2020 Activity Report

from the Federal Communications Commission (ComCom)

Federal Communications Commission (ComCom)

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Contents

Editorial

2020 was an extraordinary year for us all. Telecommunications proved essential to keeping countless aspects of life up and running, whether education, commerce, or distance teamworking. In fact, having to keep a physical distance from each other in the form of social distancing gave an enormous boost to the digitalisation of society.

The task now is to maintain this momentum, while observing the quality and security requirements that digitalisation must fulfil. We must not forget, however, that the transition to a digital world carries with it the risk of widening inequality.

However, while we need these new technologies, we are also seeing growing distrust of science and innovation. Social media are increasingly being used to spread ideas and beliefs that have no basis in fact. An atmosphere that stirs fear and anxiety produces resistance and obstruction, as with the launch of 5G, for example.

In addition to settling disputes between carriers, the Federal Communications Commission (ComCom) regards its role as keeping those concerned informed. This year and in those to come, it will also continue to support the search for viable ways to expand the infrastructure. Furthermore, it will award the new universal service licence, which guarantees every single inhabitant of Switzerland access to telecommunications services of the necessary standard.

At the international level, the role of ComCom is to ensure that, especially within Europe, Switzerland continues to nurture the sound partnerships that it has built upon the basis of exchange and mutual trust. Doing so will ensure that telecommunications function smoothly in such a closely connected world.

ComCom's composition has changed since our last report. I am delighted to have been appointed by the Federal Council to succeed Stephan Netzle as President of the Commission. Both Stephan and Andreas Bühlmann have stepped down from the Commission after 12 years of service. We would like to extend our warmest thanks to our much-valued colleagues for their huge commitment to ComCom. During their time in office, both were involved in important work to shape the Swiss telecommunications landscape of the future, in particular the two auctions for 4G and 5G mobile communications frequencies. The Federal Council has also appointed Christian Martin as Deputy President of the Commission. In addition, we welcome two new members, Patrick Krauskopf and Jean Christophe Schwaab, and look forward to being able to count on their expertise.

Finally, on behalf of my colleagues I would like to thank the ComCom Secretariat for its many years of such capable support to the Commission.

Adrienne Corboud Fumagalli, President

March 2021

I. An overview of the telecoms market

When compiling its statistical data, ComCom is largely reliant on the figures published by the major telecommunications providers. In certain cases, it also uses data published by the OECD, the EU, professional bodies and specialised research institutes such as Gartner and IDC. It also uses OFCOM data, which is also based on data from Swiss telecommunications service providers or on OFCOM's own analyses.[1] Further information on the latest developments in the Swiss fixed-network and mobile telephony market can be found on ComCom's website under the heading 'Facts and figures'.

As Liberty Global has only published partial results for Sunrise and UPC in 2020, it is not always possible to present year-end figures here.

1. Development of mobile networks

The COVID-19 pandemic has shown just how essential telecommunications infrastructures are to maintaining business activity and social contact. While the need for broadband and the number of connections made has risen sharply during the crisis, to save money many people put off buying new devices. According to the Smartphone 2020 study produced by Comparis in November 2020, Swiss consumers' willingness to buy a new smartphone fell by almost 10% compared with 2019. They are also increasingly planning to use their current device for longer.

The mobile telephony market is saturated, so the number of customers remained more or less stable. The COVID-19 crisis has had no noticeable effect here. By contrast, the Sunrise-UPC merger may reshuffle things on the Swiss telecoms market in the future.

At the end of 2020 Swisscom had 6,224,000 mobile telephony customers in Switzerland. This was fewer than in the previous year (-1.7%). An increase of 81,000 customers with contracts (postpaid offers) contrasted with a loss of 190,000 prepaid customers. Sunrise, on the other hand, recorded a very slight increase of approximately 0.4%, and had 2,832,000 mobile customers at the end of the year. The decline in the number of customers in the prepaid segment (-139,000) was more than offset by the considerable growth in the postpaid segment (+150,000 units). Meanwhile, the number of Salt customers had risen by 1% to a total of 1,825,000 customers by the end of 2020. The provider gained some 56,000 contract customers during the year, but at the same time lost 40,000 in the prepaid segment. The data available to us indicates that Swisscom had a market share of around 56% at the end of 2020, with Sunrise occupying 25% and Salt 16%.

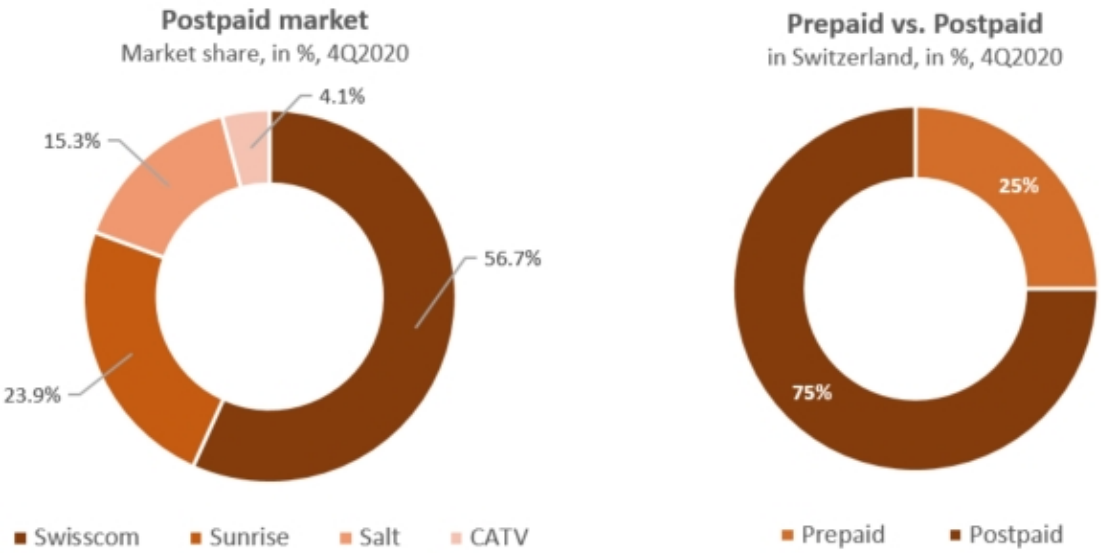
Also at the end of 2020, cable network operators had a total of over 350,000 mobile customers, corresponding to an increase of 28% in just one year. During the year under review, almost 92% of these customers were with UPC (253,000) or Quickline (70,000). At 3%, the market share occupied by CATV operators remains relatively small.

For almost ten years now, users of prepaid offers have increasingly been switching to contracts. Indeed, the market dynamic is being driven largely by their decisions. The trend is illustrated by the growth in the proportion of customers with contracts, which expanded from 56% in 2010 to 75% in 2020. Although people have been out and about less over the past year, the importance of mobile telephony has increased still further during the health crisis. One factor here was that many customers have been working at multiple locations (second homes, co-working spaces, etc.).

Mobile telephony providers – including cable network operators, which generally do not offer prepaid products – added more than 360,000 contract (postpaid) customers during the year 2020. In this segment, Swisscom took some 57% of the market, Sunrise 24%, Salt 15% and cable network operators 4%.

[1] All sources used are detailed in the source list at the end of the report.

Fig. 1: Market shares of mobile telephony providers in Switzerland, December 2020



Sources: Operators

Development of the smartphone market

According to the latest Ericsson Mobility Report, of November 2020, there were approximately 7.9 billion mobile connections worldwide in the third quarter. This figure is expected to rise to 8.8 billion by 2026. Mobile connections made using smartphones continue to rise, accounting for around 75% of all mobile contracts during this period. At the end of 2020, there were 6.1 billion recorded contract customers with smartphones around the globe. It is predicted to be 7.5 billion by 2026.

Several organisations had been expecting a resumption in growth in the smartphone market in 2020, after the slump in the three preceding years, notably due to the commissioning of 5G networks in many countries and the market launch of 5G-enabled devices. The crisis triggered by the COVID-19 pandemic is likely to delay this anticipated recovery considerably.

According to the latest figures from the International Data Corporation (IDC), published in January 2021, 1.29 billion smartphones were sold worldwide in the year under review, 5.9% fewer than in 2019. That said, the fourth quarter was encouraging, with a 4.3% year-on-year increase in sales. IDC estimates that the number of smartphones sold around the world will rise again in 2021, driven in particular by the increasing penetration of 5G.

At 1.5 billion in 2021, Gartner also expects global smartphone sales to reach a level similar to that in 2019, which would correspond to growth of approximately 11% compared with last year. The better availability of 5G networks and a broader range of (more affordable) 5G-enabled smartphones should boost demand. In fact, they could account for up to 35% of all smartphone sales in 2021.

Consumer interest in used devices remained robust during the reporting year. More than 225 million units were sold worldwide in 2020, 9.2% more than in the previous year. According to IDC, unlike the recently contracting global market for new smartphones, demand for second-hand devices shows no signs of softening. Increasing numbers of manufacturers and even mobile network operators have introduced return schemes in the past few years. For many consumers and businesses, reconditioned second-hand devices are a worthwhile alternative. Sales are expected to rise to 351.6 million units by 2024, which would correspond to annual growth of 11.2% between 2019 and 2024. Total turnover is expected to reach USD 65 billion in 2024.

In Switzerland as elsewhere, reconditioned second-hand phones are increasingly popular, and a real market is emerging. For example, at Digitec pre-owned mobile phones made up 1% of sales in 2020, but the company estimates that the proportion will soon reach 2–3% of smartphones sold overall. Businesses specialising in reconditioning smartphones, such as Revendo and Recommerce, are doing extremely well. Swisscom has been offering reconditioned phones for sale direct to customers via its online shop since June 2020. Without disclosing the exact numbers, it believes that this offer meets a genuine need among price and environmentally conscious consumers.

Growth in mobile data traffic

In 2020, the COVID-19 pandemic proved that robust fixed-network and mobile infrastructures, as well as good coverage, are vital. The year's particular circumstances meant that people spent more time than usual at home, and switched from smartphone connections to wifi. Despite this, there was an increase in mobile data traffic in Switzerland last year. On the Swisscom network, for example, it rocketed by almost 30% in the space of 12 months. Data volumes have grown 100-fold since 2010. By its own account, Sunrise is currently seeing data traffic double every 16 months.

The updated February 2021 Ericsson Mobility Report states that data traffic on mobile networks worldwide increased by 51% between 2019 and the end of 2020 and is now estimated to be 60 Exabytes per month (60 billion bytes). Mobile data traffic could expand by a factor of 4.5 in the coming years, to reach 226 Exabytes per month in 2026.

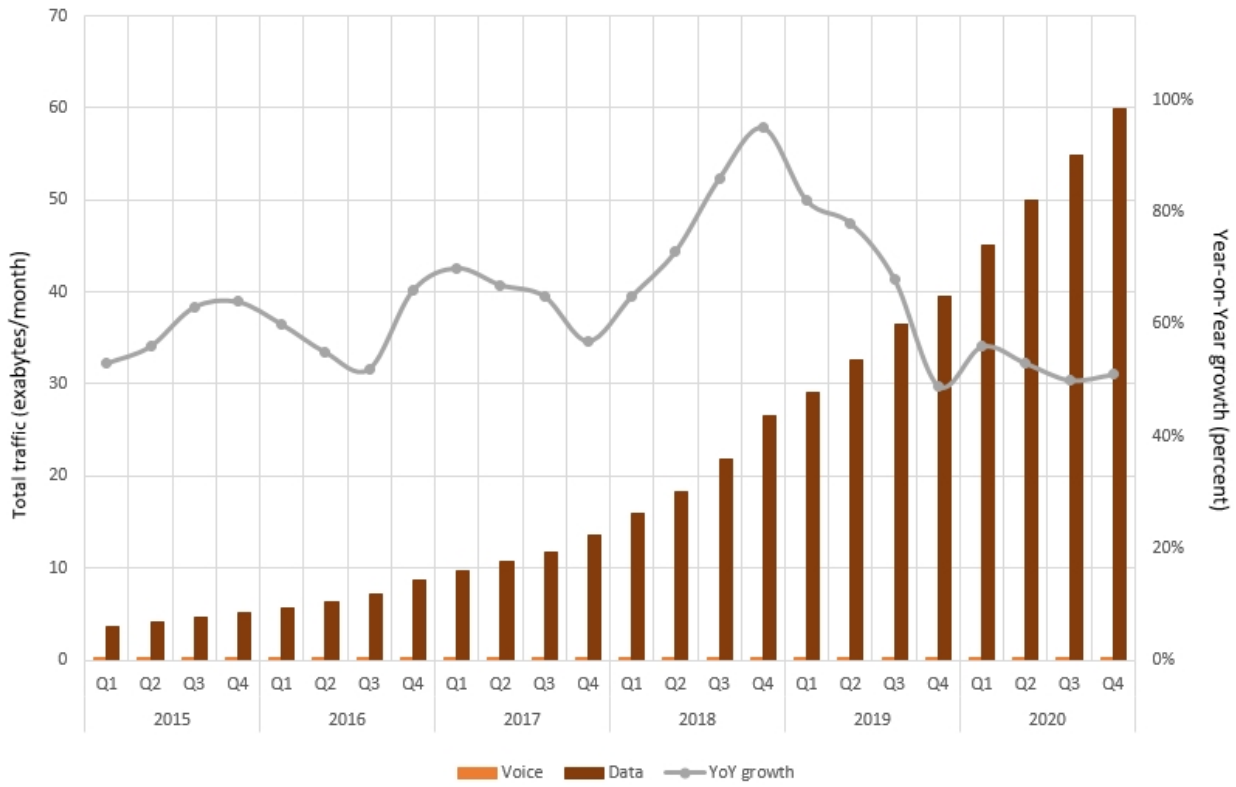
Reasons include the rising number of mobile contracts connected to smartphones, and an increase in the data volumes included in those contracts, which is being driven mainly by the rising consumption of video content. According to Ericsson, video accounted for as much as 66% of mobile data traffic in 2020 and could rise to almost 77% by 2026 – an annual increase of almost 30% worldwide.

This growth is driven in particular by the increasing popularity of embedded videos in numerous online applications, by the expansion in the use of video streaming services (VoD), which is reflected in both rising subscriber numbers and longer viewing times, and by ever higher resolutions on smartphone displays.

The lion's share of mobile data traffic is still absorbed by LTE networks which, according to Ericsson, covered some 80% of the world's population at the end of 2020. The year saw a further increase in LTE subscribers, to 4.5 billion, or 57% of all mobile phone contracts.

LTE established itself as the most important access technology in 2018, and is likely to remain so until 2026. In the interim, a record 4.8 billion contract customers is expected for 2021, followed by a decline to 3.9 billion by 2026, when the migration of increasing numbers of LTE contracts to 5G is completed.

Fig. 2: Mobile data and voice traffic 2015–2020



Source: Ericsson traffic measurements

Investment

Telecommunications service providers are making substantial investments in their network infrastructures so that they are able to cope with the enormous growth in mobile data traffic, in particular.

Swisscom's investments in Switzerland came to CHF 1.599 billion francs during the year 2020, representing a 1.3% increase from the previous year's CHF 1.565 billion – if the CHF 196 million invested in acquiring new frequencies in 2019 is not counted. Of this, Swisscom invested CHF 304 million in expanding its mobile communications network. This was 14% more than in 2019 and made up 19% of its total investments in Switzerland last year.

Sunrise had invested CHF 370 million in 2019, purchasing new frequencies for CHF 89 million. It planned to increase its capital spending to CHF 410–450 million overall in 2020, and in particular to invest more in its 4G+ and 5G mobile infrastructures. Finally, Salt also invested more in 2020, committing almost CHF 189 million to expanding its mobile communications and fibre-optic network infrastructure. The prior-year figure was CHF 166 million, in addition to more than CHF 94 million that Salt spent on buying new mobile communications frequencies in 2019.

Network quality

At the beginning of December 2020 the independent German specialist periodical Connect published a test comparing the mobile networks in Germany, Austria and Switzerland. As has been the case for many years, the test results confirm the excellent standard of all Swiss mobile communications networks.

Swisscom and Sunrise remain the front-runners with an 'outstanding' rating, while Salt was ranked fifth, behind Austria’s Magenta and A1. For three years now Salt has been the only Swiss carrier to record continuous

improvement. Due especially to the launch of VoLTE by the three Swiss carriers, consumers benefit from short call setup times and exceptional voice quality. Swisscom and Sunrise are also virtually neck-and-neck with regard to data traffic, offering very high transfer rates in the main thanks to carrier aggregation (where frequencies are combined) on the LTE network. Salt lags behind somewhat, but its results are still impressive, also in an international comparison.

The Connect network test covered 5G networks for the first time in 2020. According to the publication, Switzerland leads the field, and the individual Swisscom and Sunrise networks are of a very high standard. Both carriers have been awarded the Connect prize for innovation. Salt began later than Swisscom and Sunrise with the rollout of its 5G network, and still has some catching up to do. Where it is able to offer 5G it is nonetheless delivering impressive data rates.

Swiss users are certainly pleased to have excellent mobile communications coverage both at home and on the move. This is particularly the case in trains, where performance is way ahead of Austria and Germany.

Mobile operators are also improving network coverage all the time by erecting new antennas along rail lines. The InTrainCom consortium, an alliance of mobile phone carriers and SBB, has already equipped all long-distance trains with repeaters for receiving mobile services. With Beacon technology and a bluetooth connection via the SBB FreeSurf app, since mid-December 2020 passengers with mobile contracts with Salt, Sunrise, Quickline and Digitec have been able to surf the internet for free in long-distance trains. This solution will be available to Swisscom customers from the summer of 2021. There are plans to extend it to regional rail services.

At the same time, Swisscom is also looking into erecting antenna corridors along key segments of the rail network. Having joined with network equipment provider Ericsson in 2020 to conduct a joint test along an initial segment of the Lake Walen route, Swisscom continued its experiment into the first quarter of 2021. The aim is to develop this solution for all mobile communications users and providers in Switzerland.

Network coverage

Switzerland enjoys almost complete mobile phone coverage.

The GSM technology (2G) was introduced in Switzerland in 1993, i.e. 25 years ago. The GSM Networks were designed primarily for voice telephony and exchanging small amounts of data such as SMS texts and email. They are gradually being replaced by newer technologies. Now, the great majority of mobile connection are made via more modern networks (3G, 4G and 5G), while 2G accounted for less than 1% of all traffic in the past year. Swisscom and Salt switched off their 2G networks (GSM, GPRS and Edge) at the end of 2020. Sunrise has decided to continue operating its 2G network through to at least the end of 2022. Services such as SMS will continue to operate on the 3G, 4G and 5G networks.

Depending on the carrier, UMTS/HSPA services (3G), which enable mobile internet access at a speed of 42 Mbps, are accessible to up to 99% of the Swiss population. These services are likely to continue to be offered in parallel with the latest generation technologies (4G and 5G) for some years to come. Swisscom has announced that it will guarantee 3G coverage until at least the end of 2024. By contrast, Germany is already preparing to switch off UTMS in 2021.

According to the three Swiss providers Salt, Sunrise and Swisscom, LTE (4G) coverage reached at least 99% of the population as at the end of 2020. All carriers also report high network coverage with LTE-A technology (4G+): Swisscom states that 96% now have access to speeds of up to 300 Mbps and as many as 72% enjoy maximum speeds of 500 Mbps. At the beginning of 2020 Sunrise achieved 85% coverage of the population with its LTE-A network, offering data transfer rates of up to 900 Mbps. Salt's LTE-A network coverage stood at 97%.

Providers quickly began to roll out their 5G mobile networks after they had acquired additional frequencies at the beginning of 2019. Swisscom switched on its 5G network in April 2019, and covered 90% of the population by the end of 2020. Sunrise also launched its 5G offering in April 2019, and had already extended it to more than 686 cities, towns and communes by December 2019, covering 90% of the local population. Salt went live with its 5G

network in August 2020. It has not yet supplied any coverage data, but has announced that it will continue to expand nationwide.

The new 5G technology is an enhanced version of 4G. In addition, it now uses frequencies very similar to those in conventional mobile communications, and also complies with the same radiation thresholds, which are ten times as strict in sensitive areas as they are in our neighbouring countries.

Compared with 4G, 5G offers data transmission speeds (1 Gbps and above) that are up to 100 times faster, as well as significantly shorter response times. It also permits the transfer of much larger amounts of data and allows many more devices to be operated in parallel. 5G is also more efficient in terms of frequency use and energy consumption.

The new technology is of paramount importance for the future of Switzerland, as it makes many new types of application possible. These include the Internet of Things (IoT, the networking of large numbers of devices/appliances and sensors), time-critical, reliable remote control (e.g. for telemedicine or Industry 4.0) and self-driving vehicles, which process large amounts of data. In the future, 5G will also play a key role in managing a resource and energy-efficient economy. Further information on 5G and non-ionising radiation can be found on the ComCom and OFCOM websites.

Data transfer rates

Mobile communications users in Switzerland benefit from high data transfer rates.

The most recent Mobile Network Experience Report for Switzerland, produced using the Opensignal network monitoring app and published in December 2020, confirms the high standard of Swiss mobile communications networks, despite the extraordinary circumstances of the COVID-19 pandemic. It should be noted that Opensignal measures the real experience of users when accessing their carrier's network, and makes no claims about geographical network coverage.

The slower increase in the figures for Swiss providers may be explained by the fact that users spent more time at home, in rural and suburban areas, in 2020, whereas operators had invested in technology in generally busier locations such as town and city centres.

Swisscom was the first provider to achieve 95% availability for its 4G network, with Sunrise and Salt close behind with 93.1% and 87.8% respectively. On average, users in Switzerland currently enjoy access to 4G services for 90% of the time.

In addition, carriers have improved the capacity of their networks, allowing users to benefit from much higher speeds. In 2020, Sunrise and Salt recorded average speeds of 37.6 and 34.8 Mbps respectively. While this is still significantly slower than Swisscom, average transfer rates have increased by 3.4 Mbps (+9.9%) in the case of Sunrise and by 2.6 Mbps (+8.2%) in the case of Salt. In 2019 Swisscom was the first provider to achieve average download rates of almost 50 Mbps. Continuing to post an average of 49.8 Mbps in 2020, it remains well ahead of the competitors.

The disparity between these values and the theoretical transfer rates touted by the operators shows that the networks are coming up against their capacity limits. This is the product of the high number of users – who also share bandwidth within the same cell – and the ever-larger volumes of data being transferred.

Opensignal has therefore begun to measure the performance of 5G networks across 15 larger markets, including Switzerland. With one exception, average download rates via the 5G network in all countries are over 100 Mbps. Those in Switzerland achieved 163 Mbps on average, in other words 3.5 times the average speed of 47.1 Mbps recorded in the 4G network. In 2020, 5G availability to users in Switzerland stood at 9.7%. This is considerably lower than in the leading countries of Kuwait, Saudi Arabia, South Korea, Hong Kong and Thailand, where users have an active 5G connection between 20% and 30% of the time. Thanks to the anticipated expansion of 5G networks in Switzerland, providers should soon be able to offer their customers even higher transfer rates.

Mobile communications pricing

According to the National Consumer Price Index issued by the Federal Statistical Office (FSO), which measures price trends on the basis of a basket of the principal consumer goods and services purchased by Swiss households, the global index for telecommunications services edged up by 0.3 percentage points between 2019 and 2020. The index for mobile telephone communications rose by 2.7 percentage points last year.

The mobile telephony prices covered by OFCOM's Statistical Observatory, which are based on the lowest rates offered by providers on the Swiss market, reveal considerable differences, however.

In all baskets (for low, medium and high usage requirements), the most expensive offer (Swisscom) cost 2 to 2.5 times the lowest (UPC). This spread broadened between 2019 and 2020, which OFCOM believes is evidence of a certain dynamic in this market.

In 2020, the most competitive offer for low-use customers was from UPC at CHF 9 per month. At Swisscom, it was CHF 25. For medium-use customers, the UPC offer cost less than CHF 20, but the Swisscom one was more than CHF 51. Finally, high-use customers found the cheapest offer at UPC, for CHF 30, and the most expensive at Swisscom, for CHF 66.

Mobile telephony prices in Switzerland are still among the highest internationally, although the gap compared with other OECD countries is beginning to narrow.

This is confirmed by the Teligen price baskets published by the market research company Strategy Analytics, which are based on OECD methodology and take into account the most competitive products offered by the largest carriers in each country. These include products and options from both the prepaid and contract segments. The price basket for Switzerland factors in the three network operators Salt, Sunrise and Swisscom, as well as the secondary and tertiary brands UPC, Yallo and M-Budget. For an average basket of voice and data connections, a medium-use customer (100 calls and 2 GB of data) in Switzerland paid only CHF 3.50 more than the OECD-wide average (CHF 20.00 versus CHF 16.50). However, in terms of the cheapest offer for an average basket of telecom services, Switzerland comes in 25th, and thus in the third of the most expensive countries.

Customers with high usage requirements (unlimited calls and 20 GB of data) paid almost CHF 4 less per month in Switzerland than the OECD country average (CHF 29.90 vs. CHF 33.70). This finding requires a more nuanced view, however, because Switzerland still occupies 17th place, and several countries offer comparable products for less than CHF 20.

2. Development of fixed networks

Switzerland has several backbone networks as well as high-quality fixed access networks. Swisscom’s access network is available nationwide. The well-developed cable television networks (CATV) – in particular those of UPC and Quickline – also offer fixed-network connections in much of the country. In addition, many small cable network operators offer broadband and telephone services in geographically limited areas. Over 80% of Swiss households have a CATV network connection.

A look at the market shares in the fixed-line market shows clearly that the cable network operators have helped shape the development of fixed-line telephony in recent years. According to OFCOM statistics, Swisscom’s market share, which was over 60% for a long time, continued to decline and stood at 50.3% at the end of 2019. The historical provider nonetheless remains far ahead of its two main competitors UPC and Sunrise, which both held market shares of 15.9%. Swisscom's market share has shrunk by 15 percentage points over the past ten years, from 65.3% in 2010 to 50.3% in 2019, while that of UPC has doubled from 8.2% to 15.9% during the same period. Some smaller cable network operators have also achieved significant expansion over the past decade, despite having

only relatively modest market shares – with the exception of Quickline, claiming a market share of 3.65% at the end of 2019.

Given the continuing boom in mobile telephony, the downward trend in the number of fixed-network telephone connections in Switzerland continues. The figures available for 2020 indicate that most providers have lost subscribers. Although Sunrise gained around 15,000 new telephony customers in the first nine months of the reporting year, UPC lost 6,000 fixed-network customers in the course of 2020. Together, the cable network operators therefore lost around 14,000 customers during the year (-1.8%). By contrast, Swisscom lost 71,000 fixed-network customers between 2019 and 2020, a decline of just under 4.5%. Swisscom still had a total of 1,523,000 fixed telephony customers at the end of 2020, and this downward trend had slowed owing to the completion of the switchover to IP telephony.

Voice over IP (VoIP) internet telephony firmly established

Fixed-network telephony using VoIP technology has been available from alternative providers of telecommunications services and cable network operators for more than ten years now. The replacement of analogue by internet protocol (IP)-based telephony is also furthering VoIP.

According to OFCOM's statistics, the number of customers who make telephone calls via the fixed network using a VoIP connection from a telecommunications service provider (DSL, cable, etc.) has increased more than fivefold over the past ten years, and exceeded the three million mark by the end of 2019 (3,046,344). More than 96% of fixed-network subscribers now make calls via a VoIP connection.

Migration of analogue telephony to IP

In the spring of 2014, Swisscom announced that it would switch all fixed-network connections over to digital IP telephony in stages over the coming years, and would phase out the old analogue, as well as the ISDN technology which dates from the 1980s. The gradual replacement of traditional fixed-line telephony with IP technology is a global trend. Almost all data (music, images, videos and voice communications) is now transmitted digitally via IP-based networks, which are the only ones even able to cope with such huge volumes.

IP-based product packages (internet, TV and telephony) are becoming increasingly popular among retail customers. More and more business customers are also digitalising their infrastructures, specifically with a unified communications and collaboration (UCC) system, or by outsourcing certain services to the cloud.

By the end of 2019, Swisscom had already migrated all retail customers and over 99% of business customers to all-IP. It completed the transition to IP technology at the end of the first quarter of 2020.

3. Fixed-network broadband market

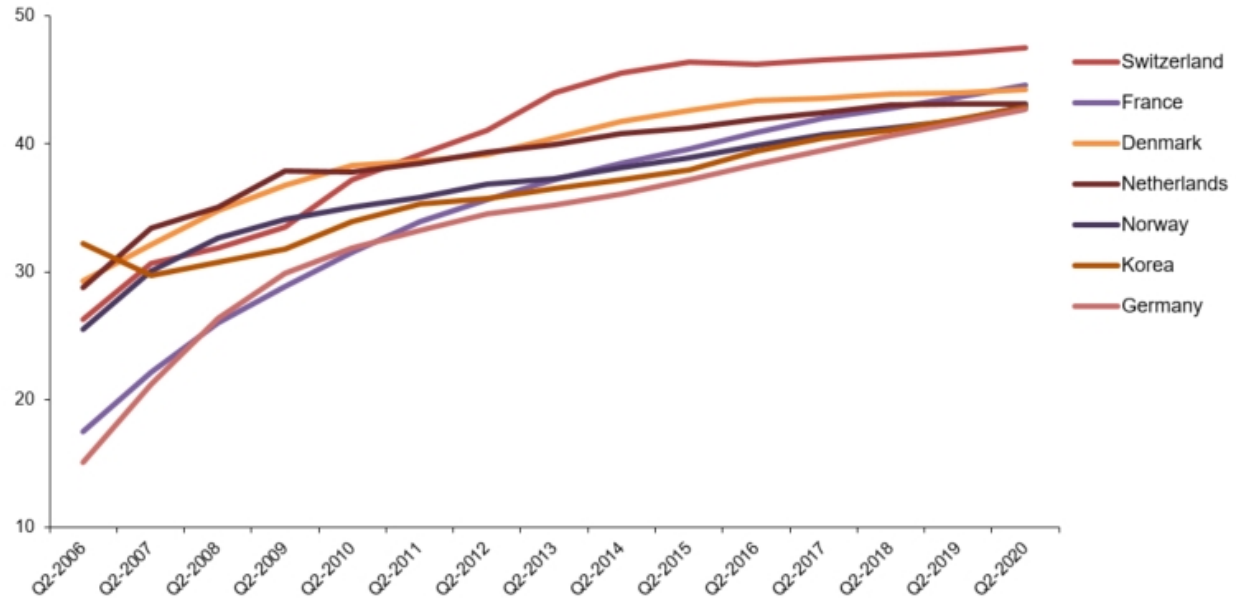
Switzerland has a high-performance broadband infrastructure. The economy as a whole benefits from competition between different infrastructures and services, as it gives consumers greater choice.

Penetration rates

By mid-2020 more than 47.6% of the Swiss population had a broadband internet connection. Switzerland therefore consolidated its top-ranking position in an OECD-wide comparison. It remains ahead of France (44.6%), Denmark (44.2%) and the Netherlands (43.1%). In the same period, the average for OECD countries was 32.6%, while that of EU countries was 35.6% (July 2019).

Switzerland is not, however, currently a world leader in terms of fibre-optic connections to the home (FTTH). According to an IDATE study for 2019, FTTH is used by only 21% of Swiss households. Although uptake in September 2019 was higher than FTTH/B (home/basement) penetration in the European Union (17%), Switzerland lags markedly behind leading countries such as Iceland (70%), Sweden (57%), Spain (54%) and the Baltic States (Latvia 54%, Lithuania 48%, and Estonia 29%).

Fig. 3: Broadband penetration in OECD countries 2006–2020



Source: OECD Broadband Portal

Data transfer rates

By international standards, Switzerland remains one of the best-networked countries, with both high broadband penetration and ever-faster data transfer rates. The performance metrics compiled by Measurement Lab (M-Lab) on the broadband networks of 221 countries, the results of which were published by Cable.co.uk at the beginning of September 2020, show that Switzerland moved up two places to rank 7th with an average transfer rate of just under 110 Mbps (2019: 9th place, 2018: 11th place). This transfer rate is almost three times the 40 Mbps recorded in 2019. As the map on the Cable.co.uk website shows, downloading a 5GB HD film at the average speed measured in Switzerland takes just six minutes, compared with 13 in France, 16 in Germany and 24 minutes in Austria.

Western Europe is now ahead by some distance in rankings that were once headed by the Asian nations of Taiwan and Singapore. There are eight Western European countries among the top ten, led by Liechtenstein with an average data transfer rate of just under 230 Mbps. The excellent standard of infrastructures in Western Europe made for average speeds of approximately 81 Mbps, compared with a global average of around 25 Mbps. The report states that those countries that have invested continually in pure fibre networks (FTTH/B) fare best.

Pricing

According to the National Consumer Price Index issued by the Federal Statistical Office (FSO), prices for fixed broadband communication remained unchanged between 2019 and 2020.

This is confirmed by tracking the communications prices that are covered by OFCOM's Statistical Observatory. These are based on the lowest rates offered by telecommunications providers on the Swiss market.

Prices remained the same for a small basket of goods. The cheapest and most expensive products for users with medium and high usage requirements, which were all offered by cable network operators, fell between 2019 and 2020. By contrast, the prices of Sunrise and Swisscom offerings increased sharply.

Beginning in 2020, BAKOM now also publishes the survey of prices of bundle service offers on fixed and mobile networks on its Statistical Observatory website. This reflects growing demand from a sizeable consumer segment that prefers to purchase all of its telecommunications services from the same provider.

Internationally, broadband prices in Switzerland are still considerably higher than the OECD-wide average. According to the Teligen price baskets published by Strategy Analytics, which for Switzerland take into account only Swisscom, Sunrise, UPC and Quickline, the lowest-cost product offers a transfer rate of at least 100 Mbps for around CHF 48 per month for medium usage.

In September 2020, a consumer in Switzerland with medium usage requirements therefore paid CHF 16 more per month for this basket than the OECD-wide average (CHF 48 vs. CHF 32). A basket with a data volume of 300 GB and a transfer rate of at least 1 Gbps cost an average of CHF 54 in OECD countries, but CHF 68 in Switzerland.

Structure of the broadband market

At the end of 2020, DSL/FTTx providers accounted for around 72% of the broadband market (approx. 2,950,000 connections), while cable network operators (1,154,000 connections) occupied the other 28%.

Looking at broadband providers as a whole (CATV, DSL and FTTx), Swisscom remains far ahead of its closest competitors with a market share of 49.8%.

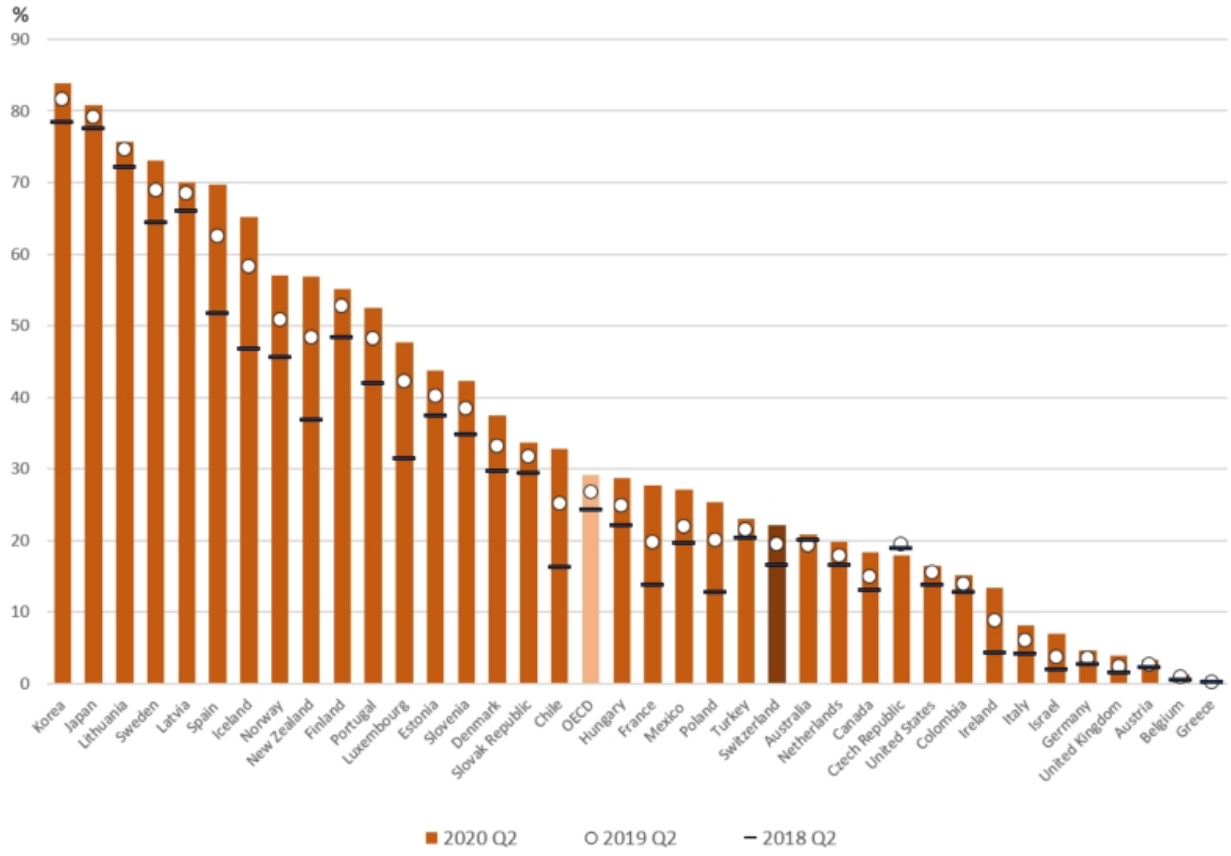
The alternative telecoms providers had a combined market share of 22.1% at the end of the reporting period, with Sunrise accounting for 13.1%. Among cable network operators, UPC took 15.6% of the market, and the other CATV operators together accounted for 12.5%.

By way of comparison, the average market share of the historical providers in EU countries is declining steadily, and stood at 39.3% in 2019.

The above figures for broadband connections in Switzerland include Swisscom subscribers who are supplied via a FTTH/B connection and hybrid fibre-optic and copper technologies (Fibre To The Cabinet (FTTC) and Fibre To The Street (FTTS)), as well as customers of alternative providers who use infrastructure operated by Swisscom or a utility company.

The expansion in fibre-optic connections (FTTH/B) in Switzerland slowed slightly compared with previous years. With around four million connections, the broadband market is almost saturated. Growth in the fibre-optic segment is primarily the result of DSL and CATV subscribers migrating to fibre-optic technology. Estimated at just under one million, the number of these connections corresponded to almost 24% of all broadband connections in Switzerland at the end of 2020. The country is therefore still a little behind by international standards, as the fibre-optic penetration rate in OECD countries had surpassed 29% by mid-2020. Although the annual increase in subscribers in Switzerland exceeds the OECD-wide average (+15.6% vs. +13.5%), it is well below the figures for its neighbouring countries of Austria (+23.6%), Germany (+34.2%), Italy (+41%) and France (+43%).

Fig. 4: Percentage of fibre connections in total fixed broadband 2018–2020



Source: OECD Broadband Portal

Unbundling

Unbundling local loops allows third-party providers to offer their customers their own telecommunications services by leasing the copper subscriber lines from Swisscom and operating them themselves as far as the end customers.

After its introduction in 2007, unbundling initially stimulated competition in the market for DSL connections. There has been a decline in the number of unbundled lines for some years now. A peak was reached in mid-2012 at approximately 315,000, or just under 10% of all broadband lines, but only some 55,000 remained at the end of 2020. Fully unbundled (full access) lines therefore now represent less than 2% of all broadband lines in Switzerland.

This is due in part to the offerings from cable network operators and the increasing use of fibre-optic connections, which are further intensifying competition on infrastructure. At the same time, growing customer interest in bundled products for telephony, internet and digital television is working against unbundling, which is unsuitable for these products because it does not permit high data transfer rates.

Expansion of ultra-fast broadband networks

In contrast to its superior ranking in the provision of broadband services via hybrid fixed networks, Switzerland is not a world leader when it comes to Fibre to the Home (FTTH). Nonetheless, various players have steadily been investing considerable sums in the expansion of the network for many years.

This investment has been driven by rapid growth in data traffic and the need to invest in a future-proof network. Infrastructure competition also has an incentive effect. The municipalities and regions that are investing in fibre are doing so primarily to make themselves more attractive as a business location.

The technological development trajectory is clear. Optical fibre has long been used for backbone networks, but it is being taken ever closer to the end customers in telecoms and CATV networks alike. Fibre-optic cables were run from the telephone exchange to a neighbourhood distribution box (Fibre to the Cabinet, or FTTC) more than ten years ago. Since then, they have been laid either to a manhole in the street (FTTS), or to building basements (FTTB). Here, only the final few metres of cabling to the home consists of conventional copper or coaxial cables. Providers could then use these hybrid connections to offer much higher bandwidths to consumers.

For some 12 years now, local utilities companies have been working alone and with telecoms providers – primarily Swisscom – to construct fibre-only Fibre to the Home (FTTH) networks in numerous cities and regions. The partners together build a local FTTH network together that gives each of them at least one optical fibre to each household. In some locations, individual local authorities are also investing independently in FTTH.

Collaborations with local utility companies have brought FTTH to around one million households to date. Following an 8–10 year construction period, several such local optical fibre networks have now been completed. Examples include Basel, St Gallen, Yverdon and Zurich. In some cases, considerably more connections have been established than originally planned. Other joint projects are in their final phases. These include the Swisscom ventures with AMB in Bellinzona and with EWB in Bern.

New plans are becoming reality in many areas. For example, partners are collaborating on new projects such as connecting the town of Kriens, and previous collaborations are being resumed, for example that between ftth fr AG and Swisscom in the Canton of Fribourg.

Fibre-optic networks are being expanded not only in major conurbations but also in many rural areas, such as in the Canton of Fribourg, the Upper Valais and the Lower Engadine. In addition, cantonal projects have been launched in Graubünden and Ticino to promote ultra-fast broadband (100 Mbps and above) coverage, particularly in peripheral areas. These cantons aim to assume an active role in service provision to ensure that their outlying regions remain competitive with Switzerland’s urban areas.

In addition to these collaborations, in many locations Swisscom is investing without partners in modernising the fixed network. For many years it opted primarily for a hybrid copper-fibre connection (FTTC, FTTS, FTTB), with the old copper cable continuing to be used on the last 50 to 200 metres to the socket in the home. This lower-cost option was possible thanks to complementary vectoring and G.fast technologies, which enable high bandwidths of 100 to 500 Mbps over short copper cables.

According to the Swisscom annual report, at the end of 2020 more than 4.4 million people – or 82% of homes and businesses – were using broadband that offered a data transfer rate of more than 80 Mbps. Some 59% had access to connections offering over 200 Mbps. Swisscom invested CHF 519 million (+5.1%) in expanding fibre-optic networks in 2020.

These investments will continue. Swisscom long ago set itself the goal of modernising the fixed network in all municipalities in Switzerland such that, by the end of 2021 90% of homes and businesses would be supplied with at least 80 Mbps, and around 85% of connections would achieve speeds of 100 Mbps or more.

Moreover, Swisscom determined new targets for FTTH connections, with coverage set to almost double by the end of 2025. This means that, in five years' time, up to 60% of all homes and businesses in Switzerland will enjoy bandwidth of up to 10 Gbps.

Since the market was opened up 23 years ago, one of the key drivers behind the expansion of broadband networks has been the infrastructure competition between Swisscom and the numerous CATV networks. More than 80% of Swiss households have a cable network connection. CATV operators have also invested heavily in recent years in FTTH, and in the DOCSIS 3.1 transmission standard for coaxial cable. According to the Suissedigital association, this allows high-speed data transfer rates of up to 1 Gbps to be offered via 90% of CATV connections. In this way,

hybrid fibre/coax (HFC) networks can reach speeds that telecoms operators such as Swisscom can achieve only with a pure fibre-optic network.

Swiss Fibre Net (SFN), which joined the market in 2013, is also likely to spark competition. SFN is a network consortium set up to market fibre-optic networks established primarily by local utility companies. SFN consists of five shareholders – the utility providers of the cities of Bern, Lucerne and St Gallen plus the network carriers Danet (Upper Valais) and Didico (Meilen-Herrliberg). The consortium also includes a further 16 partner networks.

SFN offers service providers from all over Switzerland that do not have their own access networks (e.g. Init7, iWay.ch, GGA Maur, Salt, Sunrise and VTX) the opportunity to use a shared platform to source standardised FTTH products for resale. It also offers mobile operators fibre-optic connections for mobile communications antennas. By the end of 2020, SFN is marketing around 600,000 of its partners' FTTH connections. New networks with approximately 100,000 further connections are to be added in 2021.

In 2018 Sunrise renewed its cooperation with SFN, and Salt has also partnered with SFN since it entered the fixed-line market in March 2018. Both have also announced that they will make upfront investments in the infrastructure of SFN partners in return for long-term, non-retractable usage rights.

There are plenty of local utility companies that do not market their connections via SFN, however. Some offer telecoms services to both retail and business customers (e.g. Industrielle Werke Basel) themselves, while others stick to operating their network and leave service provision to third parties. This is the case in Zurich and Geneva. In French-speaking Switzerland, many network operators market their connections via netplus.ch.

There is also a considerable divergence in consumer pricing in the fibre-optic market. At the beginning of 2021, internet access with a download rate of at least 1 Gbps, with no additional services, cost between CHF 40 and CHF 90.

Digital television in Switzerland

The digital television market is characterised by intensifying competition. It has been shaken up by the strong growth of streaming platforms, as well as changes in consumer habits such as time-shifted television viewing and the use of multiple – and specifically mobile – devices.

With some 2.04 million digital TV customers, the cable network operators were able to maintain their leading positions, but their core business continues to lose subscribers year after year. Their customer base contracted by approximately 85,000 in 2020, a 4% decline. The cable network operators' market share, which fell below the 60% mark for the first time in 2017, stood at 52.2% at the end of 2020.

Although UPC managed to stem the massive outflow of customers it had experienced in recent years, it still lost almost 60,000 subscribers (-5.8%) from its digital television service in the year under review. The largest cable network operator saw its market share decline to just 24.4% at the end of 2020.

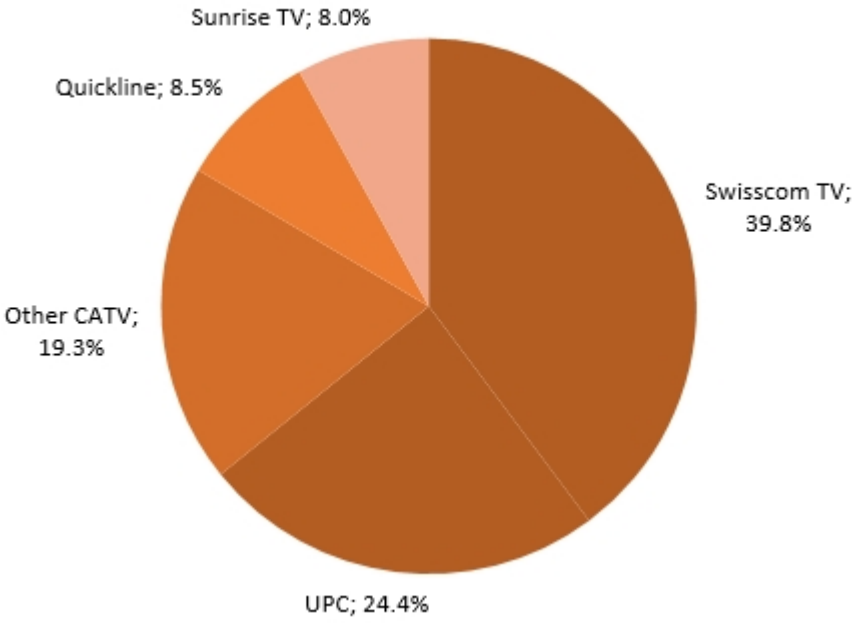
Quickline, an association of several cable network operators, also experienced a slight year-on-year decline in its TV customers of some 8,000, or -2.3%. With just under 331,000 TV customers at the end of 2020, Quickline's market share was down a little to 8.5%.

In parallel, the fixed-network providers were able to gain more digital TV customers again in 2020. They represent serious competition for cable network operators in this market segment.

Swisscom maintained the strong position that it took over from UPC in 2015, although it lost around 1,000 customers overall (–0.1%). It now has 1.554 million digital TV subscribers, and has increased its market share to 39.8%.

Sunrise, which was the last to enter this market, in 2012, recorded an increase of just under 35,000 new customers in 2020, corresponding to growth of 12.4%. Sunrise's market share has risen to 8.0%.

Fig. 5: Market shares of digital TV in Switzerland in 2020



Sources: Operators, Suissedigital
excluding satellite/terrestrial

II. Commission and Secretariat

1. Commission

ComCom is an independent, extra-parliamentary commission tasked with licensing and market regulation in the telecommunications sector.

Under the Swiss Telecommunications Act (TCA), ComCom's main tasks are:

- Granting licences for the use of the radiocommunications frequencies (Art. 24a TCA)
- Awarding the universal service licence (Art. 14 TCA)
- Determining access prices and conditions when service providers fail to agree among themselves (Art. 11 and 11a TCA)
- Imposing measures and sanctions in the event of violations of applicable law in connection with a licence granted by ComCom (Art. 58 TCA)
- Approving national numbering plans (Art. 28 TCA; to end-2020)
- Determining the arrangements for number portability and carrier selection (Art. 28 TCA; to end-2020).

At the beginning of 2021 ComCom ceased to be responsible for the last two points listed above as a result of the reform of the TCA, which was approved by Parliament in March 2019 and entered into force on 1 January 2021.

The Commission consists of seven independent experts appointed by the Federal Council.

In 2020 it was composed of the following members:

- **Stephan Netzle, President,** Dr. iur., LL.M., Attorney
- **Adrienne Corboud Fumagalli, Deputy President,** Doctor of Economics and Social Sciences, independent non-executive director of several companies
- **Andreas Bühlmann**, Dr. rer. pol., Chief of the Office of Finance of the Canton of Solothurn
- **Matthias Grossglauser**, Doctor of Information Technology, Professor at the Swiss Federal Institute of Technology Lausanne
- **Christian Martin**, Electrical Engineer HTL, Managing Director Alps (CH & AT), Google Cloud
- **Stephanie Teufel**, Professor of Management in Information and Communication Technology and Director of the international institute of management in technology (iimt) at the University of Fribourg
- **Flavia Verzasconi**, Lawyer and Notary, President of the Administrative Court of the Canton of Ticino.

Having served the statutory maximum term of office of 12 years, Stephan Netzle, President, and Andreas Bühlmann stepped down from the Commission at the end of 2020. ComCom would like to take this opportunity to thank them for their great dedication and for their important contributions to the work of the Commission.

On 18 December 2020, the Federal Council appointed Adrienne Corboud Fumagalli, member of the Commission since 2012 and Deputy President since 2018, to succeed Stephan Netzle as President from 1 January 2021. It also appointed Christian Martin, member of the Commission since 2018, to serve as Deputy President of ComCom.

At the same meeting, the Federal Council went on to nominate two new members to joint ComCom as of January 2021: Prof. Dr. Patrick Krauskopf, Lawyer, Professor, and Head of the Center for Competition Law and Compliance at the Zurich University of Applied Sciences (ZHAW), and Jean Christophe Schwaab, Dr. iur., Member of the Communal Council of Bourg-en-Lavaux and former National Councillor (SP/Canton of Vaud).

The Commission generally meets almost every month. It continued to do so in 2020, but mainly in the form of a video conference owing to the pandemic. In addition, its members spent much time preparing the meetings and adopting opinions by means of circular communications. The Commission also met in person in the late summer, for a two-day internal training course on the quality of telecommunications services in Switzerland.

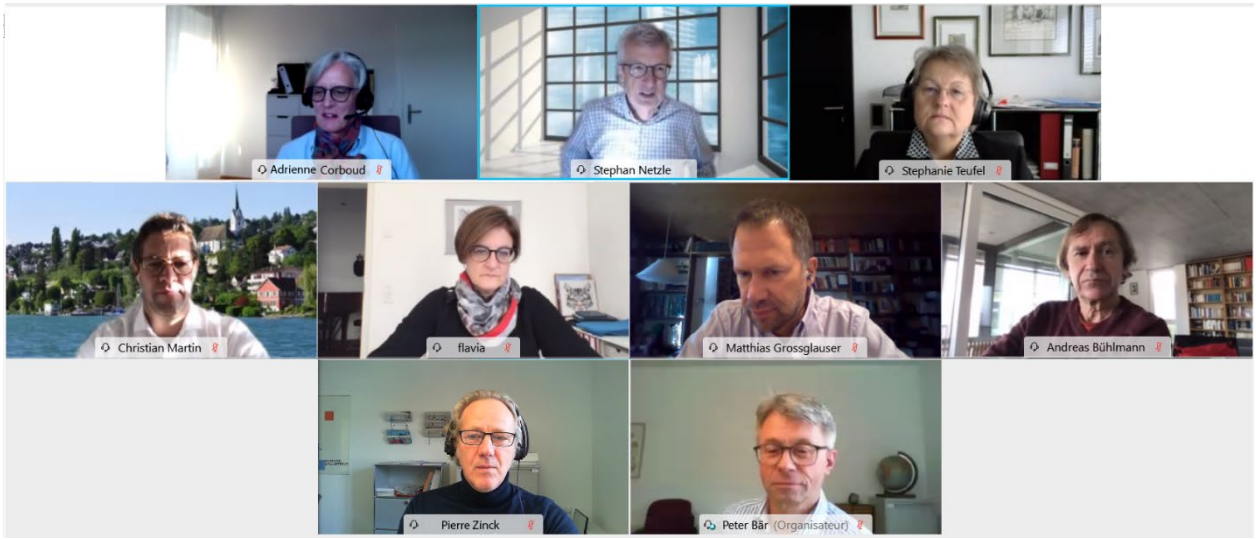
2. Secretariat

The Commission is assisted by its own Secretariat, which is responsible for management and public relations. The Secretariat coordinates the Commission's activities with OFCOM, which prepares ComCom's business and generally implements its decisions.

The Secretariat consists of a commission secretary (90%), a scientific collaborator and webmaster (80%), and an administrative secretary (70%).

The **staff of the Secretariat** will be happy to provide you with any information you might require:

- Peter Baer, Secretary of the Commission
- Pierre Zinck, Scientific Collaborator and Webmaster
- Jacqueline Fischer Pulfer, Administrative Secretary



Commission meeting via video conference in 2020

III. Activities of the Commission

The following sections provide an overview of ComCom's activities in 2020.

1. Access cases

To promote competition in the telecoms market, the Telecommunications Act (TCA, Art. 11) specifies that dominant undertakings – such as former monopolist Swisscom in certain areas – must offer other providers access in various forms to the existing infrastructure or services. Where this is the case, this access must be offered in a non-discriminatory manner and at cost-based prices.

In contrast to the technology-neutral access regime in the EU, the Act contains an exhaustive schedule of the areas in which a dominant provider must grant access to infrastructure (Art. 11 TCA). Up to the end of 2020, the following six forms of access were subject upon application to regulation:

1. Full unbundling of the local loop
2. Fast bitstream access (for a period of four years)
3. Charging for fixed-network subscriber connections
4. Interconnection
5. Leased lines
6. Access to cable ducts, providing these have sufficient capacity.

When the TCA was revised, Parliament removed two forms of access from the schedule given above. Fast bitstream access and charging for fixed-network subscriber connections ceased to be regulated as of January 2021. In fact, the obligation to provide bitstream access had not existed for several years now, and charging for fixed-network connections has become less and less important.

Where unbundling local loops is concerned, access to subscriber networks is limited to conventional copper technology. In Switzerland, connections based on fibre or coaxial cable are currently not subject to any access obligation or regulation.

Another feature of Swiss telecommunications legislation is the primacy of negotiation. This means that alternative providers must first negotiate the conditions of infrastructure access with the dominant provider. Only if these negotiations do not result in an agreement can a request be made to ComCom to determine conditions and prices. This procedure is known as *ex-post* regulation.

Pending access cases

At the end of 2020 there were a total of four access cases pending with ComCom. Two of these are currently suspended, because the same substantive issues must be judged in the context of appeals against two partial ComCom decisions that are before Federal Administrative Court (FAC).

1.1. Interconnection and other forms of access pursuant to Art. 11 TCA

At the end of 2020, two access cases were pending before ComCom concerning the prices for various forms of access such as interconnection, unbundling, leased lines and access to cable ducts.

Both cases were suspended in 2020 because appeals have been lodged with the FAC against the partial decisions issued by ComCom in February 2019 on pricing for the period up to 2016 and because the FAC has to decide

fundamental questions, which also arise in the procedures pending before ComCom. Among other things, this also concerns the first application of new legal provisions (see 2019 Annual Report). The FAC conducted an exchange of correspondence that lasted from March 2019 to March 2020. The access cases will proceed as soon as the FAC has decided these issues.

1.2. Interconnect Peering

In Init7's access case against Swisscom concerning free peering, ComCom rejected Init7's application in July 2018 (for further information please refer to the 2018 ComCom Activity Report). ComCom had assumed that peering was subject to functioning competition. In its view, there were substitutes for IP interconnection with Swisscom at all times, and certain disciplinary effects were also present. Init7 appealed against this decision to the FAC.

The FCA upheld the central points of Init7's appeal, and referred it back to ComCom for a revised decision (FCA ruling of 22 April 2020, A-5235/2018). With regard to the period from 2013 to January 2016, the FCA judged Swisscom to be a dominant undertaking in the sense of Article 4 paragraph 2 Cartel Act. It determined that cost-based prices should therefore be set for the peering requested by the appellant during this period. The issue of market dominance would have to be clarified for the time thereafter.

On behalf of ComCom, OFCOM reopened the case and assumed the primary role in what have become a two-part proceeding:

- Annual cost evidence must be obtained from Swisscom for the 2013 to January 2016 period for which it was judged to be dominant. These will be reviewed by OFCOM and serve as a basis for price-setting by ComCom.
- For the period from February 2016 onwards, the first task is to clarify the issue of market dominance. To this end, OFCOM will conduct a market survey and then consult the Competition Commission (COMCO), in accordance with Article 11a TCA.

1.3. Payment of interest on repayments

In February 2020 an application was received concerning the payment of interest on repayments made subsequent to access cases. OFCOM is leading these proceedings and ComCom will take a decision in the course of 2021.

2. Licences

In accordance with the Telecommunications Act (TCA), ComCom grants radiocommunications licences and also awards the universal service licence.

ComCom has delegated permanently to OFCOM the granting of those radiocommunications licences which are not the subject of a public tender procedure (e.g. licences for amateur radio operators or private companies' radio networks) and which are wholly or primarily intended for the broadcast of access-authorised radio and television programming (Art. 1 ComCom Ordinance; SR 784.101.112). Information concerning radio telecommunications licences award by OFCOM can be found on the www.bakom.admin.ch website.

The following overview deals only with those licences awarded by ComCom itself.

2.1. Universal service

The universal service comprises a basic range of telecoms services of a good standard which must be offered throughout the country at an affordable price to all sections of the population. These services are intended to enable people in every part of Switzerland to participate in social and economic life. The universal service also includes special services that offer those with disabilities broader communications options.

The scope of the universal service is described in the Telecommunications Act (Art. 16 TCA). The Federal Council periodically adapts its definition of a universal service to social and economic needs and to technological progress. The actual content of the universal service (including price caps in some areas) is laid down in the Ordinance on Telecommunications Services (see Arts. 15 and 22 TSO).

It is ComCom's task to grant the universal service licence by means of a public tender procedure, or by appointing a licensee directly. The universal service licence granted to Swisscom in May 2017 came into force on 1 January 2018 and runs until 31 December 2022.

With OFCOM, ComCom also ensures that the licensee is providing the component parts of the universal service to the required standard.

What are the current constituents of the universal service?

The Federal Council amended the scope of the universal service in the Ordinance on Telecommunications Services (Arts. 15 and 16 TSO) one year before the grant of the current universal service licence, which came into force at the beginning of 2018.

The following have been included in the universal service since 1 January 2018:

- A multifunctional broadband connection, based on the Internet Protocol (IP), replaces both of the earlier analogue and ISDN connections.
  By the end of 2021, Swisscom must provide an interface for analogue and ISDN equipment free of charge at the network termination point, to allow sufficient time for terminal equipment to be replaced.
- Since January 2020, the minimum data transfer rates for internet access as part of the universal service have been 10 Mbps (download) and 1 Mbps (upload).
- Each household may request a second directory listing free of charge.
- Services for people with disabilities:
  - For the hearing impaired, a round-the-clock transcription service, which also covers emergency calls, and an SMS intermediary service. At certain times there is now also a sign language service via video telephony.
  - For the visually impaired and those with reduced mobility, there is a round-the-clock directory enquiries and operator service which ensures access to the directory data of customers of all providers, using the 1145 number.

To guarantee universal service provision, the Federal Council has laid down quality criteria for its component parts (Art. 21 TSO). The universal service licensee must report annually to OFCOM on how these criteria have been met. Swisscom once again met these quality criteria in full in 2020.

What does the universal service cost?

The licensee would, in principle, have the right to charge for the uncovered costs of providing the universal service. To do this, it would have to disclose the costs and revenues attached to the component parts of that service. The

charge would be made via a fund into which major telecommunications providers would pay in proportion to their turnover.

Since Swisscom has to date always waived any charge for its uncovered costs, no such universal service fund has ever been set up. The costs of the universal service thus remain unknown.

The current political debate surrounding the universal service

In the summer of 2020, the National Council's Committee on Transport and Telecommunications (CTT-N) put forward a motion (Mo. 20.3915) proposing that the minimum internet speed under the universal service be increased to 80 Mbps.

The Federal Council requested that the motion be rejected because a "state-mandated nationwide network expansion" offering 80 Mbps would extend far beyond "the provision of a basic offering that is the intention of the universal service" and would also represent "a massive distortion of competition". The Federal Council went on to say in its opinion on the motion that the universal service was not the right means to achieve this end. In the meantime, however, the Federal Council has recognised the need for better broadband coverage, especially in remote areas.

The motion was nonetheless passed by the National Council on 10 September 2020 with an extraordinary majority of 176 votes to two. It was then shelved by the Council of States on 8 December 2020 on the grounds that it wanted to wait for the outcome of consultations on the cantonal initiative submitted by the canton of Ticino (Kt. Iv. 16.306) that the whole of Switzerland should be supplied with high-speed broadband.

ComCom is following these political discussions very closely with a view to the grant of the next universal service licence.

2.2. Mobile radiocommunications licences

All available mobile frequencies were awarded anew in 2012. Seven years later, new frequencies in the 700 MHz, 1400 MHz and 3500 – 3800 MHz bands were auctioned for exclusive use (please refer to the 2012 and 2019 annual reports for more information on these auctions). Although both calls for tenders were open to all interested companies, the three existing operators Salt, Sunrise and Swisscom were generally the only bidders. There was additional interest only in the 2019 auction, but the single other candidate here did not ultimately acquire any frequencies.

Since these two award rounds Salt, Sunrise and Swisscom each have two licences for different frequencies and licence durations:

- In 2012, all three licensees acquired a frequency in the 800 MHz, 900 MHz, 1800 MHz, 2100 MHz and 2600 MHz bands. The three licences run until the end of 2028.

- The licences awarded in 2019 contain frequencies from the 700 MHz, 1400 MHz and 3500 MHz bands, and were awarded until the end of 2034.

The three licensees each have a broad range of the different frequencies that are needed to operate a high-performance mobile telecommunications network with practically unbroken national coverage. The three network operators fulfil the conditions of use determined in their licences.

GSM switch-off

ComCom awarded these mobile radio frequencies in a technology-neutral manner. In other words, the licensee is free to decide the technologies that they will use with their frequencies. In the past, four very different systems have been operated in parallel, from outmoded and underperforming GSM, via UMTS and LTE through to the much more efficient 5G.

As explained in section I, both Swisscom and Salt had switched off GSM by the end of 2020, freeing up network capacity for more recent technologies.

This second-generation (2G) mobile technology was launched in Switzerland already in 1993. GSM brought mobile telephony and text messaging to the masses, although larger volumes of data could not be transmitted until the advent of UMTS, and then LTE.

Sunrise has announced that it will continue to offer 2G until at least the end of 2022, specifically because there are still machine-to-machine applications that are GSM-based.

Mobile communications and radiation

ComCom took part in the 'Mobile radio and radiation' working group set up by DETEC in the autumn of 2018. Its mandate was to analyse the requirements and risks involved in establishing 5G networks and to draw up recommendations.

Headed by the Federal Office for the Environment (FOEN), the working group presented its report to the public on 28 November 2019 (see the FOEN website for details: *www.bafu.admin.ch*). This report provides a broad overview of the research on the feared impact on health of mobile phone radiation, discusses different options for the expansion of 5G and proposes important accompanying measures.

In January 2020, ComCom published a proposal that it had already put forward in the working group's report: to sketch out a roadmap for how a 5G network might be established within a reasonable time frame. 5G is of the utmost importance for Switzerland’s future, so that our country is able to stand up to global competition as a place to work and to innovate.

The concept underlying ComCom’s proposal is the greater shared use of existing antenna sites. This is the only way to avoid having to erect thousands more new antennas to meet the rapidly growing customer demand for data. ComCom therefore firstly proposes that the installation limit values be applied to each user of an antenna installation rather than to the entire installation, as it is the case to date. Secondly, it supports a moderate increase in the very restrictive installation limit values that were set 20 years ago without any scientific basis (for details of the proposal, please visit the ComCom website: www.comcom.admin.ch).

In the spring of 2020, one year after the new mobile radiocommunications licences had been awarded, ComCom was concerned to find that in many cantons, building applications for mobile telecommunications installations were being given limited, if any, consideration. The reason was widespread, scientifically unfounded scepticism about 5G.

The Geneva-based International Telecommunication Union (ITU) had warned in a September 2019 study that would not be possible to construct the necessary 4G and 5G network capacity in time in countries with radiation thresholds that are lower than the international norm. It said that countries such as Switzerland would run the risk of being unable to handle the growing volumes of data.

If network capacity cannot be expanded in time, there is the unappealing prospect of service bottlenecks as a result of the sharp rise in data traffic. ComCom has shared this concern in writing with the Federal Council.

ComCom also supports the Federal Council decision of 22 April 2020 to introduce radiation exposure monitoring as quickly as possible and also specifically to improve active, fact-based public communications on mobile telecoms – especially since 20 years of broad research on mobile phone-related radiation has not found any threat to health if it is below international emission thresholds.

2.3. New block of DAB frequencies for French-speaking Switzerland

Three-quarters of radio listening is now digital, and DAB+ is the most common radio reception technology throughout Switzerland. The radio industry has therefore agreed to go ahead with the switch from FM to digital distribution via DAB+ in 2022 and 2023.

On 20 December 2017, the Federal Department of the Environment, Transport, Energy and Communications (DETEC) released three additional frequency blocks, one each for the provision of DAB+ in German, French and Italian-speaking Switzerland.

Having conducted a survey of prospective bidders, OFCOM concluded that there were a number of companies in French-speaking Switzerland that would be interested in additional DAB+ coverage. DETEC therefore decided to conduct a public tender to allocate the frequencies in question. In this case, ComCom is responsible for awarding the radiocommunications licence. In both German-speaking Switzerland and the Italian-speaking Ticino, there was only one interested party, which meant that a licence could be granted without a tender process.

With this in mind, in December 2017 DETEC instructed ComCom to begin the award process in French-speaking Switzerland. ComCom then conducted a public tender procedure in 2018 and 2019, ultimately granting the licence to DABCOM in a competition based on specific criteria (please refer to the 2018 and 2019 annual reports for more information).

The unsuccessful candidate lodged an appeal against the licence decision with the Federal Administrative Court (FAC) in May 2019. Since the appeal effectively suspends the licence, it unfortunately cannot be used until the FAC has issued its ruling

3. TCA revision and consumer protection

The primary outcome of the revision of the Telecommunications Act (TCA) in 2019 was greater protection for the consumer. After the implementing ordinances had been adopted by the Federal Council on 18 November 2020, the new provisions entered into effect on 1 January 2021.

The most important consumer protection measures include an obligation on the part of providers to combat unfair advertising by providing customers with a suitable means of activating or deactivating it at any time, i.e. a filter.

Furthermore, consumers must be better informed when they conclude their contract or activate/reactivate roaming services of the terms and arrangements that apply to international roaming. Calls must be charged to the second precisely, and data usage to the kilobyte. Consumers must also be able to set their own cost ceiling.

Finally, providers must measure the quality of fixed and mobile internet access services and release this information publicly. In the case of fixed-network internet access, this applies to all providers serving at least 300,000 customers. Where mobile access is concerned, it applies to all providers with at least 300,000 customers and one mobile radiocommunications licence. This information improves consumer choice, allowing them to compare different offers and make their decision on the basis of criteria other than the price or theoretical data transmission rate.

The revision of the TCA brought about a paradigm shift in radiocommunications. In the future, the unrestricted use of the frequency spectrum will be the norm, and licensing and reporting (or 'light' licensing) the exception. ComCom will continue to award radiocommunications licences for the provision of telecommunications services, although changes have been made to the transfer of such licences (Art. 24d).

Finally, the revision of the law leads to new tasks for ComCom: regarding the freshly introduced access to the building entry point (BEP) and the shared use of installations inside buildings (new Art. 35b), ComCom will be deciding disputes between providers.

Lawmakers nonetheless decided not to introduce a technology-neutral regulation for network access, meaning that fibre-optic local loops will still not be subject to regulation in Switzerland. The only new obligation in this area is that the Federal Council is required to present to the Parliament every three years an evaluation report on developments within the telecoms market and, where necessary, to propose measures to promote competition.

4. Number porting

Since 2000 it has been possible to keep an existing telephone number and to take it with you to a new provider.

According to Teldas, which operates the central porting database in Switzerland, more than 575,000 numbers were ported in 2020. This was 10% less than in 2019.

Mobile telephony accounts for the bulk of ported numbers – 83% in 2020.

Just over 477,000 mobile phone numbers were transferred in 2020 year, corresponding to a little under 4.5% of all mobile subscribers. Number porting is found primarily in the contract segment, where it edged up by 0.5 percentage points. By contrast, number transfers in the prepaid segment dropped by over 26% last year.

In the fixed network, slightly over 90,000 numbers were ported to another carrier in 2020, which corresponds to approximately 6% of fixed-network connections and represents a collapse of almost 32% over the previous year.

Fixed-network providers have been able to offer geographical number portability throughout Switzerland since 2002. If their carrier provides this service, when moving home customers can take their telephone number with them, even if they are moving to another area code.

Following the revision of the TCA referred to above, number portability will cease to form part of ComCom's remit from 2021 onwards.

5. International relations

ComCom is a founding member of the association of the European national telecommunications regulatory authorities, the Independent Regulators Group (IRG). The independent telecoms regulators of every European country belong to this group.

The member states of the European Union are also forming the Body of European Regulators for Electronic Communications (BEREC). While the IRG considers itself to be a platform for experience-sharing at the European and interdisciplinary level, BEREC is a body associated with the European Commission that is primarily engaged in harmonising telecommunications law and the implementation of European directives in the member states. BEREC maintains numerous expert groups that do the groundwork for regulatory decisions and legislative projects.

Since BEREC was set up Switzerland has held observer status, which is renewed on an annual basis. Represented by OFCOM and ComCom, it also plays an active part in a variety of expert groups, thereby fostering exchange that benefits both sides.

6. Outlook for 2021

In the interests of consumers, in 2021 ComCom will continue to ensure that the universal service obligation is fulfilled, market competition is encouraged, and the frequency spectrum is used efficiently. It will also continue to strive for investment-friendly framework conditions and technological innovation in the telecoms market.

ComCom will focus on the following activities in 2021:

1. **Universal service**: ComCom will ensure compliance with the universal service licence and verify that the quality standards laid down by the Federal Council are met. Considering that the current licence expires at the end of 2022, it will also initiate the relevant licence award process.
2. **Radio frequencies:** ComCom will track international developments in frequency usage, and continue to promote high-performance mobile communications provision that reaches as many people as possible with the most efficient technologies. It is also expecting a ruling from the FAC on the appeal against the DAB+ licence in French-speaking Switzerland.
3. **Access cases:** Together with OFCOM, ComCom will push ahead with the cases that remain pending, and also issue decisions on certain aspects. OFCOM will take the lead with any new access proceedings.
4. **Revision of the Telecommunications Act (TCA):** The partial revision adopted by Parliament in March 2019 entered into force in January 2021 along with the revised ordinances. ComCom will tackle implementation in the areas of concern to it.
5. **International relations:** ComCom and OFCOM will continue to contribute to the Independent Regulators Group (IRG) and to selected working groups under the aegis of the Body of European Regulators for Electronic Communications (BEREC).

IV. Finances

Regulators from various infrastructure sectors report for administrative purposes to the Federal Department of the Environment, Transport, Energy and Communications (DETEC). Together with the Federal Electricity Commission (ElCom), the Postal Services Commission (PostCom), the Rail Transport Commission (RailCom) and the Independent Complaints Authority for Radio and Television (ICA), ComCom has formed part of the Regulatory Authorities for Infrastructure (RegInfra) administrative unit since 2012. DETEC's general secretariat provides services to RegInfra in various administrative areas. In particular, it supports ComCom with regard to budget and accounting. This does not compromise ComCom's abilities to conduct its activities impartially.

ComCom collaborates very closely with OFCOM, which prepares most of ComCom's business and takes the lead in legal proceedings. OFCOM figures are given below to permit an overview of the income and expenditure of the telecoms regulator.

In 2020, OFCOM incurred total costs of CHF 1.99 million in connection with its activities for ComCom. This is much less than in previous years (2019: CHF 2.56 m; 2018: CHF 3.75 m). There are many reasons for this. There were no complex public tenders in 2020, neither were there any preparations for work on fundamental issues. In addition, access cases were suspended due to pending court rulings.

On the income side, in 2020 BAKOM collected administration fees of CHF 200,000, and radiocommunications licence fees of CHF 51,874. Administrative fees connected with ongoing legal proceedings and invitations to tender can be billed only once decisions in the cases concerned are legally binding.

The Commission and its secretariat recorded expenses of CHF 1.04 million francs in 2020, some CHF 160,000 lower than was envisaged in the preliminary estimate (for more information please refer to the estimates and state accounts of the federal government; see *www.efv.admin.ch*).

Abbreviations

5G = Fifth generation mobile radio
ADSL = Asymmetric Digital Subscriber Line
BBCS = Broadband Connectivity Service (commercial wholesale offers of Swisscom)
BEREC = Body of European Regulators for Electronic Communications
CATV = Cable television
COMCO = Competition Commission
ComCom = Federal Communications Commission
DETEC = Federal Department of the Environment, Transport, Energy and Communications
DOCSIS = Data Over Cable Service Interface Specification (technology for high bandwidths on coaxial cable)
DSL = Digital Subscriber Line
EDGE = Enhanced Data rates for GSM Evolution (GSM technology)
ESC = Energy supply companies
FAC = Federal Administrative Court
FDD = Frequency Division Duplex (two radio channels are needed for one connection)
FTTB = Fibre to the Building
FTTC = Fibre to the Cabinet
FTTH = Fibre to the Home
FTTS = Fibre to the Street
G.fast = Gigabit fast access to subscriber terminals (technology for bandwidths up to 500 Mbit/s on copper cable)
GPRS = General Packet Radio Services (GSM technology)
GSM = Global System for Mobile Communications (standard for second-generation mobile radio networks)
HDTV = High-definition television
HFC = Hybrid Fibre Coaxial
HSDPA = High Speed Downlink Packet Access (UMTS technology)
IC = Interconnection
ICT = Information and communication technologies
IP = Internet Protocol
IPTV = Internet Protocol Television
IRG = Independent Regulatory Group
ISDN = Integrated Services Digital Network
ISP = Internet Service Provider
LRIC = Long Run Incremental Costs (model for calculation of interconnection prices)
LTE = Long Term Evolution (standard for fourth-generation mobile radio networks/3.9G standard)
LTE-A = LTE-Advanced (standard for fourth-generation mobile radio networks)
MEA = Modern Equivalent Asset
NFC = Near Field Communication
NGA = Next Generation Access Network
OFCOM = Federal Office of Communications
PSTN = Public Switched Telephone Network (traditional telephone network)
SMS = Short Message System
SVOD = Subscription Video on Demand
TCA = Telecommunications Act (CC 784.10)

TDD = Time Division Duplex (bidirectional communication on only one radio channel)
TSO = Telecommunications Services Ordinance (CC 784.101.1)
TSP = Telecommunication Services provider
UMTS = Universal Mobile Telecommunications System
VDSL = Very-high-bit-rate DSL
VoD = Video on Demand
VoIP = Voice over IP
VoLTE = Voice over LTE
Wi-Fi = Wireless Fidelity (wireless local networks)
WLAN = Wireless Local Area Network

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