. The latter measurements were taken with the aid of a browser or app (connected via WiFi or LAN) and have been aggregated here under the heading of (W)LAN. The chart above shows the median, that is, the empirical value at the exact midpoint of all measurements, for each technology and quarter. The chart does not show median figures for 2G and 5G connections.

## Upload speed by technology

### Speeds for tests taken via (W)LAN continue to increase

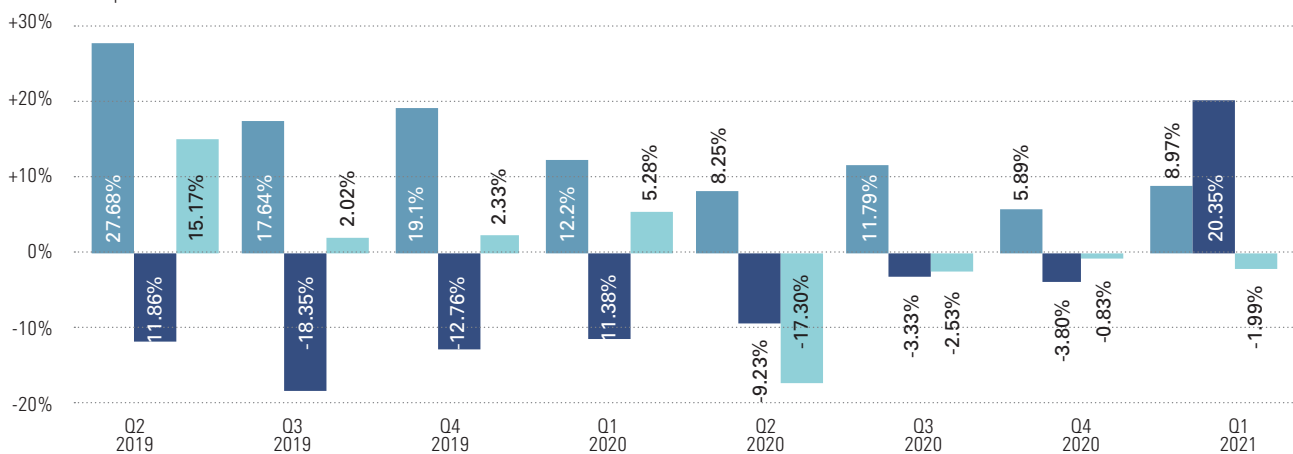
#### Upload speed by technology

Median in Mbps



#### Year-on-year change in quarterly figures

in per cent



- The upload speed for tests made over (W)LAN increased by 9.0 per cent year on year to reach 10.1 Mbps. This can probably be ascribed to a greater proportion of fibre-based broadband connections and the use of more advanced WiFi technology.
- For the 4G network, a record-breaking upload speed of 10.6 Mbps was recorded in Q1 2021. The year-on-year median upload speed remained virtually unchanged, however.
- While the speed for measurements taken over the 3G network has risen significantly since the first quarter of 2020 (+20.4%) the upload speed at the start of 2021 was only 2.1 Mbps and therefore significantly lower than upload speeds measured over (W)LAN and 4G.

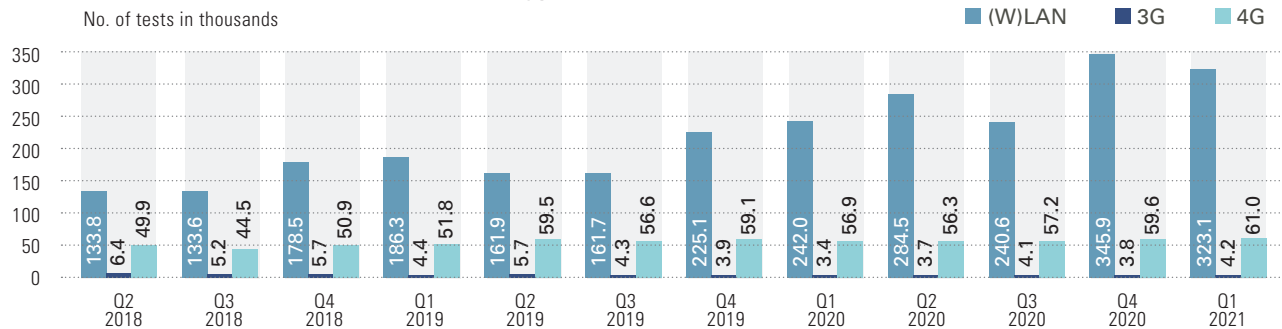
Uploading refers to data transfers from a user to the internet. Rarely the subject of advertising, the upload data rate is usually significantly lower than the download speed. Communication in the internet is a two-way street, though, and the upload rate is just as important for fast internet access. The upload data rate is particularly important when sharing photos or files or for video chatting.

## Number of tests for each technology

Over 1 million tests completed in 2020

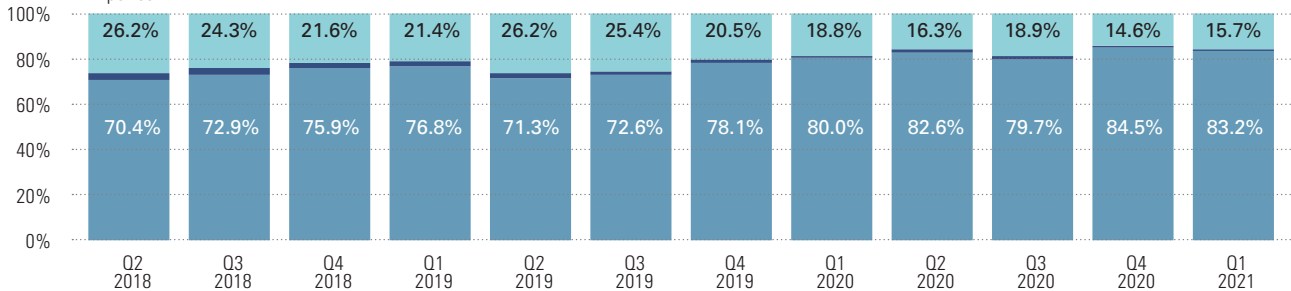
### Number of tests for each technology

No. of tests in thousands



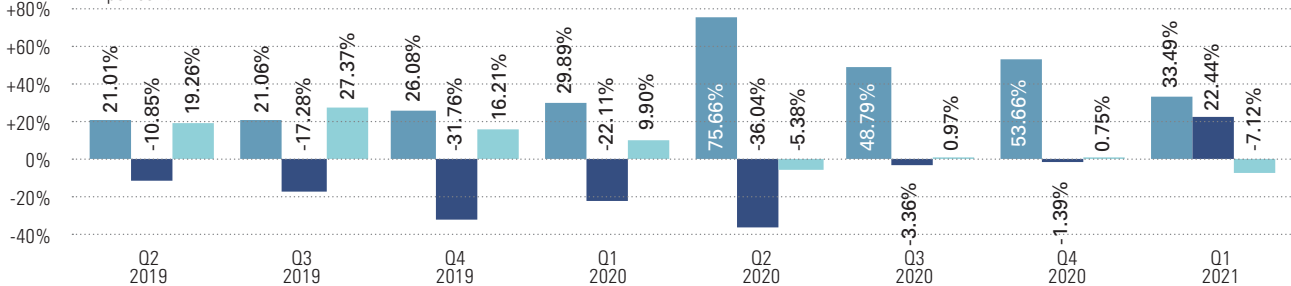
### Percentages

in per cent



### Year-on-year change in quarterly figures

in per cent



- At a figure of 83.2 per cent, most tests were taken in the (W)LAN category during Q1 2021. Around 323,100 tests were recorded during this period – an increase of about 33.5 per cent compared with the previous year. Quarter on quarter the number of tests fell by around 6.6 per cent.
- Roughly 61,000 tests were completed in the 4G network between January and March 2021. This marks a quarter-on-quarter rise of around 2.4 per cent and around 7.1 per cent more year on year.
- During 2020 the RTR-NetTest was used to complete around 1.36 million measurements across all technologies deployed. Compared with 2019, this represents a significant increase of 38.5 per cent.

All tests done in Austria (or by Austrians roaming abroad) are included in the number of tests, provided the location can be determined to within 2 km. Repeated or implausible tests are not taken into account.

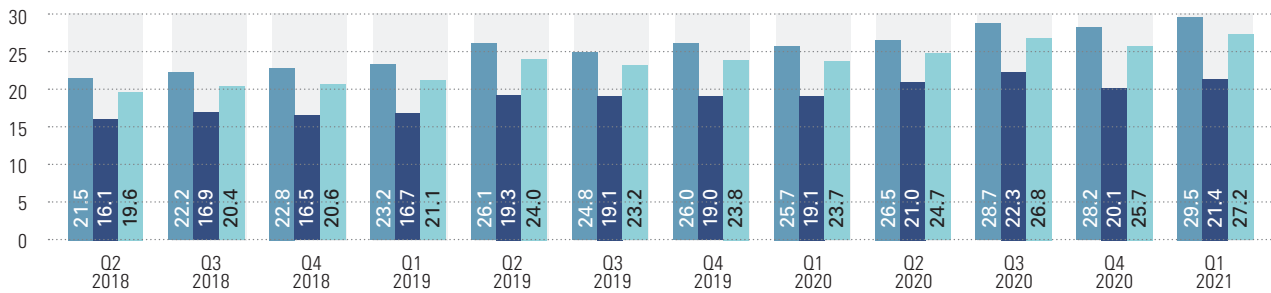
# Median download speed – off-peak and peak

## Peak and off-peak download speeds make gains in year-on-year comparison

Median download speed – off-peak and peak (all technologies)

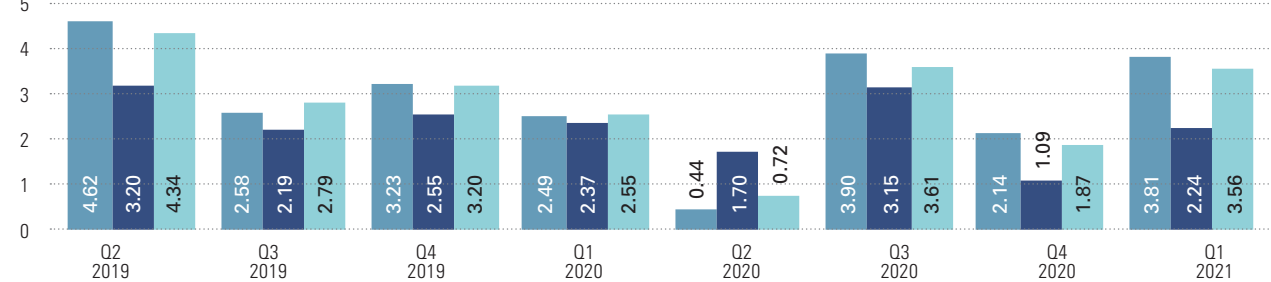
Median in Mbps

Off-peak  
Peak  
Total



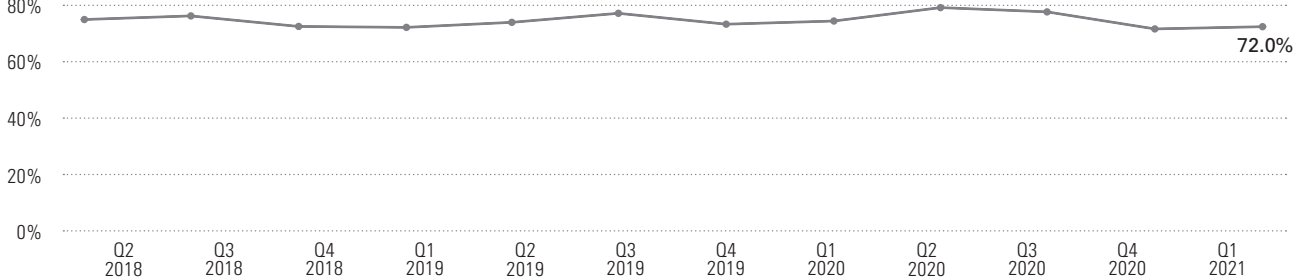
Year-on-year change in quarterly figures

in Mbps



Download-speed: Peak to off-peak ratio

in per cent



- During peak hours, an average of 21.4 Mbps was achieved during Q1 2021, a figure some 2.2 Mbps higher than for the same quarter in the previous year.
- The median off-peak speed was 29.5 Mbps between January and March 2021. In comparison, a speed of only 25.7 Mbps had been achieved for the first quarter of 2020.
- The peak value for bandwidth was approximately 72 per cent of the off-peak value in Q1 2021 (see bottom chart).

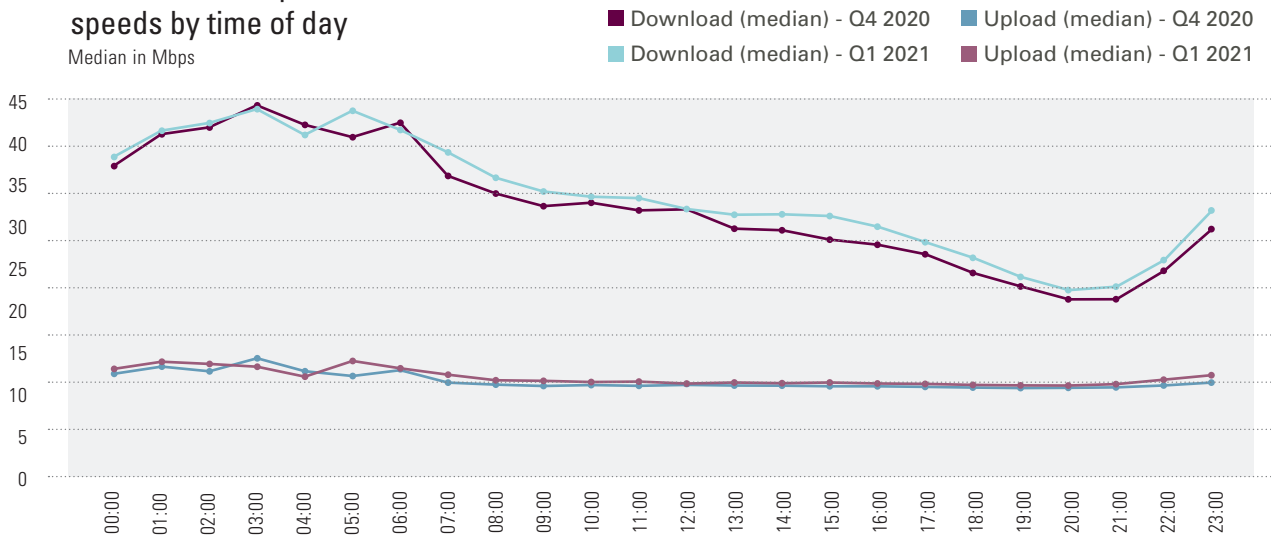
Internet access speeds can also depend on the hour of the day when the internet is used. Because available resources have to be divided up among users, speeds can drop when numerous users access the internet at the same time, during peak hours. For the purpose of evaluation, peak hours are defined as 18:00 to 23:00, the evening period of heavy internet use. The other hours of the day are regarded as off-peak hours. No distinction is made between working days, weekends and holidays.

## Download and upload speeds by time of day

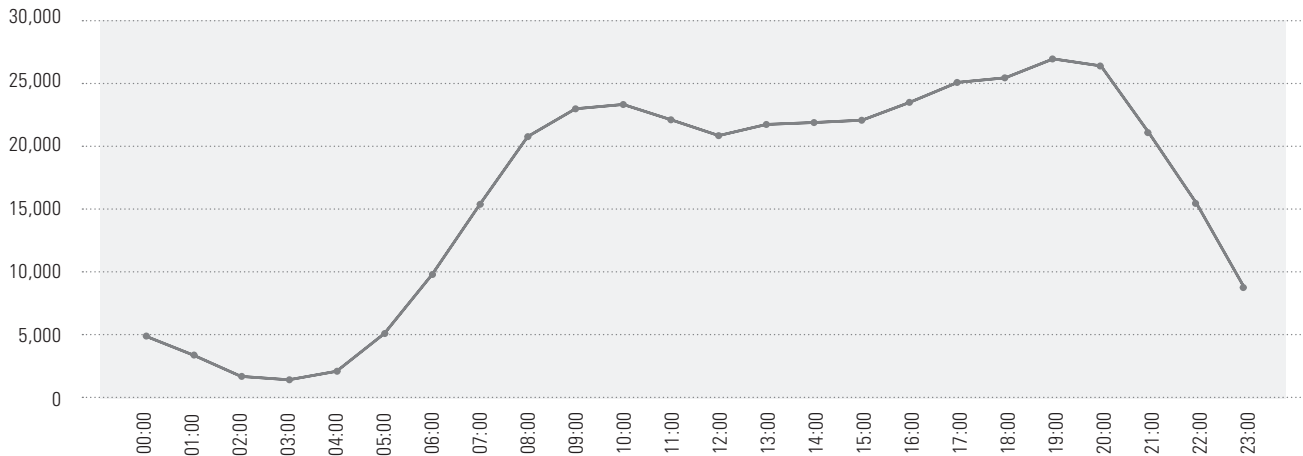
### Upload speeds by hour of the day higher than in previous quarter

Download and upload speeds by time of day

Median in Mbps



No. of test by hour of day in Q1 2021



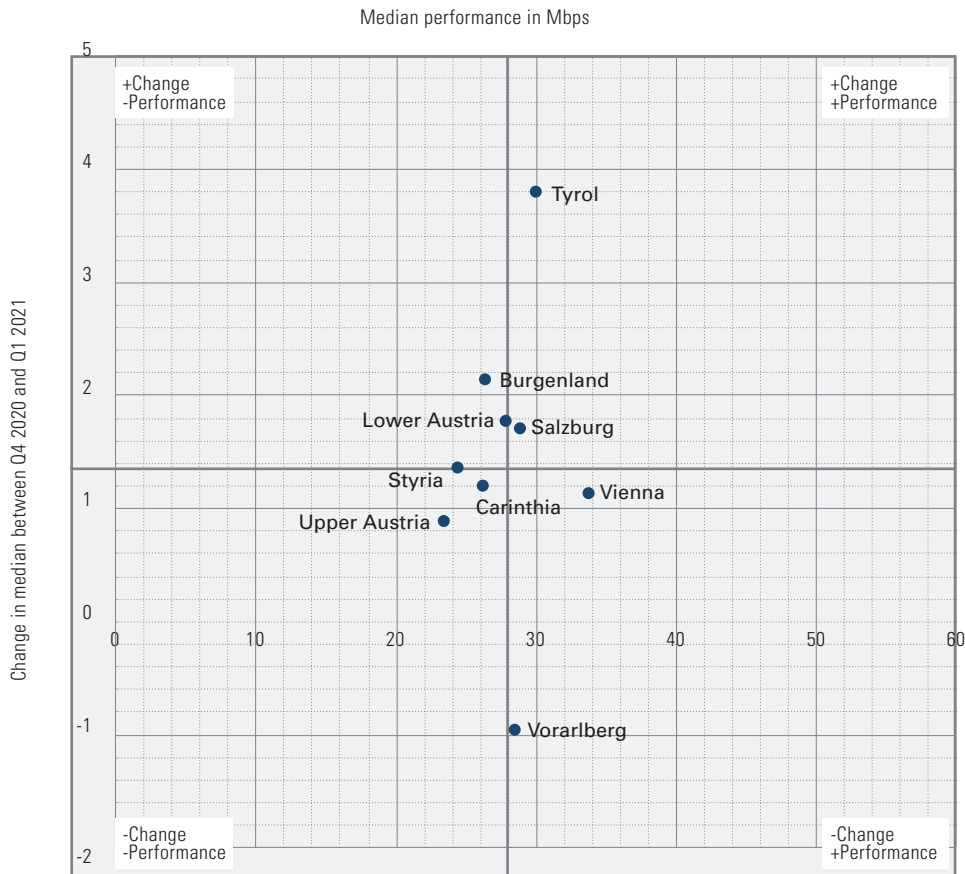
- During the day, the median download speeds for the first quarter of 2021 were higher than the values from the prior quarter. The highest value of roughly 38.9 Mbps was recorded at around 3:00, while the lowest value of 19.8 Mbps occurred at around 20:00.
- Quarter on quarter, the median upload speed remained virtually unchanged, although the upload speed of 10 Mbps measured between 18:00 and 21:00 was slightly higher than the speed at these times in Q4 2020 (9 Mbps).
- The highest number of measurements (26,970) were taken at around 19:00, with the lowest number (1,427) being made at about 3:00.

The number of network test runs varies considerably over the course of the day. Only a few tests are performed during night hours.



## Download speed by region

### Tyrol shows greatest change since last quarter



- In relation to performance, the exact middle of the rankings table was occupied by Lower Austria, with a median download speed of 27.3 Mbps in Q1 2021. In terms of changes to median figures, Styria occupied the same spot with a 1.3 Mbps change from Q4 2020 to Q1 2021.
- During the first quarter of 2021 Tyrol and Salzburg were the only provinces that managed to rise above the median in each category, both in terms of performance (T: 29.8 Mbps; S: 28.6 Mbps) and also in terms of quarter-on-quarter change (T: 3.8 Mbps, S: 1.7 Mbps).
- In contrast, both Carinthia and Upper Austria dropped below the median in both of these two categories of performance (C: 26.1 Mbps; UA: 23.2 Mbps) and quarterly change (C: 1.1 Mbps; UA: 0.8 Mbps).
- Above-median performance was also recorded by the provinces of Vorarlberg and Vienna (Vo: 27.7 Mbps; Vi: 33.6 Mbps). Change for these regions was below the Austrian median, however (Vo: -1.0 Mbps; Vi: 1.1 Mbps).
- While Burgenland recorded significant quarter-on-quarter gains of 2.1 Mbps, its download figure of 26.2 Mbps lies slightly under the median for the Austrian provinces.

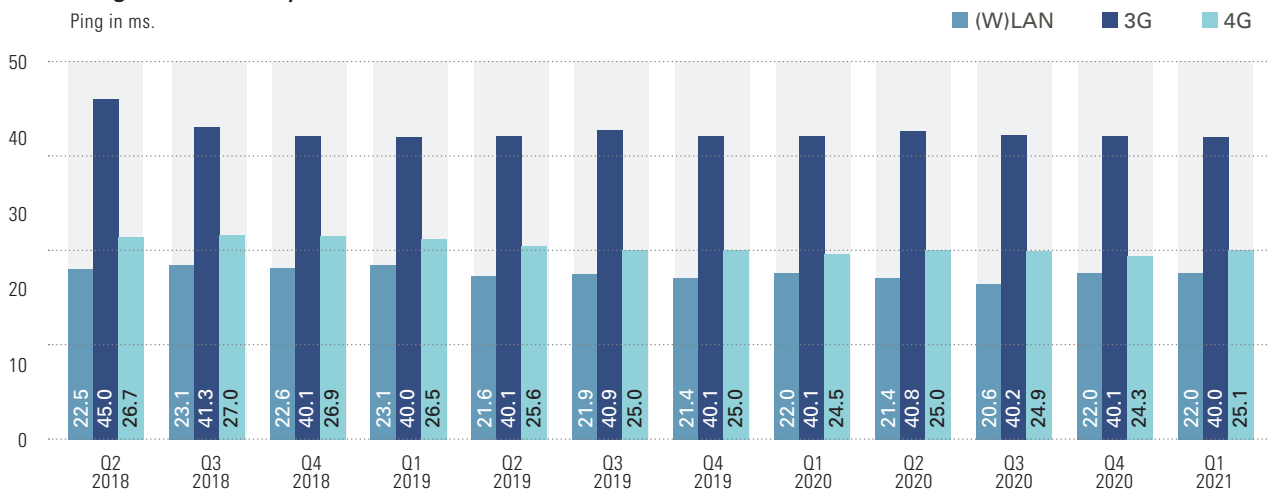
The chart shows the median download speed achieved by each province as well as the change in these medians compared with the previous quarter (both figures given in Mbps). The centre point for these four quadrants is formed by the intersection of the median download speed and the median figure for change over two quarters. The median is the value at the exact midpoint of a list values sorted according to magnitude.

## Ping time (latency)

### Virtually no change seen in ping tests

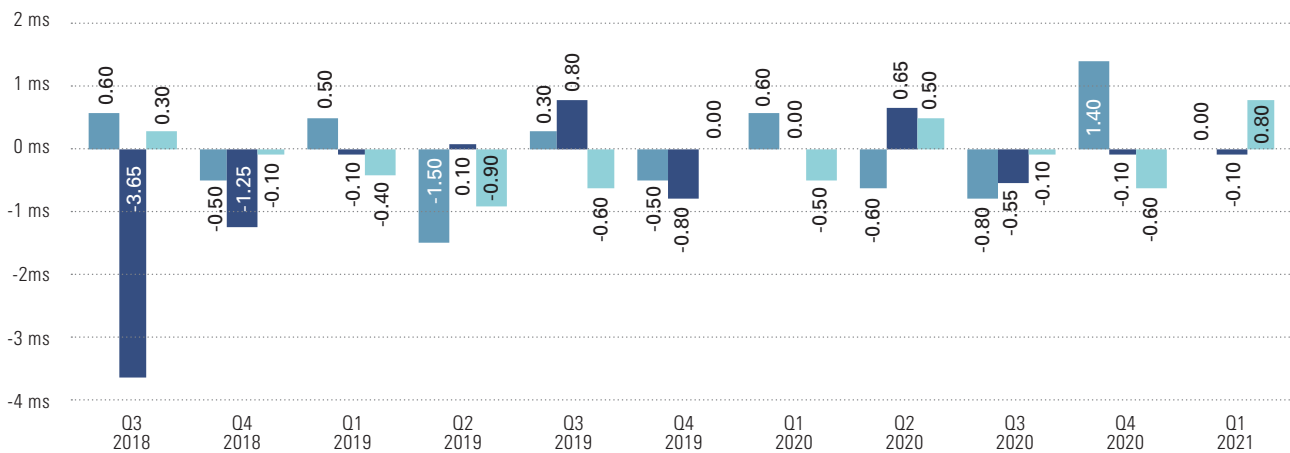
#### Ping time (latency)

Ping in ms.



#### Quarter-on-quarter change

in ms.



- The median ping time for 3G measurements in Q1 2021 remained virtually constant at 40 ms, with a drop in latency of only around 0.1 ms being observed both year on year as well as compared with the prior quarter.
- In Q1 2021 the lowest median ping value was approx. 22 ms, recorded in measurements taken over (W)LAN. This value remained the same in both a quarter-on-quarter and year-on-year comparison.
- In the 4G network, median ping times slowed by around 0.8 ms, from 24.3 ms to 25.1 ms, when compared with the prior quarter. In a year-on-year comparison, this equals a rise in latency of around 0.6 ms.

'Ping time' – or 'latency' as it is more correctly termed – is the time a small data packet needs to make its way from a user device (such as a mobile or laptop) to an online server and back. Ping time is measured in milliseconds (ms). While ping time is a key indicator in relation to online gaming, latency can also have significant bearing on how 'sluggishly' an internet connection responds during normal surfing. Both the technology used to access the internet and the extent to which access is utilised significantly affect latency.

Table 18: Median download and upload speed (all technologies) (in Mbps)  
[> see page 40](#)

|         | Download | Upload | Upload to download ratio |
|---------|----------|--------|--------------------------|
| Q2 2018 | 20       | 7      | 36%                      |
| Q3 2018 | 20       | 7      | 36%                      |
| Q4 2018 | 21       | 8      | 38%                      |
| Q1 2019 | 21       | 8      | 40%                      |
| Q2 2019 | 24       | 9      | 38%                      |
| Q3 2019 | 23       | 9      | 37%                      |
| Q4 2019 | 24       | 9      | 39%                      |
| Q1 2020 | 24       | 9      | 40%                      |
| Q2 2020 | 25       | 9      | 38%                      |
| Q3 2020 | 27       | 9      | 35%                      |
| Q4 2020 | 26       | 10     | 38%                      |
| Q1 2021 | 27       | 10     | 37%                      |

Table 19: Download speed by bandwidth category (in Mbps)  
[> see page 41](#)

|         | ≤2 | >2 to 10 | >10 to 30 | >30 to 50 | >50 to 100 | >100 |
|---------|----|----------|-----------|-----------|------------|------|
| Q1 2020 | 6  | 19       | 34        | 17        | 15         | 9    |
| Q2 2020 | 5  | 18       | 34        | 18        | 16         | 9    |
| Q3 2020 | 5  | 17       | 32        | 18        | 16         | 11   |
| Q4 2020 | 5  | 18       | 32        | 18        | 16         | 11   |
| Q1 2021 | 5  | 17       | 32        | 18        | 16         | 12   |

Table 20: Median download speed by technology (in Mbps)  
[> see page 42](#)

|         | (W)LAN | 3G | 4G |
|---------|--------|----|----|
| Q2 2018 | 18     | 9  | 29 |
| Q3 2018 | 19     | 9  | 30 |
| Q4 2018 | 19     | 9  | 31 |
| Q1 2019 | 19     | 8  | 31 |
| Q2 2019 | 22     | 9  | 35 |
| Q3 2019 | 21     | 8  | 34 |
| Q4 2019 | 22     | 8  | 37 |
| Q1 2020 | 22     | 9  | 39 |
| Q2 2020 | 23     | 8  | 34 |
| Q3 2020 | 25     | 8  | 39 |
| Q4 2020 | 24     | 8  | 38 |
| Q1 2021 | 26     | 10 | 38 |

Table 21: Median download and upload speed by technology (in Mbps)  
[> see page 43](#)

|         | (W)LAN | 3G | 4G |
|---------|--------|----|----|
| Q2 2018 | 7      | 2  | 10 |
| Q3 2018 | 7      | 2  | 10 |
| Q4 2018 | 8      | 2  | 10 |
| Q1 2019 | 8      | 2  | 10 |
| Q2 2019 | 9      | 2  | 12 |
| Q3 2019 | 8      | 2  | 10 |
| Q4 2019 | 9      | 2  | 11 |
| Q1 2020 | 9      | 2  | 11 |
| Q2 2020 | 9      | 2  | 10 |
| Q3 2020 | 10     | 2  | 10 |
| Q4 2020 | 10     | 2  | 10 |
| Q1 2021 | 10     | 2  | 11 |

Table 22: Number of tests for each technology  
[> see page 44](#)

|         | (W)LAN  | 3G    | 4G     |
|---------|---------|-------|--------|
| Q1 2019 | 186,334 | 4,400 | 51,808 |
| Q2 2019 | 161,945 | 5,710 | 59,495 |
| Q3 2019 | 161,684 | 4,283 | 56,649 |
| Q4 2019 | 225,079 | 3,893 | 59,116 |
| Q1 2020 | 242,033 | 3,427 | 56,936 |
| Q2 2020 | 284,472 | 3,652 | 56,295 |
| Q3 2020 | 240,564 | 4,139 | 57,198 |
| Q4 2020 | 345,853 | 3,839 | 59,557 |
| Q1 2021 | 323,087 | 4,196 | 60,991 |

Table 23: Median download speed – off-peak and peak (in Mbps)  
[> see page 45](#)

|         | Off-peak download | Download (total) | Peak download | Peak to off-peak ratio |
|---------|-------------------|------------------|---------------|------------------------|
| Q2 2018 | 21                | 20               | 16            | 75%                    |
| Q3 2018 | 22                | 20               | 17            | 76%                    |
| Q4 2018 | 23                | 21               | 16            | 72%                    |
| Q1 2019 | 23                | 21               | 17            | 72%                    |
| Q2 2019 | 26                | 24               | 19            | 74%                    |
| Q3 2019 | 25                | 23               | 19            | 77%                    |
| Q4 2019 | 26                | 24               | 19            | 73%                    |
| Q1 2020 | 26                | 24               | 19            | 74%                    |
| Q2 2020 | 27                | 25               | 21            | 79%                    |
| Q3 2020 | 29                | 27               | 22            | 78%                    |
| Q4 2020 | 28                | 26               | 20            | 72%                    |
| Q1 2021 | 30                | 27               | 21            | 72%                    |

Table 24: Median download and upload speed by hour of day  
[> see page 46](#)

|    | Download (Median) | Upload (Median) | No. of tests | Download (median) in previous quarter | Upload (median) in previous quarter | No. of measurements (previous quarter) |
|----|-------------------|-----------------|--------------|---------------------------------------|-------------------------------------|--|
| 0  | 34                | 11              | 4,908        | 33                                    | 11                                  | 5,474                                  |
| 1  | 37                | 12              | 3,395        | 36                                    | 12                                  | 3,562                                  |
| 2  | 37                | 12              | 1,697        | 37                                    | 11                                  | 1,969                                  |
| 3  | 39                | 12              | 1,427        | 39                                    | 13                                  | 1,526                                  |
| 4  | 36                | 11              | 2,106        | 37                                    | 11                                  | 2,256                                  |
| 5  | 39                | 12              | 5,109        | 36                                    | 11                                  | 4,844                                  |
| 6  | 37                | 11              | 9,811        | 37                                    | 11                                  | 11,291                                 |
| 7  | 34                | 11              | 15,398       | 32                                    | 10                                  | 16,355                                 |
| 8  | 32                | 10              | 20,785       | 30                                    | 10                                  | 21,741                                 |
| 9  | 30                | 10              | 22,999       | 29                                    | 10                                  | 24,839                                 |
| 10 | 30                | 10              | 23,342       | 29                                    | 10                                  | 24,908                                 |
| 11 | 29                | 10              | 22,124       | 28                                    | 10                                  | 23,985                                 |
| 12 | 28                | 10              | 20,863       | 28                                    | 10                                  | 23,140                                 |
| 13 | 28                | 10              | 21,754       | 26                                    | 10                                  | 22,878                                 |
| 14 | 28                | 10              | 21,905       | 26                                    | 10                                  | 23,376                                 |
| 15 | 28                | 10              | 22,089       | 25                                    | 10                                  | 23,953                                 |
| 16 | 26                | 10              | 23,514       | 25                                    | 10                                  | 25,278                                 |
| 17 | 25                | 10              | 25,099       | 24                                    | 10                                  | 26,752                                 |
| 18 | 23                | 10              | 25,465       | 22                                    | 9                                   | 27,938                                 |
| 19 | 21                | 10              | 26,970       | 20                                    | 9                                   | 27,963                                 |
| 20 | 20                | 10              | 26,409       | 19                                    | 9                                   | 27,825                                 |
| 21 | 20                | 10              | 21,103       | 19                                    | 9                                   | 23,151                                 |
| 22 | 23                | 10              | 15,470       | 22                                    | 10                                  | 16,957                                 |
| 23 | 28                | 11              | 8,770        | 26                                    | 10                                  | 9,714                                  |



Table 25: Median download speed by province (in Mbps)  
[> see page 47](#)

|         | Burgenland | Carinthia | Lower Austria | Upper Austria | Salzburg | Styria | Tyrol | Vorarlberg | Vienna |
|---------|------------|-----------|---------------|---------------|----------|--------|-------|------------|--------|
| Q1 2020 | 23         | 24        | 24            | 20            | 23       | 21     | 24    | 23         | 29     |
| Q2 2020 | 23         | 24        | 24            | 22            | 25       | 22     | 27    | 25         | 30     |
| Q3 2020 | 24         | 25        | 27            | 23            | 25       | 23     | 27    | 27         | 37     |
| Q4 2020 | 24         | 25        | 26            | 22            | 27       | 23     | 26    | 29         | 33     |
| Q1 2021 | 26         | 26        | 27            | 23            | 29       | 24     | 30    | 28         | 34     |

Table 26: Median ping time (in ms)  
[> see page 48](#)

|         | (W)LAN | 3G | 4G |
|---------|--------|----|----|
| Q2 2018 | 23     | 45 | 27 |
| Q3 2018 | 23     | 41 | 27 |
| Q4 2018 | 23     | 40 | 27 |
| Q1 2019 | 23     | 40 | 27 |
| Q2 2019 | 22     | 40 | 26 |
| Q3 2019 | 22     | 41 | 25 |
| Q4 2019 | 21     | 40 | 25 |
| Q1 2020 | 22     | 40 | 25 |
| Q2 2020 | 21     | 41 | 25 |
| Q3 2020 | 21     | 40 | 25 |
| Q4 2020 | 22     | 40 | 24 |
| Q1 2021 | 22     | 40 | 25 |



# Broadband access – supply and demand in geographical terms

## Broadband access – supply and demand in geographical terms

Since 2019 the Single Information Point for Broadband Coverage (ZIB) has been managed by RTR GmbH and hosted as an online service on the ZIB Portal (<https://www.rtr.at/zib>). The Portal provides data on current and future projects for the expansion of connections to telecommunications network (end customer access to fixed and mobile networks) as well as information about their use. The ZIB also collects data on bandwidths, technologies and active connections, with the aim of establishing an up-to-date picture of broadband coverage in Austria.

Every quarter, operators of public communications networks and services use the ZIB Portal to report on their fixed and mobile network telecommunications infrastructure in Austria – both currently available and planned for the future.

Coverage data are surveyed in the following categories:

- Geographical location in Austria (mapped onto a 100 by 100 m grid)
- Type of technology deployed and the nominal bandwidths thereby achievable
- Premises potentially able to be supplied (homes passed)

Operators are required to report the following kinds of data to the ZIB about the use or application of the underlying infrastructure:

- Geographical distribution within Austria at municipal level
- Bandwidths actually achieved/advertised via the individual infrastructure elements reported
- Number of end customers with coverage (number of active connections)

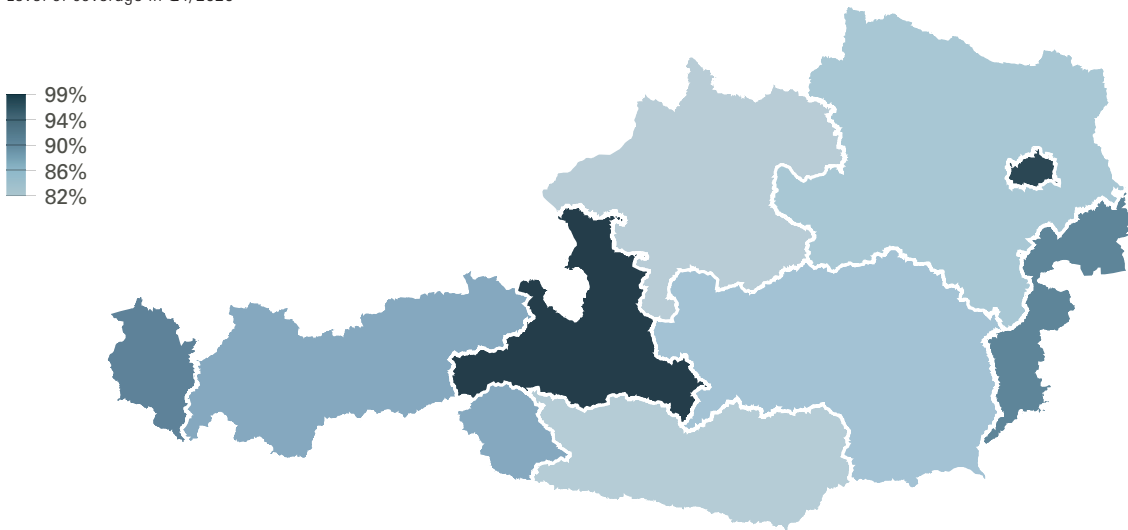
The figures shown in the following section are based on the routine data collected by the ZIB. Since data of a sufficient scope and quality were first available from the end of 2020, data are shown only for Q4 2020.

## Coverage with fixed broadband connections

### Coverage in Austria at least 82 per cent nationwide

#### Coverage with fixed network broadband connections

Level of coverage in Q4/2020

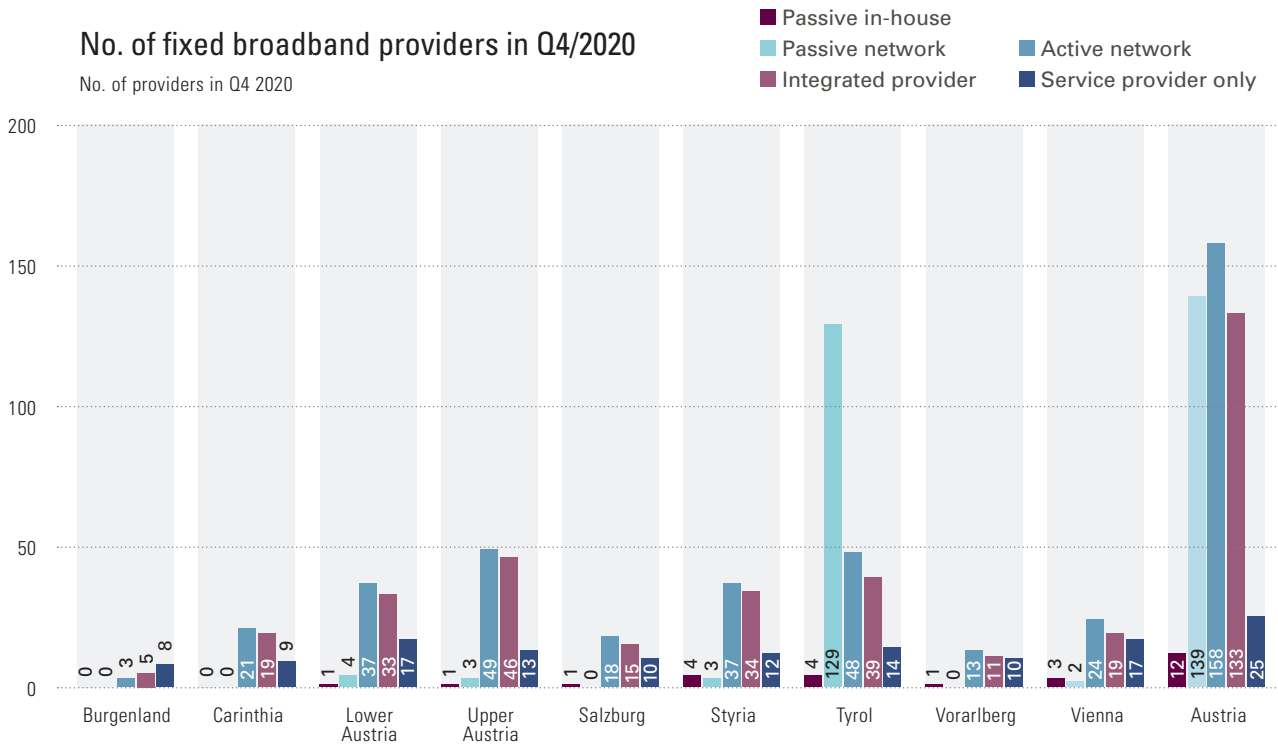


- At the end of 2020 coverage with fixed broadband connections was 82.1 per cent or higher in all Austrian provinces.
- In Q4 2020 the highest degree of coverage was achieved by Salzburg (98.6%), closely followed by Vienna (97.7%).
- Figures for Upper Austria (82.1%), Carinthia (82.5%) and Lower Austria (84.4%) indicated a comparatively low level of fixed broadband coverage.

The figure shows availability as a percentage of premises potentially able to be supplied (homes passed), independently of the technologies deployed by the operators and also without accounting for potential multiple coverage (i.e. properties able to receive coverage may in fact be supplied by several operators). The 'homes passed' metric used for potential subscriber premises in surveys sent by ZIB to providers covers commercial premises as well, since these receive coverage alongside the 4,875,109 apartments, 3,949,863 households or 8,901,064 inhabitants (persons registered at a primary place of residence). The base figure therefore totals 5,342,951 homes passed.

## Number of fixed broadband providers per province

### Majority of providers in Austria are active network operators



- At the end of 2020 there were 158 providers in Austria who were active operators of network equipment. Most providers in this category (49) operate in Upper Austria. The figure for Tyrol is 48.
- Overall, there were also 139 operators of passive fibre-optic networks in Q4 2020. Thanks to the open-access fibre-optic networks provided by municipalities in Tyrol, this province now has no less than 129 operators who are active in this category.
- There were 133 integrated (network and services) broadband providers in Austria in Q4 2020. Most of these businesses (46 providers) operate in Upper Austria.
- While some providers do operate in more than one province, they are counted only once in the overall figures. As a result, the total for individual categories across all provinces does not equal the total for Austria as a whole.

The figure presents active broadband providers in the provinces, grouped into the categories as listed below.

The first category comprises operators of passive infrastructure (duct access and dark fibre), such as cooperative property developers, office management companies (passive in-house) or operators of passive fibre-optic networks.

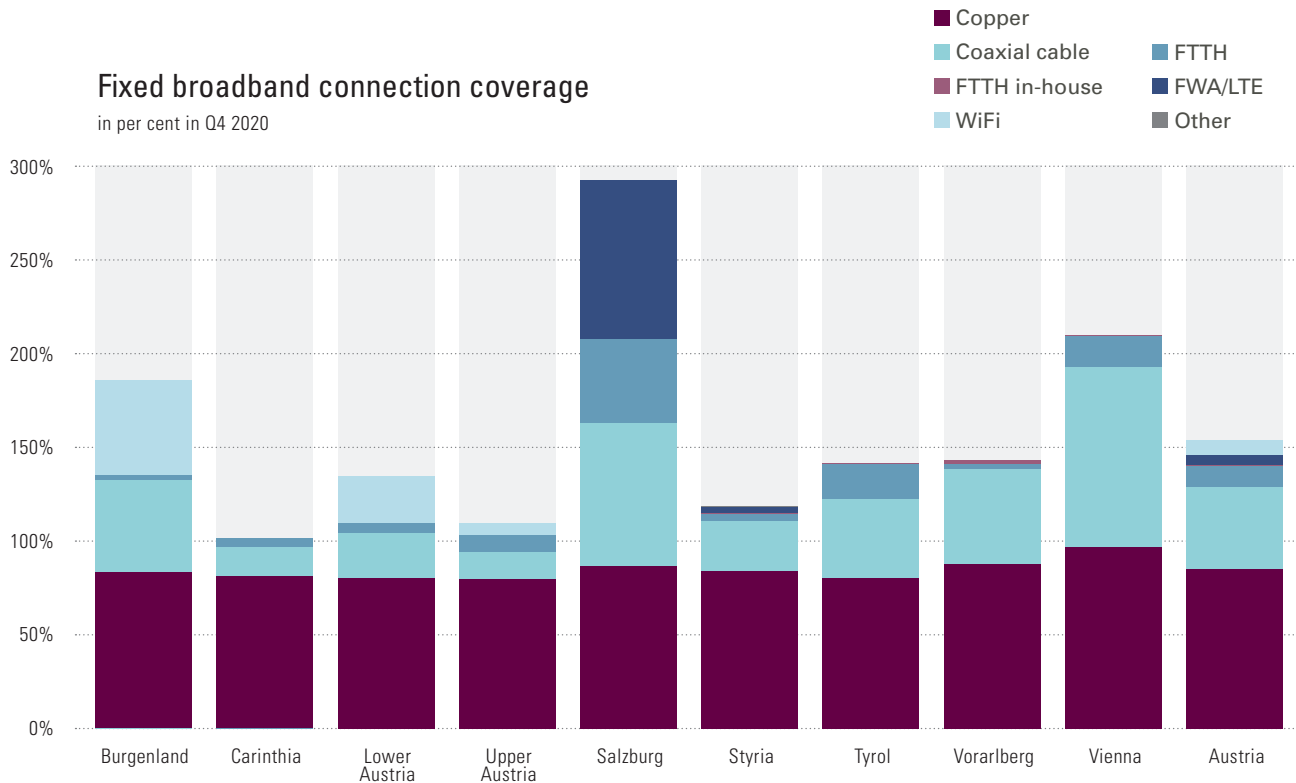
A second category is formed by network operators who also operate the active network equipment. These networks are used to provide the broadband connections from integrated (network and services) broadband providers or purely service providers. This group is significantly under-represented in the latest dataset, since operators without services currently supply data to ZIB only on a voluntary basis.

There is also a dearth of representative data in the other categories, since work on data quality is still ongoing here with the missing (and mostly small-scale) operators. All in all, data is still outstanding from more than 450 companies. The current analysis is therefore still to be understood as a 'best-guess' summary.



## Coverage with fixed broadband connections by technology

Fixed broadband technologies give Austrian households coverage level of around 154 per cent at year-end 2020



- At the end of 2020 the nationwide level of coverage was around 154.0 per cent, i.e. customers therefore typically have a choice of multiple providers and technologies.
- At least 80 per cent of homes (properties) passed can be provided with copper-cable (DSL) coverage in each province. In Q4 2020 the highest figures for connections in this category were reported in Vienna (96.9%), Vorarlberg (87.6%) and Salzburg (86.5%).
- Coaxial is also a very significant technology, even if the level of coverage varies widely between provinces (Vienna at 95.7% compared with Upper Austria at 14.0%).
- In Q4 2020, 50.7 per cent and 24.9 per cent of connections were supplied via WiFi in Burgenland and Lower Austria, respectively.
- In Salzburg 84.6 per cent of connections were based on FWA/LTE technology. In this province, Salzburg AG is deploying the 3.4–3.8 GHz band spectrum acquired in the frequency auction.
- In fibre to the home (FTTH), Salzburg was out in front on 44.9 per cent at the end of 2020, trailed by Tyrol (18.8%) and Vienna (17.0%).

As a result of the parallel infrastructure or technologies deployed by operators that compete for the same business, a redundant coverage situation often ensues, with customers typically having a choice between several providers. Accordingly, the level of coverage in individual provinces and in Austria as a whole typically exceeds 100 per cent.

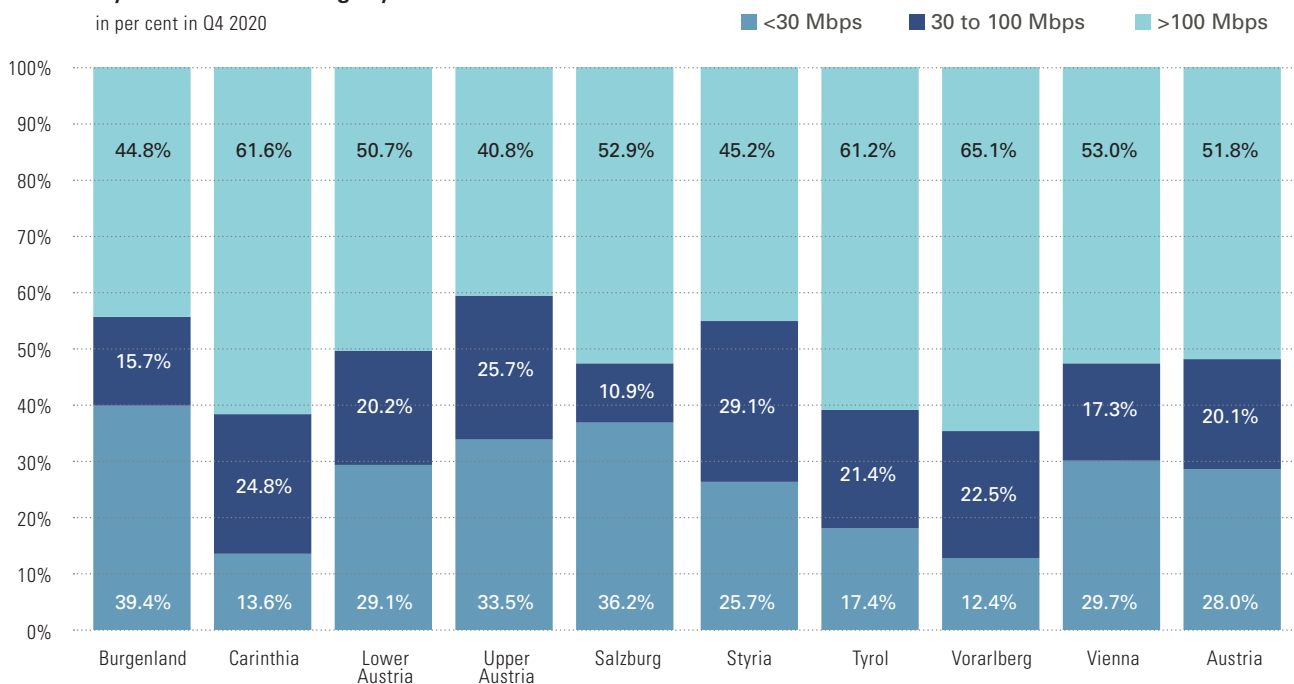
The 'Other' category includes in-house coverage based on LAN cabling, for example.

## Coverage with broadband connections by bandwidth category

Coverage level with bandwidths  $\geq 100$  Mbps tops 60 per cent in Vorarlberg, Tyrol and Carinthia at year-end 2020

### Fixed connection coverage by broadband category

in per cent in Q4 2020

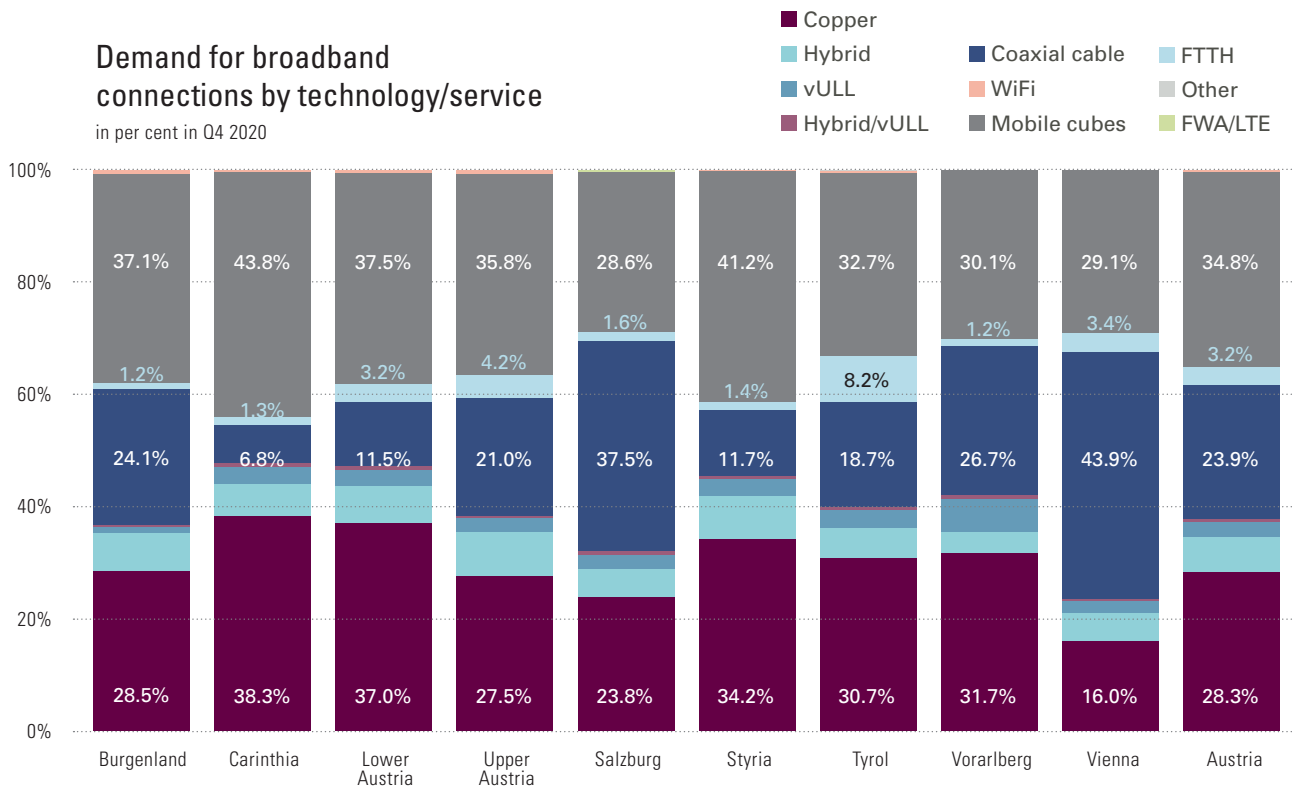


- At the end of 2020 roughly a quarter (28.0%) of connection subscribers nationwide in Austria were limited to a bandwidth of no more than 30 Mbps. In Burgenland and Salzburg, limits of this kind applied to an even larger share of the population (B: 39.4%, S: 36.2%).
- In Vorarlberg almost two-thirds of subscribers (65.1%) enjoyed bandwidths  $\geq 100$  Mbps, followed by Carinthia (61.6%) and Tyrol (61.2%). These provinces therefore placed well above the average for Austria (51.8%) in the fourth quarter of 2020.

The figure presents the bandwidths advertised by operators for coverage with broadband connections (25th percentile of normally available bandwidth, i.e. 75% of homes passed in a 100 x 100 m grid cell can be provided with bandwidth equal to or higher than this figure), grouped once again into the standard bandwidth categories.

## Demand for broadband connections by technology/service

### Majority of broadband demand is met by DSL, cable and cubes



- In Q4 2020, 87.4 per cent of broadband demand in Austria was met by connections using DSL, coaxial cable and mobile cubes.
- The greatest proportion of total broadband connections in Carinthia (43.8%) was achieved by mobile cubes at year-end 2020. In Styria and Lower Austria this proportion was 41.2 per cent and 37.5 per cent, respectively.
- In Vienna 43.9 per cent of all broadband internet connections were based on coaxial cable in Q4 2020. In Salzburg the figure for this type of connection was 37.5 per cent.
- At 38.3 per cent in Carinthia and 37.0 per cent in Lower Austria, copper-based technologies accounted for the majority of broadband connections in these provinces.
- Demand for FTTH in Austria as a whole was just 3.2 per cent of all households in Q4 2020. In Tyrol 8.2 per cent of broadband connections were provided with internet access via this infrastructure.

Providers utilise a range of technologies in order to meet demand for broadband connections. While this almost always means xDSL over copper or DOCSIS over cable TV, access is also provided via mobile networks with mobile cubes. To work around the more limited options offered by other technologies for achieving higher bandwidths (such as xDSL), A1 Telekom Austria AG has adopted a supplementary hybrid technology, whereby the fixed broadband connection is expanded with a mobile network component. The other two mobile network operators now also make use of a similar sort of option by deploying virtual unbundling as a wholesale product.

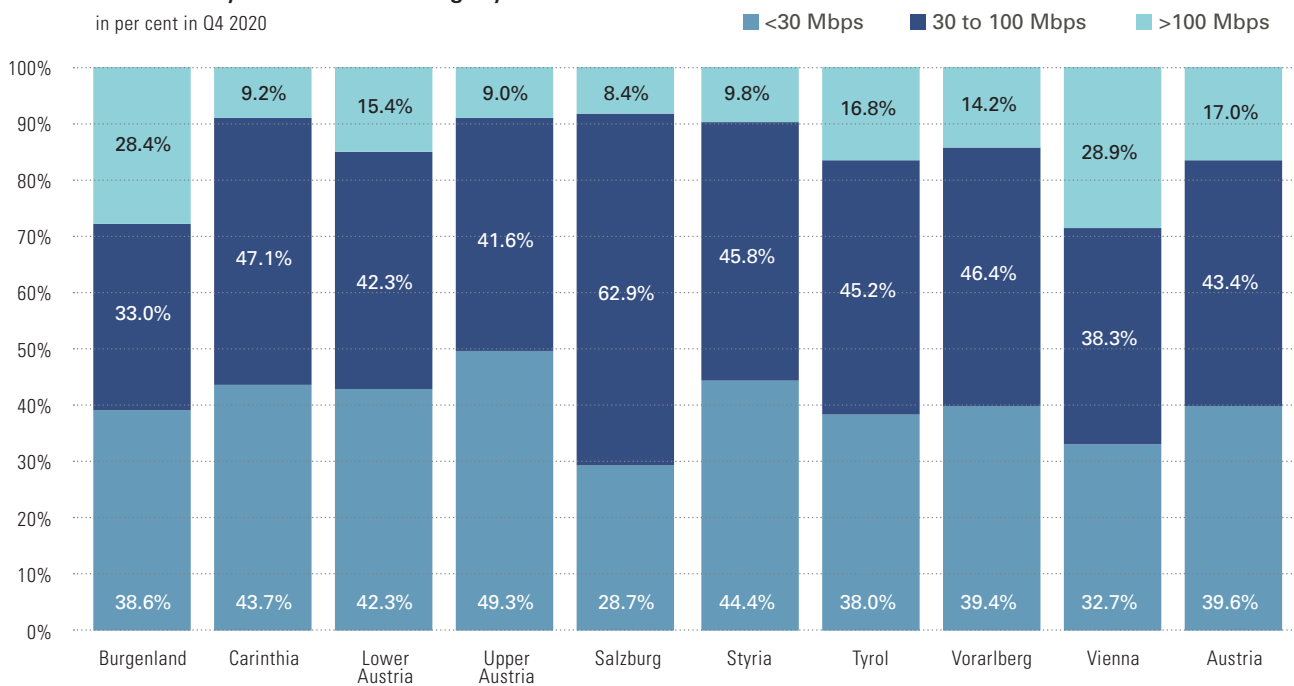
The 'Other' category includes in-house coverage based on LAN cabling, for example.

## Demand by broadband category

### Above-average demand for bandwidths $\geq 100$ Mbps in Vienna and Burgenland

#### Demand by broadband category

in per cent in Q4 2020



- End-user demand for bandwidths between  $\geq 30$  Mbps and  $< 100$  Mbps totalled 43.4 per cent in Austria during Q4 2020. Compared with the nationwide average, Salzburg posted a much higher figure of 62.9 per cent at year-end 2020.
- By a wide margin, most demand for bandwidths  $\geq 100$  Mbps was to be found in Vienna (28.9%) and Burgenland (28.4%) in Q4 2020. In Upper Austria this category accounted for only 9.0 per cent of demand.
- In Q4 2020 Upper Austria recorded the highest figure for demand for bandwidths  $< 30$  Mbps, at around 49.3 per cent; in Salzburg, market demand for bandwidth in this category represented only 28.7 per cent of end users during the same period.

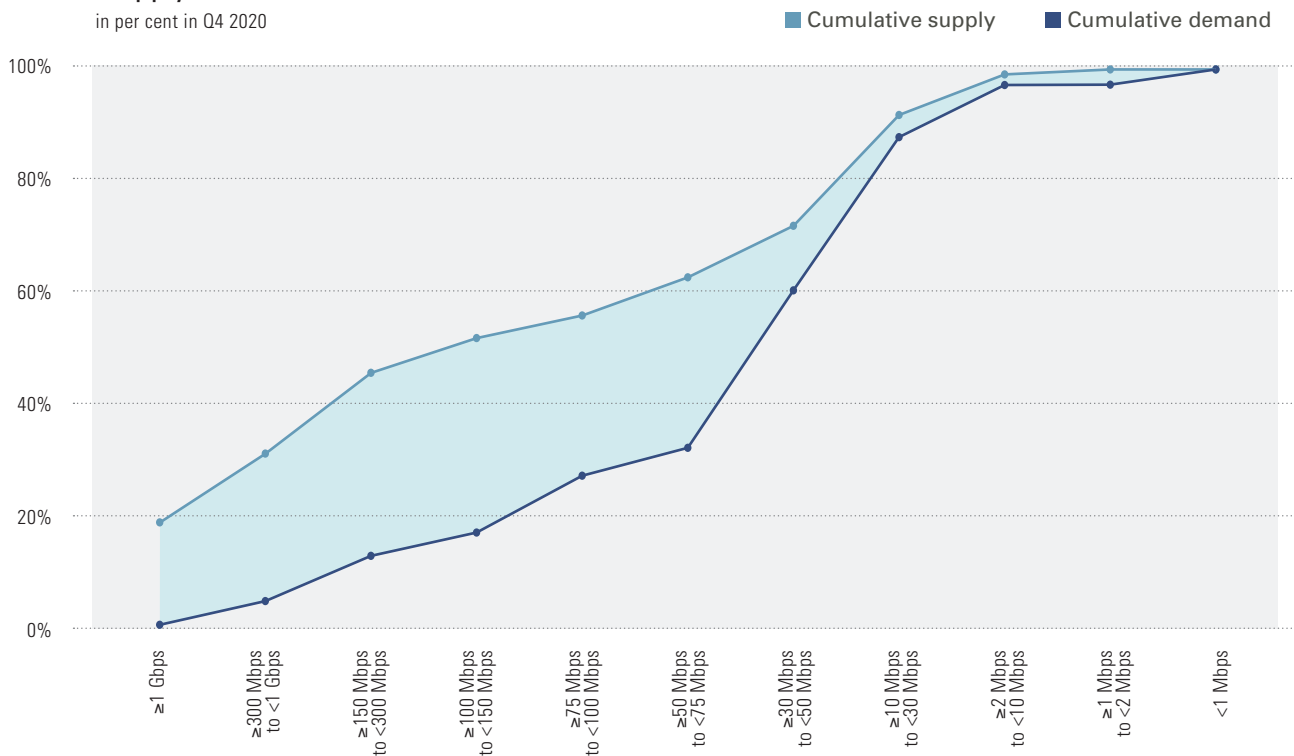
The chart depicts demand by broadband bandwidth category. The real-world bandwidths actually measured on the demand side lag behind the advertised available bandwidths (see figure 'Demand-supply gap by bandwidths').

## Demand-supply gap by bandwidths

### Supply outstrips demand at higher bandwidths

#### Supply-demand gap by bandwidth (supply vs. demand)

in per cent in Q4 2020



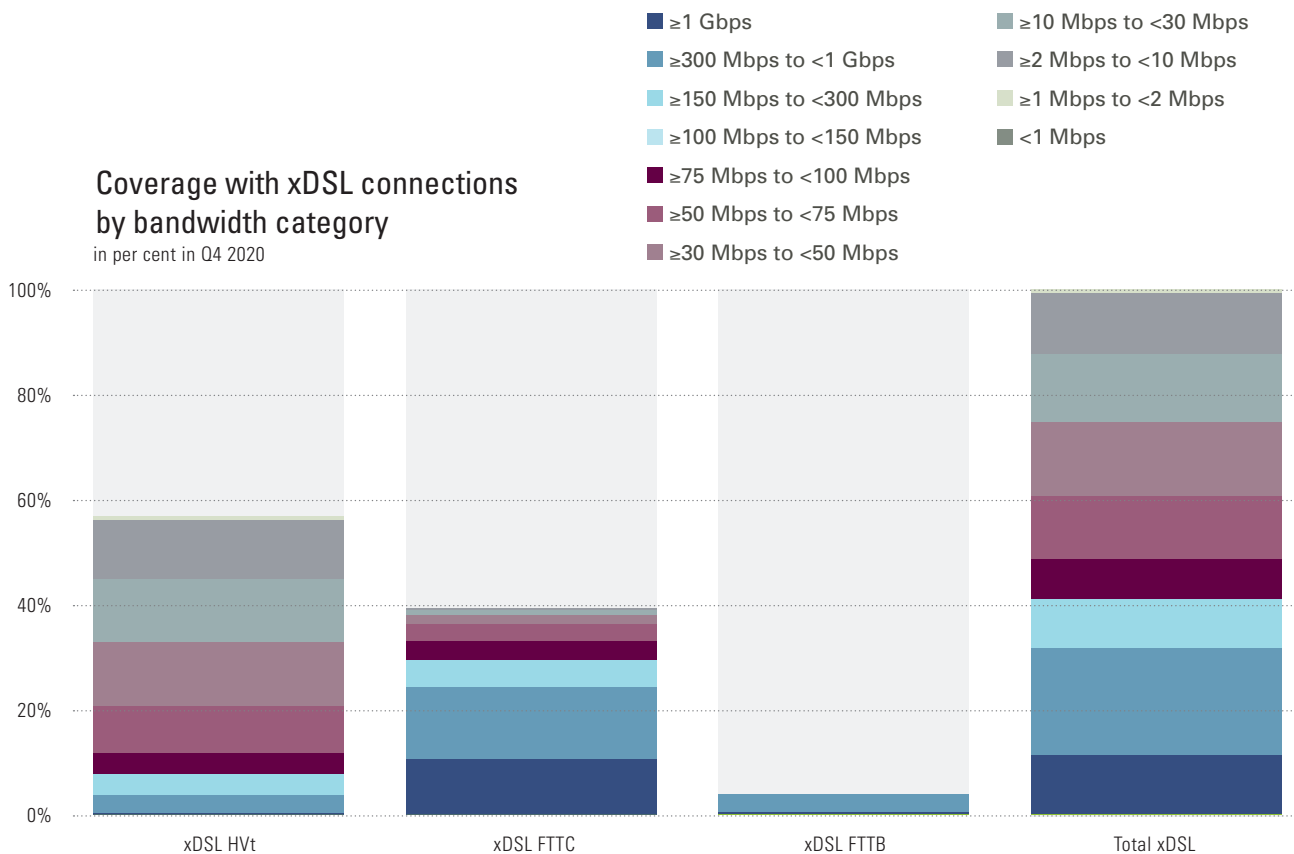
- In Q4 2020 supply and demand for the categories of <1 Mbps to <50 Mbps were almost perfectly balanced.
- At year-end 2020 roughly 51.8 per cent of bandwidths offered in Austria exceeded 100 Mbps. However, demand for connections using these kinds of bandwidth represented only 17.0 per cent of end users.
- At the end of 2020, almost 20 per cent of the connections available in Austria offered end users potential speeds of ≥1 Gbps. This figure contrasts with a consumer demand figure of just 0.4 per cent.
- Austria therefore has a supply problem rather than a demand problem in the high bandwidth segment. One explanation for the demand-supply gap, especially in relation to higher bandwidths, is that end users do not (as yet) see these bandwidths as offering any additional benefits, since these high speeds are also associated with higher usage fees.

The chart shows supply and demand by broadband connections, depicted by the bandwidths that these connections support. The blue area below the curve represents the demand-supply gap, i.e. not all customers are making use of the higher-bandwidth connections on offer.



## Coverage with xDSL connections by bandwidth category

xDSL FTTC is a major component within high-bandwidth coverage

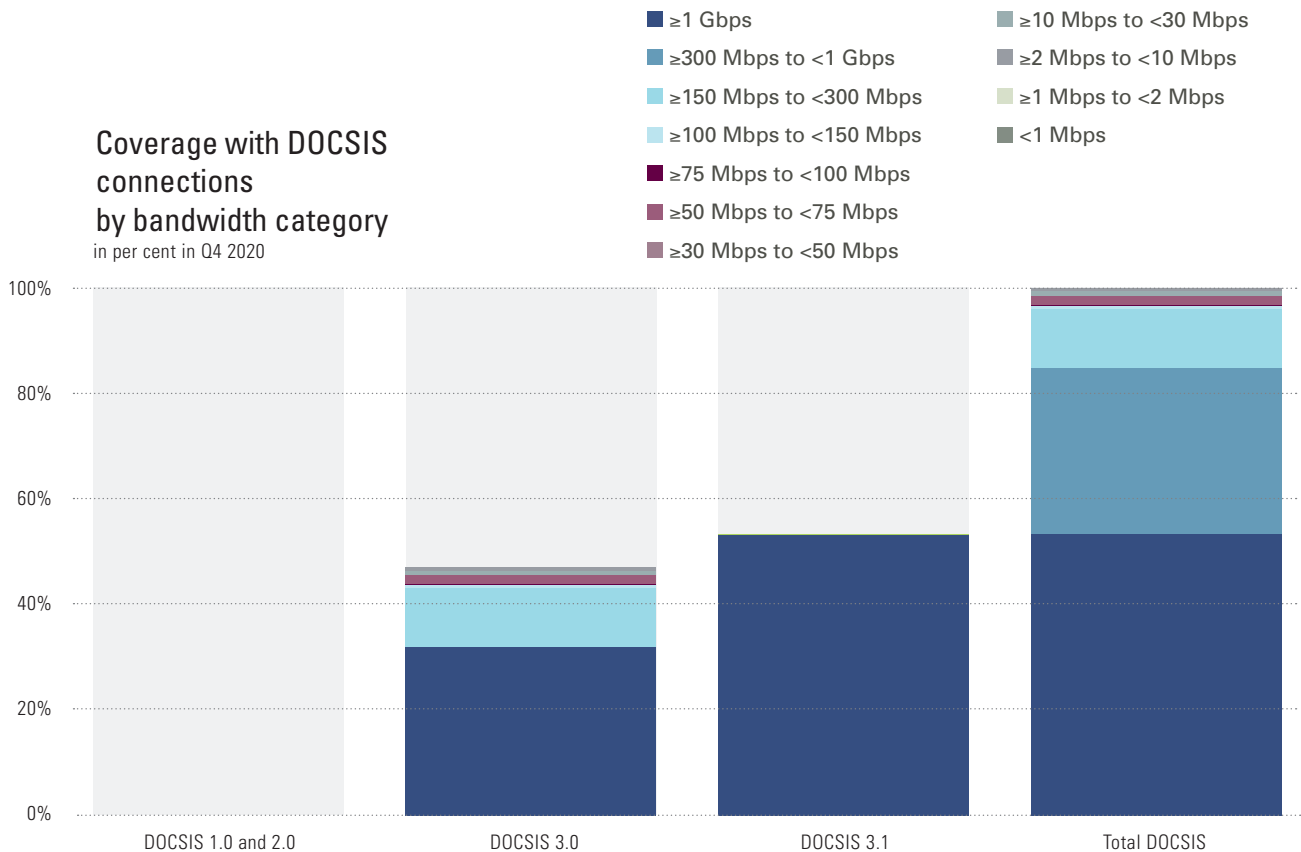


- At year-end 2020, 56.8 per cent of potential connections were covered by the main distribution frame (xDSL MDF). Most of these are capable of achieving bandwidths of between  $\ge 30\text{ Mbps}$  and  $< 50\text{ Mbps}$ .
- A total of 39.3 per cent of potential connections in Austria can be covered by upstream units (xDSL FTTC). Of these, almost a quarter can achieve speed of between  $\ge 150\text{ Mbps}$  and  $< 1\text{ Gbps}$ .
- At the end of 2020, some 3.9 per cent were covered by xDSL FTTB, i.e. 'fibre to the building.' Most of the connections registered here support speeds of between  $\ge 150\text{ Mbps}$  and  $< 300\text{ Mbps}$ .
- Over half (51.5%) of all xDSL connections currently operate below 100 Mbps.

The figure depicts the level of coverage with copper-based technologies (xDSL) in Austria, broken down by the bandwidths these technologies potentially support.

## Coverage with DOCSIS connections by bandwidth category

### DOCSIS 3.1 makes high bandwidths possible



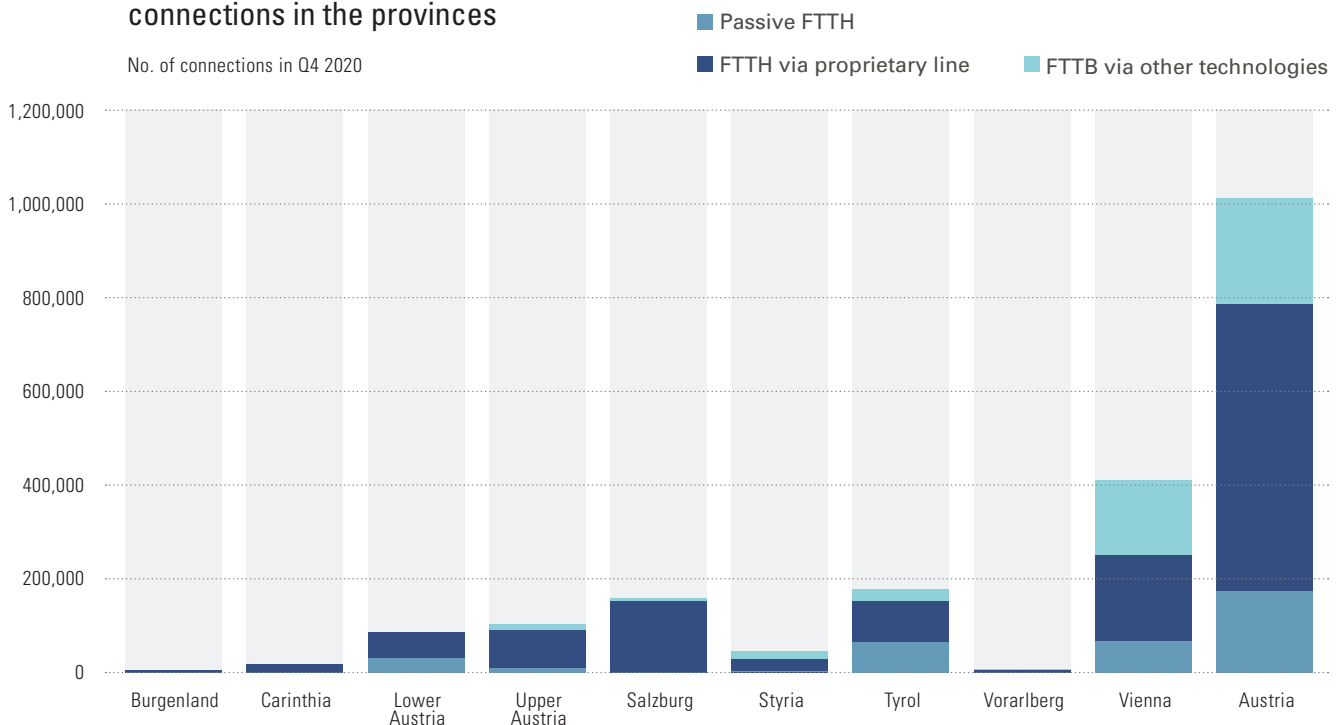
- In Austria as a whole, a total of 53.1 per cent of DOCSIS connections supported DOCSIS 3.1 at year-end 2020. Almost all of these supported speeds of  $\ge 1\text{ Gbps}$ .
- In Q4 2020 the DOCSIS 3.0 category accounted for 46.8 per cent of all DOCSIS connections available in Austria. Most of these connections are capable of achieving speeds of between  $\ge 300\text{ Mbps}$  and  $< 1\text{ Gbps}$ .
- As they possess very little market share, the technologies DOCSIS 1.0 and DOCSIS 2.0 play only a minor role.
- Bandwidths of at least 300 Mbps are achieved by around 96.0 per cent of cable connections.

Alongside the copper-based xDSL technology, broadband access provided using DOCSIS via cable TV networks is also a significant technology in Austria. Most of this capacity can be implemented using DOCSIS 3.0 and DOCSIS 3.1. According to figures from providers, bandwidths in excess of 1 Gbps can be offered here. Older versions of DOCSIS (1.0 and 2.0) play no further role today.

## Coverage with FTTx broadband connections in the provinces

More than 60 per cent of fibre-optic connections available via FTTH over own lines

### Coverage with FTTx broadband connections in the provinces



- Slightly more than a million fibre-optic connections were available in Austria in Q4 2020.
- Nationwide, the largest proportion of these connections (60.5%, 613K connections) was accounted for by the category of FTTH using own lines in Q4 2020. Most of these connections were to be found in Vienna (approx. 183.5K connections), followed by Salzburg (approx. 152.6K), Tyrol (86.9K) and Upper Austria (79.3K).
- Of the fibre-optic connections registered in Austria, 22.3 per cent were accounted for by 'FTTB other technologies' in Q4 2020. Compared regionally, Vienna accounted for the vast majority of these connections (160.8K) at year-end 2020. A total of 26.5K connections were reported for Tyrol in Q4 2020.
- With a figure of 67.3K, Vienna also takes the top spot in terms of potential coverage with passive FTTH connections, with Tyrol only just behind at a total of 64.4K connections.

The chart depicts current potential coverage with broadband connections based on fibre-optic technology, grouped by passive FTTH connections, FTTH using the operator's own lines and FTTB using other technologies. While fibre reaches right into the home with FTTH, FTTB only connects the building itself to the operator's wider fibre-optic network.

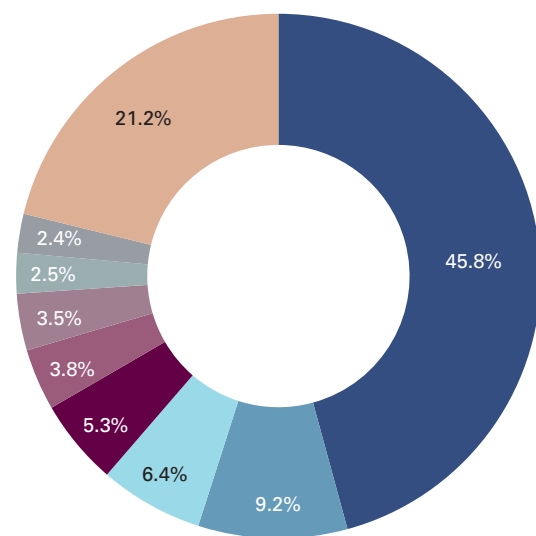
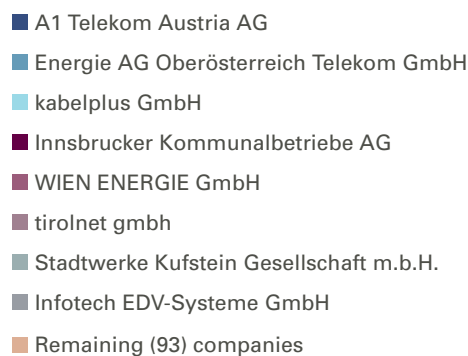
In the case of passive FTTH connections, the underlying infrastructure (optical fibre) is installed by a company that is not necessarily a telecoms operator. This gives telecoms providers the option of rendering services to end users over passive FTTH connections.

With FTTB based on other technologies, the 'local loop' that runs to the end user is typically implemented using DOCSIS, DSL and Ethernet.

## Major FTTH providers (by number of active connections)

Largest FTTH providers are cable TV operators,  
power suppliers and municipal service providers

### Major FTTH providers (by number of active connections)



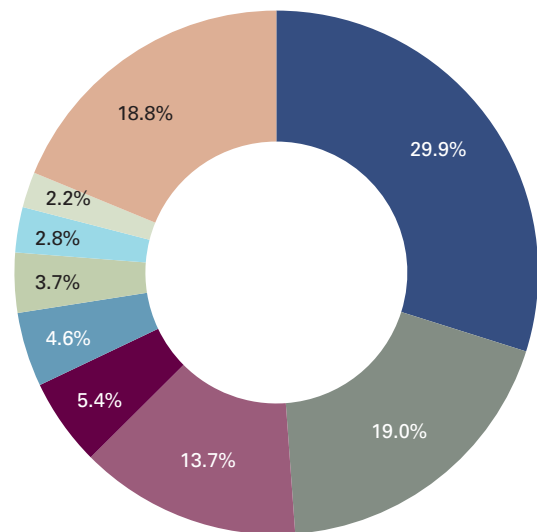
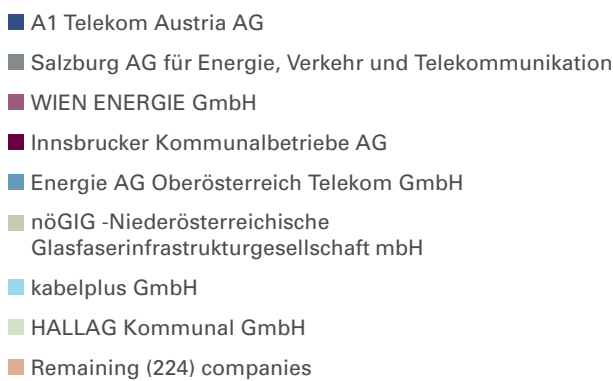
- In Q4 2020 the largest provider was A1 Telekom Austria, with a market share of 45.8 per cent.
- With a share of 9.2 per cent, the second-largest FTTH provider on the Austrian market is Energie AG Oberösterreich Telekom GmbH, followed by kabelplus GmbH (6.4%) and Innsbrucker Kommunalbetriebe AG (5.3%).
- In Q4 2020 the combined share held by other FTTH operators in the market totalled around 21.2 per cent, split between a total of 93 operators.

The chart depicts the market share of major FTTH providers (by number of active connections). Operators are shown separately if their market share exceeds 2 per cent.

## Major FTTH providers (supply side)

Largest FTTH providers are cable TV operators, power suppliers and municipal service providers

### Largest FTTH providers (supply side)



- With a share of 29.9 per cent, A1 Telekom Austria also led the supply-side rankings in Q4 2020.
- At the end of 2020, 224 operators (collectively referenced as 'Other companies') accounted for a share of 18.8 per cent.

The chart depicts the market share held by major (supply-side) FTTH providers. Operators are shown separately if their market share exceeds 2 per cent.



Table 27: Coverage with fixed network broadband connections in Q4 2020  
[> see page 55](#)

|               | Percentage level of coverage (excluding redundant coverage) |
|---------------|---|
| Burgenland    | 91.4%   |
| Carinthia     | 82.5%   |
| Lower Austria | 84.4%   |
| Upper Austria | 82.1%   |
| Salzburg      | 98.6%   |
| Styria        | 85.3%   |
| Tyrol         | 88.0%   |
| Vorarlberg    | 91.4%   |
| Vienna        | 97.7%   |

Table 28: Number of fixed broadband providers per province in Q4 2020  
[> see page 56](#)

|               | Passive in-house | Passive network | Active network | Integrated provider | Purely service provider |
|---------------|------------------|-----------------|----------------|---------------------|-------------------------|
| Burgenland    | 0                | 0               | 3              | 5                   | 8                       |
| Carinthia     | 0                | 0               | 21             | 19                  | 9                       |
| Lower Austria | 1                | 4               | 37             | 33                  | 17                      |
| Upper Austria | 1                | 3               | 49             | 46                  | 13                      |
| Salzburg      | 1                | 0               | 18             | 15                  | 10                      |
| Styria        | 4                | 3               | 37             | 34                  | 12                      |
| Tyrol         | 4                | 129             | 48             | 39                  | 14                      |
| Vorarlberg    | 1                | 0               | 13             | 11                  | 10                      |
| Vienna        | 3                | 2               | 24             | 19                  | 17                      |
| Austria       | 12               | 139             | 158            | 133                 | 25                      |

Table 29: Coverage with fixed broadband connections by technology in Q4 2020  
[> see page 57](#)

|               | Copper | Coaxial cable | FTTH  | FTTH in-house | FWA/LTE | WiFi  | Other |
|---------------|--------|---------------|-------|---------------|---------|-------|-------|
| Burgenland    | 83.2%  | 49.4%         | 2.6%  | 0.0%          | 0.0%    | 50.7% | 0.0%  |
| Carinthia     | 81.1%  | 15.5%         | 5.0%  | 0.0%          | 0.0%    | 0.0%  | 0.0%  |
| Lower Austria | 80.4%  | 24.1%         | 5.2%  | 0.0%          | 0.0%    | 24.9% | 0.0%  |
| Upper Austria | 79.9%  | 14.0%         | 9.1%  | 0.0%          | 0.0%    | 6.8%  | 0.0%  |
| Salzburg      | 86.5%  | 76.5%         | 44.9% | 0.0%          | 84.6%   | 0.1%  | 0.0%  |
| Styria        | 84.0%  | 26.9%         | 3.6%  | 0.5%          | 3.1%    | 0.2%  | 0.3%  |
| Tyrol         | 80.4%  | 42.1%         | 18.8% | 0.2%          | 0.0%    | 0.2%  | 0.1%  |
| Vorarlberg    | 87.6%  | 51.0%         | 2.5%  | 2.3%          | 0.0%    | 0.0%  | 0.0%  |
| Vienna        | 96.9%  | 95.7%         | 17.0% | 0.1%          | 0.0%    | 0.0%  | 0.0%  |
| Austria       | 85.0%  | 43.6%         | 11.5% | 0.2%          | 5.8%    | 7.9%  | 0.1%  |

Table 30: Coverage with broadband connections by bandwidth category in Q4 2020  
> see page 58

|                       | BL    | C     | LA    | UA    | S     | ST    | T     | VB    | V     | Austria |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|
| ≥1 Gbps               | 0.9%  | 15.8% | 7.1%  | 8.6%  | 0.5%  | 12.3% | 30.3% | 16.2% | 34.6% | 18.8%   |
| ≥300 Mbps to <1 Gbps  | 30.4% | 12.9% | 21.5% | 13.0% | 17.6% | 9.4%  | 12.0% | 20.6% | 4.3%  | 12.3%   |
| ≥150 to <300 Mbps     | 8.6%  | 22.5% | 14.2% | 12.1% | 31.3% | 15.7% | 11.6% | 18.6% | 9.7%  | 14.5%   |
| ≥100 to <150 Mbps     | 4.9%  | 10.4% | 8.0%  | 7.2%  | 3.4%  | 7.8%  | 7.3%  | 9.7%  | 4.3%  | 6.2%    |
| ≥75 Mbps to <100 Mbps | 3.7%  | 6.5%  | 5.5%  | 5.3%  | 2.7%  | 5.8%  | 4.7%  | 6.4%  | 2.0%  | 4.1%    |
| ≥50 Mbps to <75 Mbps  | 5.9%  | 9.7%  | 8.0%  | 9.0%  | 4.1%  | 9.4%  | 7.5%  | 8.4%  | 5.0%  | 6.8%    |
| ≥30 Mbps to <50 Mbps  | 6.2%  | 8.7%  | 6.7%  | 11.4% | 4.1%  | 14.0% | 9.2%  | 7.7%  | 10.3% | 9.2%    |
| ≥10 Mbps to <30 Mbps  | 32.6% | 6.7%  | 22.7% | 16.6% | 32.1% | 17.2% | 10.9% | 7.8%  | 21.1% | 19.9%   |
| ≥2 Mbps to <10 Mbps   | 6.1%  | 6.4%  | 5.8%  | 15.2% | 3.6%  | 7.9%  | 6.2%  | 4.6%  | 7.3%  | 7.3%    |
| ≥1 to <2 Mbps         | 0.7%  | 0.4%  | 0.5%  | 1.7%  | 0.5%  | 0.6%  | 0.3%  | 0.0%  | 1.4%  | 0.9%    |
| <1 Mbps               | 0.0%  | 0.0%  | 0.0%  | 0.0%  | 0.0%  | 0.0%  | 0.0%  | 0.0%  | 0.0%  | 0.0%    |

Table 31: Demand for broadband connections by technology/service  
> see page 59

|               | BL    | C     | LA    | UA    | S     | ST    | T     | VB    | V     | Austria |
|---------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|
| Copper        | 28.5% | 38.3% | 37.0% | 27.5% | 23.8% | 34.2% | 30.7% | 31.7% | 16.0% | 28.3%   |
| Hybrid        | 6.7%  | 5.7%  | 6.6%  | 7.8%  | 5.0%  | 7.5%  | 5.3%  | 3.6%  | 5.0%  | 6.1%    |
| vULL          | 1.1%  | 3.0%  | 2.9%  | 2.5%  | 2.5%  | 3.1%  | 3.3%  | 6.0%  | 2.1%  | 2.8%    |
| Hybrid/vULL   | 0.4%  | 0.7%  | 0.6%  | 0.4%  | 0.6%  | 0.6%  | 0.5%  | 0.6%  | 0.4%  | 0.5%    |
| Coaxial cable | 24.1% | 6.8%  | 11.5% | 21.0% | 37.5% | 11.7% | 18.7% | 26.7% | 43.9% | 23.9%   |
| FTTH          | 1.2%  | 1.3%  | 3.2%  | 4.2%  | 1.6%  | 1.4%  | 8.2%  | 1.2%  | 3.4%  | 3.2%    |
| Mobile cubes  | 37.1% | 43.8% | 37.5% | 35.8% | 28.6% | 41.2% | 32.7% | 30.1% | 29.1% | 34.8%   |
| FWA/LTE       | 0.0%  | 0.0%  | 0.0%  | 0.0%  | 0.2%  | 0.0%  | 0.0%  | 0.0%  | 0.0%  | 0.0%    |
| WiFi          | 0.8%  | 0.3%  | 0.5%  | 0.7%  | 0.1%  | 0.1%  | 0.3%  | 0.0%  | 0.0%  | 0.3%    |
| Other         | 0.0%  | 0.0%  | 0.0%  | 0.0%  | 0.0%  | 0.1%  | 0.2%  | 0.0%  | 0.0%  | 0.0%    |

Table 32: Demand by broadband category in Q4 2020  
> see page 60

|                       | BL    | C     | LA    | UA    | S     | ST    | T     | VB    | V     | Austria |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|
| ≥1 Gbps               | 0.0%  | 0.0%  | 0.0%  | 2.2%  | 0.2%  | 0.0%  | 0.3%  | 0.0%  | 0.4%  | 0.4%    |
| ≥300 Mbps to <1 Gbps  | 25.3% | 1.7%  | 9.3%  | 0.7%  | 0.6%  | 0.8%  | 3.5%  | 1.7%  | 3.9%  | 4.3     |
| ≥150 to <300 Mbps     | 1.9%  | 4.5%  | 4.2%  | 3.2%  | 3.7%  | 6.5%  | 7.2%  | 8.6%  | 17.2% | 8.1%    |
| ≥100 to <150 Mbps     | 1.2%  | 2.9%  | 2.0%  | 2.9%  | 3.9%  | 2.5%  | 5.9%  | 3.9%  | 7.5%  | 4.2%    |
| ≥75 Mbps to <100 Mbps | 5.3%  | 8.9%  | 8.5%  | 5.9%  | 20.7% | 8.6%  | 10.7% | 10.7% | 12.5% | 10.2%   |
| ≥50 Mbps to <75 Mbps  | 3.7%  | 4.9%  | 5.6%  | 5.3%  | 3.1%  | 4.9%  | 5.8%  | 9.5%  | 4.2%  | 5.0%    |
| ≥30 Mbps to <50 Mbps  | 24.0% | 33.3% | 28.2% | 30.5% | 39.1% | 32.4% | 28.7% | 26.2% | 21.7% | 28.2%   |
| ≥10 Mbps to <30 Mbps  | 28.2% | 31.9% | 29.8% | 32.6% | 19.6% | 32.4% | 27.4% | 30.8% | 20.9% | 27.5%   |
| ≥2 Mbps to <10 Mbps   | 9.0%  | 10.7% | 11.0% | 14.8% | 7.3%  | 10.8% | 8.9%  | 7.4%  | 5.4%  | 9.4%    |
| ≥1 to <2 Mbps         | 0.0%  | 0.0%  | 0.0%  | 0.1%  | 0.5%  | 0.0%  | 0.0%  | 0.1%  | 0.0%  | 0.1%    |
| <1 Mbps               | 1.4%  | 1.2%  | 1.4%  | 1.9%  | 1.3%  | 1.2%  | 1.6%  | 1.1%  | 6.4%  | 2.7%    |

Table 33: Demand-supply gap by bandwidth (supply vs. demand in Q4 2020)  
[> see page 61](#)

|                       | Cumulative supply | Cumulative demand |
|-----------------------|-------------------|-------------------|
| ≥1 Gbps               | 18.8%             | 0.4%              |
| ≥300 Mbps to <1 Gbps  | 31.1%             | 4.7%              |
| ≥150 to <300 Mbps     | 45.6%             | 12.8%             |
| ≥100 to <150 Mbps     | 51.8%             | 17.0%             |
| ≥75 Mbps to <100 Mbps | 55.9%             | 27.2%             |
| ≥50 Mbps to <75 Mbps  | 62.7%             | 32.2%             |
| ≥30 Mbps to <50 Mbps  | 72.0%             | 60.4%             |
| ≥10 Mbps to <30 Mbps  | 91.8%             | 87.9%             |
| ≥2 Mbps to <10 Mbps   | 99.1%             | 97.2%             |
| ≥1 to <2 Mbps         | 100.0%            | 97.3%             |
| <1 Mbps               | 100.0%            | 100.0%            |

Table 34: Coverage with xDSL connections by bandwidth category in Q4 2020  
[> see page 62](#)

|                       | xDSL MDF | xDSL FTTC | xDSL FTTB | xDSL total |
|-----------------------|----------|-----------|-----------|------------|
| ≥1 Gbps               | 0.0%     | 0.0%      | 0.0%      | 0.0%       |
| ≥300 Mbps to <1 Gbps  | 0.3%     | 10.6%     | 0.4%      | 11.3%      |
| ≥150 to <300 Mbps     | 3.3%     | 13.6%     | 3.5%      | 20.3%      |
| ≥100 to <150 Mbps     | 4.1%     | 5.3%      | 0.0%      | 9.4%       |
| ≥75 Mbps to <100 Mbps | 4.0%     | 3.5%      | 0.0%      | 7.5%       |
| ≥50 Mbps to <75 Mbps  | 8.8%     | 3.3%      | 0.0%      | 12.1%      |
| ≥30 Mbps to <50 Mbps  | 12.3%    | 1.7%      | 0.0%      | 14.0%      |
| ≥10 Mbps to <30 Mbps  | 12.0%    | 0.9%      | 0.0%      | 13.0%      |
| ≥2 Mbps to <10 Mbps   | 11.1%    | 0.5%      | 0.0%      | 11.6%      |
| ≥1 to <2 Mbps         | 0.9%     | 0.0%      | 0.0%      | 0.8%       |
| <1 Mbps               | 0.0%     | 0.0%      | 0.0%      | 0.0%       |

Table 35: Coverage with DOCSIS connections by bandwidth category  
[> see page 63](#)

|                       | DOCSIS 1.0 and 2.0 | DOCSIS 3.0 | DOCSIS 3.1 | DOCSIS total |
|-----------------------|--------------------|------------|------------|--------------|
| ≥1 Gbps               | 0.0%               | 0.1%       | 53.1%      | 53.2%        |
| ≥300 Mbps to <1 Gbps  | 0.0%               | 31.6%      | 0.0%       | 31.6%        |
| ≥150 to <300 Mbps     | 0.0%               | 11.2%      | 0.0%       | 11.2%        |
| ≥100 to <150 Mbps     | 0.0%               | 0.6%       | 0.0%       | 0.6%         |
| ≥75 Mbps to <100 Mbps | 0.0%               | 0.0%       | 0.0%       | 0.0%         |
| ≥50 Mbps to <75 Mbps  | 0.0%               | 0.1%       | 0.0%       | 0.2%         |
| ≥30 Mbps to <50 Mbps  | 0.0%               | 1.7%       | 0.0%       | 1.7%         |
| ≥10 Mbps to <30 Mbps  | 0.0%               | 0.8%       | 0.0%       | 0.8%         |
| ≥2 Mbps to <10 Mbps   | 0.0%               | 0.7%       | 0.0%       | 0.7%         |
| ≥1 to <2 Mbps         | 0.0%               | 0.0%       | 0.0%       | 0.0%         |
| <1 Mbps               | 0.0%               | 0.0%       | 0.0%       | 0.0%         |

Table 36: Coverage with FTTx broadband connections in the provinces (number of connections) in Q4 2020  
[> see page 64](#)

|               | passive FTTH | FTTH over own lines | FTTB other technologies |
|---------------|--------------|---------------------|-------------------------|
| Burgenland    | 0            | 4,749               | 151                     |
| Carinthia     | 0            | 18,056              | 226                     |
| Lower Austria | 30,601       | 54,887              | 757                     |
| Upper Austria | 9,973        | 79,335              | 13,061                  |
| Salzburg      | 0            | 152,590             | 5,312                   |
| Styria        | 1,939        | 26,900              | 17,022                  |
| Tyrol         | 64,409       | 86,935              | 26,539                  |
| Vorarlberg    | 0            | 5,704               | 1,469                   |
| Vienna        | 67,384       | 183,497             | 160,773                 |
| Austria       | 174,306      | 612,653             | 225,310                 |

Table 37: Major FTTH providers (by number of active connections) in Q4 2020  
[> see page 65](#)

|   |       |
|---|-------|
| A1 Telekom Austria AG                   | 45.8% |
| Energie AG Oberösterreich Telekom GmbH  | 9.2%  |
| kabelplus GmbH                          | 6.4%  |
| Innsbrucker Kommunalbetriebe AG         | 5.3%  |
| WIEN ENERGIE GmbH                       | 3.8%  |
| tirolnet gmbh                           | 3.5%  |
| Stadtwerke Kufstein Gesellschaft m.b.H. | 2.5%  |
| Infotech EDV-Systeme GmbH               | 2.4%  |
| Remaining companies (93)                | 21.2% |

Table 38: 10 largest FTTH providers (supply side) in Q4 2020  
[> see page 66](#)

|  |       |
|--|-------|
| A1 Telekom Austria AG  | 29.9% |
| Salzburg AG für Energie, Verkehr und Telekommunikation               | 19.0% |
| WIEN ENERGIE GmbH  | 13.7% |
| Innsbrucker Kommunalbetriebe AG                                      | 5.4%  |
| Energie AG Oberösterreich Telekom GmbH                               | 4.6%  |
| nöGIG - Niederösterreichische Glasfaserinfrastrukturgesellschaft mbH | 3.7%  |
| kabelplus GmbH   | 2.8%  |
| HALLAG Kommunal GmbH   | 2.2%  |
| Remaining companies (224)  | 18.8% |





# Explanatory notes and Glossary



## Explanatory notes on data sources

### Communications Survey Ordinance

Unless stated otherwise, the charts published in the Internet Monitor are based on data collected in accordance with the Communications Survey Ordinance (KEV), FLG II 365/2004, which became effective as of 1 October 2004. Under the KEV, RTR is obliged to carry out quarterly surveys of communications markets and to compile and publish the statistics. The most recent amendment of the KEV entered into force on 1 October 2017, so that accordingly amended data was collected for the first time in Q4 2017.

The data collected under the KEV can be viewed as Open Data in the formats XLSX, CSV, XML and JSON at <https://www.rtr.at> (in German).

### Broadband prices

RTR collects broadband price information directly from operators' websites once every quarter, in March, June, September and December. In addition to one-off, yearly and monthly charges, information is collected on a variety of product features, such as bandwidth, included volume and whether or not bundled (i.e. with a fixed line or TV).

These operators and/or brands are currently considered when determining the hedonic index or the price baskets: A1, Magenta, Hutchison (3), LIWEST, Salzburg AG, Kabelplus, Russmedia IT (VOL), bob, Telering and HoT (Hofer Telekom).

### RTR-NetTest

Data collected through the RTR-NetTest are available as Open Data under the Creative Commons Attribution 4.0 (CC BY 4.0) licence; see <https://www.netztest.at/en/Opendata>.

### Single Information Point for Broadband Coverage

Pursuant to the Ordinance on the Single Information Point for Broadband Coverage (ZIB-V), RTR is tasked with collecting data on fixed and mobile broadband coverage in Austria. From Q3 2020 onwards, these data can be downloaded via the respective Internet Monitor – see <https://www.rtr.at/TKP/aktuelles/publikationen/Uebersichtseite.en.html>

## Glossary

### Bitstream and resale

Bitstream and resale access are wholesale products sold at different levels of the value chain. These products allow internet connections to be provided to end users. With bitstream access, data traffic is transferred at predefined (regional or national) handover points at IP level, with the wholesale customer directly providing internet connectivity. By comparison, in the case of resale access, the wholesale supplier provides internet connectivity, with the wholesale customer acting merely as reseller.

### Broadband

Broadband internet access or a broadband internet connection refers to an internet connection that supports a download speed higher than 144 kbps, independent of the technology implemented. Internet access can also be provided as part of a bundle with other services. The connection can be established by any of the following means:

- Proprietary line (a copper wire pair in the A1 Telekom Austria AG network)
- Unbundled line (see unbundling)
- Virtual unbundling (see virtual unbundling)
- Coaxial cable (cable modem)
- Fixed wireless access, e.g. WLAN, WiFi or WLL ('fixed' access but not via a hotspot)
- Other infrastructure, including powerline (PWL) broadband via the power grid and satellite (SAT) broadband access

### Unbundling (physical)

In telecommunications, physical unbundling refers to the separate provision of specific services which were previously only available in conjunction with other services. The unbundling of subscriber lines from fixed network access as offered by the incumbent operator gives competing service providers direct access to customers without requiring those providers to install the 'last mile' themselves, allowing them instead to lease (naked) subscriber lines from the incumbent under regulated terms. Unbundled network elements are made available where based on a market analysis procedure the regulatory authority identifies one company having significant market power and imposes on that operator the obligation to grant access to its telecommunications network and the corresponding unbundled elements.

### Hybrid products

With hybrid products, data traffic is normally routed via a fixed connection (usually based on DSL) and additionally via a mobile network when required.

### Median

The median is the value at the exact midpoint of a sorted list of empirical values. The median is an actual empirical value, unlike the mean, which is a parameter calculated using statistical techniques. The mean for the values 1, 2, 4, 8 and 16 is 6.2, for example. The median, in contrast, is 4, with two other empirical values each above and below that value.

### Mobile broadband

With mobile broadband, a distinction is made between data-only subscriptions at a set monthly fee, data subscriptions without a set monthly fee and smartphone subscriptions.

Up to Q4 2015, data-only subscriptions (which support data but not voice calls or text messages) were restricted to those that included at least 250 megabytes in the monthly rate. This restriction was lifted as of Q1 2016. From Q4 2017 onwards, an activity criterion has also been introduced for this category: SIM cards are counted only if used to access the internet at least once in the corresponding quarter.

Falling within the category of products without a set monthly charge are products with a monthly charge that does not cover free data but are used by customers to access the internet at least once in the particular quarter.

Smartphone subscriptions are defined as all contracts for voice and text messaging services that also include data and are used by customers to access the internet at least once in the specific quarter. Prior to Q4 2015, such subscriptions were additionally restricted to those that included at least 250 megabytes in the monthly rate. This restriction was lifted as of Q1 2016.

### **Broadband price index (hedonic)**

The broadband index is a hedonic price index for fixed and mobile broadband products. 'Hedonic' refers to the fact that both price changes and changes in product characteristics (in particular download rate and download volume) are taken into account. To arrive at the index, a regressive analysis of prices is performed in relation to product characteristics and time variables.

For the calculation, tariffs and product characteristics are surveyed quarterly for the broadband products supplied by the major providers. All tariff plans available to new customers at that particular time are collected. Both standalone broadband products and products bundled with fixed line telephony or TV are surveyed. In the case of mobile broadband, prepaid rates are not included. In addition to monthly charges, one-off charges and annual charges as well as special offers are taken into account. The most expensive 10 per cent of subscriptions (currently plans costing more than about EUR 65) are not included in the calculation, as they can be assumed to be in low demand by customers. The remaining tariff plans are weighted in proportion to the operators' market shares in the respective quarter. All tariff plans offered by one operator are weighted by the same amount in one quarter. The reference base is 2010. The indexes are calculated by means of regressive analysis, first considering only fixed network tariff plans (fixed index), then only mobile subscriptions (mobile index) and finally all plans (fixed and mobile index).

As of this writing (Q2/2021), revisions are being made to the structure and content of the mobile network price index.

### **Private customers vs. business customers**

The definitions of private and business customer segments vary within the contexts of fixed network and mobile services. In the fixed network, the definitions are based on products (private customer product versus business customer product) and in mobile networks on the customer groups.

The following applies to fixed connections (DSL, cable, wireless and fibre):

'business customer products' are all broadband products or product bundles with broadband that are geared towards business customers. These products are either discernible by their name ('business', 'office', etc.) or include certain features that are not typically offered to private customers, such as one or more fixed IP addresses, a larger number of

mailboxes, more webspace, a domain name, a security package (antivirus, firewall or similar), business SLAs or lower average overselling on the backbone. SDSL products are also to be viewed as business customer products.

'Private customer products' are any products not to be categorised as business customer products.

The following applies to mobile connections:

'Business customers' are all legal persons and corporations under public or private law, partnerships, registered companies and partnerships under the Civil Code, as well as natural and legal persons who are entrepreneurs within the meaning of Art. 1 of the Austrian Consumer Protection Act, FLG 140/1979 as amended (including start-up activities within the meaning of Art. 1 Par. 3 of that act). In this context, a business means any organisation intended as permanent that is for the purpose of independent commercial activity, even if not for profit. 'Private customers' are all customers not falling under the definition above.

### **Virtual unbundling**

Under decisions by the TKK, A1 Telekom Austria AG is obliged to offer virtual unbundling, including transfer of traffic at local and regional levels. Virtual unbundling is a wholesale service that enables alternative providers to offer their own (broadband) products to end users, in a manner similar to physical unbundling.

### **Wholesale market**

The market in which telecoms companies offer services to one another, thereby enabling services to be provided to end users. An example is the wholesale broadband market, which includes all broadband connections made available by one company to other communications service providers for the purpose of allowing end users to access the network. A1 Telekom makes bitstream and unbundling available as regulated wholesale products.

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