RTR

RTR INTERNET MONITOR

Annual Report

2019

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2019

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Preface

Dear Reader,

what have we learned in recent weeks? Virtually overnight, the offline aspects of both our social and work lives have been shut down by the new physical distancing regulations. And then started up almost as quickly online: working from home instead of in the workplace, virtual meetings instead of conferences and business trips, home schooling, live streams of gigs, opera performances or fitness courses and, potentially in some cases, video chats instead of visits to hospitals or retirement homes – to name just a few examples. Without the internet, physical distancing plus more social interaction online would be unthinkable.

The latest Internet Monitor annual report offers a comprehensive picture of the Austrian broadband market. I'd like to take a moment to highlight a few of its key figures:

- In Q4 2019, there were around 10.6 million broadband connections in Austria, a rise of 2.7 per cent from 2018.
- A quarter of these are fixed-network connections, while three quarters utilise mobile networks.
- Fixed networks are responsible for two thirds of the data volume used, with mobile networks consuming one third.

As we have seen over the last few weeks, a functional internet connection is an essential service. Figures for the last few months will certainly be interesting, as will the trend until the end of the year. Once again, this has also highlighted the urgency with which we must expand mobile and fixed networks in order to ensure we remain 'crisis-proof' in the future.

I hope this summary has whetted your appetite for this year's report. On behalf of the report authors who collect and prepare the market data every quarter, I hope you enjoy reading this year's RTR Telecom Monitor.

Vienna,
June 2020

Dr. Klaus M. Steinmaurer
Managing Director
Telecommunications and Postal Services Division
RTR

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01

Broadband in Austria

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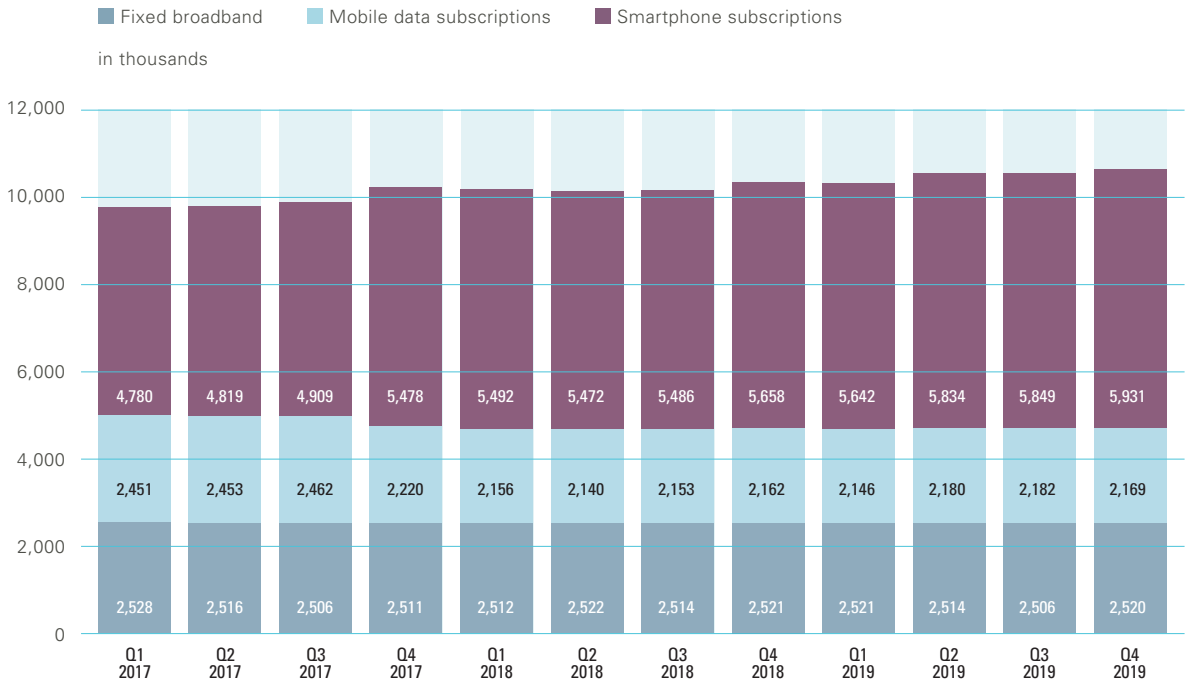
Fixed and mobile broadband connections

Around 10.62 million broadband connections in Austria in Q4 2019

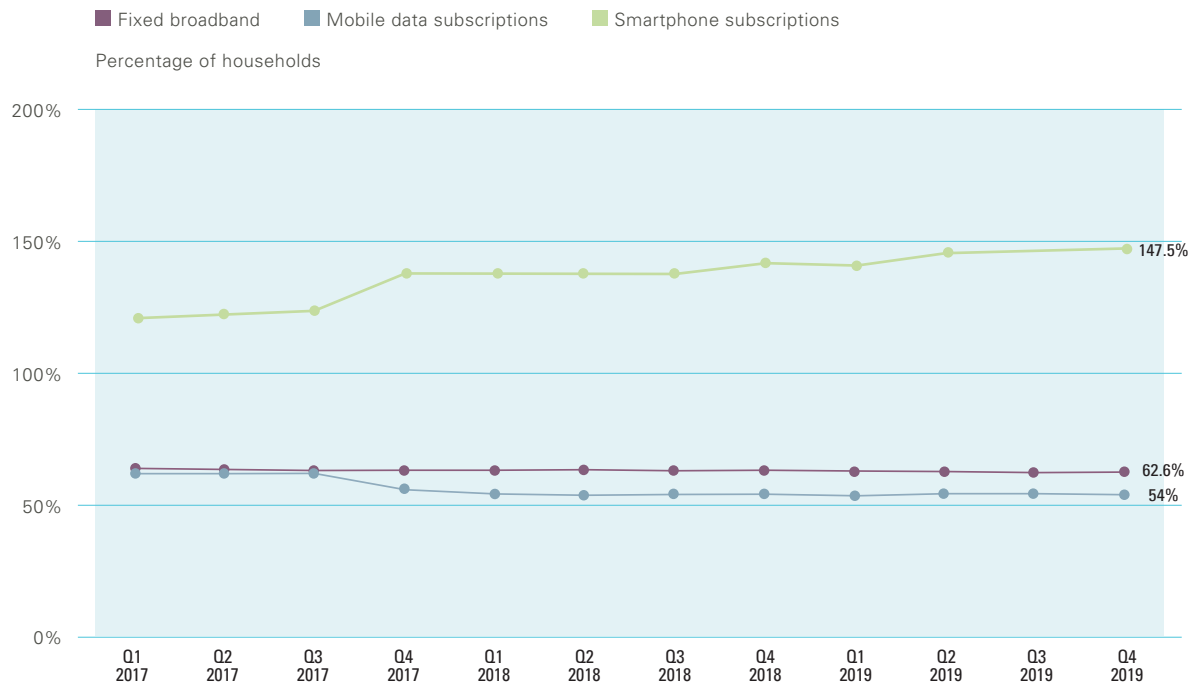


- In Q4 2019 Austria recorded around 10.62 million broadband connections, an increase of 2.7 per cent from the previous year. The rate of increase from the previous quarter was 0.8 per cent.
- Nearly a quarter of all connections in Q4 2019 were fixed broadband connections. The overall total of 2.52 million connections changed only slightly in comparison with the previous quarter and with the previous year.
- The total for mobile data subscriptions also remained virtually constant, both year on year and compared with the previous quarter. In Q4 2019 this figure was around 2.17 million, representing 20.4 per cent of all connections at this point in time.
- Smartphone subscriptions made up over half (55.8%) of all broadband connections at the end of 2019. Subscriptions rose continuously throughout 2019 and recorded an increase of 4.8 per cent in Q4 2019 compared with the previous year. The increase compared with the previous quarter was 1.4 percent.

The chart above shows the total number of fixed and mobile broadband connections. Fixed broadband connections include both those based on provider-owned infrastructure and unbundled lines, as well as those purchased in the wholesale market. Within mobile broadband, a distinction is made between mobile data subscriptions (with or without data volumes included) and smartphone subscriptions. M2M SIM cards are not shown in the chart. 'Broadband connections' is defined in the glossary at the end of the report.

Broadband penetration

Year-on-year rise in number of smartphone subscriptions



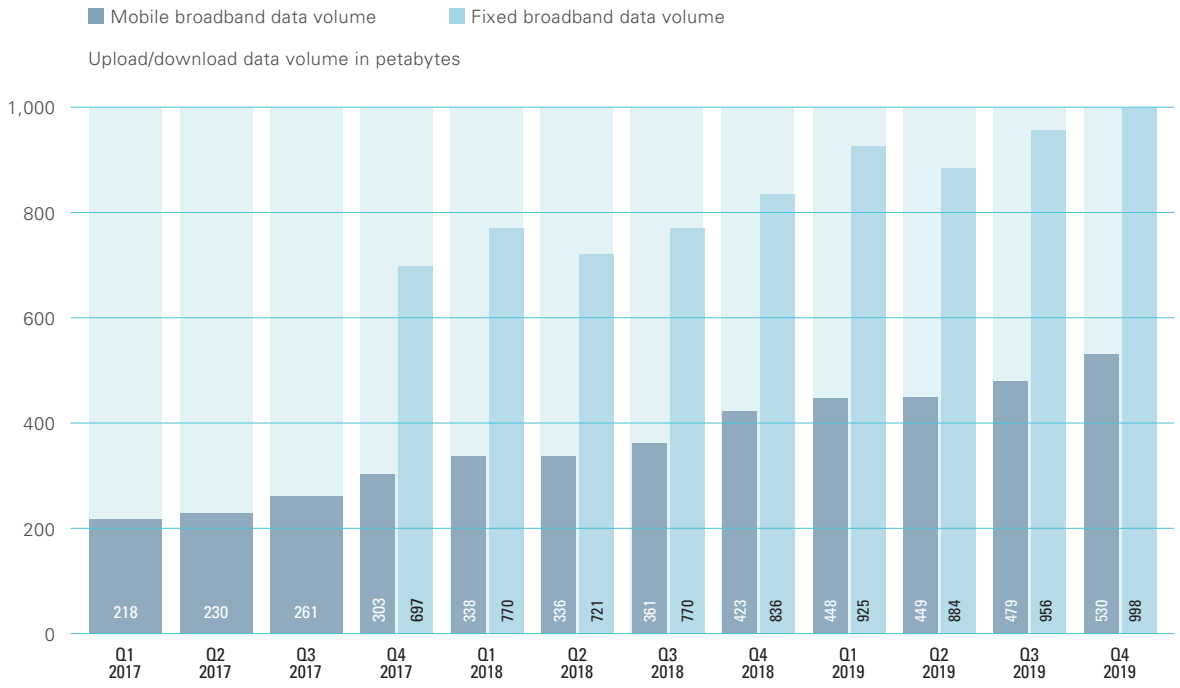
Source for number of households: Statistics Austria

- As in previous quarters, the smartphone subscription category achieved the highest market penetration: the broadband penetration rate for access via smartphone extended its lead by another 5.6 percentage points, reaching a new record figure of 147.5 per cent by the end of 2019.
- Although the penetration rate for fixed broadband connections experienced a slight year-on-year decline in Q4 2019, slipping by 0.9 per cent, mobile data subscriptions remained generally stable.
- In Q4 2019 fixed broadband was present in 62.6 per cent of households and 54 per cent of households had mobile data subscriptions.

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

More than 1,500 petabytes consumed in fixed/mobile networks overall

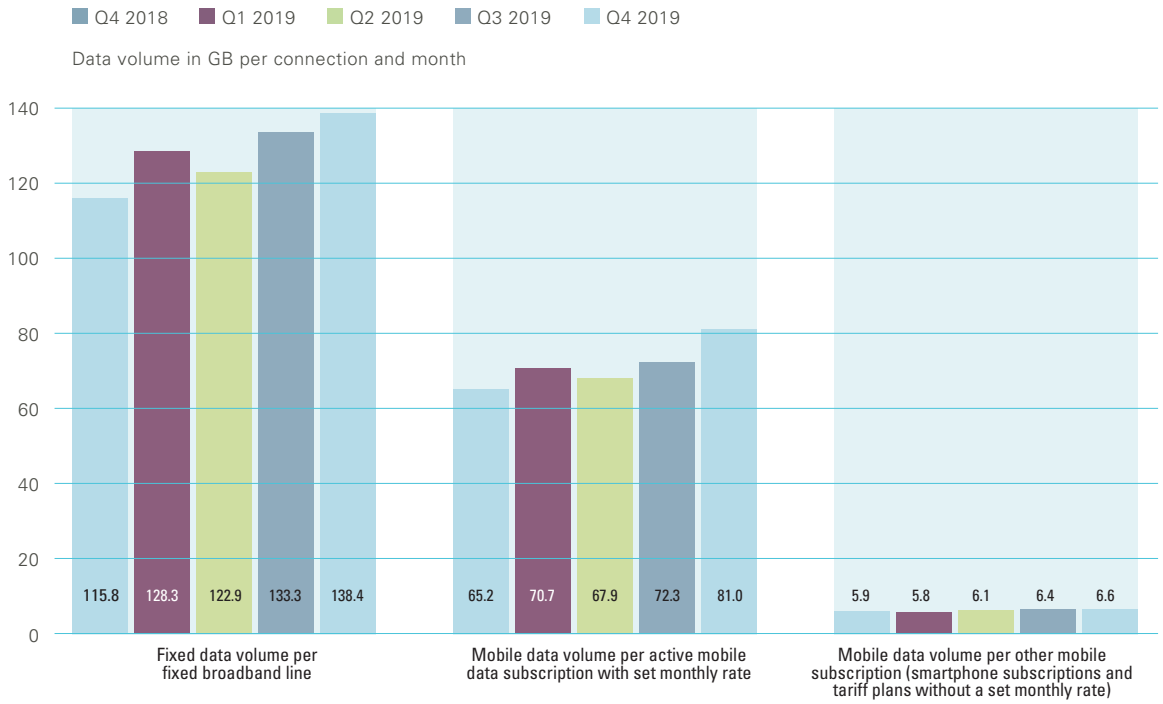


- In Q4 2019 data usage in fixed and mobile networks reached a new peak, totalling 1,528 petabytes overall.
- The fixed network data volume nearly passed the 1,000-petabyte mark for the first time in Q4 2019. This represents an increase of 4.4 per cent compared with the previous quarter and year-on-year growth of 19.5 per cent.
- The 500-petabyte milestone for data volume consumed was passed by mobile networks at the end of 2019. Then, an increase of 25.3 per cent was recorded compared with the previous year.
- Consumption of fixed data volume continues to be almost double that of mobile data volume.

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). The data volume for retail fixed networks is only available from Q4 2017 onwards.

Fixed and mobile data volume per connection

Significant year-on-year rise in data volume in the fixed network and mobile subscriptions with a fixed monthly fee

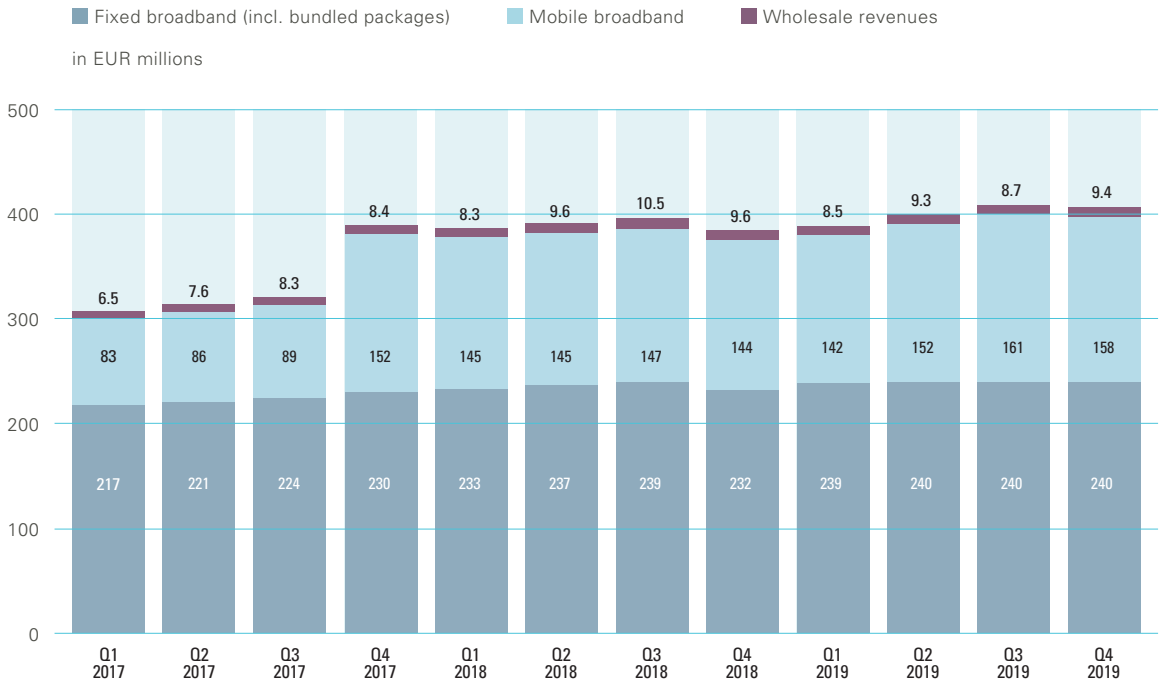


- In the fixed network, the data volume consumed per connection and month in Q4 2019 was around 138.4 GB, equal to a rise of 3.8 per cent compared with the previous quarter. This represents year-on-year growth of 19.5 per cent.
- A comparatively large year-on-year increase in average data use was recorded for data-only subscriptions with a fixed monthly fee (+24.3%).
- Data volume usage in smartphone bundles and data subscriptions without a fixed monthly fee rose 11.7 per cent to 6.6 GB/month compared with the previous year. A slight increase can also be identified here compared with the previous quarter.

The chart shows the volume of uploaded and downloaded data consumed in the fixed network 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

Total revenues of roughly EUR 1.6 billion in 2019



- Although broadband revenues fell slightly compared with the previous quarter (–0.7%), revenues were up again year on year in Q4 2019, rising by 5.4 per cent. In absolute terms, this represents an increase from EUR 386 million in Q4 2018 to EUR 407 million in Q4 2019.
- At 59 per cent, the largest share of total broadband revenues was earned once again by fixed broadband (including bundles). In Q4 2019, revenue amounted to around EUR 240 million.
- The share earned by mobile broadband was 38.8 per cent at the end of 2019 . Despite a slight decline compared with the previous quarter, there was a year-on-year increase of 9.7 per cent.
- At 2.2 per cent, wholesale sales made up the smallest share of overall broadband revenues. A notable decline was recorded here, with revenues falling 10 per cent compared with the previous year.

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). Up to and including Q3 2017, 'mobile broadband' also comprises 'fees for data and value-added data services', and as of Q4 2017 'data-only subscriptions'.

TABLE 01: FIXED AND MOBILE BROADBAND CONNECTIONS (IN THOUSANDS)

SEE PAGE 8

	Fixed broadband	Mobile data subscriptions	Smartphone subscriptions
Q1 2017	2,528	2,451	4,780
Q2 2017	2,516	2,453	4,819
Q3 2017	2,506	2,462	4,909
Q4 2017	2,511	2,220	5,478
Q1 2018	2,512	2,156	5,492
Q2 2018	2,522	2,140	5,472
Q3 2018	2,514	2,153	5,486
Q4 2018	2,521	2,162	5,658
Q1 2019	2,521	2,146	5,642
Q2 2019	2,514	2,180	5,834
Q3 2019	2,506	2,182	5,849
Q4 2019	2,520	2,169	5,931

TABLE 02: BROADBAND PENETRATION (IN PERCENTAGE OF HOUSEHOLDS)

SEE PAGE 9

	Fixed broadband	Mobile data subscriptions	Smartphone subscriptions
Q1 2017	64.0%	62.0%	121.0%
Q2 2017	63.6%	62.0%	121.8%
Q3 2017	63.2%	62.1%	123.8%
Q4 2017	63.3%	55.9%	138.0%
Q1 2018	63.3%	54.3%	138.3%
Q2 2018	63.5%	53.8%	137.7%
Q3 2018	63.1%	54.1%	137.8%
Q4 2018	63.3%	54.2%	141.9%
Q1 2019	63.0%	53.6%	141.0%
Q2 2019	62.8%	54.4%	145.7%
Q3 2019	62.4%	54.4%	145.7%
Q4 2019	62.6%	54.0%	147.5%

TABLE 03: DATA VOLUME (IN PETABYTES)

SEE PAGE 10

	Mobile broadband data volume	Fixed broadband data volume
Q1 2017	218	
Q2 2017	230	
Q3 2017	261	
Q4 2017	303	697
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

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 2018	115.8	65.2	5.9
Q1 2019	128.3	70.7	5.8
Q2 2019	122.9	67.9	6.1
Q3 2019	133.3	72.3	6.4
Q4 2019	138.4	81.0	6.6

TABLE 05: BROADBAND REVENUES (IN MILLIONS EURO)
SEE PAGE 12

	Fixed broadband (incl. bundled packages)	Mobile broadband	Wholesale revenues
Q1 2017	217	83	7
Q2 2017	221	86	8
Q3 2017	224	89	8
Q4 2017	230	152	8
Q1 2018	233	145	8
Q2 2018	237	145	10
Q3 2018	239	147	11
Q4 2018	232	144	10
Q1 2019	239	142	8
Q2 2019	240	152	9
Q3 2019	240	161	9
Q4 2019	240	158	9

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Fixed broadband

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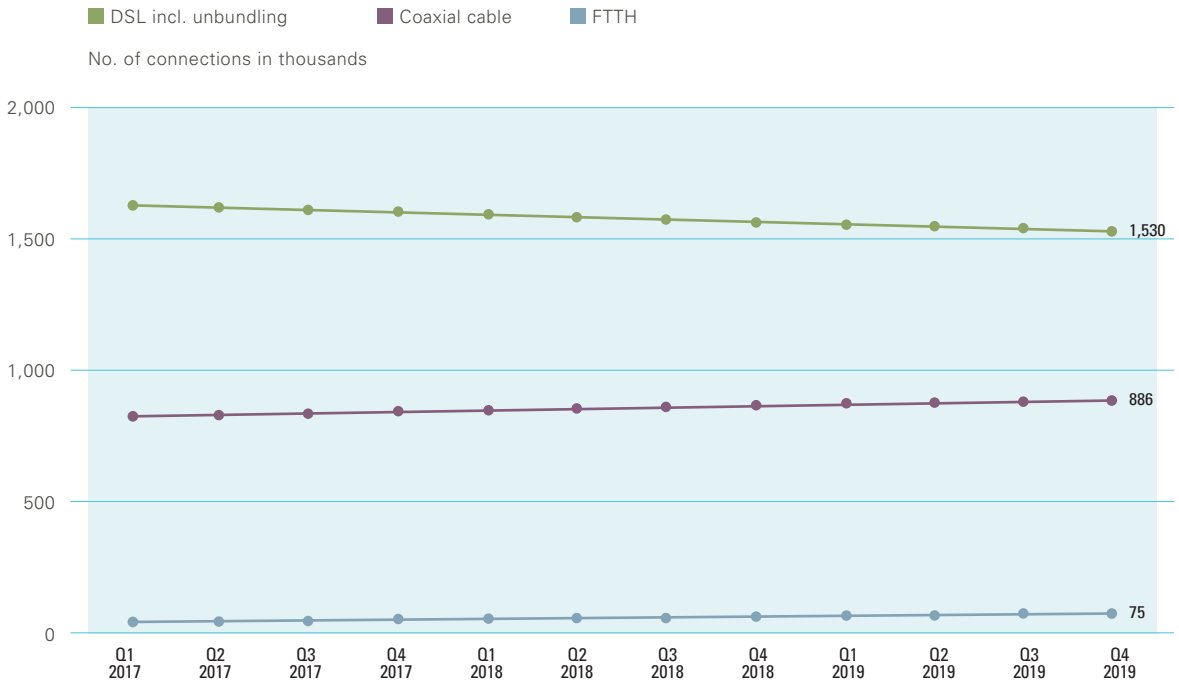
Retail fixed broadband by infrastructure

Slight year-on-year gains made by coaxial cable and FTTH broadband connections

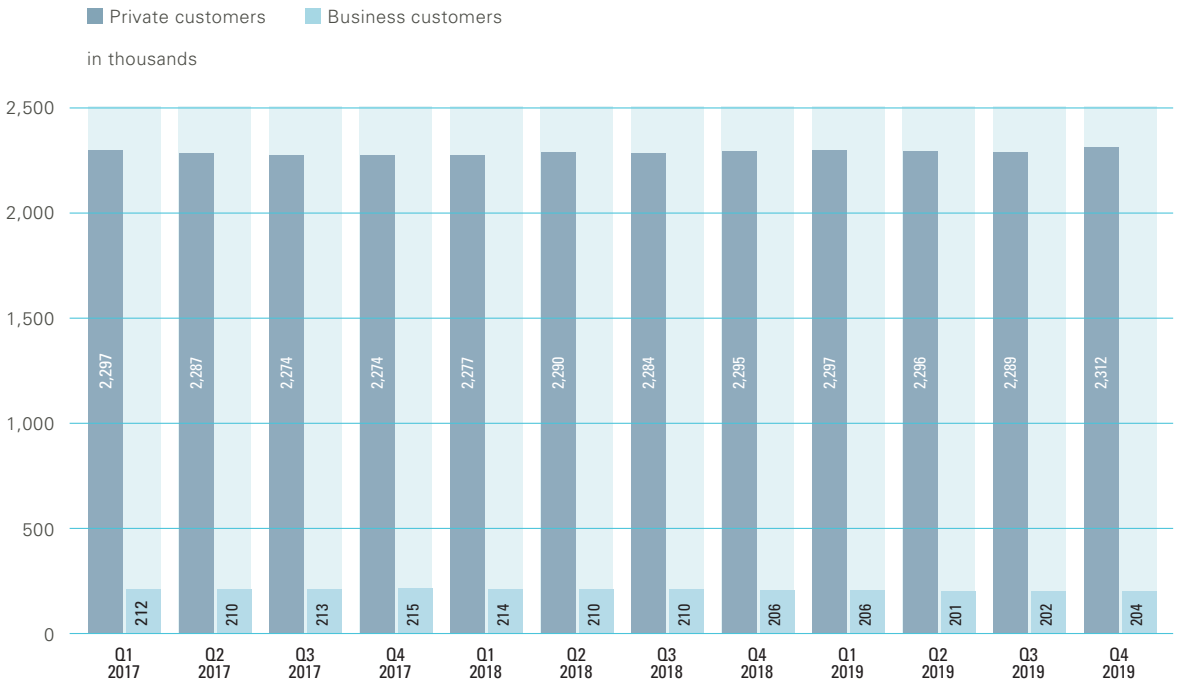


- FTTH connections as a proportion of fixed consumer broadband connections increased in the reporting year from 2.5 per cent in Q4 2018 to 3 per cent in Q4 2019. This corresponds to growth of around 12,000 connections.
- The number of cable connections rose by 1.7 per cent (15,000 connections) compared to the previous year. In Q4 2019 this category made up just over a third (35.2% in total) of all fixed broadband connections.
- With a share of 60.7 per cent, the majority of fixed consumer broadband connections in Q4 2019 were to be found in the DSL connections category (including unbundling). While no change in the number of these connections was seen compared with the previous quarter, a year-on-year comparison reveals a loss of 29,000 DSL connections, equivalent to a decline of 1.9 per cent.
- Retail FWA connections (not shown in the chart) stayed stable at around 28,000, with no changes seen either year-on-year or compared with the previous quarter.

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.

Retail fixed broadband by customer category

Around 2.31 million fixed private customer broadband connections in Austria

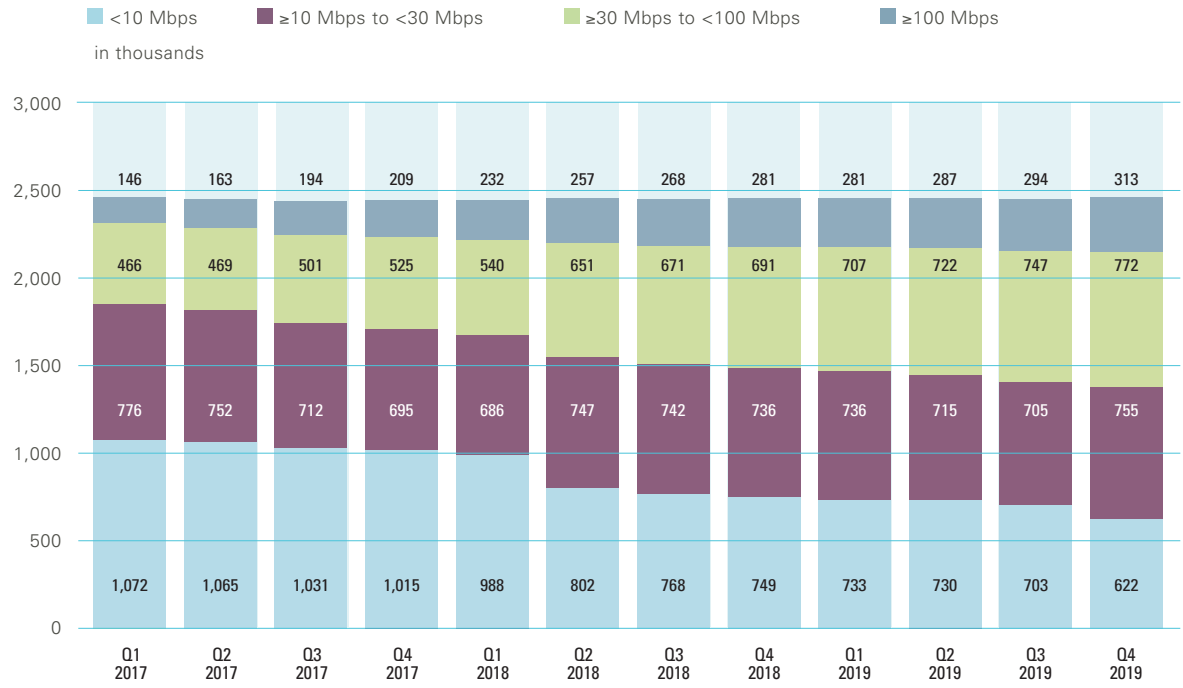


- In Q4 2019 the number of fixed broadband connections in the private customer segment rose above 2.31 million for the first time, equalling year-on-year growth of 0.7 per cent.
- In contrast, business customer products suffered a year-on-year decline of 1 per cent, falling from 206,000 to 204,000 connections.
- Overall, there were about 15,000 more connections in the private and business customer fixed broadband segments in Q4 2019 than in Q4 2018.

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

Drop in proportion of broadband connections under 30 Mbps

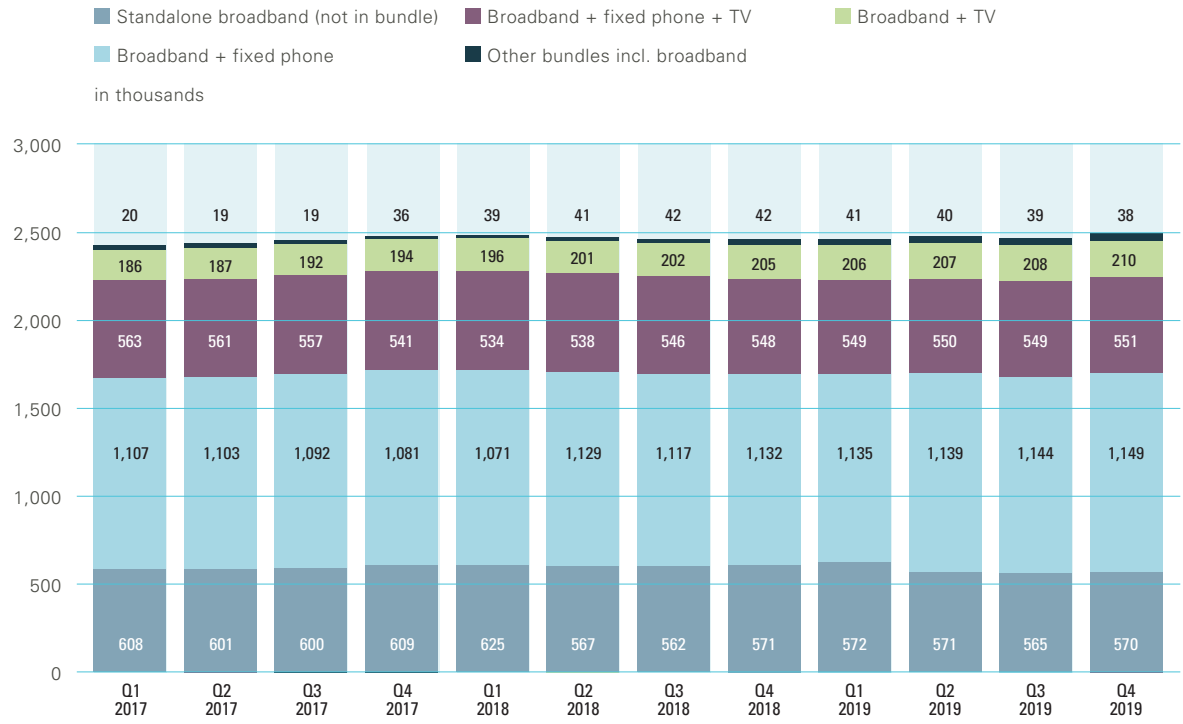


- In Q4 2019 there were around 2.46 million fixed broadband connections overall, some 0.2 per cent more than in Q4 2018. At the end of 2019 broadband connections in categories under 30 Mbps accounted for 55.9 per cent of all connections. In the previous year, this figure was 60.4 per cent.
- The biggest downward trend in Q4 2019 was recorded by fixed broadband connections in the <10 Mbps category, which fell 17.0 per cent year-on-year.
- In the category ≥10 to <30 Mbps, new connections in Q4 2019 rose by around 50,000 compared with the previous quarter. In comparison with the previous year, an increase of 2.6 per cent was recorded for this connection category.
- Most of the new connections installed were in the ≥30 to <100 Mbps category. In Q4 2019, growth of 11.7 per cent compared with Q4 2018 was observed in this category, with around 81,000 new connections installed. By the end of 2019, this category already accounted for 31.4 per cent of all fixed broadband connections.
- Strong demand continues to be seen for connections in the broadband category ≥100 Mbps, which made up 12.7 per cent of all fixed broadband connections in Q4 2019. Compared with Q4 2018, this category had added roughly 32,000 more connections by the end of December 2019.

The chart depicts the number of fixed broadband connections grouped by bandwidth category. The figures include connections based on provider-owned infrastructure or 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

Rise in number of fixed broadband connections bundled with TV

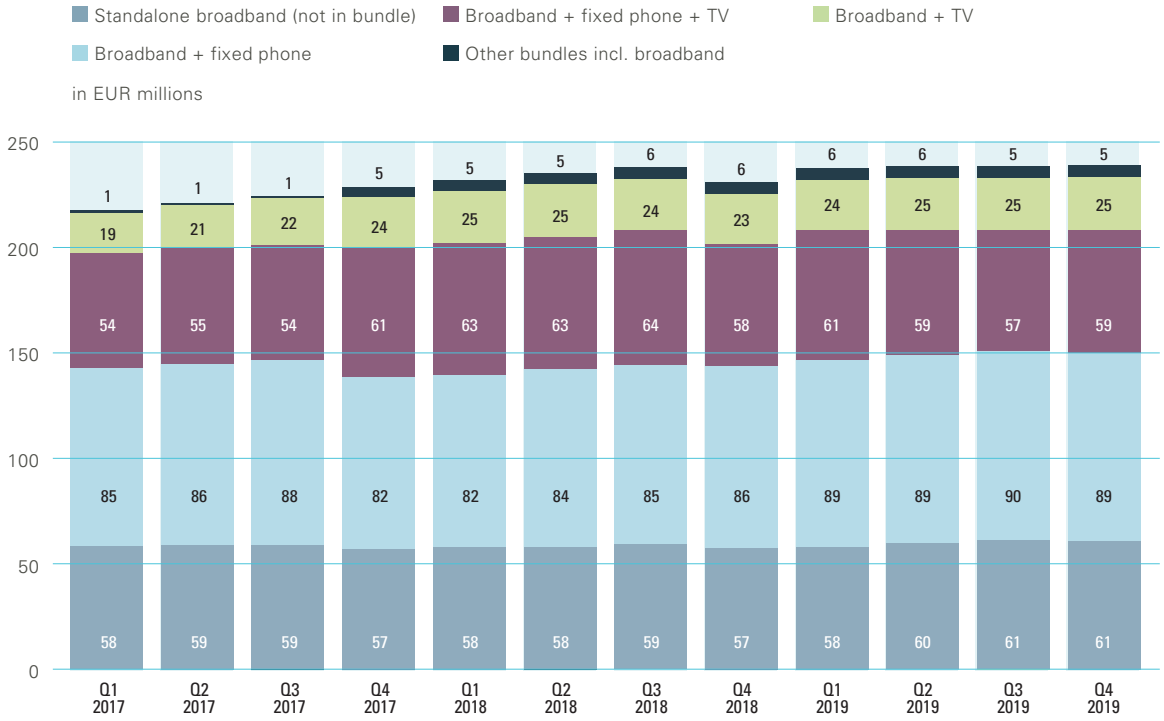


- The most popularcombination, with a share of 45.3 per cent of all fixed customer broadband connections in Q4 2019, continued to be broadband bundled with fixed voice telephony.This quarter recorded a 1.5 per cent growth in these connections compared with Q4 2018.
- In Q4 2019 the strongest growth compared with the previous quarter was seen in the category of fixed broadband combined with TV (+1%). With around 210,000 connections, this category accounted for 8.3 per cent of all connections in Q4 2019. In this quarter the category added around 5,000 connections compared with Q4 2018.
- Virtually no year-on-year movement was seen in the share of fixed broadband connections combined with fixed telephony and TV, and the category of 'standalone' broadband connections (21.7% and 22.5% of all connections, respectively) in Q4 2019.
- Falling 9.5 per cent compared with Q4 2018, other bundles with broadband was the category suffering the biggest year-on-year decline in Q4 2019.
- From Q4 2017, data are now also collected on bundled products combined not with fixed broadband but instead offered with other telecoms services (e.g. TV and mobile services or fixed network voice telephony and TV). There were around 16,000 such products at the end of December 2019 (not shown).

The chart shows the number of broadband products sold to retail customers, where the products are based on the provider's own infrastructure or an unbundled line 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

Fixed broadband connections bundled with fixed telephony once again best-performing product category

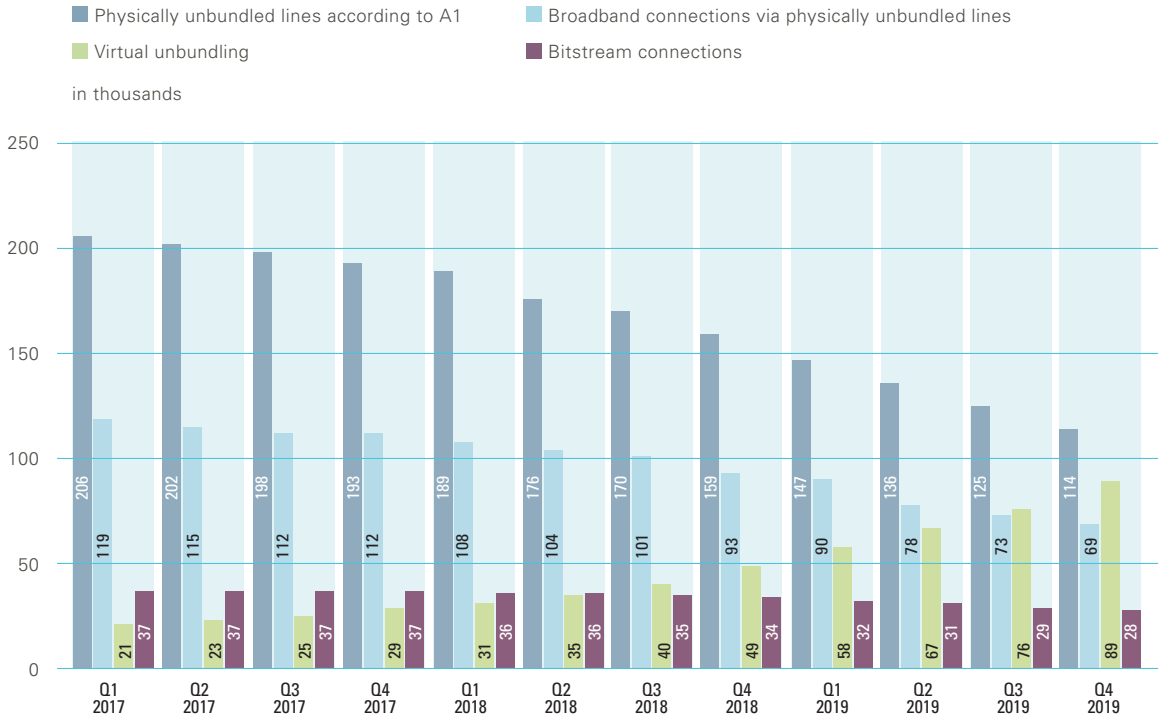


- Revenues from customer broadband connections (standalone products and bundles with fixed broadband) grew by 1.8 per cent in 2019 to total around EUR 958 million. In Q4 2019 revenues from fixed consumer broadband connections totalled around EUR 240 million.
- At around EUR 89 million, 37.1 per cent of total revenue in Q4 2019 was earned by products in the category of fixed broadband bundled with fixed network telephony. Compared with the same quarter in the previous year, this represents growth of 3.5 per cent.
- In 2019 standalone broadband products accounted for 25.4 per cent of total revenue. Products in this category achieved a year-on-year increase of around EUR 4 million in Q4 2019.
- Slight growth of 1.7 per cent compared with the same quarter in the previous year was seen in Q4 2019 for the product bundling fixed broadband with fixed telephony and TV (24.6% of total revenue at the end of 2019). Revenues in this category had risen 3.5 per cent year-on-year by Q4 2019.
- In the fourth quarter of 2019, the strongest year-on-year growth, a gain of 8.7 per cent, was achieved by broadband products combined with TV. The category of other bundles with broadband recorded revenue losses of 16.7 per cent in this quarter compared with Q4 2018.

The chart shows the revenues from broadband access sold to retail customers, for connections based on provider-owned infrastructure or an unbundled line. 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

Year-on-year figures show huge rise in virtual unbundling, sharp drop in physically unbundled lines



- In Q4 2019 alone, year-on-year growth of 17.1 per cent was recorded for virtually unbundled lines, with installations rising to around 89,000 lines. This represents growth of 81.6 per cent compared with Q4 2018.
- Both the number of physically unbundled lines and of broadband connections provided on the basis of such lines declined, by 8.8 per cent and 5.5 per cent respectively. Compared with Q4 2018, physically unbundled lines fell by 45,000, with 24,000 fewer broadband connections now utilising physically unbundled lines.
- The decline in bitstream connections continued in the fourth quarter of 2019, with around 28,000 fewer connections overall in this quarter, a loss of 3.4 per cent in comparison with Q3 2019. When compared with the same quarter in 2018, this loss widens to 17.6 per cent.
- Compared with the previous year, the overall volume of broadband wholesale products from A1 declined by 10.5 per cent to around 300,000 in 2019.

The chart compares the total number of supply-side unbundled lines provided by A1 with the demand-side lines unbundled by other providers in order to provide broadband connections to customers. The difference between the two figures is accounted for by the unbundled lines that are used only for voice services or as leased lines, thus not falling under broadband. In addition, in some cases multiple lines are used for one broadband connection ('line bonding').
The chart also shows the total number of virtually unbundled connections and bitstream connections provided by A1 at wholesale level (see Glossary).

TABLE 06: RETAIL FIXED BROADBAND BY INFRASTRUCTURE (IN THOUSANDS)
SEE PAGE 18

	DSL incl. unbundling	Coaxial cable	FTTH	FWA
Q1 2017	1,630	825	43	29
Q2 2017	1,612	831	44	29
Q3 2017	1,592	839	46	29
Q4 2017	1,586	845	52	28
Q1 2018	1,573	855	55	28
Q2 2018	1,575	862	56	28
Q3 2018	1,560	868	57	28
Q4 2018	1,559	871	63	28
Q1 2019	1,552	875	65	28
Q2 2019	1,540	878	67	28
Q3 2019	1,530	881	66	28
Q4 2019	1,530	886	75	28

TABLE 07: RETAIL FIXED BROADBAND BY CUSTOMER CATEGORY (IN THOUSANDS)
SEE PAGE 19

	Private customers	Business customers
Q1 2017	2,297	212
Q2 2017	2,287	210
Q3 2017	2,274	213
Q4 2017	2,274	215
Q1 2018	2,277	214
Q2 2018	2,290	210
Q3 2018	2,284	210
Q4 2018	2,295	206
Q1 2019	2,297	206
Q2 2019	2,296	201
Q3 2019	2,289	202
Q4 2019	2,312	204

TABLE 08: RETAIL BROADBAND CONNECTIONS BY BANDWIDTH CATEGORY – FIXED NETWORK (IN THOUSANDS) SEE PAGE 20

	<10 Mbps	10 Mbps bis <30 Mbps	30 Mbps bis <100 Mbps	≥100 Mbps
Q1 2017	1,072	776	466	146
Q2 2017	1,065	752	469	163
Q3 2017	1,031	712	501	194
Q4 2017	1,015	695	525	209
Q1 2018	988	686	540	232
Q2 2018	802	747	651	257
Q3 2018	768	742	671	268
Q4 2018	749	736	691	281
Q1 2019	733	736	707	281
Q2 2019	730	715	722	287
Q3 2019	703	705	747	294
Q4 2019	622	755	772	313

TABLE 09: RETAIL BROADBAND CONNECTIONS BY BUNDLE CATEGORY – FIXED NETWORK (IN THOUSANDS) SEE PAGE 21

	Standalone broadband (not in bundle)	Broadband + fixed phone	Broadband + fixed phone + TV	Broadband + TV	Other bundles incl. broadband	Other bundles w/o fixed broadband (from Q4/17)
Q1 2017	608	1,107	563	186	20	16
Q2 2017	601	1,103	561	187	19	16
Q3 2017	600	1,092	557	192	19	16
Q4 2017	609	1,081	541	194	36	16
Q1 2018	625	1,071	534	196	39	16
Q2 2018	567	1,129	538	201	41	16
Q3 2018	562	1,117	546	202	42	16
Q4 2018	571	1,132	548	205	42	15
Q1 2019	572	1,135	549	206	41	15
Q2 2019	571	1,139	550	207	40	16
Q3 2019	565	1,144	549	208	39	16
Q4 2019	570	1,149	551	210	38	16

TABLE 10: REVENUES FROM RETAIL BROADBAND CONNECTIONS – FIXED NETWORK (IN MILLIONS) SEE PAGE 22

	Standalone broadband (not in bundle)	Broadband + fixed phone	Broadband + fixed phone + TV	Broadband + TV	Other bundles incl. broadband	Other bundles w/o fixed broadband (from Q4/17)
Q1 2017	58	85	54	19	1	
Q2 2017	59	86	55	21	1	
Q3 2017	59	88	54	22	1	
Q4 2017	57	82	61	24	5	1
Q1 2018	58	82	63	25	5	2
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	90	57	25	5	1
Q4 2019	61	89	59	25	5	1

TABLE 11: WHOLESALE BROADBAND PRODUCTS OFFERED BY A1 TELEKOM AUSTRIA AG (IN THOUSANDS) SEE PAGE 23

	Physically unbundled lines according to A1	Broadband connections via physically unbundled lines	Virtual unbundling	Bitstream connections
Q1 2017	206	119	21	37
Q2 2017	202	115	23	37
Q3 2017	198	112	25	37
Q4 2017	193	112	29	37
Q1 2018	189	108	31	36
Q2 2018	176	104	35	36
Q3 2018	170	101	40	35
Q4 2018	159	93	49	34
Q1 2019	147	90	58	32
Q2 2019	136	78	67	31
Q3 2019	125	73	76	29
Q4 2019	114	69	89	28

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03

Mobile broadband

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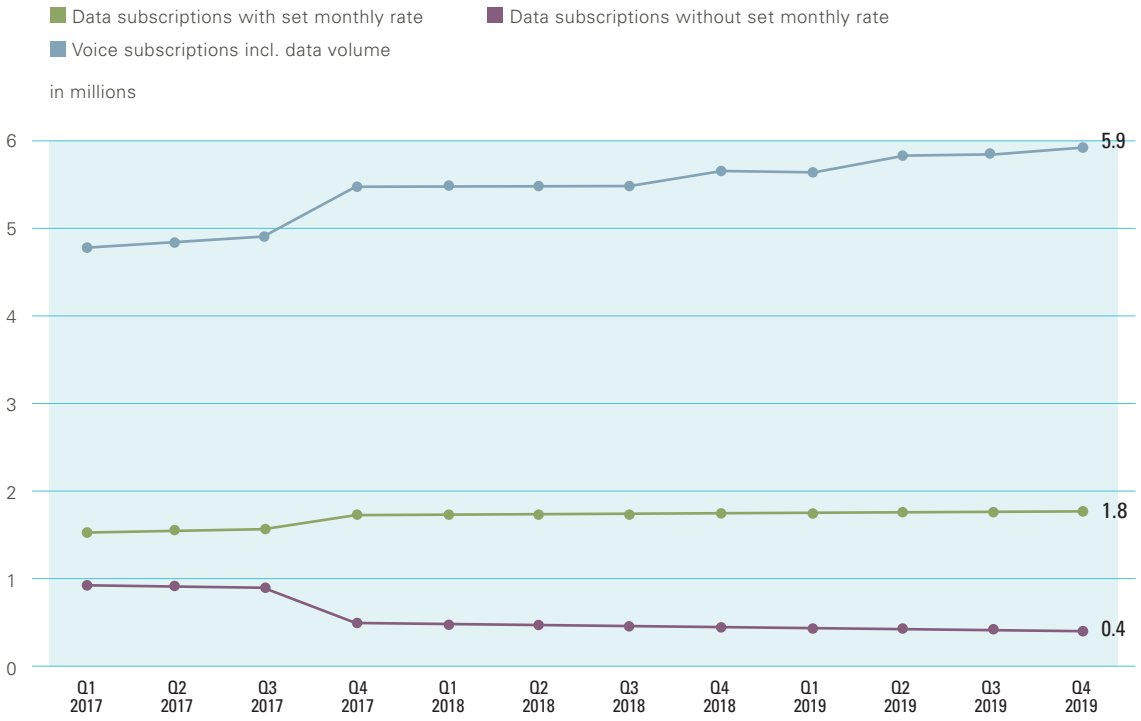
Active mobile broadband connections – retail

Around 5.93 million mobile broadband connections with smartphone subscriptions in Austria in Q4 2019

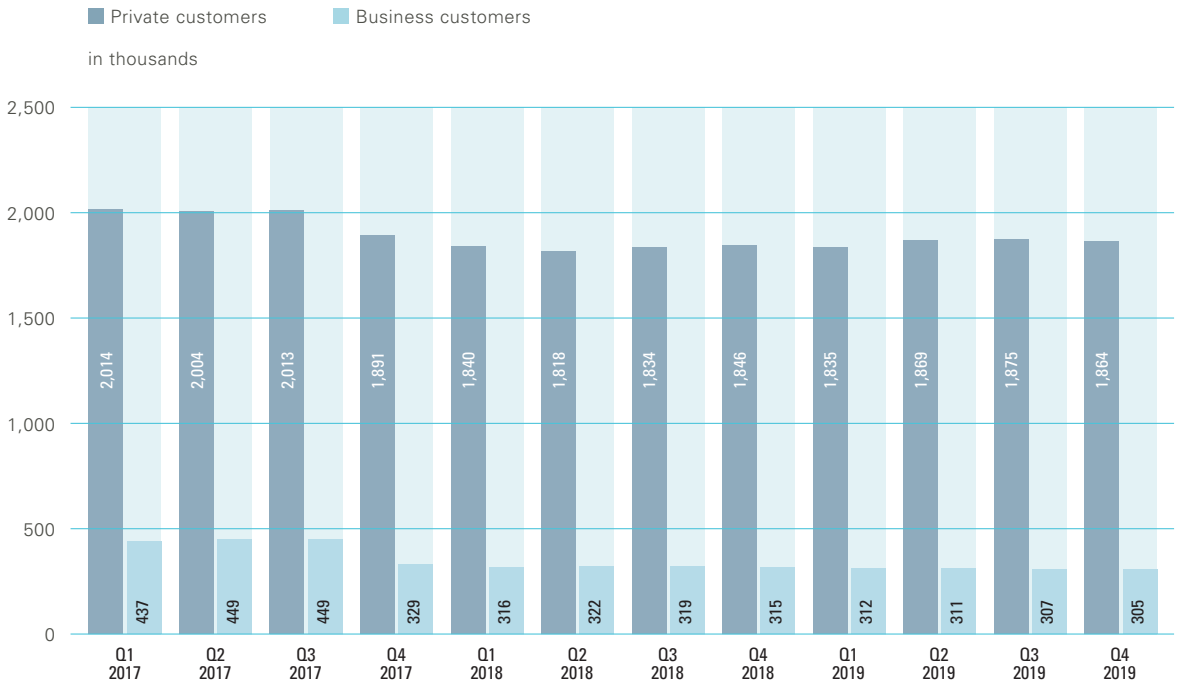


- A total of 8.1 million active mobile broadband connections (incl. smartphones) were recorded in Austria in Q4 2019. This represents growth of 3.6 per cent compared with the previous year.
- In Q4 2019 there were around 0.4 million connections featuring data subscriptions without a fixed monthly fee. This amounts to a year-on-year loss of 10.1 per cent for these connections and a decline of 5.7 per cent compared with Q3 2019.
- Smartphone subscriptions made up some 73 per cent of mobile broadband connections in Q4 2019. Over 5.93 million smartphone subscriptions were recorded in Austria for the first time in this quarter.
- Achieving growth of 0.6 per cent compared with the previous quarter, consumer broadband connections for data subscriptions with a fixed monthly fee totalled 1.8 million in Q4 2019. In year-on-year terms, this represents growth of 3 per cent, with around 52,000 new active broadband connections in this category.

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 of these categories were revised by the amendment to the KEV from Q4 2017 onwards. The definitions are explained in detail in the Glossary at the end of the report.

Active mobile broadband connections by customer category

Around 2.2 million active mobile broadband connections (excl. smartphones) in Austria in Q4 2019

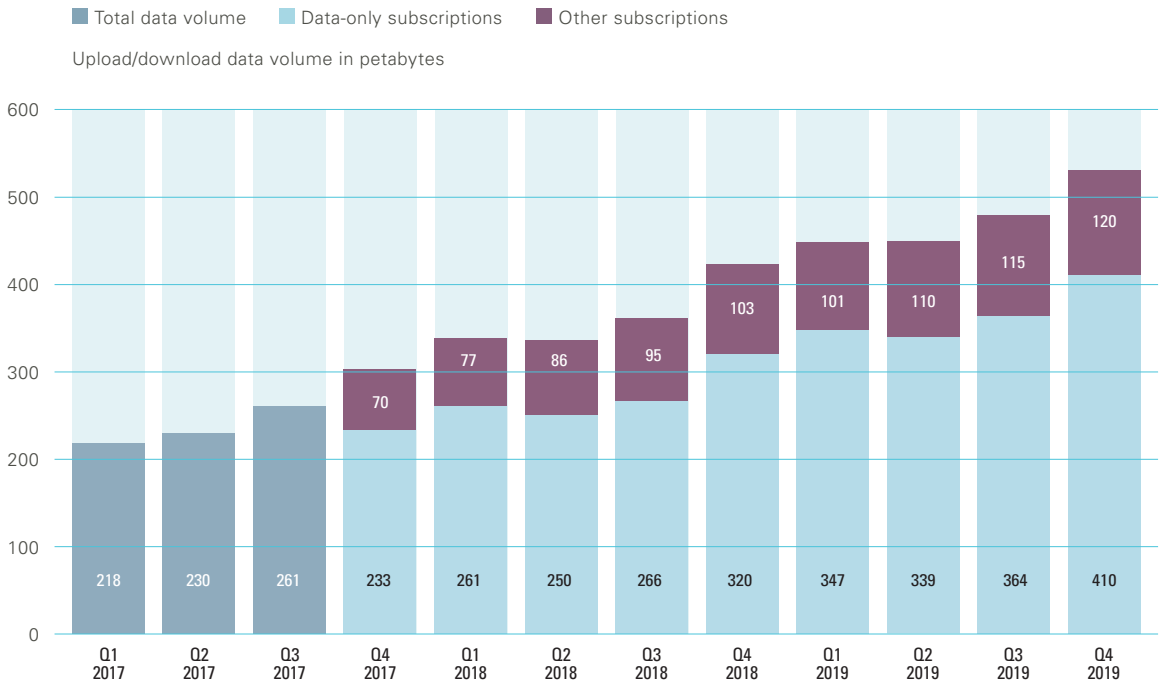


- The number of mobile broadband connections (data subscriptions with and without a fixed monthly fee), which customers used to access the internet at least once, totalled approximately 2.2 million in Q4 2019, which equates to year-on-year growth of some 0.4 per cent.
- The number of private customer connections continues to increase slightly. In a year-on-year comparison, connections rose by 1 per cent to around 1.86 million connections in Q4 2019.
- Around 305,000 active mobile broadband connections were recorded in the business customer segment in Q4 2019. This marks a year-on-year decrease of 3.2 per cent from Q4 2018, when the figure was around 315,000 connections.

The chart shows the number of active mobile broadband connections (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. This means that a product intended for private customers can also fall under the business customer category when purchased by a company (see Glossary).

Retail data volumes in mobile networks

500-petabyte mobile network consumption milestone passed in Q4 2019



- In Q4 2019 a mobile data volume of around 530 petabytes was consumed, an increase of 10.7 per cent compared with the previous quarter. In terms of mobile network data usage, this represents growth of 25.2 per cent compared with Q4 2018.
- At the end of 2019 consumption by smartphone bundles or other subscriptions with voice or text message services was around 17 petabytes higher than in Q4 2018. This also represents growth of 3.9 per cent compared with the previous quarter.
- Data volume usage using data-only subscriptions grew by 12.8 per cent (to a total of around 410 petabytes) in Q4 2019 compared with the previous quarter. Data-only subscriptions therefore accounted for 77.4 per cent of mobile data usage.

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. From Q4 2017, data volumes can be distinguished based on whether they originated from data-only subscriptions (plans not including voice or text services) or another kind of subscription (smartphone bundles and other plans including voice and text services).

TABLE 12: ACTIVE MOBILE BROADBAND CONNECTIONS – RETAIL (IN THOUSANDS)
SEE PAGE 28

	Data subscriptions with set monthly rate	Data subscriptions without set monthly rate	Voice subscriptions incl. data volume
Q1 2017	1,527	925	4,780
Q2 2017	1,536	916	4,819
Q3 2017	1,565	896	4,909
Q4 2017	1,726	494	5,478
Q1 2018	1,714	442	5,492
Q2 2018	1,715	425	5,472
Q3 2018	1,731	422	5,486
Q4 2018	1,718	444	5,658
Q1 2019	1,716	431	5,642
Q2 2019	1,744	436	5,834
Q3 2019	1,760	423	5,849
Q4 2019	1,770	399	5,931

TABLE 13: ACTIVE MOBILE BROADBAND CONNECTIONS BY CUSTOMER CATEGORY (IN THOUSANDS)
SEE PAGE 29

	Private customer segment	Business customer segment
Q1 2017	2,014	437
Q2 2017	2,004	449
Q3 2017	2,013	449
Q4 2017	1,891	329
Q1 2018	1,840	316
Q2 2018	1,818	322
Q3 2018	1,834	319
Q4 2018	1,846	315
Q1 2019	1,835	312
Q2 2019	1,869	311
Q3 2019	1,875	307
Q4 2019	1,864	305

TABLE 14: RETAIL DATA VOLUMES IN MOBILE NETWORKS (IN PETABYTES)
SEE PAGE 30

	Total data volume (up to and including Q3 2017)	Data-only subscriptions	Other subscriptions
Q1 2017	218		
Q2 2017	230		
Q3 2017	261		
Q4 2017		233	70
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		364	115
Q4 2019		410	120

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04

Broadband prices

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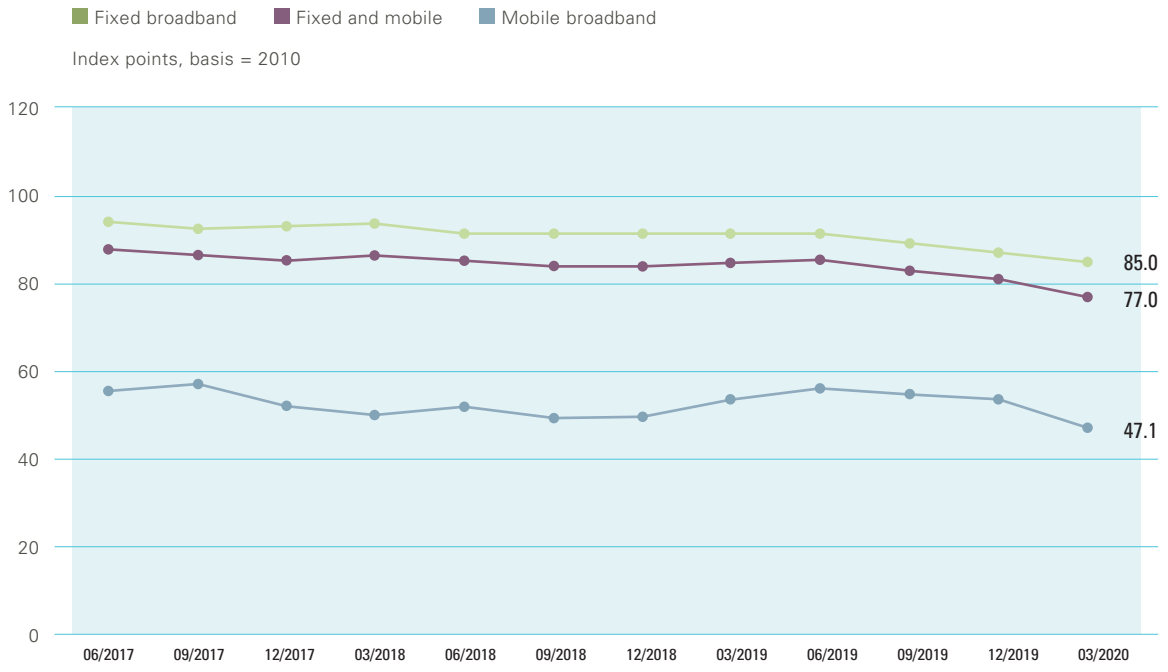
Hedonic price index for broadband

Broadband becomes less expensive year-on-year

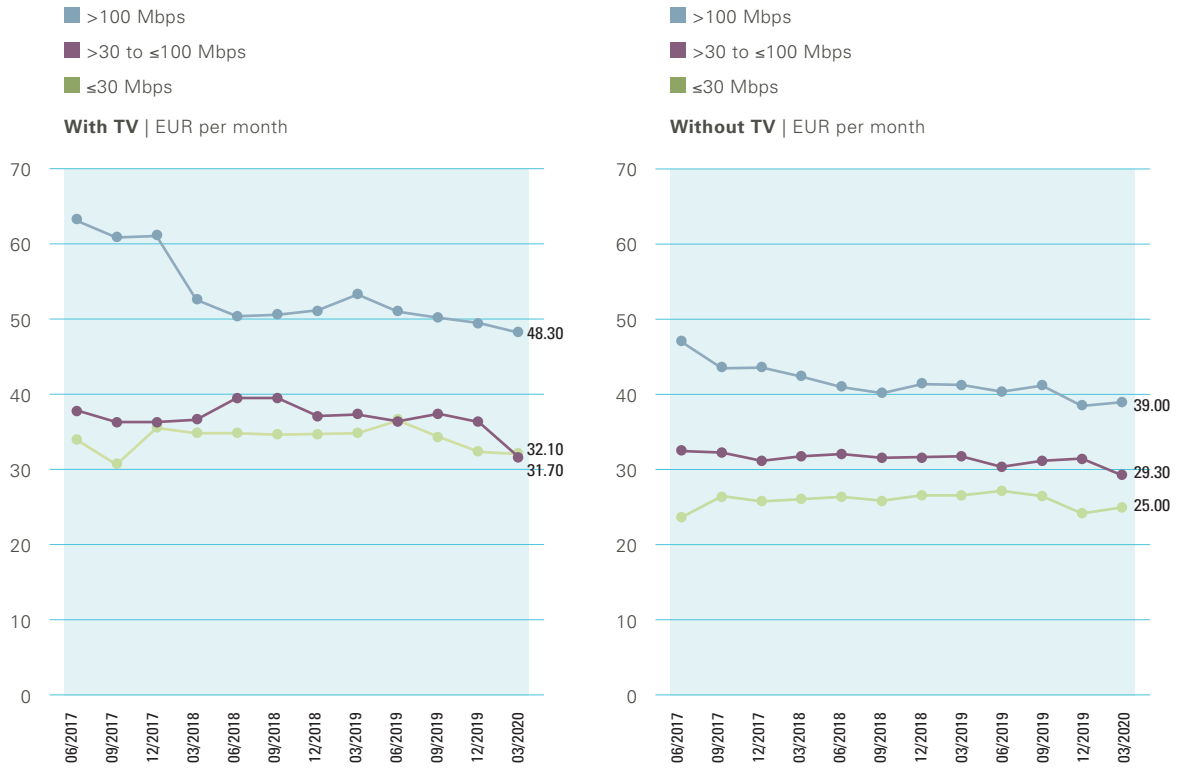


- In Q1 2020 the hedonic price index for fixed broadband declined by 2.2 per cent compared with the previous quarter. Compared with the same quarter in the previous year, this price index decreased by 6.4 per cent from around 90.9 to 85.0 index points.
- In contrast, the index for mobile broadband fell by 12.1 per cent from around 53.6 to around 47.1 points in Q1 2020, compared with the previous quarter. Since the index was at 53.5 points in Q1 2019, this translates to a loss of 11.9 per cent compared with the price index in Q1 2020.
- The overall index also trended downwards, falling from around 84.8 in Q1 2019 to around 77.0 index points in Q1 2020. Accordingly, both mobile and fixed broadband have become less expensive over the past year.

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

Subscriptions in the bandwidth category ≤30 Mbps: basket with TV 22 per cent more expensive than basket without TV

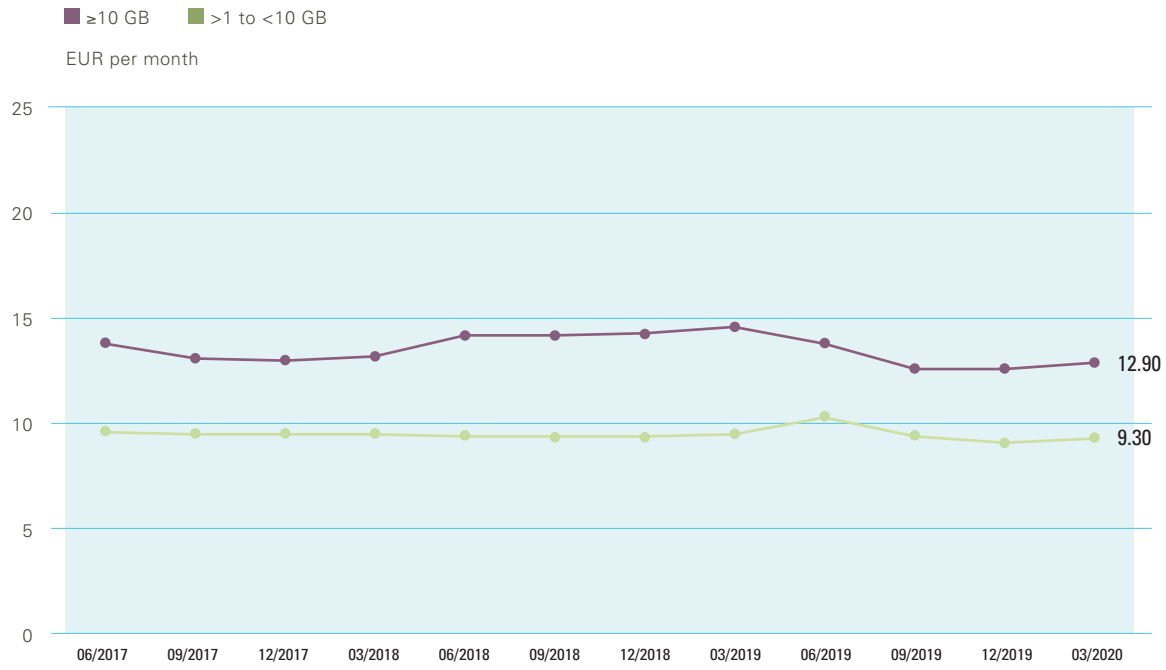


- For fixed broadband without TV, prices rose slightly by around EUR 0.90 to about EUR 25.00 during Q1 2020 in the bandwidth category ≤30 Mbps. The basket value for fixed broadband without TV in the bandwidth category >100 Mbps also increased, rising from around EUR 38.50 to around EUR 39.00.
- Compared with the previous quarter, the basket for broadband with TV in the bandwidth category >30 to ≤100 Mbps became around EUR 4.70 cheaper in Q1 2020. This basket price of around EUR 31.70 therefore dropped below the basket price for broadband with TV in the ≤30 Mbps category.
- All other baskets became slightly cheaper when compared with the previous quarter.

Six fixed broadband price baskets are shown, for each of the three bandwidth categories of ≤30 Mbps, >30 to ≤100 Mbps and >100 Mbps, with each broken down in turn according to products including or not including TV. The basket value 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

Basket for limited mobile data volume (≥10 GB incl.) some 12.2 per cent cheaper in Q1 2020 than in the previous year

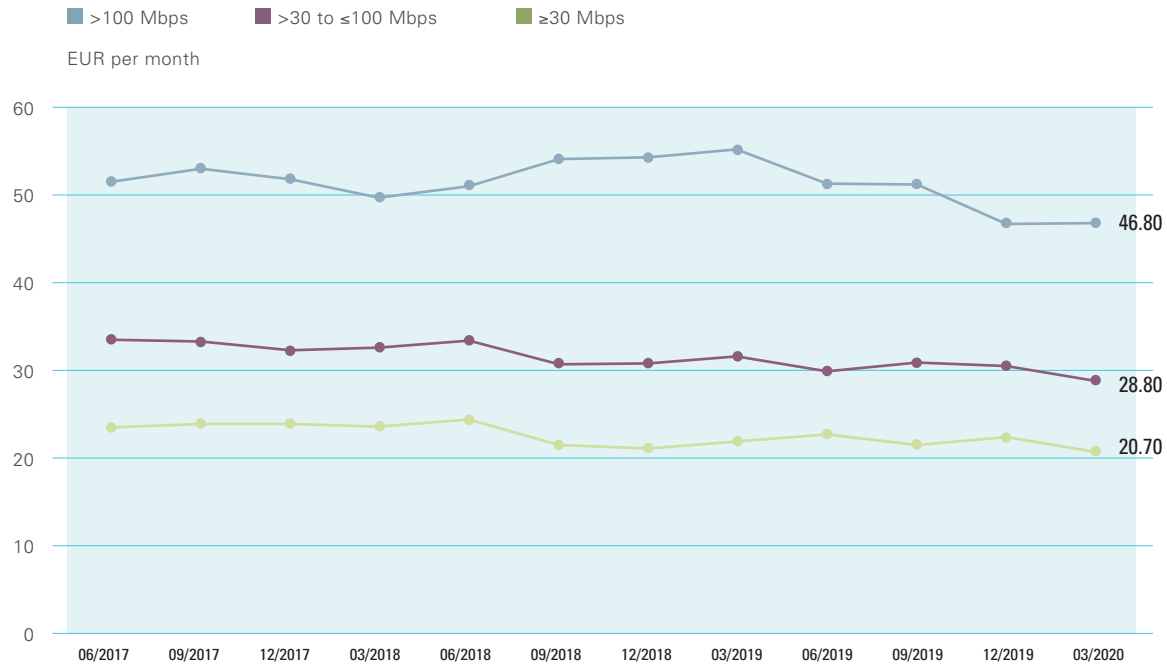


- For subscriptions >1 to <10 GB, an uptick from around EUR 9.10 in Q4 2019 to around EUR 9.30 in Q1 2020 was observed. In year-on-year terms, the basket value fell by 2.5 per cent in Q1 2019.
- A slight increase was also recorded by the category ≥10 GB, which rose from around EUR 12.60 in Q4 2019 to around EUR 12.90 in the first quarter of 2020. In a year-on-year comparison, this basket fell by 12.2 per cent.
- 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 ≥10 GB. The basket value 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 broadband >100 Mbps becomes significantly cheaper year-on-year



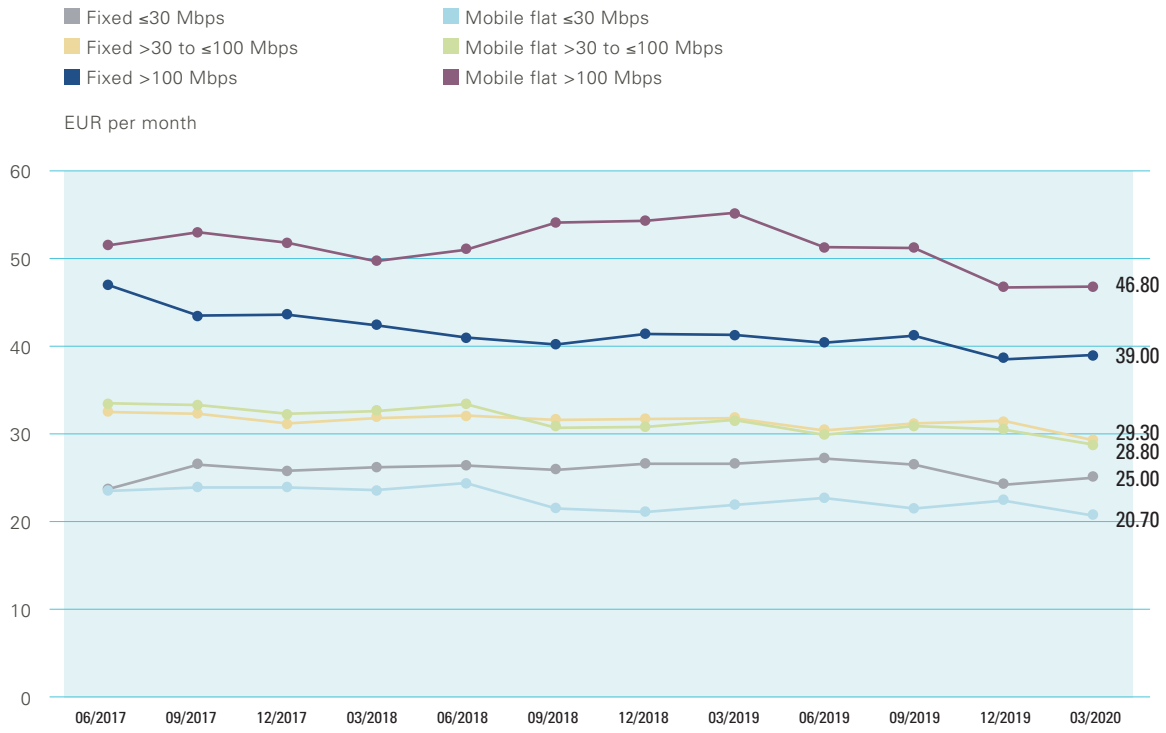
- Basket values with unlimited mobile broadband fell slightly in Q1 2020 compared with the previous quarter in the categories ≤30 Mbps and >30 to ≤100 Mbps. The basket value for ≤30 Mbps was around EUR 20.70 and around EUR 28.80 for the >30 to ≤100 Mbps category. These represent the cheapest basket values within the period shown.

- In a year-on-year comparison, unlimited mobile broadband in the category >100 Mbps fell in price by roughly EUR 8.40. The basket value in Q1 2020 was around EUR 46.80. Compared with the previous quarter, the value rose slightly by about EUR 0.16.

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

Fixed broadband at ≤30 Mbps more expensive than mobile broadband



- As before, mobile internet continues to cost more than fixed broadband at high bandwidths (>100 Mbps). While mobile broadband was 25 per cent more expensive than fixed broadband in Q1 2019, this difference shrank to 17 per cent in Q1 2020. Recent prices were at around EUR 46.80 and EUR 39.00 for mobile and fixed broadband, respectively.

- In the category >30 to ≤100 Mbps, prices for mobile broadband in every quarter in 2019 were slightly lower than prices for fixed broadband and most recently at around EUR 28.80 compared with around EUR 29.30.

- In the category ≤30 Mbps, the basket value for fixed broadband was 21 per cent higher than for mobile broadband, with prices at around EUR 25.00 and EUR 20.70, respectively.

The chart contrasts the three price baskets for fixed network broadband (each without TV) 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 value is based on the least expensive product from each operator that can be included in the respective basket.

TABLE 15: HEDONIC PRICE INDEX FOR BROADBAND (INDEX POINTS, BASIS = 2010)
SEE PAGE 34

	Fixed	Mobile	Fixed and mobile
March 17	94.2	52.3	87.3
June 17	94.2	55.5	87.9
Sept. 17	92.6	57.1	86.6
Dec. 17	92.7	52.0	85.3
March 18	93.8	50.0	86.5
June 18	91.5	51.9	85.3
Sept. 18	91.1	49.3	84.0
Dec. 18	91.2	49.6	84.0
March 19	90.9	53.5	84.8
June 19	91.5	56.1	85.5
Sept. 19	88.9	54.7	83.0
Dec. 19	86.9	53.6	81.1
March 20	85.0	47.1	77.0

TABLE 16: PRICE BASKETS: FIXED BROADBAND WITHOUT TV (EURO PER MONTH)
SEE PAGE 35

	≤30 Mbps	>30 to ≤100 Mbps	>100 Mbps
March 17	24.0	33.0	49.3
June 17	23.7	32.5	47.0
Sept. 17	26.5	32.3	43.5
Dec. 17	25.8	31.2	43.6
March 18	26.2	31.8	42.4
June 18	26.4	32.1	41.0
Sept. 18	25.9	31.6	40.2
Dec. 18	26.6	31.7	41.4
March 19	26.6	31.8	41.3
June 19	27.2	30.4	40.4
Sept. 19	26.5	31.2	41.2
Dec. 19	24.2	31.5	38.5
March 20	25.0	29.3	39.0

TABLE 17: PRICE BASKETS: FIXED BROADBAND WITH TV (EURO PER MONTH)
SEE PAGE 35

	≤30 Mbps	>30 to ≤100 Mbps	>100 Mbps
March 17	28.3	37.9	62.5
June 17	34.1	38.0	63.3
Sept. 17	30.7	36.4	61.0
Dec. 17	35.6	36.4	61.2
March 18	34.9	36.7	52.7
June 18	34.9	39.6	50.5
Sept. 18	34.7	39.6	50.7
Dec. 18	34.8	37.2	51.3
March 19	34.9	37.4	53.4
June 19	36.6	36.5	51.1
Sept. 19	34.4	37.5	50.3
Dec. 19	32.4	36.4	49.6
March 20	32.1	31.7	48.3

TABLE 18: PRICE BASKETS: MOBILE BROADBAND (EURO PER MONTH)
SEE PAGE 34 AND PAGE 37

	Limited data volumes		Unlimited data volumes		
	>1 bis <10 GB	≥10 GB	≤30 Mbps	>30 to ≤100 Mbps	>100 Mbps
March 17	9.6	14.8	23.5	32.4	50.1
June 17	9.6	13.8	23.5	33.5	51.5
Sept. 17	9.5	13.1	23.9	33.3	53.0
Dec. 17	9.5	13.0	23.9	32.3	51.8
March 18	9.5	13.2	23.6	32.6	49.7
June 18	9.4	14.2	24.4	33.4	51.0
Sept. 18	9.4	14.2	21.5	30.7	54.1
Dec. 18	9.4	14.3	21.1	30.8	54.3
March 19	9.5	14.6	21.9	31.6	55.2
June 19	10.3	13.8	22.7	29.9	51.3
Sept. 19	9.4	12.6	21.5	30.9	51.2
Dec. 19	9.1	12.6	22.4	30.5	46.7
March 20	9.3	12.9	20.7	28.8	46.8

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05

Monitoring internet access quality

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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 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 or 4G), 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 6). The following measurements are not used:

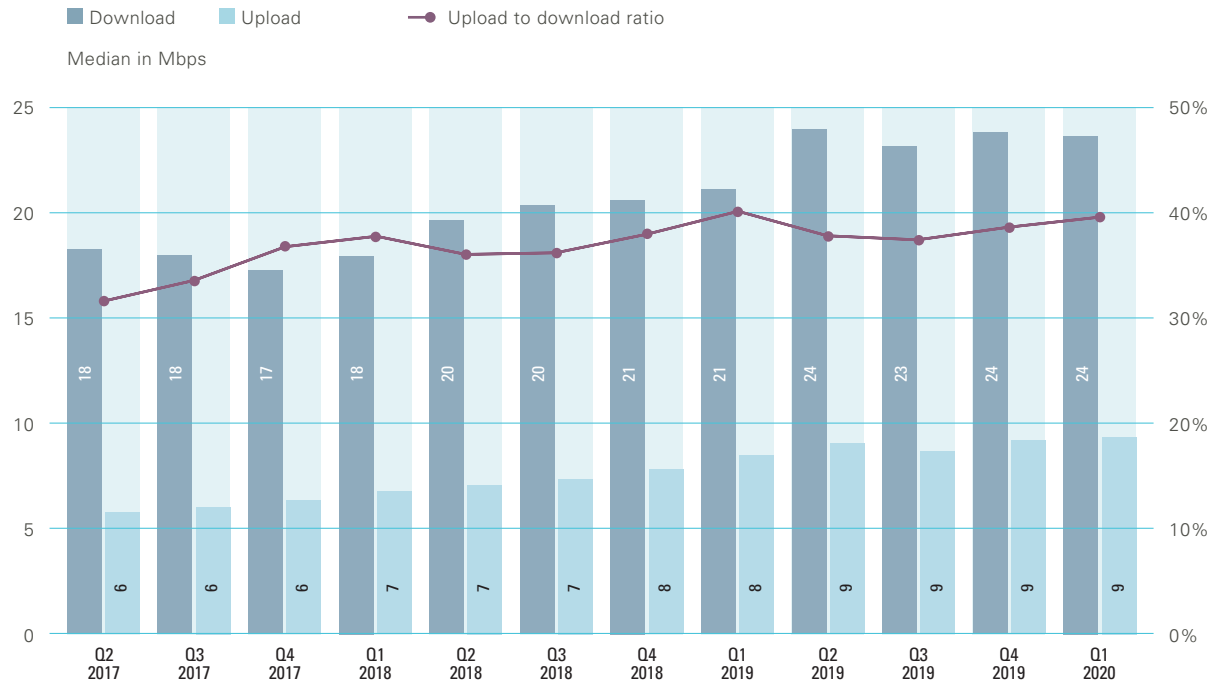
- Measurements taken outside of Austrian territory
- Measurements for which the location can only be determined to within 2 or more km, or without any location details
- Repeated or implausible tests

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). The method behind RTR-NetTest is based on crowd sourcing, meaning that the test environment is not consistent over time, nor are conditions controlled or the sample representative.

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

Download and upload speeds (all technologies)

Median values for download and upload speeds remain stable

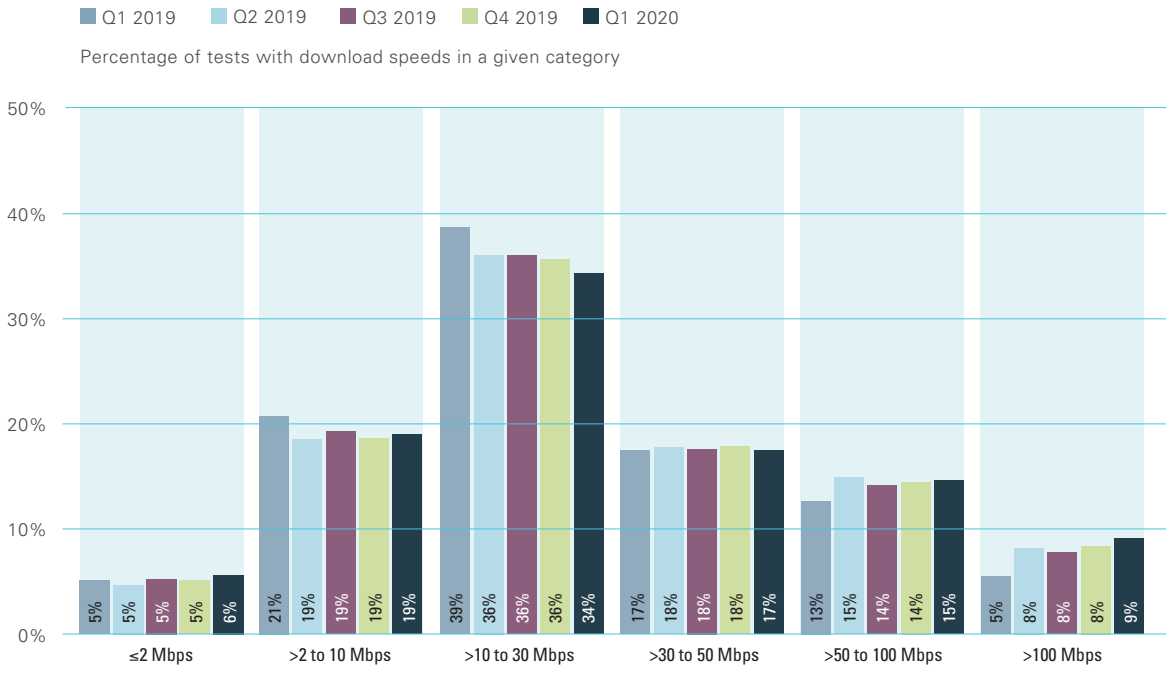


- The median value for download speed was 24 Mbps in Q1 2020 and therefore 3 Mbps higher in a year-on-year comparison.
- The median value for upload speed has remained stable at 9 Mbps since Q2 2019.
- The ratio of upload speed to download speed was once again around 40 per cent in Q1 2020 (see bottom chart).

Expressed in megabits per second (Mbps), internet access speed represents the amount of data transferred in one 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

Around one in three tests achieved speeds between 11 and 30 Mbps

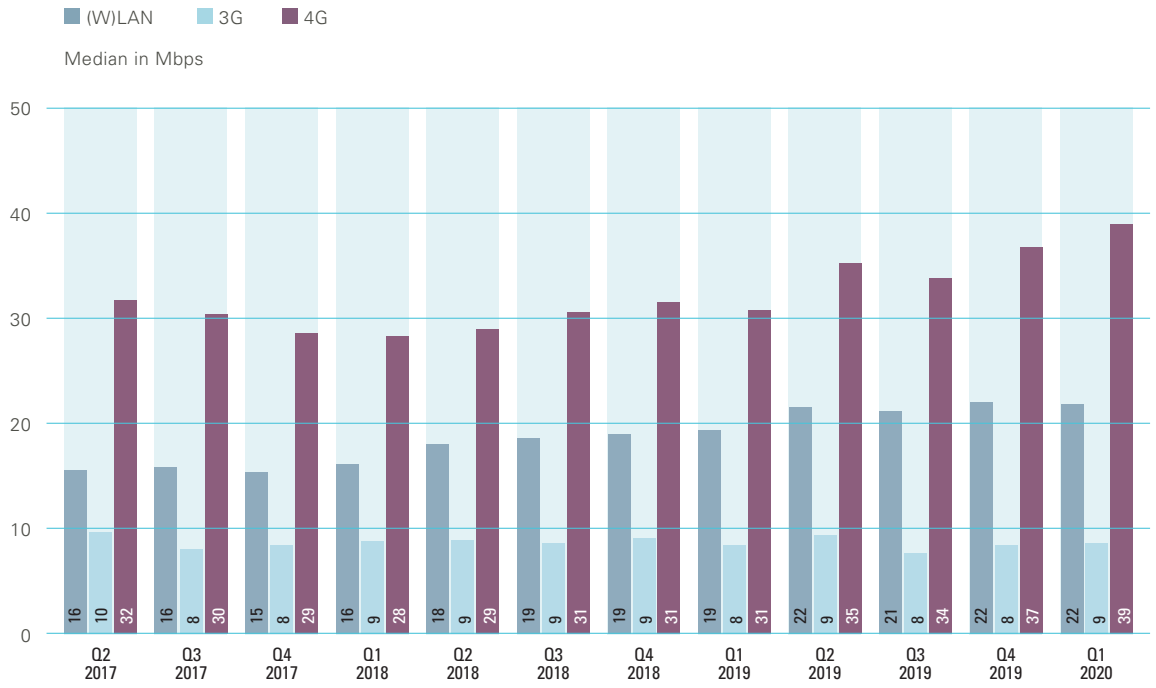


- A download speed of more than 100 Mbps was recorded for about 9 per cent of tests in Q1 2020. In the same quarter in the previous year, this speed was achieved in about 5 per cent of all tests.
- Overall, around 25 per cent of tests achieved speeds of up to 10 Mbps in Q1 2020. This was the case for around 26 per cent of tests in Q1 2019.
- The proportion of tests falling into the categories ≤2 Mbps, >2 to 10 Mbps, >30 to 50 Mbps and >50 to 100 Mbps remained the same or approximately the same in Q1 2020.

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. 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

Slight rise in 4G download speed

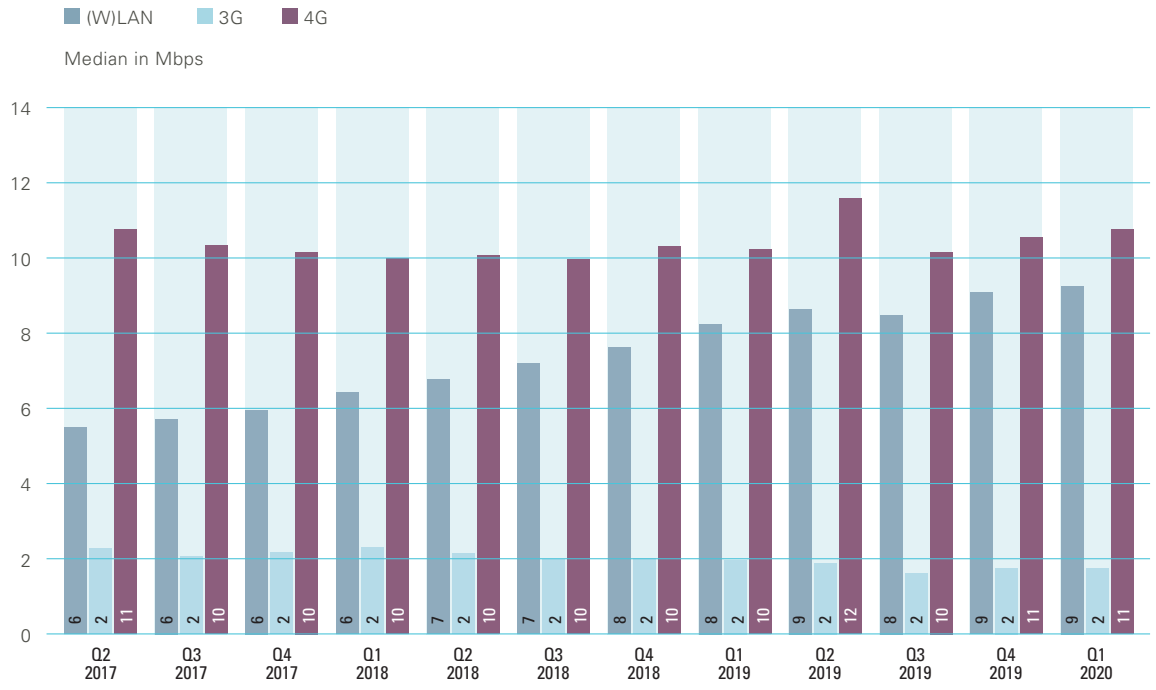


- In Q1 2020 the median download speed for 4G measurements was around 39 Mbps and therefore the highest value measured to date. By way of comparison, this median value was around 31 Mbps in Q1 2019.
- In Q1 2020 the median for LAN/Wi-Fi speeds measured remained constant at around 22 Mbps.
- 3G measurements achieved a median speed of some 9 Mbps in Q1 2020, representing a slight rise compared with the previous quarter and the same quarter in the previous year (each with a median of 8 Mbps).

Internet access speed depends on factors including the technology implemented. Distinctions are made between 2G (GPRS, EDGE), 3G (UMTS, HSPA) and 4G (LTE) as well as on the basis of measurements of various fixed and network technologies. The measurements were taken with the aid of a browser or app (for WiFi) 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. Because of the low data rates achieved with 2G, no median values are shown for such connections.

Upload speed by technology

Speeds achieved by LAN/Wi-Fi and 4G becoming increasingly uniform

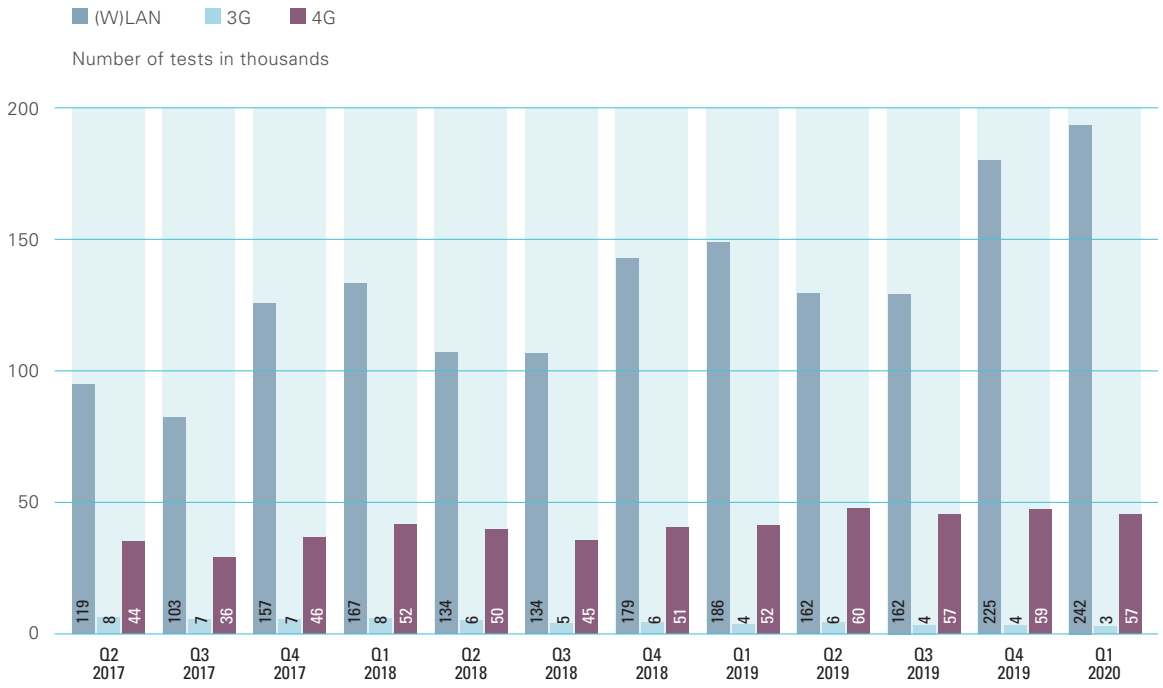


- Over the last year, the median upload speed recorded in LAN/Wi-Fi measurements rose slightly from around 8 Mbps in Q1 2019 to around 9 Mbps in Q1 2020.
- Measurements taken over 4G recorded a median value of around 11 Mbps in Q1 2020.
- As in previous quarters, the median upload speed achieved with 3G connections was about 2 Mbps.

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 300,000 measurements taken by RTR-NetTest

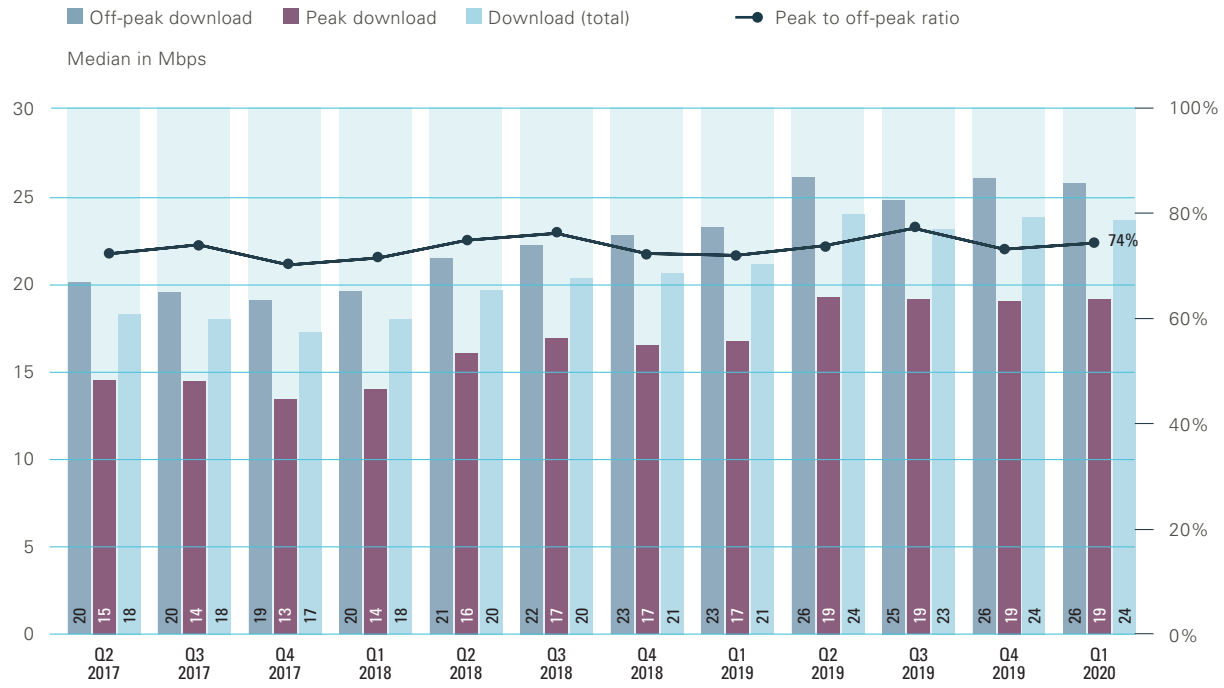


- The overall number of measurements taken by RTR-NetTest rose significantly in Q1 2020 to set a new record of 302,551 measurements.
- In Q1 2020 RTR-NetTest was used to take 242,153 measurements over LAN/Wi-Fi. This category was responsible for 80 per cent of measurements, a figure 7.5 per cent higher than in the previous quarter and 29.9 per cent higher year-on-year.
- Compared with the same quarter in the previous year, the number of measurements taken over 3G declined, however, falling by 22.1 per cent in Q1 2020 to around 3,427 measurements.
- While the 56,971 tests performed over 4G in Q1 2020 comprise a volume similar to the previous quarter, this figure represents a 9.9 per cent rise year-on-year.

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

Large gap persists between off-peak and peak speeds

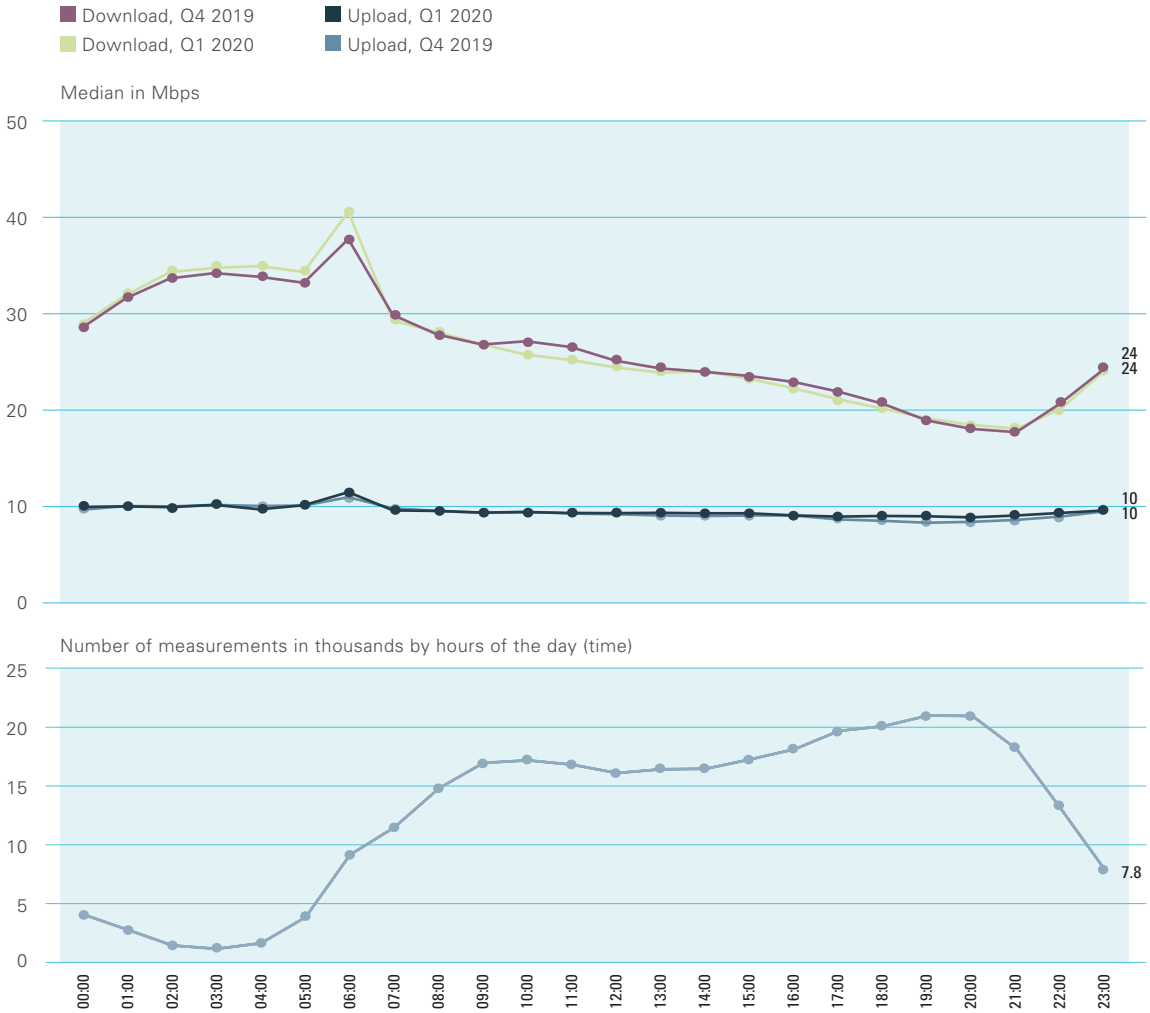


- In Q1 2020, the median value for off-peak download speed was around 26 Mbps and therefore about 3 Mbps higher than in Q1 2019.
- As in previous quarters, the median speed achieved during peak times remained constant at around 19 Mbps. Compared with the previous year, the median also rose here in Q1 2020 by around 2 Mbps.
- As in the previous quarter, the ratio of peak to off-peak speed remained steady at 74 per cent in Q1 2020 (see bottom chart).

Internet access speeds can also depend on the time of 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 6 pm to 11 pm, 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

Average upload speeds remain constant from one day to another

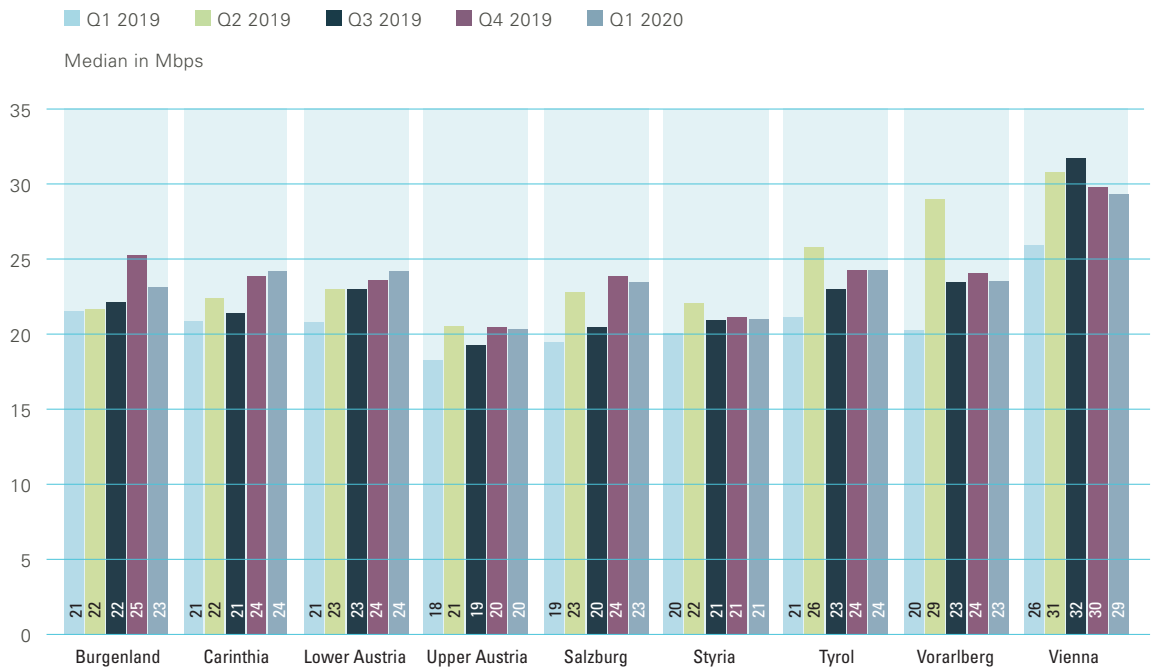


- In Q1 2020 the median value for upload speed remained constant from one day to the next at around 9 Mbps and virtually unchanged compared with the previous quarter.
- The median overnight download speed was slightly higher than the values from the previous quarter. A peak value of some 41 Mbps was measured at around 6 AM. After this, the value fell continuously, reaching its lowest point of around 18 Mbps between 8 pm and 9 pm.
- The number of measurements made peaked at around 7 PM with 20,950 measurements, falling to 1,157 measurements by 3 AM.

The number of network test runs varies considerably over the course of the day. Since only few tests are performed during night hours, the median obtained for this period fluctuates more. The evaluation is based on the results of all tests performed in the specified quarter.

Download speed by province

As before, fastest median download speed of 29 Mbps recorded in Vienna

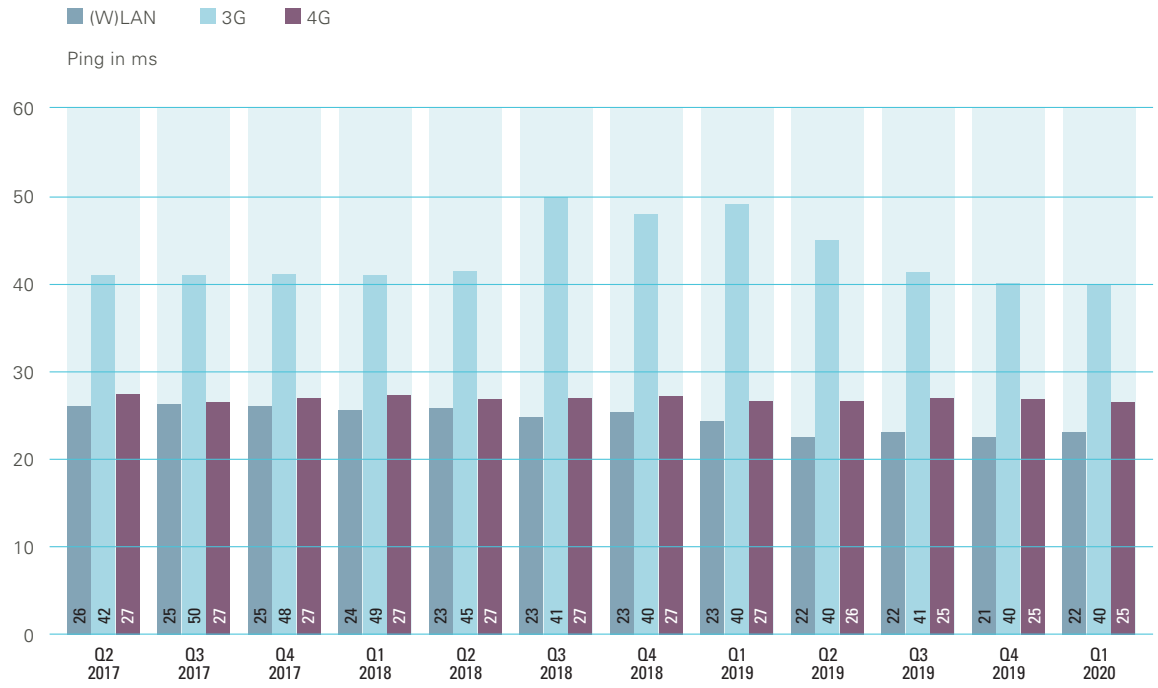


- In Q1 2020 the fastest download speeds were again achieved in Vienna, with a median speed of 29 Mbps being recorded. By way of comparison, the median value was 26 Mbps in Q1 2019.
- Compared with the previous quarter, virtually no change was seen in median download speeds measured from one province to another.
- Compared with Q1 2019 an increase of around 4 Mbps to 23 Mbps was observed in Salzburg in Q1 2020.
- As in the previous year, the lowest median value for download speed measurements was recorded in Upper Austria, with a value of 20 Mbps in Q1 2020.

RTR-NetTest can identify the location where the test is being run. This allows a median download speed to be determined for every Austrian province. The median calculated here includes all network technologies.

Ping time (latency)

Ping times remain constant



- In Q1 2020 the median ping value for 4G measurements remained stable compared with previous quarters at around 25 ms. This does represent a reduction in latency of around 2 ms year-on-year, however.
- The median ping measured in LAN/Wi-Fi networks stayed fairly constant in Q1 2020 at around 22 ms. This represents a year-on-year reduction in latency of about 1 ms.
- In Q1 2020 the median ping for 3G measurements remained unchanged both compared with the previous quarter and also year-on-year at 40 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 19: MEDIAN DOWNLOAD AND UPLOAD SPEED (ALL TECHNOLOGIES) (IN MBIT/S) SEE PAGE 45

	Download	Upload	Upload to download ratio
Q2 2017	18	6	32%
Q3 2017	18	6	34%
Q4 2017	17	6	37%
Q1 2018	18	7	38%
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%

TABLE 20: DOWNLOAD SPEED BY BANDWIDTH CATEGORY (IN MBPS)
SEE PAGE 46

	≤2	>2 to 10	>10 to 30	>30 to 50	>50 to 100	>100
Q1 2019	5%	21%	39%	17%	13%	5%
Q2 2019	5%	19%	36%	18%	15%	8%
Q3 2019	5%	19%	36%	18%	14%	8%
Q4 2019	5%	19%	36%	18%	14%	8%
Q1 2020	6%	19%	34%	17%	15%	9%

TABLE 21: MEDIAN DOWNLOAD SPEED BY TECHNOLOGY (IN MBPS)
SEE PAGE 47

	(W)LAN	3G	4G
Q2 2017	16	10	32
Q3 2017	16	8	30
Q4 2017	15	8	29
Q1 2018	16	9	28
Q2 2018	18	9	29
Q3 2018	19	9	31
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

TABLE 22: MEDIAN DOWNLOAD AND UPLOAD SPEED BY TECHNOLOGY (IN MBPS)
SEE PAGE 48

	(W)LAN	3G	4G
Q2 2017	6	2	11
Q3 2017	6	2	10
Q4 2017	6	2	10
Q1 2018	6	2	10
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

TABLE 23: NUMBER OF TESTS FOR EACH TECHNOLOGY
SEE PAGE 49

	(W)LAN	3G	4G
Q1 2018	166,861	7,595	52,301
Q2 2018	133,885	6,406	49,895
Q3 2018	133,647	5,182	44,536
Q4 2018	178,533	5,705	50,879
Q1 2019	186,409	4,401	51,820
Q2 2019	161,981	5,710	59,505
Q3 2019	161,704	4,287	56,652
Q4 2019	225,147	3,895	59,145
Q1 2020	242,153	3,427	56,971

TABLE 24: MEDIAN DOWNLOAD SPEED – OFF-PEAK AND PEAK (IN MBPS)
SEE PAGE 50

	Off-peak download	Download (total)	Peak download	Peak to off-peak ratio
Q2 2017	20	18	15	72%
Q3 2017	20	18	14	74%
Q4 2017	19	17	13	70%
Q1 2018	20	18	14	72%
Q2 2018	21	20	16	75%
Q3 2018	22	20	17	76%
Q4 2018	23	21	17	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%

TABLE 25: MMEDIAN DOWNLOAD AND UPLOAD SPEED BY HOUR OF DAY

SEE PAGE 51

Hour of the day	Download (median)	Upload (median)	No. of tests	Download (median) in previous quarter	Upload (median) in previous quarter	Number of measurements (previous quarter)
0	29	10	4,073	28	10	4,195
1	32	10	2,771	32	10	2,544
2	34	10	1,446	34	10	1,417
3	35	10	1,157	34	10	1,063
4	35	10	1,637	34	10	1,664
5	34	10	3,843	33	10	3,674
6	41	12	9,140	38	11	8,443
7	29	10	11,475	30	10	10,441
8	28	10	14,781	28	10	13,195
9	27	9	16,933	27	9	15,245
10	26	9	17,152	27	9	16,235
11	25	9	16,784	27	9	15,650
12	24	9	16,073	25	9	15,239
13	24	9	16,393	24	9	15,672
14	24	9	16,435	24	9	16,782
15	23	9	17,231	24	9	16,364
16	22	9	18,097	23	9	17,750
17	21	9	19,652	22	9	19,238
18	20	9	20,048	21	9	19,110
19	19	9	20,950	19	8	19,886
20	18	9	20,917	18	8	19,484
21	18	9	18,087	18	9	17,343
22	20	9	12,993	21	9	13,142
23	24	10	7,756	24	10	7,616

TABLE 26: MEDIAN DOWNLOAD SPEED BY PROVINCE (IN MBPS)

SEE PAGE 52

	Burgenland	Carinthia	Lower Austria	Upper Austria	Salzburg	Styria	Tyrol	Vorarlberg	Vienna
Q1 2019	21	21	21	18	19	20	21	20	26
Q2 2019	22	22	23	21	23	22	26	29	31
Q3 2019	22	21	23	19	20	21	23	23	32
Q4 2019	25	24	24	20	24	21	24	24	30
Q1 2020	23	24	24	20	23	21	24	23	29

TABLE 27: MEDIAN PING TIME (IN MS)
SEE PAGE 53

	(W)LAN	3G	4G
Q2 2017	26	42	27
Q3 2017	25	50	27
Q4 2017	25	48	27
Q1 2018	24	49	27
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

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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/de/inf/odKEV (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 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.

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, independent of the technology implemented, supports a download speed higher than 144 kbps. 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. For example, the mean of the values 1, 2, 4, 8 and 16 is 6.2. 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).

Private customers vs. business customers

Separate differentiators apply to fixed network and mobile in the private and business customer segments. Differentiators are product-based (private customer product versus business customer product) in the fixed network and customer-based in the mobile network.

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 leg. cit). In this context, a business means any organisation intended as permanent and 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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