

# RTR INTERNET MONITOR

## 2021 Annual Report

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## Preface

Dear Reader,

Our recent experience has taught us the need for innovative approaches and solutions if we are to get along well with one another, both in professional contexts and in society at large. Back in 2020, we were still focused on agile responses, implementing entirely new workflows and processes. Today, 'new' ways of working and learning have for most of us become commonplace aspects of our daily experience.

Stable and fast broadband connections are key for the smooth functioning of a home office, or for enjoying streaming services or implementing smart home solutions, which in turn requires infrastructure. We continue to see growing investments in the expansion of this infrastructure.

Retail customers are also coming to rely on broadband access that supports high bit rates, even if current demand in some cases still lags considerably behind supply.

We are firmly convinced that current and planned infrastructure investments are absolutely necessary to be able to appropriately respond to future needs, expected to eventually emerge.

In 2021, we again observed significant growth in data consumption, both in fixed and mobile networks. And recently, the deployment of fibre networks as well as demand for fibre access have also accelerated noticeably. The data collected through RTR-NetTest point to a clear preference for high bandwidths in mobile networks. While the number of measurements taken via 3G and 4G dropped year on year, the number of 5G tests rose sharply. The statistics demonstrate that this technology enables download speeds as much as five times higher than 4G, while 5G internet access is clearly much faster than connections based on previous mobile standards. The statistics also show the significant role that mobile networks play in supplying broadband to Austrian households.

Since the 2017 annual report, the RTR Internet Monitor has been providing quarterly summaries covering the fixed and mobile broadband markets. As in previous reports, the various charts present quarter-by-quarter values. To highlight trends and seasonal effects, again in this issue we have prepared charts showing changes in various categories. These charts are explained in the accompanying notes. Therefore, when reading the report and evaluating the results, it is important to keep the overall context in mind, to be able to draw appropriate conclusions about future developments in the regions and in Austria as a whole.

With these words, I hope to have whetted your appetite for this year's report. On behalf of my team of experts, responsible for collecting and compiling the underlying data, I hope you find this report makes interesting reading, with many stimulating insights and learnings.

Vienna,  
July 2022

**Klaus M. Steinmaurer**

*Managing Director  
Telecommunications and Postal Services Division  
RTR*



01

# Broadband in Austria

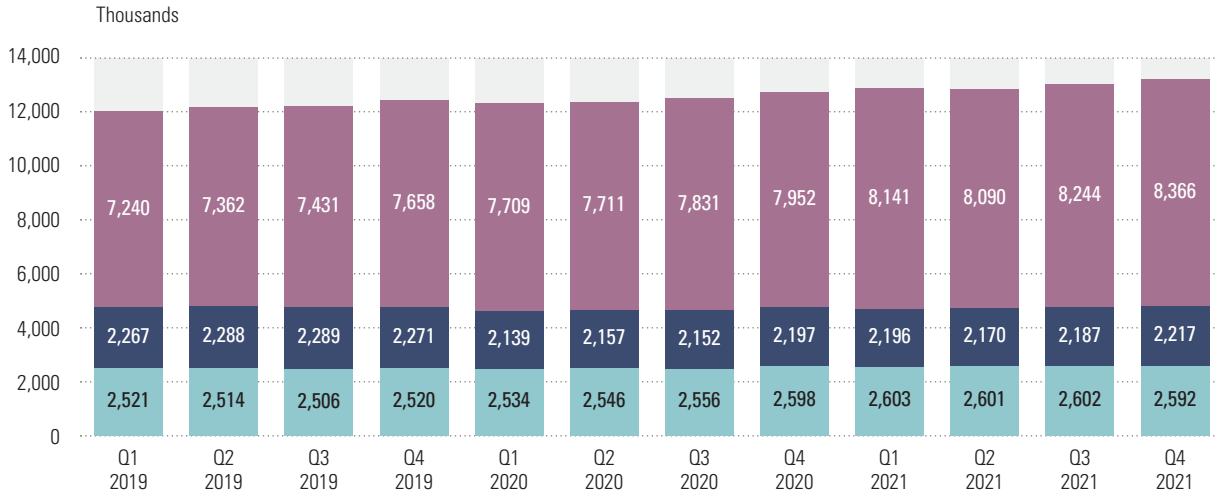
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# Fixed and mobile broadband connections

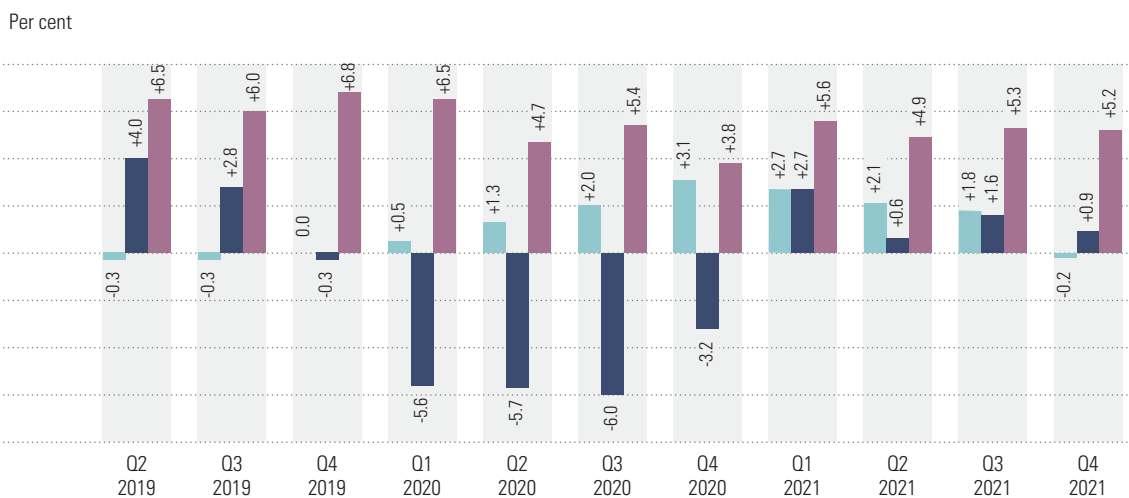
→ Year-on-year comparison of growth in mobile data subscriptions and smartphone subscriptions

## Fixed and mobile broadband connections

■ Fixed broadband ■ Mobile data subscriptions ■ Smartphone subscriptions



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



- Following growth of 3.4 per cent compared with the previous year, there were around 13.2 million active broadband connections in fixed and mobile networks at the end of 2021. Quarter on quarter, growth was 1.1 per cent.
- Smartphone subscriptions made up the majority of retail broadband connections, at 63.5 per cent. In Q4 2021, connections in this category totalled 8.4 million, which represents a gain of 414,000 connections when compared with the previous year.
- Compared with the same quarter in the previous year, total fixed broadband connections slipped 0.2 per cent to around 2.6 million. This compares with the most recent figure of 2.2 million mobile data subscriptions. Year on year, this category experienced growth totaling roughly 20,100 connections.

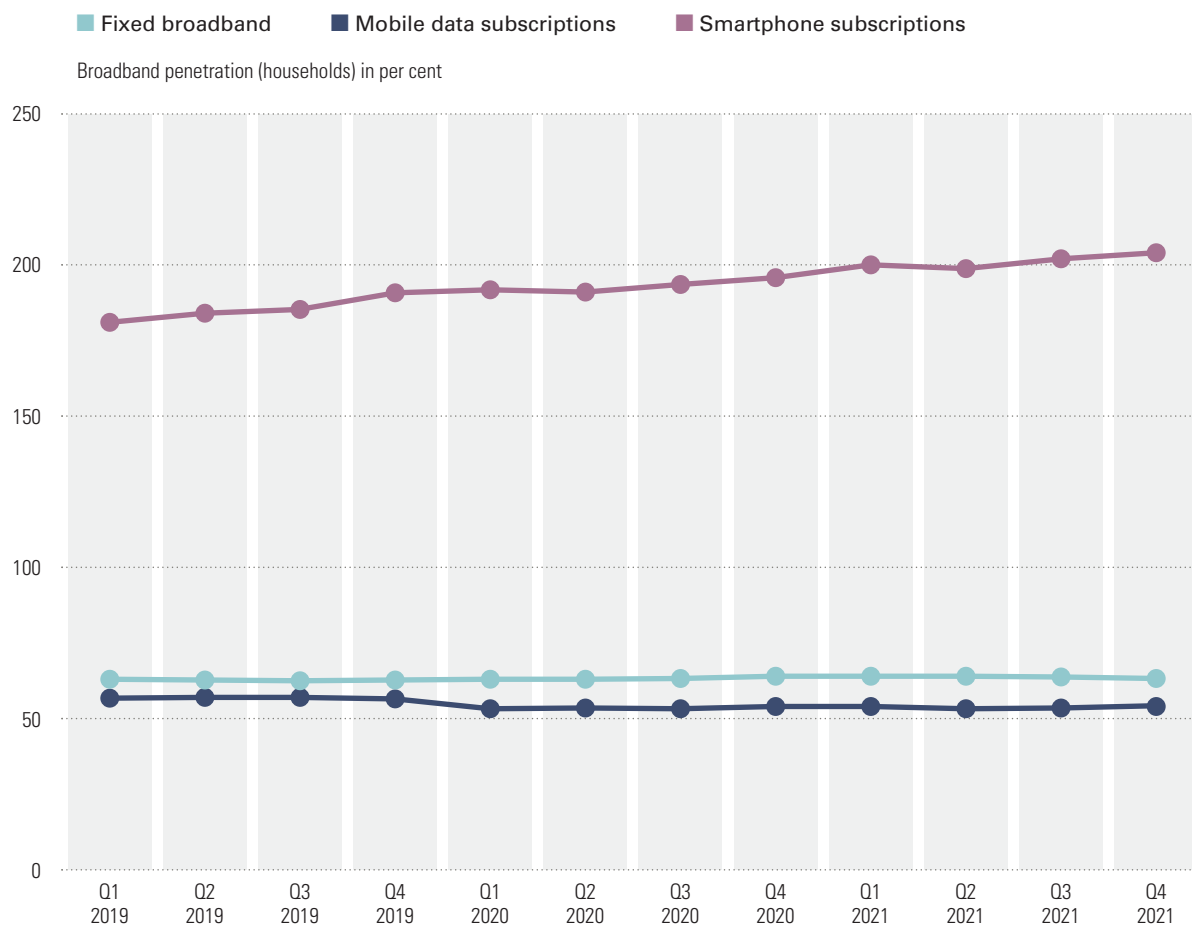
The chart above shows the total number of active broadband connections serviced by fixed or mobile networks.

In the context of mobile networks, 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

## Broadband penetration



Source for number of households: Statistics Austria

- The rising number of smartphone subscriptions is also reflected in the increasing penetration rate for this category. In Q4 2021, each household in Austria had slightly more than two smartphone connections on average (204.1%). This figure has risen by 8.4 percentage points within a single year.
- In contrast, the penetration rate for fixed broadband and mobile data subscriptions remained largely stable year on year, with the latest figures being 63.2 per cent (for fixed broadband) and 54.1 per cent (mobile data subscriptions).

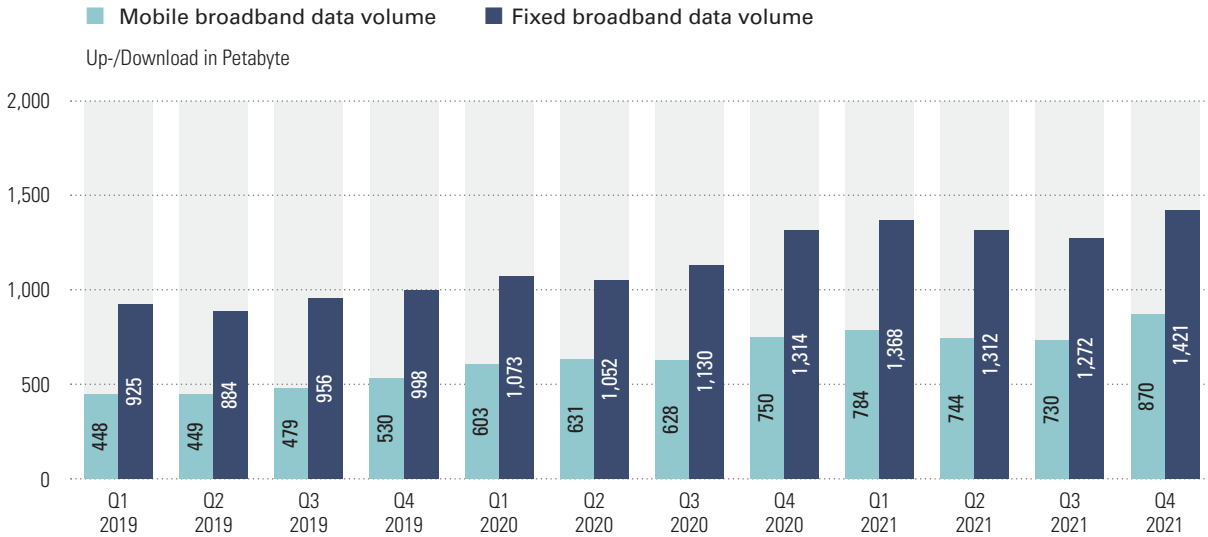
Broadband penetration refers to the ratio of fixed and mobile broadband connections to the total number of households in Austria. The penetration rate also takes into account broadband connections used by businesses.



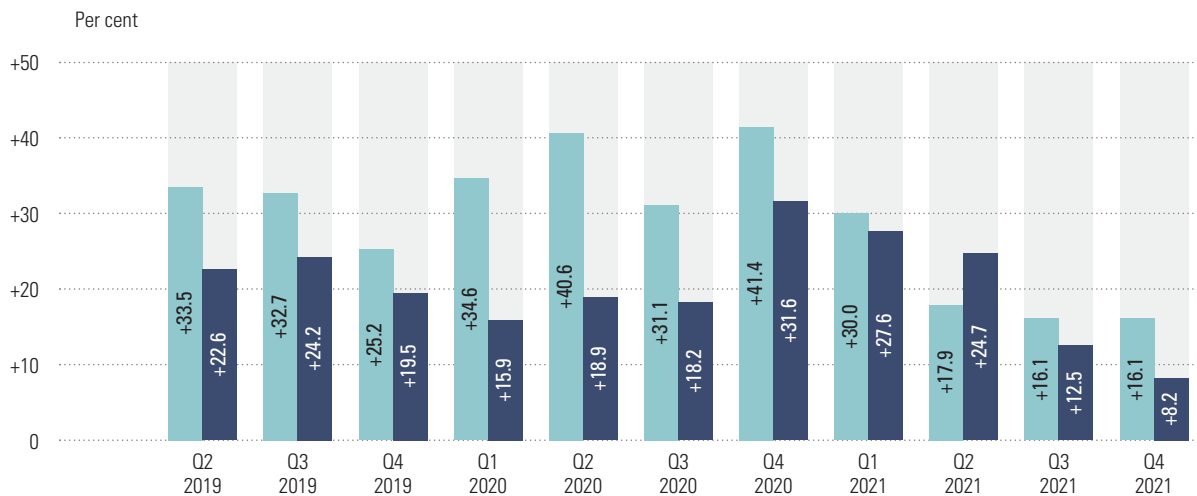
# Fixed and mobile data volume – retail market

→ Consumed data volume totalled a record 2,291 petabytes in Q4 2021

## Fixed and mobile data volume – retail market



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



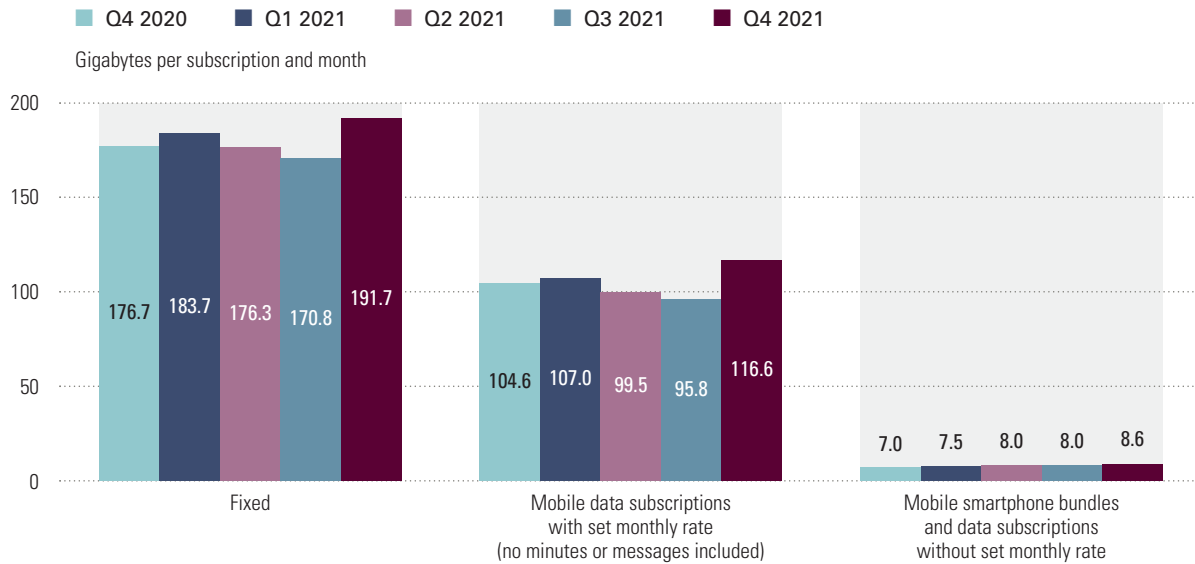
- Data consumption in fixed and mobile networks continued its resolutely upward trend throughout Q4 2021. Rising 11.1 per cent year on year, total volume for retail customers culminated in a new record figure of 2,291 petabytes in this quarter.
- Of this volume, 62.0 per cent represented data consumed via fixed broadband connections, which increased by 8.2 per cent within the space of a year and attained a peak value of 1,421 petabytes in Q4 2021. This represents an increase of 11.8 per cent compared with the previous quarter.
- The latest figure of 870 petabytes for mobile broadband also constitutes a new record. Year on year, this marks an increase of 16.1 per cent in this category.

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).

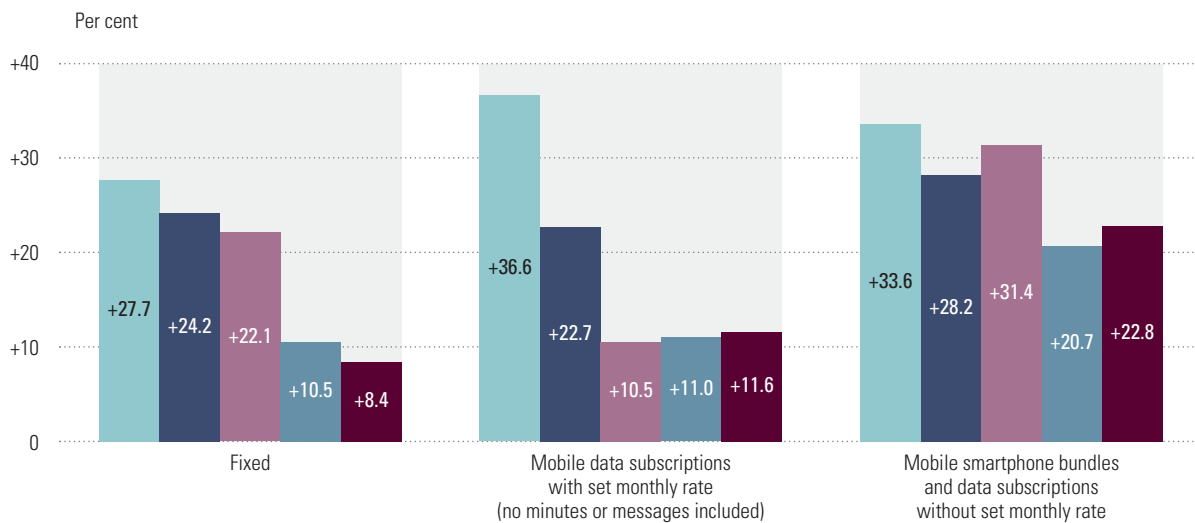
# Fixed and mobile data volume per subscription

→ Sharp rise in year-on-year data consumption for fixed and mobile networks

## Fixed and mobile data volume per subscription



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



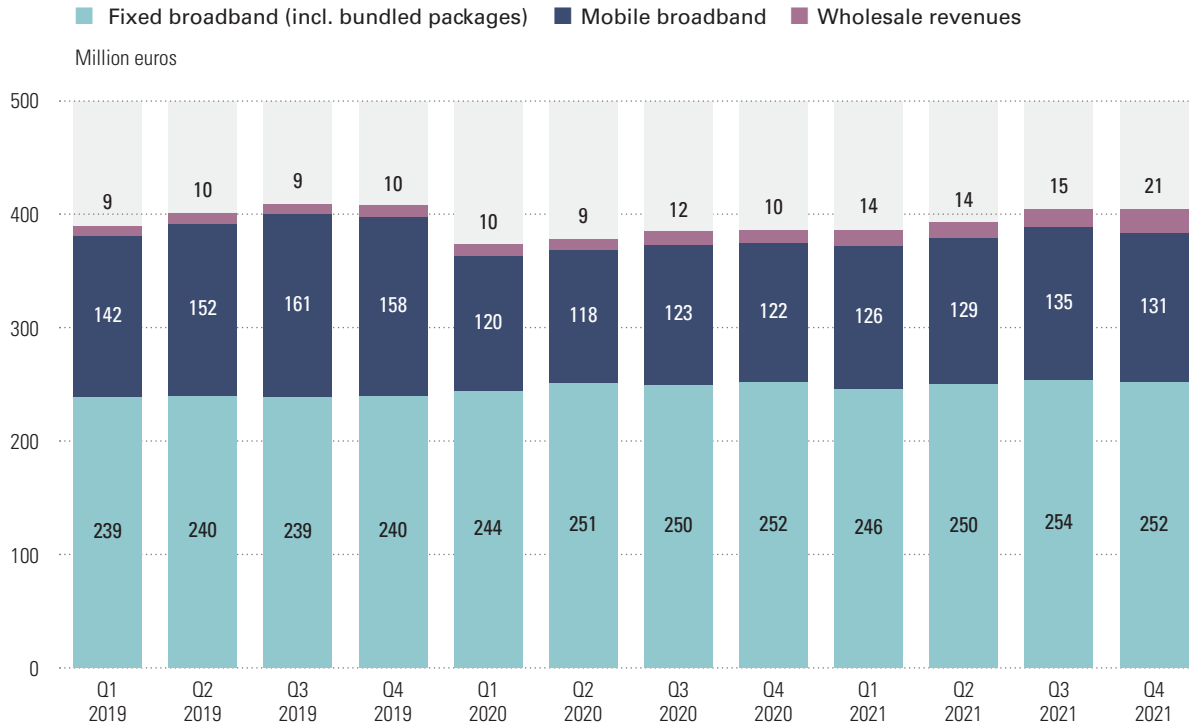
- Rising data volumes in fixed and mobile broadband connections are also strongly reflected in average figures per connection and per month. An average of 191.7 GB was consumed via fixed broadband connections during the fourth quarter of 2021. Compared with Q4 2020, this represents growth of 8.4 per cent.
- Gains in mobile data subscriptions with a fixed monthly fee (excluding smartphone subscriptions) were even more considerable: 116.6 GB per connection and month represents an annual increase of 11.6 per cent in this category.
- Although only 8.6 GB had been consumed per month and connection in smartphone bundles and data subscriptions without a fixed monthly fee at year-end 2021, this category then posted the highest growth over the next twelve months (+22.8%).

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

→ Revenues rise to around EUR 1.6 billion in 2021

## Broadband revenues



- Broadband products earned telecoms operators total revenues of almost EUR 1.6 billion in 2021, an increase of 4.3 per cent compared with 2020.
- Most of this revenue (63.0%) was posted in the category of fixed broadband and bundled products. In terms of revenue figures, this equates to around EUR 1 billion in 2021, representing an increase of 0.5 per cent from 2020.
- The highest figure for growth in this period was observed at the wholesale level (+55.8%), although revenues in this category were relatively minor (EUR 64.4 million) compared with fixed and mobile broadband.
- In mobile broadband, revenues rose year on year by 7.8 per cent to EUR 520.5 million.

The chart shows revenues from broadband connections, broken down by fixed broadband revenues (including bundles), revenues from mobile broadband (data-only subscriptions) and wholesale revenues (bitstream and resale). The bitstream wholesale product is defined as a data stream that is handed over at a predefined point to a wholesale customer, who then handles the provision of internet connectivity and the end customer relationship. In contrast, resale access involves internet connectivity also being provided by the wholesale supplier, with the wholesale customer merely acting as a reseller.

## Tables

### Fixed and mobile broadband connections

		Millions		
		Fixed broadband	Mobile data subscriptions	Smartphone subscriptions
2019	Q1 2019	2.521	2.267	7.240
	Q2 2019	2.514	2.288	7.362
	Q3 2019	2.506	2.289	7.431
	Q4 2019	2.520	2.271	7.658
2020	Q1 2020	2.534	2.139	7.709
	Q2 2020	2.546	2.157	7.711
	Q3 2020	2.556	2.152	7.831
	Q4 2020	2.598	2.197	7.952
2021	Q1 2021	2.603	2.196	8.141
	Q2 2021	2.601	2.170	8.090
	Q3 2021	2.602	2.187	8.244
	Q4 2021	2.592	2.217	8.366

### Broadband penetration

		Percentage of households		
		Fixed broadband	Mobile data subscriptions	Smartphone subscriptions
2019	Q1 2019	63.0	56.7	180.9
	Q2 2019	62.8	57.1	183.9
	Q3 2019	62.5	57.0	185.2
	Q4 2019	62.7	56.5	190.7
2020	Q1 2020	63.0	53.2	191.8
	Q2 2020	63.1	53.4	190.9
	Q3 2020	63.2	53.2	193.5
	Q4 2020	63.9	54.1	195.7
2021	Q1 2021	64.0	54.0	200.1
	Q2 2021	63.9	53.3	198.7
	Q3 2021	63.7	53.6	201.9
	Q4 2021	63.2	54.1	204.1

## Data volume

Petabytes			
		Mobile broadband data volume	Fixed broadband data volume
2019	Q1 2019	448	925
	Q2 2019	449	884
	Q3 2019	479	956
	Q4 2019	530	998
2020	Q1 2020	603	1,073
	Q2 2020	631	1,052
	Q3 2020	628	1,130
	Q4 2020	750	1,314
2021	Q1 2021	784	1,368
	Q2 2021	744	1,312
	Q3 2021	730	1,272
	Q4 2021	870	1,421

## Data volume per connection and month

Gigabyte				
		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)
2020	Q4 2020	176.7	104.6	7.0
2021	Q1 2021	183.7	107.0	7.5
	Q2 2021	176.3	99.5	8.0
	Q3 2021	170.8	95.8	8.0
	Q4 2021	191.7	116.6	8.6

## Broadband revenues

EUR millions				
		Fixed broadband (incl. bundled packages)	Mobile broadband	Wholesale revenues
2019	Q1 2019	239	142	9
	Q2 2019	240	152	10
	Q3 2019	239	161	9
	Q4 2019	240	158*	10
2020	Q1 2020	244	120*	10
	Q2 2020	251	118	9
	Q3 2020	250	123	12
	Q4 2020	252	122	10
2021	Q1 2021	246	126	14
	Q2 2021	250	129	14
	Q3 2021	254	135	15
	Q4 2021	252	131	21

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



# 02

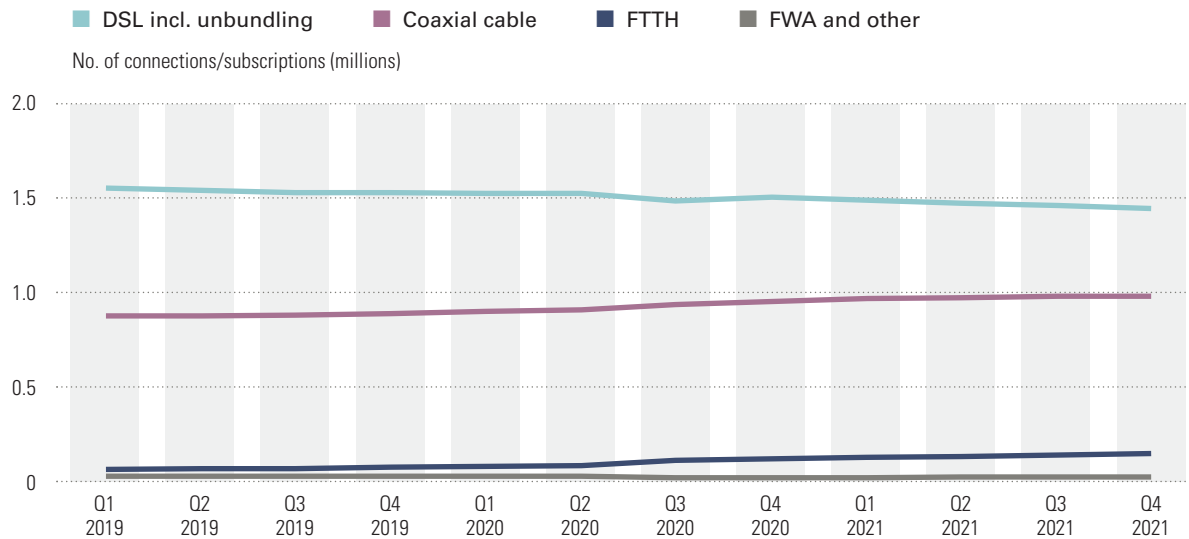
## Fixed broadband

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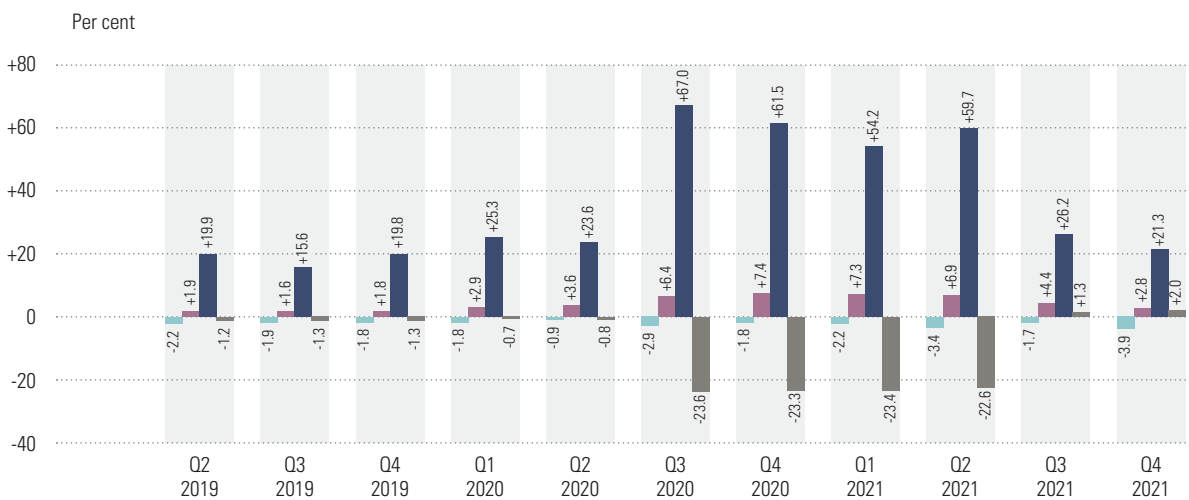
# Retail fixed broadband by infrastructure

→ Significant growth in demand for FTTH connections, DSL in decline

## Retail fixed broadband by infrastructure



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



- Nearly 2.6 million fixed broadband connections were recorded in Austria in Q4 2021. This amounts to 5,881 fewer connections (0.2%) than in Q4 2020.
- At 55.7 per cent, DSL connections including unbundled lines made up the largest proportion of all fixed retail broadband connections at the end of 2021, although this is a significant decline compared with the same quarter in the previous year (–3.9%). The most recent figure records 1.4 million active connections in this category.
- A total of 37.7 per cent of fixed broadband connections were provided via coaxial cable at the end of 2021. Totalling around 978,400 connections, this represents year-on-year growth of 2.8 per cent.
- The highest level of year-on-year growth was observed for active FTTH connections (+21.3% to 147,541), although this accounts for a trivial proportion of all active fixed broadband connections (most recent figure: 5.7%).
- Year-on-year growth was also observed in the ‘FWA and others’ category, with connections here rising by 2.0 per cent. Retail customer connections totalled 22,322 at the end of 2021.

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. The ‘other’ category comprises satellite connections and fixed connections that cannot be assigned to any of the aforementioned categories.

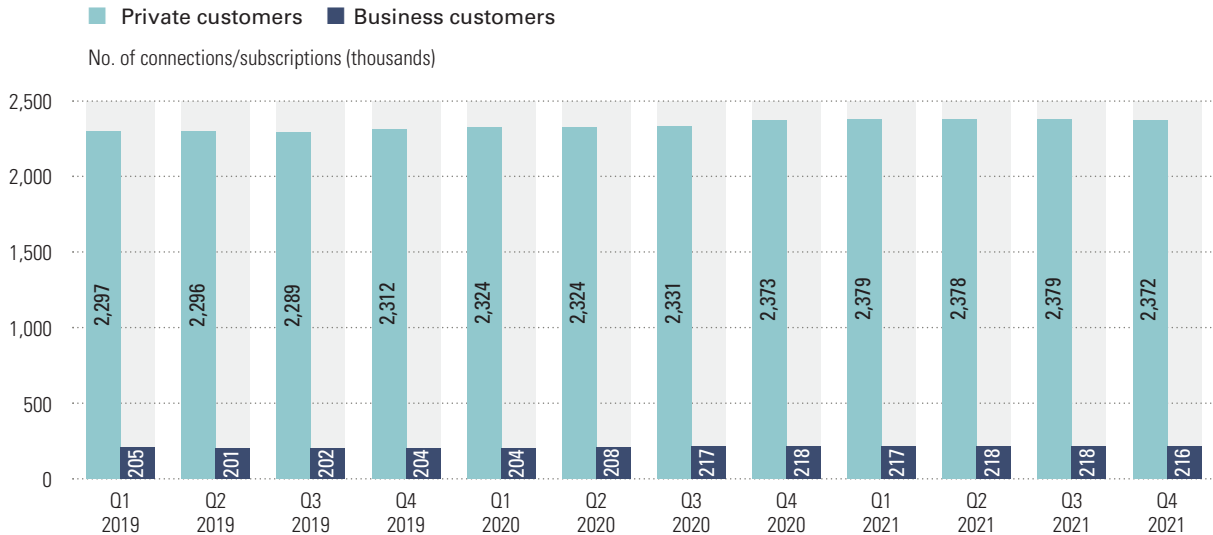
The number of fixed retail broadband connections in this chart represents broadband connections based on provider-owned infrastructure or an unbundled line as well as connections offered on the wholesale market.



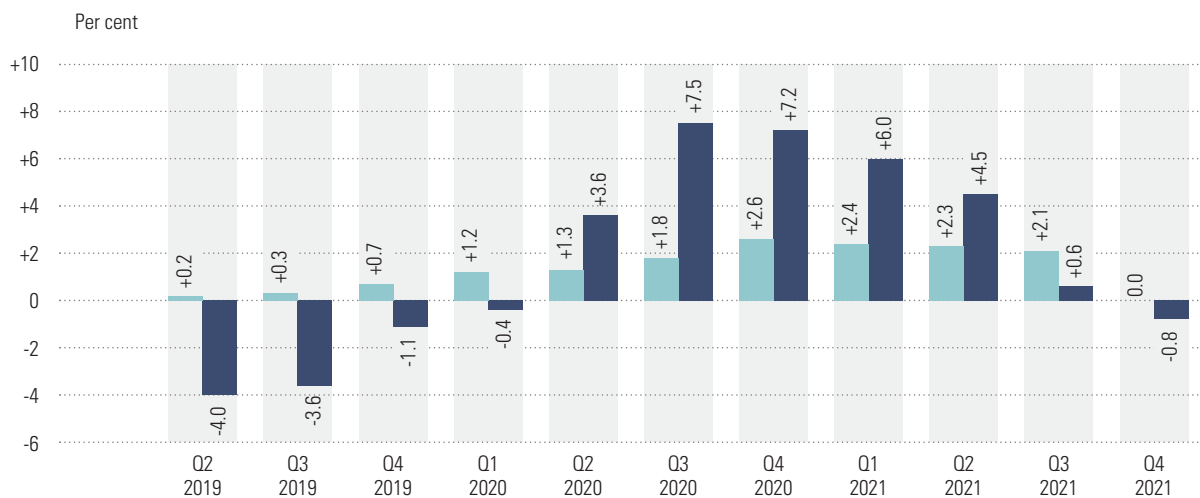
# Retail fixed broadband by customer category

→ Marginal decline in retail broadband connections

## Retail fixed broadband by customer category



## Year-on-year change in quarterly figures



- Private customer connections accounted for 91.6 per cent (around 2.4 million) of the almost 2.6 million fixed retail broadband connections in Q4 2021.
- While a slight quarter-on-quarter decline of 0.3 per cent was observed in the private customer segment, year-on-year connection numbers remained virtually the same.
- In the business customer segment, active fixed retail broadband connections totalled 216,400 at the end of 2021, representing a decline of 0.8 per cent year on year.

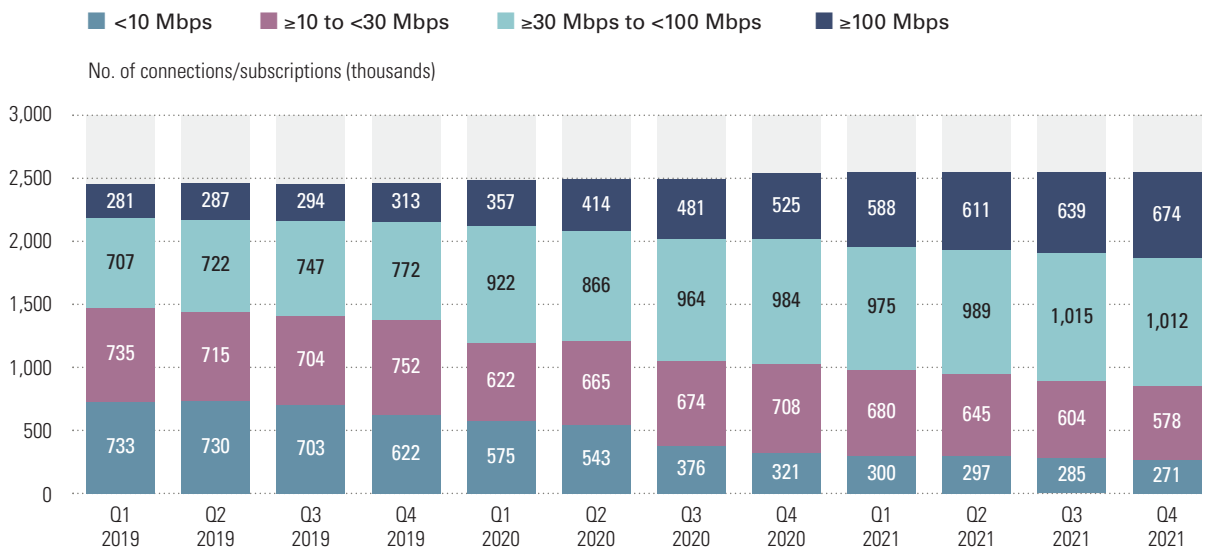
The chart shows the number of fixed broadband connections, broken down by customer category. Categories are differentiated according to product type. When sold as a private customer product, a connection is classified under the private customer segment, even if purchased by a business customer. Refer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

The figure for total fixed retail broadband connections in this chart reflects the number of fixed retail broadband connections based on provider-owned infrastructure or other broadband connections purchased on the wholesale market: in the context of the Austrian Communications Survey Ordinance (KEV), customer type is only used as a differentiator at the wholesale level for purchased broadband connections. Accordingly, the total sum given may not necessarily match the total sum in the figure for 'Retail fixed broadband connections by infrastructure'.

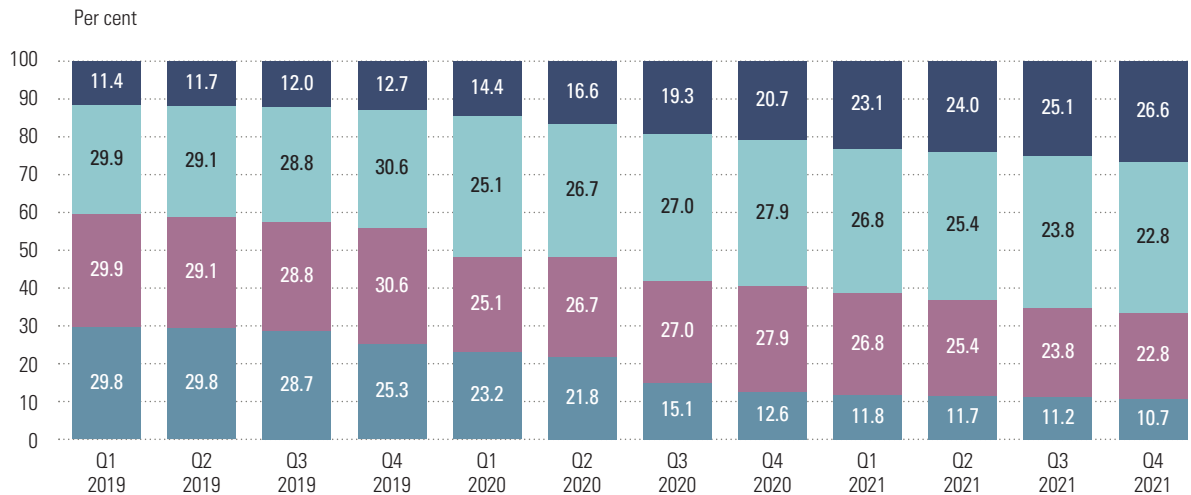
# Retail broadband connections by bandwidth category – fixed network

→ High bandwidths continue to make significant gains

## Retail broadband connections by bandwidth category – fixed network



## Percentage share



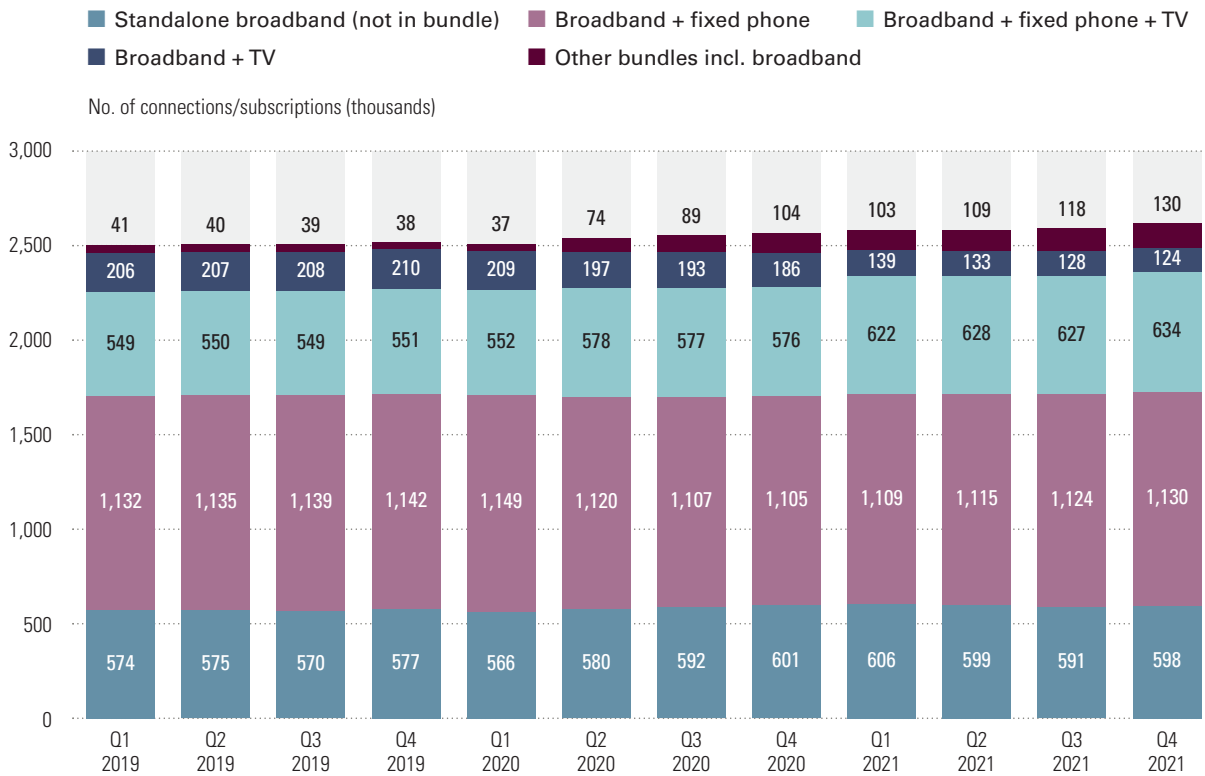
- In the case of bandwidth growth, a familiar trend is seen to continue. As in previous quarters, retail demand for connections supporting low bandwidths continued to fall while demand for high-bandwidth connections increased as before.
- In the space of one year, connections supporting more than 100 Mbps have jumped by 28.5 per cent to almost 674,000 and now account for 26.6 per cent of all fixed broadband connections. Connections in the category ≥30 Mbps to <100 Mbps also increased in the same period, although only by 2.8 per cent, now comprising just under 40 per cent of fixed broadband connections.
- In contrast, the number of lower-bandwidth connections fell significantly during the year. As one example, the category of ≥10 Mbps to <30 Mbps posted a loss of 18.4 per cent and now accounts for only 22.8 per cent of fixed broadband connections.

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

→ Three quarters of fixed broadband connections purchased as a bundle

## Retail broadband connections by bundle category – fixed network



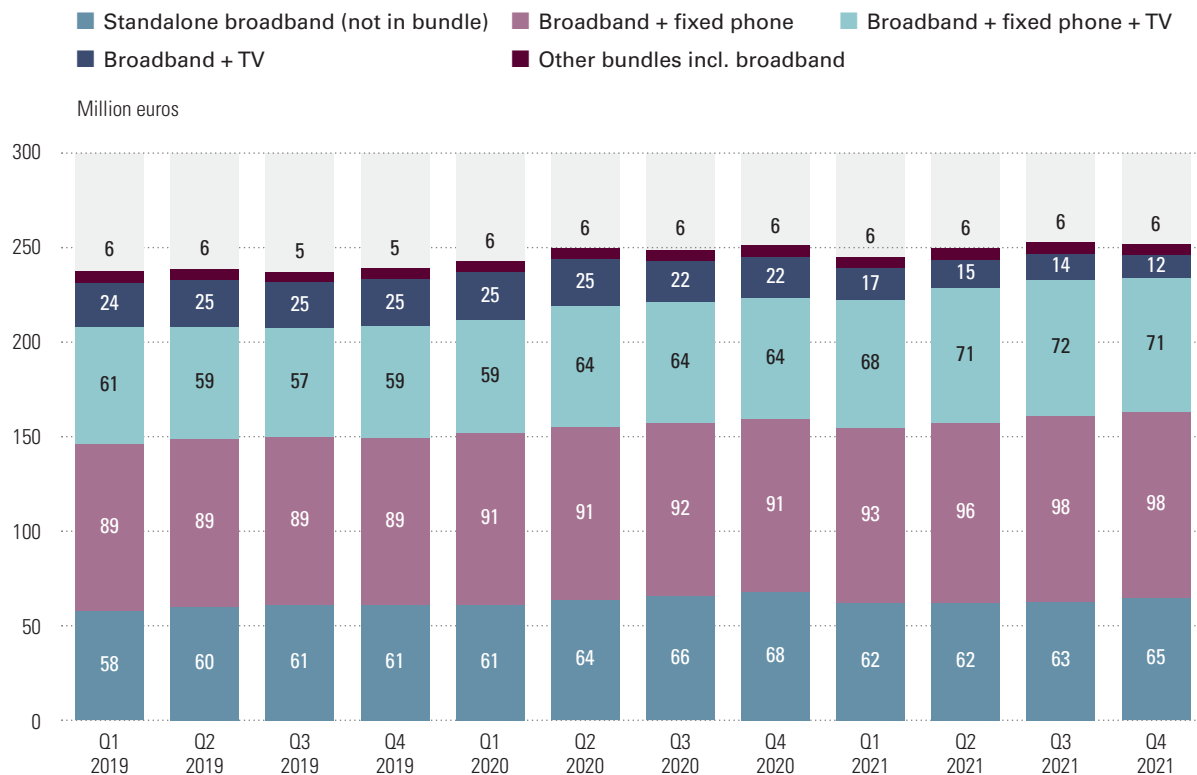
- The most popular bundled product (broadband with fixed network telephony) grew by 2.2 per cent during the year to total more than 1.1 million active connections. At the end of 2021, this product accounted for 43.2 per cent of all active broadband products based on provider-owned infrastructure or an unbundled line.
- A total of 598,117 standalone broadband products were reported in Q4 2021. Year on year, this represents a slight decline of 0.4 per cent for this category.
- While a significant year-on-year contraction was reported for broadband bundled with TV (–33.3%), broadband combined with TV and fixed network telephony expanded by 10.1 per cent.
- Gains were also reported for ‘other bundles incl. broadband’ (+1.7% year on year), although these play only a minor role with their 5.0 per cent total market share.

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

→ Fixed broadband breaks through the billion-euro barrier for annual revenue

## Revenues from retail broadband connections – fixed network



- Annual revenues from fixed network broadband products – whether bundled or standalone – totalled EUR 1,001.6 million in 2021. This represents a 0.5 per cent increase from 2020.
- The biggest earner in 2021 was once again the broadband and fixed network telephony product bundle, taking a 38.4 per cent (EUR 384.5 million) slice of total annual revenue. This share also rose by 5.2 per cent compared with 2020, despite a fall in active connections in this category.
- Significant gains were also achieved in 2021 by the broadband, fixed network telephony and TV bundle, with total annual revenue amounting to EUR 282.0 million, an increase of 12.1 per cent compared with 2020.
- In contrast, the broadband and TV bundled product lost a lot of ground in 2021, posting annual revenue of only EUR 57.5 million – a year-on-year fall of 38.5 per cent.
- While year-on-year demand for standalone broadband products was higher in 2021, the revenue generated nonetheless declined (–2.7 per cent to EUR 251.9 million).

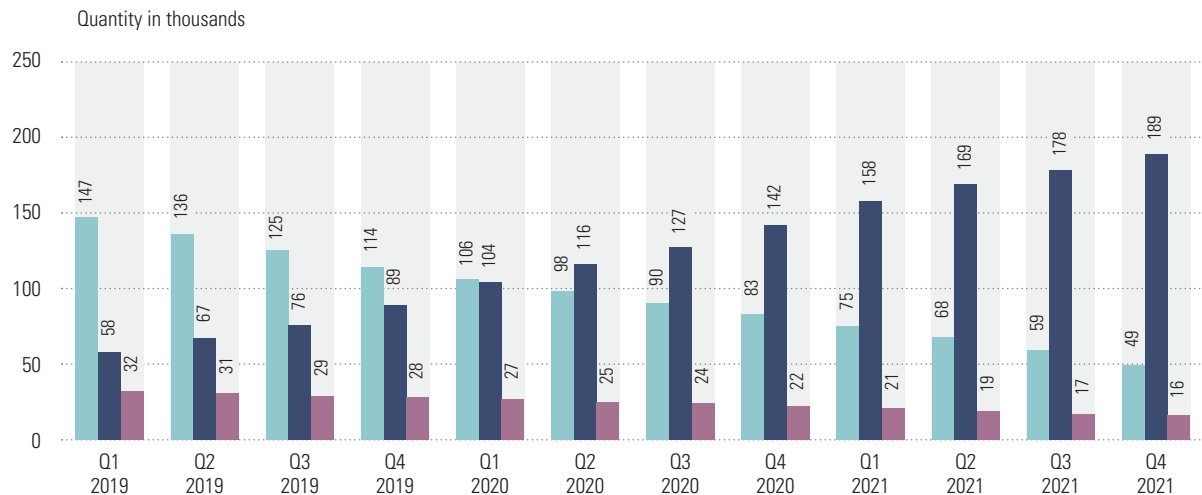
The chart shows the revenues from fixed broadband access sold to retail customers, for connections based on provider-owned infrastructure or (physically or virtually) unbundled lines. This includes both standalone broadband products and bundled products, the latter referring to broadband offered in combination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

# Wholesale broadband products offered by A1 Telekom Austria AG

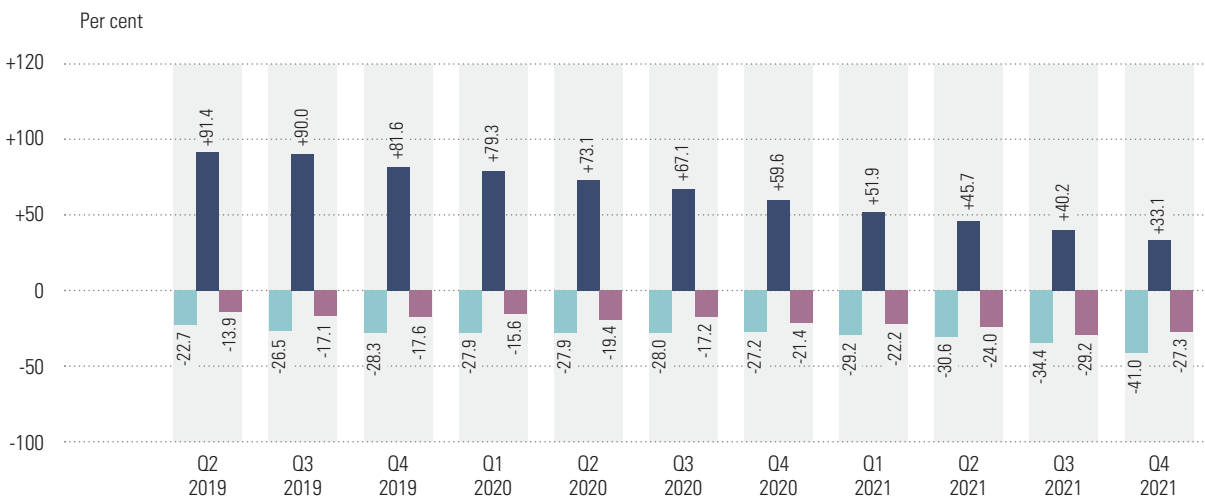
→ Virtual unbundling maintains strong performance

## Wholesale broadband products offered by A1 Telekom Austria AG

■ Physically unbundled lines reported by A1 ■ Virtual unbundling ■ Bitstream connections



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



- The sharp downward trend in physically unbundled lines from A1 Telekom Austria continued unabated in 2021. In Q4 2021, a total of 49,000 physically unbundled lines were reported. This represents a decline of 41.0% since the end of 2020.
- The situation with bitstream connections is the same, which fell by 27.3 per cent to a total figure of only 16,000 reported connections in Q4 2021.
- In contrast, the virtually unbundled lines segment continues to make significant gains, with 189,000 connections at the end of 2021, a sharp rise of 33.1 per cent compared with Q4 2020.

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

## Tables

### Retail fixed broadband by infrastructure

		Thousands			
		DSL incl. unbundling	Coaxial cable	FTTH	FWA and other
2019	Q1 2019	1,551	875	65	29
	Q2 2019	1,540	878	67	29
	Q3 2019	1,530	881	66	29
	Q4 2019	1,530	886	75	29
2020	Q1 2020	1,523	901	82	29
	Q2 2020	1,526	909	83	28
	Q3 2020	1,486	938	111	22
	Q4 2020	1,503	952	122	22
2021	Q1 2021	1,489	966	126	22
	Q2 2021	1,474	972	133	22
	Q3 2021	1,461	979	140	22
	Q4 2021	1,444	978	148	22

### Retail fixed broadband by customer category

		Thousands	
		Private customers	Business customers
2019	Q1 2019	2,297	205
	Q2 2019	2,296	201
	Q3 2019	2,289	202
	Q4 2019	2,312	204
2020	Q1 2020	2,324	204
	Q2 2020	2,324	208
	Q3 2020	2,331	217
	Q4 2020	2,373	218
2021	Q1 2021	2,379	217
	Q2 2021	2,378	218
	Q3 2021	2,379	218
	Q4 2021	2,372	216

## Retail broadband connections by bandwidth category – fixed network

		Thousands			
		<10 Mbps	10 Mbps to <30 Mbps	30 Mbps to <100 Mbps	≥100 Mbps
2019	Q1 2019	733	735	707	281
	Q2 2019	730	715	722	287
	Q3 2019	703	704	747	294
	Q4 2019	622	752	772	313
2020	Q1 2020	575	622	922	357
	Q2 2020	543	665	866	414
	Q3 2020	376	674	964	481
	Q4 2020	321	708	984	525
2021	Q1 2021	300	680	975	588
	Q2 2021	297	645	989	611
	Q3 2021	285	604	1,015	639
	Q4 2021	271	578	1,012	674

## Retail broadband connections by bundle category – fixed network

		Thousands					
		Standalone broadband (not bundled)	Broadband + fixed phone	Broadband + fixed phone + TV	Broadband + TV	Other bundles incl. broadband	Other bundles w/o fixed broadband
2019	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
2020	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
2021	Q1 2021	606	1,109	622	139	103	11
	Q2 2021	599	1,115	628	133	109	11
	Q3 2021	591	1,124	627	128	118	11
	Q4 2021	598	1,130	634	124	130	7

## Revenues from retail broadband connections – fixed network

		EUR millions					
		Standalone broadband (not bundled)	Broadband + fixed phone	Broadband + fixed phone + TV	Broadband + TV	Other bundles incl. broadband	Other bundles excl. broadband
2019	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
2020	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
2021	Q1 2021	62	93	68	17	6	1
	Q2 2021	62	96	71	15	6	1
	Q3 2021	63	98	72	14	6	1
	Q4 2021	65	98	71	12	6	0

## Wholesale broadband products offered by A1 Telekom Austria AG

		Thousands			
		Physically unbundled lines reported by A1	Broadband connections via physically unbundled lines	Virtual unbundling	Bitstream connections
2019	Q1 2019	147	87	58	32
	Q2 2019	136	75	67	31
	Q3 2019	125	70	76	29
	Q4 2019	114	65	89	28
2020	Q1 2020	106	73	104	27
	Q2 2020	98	71	116	25
	Q3 2020	90	57	127	24
	Q4 2020	83	54	142	22
2021	Q1 2021	75	50	158	21
	Q2 2021	68	45	169	19
	Q3 2021	59	42	178	17
	Q4 2021	49	38	189	16





# 03

## Mobile broadband

<b>3</b>	<b>Mobile broadband</b>	<b>25</b>
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	Active mobile broadband connections from data-only subscriptions, by customer type	27
	Retail data volumes in mobile networks	28
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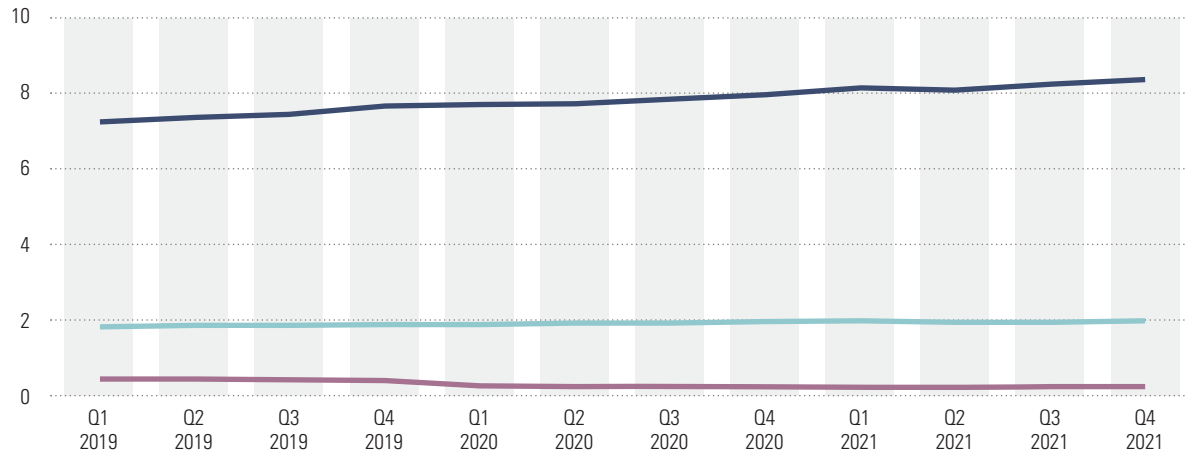
# Active mobile broadband connections – retail

→ Year-on-year growth of 4.3 per cent in active mobile broadband connections

## Active mobile broadband connections – retail

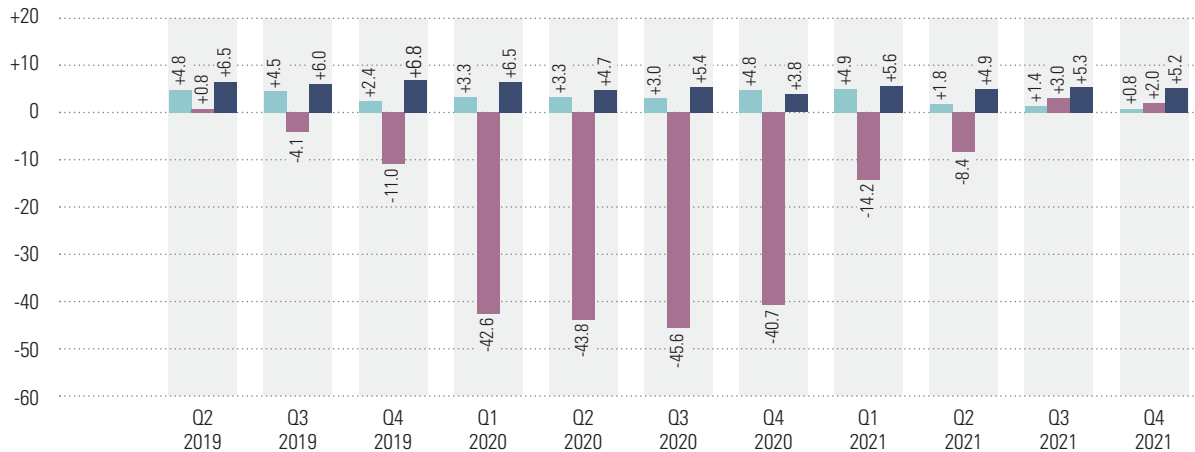
■ Data subscriptions with set monthly rate     ■ Data subscriptions without set monthly rate  
■ Voice subscriptions incl. data volume

No. of subscriptions in millions



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

Per cent



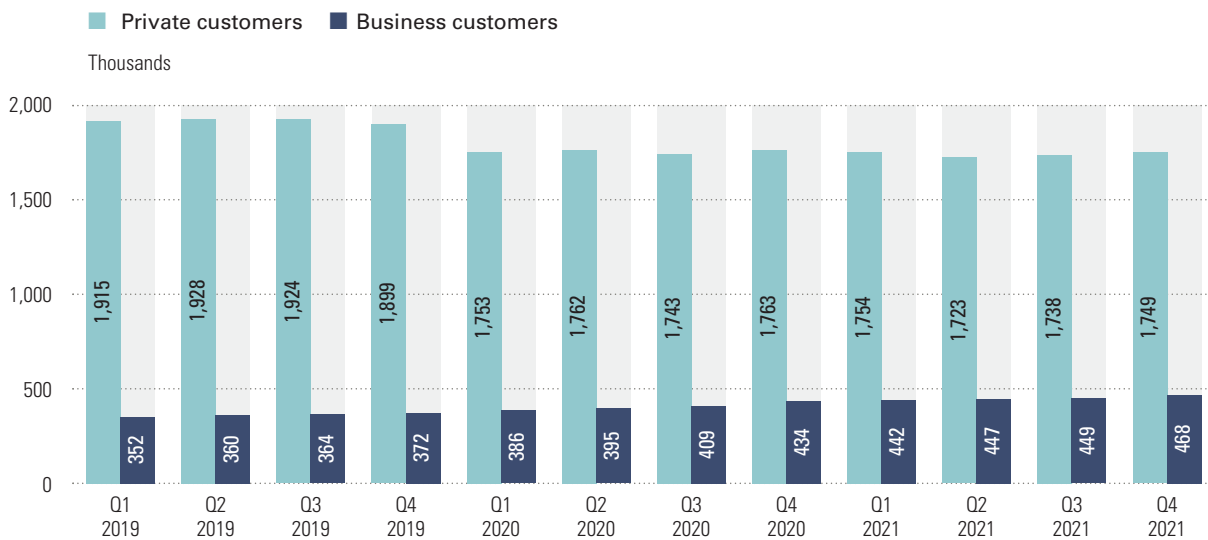
- At the end of 2021, the total number of active mobile retail broadband connections (including smartphones) rose 4.3 per cent year on year to around 10.6 million connections.
- At almost 80 per cent, smartphone subscriptions once again constituted the greatest proportion of active mobile broadband connections in Q4 2021. The year-on-year figure for this quarter rose by 5.2 per cent to a total of 8.4 million connections.
- Trailing this figure by a wide margin at 18.7 per cent, as a proportion of mobile broadband connections, are data subscriptions with a fixed monthly fee. Nearly 2 million connections were recorded in this category at the end of 2021, representing a slight year-on-year increase of 0.8 per cent.
- Achieving growth of around 2 per cent compared with Q4 2020, broadband connections for data subscriptions without a fixed monthly fee totalled 0.2 million in Q4 2021. Quarter on quarter, this represents growth of 1.9 per cent, with more than 4,500 new 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 tariff plans (voice call plans including data volumes).

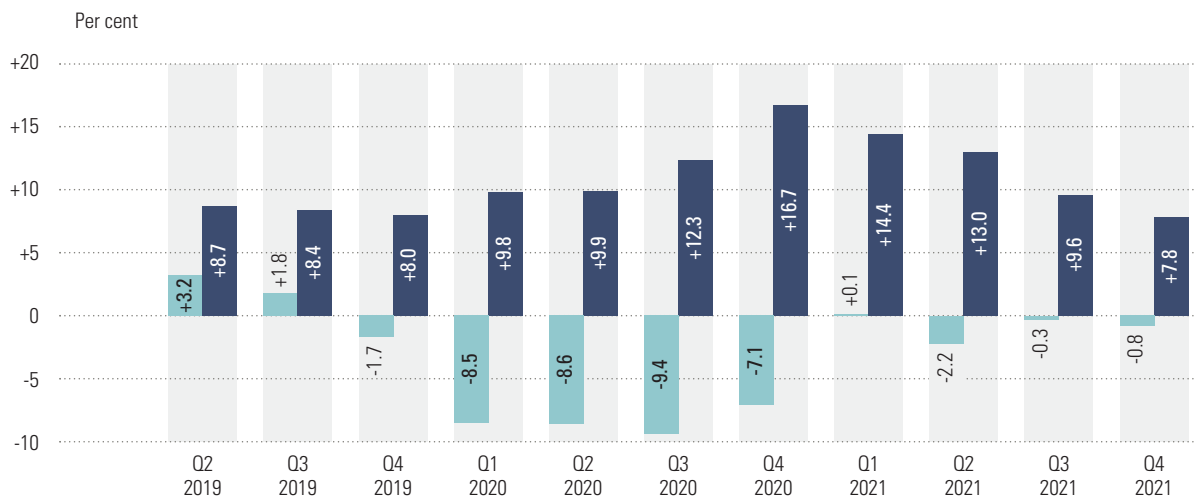
# Active mobile broadband connections from data-only subscriptions, by customer type

→ Significant growth in mobile broadband connections from data-only subscriptions in the business customer segment

## Active mobile broadband subscriptions by customer category



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



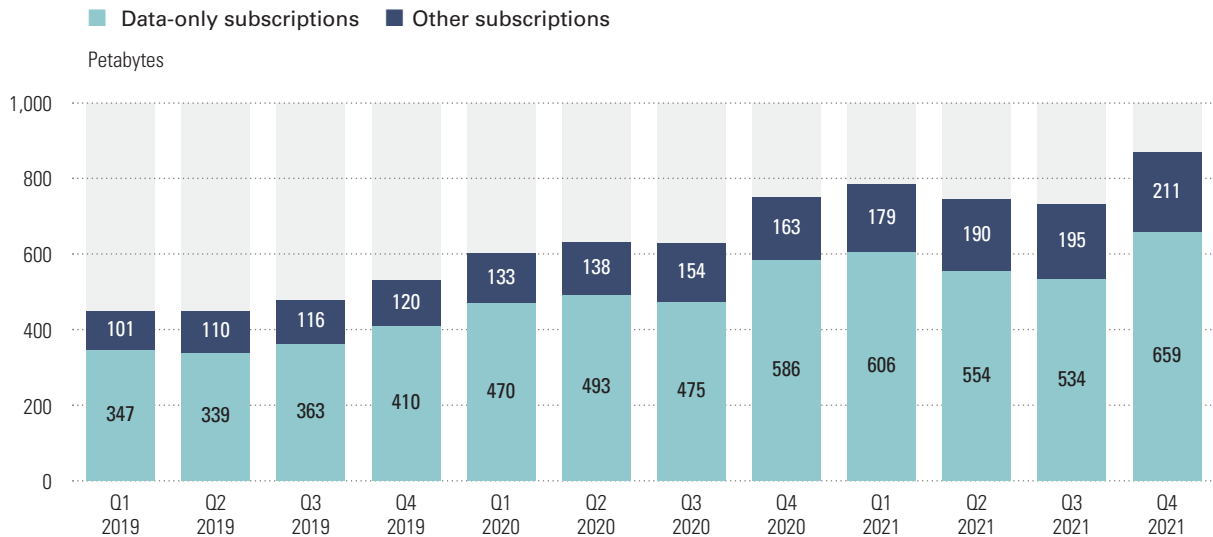
- At the end of 2021, customers used the roughly 2.2 million mobile broadband connections from data-only subscriptions (data subscriptions with or without a fixed monthly fee) to access the internet on at least one occasion – a year-on-year rise of 0.9 per cent.
- While the proportion accounted for by private customers is slowly losing ground, it still has the largest share at nearly 79 per cent. Year on year, the number of active connections in this category declined by 0.8 per cent to 1.7 million at the end of 2021.
- Achieving year-on-year growth of 7.8 per cent, more than 468,000 mobile broadband connections from data-only subscriptions were recorded in the business customer segment at the end of 2021. Quarter on quarter, growth in this segment was 4.3 per cent.

The chart shows the number of active mobile broadband connections under data-only subscriptions (both with and without a set monthly rate), broken down by customer category. The chart does not include figures for smartphone subscriptions. In contrast to fixed broadband, the private and business segments are differentiated by customer and not by product.

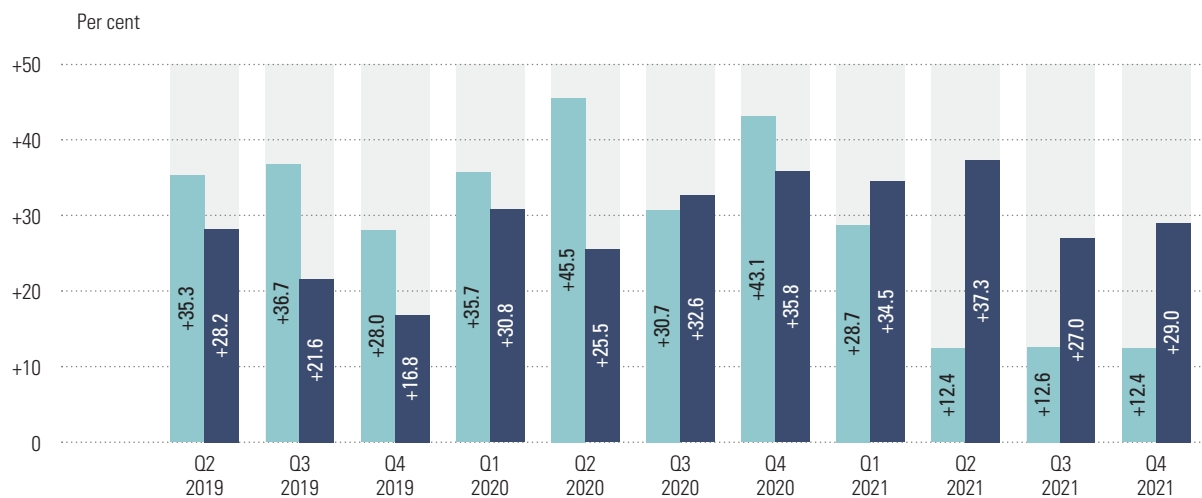
# Retail data volumes in mobile networks

→ Strong upward trend continues for data volume consumed

## Retail data volumes in mobile networks



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



- Mobile data volume consumed achieved a new record of 870 petabytes at the end of 2021. Year on year, this represents a growth in data usage of 16.2 per cent. Quarter-on-quarter growth was even higher at 19.3 per cent.
- Data subscriptions with and without a fixed monthly fee account for almost 76 per cent of data consumed in mobile networks. At the end of 2021, data usage in this category amounted to 659 petabytes, an increase of 12.4 per cent compared with Q4 2020.
- Data volumes consumed via smartphone bundles or other subscriptions with voice or text services rose around 29 per cent year on year to 211 petabytes at the end of 2021. Quarter on quarter growth was 8.2 per cent.

The chart shows upload and download volumes consumed in the mobile retail market in the categories of data-only subscriptions (all data-only subscriptions with and without a fixed monthly fee) and other subscriptions (smartphone subscriptions with free data and voice/text-only subscriptions). M2M SIM cards are not included in these figures.

Figures are shown in petabytes (1 petabyte = 1,024 terabytes = 1,048,576 gigabytes = 1,073,741,824 megabytes).

## Tables

### Active mobile broadband subscriptions - retail

		Thousands		
		Data subscriptions with set monthly rate	Data subscriptions without set monthly rate	Voice subscriptions incl. data volume
2019	Q1 2019	1,825	442	7,240
	Q2 2019	1,851	437	7,362
	Q3 2019	1,865	423	7,431
	Q4 2019	1,871	400	7,658
2020	Q1 2020	1,885	254	7,709
	Q2 2020	1,912	245	7,711
	Q3 2020	1,922	230	7,831
	Q4 2020	1,960	237	7,952
2021	Q1 2021	1,978	218	8,141
	Q2 2021	1,945	225	8,090
	Q3 2021	1,950	237	8,244
	Q4 2021	1,976	242	8,366

### Active mobile broadband connections from data-only subscriptions, by customer type

		Thousands	
		Private customer segment	Business customer segment
2019	Q1 2019	1,915	352
	Q2 2019	1,928	360
	Q3 2019	1,924	364
	Q4 2019	1,899	372
2020	Q1 2020	1,753	386
	Q2 2020	1,762	395
	Q3 2020	1,743	409
	Q4 2020	1,763	434
2021	Q1 2021	1,754	442
	Q2 2021	1,723	447
	Q3 2021	1,738	449
	Q4 2021	1,749	468

## Retail data volumes in mobile networks

		Petabytes	
		Data-only subscriptions	Other subscriptions
2019	Q1 2019	347	101
	Q2 2019	339	110
	Q3 2019	363	116
	Q4 2019	410	120
2020	Q1 2020	470	133
	Q2 2020	493	138
	Q3 2020	475	154
	Q4 2020	586	163
2021	Q1 2021	606	179
	Q2 2021	554	190
	Q3 2021	534	195
	Q4 2021	659	211



# 04

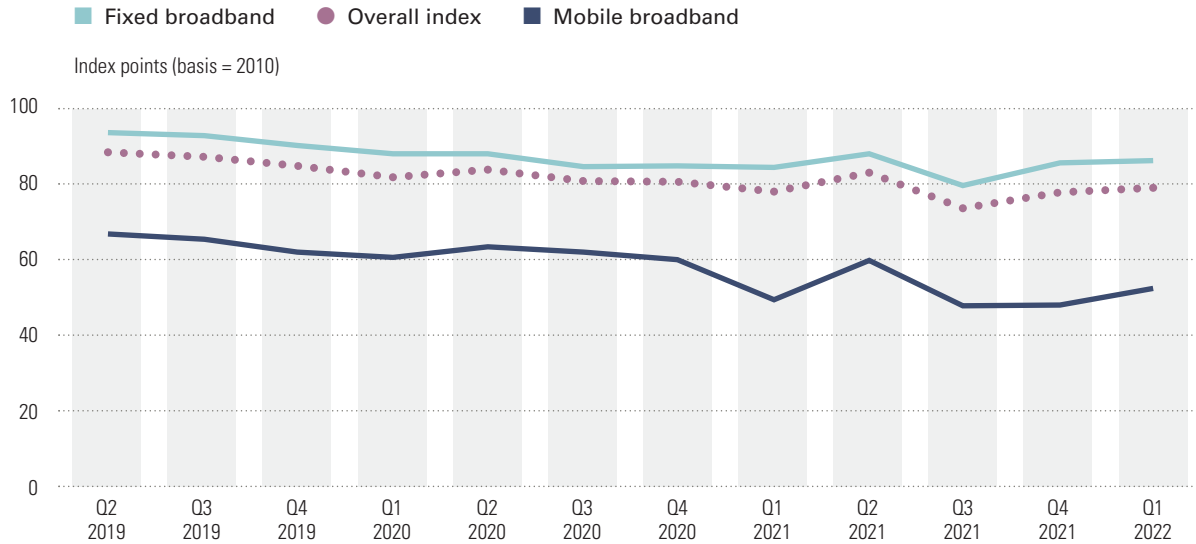
## Broadband prices

<b>4</b>	<b>Broadband prices</b>	<b>31</b>
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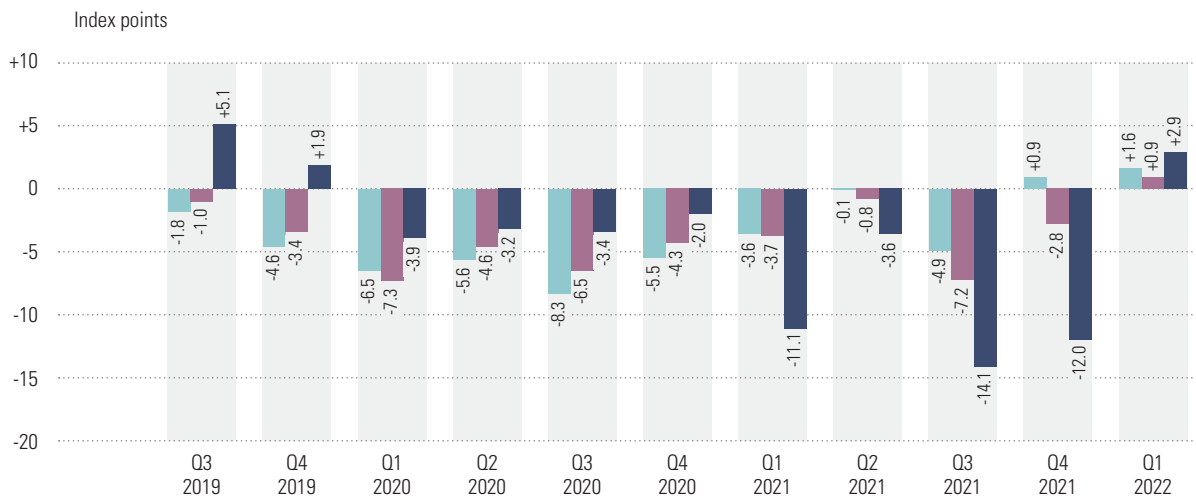
# Hedonic price index for broadband

→ Fixed and mobile broadband more expensive year on year

## Hedonic price index for broadband



## Year-on-year change in quarterly figures, in index points



- The hedonic price index for fixed broadband increased from 84.5 index points in Q1 2021 to 86.1 index points in Q1 2022. Quarter on quarter, this index rose by 0.5 index points.
- In Q1 2022, the mobile broadband index made significant quarter-on-quarter gains, rising by 4.3 points to 52.3 index points. Year on year this represents a rise of 2.9 index points from the previous figure of 49.4 points in the first quarter of 2021.
- The overall index followed an upward trajectory in 2021, rising by 0.9 points to 78.9 index points. As the figures show, both fixed and mobile broadband products grew more expensive during this period.

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.



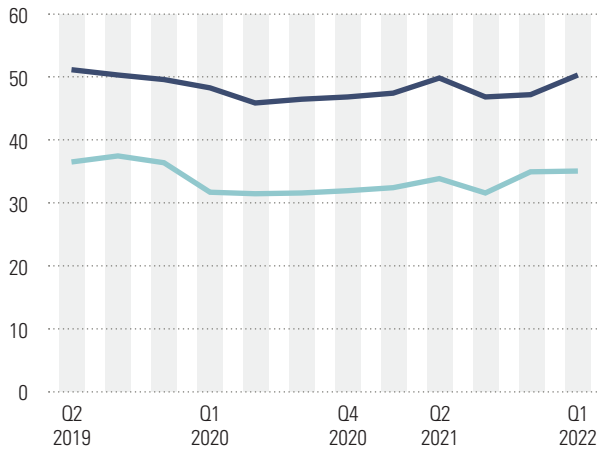
# Price baskets for fixed broadband – with and without TV

→ Year-on-year price increase for fixed broadband with and without TV

**Price baskets: fixed broadband incl. TV**

>30 to ≤100 Mbps    >100 Mbps

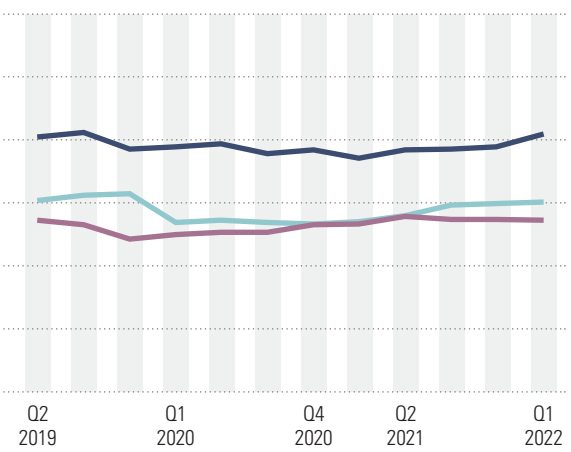
€ per month



**Price baskets: fixed broadband excl. TV**

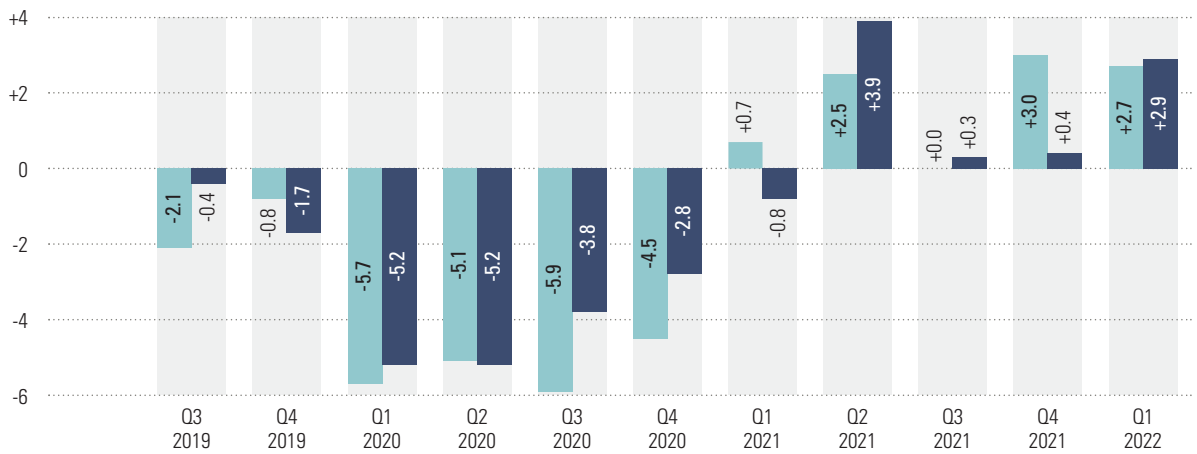
≤30 Mbps    >30 to ≤100 Mbps    >100 Mbps

€ per month

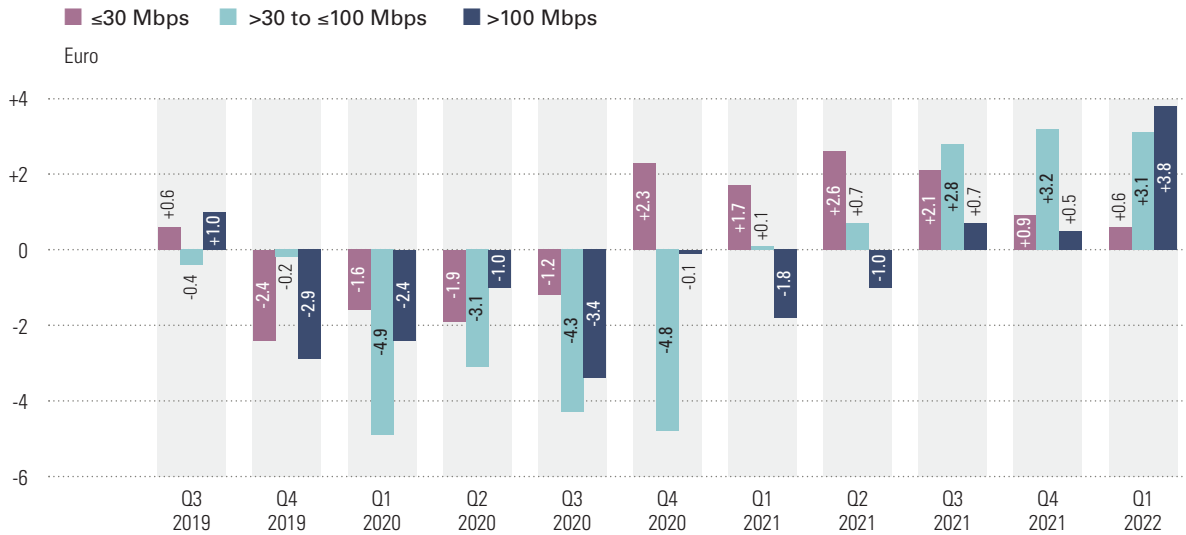


**Year-on-year change in quarterly figures, in EUR – fixed broadband with TV**

Euro



### Year-on-year change in quarterly figures, in EUR – fixed broadband without TV



- Between Q1 2021 and Q1 2022, monthly pricing for the bandwidth category >100 Mbps in fixed broadband with TV rose by EUR 2.90 to EUR 50.30. An increase was also observed in this bandwidth category for fixed broadband without TV, where monthly pricing rose from EUR 37.10 to EUR 40.90.
- In a year-on-year comparison, price baskets for the category >30 to ≤100 Mbps also increased for fixed broadband with TV (+EUR 2.70) and for fixed broadband without TV (+EUR 3.10) during Q1 2022.
- The price basket for fixed broadband without TV in the ≤30 Mbps category also became more expensive in the course of the previous year (+EUR 0.60 to EUR 27.30 in Q1 2022).

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 now only analysed 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.

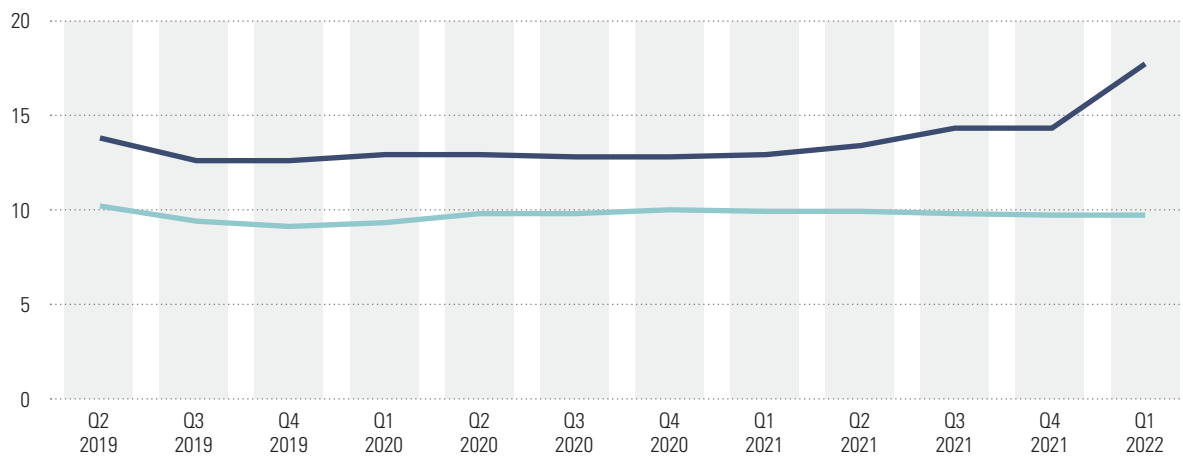
# Price baskets for mobile broadband – limited data volumes

→ Significant increase in pricing for mobile broadband with limited data in the  $\geq 10$  GB category

## Price baskets for mobile broadband – limited data volumes

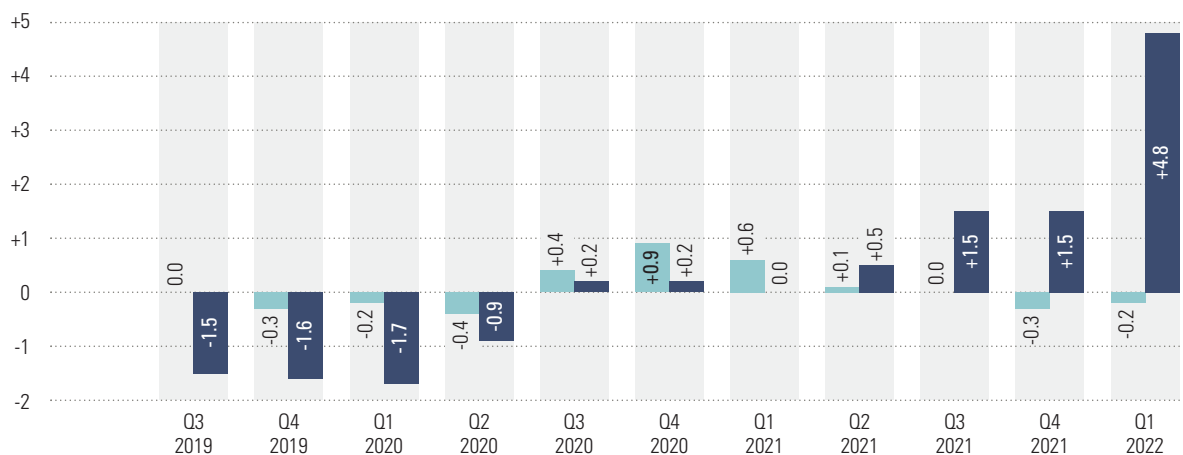
■  $>1$  to  $<10$  GB   ■  $\geq 10$  GB

€ per month



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

Euro



- For subscriptions in the  $\geq 10$  GB category, an increase from EUR 14.30 to EUR 17.70 was observed between Q4 2021 and Q1 2022. An even more significant price rise was seen in the Q1 2021 to Q1 2022 period, with the basket value increasing by no less than EUR 4.80.
- In the  $>1$  to  $<10$  GB category, however, a year-on-year downtick of EUR 0.20 (to EUR 9.70) was observed between January and March 2022.
- 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).

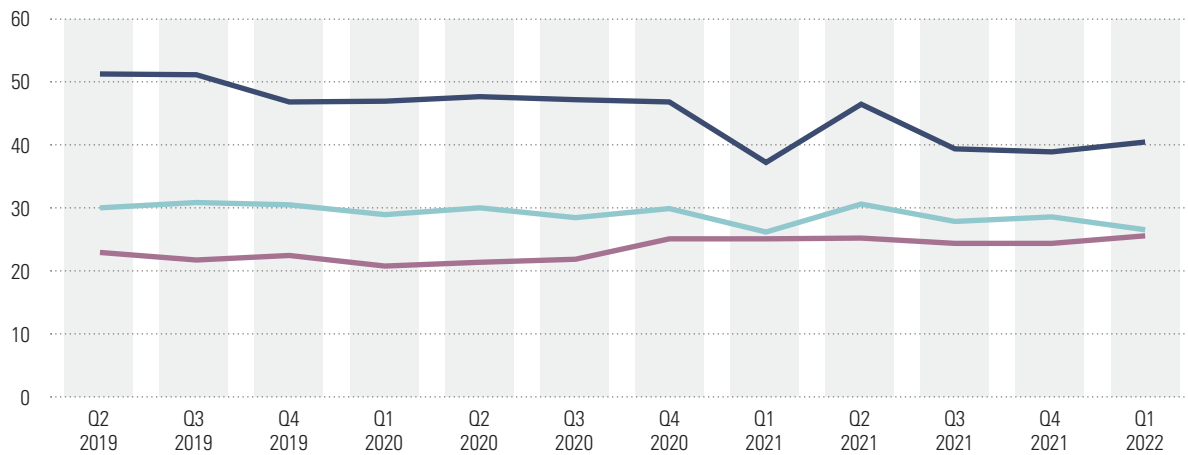
# Price baskets for mobile broadband – unlimited data volumes

→ Baskets for unlimited mobile data volume more expensive year on year

## Price baskets for mobile broadband – unlimited data volumes

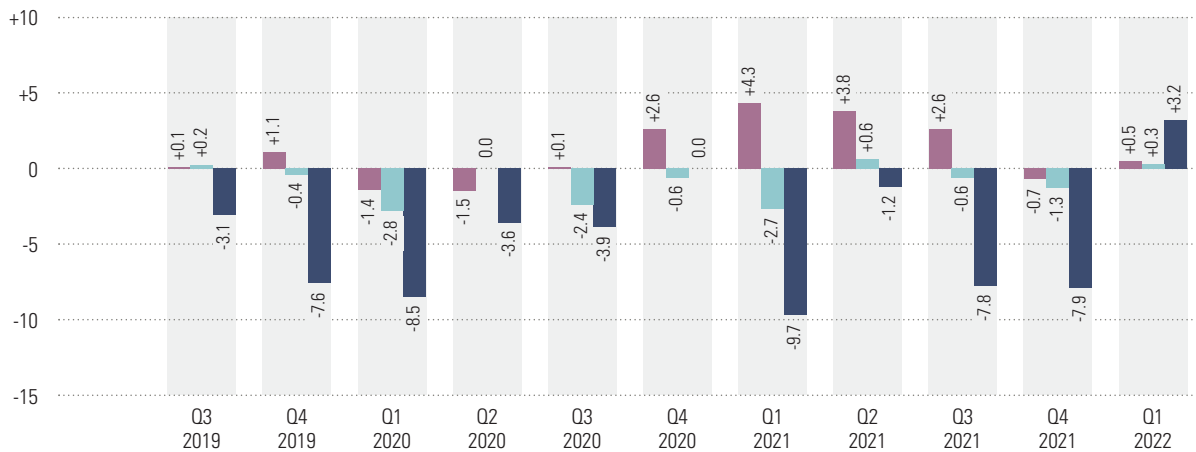
■ ≤30 Mbps   ■ >30 to ≤100 Mbps   ■ >100 Mbps

€ per month



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

Euro



- In a year-on-year comparison, basket prices for unlimited mobile broadband rose in all of the bandwidth categories considered during Q1 2022. Pricing rose by EUR 0.50 for ≤30 Mbps bandwidths and by EUR 0.30 for bandwidths in the >30 to ≤100 Mbps category. A significant increase was seen in pricing for the >100 Mbps category (+EUR 3.20).
- Notably, the difference in prices between the ≤30 Mbps and >30 to ≤100 Mbps categories was still EUR 4.20 in the fourth quarter of 2021. During Q1 2022, this price difference shrank to just EUR 0.90. In early 2022, unlimited mobile broadband with a bandwidth of ≤30 Mbps was thus only slightly less expensive than broadband in the >30 to ≤100 Mbps category.

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 Wi-Fi modem/cube). Operators are weighted according to the respective shares held in the mobile broadband connection market overall (excluding smartphone subscriptions).

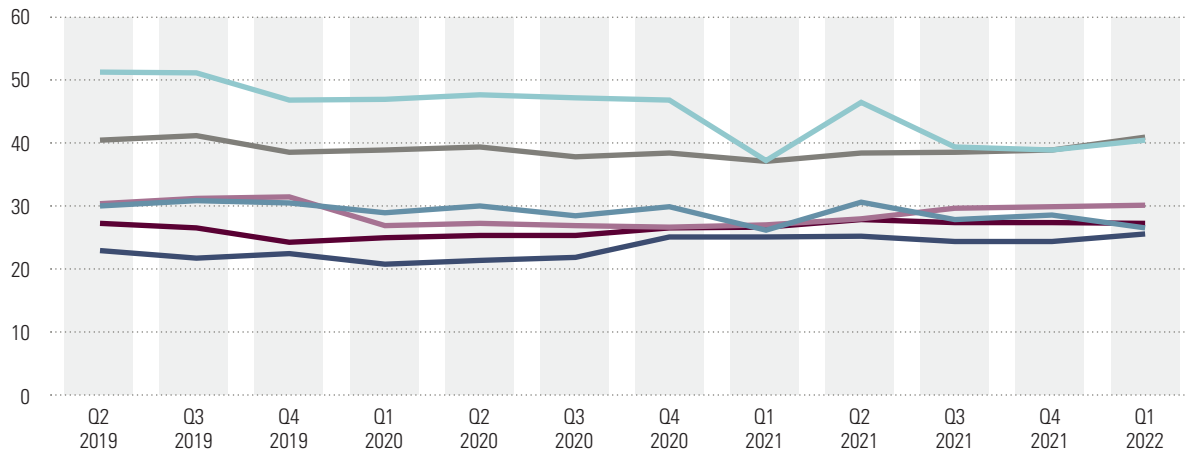
# Price baskets: fixed vs. mobile broadband

→ Mobile broadband cheaper than fixed broadband

## Price baskets: fixed vs. mobile broadband

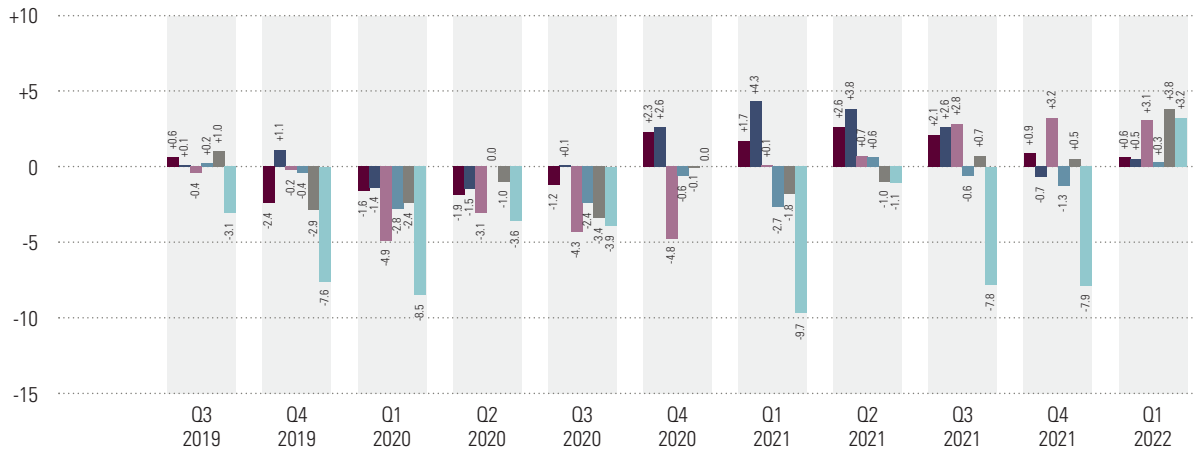
- Fixed ≤30 Mbps
- Fixed >30 to ≤100 Mbps
- Fixed >100 Mbps
- Mobile ≤30 Mbps
- Mobile >30 to ≤100 Mbps
- Mobile >100 Mbps

€ per month



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

Euro



- In Q1 2022, mobile broadband at high bandwidths (>100 Mbps) cost less than fixed broadband for the first time (EUR 40.40 versus EUR 40.90). In the previous quarter, each type had cost the same (EUR 38.90).
- In early 2022, pricing for mobile broadband in the >30 to ≤100 Mbps category lagged behind pricing for fixed broadband (EUR 26.50 versus EUR 30.10). Mobile broadband had also been cheaper than fixed broadband in the previous year (EUR 26.20 versus EUR 27.00).
- In each quarter of 2021, the basket value for mobile broadband in the ≤30 Mbps category was below the pricing for fixed broadband – most recently EUR 25.60 compared with EUR 27.30.
- A year-on-year comparison clearly shows how the price baskets for both fixed and mobile broadband have become more expensive across all of the bandwidth categories surveyed.

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).

## Tables

### Hedonic price index

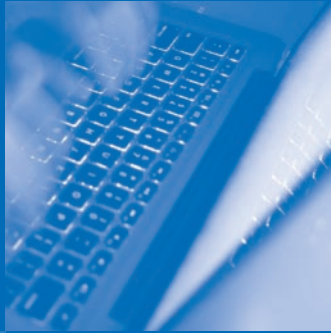
Hedonic price index for broadband (index points, basis = 2010)				
		Fixed	Mobile	Fixed and mobile
2019	Q1 2019	94.6	64.4	89.1
	Q2 2019	93.7	66.7	88.5
	Q3 2019	92.8	65.3	87.3
	Q4 2019	90.3	62.0	84.9
2020	Q1 2020	88.0	60.5	81.8
	Q2 2020	88.1	63.5	83.8
	Q3 2020	84.5	61.9	80.8
	Q4 2020	84.7	60.0	80.6
2021	Q1 2021	84.5	49.4	78.1
	Q2 2021	88.0	59.9	83.0
	Q3 2021	79.7	47.8	73.6
	Q4 2021	85.6	48.0	77.7
2022	Q1 2022	86.1	52.3	78.9

### Price baskets: fixed broadband

€ per month						
		Without TV			With TV	
		≤30 Mbps	>30 to ≤100 Mbps	>100 Mbps	>30 to ≤100 Mbps	>100 Mbps
2019	Q1 2019	26.6	31.8	41.3	37.4	53.4
	Q2 2019	27.2	30.4	40.4	36.5	51.1
	Q3 2019	26.5	31.2	41.2	37.5	50.3
	Q4 2019	24.2	31.5	38.5	36.4	49.6
2020	Q1 2020	25	26.9	38.9	31.7	48.2
	Q2 2020	25.3	27.3	39.4	31.4	45.9
	Q3 2020	25.3	26.9	37.8	31.6	46.5
	Q4 2020	26.5	26.7	38.4	31.9	46.8
2021	Q1 2021	26.7	27	37.1	32.4	47.4
	Q2 2021	27.9	28	38.4	33.9	49.8
	Q3 2021	27.4	29.7	38.5	31.6	46.8
	Q4 2021	27.4	29.9	38.9	34.9	47.2
2022	Q1 2022	27.3	30.1	40.9	35.1	50.3

## Price baskets for mobile broadband

		€ per month				
		Limited data volumes		Unlimited data volumes		
		>1 to <10 GB	≥10 GB	≤30 Mbps	>30 to ≤100 Mbps	>100 Mbps
2019	Q1 2019	9.5	14.6	22.2	31.7	55.4
	Q2 2019	10.2	13.8	22.9	30	51.2
	Q3 2019	9.4	12.6	21.7	30.9	51.1
	Q4 2019	9.1	12.6	22.5	30.5	46.8
2020	Q1 2020	9.3	12.9	20.8	28.9	46.9
	Q2 2020	9.8	12.9	21.4	30	47.6
	Q3 2020	9.8	12.8	21.8	28.5	47.2
	Q4 2020	10	12.8	25.1	29.9	46.8
2021	Q1 2021	9.9	12.9	25.1	26.2	37.2
	Q2 2021	9.9	13.4	25.2	30.6	46.4
	Q3 2021	9.8	14.3	24.4	27.9	39.4
	Q4 2021	9.7	14.3	24.4	28.6	38.9
2022	Q1 2022	9.7	17.7	25.6	26.5	40.4



# 05

## Monitoring internet access quality

<b>5</b>	<b>Monitoring internet access quality</b>	<b>40</b>
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## RTR-NetTest

Developed by RTR, the NetTest is a tool for checking 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 or 5G), Wi-Fi 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. 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

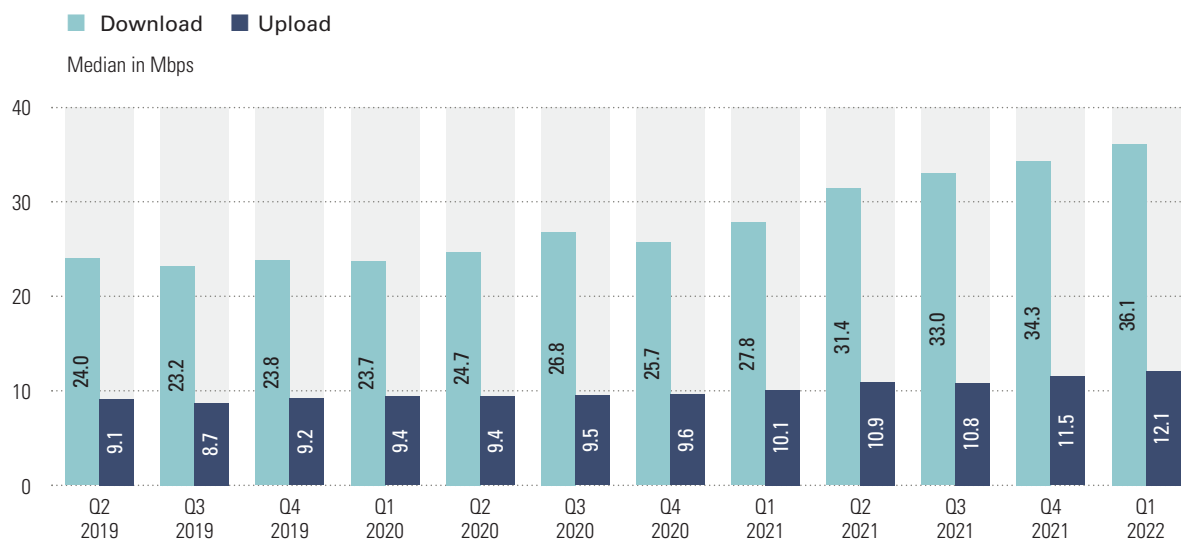
The results shown are based on actual measurements, which depend on factors such as the available technology or network coverage at the particular location, the user's tariff plan, network traffic level, and the test environment (including device performance and operating system). The RTR-NetTest is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

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

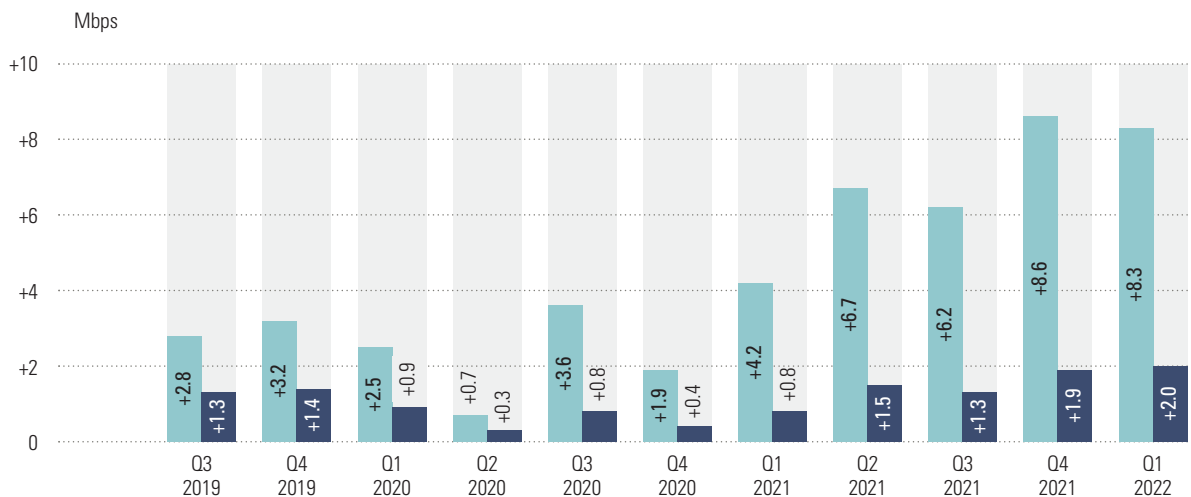
# Download and upload speeds (all technologies)

→ Significant increase in download and upload speeds

## Download and upload speeds (all technologies)



## Year-on-year change in quarterly figures



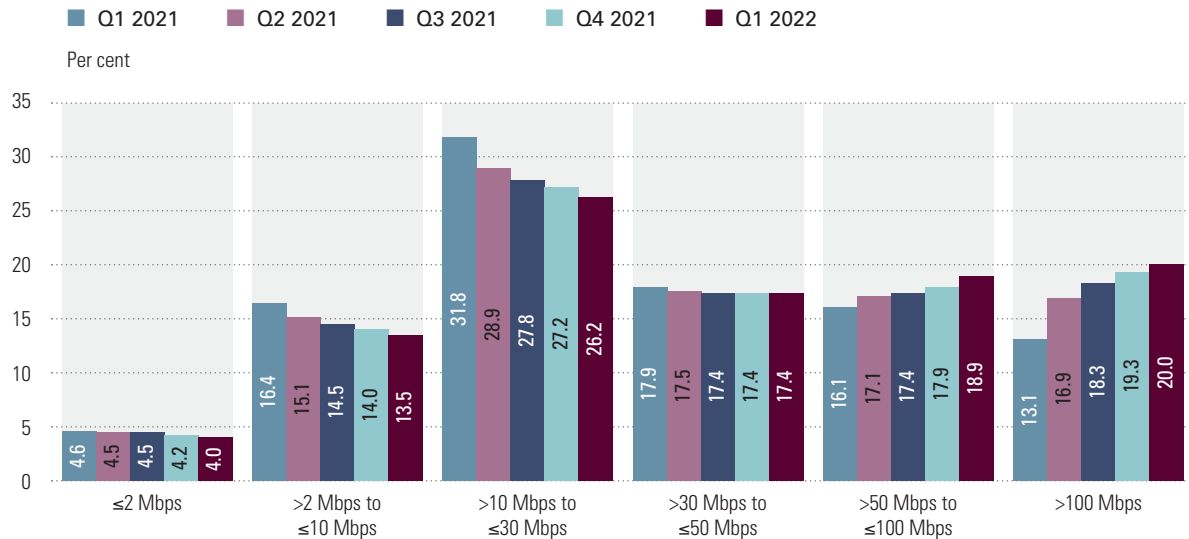
- The median download speed for data in Q1 2022 was 36.1 Mbps, which represents an increase of 8.3 Mbps in the space of a single year.
- Within the same period, the median upload speed also rose by 2.0 Mbps to its most recent median of 12.1 Mbps.
- One reason for the significant gains achieved by these median download and upload speeds over the past year is the inclusion of 5G measurements in the data analysed for this report from Q1 2021.

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 mid-point of a list sorted according to magnitude.

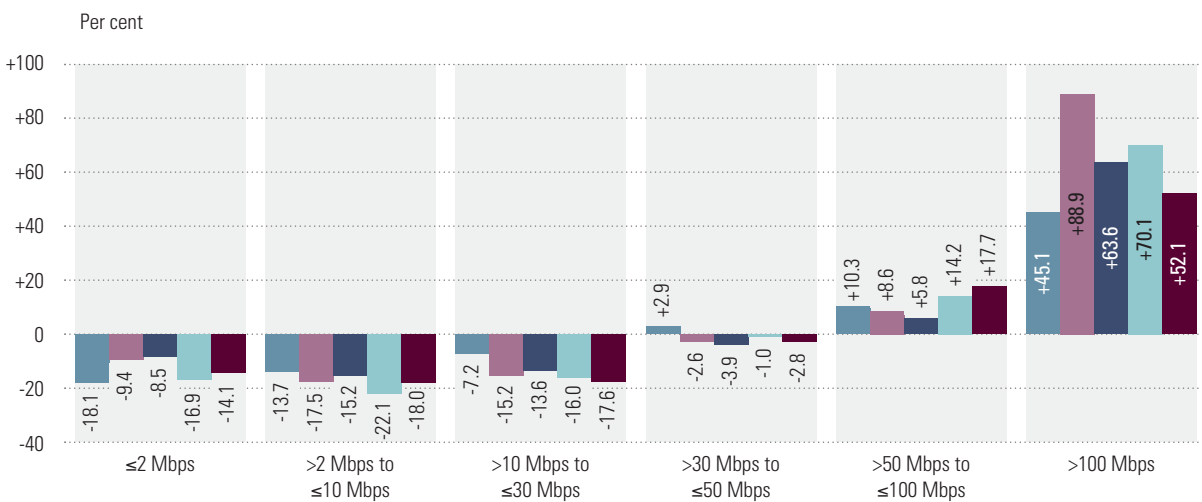
# Download speed by bandwidth category

→ One in five tests now show bandwidths of more than 100 Mbps

## Download speed by bandwidth category



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



- While the majority (26.2%) of tests conducted in Q1 2022 achieved download speeds between >10 Mbps and 30 Mbps, fewer and fewer tests are now being performed in this category (-17.6% compared with Q1 2021).
- Within the space of one year, the number of tests during which download speeds of >100 Mbps were attained increased by more than half (+52.1%, accounting for 20.0% of all measurements performed). This category exhibited the highest rate of growth by a wide margin.
- The proportion of tests in the bandwidth category >50 Mbps to 100 Mbps also increased from 17.7 per cent to 18.9 per cent year on year.
- These results once again highlight the strong upward trajectory now taken by active high-bandwidth connections (see also section 2).

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 ('Fixed broadband'). While section 2 lists nominal (advertised) bandwidths, here the actual bandwidths that were measured for fixed and mobile connections are shown.

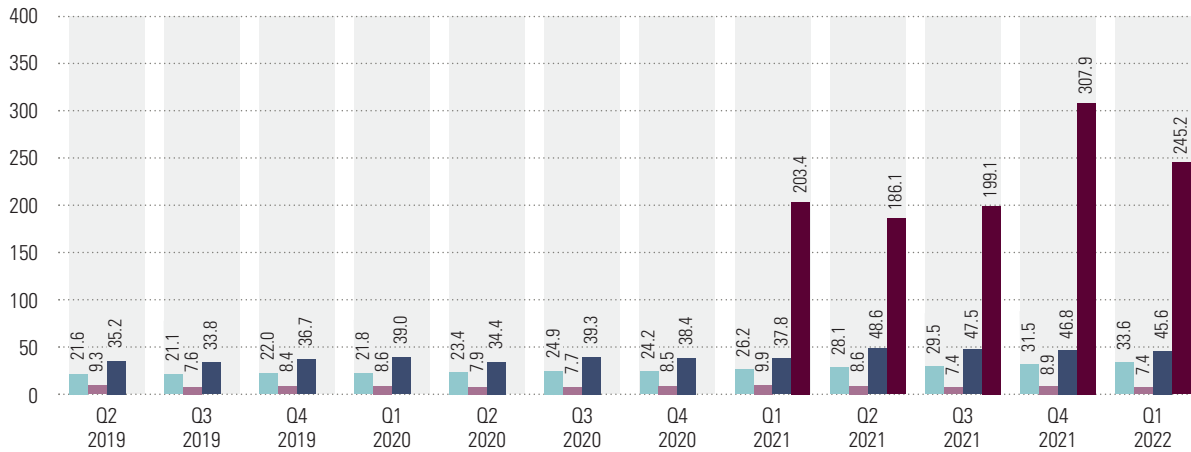
# Download speed by technology

→ 5G network median a clear front-runner

## Download speed by technology

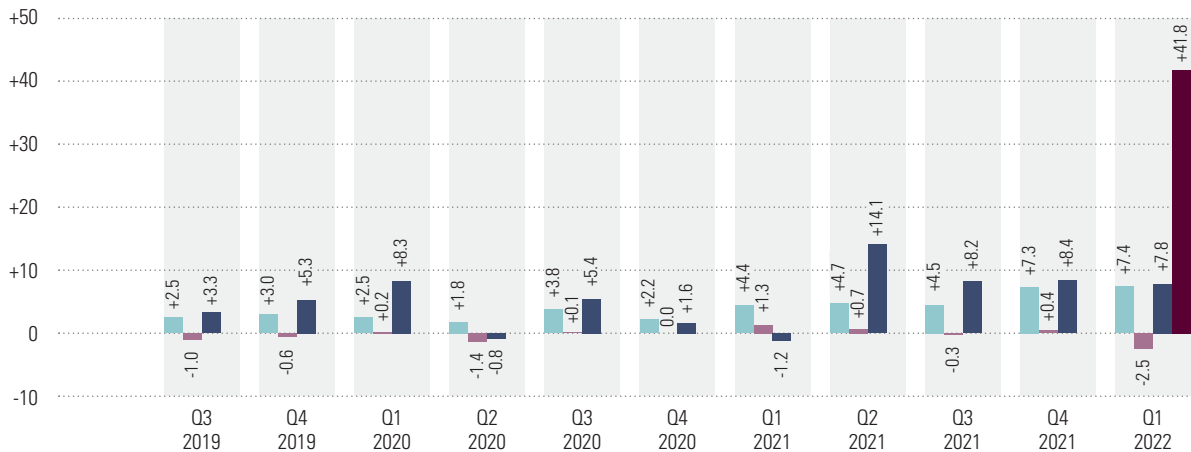
(W)LAN 3G 4G 5G

Median in Mbps



## Year-on-year change in quarterly figures

Mbps



- In Q1 2022, the 5G network achieved the highest median for download speeds by a clear margin. At 245.2 Mbps, this median was 41.8 Mbps higher than the median figure for the same quarter last year.
- Although much less substantial, gains were also recorded for medians measured in the 4G network (+7.8 Mbps) and via (W)LAN (+7.4 Mbps) during the first three months of 2022, with these Q1 medians being 45.6 Mbps and 33.6 Mbps, respectively. The rise in (W)LAN speeds is probably attributable to a higher proportion of high-bitrate broadband connections and wider use of more advanced (W)LAN systems at the respective locations.
- The median download speed in the 3G network maintained its downward trend in 2021, falling to 7.4 Mbps and therefore 2.5 Mbps below the figure for Q1 2021.

Internet access speed depends on factors including the technology implemented. Distinctions are made between 2G (GPRS, EDGE), 3G (UMTS, HSPA), 4G (LTE), 5G (NR) as well as on the basis of measurements of various fixed and network technologies. These measurements were taken with the aid of a browser or app (for Wi-Fi) 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 median for 5G connections is shown from the first quarter of 2021. The chart excludes the median from 2G tests, on account of only the low data transfer rates achievable in this network.

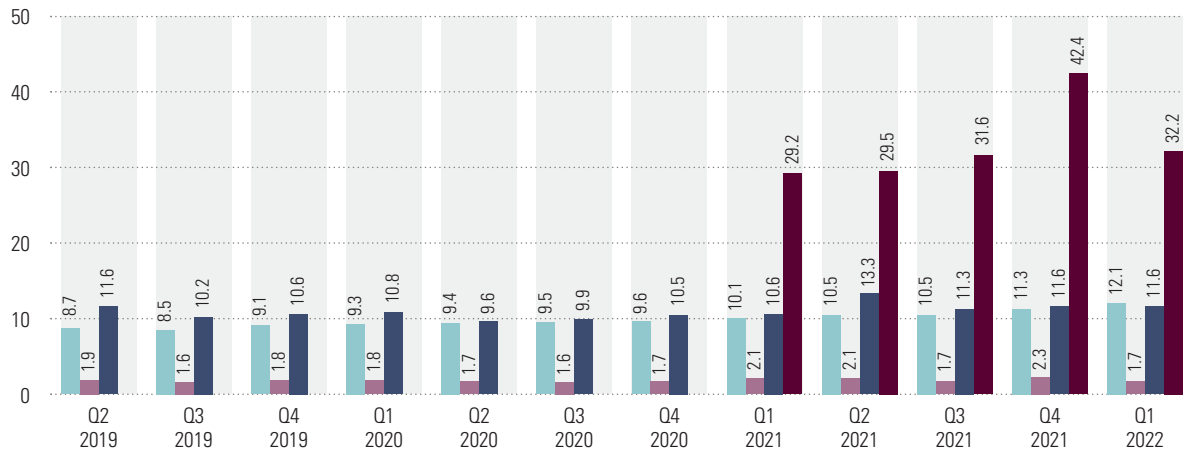
# Upload speed by technology

→ 5G measurements show largest overall speed increase

## Upload speed by technology

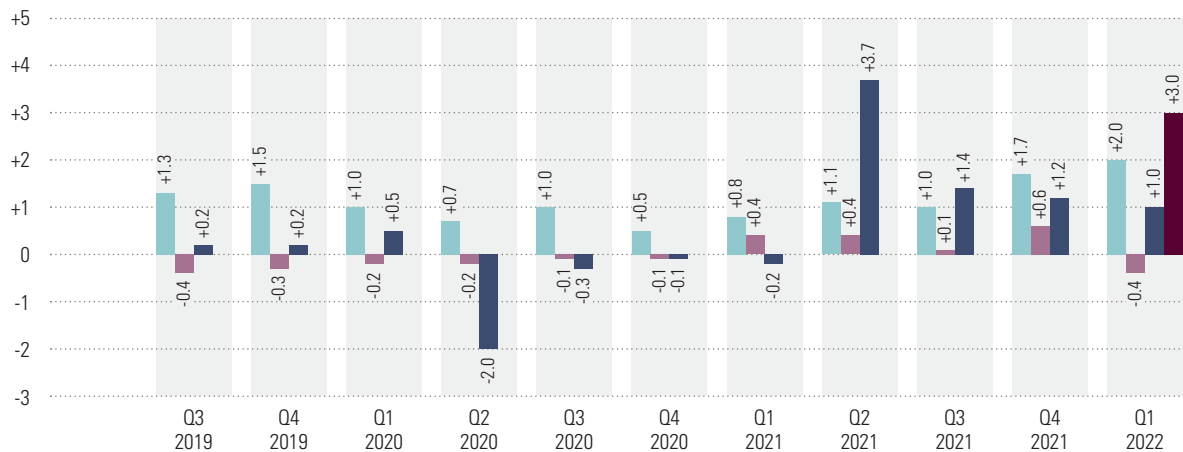
(W)LAN 3G 4G 5G

Median in Mbps



## Year-on-year change in quarterly figures

Mbps



- In early 2022, 5G data achieved the fastest median speed for uploads at 32.2 Mbps (+3.0 Mbps compared with the first quarter of 2021). The upload median in Q3 2022 was even higher, at 42.4 Mbps, and set a new record for this metric.
- The median upload speed for measurements taken via (W)LAN increased by 2.0 Mbps year on year, reaching 12.1 Mbps in Q1 2022. As with the (W)LAN download speed median, this is probably attributable to a higher proportion of high-bitrate broadband connections and wider use of more advanced (W)LAN systems at the respective locations.
- The median upload speed for data transferred over 3G slipped by 0.4 Mbps year on year to a figure of 1.7 Mbps in the first quarter of 2022.

Uploading refers to data transfers 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. The median for 5G connections is displayed beginning from the first quarter of 2021.

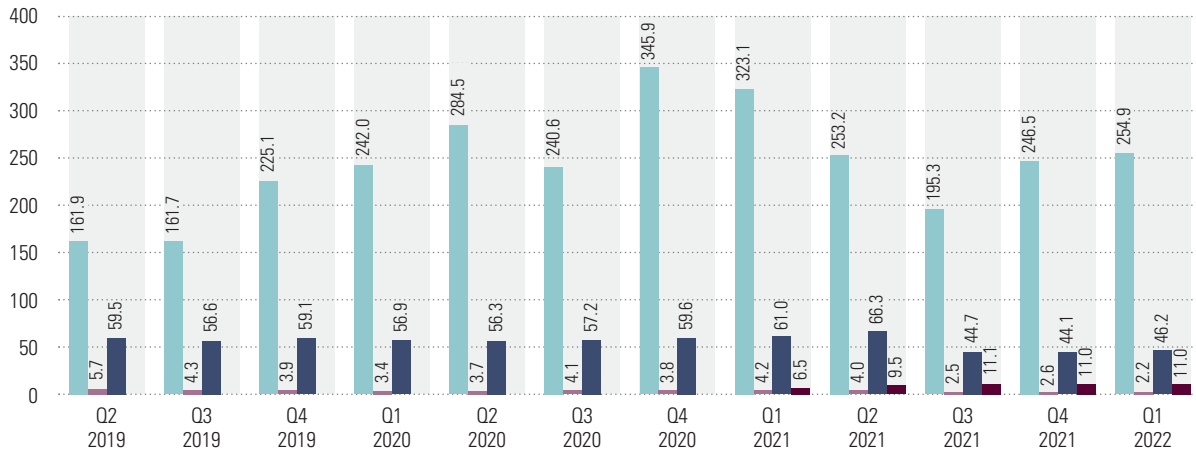
# Number of tests for each technology

→ Measurement volume declines year on year

## Number of tests for each technology

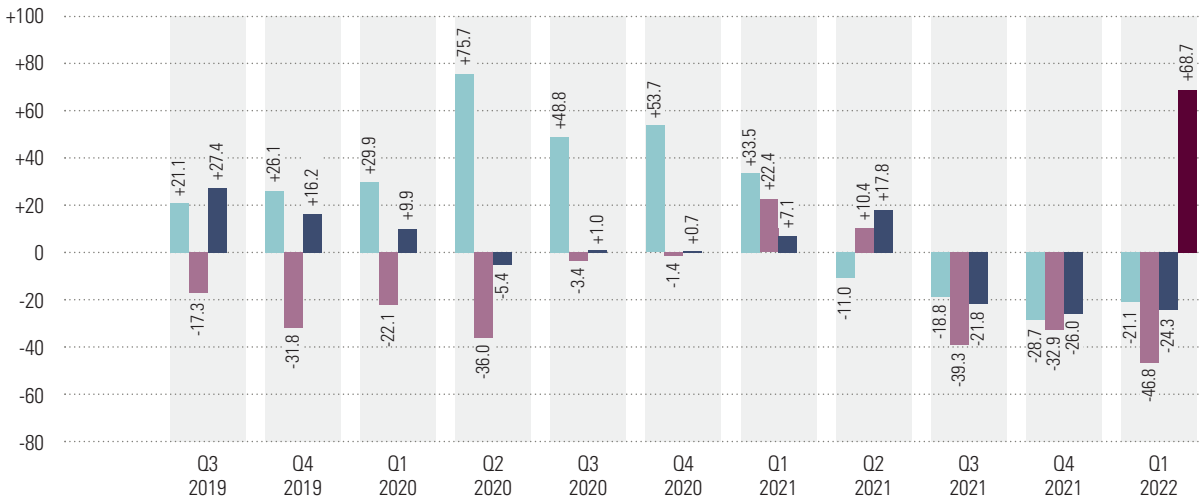
(W)LAN 3G 4G 5G

No. of tests in thousands



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

Per cent



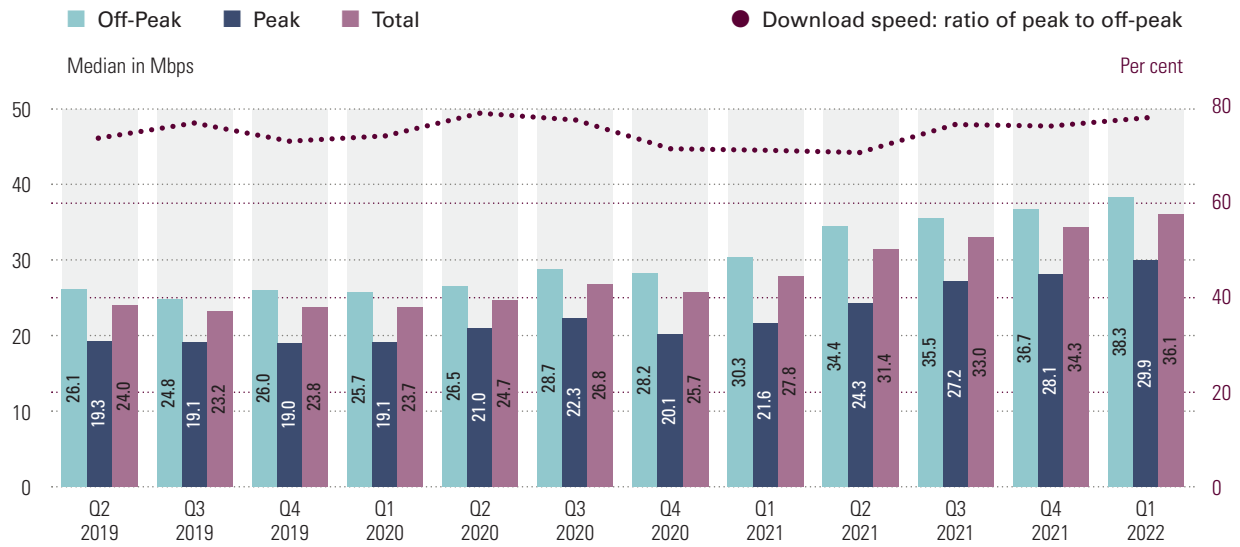
- Four in five of the tests recorded for Q1 2022 were made via (W)LAN. A total of 254,900 tests were completed in this period, which marks a significant decline in test volume compared with Q1 2021 (-21.1%).
- A major downswing in year-on-year measurement volumes was also seen for tests made over 3G (-46.8%) and 4G (-24.3%). Establishing whether this is attributable to Covid-19 or perhaps to a general ‘test fatigue’ on the part of users is out of scope for this report.
- In sharp contrast, the number of measurements made over 5G rose to 11,047 tests – a 68.7 per cent increase compared with Q1 2021. 5G still accounts for only 3.5 per cent of all tests, however.

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. Measurements for 5G connections are displayed beginning from the first quarter of 2021.

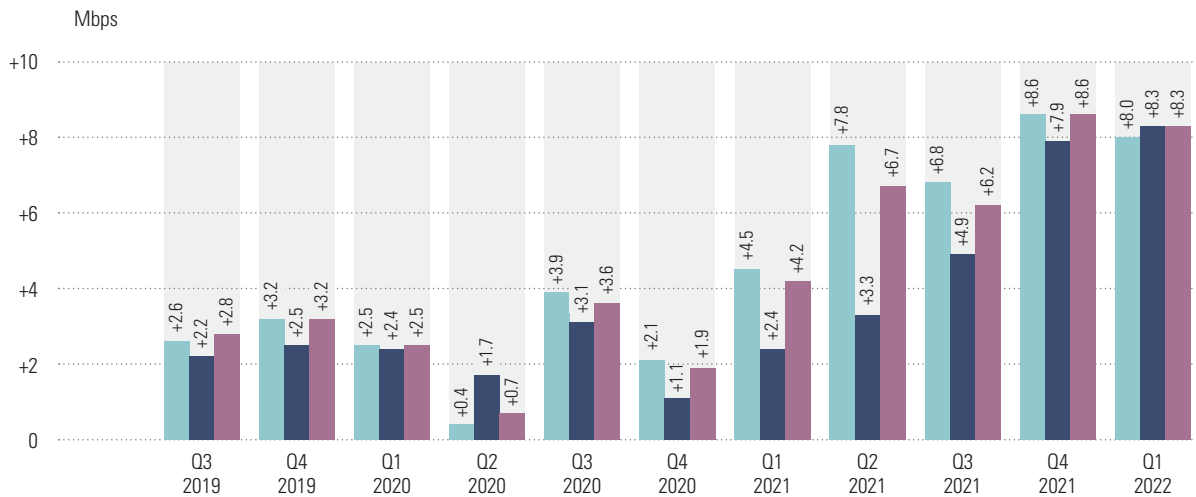
# Median download speed – off-peak and peak

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

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



## Year-on-year change in quarterly figures



- Between January and March 2022, the median at peak times rose by 8.3 Mbps year on year to 29.9 Mbps.
- The off-peak median for Q1 2022 was 38.3 Mbps, representing an increase of around 8 Mbps compared with the first quarter of 2021.
- In early 2022, the peak bandwidth median achieved 78.1 per cent of the off-peak figure.

Internet access speeds can also depend on the hour of the day when the internet is used. Because available resources may have to be divided up among several parties, 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.

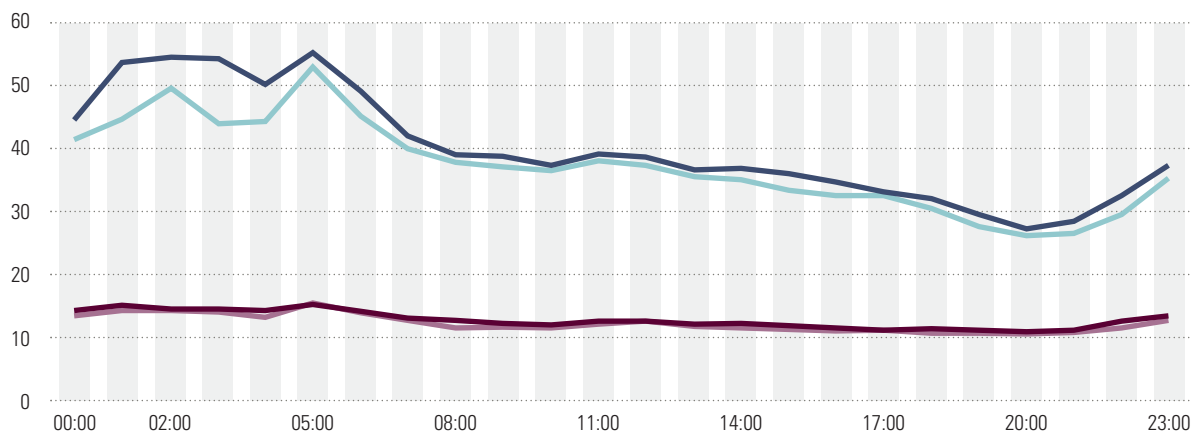
## Download and upload speeds by time of day

→ [Download speeds consistently higher than prior-quarter figures](#)

### Download and upload speeds by time of day (all technologies)

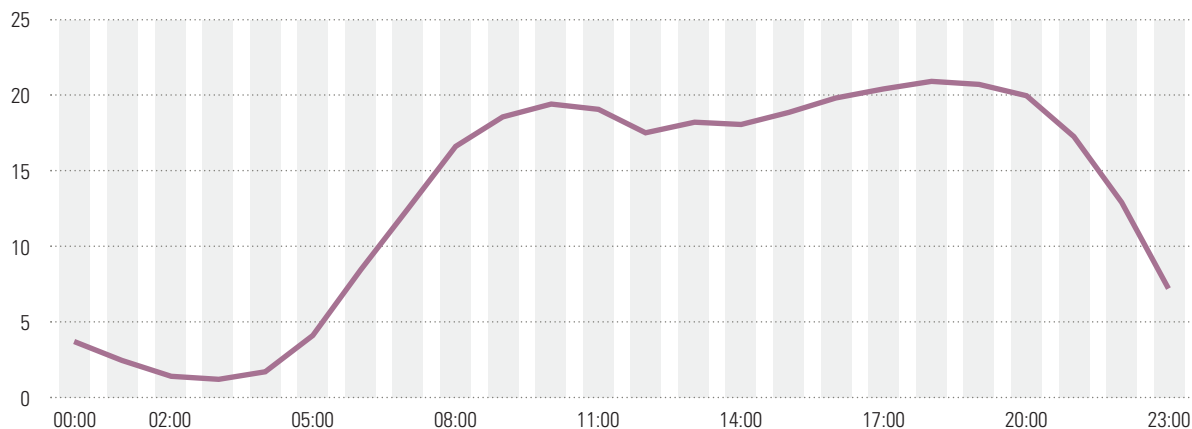
■ Download (median) Q4/2021      ■ Upload (median), Q4/2021  
■ Download (median), Q1/2022      ■ Upload (median), Q1/2022

Median in Mbps



### No. of tests by hour of day

Thousands in Q1/2022



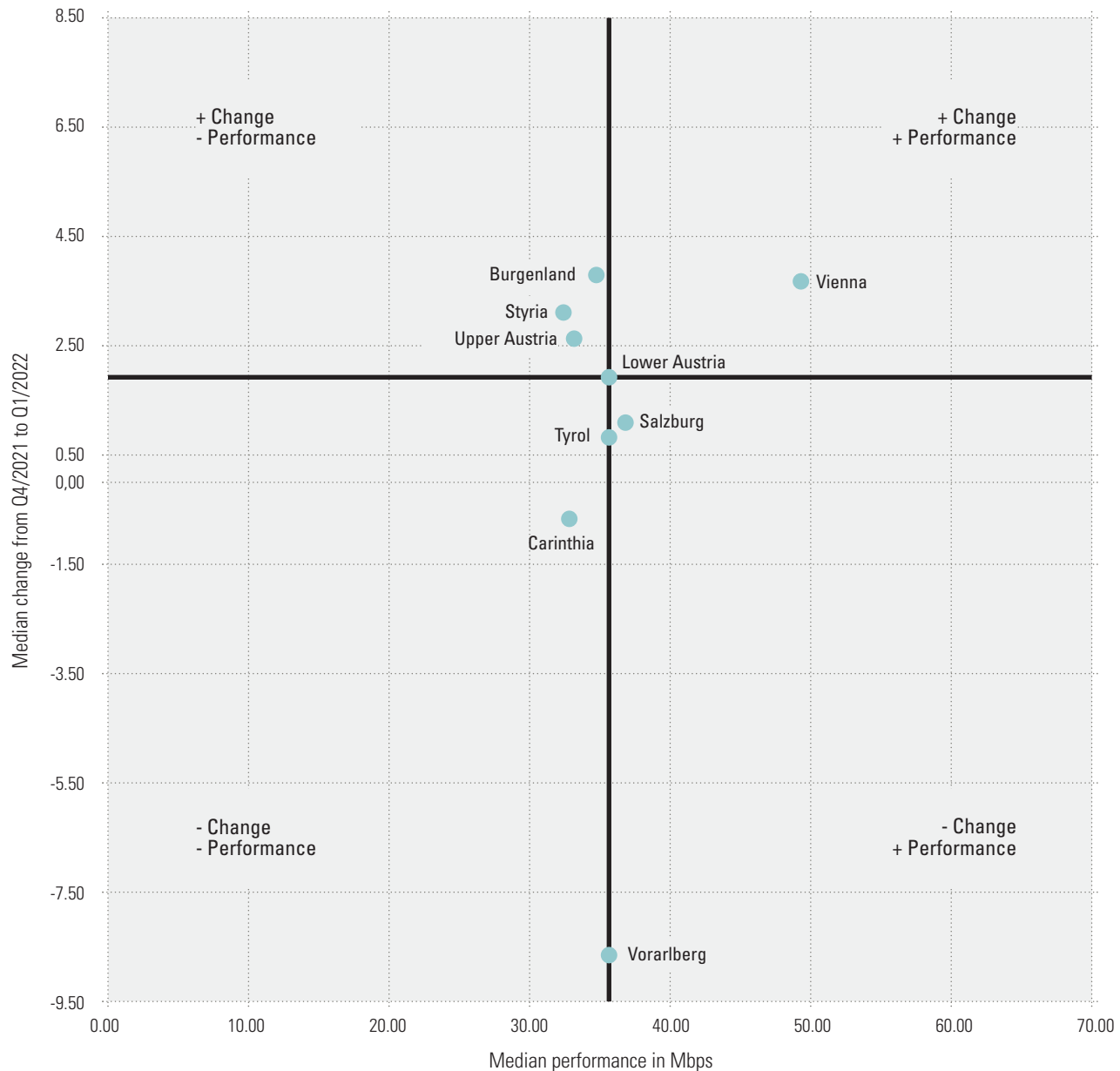
- The median download speeds for the first quarter of 2022 were higher than the values from the prior quarter. The highest value of 55.3 Mbps was achieved at 5:00, while the lowest value of 27.3 Mbps was recorded at 20:00.
- In a quarter-on-quarter comparison, median upload speeds by hour of the day remained virtually unchanged.
- Most measurements (20,889) were taken at around 18:00, with the lowest number of tests (1,187) being recorded at 03:00.

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 province

→ Vienna with highest download median in first quarter of 2022



- As can be seen, Lower Austria occupies the exact centre of this chart, both in terms of its performance (median download speed of 35.3 Mbps in Q1 2022) and its quarter-on-quarter change in medians (1.9 Mbps from Q4 2021 to Q1 2022).
- Vienna was above the median figure for the Austrian provinces both in terms of performance (49.3 Mbps) and change in performance (3.7 Mbps), while lower values were recorded for Carinthia (performance: 32.7 Mbps, change: -0.6 Mbps).
- While performance medians for Tyrol, Vorarlberg and Salzburg were above the median for Austria (T: 35.5 Mbps; V: 35.6 Mbps; S: 36.8 Mbps), the respective change figures lay below the median for the provinces (T: -0.6 Mbps; V: -8.6 Mbps; S: 1.1 Mbps).
- Although Upper Austria, Styria and Burgenland achieved significant quarter-on-quarter gains to their medians (OÖ: 2.6 Mbps, Stmk: 3.1 Mbps, B: 3.8 Mbps), their performance figures remained below the median for Austria (OÖ: 33.0 Mbps, Stmk: 32.6 Mbps; B: 34.6 Mbps).

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.

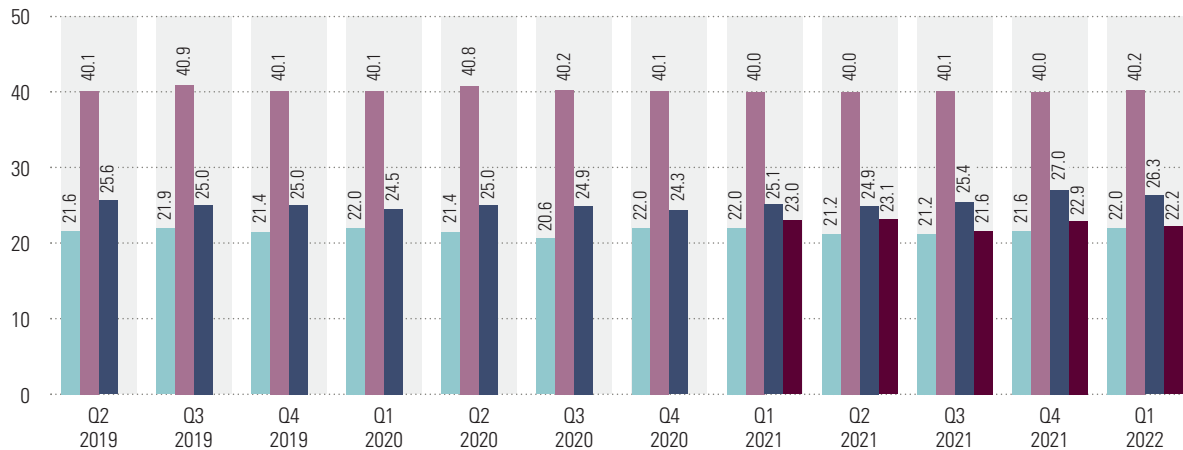
# Ping time (latency)

→ Virtually no change seen in ping tests

## Ping time (latency)

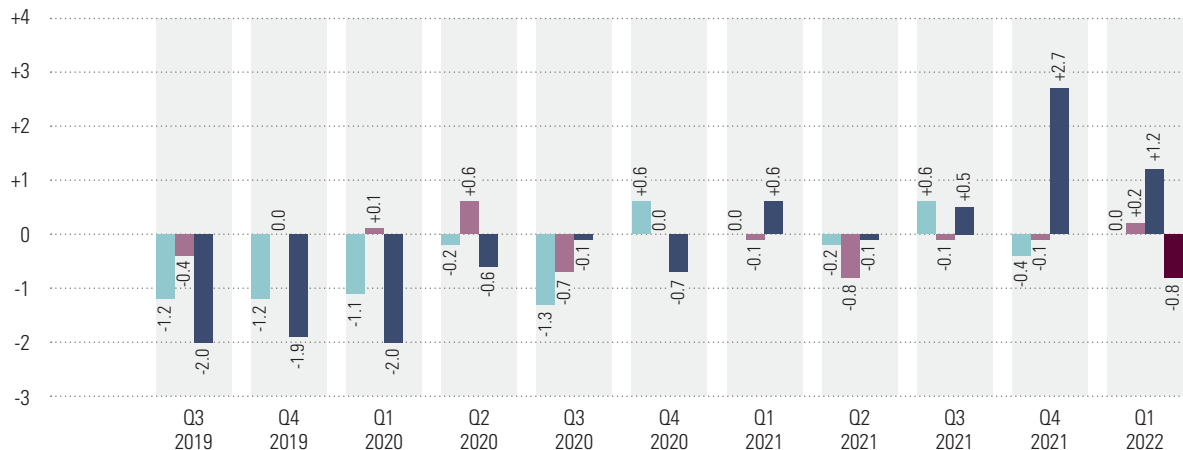
(W)LAN 3G 4G 5G

Ping in ms.



## Year-on-year change in quarterly figures

Milliseconds



- In Q1 2022, the median ping time for 5G measurements was 22.2 ms and therefore slightly lower than the prior-year figure (23.0 ms).
- Measurements taken via (W)LAN achieved the lowest median latency of 22.0 ms. This value has also remained unchanged since the first quarter of 2021.
- For ping measurements made over 3G, the median time remained largely unchanged, with 40.2 ms being achieved in Q1 2022. Latency slipped by only 0.2 ms both year on year and quarter on quarter.
- The median ping time for measurements over 4G worsened year on year, falling 1.2 ms for a final figure of 26.3 ms. Latency did improve quarter on quarter, however, rising by 0.7 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. Ping time measurements for 5G connections are displayed beginning from the first quarter of 2021.

## Tables

Median download and upload speed (all technologies)

		In Mbps		
		Download	Upload	Upload to download ratio
2019	Q2 2019	24	9	38%
	Q3 2019	23	9	37%
	Q4 2019	24	9	39%
2020	Q1 2020	24	9	40%
	Q2 2020	25	9	38%
	Q3 2020	27	9	35%
	Q4 2020	26	10	38%
2021	Q1 2021	28	10	36%
	Q2 2021	31	11	35%
	Q3 2021	33	11	33%
	Q4 2021	34	12	34%
2022	Q1 2022	36	12	32%

Download speed by bandwidth category

		Percentage of tests in each category					
		≤2 Mbps	>2 Mbps to ≤10 Mbps	>10 Mbps to ≤30 Mbps	>30 Mbps to ≤50 Mbps	>50 Mbps to ≤100 Mbps	>100 Mbps
2021	Q1 2021	4.6	16.4	31.8	17.9	16.1	13.1
	Q2 2021	4.5	15.1	28.9	17.5	17.1	16.9
	Q3 2021	4.5	14.5	27.8	17.4	17.4	18.3
	Q4 2021	4.2	14.0	27.2	17.4	17.9	19.3
2022	Q1 2022	4.0	13.5	26.2	17.4	18.9	20.0

### Median download speed by technology

		In Mbps			
		(W)LAN	3G	4G	5G
2019	Q2 2019	21.6	9.3	35.2	
	Q3 2019	21.1	7.6	33.8	
	Q4 2019	22.0	8.4	36.7	
2020	Q1 2020	21.8	8.6	39.0	
	Q2 2020	23.4	7.9	34.4	
	Q3 2020	24.9	7.7	39.3	
	Q4 2020	24.2	8.5	38.4	
2021	Q1 2021	26.2	9.9	37.8	203.4
	Q2 2021	28.1	8.6	48.6	186.1
	Q3 2021	29.5	7.4	47.5	199.1
	Q4 2021	31.5	8.9	46.8	307.9
2022	Q1 2022	33.6	7.4	45.6	245.2

### Median upload speed by technology

		In Mbps			
		(W)LAN	3G	4G	5G
2019	Q2 2019	8.7	1.9	11.6	
	Q3 2019	8.5	1.6	10.2	
	Q4 2019	9.1	1.8	10.6	
2020	Q1 2020	9.3	1.8	10.8	
	Q2 2020	9.4	1.7	9.6	
	Q3 2020	9.5	1.6	9.9	
	Q4 2020	9.6	1.7	10.5	
2021	Q1 2021	10.1	2.1	10.6	29.2
	Q2 2021	10.5	2.1	13.3	29.5
	Q3 2021	10.5	1.7	11.3	31.6
	Q4 2021	11.3	2.3	11.6	42.4
2022	Q1 2022	12.1	1.7	11.6	32.2

### Number of tests for each technology

		No. of tests			
		(W)LAN	3G	4G	5G
2019	Q2 2019	161,943	5,710	59,495	
	Q3 2019	161,684	4,283	56,649	
	Q4 2019	225,079	3,893	59,116	
2020	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	345,850	3,838	59,556	
2021	Q1 2021	323,073	4,194	60,979	6,547
	Q2 2021	253,185	4,030	66,327	9,531
	Q3 2021	195,308	2,513	44,707	11,075
	Q4 2021	246,455	2,576	44,050	11,008
2022	Q1 2022	254,900	2,232	46,171	11,047

### Median download speed – off-peak and peak

		In Mbps			
		Off-peak download	Download (total)	Peak download	Peak to off-peak ratio
2019	Q2 2019	26.1	24.0	19.3	73.8%
	Q3 2019	24.8	23.2	19.1	77.0%
	Q4 2019	26.0	23.8	19.0	73.2%
2020	Q1 2020	25.7	23.7	19.1	74.3%
	Q2 2020	26.5	24.7	21.0	79.0%
	Q3 2020	28.7	26.8	22.3	77.5%
	Q4 2020	28.2	25.7	20.1	71.5%
2021	Q1 2021	30.3	27.8	21.6	71.3%
	Q2 2021	34.4	31.4	24.3	70.7%
	Q3 2021	35.5	33.0	27.2	76.7%
	Q4 2021	36.7	34.3	28.1	76.4%
2022	Q1 2022	38.3	36.1	29.9	78.1%

### Median download and upload speed by hour of day

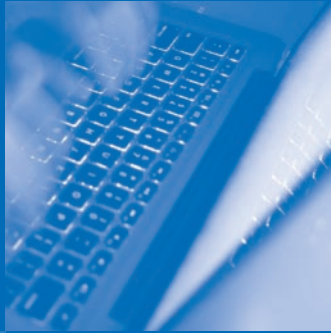
Hour of the day	Median					
	Download (median)	Upload (median)	No. of tests	Download (median) in previous quarter	Upload (median) in previous quarter	Number of measurements (previous quarter)
00:00	44.5	14.3	3,720	41.4	13.4	3,725
01:00	53.7	15.1	2,444	44.6	14.3	2,479
02:00	54.5	14.5	1,400	49.5	14.3	1,475
03:00	54.2	14.5	1,187	43.9	14.0	1,173
04:00	50.2	14.3	1,701	44.3	13.2	1,658
05:00	55.3	15.3	4,112	52.9	15.5	4,120
06:00	49.1	14.2	8,197	45.1	13.9	7,781
07:00	42.0	13.0	12,455	40.0	12.7	11,588
08:00	39.0	12.7	16,579	37.8	11.5	15,823
09:00	38.8	12.2	18,561	37.0	11.6	17,638
10:00	37.4	12.0	19,400	36.5	11.6	18,169
11:00	39.2	12.6	19,065	38.1	12.2	18,231
12:00	38.6	12.6	17,513	37.4	12.5	17,145
13:00	36.6	12.1	18,215	35.5	11.7	17,036
14:00	36.8	12.2	18,055	35.1	11.5	17,171
15:00	36.0	11.9	18,860	33.4	11.3	17,190
16:00	34.7	11.5	19,799	32.6	11.0	17,911
17:00	33.1	11.2	20,396	32.5	11.2	19,363
18:00	32.1	11.4	20,889	30.5	10.7	20,651
19:00	29.6	11.2	20,676	27.6	10.6	20,271
20:00	27.3	10.9	19,945	26.1	10.6	19,931
21:00	28.4	11.1	17,249	26.6	10.8	16,439
22:00	32.6	12.6	12,919	29.6	11.6	12,116
23:00	37.3	13.5	7,212	35.3	12.8	7,167

### Median download speed by province

		In Mbps								
		Burgenland	Carinthia	Lower Austria	Upper Austria	Salzburg	Styria	Tyrol	Vorarlberg	Vienna
2021	Q1 2021	26.4	27.2	27.7	23.4	28.7	24.5	30.9	28.1	34.9
	Q2 2021	26.4	30.0	30.4	26.9	32.8	29.0	34.3	30.8	39.6
	Q3 2021	28.6	29.9	31.5	28.1	33.3	30.6	32.2	32.6	47.5
	Q4 2021	30.8	33.3	33.4	30.5	35.7	29.5	34.6	44.1	45.7
2022	Q1 2022	34.6	32.7	35.3	33.0	36.8	32.6	35.5	35.6	49.3

### Ping time (latency)

		In ms			
		(W)LAN	3G	4G	5G
2019	Q2 2019	21.6	40.1	25.6	
	Q3 2019	21.9	40.9	25.0	
	Q4 2019	21.4	40.1	25.0	
2020	Q1 2020	22.0	40.1	24.5	
	Q2 2020	21.4	40.8	25.0	
	Q3 2020	20.6	40.2	24.9	
	Q4 2020	22.0	40.1	24.3	
2021	Q1 2021	22.0	40.0	25.1	23.0
	Q2 2021	21.2	40.0	24.9	23.1
	Q3 2021	21.2	40.1	25.4	21.6
	Q4 2021	21.6	40.0	27.0	22.9
2022	Q1 2022	22.0	40.2	26.3	22.2



# 06

## Broadband access – supply and demand in geographical terms

<b>6</b>	<b>Broadband access – supply and demand in geographical terms</b>	<b>56</b>
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## Broadband access in geographical terms: supply and demand

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. Data is also collected 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:

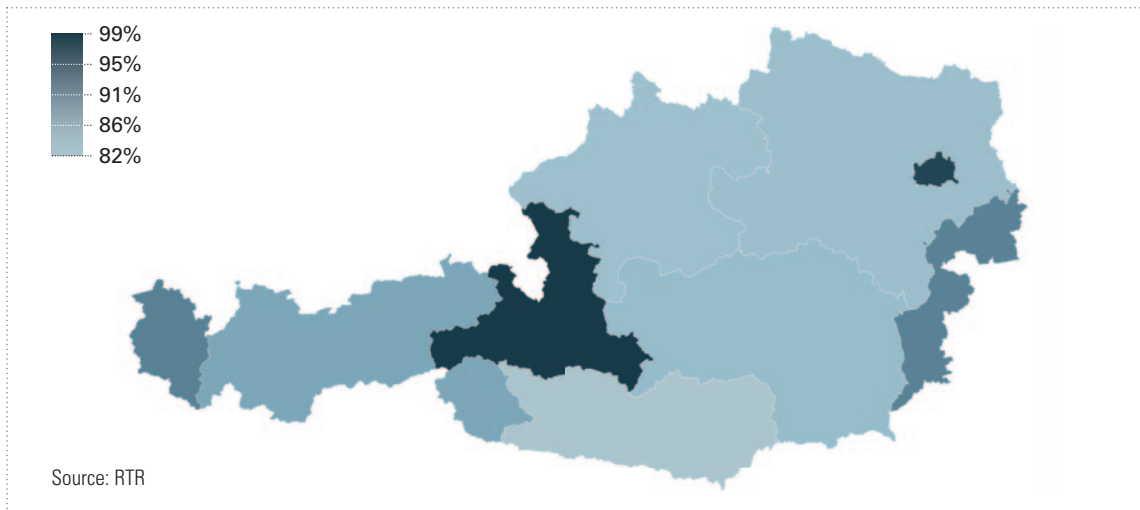
- Geographical distribution within Austria at municipal level
- Bandwidths actually achieved/advertised via the individual infrastructure elements reported
- Number of end customers with coverage (number of active connections)

The figures shown in the following section are based on the routine data collected by the ZIB.

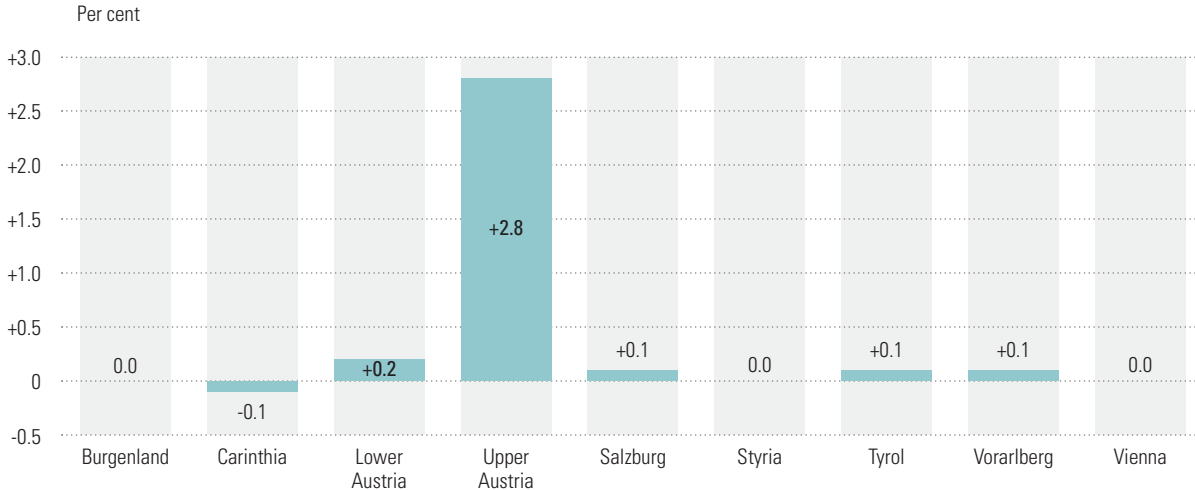
# Potential coverage with fixed broadband connections

→ Coverage in Austria at least 82.4 per cent nationwide

## Broadband coverage



## Change in level of coverage with fixed broadband: Q4/2021 to Q4/2020 comparison



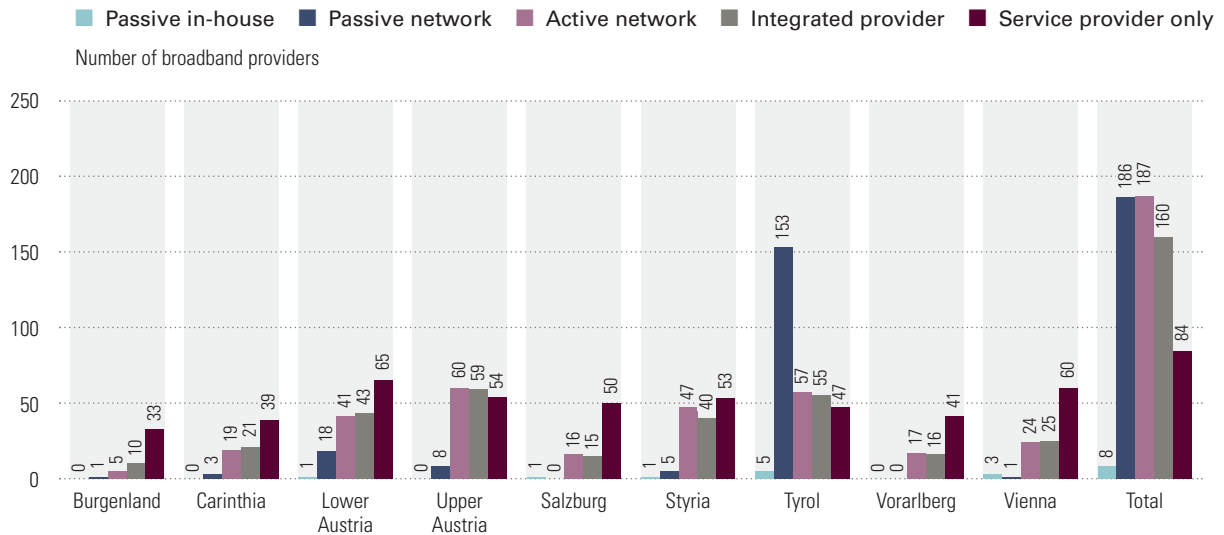
- In Q4 2021, coverage with fixed broadband connections was observed to be 82.4 per cent or higher in all Austrian provinces. This marks a year-on-year increase of 0.4 per cent.
- Salzburg again achieved the highest level of fixed broadband coverage at 98.7 per cent, followed by Vienna at 97.7 per cent.
- Comparatively low levels of coverage were achieved by the provinces of Lower Austria (84.5%), Upper Austria (84.3%) and Carinthia (82.4%).
- Year on year, Upper Austria achieved the highest rate of coverage growth at 2.8 per cent, while coverage actually declined by 0.1 per cent in Carinthia.

When a home passed is connected to fixed broadband infrastructure by a telecoms operator (by the laying of copper cable, coaxial cable, optical fibre etc.), that location potentially has fixed internet access. Potential coverage is therefore entirely dependent on the availability of fixed broadband infrastructure at a specific location. The level of coverage shown in the chart represents availability as a percentage of all homes passed (to which coverage could be provided) per province. Potential multiple coverage of a home passed by several technologies and network operators has been factored out of the data.

# Number of fixed broadband providers per province

→ Majority of providers in Austria are active network operators

## Number of broadband providers active in each province in Q4/2021



- In Q4 2021, a total of 187 providers operated active network components in Austria. Upper Austria had the largest number of providers in this category (60), followed by Tyrol (57).
- A total of 186 operators of passive networks also operated nationwide at the end of 2021. No fewer than 153 of these operators are active in Tyrol, thanks to the availability of open-access fibre-optic networks.
- In the same quarter, 160 integrated (network) broadband providers offered their services in Austria. Of these, Upper Austria again had the largest number (59).
- Some providers offer their services in more than one province but are counted only once for 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 ‘passive in-house’ category comprises operators of passive infrastructure (duct access and dark fibre), such as cooperative property developers, office management companies or operators of passive fibre-optic networks.

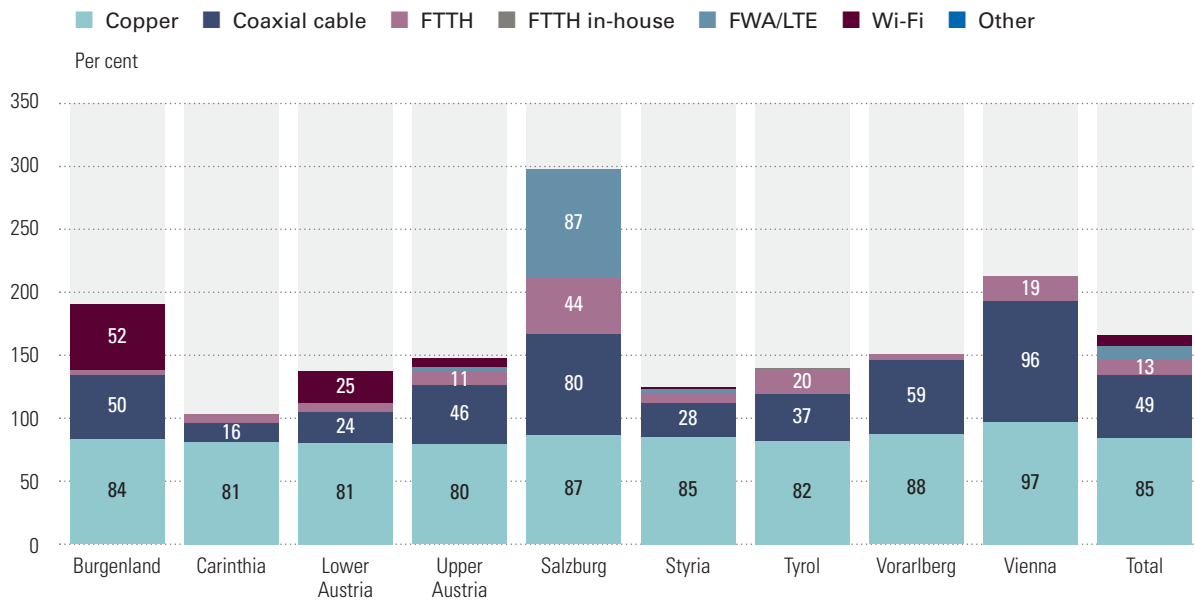
A second category consists of network operators who also operate the active network equipment. These networks are used to provide the broadband connections from integrated (network and services) broadband providers or purely service providers. This group is significantly under-represented in the latest 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 to be understood merely as a ‘best-guess’ summary.

# Coverage with fixed broadband connections by technology

→ Highest growth seen in FTTH coverage

**Fixed broadband coverage by technology in Q4/2021**



- In Q4 2021, the nationwide level of coverage for fixed broadband connections reached 162.9 per cent, an increase of 5.8 per cent year on year. This figure indicates that customers have a choice of several providers and technologies.
- In each province, at least 80.4 per cent of homes passed can receive coverage via copper cable (DSL). Vienna had the highest proportion of copper cable coverage (96.7%), followed by Vorarlberg (88.0%) and Salzburg (87.2%).
- Coaxial cable is also a significant technology for coverage, although levels vary significantly among individual provinces, with Vienna at 96.4 per cent and Carinthia at 15.7 per cent.
- Considerable variance in the level of coverage can also be seen with optical fibre connections: while coverage with this technology was possible for 43.7 per cent of homes passed in Salzburg at year-end 2021, Vorarlberg achieved a mere 4.2 per cent in the same quarter. The largest gains year on year were attained by Burgenland (+65.4% to 4.3 per cent) and Styria (+53.3% to 6.9 per cent).

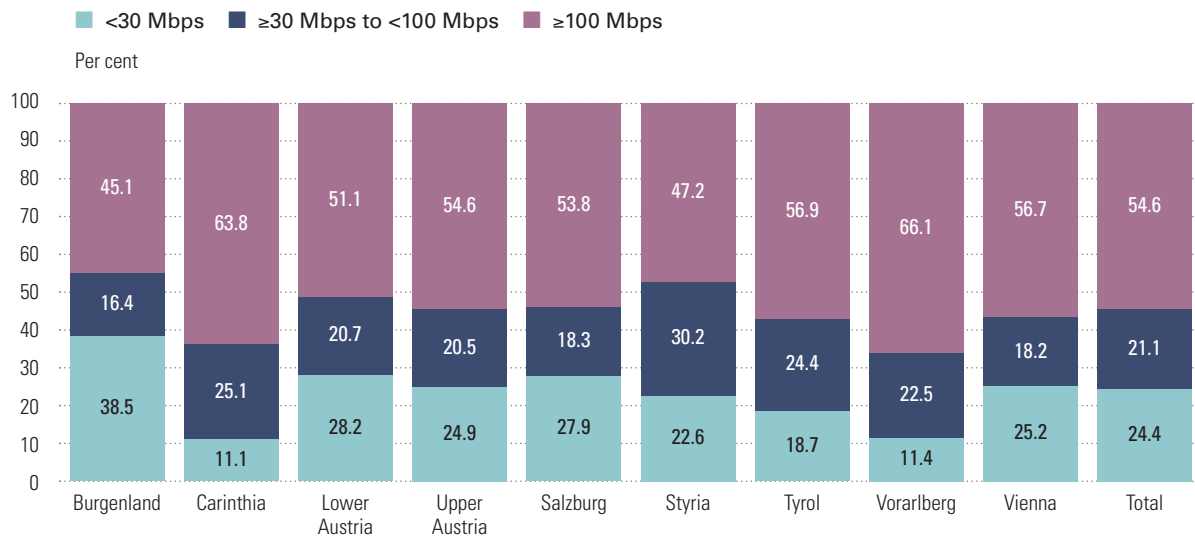
Since homes passed typically enjoy coverage from multiple providers with separate technologies, multiple coverage is a common occurrence. In this scenario, customers have a choice between several providers and technologies. Accordingly, when broken down by technology, the level of coverage in individual provinces and in Austria as a whole exceeds 100 per cent.

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

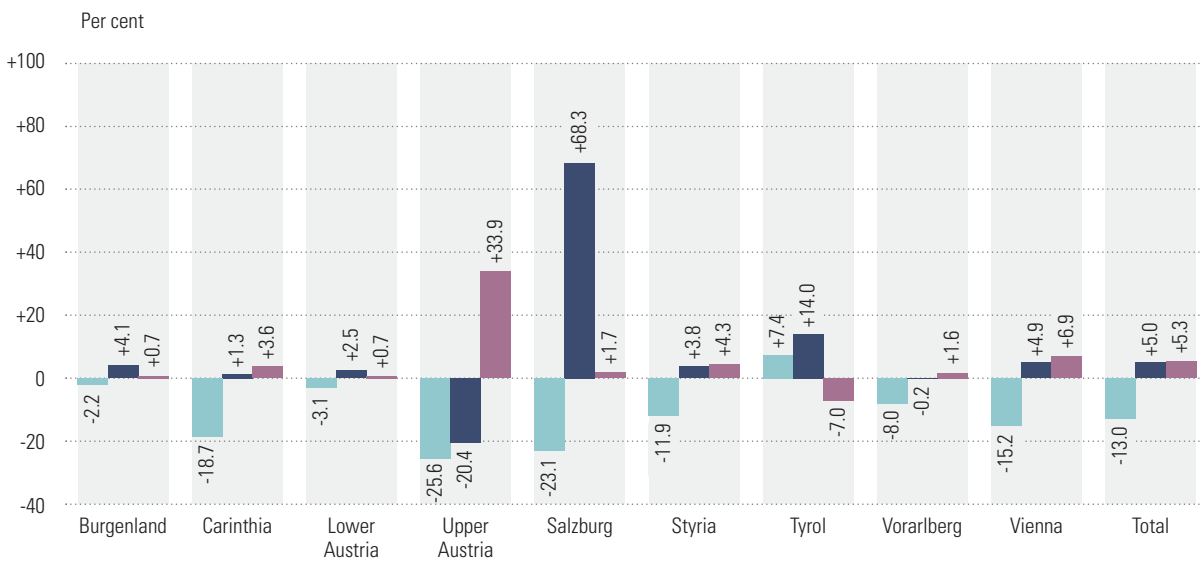
# Coverage with broadband connections by bandwidth category

→ Bandwidths ≥100 Mbps achieve greatest increase in level of coverage nationwide

## Broadband coverage by broadband category in Q4/2021



## Change in level of coverage: Q4/2021 to Q4/2020 comparison



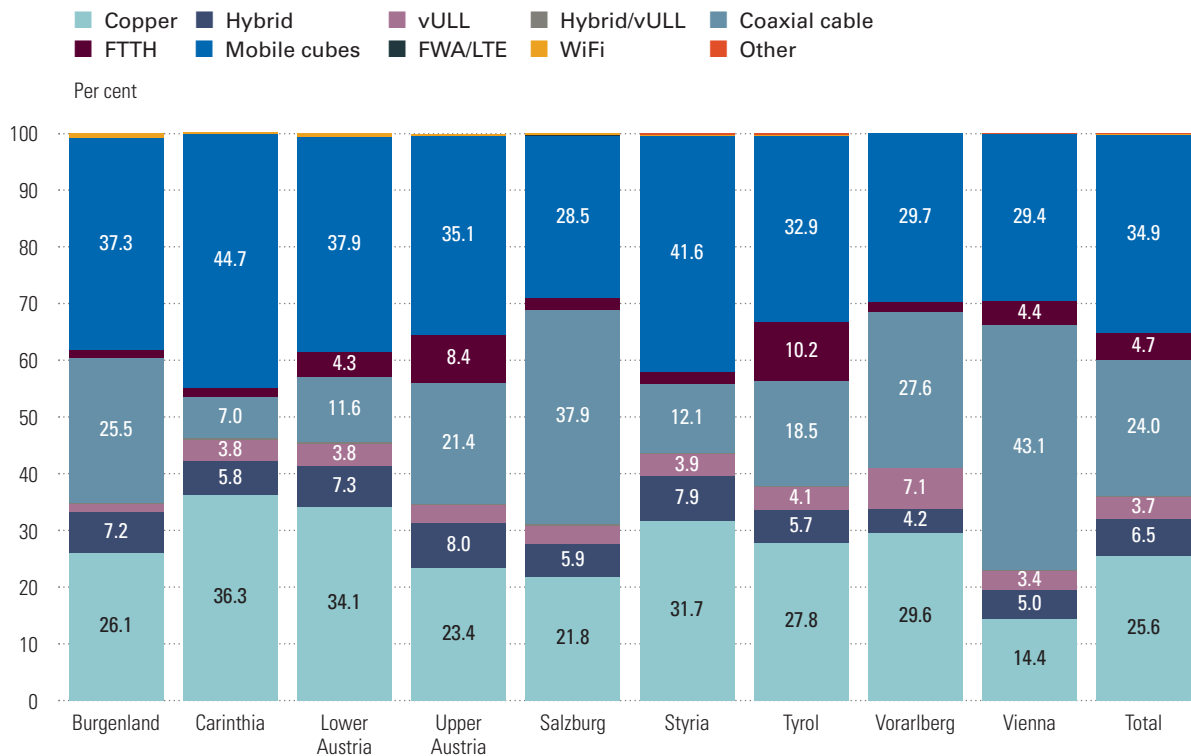
- In Q4 2021, 24.4 per cent of connection owners throughout Austria as a whole were limited to bandwidths <30 Mbps. One year previously, this figure had been 28.0 per cent. In Burgenland and Lower Austria, restrictions of this sort applied to a significantly larger proportion of homes passed (B: 38.5%, LA: 28.2%).
- In Vorarlberg, two thirds of homes passed had coverage of ≥100 Mbps (+1.6%). In Carinthia, 63.8 per cent of homes passed had coverage with bandwidths in this category. These two provinces therefore placed well above the average for Austria (54.6%) in Q4 2021.

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

→ FTTH achieves highest growth rates in demand

**Demand for broadband connections by technology/service in Q4/2020**



- Nationwide, Austrian demand for broadband continued to be met largely (84.5%) by copper, coaxial cable and mobile cubes in 2021 (–2.9% year on year compared with Q4 2020).
- In Q4 2021, mobile cubes constituted the greatest proportion (44.7%) of total active broadband connections in Carinthia. In Styria and Lower Austria, this technology accounted for 41.6 per cent and 37.9 per cent of broadband demand, respectively.
- In Vienna 43.1 per cent of all broadband internet connections were based on coaxial cable by the end of 2021. In Salzburg, the proportion was 37.9 per cent.
- While copper-based technologies continue to play an important role in meeting demand for broadband connections, a decline in demand for copper was nonetheless recorded in every province during Q4 2021. This decline was most noticeable in Upper Austria (–14.9%), Vienna (–10.6%) and Tyrol (–9.4%).
- The highest rates of growth by the end of 2021 had been observed for active FTTH connections: Demand for this technology increased nationwide by 46.9 per cent (to 4.7%), with Styria posting an increase of 50.0 per cent (to 2.1%) and Upper Austria even doubling demand (to 8.4%).

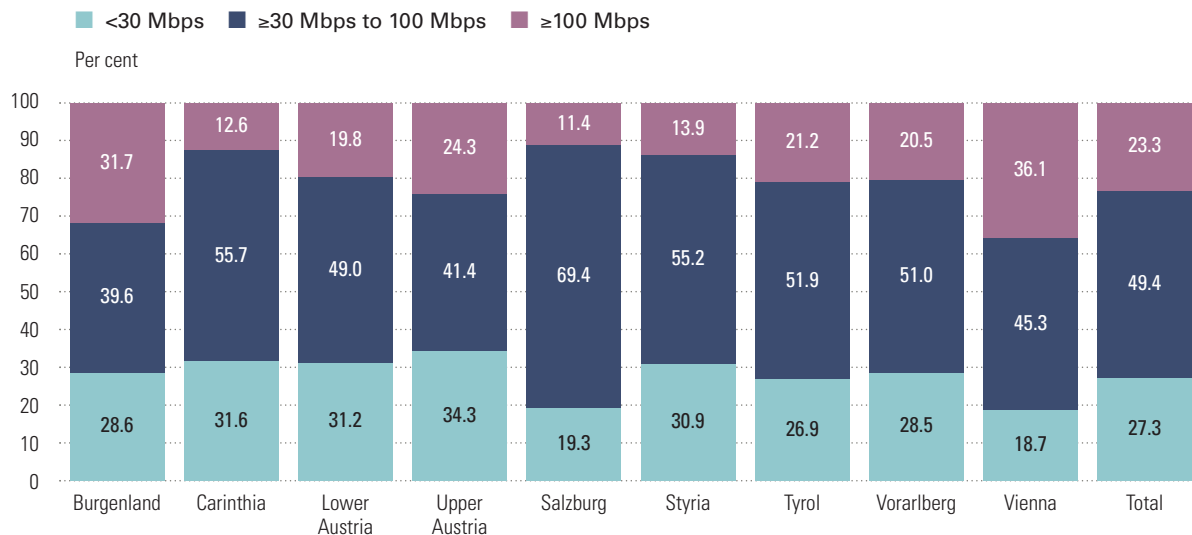
Providers utilise a range of technologies in order to meet active demand for broadband connections. While this almost always means xDSL over copper or DOCSIS over cable TV, access is also provided via mobile networks with mobile cubes. To work around the more limited options offered by other technologies 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.

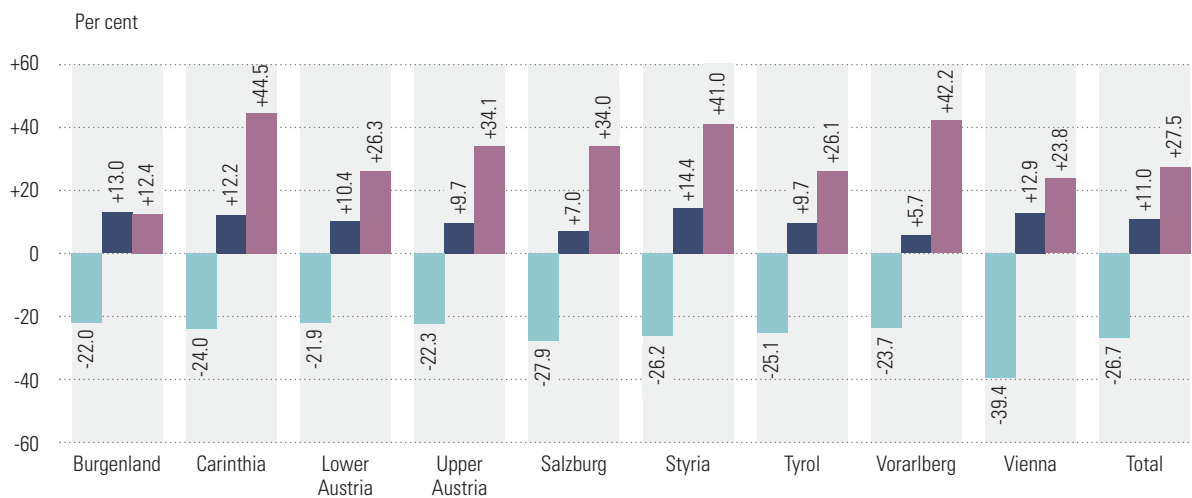
# Demand by broadband category

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

## Demand by broadband category in Q4/2021



## Change in demand: Q4/2021 to Q4/2020 comparison



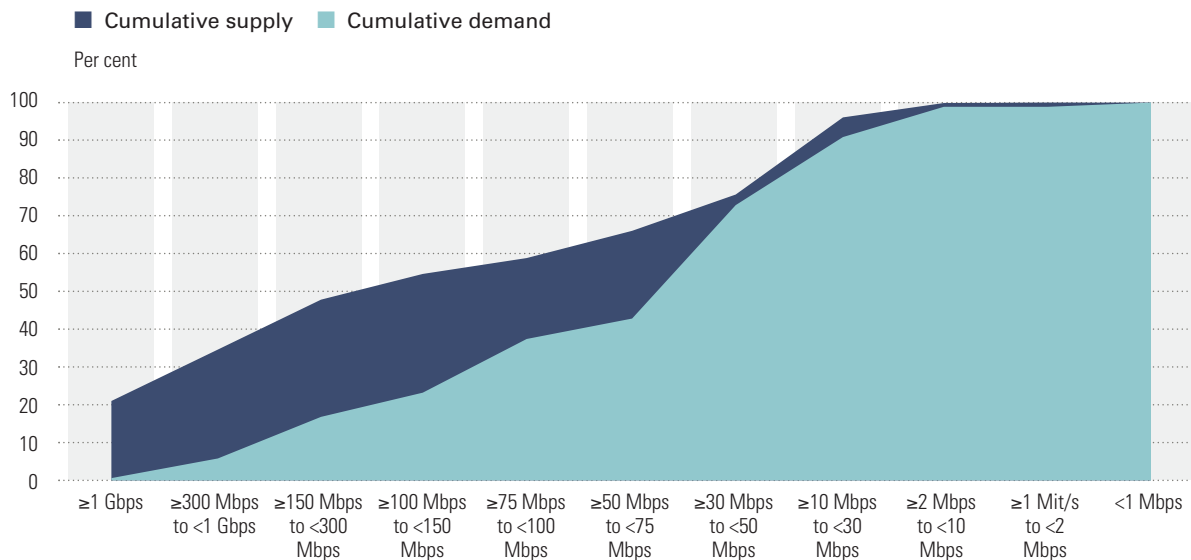
- Nationwide, demand from almost half of all active users of fixed internet connections was for bandwidths  $\geq 30$  Mbps to  $< 100$  Mbps in Q4 2021. In Salzburg, demand in this category was significantly higher, at 69.4 per cent.
- During the year, fixed connections supporting bandwidths  $\geq 100$  Mbit/s experienced the highest rates of growth by a wide margin. End-of-year figures for Carinthia, Vorarlberg and Styria ranged between 44.5 and 41.0 per cent.
- Year-on-year demand for bandwidths  $< 30$  Mbps declined in all provinces, however. This fall was most noticeable in Vienna (-39.4%), followed by Salzburg (-27.9%) and Styria (-26.2%).

The chart depicts active demand for bandwidth categories by retail users. Despite increases, the real-world bandwidths actually measured on the demand side lag behind the advertised available bandwidths (see figure 'Demand-supply gap by bandwidths').

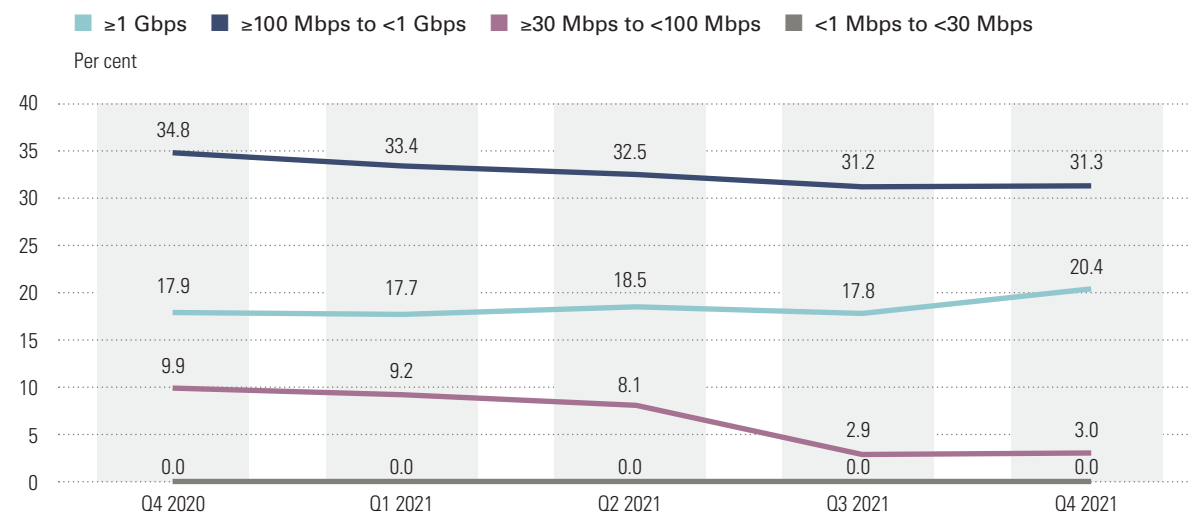
# Supply-demand gap by bandwidths

→ Significantly higher supply than demand in higher bandwidth categories

## Supply-demand gap by bandwidth in Q4/2021



## Change in demand-supply gap by bandwidth over time



- Supply and demand for bandwidth ranging from  $< 1\text{ Mbps}$  to  $< 50\text{ Mbps}$  were virtually identical at the end of 2021.
- At year-end 2021, 54.6 per cent of bandwidth offered in Austria exceeded 100 Mbps. This figure contrasts with a figure for demand of just 23.3 per cent of retail users.
- In Q4 2021, 20.9 per cent of connections supported speeds of  $\ge 1\text{ Gbps}$ , although demand in the same period amounted to a mere 0.6 per cent of retail users.
- As the chart shows, the demand-supply gap for bandwidths  $\ge 1\text{ Gbps}$  became significantly larger in the space of one year (+14.0% to 20.4% in Q4 2021). Over the same period, this same gap shrank for connections in categories supporting speeds  $\ge 30\text{ Mbps}$  to  $< 1\text{ Gbps}$  ( $\ge 100\text{ Mbps}$  to  $< 1\text{ Gbps}$ : -10.1% to 31.3%;  $\ge 30\text{ Mbps}$  to  $< 100\text{ Mbps}$ : -69.7% to 3.0%).
- The problem is therefore excess supply rather than lack of demand, especially for higher-bandwidth categories in Austria. One explanation for the demand-supply gap is that end users do not (as yet) see these higher, and thus more costly bandwidths as offering any additional benefits.

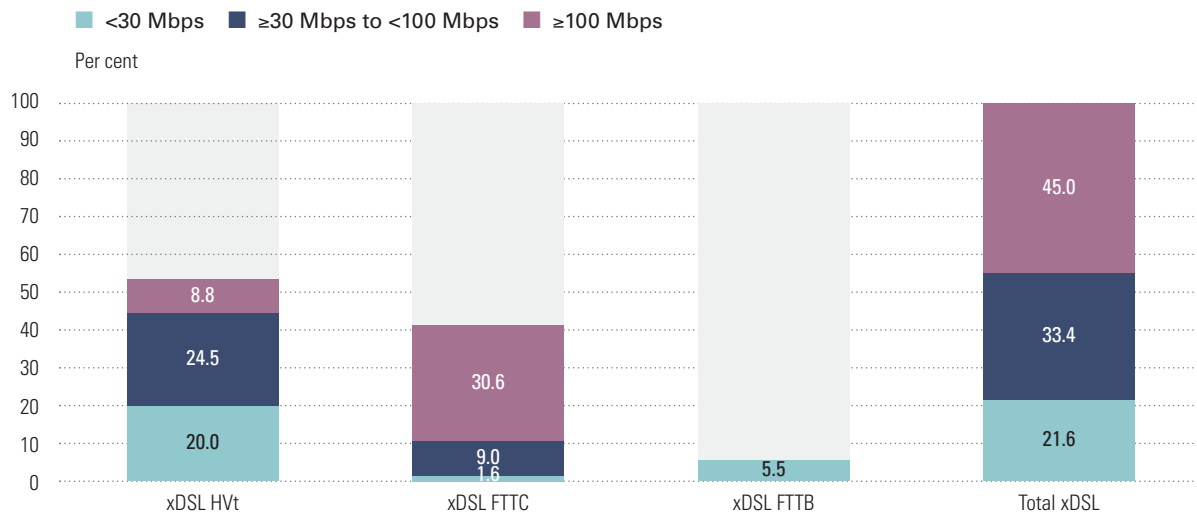
The chart shows supply and demand by broadband connections, depicted by the bandwidths that these connections support. The blue area below the curve represents the demand-supply gap, i.e. not all customers are making use of the higher-bandwidth connections on offer.



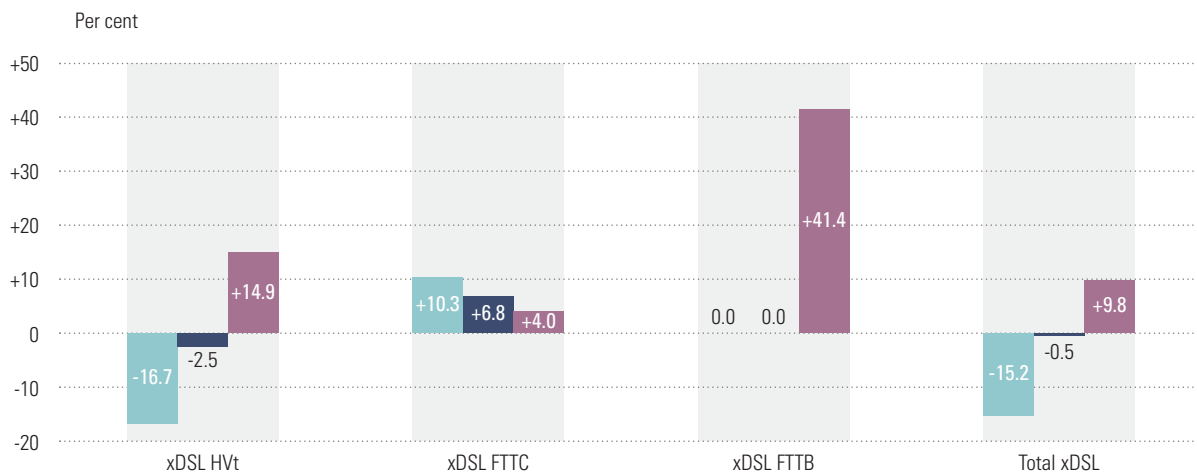
# Coverage with xDSL connections by bandwidth category

→ FTTC accounts for almost 70 per cent of xDSL coverage at bandwidths ≥100 Mbps

## Coverage with xDSL connections by bandwidth category in Q4/2021



## Change in level of coverage: Q4/2021 to Q4/2020 comparison



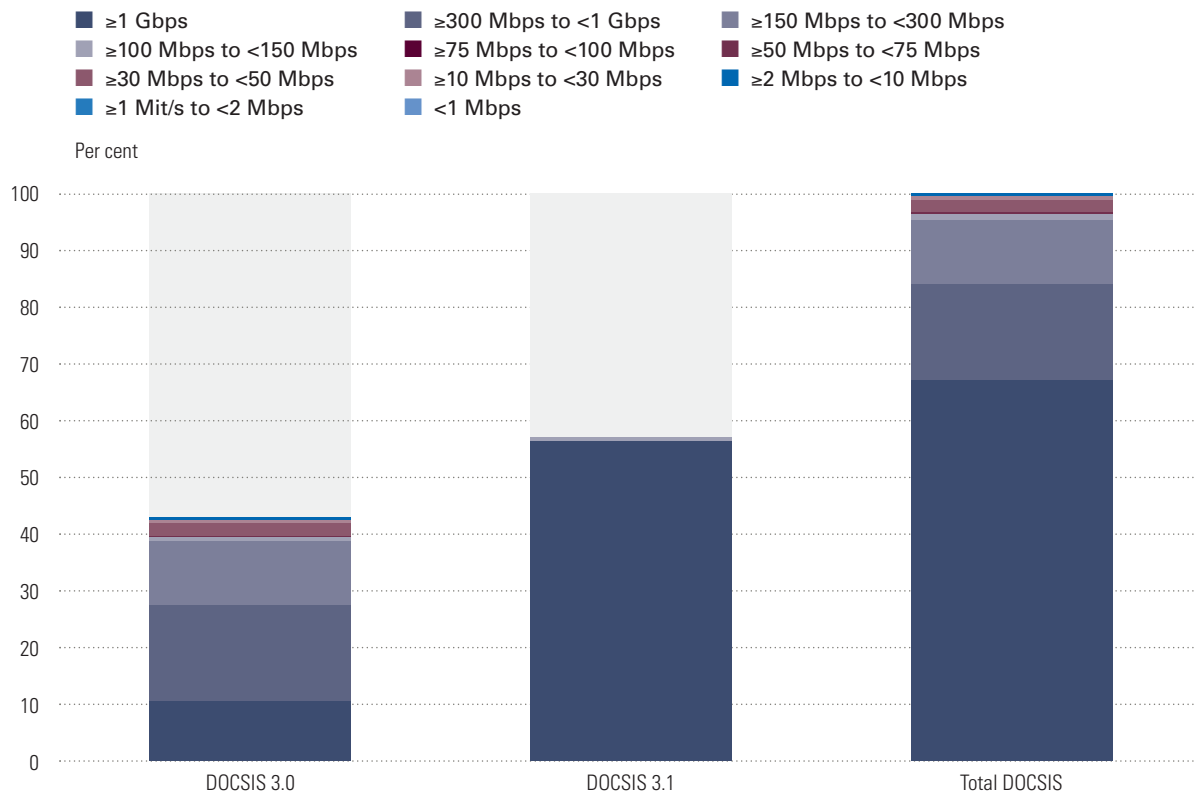
- Downstream from the main distribution frame, 53.3 per cent of homes passed had coverage in Q4 2021 (xDSL HVt). Of this figure, the largest group was capable of achieving bandwidths of ≥30 Mbps to <100 Mbps (24.5%).
- At the end of 2021, 41.2 per cent of homes passed in Austria had coverage from upstream units (xDSL FTTC), with almost a third of these supporting transfer speeds of ≥100 Mbps. This figure had been only 29.4 per cent in Q4 2020.
- At year-end 2021, 5.5 per cent of reported connections were provided using fibre to the building (xDSL FTTB), which constitutes a year-on-year rise of no less than 41.4 per cent. Reported connections in this category supported transfer speeds of ≥100 Mbps in the fourth quarter of 2021.

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 is a major factor in high-bandwidth coverage](#)

**Coverage with DOCSIS connections by bandwidth category in Q4/2021**



- At year-end 2021, the DOCSIS 3.0 category accounted for 42.9 per cent of all potential coverage with DOCSIS connections in Austria. This constitutes a year-on-year decline of 8.3 per cent. Year-end figures for these connections show that most support transfer speeds of ≥300 Mbps to <1 Gbps.
- In Q4 2021, DOCSIS 3.1 accounted for 57.1 per cent of all DOCSIS connections (+7.5% compared with year-end 2020). Virtually all of these connections are capable of achieving speeds of ≥1 Gbps.
- Year-end figures show that 67.2 per cent of cable connections were capable of bandwidths ≥1 Gbps (DOCSIS as a whole). One year earlier, this figure had been only 53.2 per cent.
- Older versions of DOCSIS (1.0 and 2.0) play no further role today and are therefore not reported on separately in the chart.

Broadband access provided using DOCSIS via cable TV networks is also a key 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.

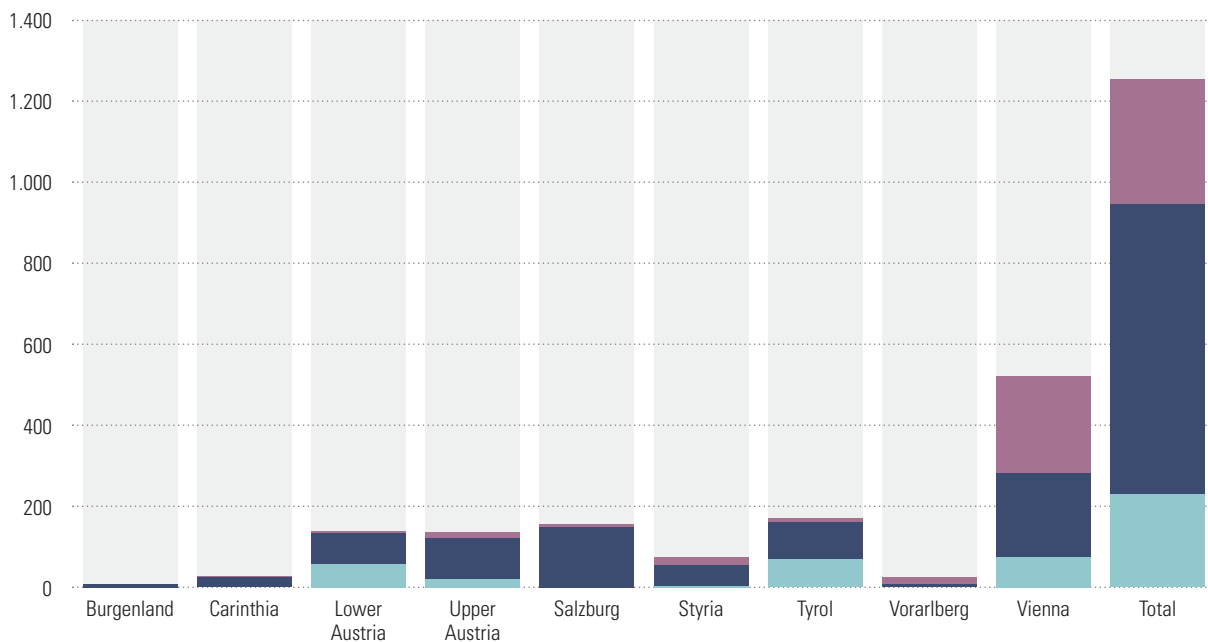
## Coverage with FTTx broadband connections in the provinces

→ Majority of fibre-optic connections available via FTTH over own lines

### Coverage with FTTx broadband connections in the provinces in Q4/2021

■ Passive FTTH ■ FTTH via proprietary line ■ FTTB via other technologies

Number of connections in thousands



- With the addition of more than 234,400 connections compared with Q4 2020, almost 1.3 million connections based on optical fibre were reported in Austria at year-end 2021.
- Of these, 57.1 per cent were accounted for by the category of FTTH using the operator's own lines. Most of these connections were to be found in Vienna (approx. 209.7K connections), followed by Salzburg (approx. 148.6K), Tyrol (86.9K) and Upper Austria (98.5K).
- With FTTB using other technologies, the 'local loop' is typically implemented using DOCSIS and G.fast. In Q4 2021, optical fibre technologies included in this specific category accounted for a 24.4 per cent share nationwide in Austria. Among the provinces, year-end figures for Vienna show the most reported connections by a wide margin (236.9K). In Styria, 18.2K connections were reported in this category.
- With a figure of around 73.8K, Vienna also takes the top spot in terms of coverage with passive FTTH connections. Tyrol is placed slightly lower at 71.6K. Lines

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.

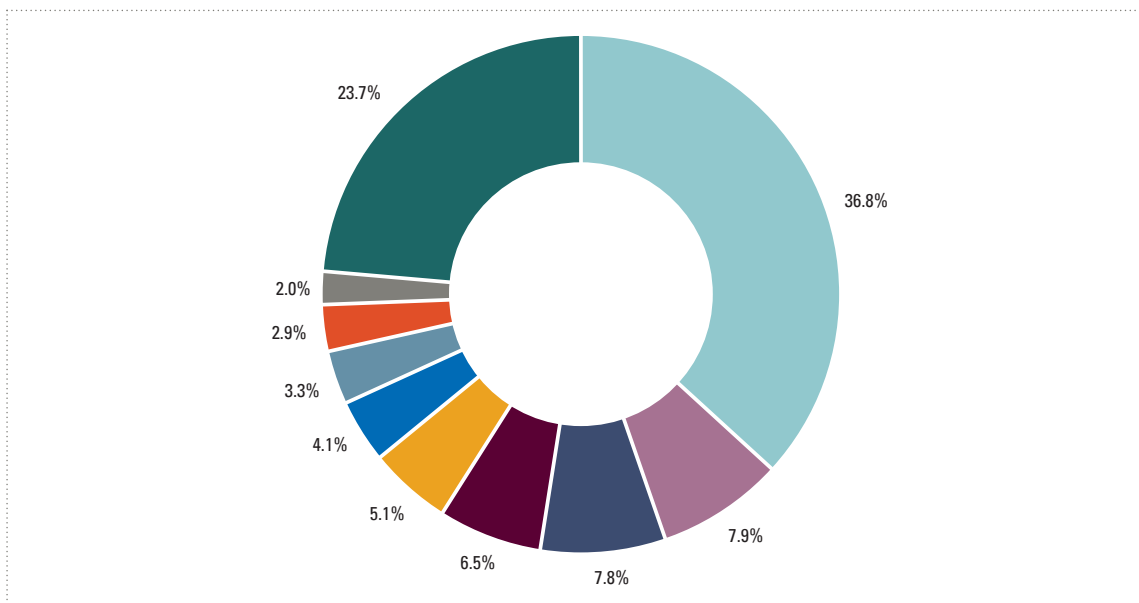
With FTTB using other technologies, the 'local loop' is typically implemented using DOCSIS and G.fast.

# 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 Q4/2021

- |  |  |
|--|--|
| <span style="color: #80CBC4;">■</span> A1 Telekom Austria AG                   | <span style="color: #0070C0;">■</span> Innsbrucker Kommunalbetriebe AG         |
| <span style="color: #9932CC;">■</span> Energie AG Oberösterreich Vertrieb GmbH | <span style="color: #4682B4;">■</span> tirolnet gmbh                           |
| <span style="color: #191970;">■</span> Energie AG Oberösterreich Telekom GmbH  | <span style="color: #FF4500;">■</span> INFOTECH EDV-Systeme GmbH               |
| <span style="color: #800000;">■</span> WIEN ENERGIE GmbH                       | <span style="color: #696969;">■</span> Stadtwerke Kufstein Gesellschaft m.b.H. |
| <span style="color: #FFD700;">■</span> kabelplus GmbH                          | <span style="color: #008080;">■</span> Remaining companies (121)               |



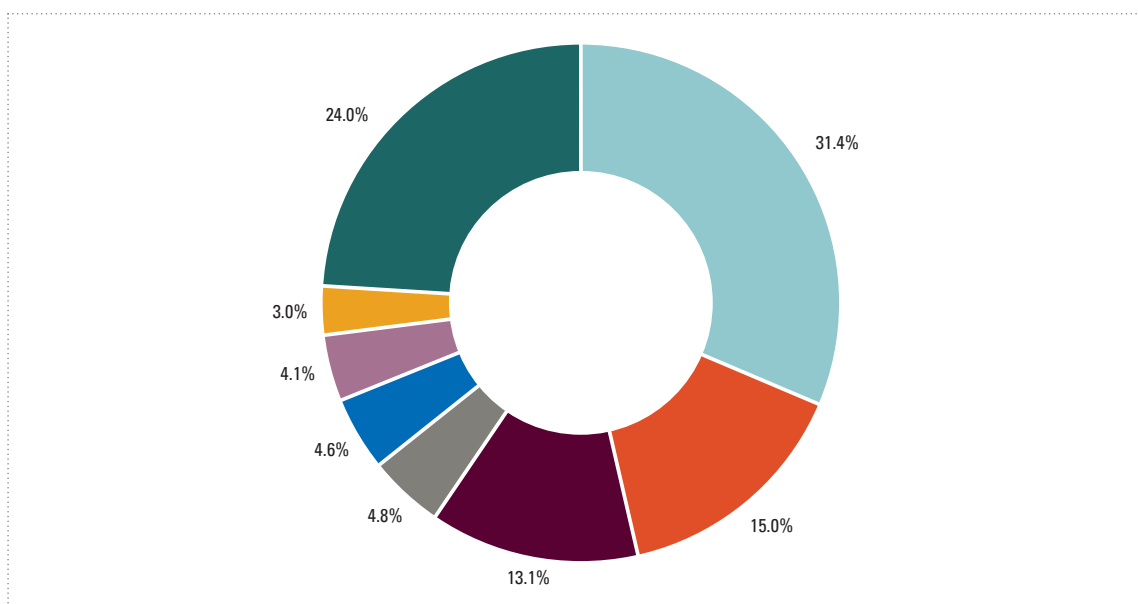
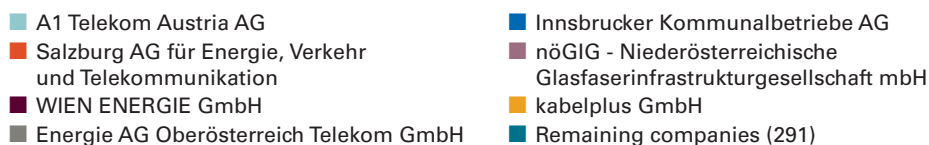
- Measured on the basis of the 188,146 active connections on the Austrian market, A1 Telekom Austria was the largest provider in Q4 2021, with a market share of 36.8 per cent.
- The second-largest provider of active optical fibre connections at year-end 2021 was Energie AG Oberösterreich Vertrieb GmbH (7.9%), followed by Energie AG Oberösterreich Telekom GmbH (7.8%) and WIEN ENERGIE GmbH (6.5%).
- Operators are shown separately if their market share exceeds 2 per cent.
- In Q4 2021, the combined share held by other FTTH operators in the market totalled 23.7 per cent. This share was split among 121 separate companies.

The chart depicts the market share held by the largest providers of active optical fibre (FTTH) connections, as a proportion of total active connections (188,146).

## Major FTTH providers (by number of homes passed)

→ Cable TV operators, power suppliers and municipal service providers also among largest FTTH providers on supply side

### Major FTTH providers (by number of homes passed) in Q4/2021



- When measured on the basis of the 948,513 potentially covered connections (homes passed), A1 Telekom Austria again had the largest market share in Q4 2021, at 31.4 per cent,
- followed by Salzburg AG, WIEN ENERGIE GmbH and Energie AG Oberösterreich Telekom GmbH, with market shares ranging between 15.0 per cent and 4.8 per cent.
- Operators are shown separately if their market share exceeds 2 per cent.
- At the end of 2021, 291 operators (collectively referenced as 'Remaining companies') accounted for a share of 24.0 per cent.

The chart depicts the market share held by the largest providers of active optical fibre (FTTH) connections, as a proportion of total homes passed (948,513).

## Tables

### Coverage with fixed network broadband connections in Q4 2021

Percentage level of coverage (excluding redundant coverage)	
Burgenland	91.4
Carinthia	82.4
Lower Austria	84.5
Upper Austria	84.3
Salzburg	98.7
Styria	85.3
Tyrol	88.0
Vorarlberg	91.5
Vienna	97.7

### Number of fixed broadband providers per province in Q4/2021

Number of fixed broadband providers					
	Passive in-house	Passive network	Active network	Integrated provider	Purely service provider
Burgenland	0	1	5	10	33
Carinthia	0	3	19	21	39
Lower Austria	1	18	41	43	65
Upper Austria	0	8	60	59	54
Salzburg	1	0	16	15	50
Styria	1	5	47	40	53
Tyrol	5	153	57	55	47
Vorarlberg	0	0	17	16	41
Vienna	3	1	24	25	60
Austria	8	186	187	160	84

## Coverage with fixed broadband connections by technology in Q4/2021

Per cent							
	Copper	Coaxial cable	FTTH	FTTH in-house	FWA/LTE	Wi-Fi	Other
Burgenland	84.3	50.0	4.3	0.0	0.0	51.5	0.0
Carinthia	81.2	15.7	6.6	0.0	0.0	0.2	0.0
Lower Austria	80.8	23.7	7.1	0.0	0.0	25.3	0.0
Upper Austria	80.4	46.4	11.3	0.0	3.3	6.8	0.0
Salzburg	87.2	80.4	43.7	0.0	87.3	0.3	0.0
Styria	84.5	27.5	6.9	0.0	3.3	1.4	0.1
Tyrol	81.7	37.2	19.7	0.5	0.1	0.2	0.1
Vorarlberg	88.0	58.7	4.2	0.0	0.0	0.1	0.0
Vienna	96.7	96.4	19.4	0.1	0.0	0.0	0.0
Austria	85.4	49.2	13.4	0.1	6.6	8.2	0.0

## Coverage with broadband connections by bandwidth category in Q4/2021

Per cent										
	Burgenland	Carinthia	Lower Austria	Upper Austria	Salzburg	Styria	Tyrol	Vorarlberg	Vienna	Austria
≥1 Gbps	1.4	16.8	6.8	25.7	1.2	14.0	25.1	27.2	35.2	20.9
≥300 Mbps to <1 Gbps	30.8	15.5	22.9	10.9	17.8	11.6	11.3	12.8	8.5	13.7
≥150 Mbps to <300 Mbps	7.8	20.5	13.1	11.0	30.0	13.7	12.0	16.5	8.1	13.2
≥100 Mbps to <150 Mbps	5.1	11.0	8.3	7.0	4.8	7.9	8.5	9.7	4.8	6.7
≥75 Mbps to <100 Mbps	3.7	7.2	5.9	4.2	2.7	5.8	5.6	6.1	2.2	4.2
≥50 Mbps to <75 Mbps	6.3	9.8	8.1	7.7	4.1	10.1	9.0	9.0	6.1	7.4
≥30 Mbps to <50 Mbps	6.3	8.1	6.8	8.6	11.5	14.4	9.8	7.4	9.9	9.6
≥10 Mbps to <30 Mbps	35.5	8.5	25.1	18.5	26.1	17.9	14.5	8.2	20.9	20.3
≥2 Mbps to <10 Mbps	3.0	2.5	3.0	6.2	1.7	4.6	4.1	3.2	4.1	3.9
≥1 Mit/s to <2 Mbps	0.0	0.0	0.0	0.2	0.1	0.2	0.1	0.0	0.2	0.1
<1 Mbps	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## Demand for broadband connections by technology/service in Q4/2021

Per cent										
	Burgen-land	Carinthia	Lower Austria	Upper Austria	Salzburg	Styria	Tyrol	Vorarl-berg	Vienna	Austria
Copper	26.1	36.3	34.1	23.4	21.8	31.7	27.8	29.6	14.4	25.6
Hybrid	7.2	5.8	7.3	8.0	5.9	7.9	5.7	4.2	5.0	6.5
vULL	1.3	3.8	3.8	3.1	3.2	3.9	4.1	7.1	3.4	3.7
Hybrid/vULL	0.2	0.4	0.3	0.1	0.2	0.3	0.2	0.1	0.1	0.2
Coaxial cable	25.5	7.0	11.6	21.4	37.9	12.1	18.5	27.6	43.1	24.0
FTTH	1.5	1.7	4.3	8.4	2.0	2.1	10.2	1.6	4.4	4.7
Mobile cubes	37.3	44.7	37.9	35.1	28.5	41.6	32.9	29.7	29.4	34.9
FWA/LTE	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0
Wi-Fi	0.8	0.2	0.6	0.3	0.2	0.1	0.3	0.0	0.0	0.2
Other	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.1	0.1

## Demand by broadband category in Q4/2021

Per cent										
	Burgen-land	Carinthia	Lower Austria	Upper Austria	Salzburg	Styria	Tyrol	Vorarl-berg	Vienna	Austria
≥1 Gbps	0.0	0.0	0.0	2.3	0.2	0.0	0.4	0.1	0.7	0.6
≥300 Mbps to <1 Gbps	26.8	1.7	10.5	1.2	0.9	1.4	4.5	2.6	6.0	5.2
≥150 Mbps to <300 Mbps	3.0	7.2	5.9	7.0	4.9	8.7	9.7	12.2	22.7	11.1
≥100 Mbps to <150 Mbps	2.0	3.7	3.4	13.8	5.3	3.7	6.6	5.6	6.8	6.4
≥75 Mbps to <100 Mbps	9.9	15.2	12.9	9.4	24.6	14.0	14.5	13.2	15.8	14.1
≥50 Mbps to <75 Mbps	3.7	5.0	5.6	4.8	4.0	5.7	7.1	10.1	4.7	5.4
≥30 Mbps to <50 Mbps	26.1	35.5	30.6	27.2	40.8	35.5	30.3	27.7	24.8	29.9
≥10 Mbps to <30 Mbps	19.7	21.2	20.5	22.7	11.6	20.5	18.2	20.8	12.0	18.0
≥2 Mbps to <10 Mbps	7.8	9.4	9.6	10.4	6.1	9.4	7.6	6.7	5.1	8.0
≥1 Mit/s to <2 Mbps	0.0	0.0	0.0	0.1	0.4	0.0	0.0	0.1	0.0	0.1
<1 Mbps	1.1	0.9	1.1	1.2	1.1	1.0	1.0	0.9	1.5	1.2



## Supply-demand gap by bandwidth (supply vs. demand) in Q4/2021

Per cent		
	Cumulative supply	Cumulative demand
≥1 Gbps	20.9	0.6
≥300 Mbps to <1 Gbps	34.7	5.8
≥150 Mbps to <300 Mbps	47.8	16.9
≥100 Mbps to <150 Mbps	54.6	23.3
≥75 Mbps to <100 Mbps	58.7	37.4
≥50 Mbps to <75 Mbps	66.1	42.8
≥30 Mbps to <50 Mbps	75.7	72.7
≥10 Mbps to <30 Mbps	96.0	90.7
≥2 Mbps to <10 Mbps	99.9	98.8
≥1 Mit/s to <2 Mbps	100.0	98.8
<1 Mbps	100.0	100.0

## Coverage with xDSL connections by bandwidth category in Q4/2021

Per cent				
	xDSL MDF	xDSL FTTC	xDSL FTTB	xDSL total
≥1 Gbps	0.0	0.0	0.0	0.0
≥300 Mbps to <1 Gbps	0.4	13.0	4.0	17.4
≥150 Mbps to <300 Mbps	3.8	11.3	1.5	16.7
≥100 Mbps to <150 Mbps	4.6	6.3	0.0	10.9
≥75 Mbps to <100 Mbps	4.3	3.4	0.0	7.7
≥50 Mbps to <75 Mbps	9.6	3.5	0.0	13.0
≥30 Mbps to <50 Mbps	10.6	2.1	0.0	12.7
≥10 Mbps to <30 Mbps	15.8	1.5	0.0	17.2
≥2 Mbps to <10 Mbps	4.2	0.1	0.0	4.4
≥1 Mit/s to <2 Mbps	0.0	0.0	0.0	0.0
<1 Mbps	0.0	0.0	0.0	0.0

## Coverage with DOCSIS connections by bandwidth category in Q4/2021

Per cent				
	DOCSIS 1.0 and 2.0	DOCSIS 3.0	DOCSIS 3.1	DOCSIS total
≥1 Gbps	0.0	10.6	56.6	67.2
≥300 Mbps to <1 Gbps	0.0	16.9	0.0	16.9
≥150 Mbps to <300 Mbps	0.0	11.2	0.0	11.2
≥100 Mbps to <150 Mbps	0.0	0.7	0.5	1.2
≥75 Mbps to <100 Mbps	0.0	0.0	0.0	0.0
≥50 Mbps to <75 Mbps	0.0	0.3	0.0	0.3
≥30 Mbps to <50 Mbps	0.0	2.2	0.0	2.3
≥10 Mbps to <30 Mbps	0.0	0.5	0.0	0.5
≥2 Mbps to <10 Mbps	0.0	0.4	0.0	0.4
≥1 Mit/s to <2 Mbps	0.0	0.0	0.0	0.0
<1 Mbps	0.0	0.0	0.0	0.0

## Coverage with FTTx broadband connections in the provinces in Q4/2021

Number of connections			
	passive FTTH	FTTH over own lines	FTTB other technologies
Burgenland	50	7,964	150
Carinthia	1,697	23,897	2,181
Lower Austria	58,778	75,769	3,869
Upper Austria	22,431	98,480	12,637
Salzburg	0	148,625	5,394
Styria	3,140	52,367	18,245
Tyrol	71,603	90,830	9,664
Vorarlberg	0	9,421	17,705
Vienna	73,778	209,683	236,862
Austria	231,477	717,036	306,707

## Major FTTH providers in Q4/2021

By number of active connections in per cent	
A1 Telekom Austria AG	36.8
Energie AG Oberösterreich Vertrieb GmbH	7.9
Energie AG Oberösterreich Telekom GmbH	7.8
WIEN ENERGIE GmbH	6.5
kabelplus GmbH	5.1
Innsbrucker Kommunalbetriebe AG	4.1
tirolnet gmbh	3.3
INFOTECH EDV-Systeme GmbH	2.9
Stadtwerke Kufstein Gesellschaft m.b.H.	2.0
Remaining companies (121)	23.7

## Largest FTTH providers in Q4/2021

By number of homes passed in per cent	
A1 Telekom Austria AG	31.4
Salzburg AG für Energie, Verkehr und Telekommunikation	15.0
WIEN ENERGIE GmbH	13.1
Energie AG Oberösterreich Telekom GmbH	4.8
Innsbrucker Kommunalbetriebe AG	4.6
nöGIG - Niederösterreichische Glasfaserinfrastrukturgesellschaft mbH	4.1
kabelplus GmbH	3.0
Remaining companies (291)	24.0



07

# Explanatory notes and Glossary

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# Explanatory notes on data sources

## Communications Survey Ordinance

Unless stated otherwise, the charts published in the RTR Internet Monitor annual report are based on data collected in accordance with the Communications Survey Ordinance (KEV), Federal Law Gazette (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 and the price baskets: A1, Magenta, Drei (Hutchison), LIWEST, Salzburg AG, Spusu, Kabelplus, Russmedia IT (VOL), bob 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. As of Q3 2020, 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 support the provision of internet connections 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 contrast, 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, Wi-Fi or WLL (involving '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 provider 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 rate and smartphone subscriptions.

Prior 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, activity was introduced as a criterion 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 rate 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 derive 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 costly 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 very low demand among 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 customer and business customer segments

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 designed for 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, additional 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 included in the above definition.

## Virtual unbundling

Under decisions by the TTK, 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 mutually provide services, thereby enabling one another to provide services 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.



# Publishing information

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