2021 Activity Report

from the Federal Communications Commission (ComCom)

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EDITORIAL

The pandemic necessitated changes to the way we work in 2021, throwing into sharp relief the importance of access to resilient, high-performance telecommunications infrastructures.

The 5G rollout is advancing, but progress has faltered owing to problems sourcing electronic components and appeals against antenna construction. Despite this, 5G technology is efficient and capable of meeting rising demand for mobile data services.

The green wave is also heavily disrupting the ICT industry. As a result, Switzerland is seeing a growing market for used smartphones. Such environmental awareness can also be observed among supplier companies. Here, the legal obligation to reduce their carbon footprint drastically is generating real innovative momentum. The telecommunications sector is thus now beginning to take full account of the ecological aspects of its output. After all, more efficient devices can reduce power consumption. A holistic approach is emerging. From component manufacture to data storage, the industry is investing in research to achieve some of the United Nations' 17 Sustainable Development Goals.

It has not yet been possible to fully harness the potential of 5G. There is budding demand in industry for mobile communications for production and logistics applications. As things stand, 5G is able to handle the massive increase in the data volumes used by private individuals, specifically. These volumes are doubling every two years or so. Fixed network infrastructures are experiencing the same rise in data traffic owing to the introduction of new modes of working and the use of video-on-demand services. Furthermore, teleworking has highlighted the need for better symmetrical communication, a factor that might be considered in deliberations about the universal service.

ComCom engages in the discussion about future needs for fixed network and mobile telecommunications infrastructures at the national level. It has therefore entered the debate on the universal service and the development of a national high-speed broadband strategy, and has brought its thoughts and concerns before the parliamentary Transport and Telecommunications Committee (TTC-N).

Although Switzerland has an excellent infrastructure, it lags behind the OECD average in respect of optical fibre rollout (fibre to the home, FTTH). What remain above average, however, are prices.

ComCom celebrates its 25th anniversary in 2022. Alongside its secretariat, the Commission's aim is to continue supporting the development of the telecoms infrastructures that are so vital to the smooth functioning of our society.

Adrienne Corboud Fumagalli, President

February 2022

I. AN OVERVIEW OF THE TELECOMS MARKET

The first section of this report provides a selection of data that give an overview of how the Swiss and international telecommunications markets are developing.

For its statistical data, ComCom relies primarily on the figures released by the major telecommunications providers, as well as on publications by the OECD, EU and professional bodies or specialised research institutes such as Gartner and IDC. It may also use various data sets and analyses from OFCOM as a basis[1]. Further information on the latest developments in the Swiss fixed network and mobile telephony market is available on the ComCom website under the heading "Facts and figures".

It should be pointed out here that the merger between Sunrise and UPC at the end of 2020, the consolidation of the new company's results in the course of 2021 and the different ways in which the number of customers is counted means that customer figures for 2020 and 2021 are not always comparable.

The new Sunrise UPC is likely to bring about certain changes on the Swiss telecommunications market simply by virtue of the fact that it is a serious competitor to Swisscom, which remains the market leader in mobile and fixed network telecoms and digital television. Generally speaking, networks are also continuing to converge. This is true both between fixed networks (copper, coaxial and fibre-optic cables), where the distinction between telecommunications and cable network operators is becoming increasingly blurred, and between fixed and mobile networks, possibly because customers are increasingly favouring package deals. The competitive advantage and economies of scale that the Sunrise UPC merger is expected to deliver will unfortunately be accompanied by the loss of hundreds of jobs in 2022, as the operator announced in the spring of 2021.

1. DEVELOPMENT OF MOBILE NETWORKS

Customer numbers in the saturated mobile telecoms market remained more or less stable, with the COVID-19 crisis having little impact in 2021. In addition, the Sunrise UPC merger had not yet had any significant effect on the distribution of market shares, which did not change noticeably over the past year.

At the end of 2021 Swisscom had 6,177,000 mobile telephony customers in Switzerland, 0.8% or a total of 47,000 fewer than in 2020. It gained 128,000 contract customers (postpaid offers), but lost 175,000 prepaid customers. With 2,610,000 mobile customers, in the same period Sunrise UPC recorded a surge of 157,000 new sign-ups. A significant 175,000 increase in postpaid customers contrasted with the loss of only 19,000 prepaid customers. The number of Salt customers fell slightly to 1,806,200 (-1%) in 2021. The operator added some 67,000 postpaid contracts during the year, but at the same time lost 85,000 customers in the prepaid segment. The data available to us indicate that Swisscom had a market share of around 58% at the end of 2021, while Sunrise UPC occupied 24% and Salt 17%. The market share of other cable network operators remained at a relatively low 1%.

For over ten years now users of prepaid offers have increasingly been switching to contracts. Indeed, the market dynamic is being driven largely by this market segment, with the proportion of customers with

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

contracts rising from 58% in 2011 to 80% in 2021. The proportion of contract customers has continued to rise at each of the three network operators in recent months, and now stands at 82.5% at Sunrise UPC, 80.6% at Swisscom and 76.0% at Salt.

Together they gained more than 350,000 additional postpaid contract customers in total in 2021. In this segment around 58% of the market fell to Swisscom, 25% to Sunrise UPC, 16% to Salt and 1% to CATV operators.

FIG. 1: MARKET SHARES OF MOBILE TELEPHONY PROVIDERS IN SWITZERLAND, 2021
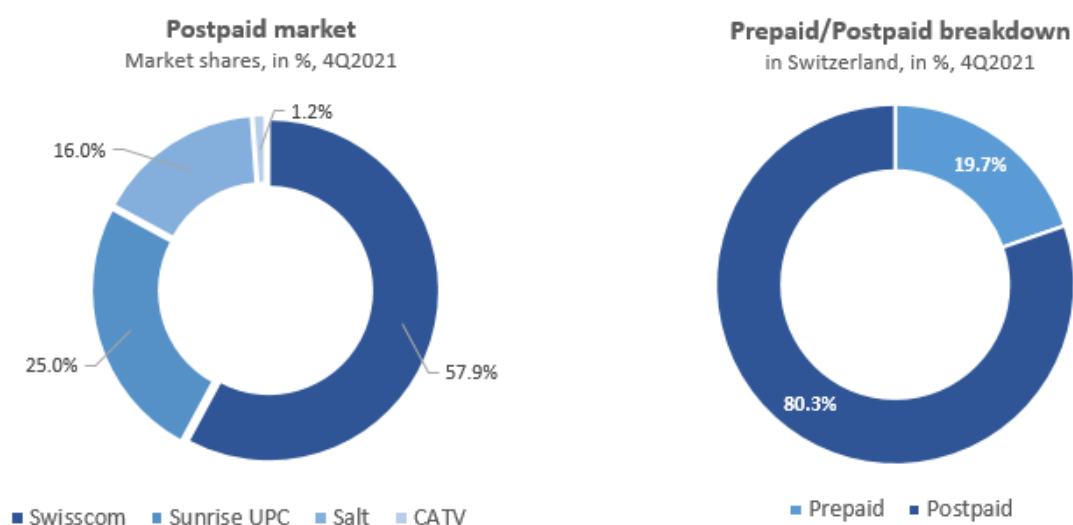
SOURCES: OPERATORS

Development of the smartphone market

There were around 8.1 billion mobile communications subscriptions worldwide in the third quarter of 2021, according to the Ericsson Mobility Report for that year.

The number of mobile connections made using smartphones continues to rise, and was expected to have reached a total of 6.3 billion at the end of 2021, corresponding to approximately 77% of all mobile telephony subscriptions. It is forecast to increase still further to 7.7 billion in 2027, representing 86% of all mobile contracts.

The smartphone market has slowed down in recent years, however, expanding less than in the previous decade when masses of consumers rushed to buy the very latest in phone technology. The trend is explained by factors such as the high proportion of the population that already owns a smartphone, little technological innovation, high prices and greater environmental awareness among consumers that means that they are keeping their devices for longer.

The industry had invested its hopes for new growth in 5G, but the COVID-19 crisis delayed its rollout in 2020, and a lack of semiconductors held sales back in the first half of 2021.

According to the latest figures released by International Data Corporation (IDC) in January 2022, 1.35 billion smartphones were sold worldwide in 2021, corresponding to a 5.7% increase in sales

volume. This was thanks to strong growth in the first half of the year, which evened up the lower-than-expected second half.

Component shortages and supply bottlenecks may persist in 2022.

At the end of 2021 IDC lowered its growth forecasts for the current year, adjusting expected annual growth to a modest 3.5% for the next few years. It cited pent-up demand, decreasing prices and the ongoing switch from old-style phones to smartphones.

IDC also found that 4G is more affected than 5G by component shortages. In addition, growing consumer interest in 5G is likely to accelerate the rapid transition to 5G devices. These might account for almost 60% of global shipments in 2022.

Growth of the second-hand market

Whether for financial or environmental reasons, reconditioned smartphones are an increasingly popular choice among consumers. Despite the supply issues that also impact this market, sales continued to rise in 2021.

According to IDC, unlike the recent contraction in the market for new smartphones there are no signs of the market for second-hand phones softening anywhere in the world. More and more device manufacturers and also mobile network operators have introduced return schemes in recent years. For many consumers and businesses, reconditioned pre-owned 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% in the 2019–24 period. Total revenue in 2024 is expected to reach USD 65 billion.

Increasing numbers of consumers in Switzerland are planning to hold on to their mobiles for longer. According to the 2021 Comparis Smartphone Report, 39.1% of users intend to use their current phone for at least four years, which is up on the 32.8% recorded in 2019. Ever fewer plan to buy a new smartphone in the next 12 months (44%, down from 57.1% in 2019). Comparis believes that this is an underlying trend rather than simply a temporary slowdown in response to the coronavirus crisis.

This is confirmed by the new Recommerce barometer for the used smartphone market, published in February 2022. It covers Switzerland, France and six other countries, and shows that 27% of the Swiss population has already sold on their last smartphone, while 37% have previously purchased a pre-owned device.

At Swisscom, too, demand for used smartphones continued to rise in 2021: re-used devices in relation to new models sold grew from 15.5% to 21% over the past year.

Growth in mobile data traffic

Over the past two years the COVID-19 pandemic revealed just how crucial it is to have robust fixed network and mobile telecoms infrastructures, as well as good coverage. Although commuting was down owing to the huge expansion of working from home and home schooling, and some internet traffic shifted from mobile to fixed networks, mobile data transfers in Switzerland expanded again in 2020 and 2021. For example, the volume of data transmitted on Swisscom's mobile network swelled by 13% in 2021 alone, reaching 57 times its level of nine years ago. By its own account, Sunrise UPC is currently seeing data traffic double every 16 months.

In its November 2021 Mobility Report, Ericsson estimates that mobile networks now carry 300 times the data they did in 2011, when the Report was first published. Data traffic on mobile networks worldwide rocketed by 42% between 2020 and 2021 to an estimated 65 exabytes (65 billion billion bytes) per month by December 2021. Including traffic generated by fixed wireless access (FWA), monthly volume in the autumn of 2021 came to 78 exabytes. Global mobile data traffic could expand by a factor of 4.4 in the coming years, to a total of 288 exabytes per month in 2027, or 370 if FWA is factored in.

Reasons include the rising number of mobile contracts linked 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 69% of mobile data traffic in 2021 and could rise to almost 79% by 2027.

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, and are expected to reach 95% by 2027. The third quarter of 2021 saw a further increase in LTE subscribers, to 4.6 billion.

LTE established itself as the most important access technology in 2018 and is likely to remain so until 2027. After a record of 4.7 billion contract customers was reached in 2021, numbers are expected to decline to 3.3 billion by 2027, when the migration of increasing numbers of LTE contracts to 5G has been completed.

As providers continue to move to 5G, the number of 5G subscribers worldwide is put at 660 million as at the end of 2021. Ericsson believes that there will be 4.4 billion in 2027, accounting for almost half (49%) of all mobile telephony contracts and making 5G the dominant technology. Customers are transitioning to 5G faster than they did to 4G after its launch in 2009, putting 5G on track to reach the one-billion milestone two years earlier. It could be rolled out faster than any previous generation of mobile communications technology.

FIG. 2: MOBILE DATA AND VOICE TRAFFIC WORLDWIDE, 2015–2021
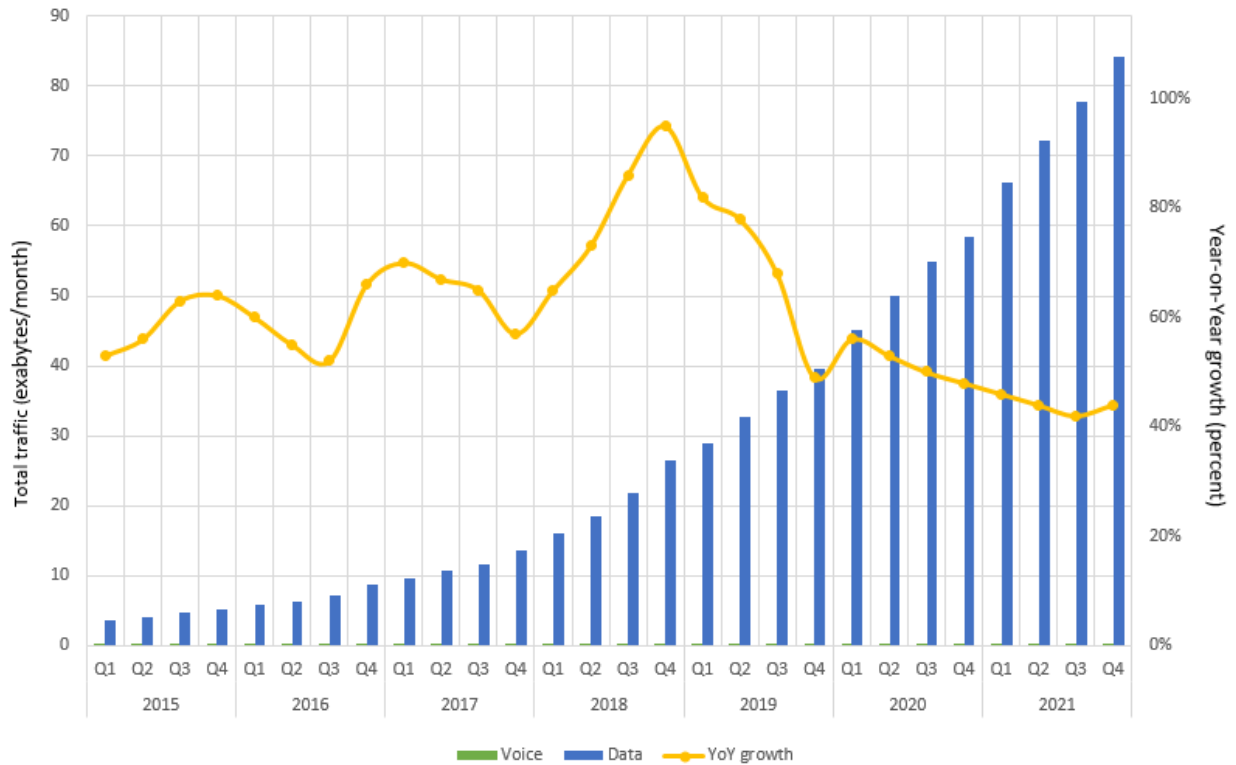
SOURCE: ERICSSON TRAFFIC MEASUREMENTS

Network quality

At the end of November 2021 German trade magazine Connect published its most recent test comparing mobile networks in Germany, Austria and Switzerland. As in the past, the results confirm the excellent standard of all Swiss mobile communications networks.

 Swisscom and Sunrise UPC place first and second. They remain the front-runners with an "outstanding" rating. Both operators score top marks in the three categories of voice, data and crowdsourcing. Salt is slightly behind in sixth place, but also achieves a high performance level and is still relatively close to its competitors. The three Swiss carriers also gained ground compared to 2020.

Thanks in particular to VoLTE (Voice over LTE) technology, they offer excellent voice telephony in terms of availability, call setup times and call quality both in town and on the move.

The performance and reliability of data traffic on Swiss networks are also remarkable, with users benefiting from very fast transmission rates. The crowdsourced measurements, i.e. those taken by users, confirm these test results and once again provide evidence of the consistently high standard of Swiss mobile networks.

Finally, for the second time Connect also measured 5G networks. The coverage offered by the Swisscom and Sunrise UPC networks is impressive, extending even to small towns, roads, and trains. In addition

the two major carriers offer very fast transmission rates. Salt began later with the rollout of its own 5G network and still has some catching up to do. It has nonetheless made considerable progress and was able to expand 5G coverage significantly compared to 2020. Where Salt's 5G is already available it, too, achieves a high performance.

Connect once again highlights the mobile coverage and network quality that the three providers offer to rail passengers. These are similar to those enjoyed by road users and should be emulated by other countries, according the magazine.

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 UPC, Quickline and Digitec have been able to surf the internet for free in long-distance trains. There are plans to extend this service to regional rail operators. It became available to Swisscom customers in December 2021.

Network coverage

Switzerland enjoys almost complete mobile coverage.

GSM technology (2G) was introduced in Switzerland in 1993 and was primarily designed for voice telephony and exchanging small amounts of data such as SMS texts and email. GSM networks are now gradually being replaced by newer technologies. Salt and Swisscom phased out their 2G networks (GSM, GPRS and Edge) between 2019 and 2021, while Swisscom took the last of its 2G devices offline and switched off the technology for good in mid-April 2021. The network resources that this freed up can be used for latest-generation 4G and 5G. Sunrise UPC, meanwhile, has decided to continue operating its 2G network through to at least the end of 2022. Carriers' 3G, 4G and 5G networks will still support services such as text messaging.

Third-generation (3G) networks, which permit mobile internet access for small data volumes at a speed of 42 Mbps, are accessible to up to 99% of the Swiss population. Although providers will probably continue offering these services in parallel with the latest-generation technologies (4G and 5G) for some time, they are likely to be switched off in the years ahead. All operators in Germany shut down their 3G networks in 2021. In the United Kingdom, in early 2022 Vodafone UK confirmed that it intends to switch off its earlier 3G network from 2023 onwards. Several operators in many European countries and the USA have also announced phase-outs by 2025 at the latest. In Switzerland, Swisscom has announced that it will continue to operate the 3G technology until the end of 2025.

At the end of 2021, at least 99% of the Swiss population was covered by LTE (4G), which was launched almost ten years ago now. All carriers also report high mobile coverage with LTE Advanced (4G+). At Swisscom, 96% are now thought to have access to speeds of up to 300 Mbps, and as many as 72% enjoy maximum speeds of 500 Mbps. In 2021 Sunrise UPC achieved 98% reach with its LTE-A network, offering data transfer rates of up to 900 Mbps. By contrast Salt's LTE-A network reach stood at 55%, but permitted data transfers at up to 1 Gbps.

The explosion in data traffic, with volumes doubling roughly every two years, nonetheless means that fourth-generation mobile telecommunications networks are approaching their limits.

Having acquired additional frequencies in early 2019, some providers quickly began to roll out their 5G networks. By the end of 2021 Swisscom reached 98% of the population with 5G and transmission rates of up to 1 Gbps, and 31% with 5G+ and transmission rates of up to 2 Gbps. As at December 2021 Sunrise UPC covered over 96% with 5G and transmission rates of up to 1 Gbps. It also already supplies more than 1,000 towns and villages with 5G broadband, with transmission rates of up to 2 Gbps. Salt has not yet supplied any coverage data, but has announced that it will continue to expand nationwide.

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 to the future of Switzerland, as it facilitates many new types of application. These include the Internet of Things (IoT, the networking of large numbers of 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 and ever-faster transmission speeds.

The most recent Mobile Network Experience Report for Switzerland, published in November 2021 and produced using the Opensignal network monitoring app, confirms the high standard of Swiss mobile communications networks. 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.

In 2021, average transmission rates of over 45 Mbps were available to Swiss users across all operators. Swisscom had increased its speed by 14.7 Mbps to almost 70 Mbps since the previous report. Salt and Sunrise UPC also saw uplift of 7.8 Mbps and 12.2 Mbps to 45 Mbps and 49.5 Mbps respectively.

Figures for 4G availability refer to the average proportion of time for which users of the individual providers' networks are able to enjoy a 4G or better connection. By this metric, Swisscom customers can access 4G services for more than 95% of the time. Sunrise UPC is close behind at 93%, and third-largest provider Salt at more than 87%.

Furthermore, carriers have made progress with the availability of 5G. In fact, the most recent Opensignal 5G Experience Report, which came out at the end of November 2021, remarked: "Swiss mobile operators are among world leaders when it comes to the quality of their 5G networks".

Sunrise UPC broke the 200 Mbps barrier with data transmission rates in its 5G network of 213.8 Mbps, representing an increase of 14.8 Mbps in average download rates since the previous report in September 2021. The average 5G speed recorded at Salt and Swisscom rose by 6.4 Mbps and 7.7 Mbps to come in at 154.3 Mbps and 171.1 Mbps respectively.

5G users also experience a significant improvement in the quality of videos transmitted via mobile devices, with fast loading times and almost non-existent stalling. All Swiss operators placed in the "excellent" category for their 5G video experience.

Another study published by Ookla in December 2021 also confirmed Switzerland had the fastest video loading times, across all mobile technologies, of all the countries that were analysed. While median loading time in the third quarter of 2021 was one second, on 5G networks it was as almost a fifth faster, at 0.79 seconds. Switzerland also ranks very well for 4K video resolution quality, which is achieved in over 80% of cases. With 5G enabling higher resolutions, 4K resolution is achieved almost 93% of the time in Switzerland's 5G network.

Prices of mobile communications

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 overall index for telecommunications services declined by 0.5 percentage points between 2020 and 2021. The index for mobile telephone communications remained virtually unchanged last year (+0.1 percentage points).

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.

As last year, in all baskets the most expensive deal (Swisscom) cost 2 to 2.5 times the most affordable, which was UPC in the small and medium-sized basket and Yallo in the large basket.

In 2021, the most competitive deal for low-use customers was available from UPC at less than CHF 10 per month. At Swisscom, it was CHF 25. For medium-use customers, the UPC deal cost less than CHF 20, but the Swisscom one was CHF 50. Finally, high-use customers found the cheapest offer at Yallo for around CHF 25.60 and the most expensive at Swisscom for CHF 50.60. The latter price dropped by a considerable CHF 15.50 from 2020 to 2021.

Mobile telephony prices in Switzerland are still among the highest internationally for the medium-sized basket. 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. They are below the OECD average for the small and large baskets, but more detail is needed to understand this finding fully.

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. These include products and options from both the prepaid and contract segments. For a medium-use basket of voice and data connections (100 calls and 2 GB of data), a customer in Switzerland paid almost CHF 4 per month more than the OECD-wide average in August 2021 (CHF 19.90 vs. CHF 16.20). In terms of the cheapest offer Switzerland comes in 23rd and thus in the third containing the most expensive countries.

By contrast, customers who have comparatively little need of mobile services (30 calls and 500 Mbps data) paid CHF 2.50 less per month in Switzerland than the OECD average (CHF 9.90 vs. CHF 12.40). Even with its cheapest offer Switzerland is still in 15th place.

Customers with high usage requirements (unlimited calls and 20 GB of data) paid almost CHF 8 less per month in Switzerland than the OECD average (CHF 25.60 vs. CHF 33.20). Switzerland still ranks 14th, however, and ten or so countries offer comparable products for less than CHF 20 per month.

2. DEVELOPMENT OF FIXED NETWORKS

Switzerland has several backbone networks as well as high-quality access networks. Swisscom's access network is available nationwide. The well-developed cable television (CATV) networks also offer fixed-network connections in much of the country. A little over 80% of Swiss households have a CATV network connection.

Given the continuing boom in mobile telephony, the downward trend in the number of fixed-network telephone lines in Switzerland continues. The number and duration of fixed telephony connections has been declining for many years now. According to OFCOM's Statistical Observatory, there has been a 65% drop in the number of connections made over the past ten years, from over 4.3 billion in 2010 to 1.5 billion in 2020. In the same period the duration of those calls has contracted by over 50% from almost 15 billion minutes (2010) to just over 7 billion (2020). Call time nonetheless increased in 2020 owing to the effects of the COVID-19 crisis (lockdown, working from home, etc.) and the popularity of all-inclusive deals with unlimited calls.

Voice telephony via Internet (VoIP) firmly established

Fixed-network telephony services using VoIP technology have 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) telephony is also furthering VoIP.

According to OFCOM 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 had almost reached the three million mark by the end of 2020 (2,299,215). More than 98% of fixed-network subscribers now use a VoIP connection, and the number and duration of calls made in this way increased by 110% and 255% respectively between 2010 and 2020.

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, phasing out the old analogue telephony and the ISDN technology of 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.

The different technologies and platforms will be maintained in parallel in the transitional phase of migration, which make operations highly complex. The revised Telecommunications Act (TCA) entered into force on 1 January 2021. Based on the new Article 48a, the Federal Council will now be able to issue provisions on the security of information and of telecommunications infrastructures and services. It has already started work on specifying the corresponding requirements at ordinance level, and a first draft was sent for consultation in December 2021.

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. BROADBAND MARKET ON THE FIXED NETWORK

Switzerland has a very 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

Switzerland has a high number of fixed-network broadband subscribers. By mid-2021 almost 47.4% of the Swiss population had a broadband internet connection, thereby consolidating the country's top-ranking position in an OECD-wide comparison. It remains ahead of France (45.9%), Norway (44.9%) and Denmark (44.6%). In the same period, the average for OECD countries was 33.8%, while that of EU countries was 37.2%. Switzerland is not, however, currently a world leader in terms of optical fibre connections to the home or basement (FTTH/B). Updated OECD figures from mid-2021 indicate that only just under 24% of Swiss households use an FTTH connection, against an OECD average of 32%.

FIG. 3: BROADBAND PENETRATION IN TOP OECD COUNTRIES, 2006-2021
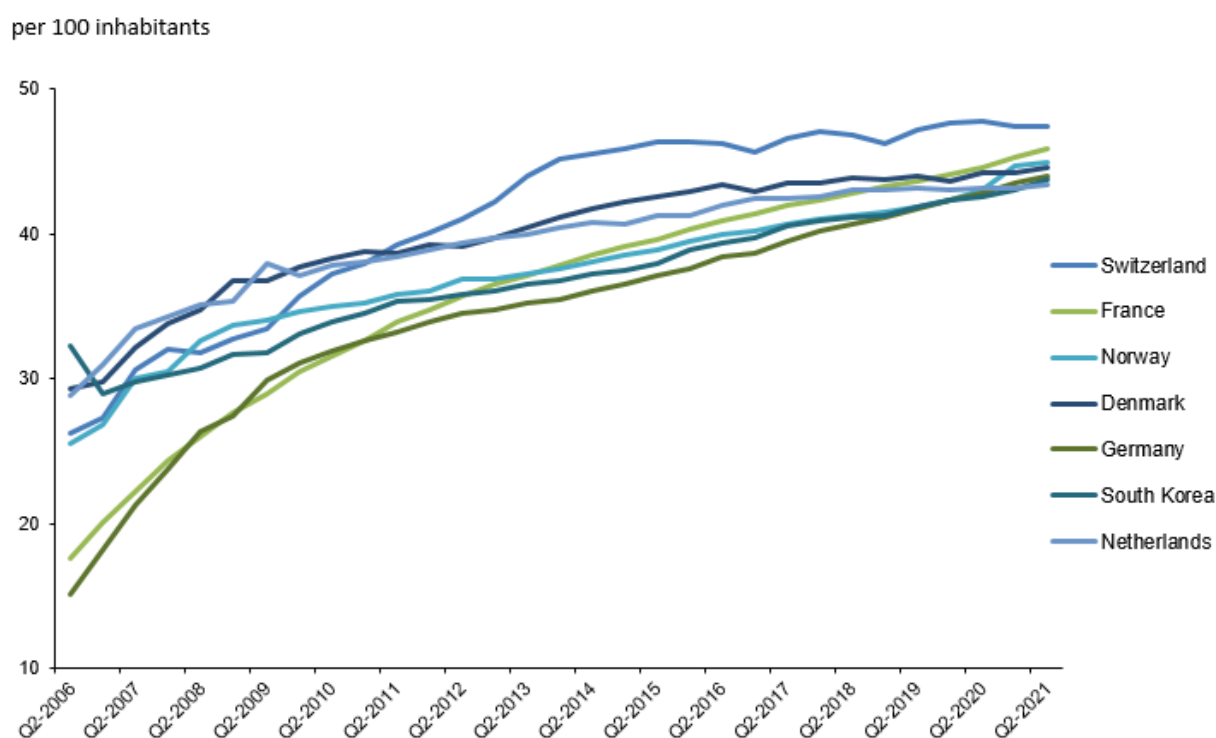
SOURCE: BROADBAND PORTAL – OECD

Data transfer rates

There are many tools for measuring internet data transfer rates that can also be used to produce comparisons and rankings. Two of the best-known are Ookla and M-Lab, which are also recognised by organisations such as the OECD. Switzerland fares more or less well in an international comparison depending on which tool or method is used. According to data collected by Ookla in December 2021, Switzerland takes 16th place with transmission rates of 110 Mbps. Singapore holds on to the top spot with a median transfer rate of 192 Mbps, while the average (median transfer rates of 178 countries) is just 59.75 Mbps. Ookla is clear that its speed test is now based on the median – and no longer the average – transmission speed. This is because it is less affected by major deviations and also better reflects users' real experience. Focusing only on OECD countries and excluding territories such as Jersey, Andorra, Gibraltar and Monaco, Switzerland's 110 Mbps would put it in 8th place.

Looking only at the average, rather than median, performance figures that were still available in 2021, Switzerland's transmission speeds of 237 Mbps would place it a flattering second, just behind Singapore, where rates reached 254 Mbps and the average is 124 Mbps.

M-Lab data published by Cable.co.uk measured the performance of household internet connections in 244 countries and territories between June 2020 and June 2021. Its figures show Switzerland in 45th place with average transmission speeds of a little over 50 Mbps. Jersey leads with average transfer rates of almost 275 Mbps, followed by Liechtenstein (211 Mbps). To put this into context, the global average is 29 Mbps. Surprisingly, Switzerland comes off worse than in 2020, when its transfer rates measured almost 110 Mbps. Cable.co.uk nonetheless explains that a platform upgrade in 2020 resulted in a significant rise in speeds from one year to the next within this period. It is also important to know that the collected data may include wifi connections between router and device, and that users are inclined to conduct tests when they believe that something is not working. These tests are still interesting because they reflect users' real-life experience.

Furthermore, since 1 September 2021 the major providers in Switzerland have offered customers a standardised tool to measure the quality of their own internet access (see www.networktest.ch; see also below, page 34).

Pricing

According to the National Consumer Price Index issued by the Federal Statistical Office (FSO), prices for fixed-network communication services rose by 2.9% between 2020 and 2021.

The major providers tended to charge less for their broadband services, however. 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 providers on the Swiss market.

Regardless of customer profile, the best-value deals are those from Sunrise and UPC, while Swisscom and Quickline are much more expensive.

Since 2020 OFCOM has published the survey of prices of product bundles on fixed and mobile networks on its Statistical Observatory website. These reflect growing demand from a sizeable consumer segment that prefers to purchase all of its telecommunications services from the same provider.

Prices for broadband services in Switzerland remain much higher than the OECD-wide average, however. 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 for medium usage offers a transfer rate of at least 100 Mbps for around CHF 46 per month.

In September 2021, a consumer in Switzerland with medium usage requirements therefore paid CHF 11 more per month for this basket than the average of all OECD countries (CHF 45.60 vs. CHF 34.70). A small basket with 60 GB and a transmission speed of at least 25 Mbps cost Swiss consumers over CHF 14 more (CHF 45.60 vs. CHF 31.20). The price gap for a basket comprising 300 GB of data and a transfer rate of at least 1 Gbps is narrower. Customers in OECD countries pay an average of CHF 54 per month, the Swiss CHF 58.

Structure of the broadband market

The merger of Sunrise and UPC marks a significant restructuring of the Swiss broadband market. As mentioned above, it blurs the distinction between telecommunications providers and cable network operators.

However, looking at broadband providers as a whole (CATV, DSL and FTTx) Swisscom remains far ahead of its closest competitors, with a market share of 49.5%.

Sunrise UPC's market share is around 28.5%. As a reminder, Sunrise occupied 13.1% and UPC 15.6% in 2020. Other cable network operators accounted for approximately 13% of the market, including Quickline's 4%. Other telecom providers came in at 5% and Salt at 4%.

The number of optical fibre connections (FTTH/B) in Switzerland is expanding less quickly than it has in recent 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 this new technology. Estimated at just under one million, these lines represented almost 24% of all broadband connections in Switzerland at the end of 2021. The country is therefore still a little behind by international standards, as the fibre-optic penetration rate in OECD countries was over 32% on average during the same period. That said, Switzerland is in a better position than most of its neighbours, with 12.3% FTTH/B reach in Italy, 6.4% in Germany and 5.1% in Austria. Only France has a relatively high proportion of fibre subscribers, at 40%. In Europe around ten countries have fibre subscription rates of over 50%, such as Lithuania (77%), Spain (76%), Sweden (76%), Latvia (71%) and Norway (63%).

Switzerland also recorded significantly slower growth in the number of fibre subscriptions (+9.1%) between June 2020 and June 2021 compared to the OECD average (+15.2%) or its neighbours Austria (+59.7%), Italy (+52.7%), France (+49.3%) and Germany (+32.6%).

FIG. 4: PERCENTAGE OF FIBRE CONNECTIONS IN TOTAL FIXED BROADBAND, OECD, 2019–2021
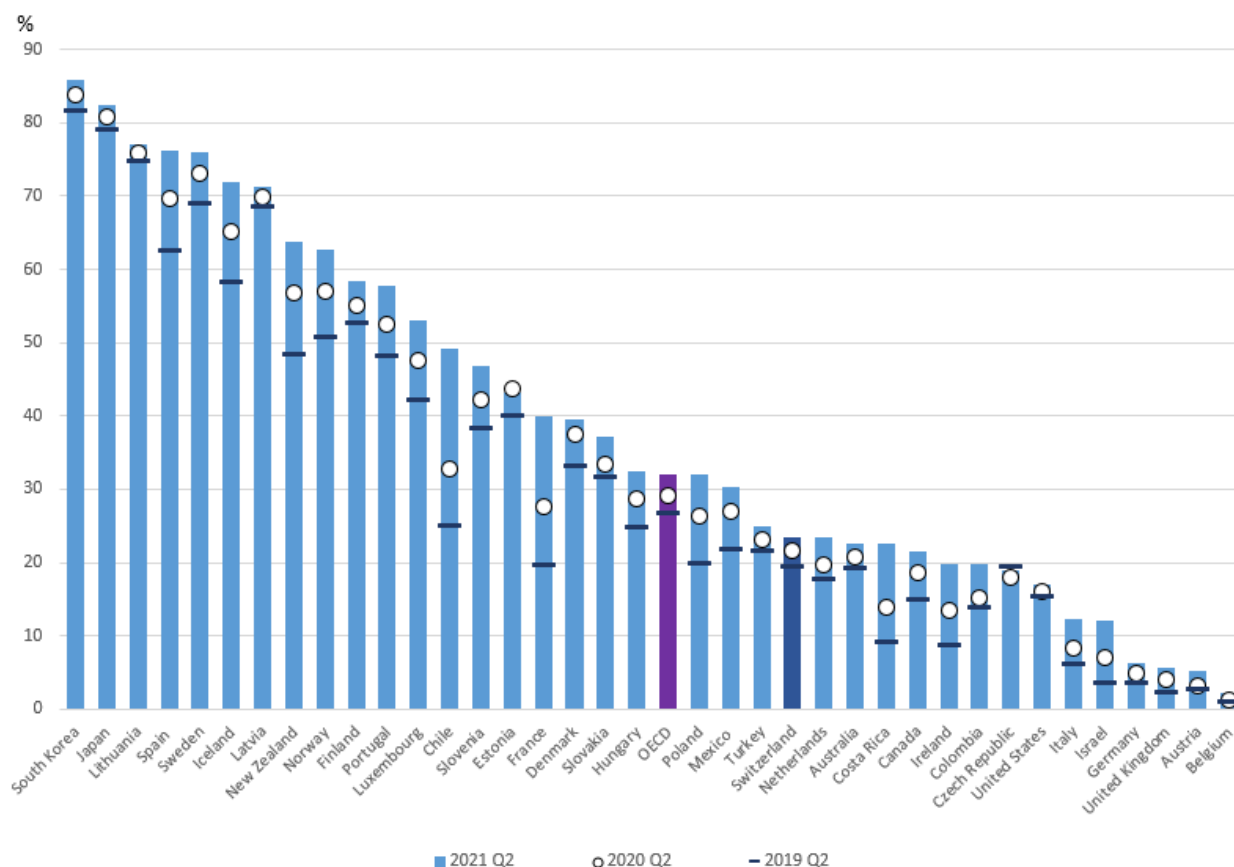
SOURCE: BROADBAND PORTAL – OECD

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. As legal provisions on unbundling were not formulated in technology-neutral terms, current regulations in Switzerland apply only to the copper network.

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 connections for some years now, however. A peak was reached in mid-2012 at approximately 315,000, or just under 10% of all broadband lines, but only some 41,000 remained at the end of 2021. Fully unbundled (full access) lines therefore now represent less than 1% of all broadband connections in Switzerland.

This is due in part to the offerings from cable network operators and the increasing use of optical fibre connections, which are further intensifying competition on infrastructure. At the same time, growing customer interest in product packages 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-high-speed broadband networks

In contrast to its superior ranking in the provision of broadband services via hybrid fixed networks, Switzerland is still not a world leader when it comes to fibre to the home (FTTH). It is catching up a little, however, having joined the middle of the European field in terms of rollout and use of fibre-optic access. There was a sharp rise in FTTH connections throughout Europe, even during the pandemic. On average, just under 44% of households in the EU have fibre, corresponding almost exactly to the proportion in Switzerland that have been connected to date. With regard to actual usage by households connected by FTTH, the FTTH Council Europe puts Switzerland slightly ahead of the EU average of 20.5%.

The Council's forecasts assume that the number of connections will continue to expand strongly throughout Europe. Almost two thirds of households are expected to use FTTH by 2026, which should narrow the digital divide that exists in many countries between rural and urban areas.

In Switzerland, too, for many years various players have been investing considerable sums in expanding the fibre-optic network.

Advancing digitalisation in all areas of life has been one of the underlying forces behind this development. Network operators want to invest in future-proof infrastructure to ensure that they can continue to handle mushrooming data volumes. In addition, many communes and regions decided a decade ago, some more recently, to invest in optical fibre connections themselves or via their electricity provider or TV cable network, to make themselves more attractive as places to live and work.

Infrastructure competition is another major factor in this trend. If operators invest in upgrading their network infrastructure and then offer higher bandwidth services, they create pressure on other network operators to bring their infrastructure up to a similar or even better performance level. In Switzerland, infrastructure competition was triggered primarily by CATV operators expanding their networks using the DOCSIS 3.0 and 3.1 transmission standards.

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 extended 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 to the home consist of conventional copper or coaxial cables.

For almost 15 years now, local utilities companies have been working alone and with Swisscom to construct fibre-only 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.

After years of construction, several such fibre-optic networks have now been completed in cities such as Basel, Bellinzona, St Gallen, Yverdon and Zurich, while other joint projects are in their final stages. Collaborations with local utility companies have brought FTTH to around one million households to date. In recent years there have been new alliances established (to connect the town of Kriens, for example) or old ones resumed, as is the case with ftth fr AG in the canton of Fribourg. Swisscom did not announce any new network construction partnerships in 2021.

The Swiss market leader did state in April 2021 that it was entering into a new form of partnership with Salt, however. Salt is investing in a long-term right to use its own Swisscom-built parallel fibre-optic infrastructure in the point-to-multipoint architecture. Swisscom remains open to further collaborative projects with other companies.

In addition to these alliances, in many locations Swisscom is investing without partners in modernising the fixed network. For many years it primarily used a hybrid copper-fibre connection (FTTC and FTTS), opting not to replace the old copper cable for the last few 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. For some time now Swisscom has been investing in FTTH again, but this time in a point-to-multipoint (P2MP) network architecture.

It reports that at the end of 2021 it achieved its aim of providing 90% of all homes and businesses in all communes in Switzerland with transmission speeds of at least 80 Mbps. It says that 72% benefit from speeds of over 200 Mbps, and that it has connected a third at 10 Gbps via FTTH. Swisscom has adjusted its target of connecting 60% of homes and businesses with FTTH by 2025 in light of the Competition Commission investigation described below, and is now talking about 50 to 60%.

  As mentioned, one of the key drivers behind the steady expansion of broadband networks has been the infrastructure competition between the numerous CATV networks and Swisscom. In 1999 Cablecom was the first company to launch "hispeed internet" via coaxial cables. It was followed a year later by Swisscom offering ADSL through the telephone network. In 2000 there were just 42,000 connections in Switzerland: 38,000 through the cable network and 5,000 via ADSL. By 2003 this had multiplied to 850,000 (350,000 CATV / 500,000 ADSL). Connections then passed the 2-million mark in 2006, when transmission speeds ranged between 3.5 and a maximum of 10 Mbps. In 2000 they were still well below 1 Mbps.

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 very high 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 fibre-only network.

Swiss Fibre Net (SFN), which joined the market in 2013, is also stimulating competition. SFN is a network consortium set up to market fibre-optic networks. It 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 includes 18 local energy suppliers, two cable network operators and six other fibre-optic network operators, such as Swiss4net, Danet from the Upper Valais and ftth fr from the canton of Fribourg.

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 UPC 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. In 2021 SFN marketed around 650,000 of its partner networks' FTTH connections.

However, not all local utility companies market their fibre connections via SFN. 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 the cities of Zurich and Geneva. In French-speaking Switzerland, many network operators market their connections via netplus.ch.

High-speed broadband throughout Switzerland

Fibre-optic networks are being rolled out 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 Grisons and Ticino to promote ultra-fast broadband (100 Mbps and above) coverage, particularly in peripheral areas. Like Fribourg, these cantons want to play an active role in promoting service provision to ensure that their outlying regions remain competitive with Switzerland's urban areas.

In the canton of Grisons, the infrastructure is to be expanded on a regional basis. After the cantonal authorities had drawn up their plan for promoting ultra-high-speed broadband access, a strategy and coordination team was created to provide technical support to regional projects and manage rollout across the regions. Regional teams are in charge of construction work and financing. In addition to infrastructure development, the Grisons cantonal government has recently begun supporting projects to advance the digital transformation. It has passed the corresponding legislation, provided funding and instructed an association to proceed with implementation. The overall aim is to improve the competitiveness and innovative capacity of Grisons as a business location.

In the canton of Ticino, preliminary work for a *Piano strategico per la banda ultra-larga in Ticino* was presented in the autumn of 2019, and work has since been done to prepare a bill for adoption into law. According to information in the public domain, the aim is for at least 85% of buildings in building zones to be connected to ultra-high-speed broadband within ten years, rising to 95% within 15 years. Ticino may nonetheless wait to see what is decided at the national level, especially since a cantonal initiative of the Ticino has been pending in national parliament since 2016 (Cant. Iv. 16.306; in German). This proposes additional support for regions in which high-speed broadband access is poor.

  In June 2021 the National Council passed a postulate from the Transport and Telecommunications Committee (TTC-N; Po. 21.3461 of 27 April 2021) which instructs the Federal Council to present a "Federal Government High-Speed Broadband Strategy" by 2023.

Motivated by competition, for over ten years a variety of companies and local energy suppliers have been investing in the communications infrastructure of the future without any financial support from the state. In recent years it has nevertheless become increasingly clear that assistance from the public sector is ultimately the only way to extend a modern optical fibre network to certain, mostly peripheral, areas. This also chimes with the experience of most European countries, all of which have long had national strategies to encourage high-speed broadband.

  ComCom therefore welcomes political moves towards a strategy to connect the whole of Switzerland with ultra-high-speed broadband (for more information, please also read the "Universal service licence" section below).

Competition Commission investigation into Swisscom's network expansion strategy

In December 2020 the Competition Commission (COMCO) opened an investigation on the grounds of the risk that Swisscom's construction of an optical fibre network would exclude competitors from the market. COMCO imposed precautionary measures on Swisscom, forbidding it to refuse competitors access to through lines as it expands its optical fibre network (Competition Commission media release of 17 December 2020). According to COMCO, Swisscom may continue to build fibre connections as long as it grants competitors access to the physical network infrastructure at local exchanges.

The issue is ultimately whether the point-to-multipoint (P2MP) network architecture that Swisscom favours where it alone is building FTTH networks is permissible under competition law.

The alternative has been the predominant system in Switzerland for many years now: point-to-point (P2P) connections in which each household is connected with at least one fibre-optic cable laid straight through from the exchange to the home. The network operator can use these lines themselves, or lease them to a competitor for its use. This is referred to as "dark fibre".

A P2MP optical fibre network has a tree structure. Although each household is connected by at least one fibre-optic cable from a manhole in the street, for a certain number of those households only one such cable is laid from manhole to exchange. In other words, incoming data traffic for several households is bundled and transmitted together in this feeder section until it reaches a splitter in the manhole, which sends it to the home via a direct fibre connection.

Swisscom lodged an appeal against COMCO's precautionary ruling, but it was rejected by the Federal Administrative Court on 30 September 2021 (B-161/2021; in German). Swisscom appealed against this decision to the Federal Supreme Court.

In summary, the Federal Administrative Court held in its decision that the FTTH Roundtable had established a certain industry standard in the form of a specific fibre-optic technology, on the basis of a voluntary commitment from the relevant industrial companies that had been initiated by the authorities (paragraph 67 of the decision published online). Paragraph 68 continued that a key element of this optical fibre standard is the definition of a certain network architecture. According to this, the FTTH network is to be rolled out on the basis of a four-fibre model with P2P topology. Later on, paragraph 270 of the decision states that the fibre-optic standard was applicable to nationwide rollout throughout Switzerland.

FTTH Roundtable, 2008–2012

The Communications Commission is not involved in these proceedings with the Competition Commission. It would nonetheless like to point out here, in heavily condensed form, certain aspects of the FTTH Roundtable that ComCom led from 2008 to 2012.

In 2008 work on laying FTTH connections was only just beginning. Roundtable discussions between industry representatives were prompted by announcements from a number of companies that they wished to start building their own FTTH networks. This raised concerns about an inefficient situation with parallel network construction, especially in larger cities. Talks were therefore intended to ensure a coordinated approach to network development, access to the new infrastructure for all service providers, and thus healthier competition in the telecoms market.

The discussions did not focus on the network rollout throughout Switzerland, but specifically on cooperation between Swisscom and local energy suppliers, primarily in the larger cities. Where network architecture was concerned, the focus was on P2P access.

The often-heard contention that the Roundtable agreed on connection with four continuous optical fibres from the exchange to each household is not correct. Naturally, each construction partner wanted at least one continuous fibre optic line in return for its investment, either for its own use or to market to third parties. This was described as the multi-fibre model. It applied to network construction partnerships.

However, on the periphery of the FTTH Roundtable, an industry working group led by OFCOM did determine a standard for cabling in the buildings. This did indeed provide for four fibre lines for each household, but only from the basement or manhole in the street to the households.

The FTTH Roundtable did agree on some general principles, and industry working groups arrived at certain technical standards. No written agreement emerged from the Roundtable, however. It should also be noted that network construction partnerships are apparently not configured the same way everywhere. In addition, to dispel antitrust concerns COMCO also reviewed each cooperation agreement individually, independently of the Roundtable setting.

4. DIGITAL TELEVISION IN SWITZERLAND

In this market segment, too, the Sunrise UPC merger is significantly changing the balance of forces between the major players.

Swisscom defends the strong position it took over from UPC in 2015. Having lost around 1,000 customers in 2020 and had an unsuccessful first quarter in 2021, losing a further 7,000, the historic telecom operator reversed the trend during the rest of the year, adding 11,000 new customers over the nine-month period and recording a net gain of 4,000 for the year as a whole. Swisscom now has 1.59 million digital TV subscribers, and expanded its market share to 41% as at the end of 2021.

In the same period, Sunrise UPC's market share was almost 32%. As a reminder, Sunrise ended 2020 at 8%, UPC at 24%. Sunrise UPC's gain of approximately 4,000 customers over the whole of 2021 is due to a good first quarter, when it attracted 6,900 new subscribers. The new company went on to lose customers in the two quarters that followed (-2,400 in Q2 and -1,400 in Q3), before it returned to a growth path and welcomed 3,800 new subscribers in the fourth quarter.

Quickline, an association of several cable network operators, experienced a slight year-on-year decline in TV customer numbers of some 10,000, or -3.2%. With 312,260 TV customers at the end of 2021, Quickline's market share stood at around 8%. Other cable network operators occupied roughly 15% of the market, Salt 4%.

To counter growing competition from streaming platforms (Netflix, etc.) and YouTube, and the related changes in viewing habits, in autumn 2021 Swisscom launched "blue Play", its own streaming service for films and series to complement its digital TV offering in Switzerland. SRG had previously launched the Play Suisse platform in November 2020. It offers a broad selection of films, series and documentaries from all of Switzerland's language regions, both in-house and co-productions.

The rise in the use of streaming services is indeed remarkable. According to the Digimonitor study on media consumption in Switzerland that was published at the end of August 2021, the number of Netflix subscribers in Switzerland rose by 500,000 last year to 2.8 million, or 42% of the population. Among the main streaming services watched by the Swiss, Play Suisse takes second place with 700,000 occasional users (10% of the population) just a year after its launch. It is striking that this service is often used on the move, with 48% watching mainly on their laptop, 33% on their smartphone and only 18% on their TV. However, in the latter case people watch for twice as long as they do on their phone. Digimonitor reports that YouTube has 4.6 million users in Switzerland, corresponding to 68% of the population. Despite the competition from these digital services, a large proportion of the population – 6.3 million – still watches conventional television.

FIG. 2: MARKET SHARES OF DIGITAL TV IN SWITZERLAND IN 2021
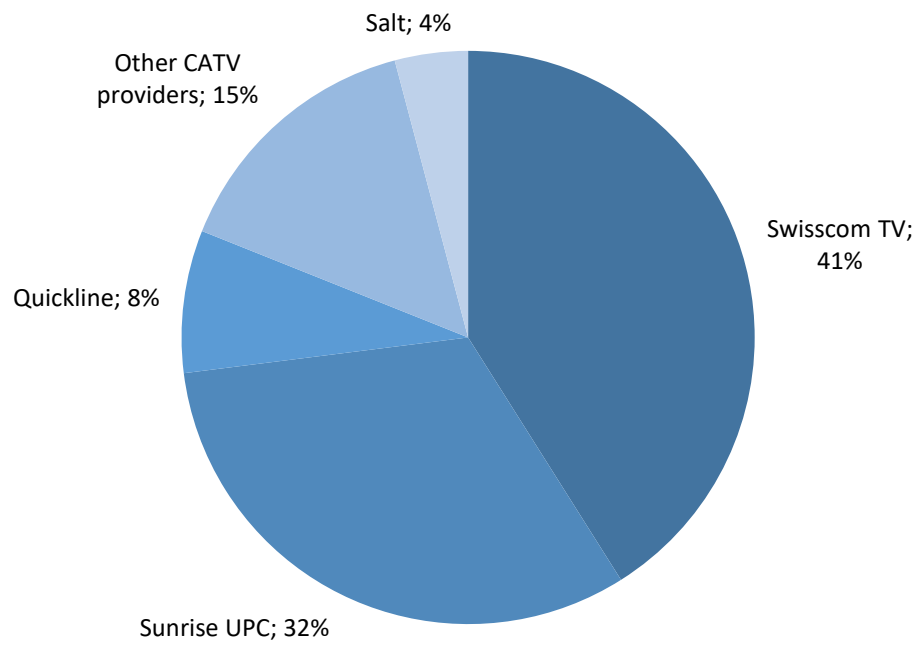
SOURCES: OPERATORS, SUISSEDIGITAL
EXCLUDING SATELLITE/TERRESTRIAL

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 radiocommunications frequencies (Art. 22*a* TCA),

- Awarding the universal service licence (Art. 14 TCA)

- Determining access prices and conditions when service providers fail to agree among themselves (Art. 11*a* TCA)

- Determining conditions of access to the building entry point and the joint use of installations within buildings in the event of disputes between telecommunications service providers (Art. 35*b* TCA)

- Imposing measures and sanctions in the event of violations of applicable law in connection with a licence granted by ComCom (Art. 58 TCA).

Following the revision of the Telecommunications Act, which was passed by Parliament in March 2019 and entered into force on 1 January 2021, ComCom ceased to be responsible for approving national numbering plans, the arrangements for number portability and the free choice of service provider. These have fallen to the Federal Council and OFCOM respectively from January 2021.

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

In 2021 it was composed of the following members:

- **Adrienne Corboud Fumagalli**, **President**, Doctor of Economics and Social Sciences, independent non-executive director of several companies

- **Christian Martin, Deputy President**, Electrical Engineer HTL, Managing Director Alps (CH & AT), Google Cloud

- **Matthias Grossglauser**, Doctor of Information Technology, Professor at the Swiss Federal Institute of Technology Lausanne (EPFL)

- **Patrick Krauskopf**, Lawyer, Professor, and Head of the Center for Competition Law and Compliance at Zurich University of Applied Sciences (ZHAW)

- **Jean Christophe Schwaab**, Dr. iur., Member of the Communal Council of Bourg-en-Lavaux

- **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

In 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. She took office on 1 January 2021. The Federal Council also selected Christian Martin, member of the Commission since 2018, to serve as Deputy President.

In addition, it nominated Patrick Krauskopf, a lawyer and professor at the Zurich University of Applied Sciences (ZHAW), and Jean Christophe Schwaab, Dr. iur. and Member of the Communal Council of Bourg-en-Lavaux, to serve on the Commission.

The Commission generally meets on an almost-monthly basis. It did so again in 2021, but owing to the pandemic mainly by video conference. In addition, its members spent much time preparing the meetings and adopting opinions by means of circular communications.

The Commission met in person in late summer for a two-day internal seminar. Members heard experts speak about optical fibre rollout in Switzerland and about experience in neighbouring countries which have national strategies to promote broadband access. ComCom also discussed the universal telecoms service going forward and the possible elements of a future broadband strategy 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 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 **Members of the Secretariat** will be happy to provide you with any information you might require:

- Peter Bär, Secretary of the Commission

- Pierre Zinck, Scientific Collaborator and Webmaster

- Jacqueline Fischer Pulfer, Administrative Secretary
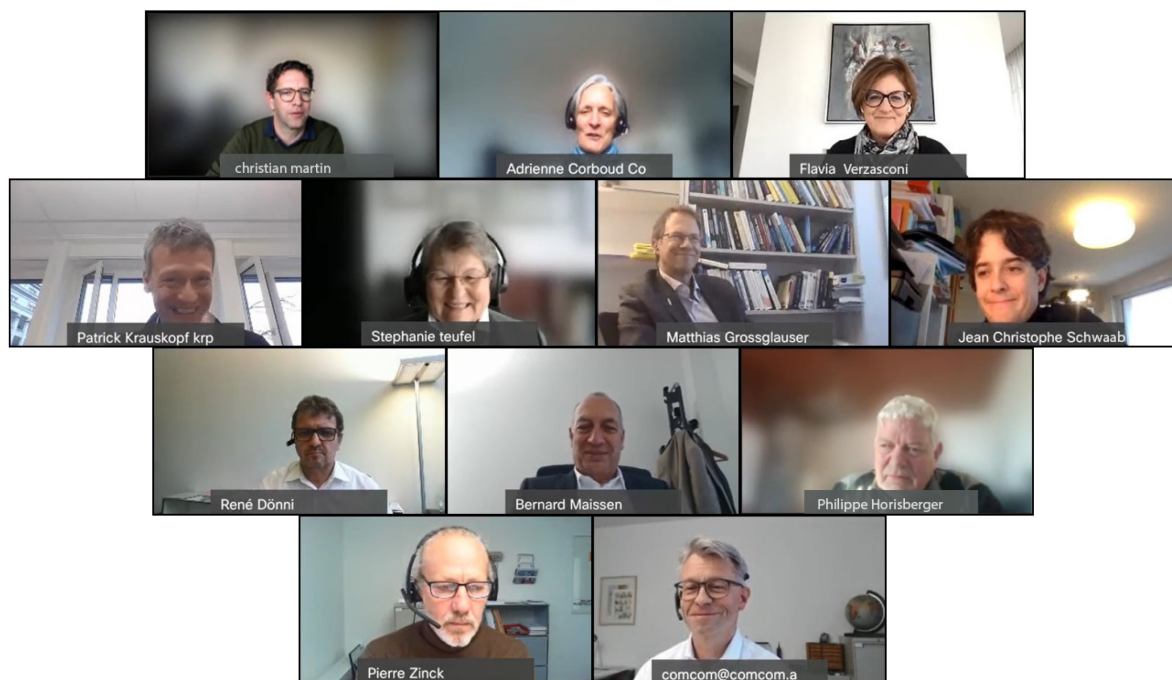
Commission meeting via video conference in 2021

III. ACTIVITIES OF THE COMMISSION

The following sections provide an overview of ComCom's activities in 2021.

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 some 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-oriented 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). Since 2021 the following four forms of access have been subject upon application to regulation:

1. Fully unbundled access to the local loop (copper technology only)
2. Interconnection
3. Leased lines
4. Access to cable ducts, provided these have sufficient capacity.

When the TCA was last revised in 2019, Parliament decided that two forms of access, fast bitstream access and charging for fixed-network subscriber connections, should no longer be subject to regulation.

On this occasion lawmakers refrained from introducing technology-neutral network access regulation. However, the new article 3a TCA tasks the Federal Council with presenting an evaluation report on the development of the telecoms market every three years and submitting proposals to promote effective competition where necessary.

In Switzerland, subscriber lines based on fibre or coaxial cable therefore continue to be exempt from 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 2021 there were three access cases still in process with ComCom, and an appeal against one of ComCom's principal decisions had been lodged with the Federal Administrative Court (FAC).

1.1. INTERCONNECTION AND OTHER FORMS OF ACCESS PURSUANT TO ART. 11 TCA

At the end of 2021 two access cases were pending before ComCom concerning the prices for various forms of access:

a) Sunrise UPC vs. Swisscom concerning prices for interconnection, unbundling, leased lines and cable ducts from 2013 onwards
b) Salt vs. Swisscom concerning prices for interconnection and leased lines from 2014 onwards.

These extremely complex and extensive proceedings were divided into two parts:
ComCom had issued a partial decision on the disputed prices for 2013 and 2014 to 2016 in February of 2019. However, because all parties to the proceedings lodged an appeal against that decision to the FAC, OFCOM suspended its instruction concerning proceedings on prices from 2017 onwards until the FAC had delivered its judgment.

The FAC partially upheld the appeals in two judgments of 16 July 2021 (A-1286/2019 and A-1496/2019), and referred the matter back to ComCom for review. The FAC nonetheless agreed with ComCom on the key points in dispute, and rejected many of the appellants' criticisms.

These parties had the same number of complaints admitted in both proceedings. An overview can be found in the summaries of the two 16 July 2021 judgments (A-1286/2019 E. 52 and A-1496/2019 E. 57; in German). The majority of objections upheld by the FAC related to the re-examination in greater depth of certain factors relevant to price calculation and greater justification for the decisions made.

In response, OFCOM reinstated its instruction to proceed with access cases in the matters of both the FAC complaints and prices from 2017 onwards.

These proceedings may be contentious partly because ordinance-level legislation is being applied for the first time, which then establishes new price-setting precedent (see also 2019 Activity Report).

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

On behalf of ComCom, OFCOM reopened the case and is now pursuing what have become two-part proceedings:

- Annual cost evidence must be obtained from Swisscom for the 2013 to January 2016 period for which it was judged to be dominant. This will be reviewed by OFCOM and will serve as a basis for ComCom's difficult price-setting task.

- For the period from February 2016 onwards, the first task was to clarify the issue of market dominance. To this end, OFCOM conducted a market survey in 2021 and then sought an expert opinion from the Competition Commission (COMCO), in accordance with Article 11a Telecommunications Act.

COMCO then issued its opinion on the matter of market dominance from 2016 on 25 October 2021. Under certain conditions, the COMCO also answers the question in the affirmative for the years from 2016 onwards (cf. the publication series RPW of the Competition Commission).

OFCOM will continue with proceedings and push ahead with the complex background work to calculate an interconnection price for peering.

1.3. PAYMENT OF INTEREST ON REPAYMENTS

In February 2020 Sunrise UPC submitted an application concerning interest on repayments on the grounds of excessively high prices for access services. It requested that such interest should be based on the weighted average cost of capital (WACC) approach in future. The well-established previous system was for interest to be paid at the 12-month LIBOR in Swiss francs, plus a risk premium of 1.3%.

Having been instructed by OFCOM to consider the application, ComCom decided in June 2021 that the WACC was the appropriate rate at which interest on repayments should be paid (see ComCom website, decision of 24 June 2021).

Swisscom has lodged an appeal against ComCom's decision with the FAC.

2. LICENCES

Pursuant to the Telecommunications Act (TCA), ComCom grants radio communications licences for the provision of telecommunications services (Art. 22a TCA) and the universal service licence (Art. 14 TCA).

ComCom has permanently delegated to OFCOM the granting of those radio communications licences which are not in short supply, and which are therefore not the subject of a public tender procedure. These include licences for amateur radio operators or private companies' radio networks. Information concerning licences awarded by OFCOM can be found on the www.bakom.admin.ch website.

The following overview deals only with 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 ensure that those with disabilities have various 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 current content of the universal service (including price caps in some areas) is laid down in the Telecommunications Services Ordinance (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.

What are the current constituents of the universal service?

The universal service current comprises the following telecommunications services:

- A multifunctional broadband connection based on the Internet Protocol (IP). By the end of 2021, Swisscom had to 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 1 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 a text message intermediary service. Since 2018 there has also been a sign language interpreting service via video telephony at certain times.
    - 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.

The Federal Council sets quality criteria for services under the universal licence (Art. 21 TSO), that the universal service licensee must meet. As the market supervisory authority, OFCOM checks annually (on the basis of reports from Swisscom) whether the licensee is providing the universal service to the required standard. Swisscom once again met these quality criteria in full in 2021.

The current political debate surrounding the universal service

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

The motion was 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 (Cant. Iv. 16.306) that the whole of Switzerland should be supplied with high-speed broadband.

On 27 April 2021, talks were held between the TTC-N and the ComCom presidency about the universal service licence and connecting Switzerland with high-speed broadband. On this occasion, ComCom pointed out that while increasing internet access under the universal service to 80 Mbps was a quick fix to improving broadband access in peripheral areas, it should be only a first step towards a national strategy for connecting the whole of Switzerland with ultra-fast broadband. ComCom takes the view that, as currently defined in the TCA, the universal service is not the appropriate means by which to achieve this. Bandwidth under the universal service should not be increased repeatedly in small increments, because this would result in one-sided support for the network run by the universal service licensee, and thus distort competition (please refer also to the ComCom opinion issued as part of consultations on amendments to the universal service, at www.bakom.admin.ch).

   On the same day the TTC-N launched the aforementioned postulate 21.3461 on a "Federal Government High-Speed Broadband Strategy".

Federal Council consultations on faster internet access under the universal service

On 10 December 2021, the Federal Council announced that it would like to increase internet speeds under the universal service. It proposes adding broadband access offering 80/8 Mbps to the existing internet connection with 10 Mbps download and 1 Mbps upload speeds. The Federal Council held consultations on its proposal that ran to 25 March 2022. The proposal thus takes up the demand of the TTC in its Motion 20.3915 and incorporates additional measures to limit costs and prevent market distortion as far as is possible.

Extension and new award of the universal service licence

The current universal service licence expires at the end of 2022. The applicable rules of Art. 12 TSO state that the new licence must be awarded at least six months before the current one expires.

As a result of its consultations the Federal Council will only be able to redefine the content of the future universal service mandate, as laid down in the TSO, in the course of 2022. This means that before mid-2022 there will be no stable legal foundation on which to grant the universal service licence.

However, to guarantee the universal telecoms service at all times, ComCom has decided to extend Swisscom's existing licence for a period of probably one year, unchanged in terms of content.

As soon as the Federal Council has determined the content of the universal service and a stable legal basis once again exists, ComCom will begin the new licence award process. ComCom expects the next universal service licence to enter into force at the beginning of 2024.

2.2. Mobile radio communications licences

All available mobile frequencies were awarded anew in 2012. Seven years later, newly available frequencies in the 700 MHz, 1400 MHz and 3500 – 3800 MHz bands were auctioned for mobile radio communications use. Please refer to the activity reports for 2012 and 2019 for more information on these auctions. Although both calls for tenders were open to all interested companies, in addition to the three existing operators Salt, Sunrise (now Sunrise UPC) and Swisscom there was additional interest in the 2019 auction only, from Dense Air. This candidate did not ultimately acquire any frequencies, however.

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

- In 2012, all three licensees acquired frequencies 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 expire at 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 conditions of use stipulated in the licences require the licensees to serve at least 50% of the Swiss population with mobile communication services via their own infrastructures. All three network operators fulfil these conditions.

GSM switch-off at Salt and Swisscom

ComCom awarded these mobile communications frequencies as technology-neutral. In other words, the licensee is free to decide the technologies to use with their frequencies. Up to 2021 four very different systems were operated in parallel, from outmoded and underperforming GSM (2G), to UMTS (3G) and LTE (4G) through to the much more efficient 5G.

Salt switched off GSM back in 2020. After several public announcements and lengthy preparatory work, Swisscom began in January 2021 to take the last remaining 2G devices off the network. By mid-April it had finally switched off the GSM technology that it introduced in 1993, thereby freeing up frequencies for other uses.

Sunrise UPC will continue to operate GSM until at least the end of 2022, because in addition to very old mobile phones there are still some machine-to-machine applications that are GSM-based.

2.3. 2019 award of DAB+ licence for French-speaking Switzerland now legally effective

DAB+ is gaining ground. Digital radio listening on DAB+ and the internet now accounts for three quarters of the total, while FM listening has halved over the past six years, according to the Digital Migration working group. Swiss radio broadcasters communicated in August 2021 that the final switch to digital would be made on 31 December 2024, when the last FM transmitters are switched off.

In 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.

A survey of prospective bidders conducted by OFCOM found that there was only one interested candidate in both German-speaking Switzerland and Italian-speaking Ticino. One licence for each of these areas could therefore be granted without a tender process. However, a number of companies had expressed an interest in the additional DAB+ coverage for French-speaking Switzerland. In such cases licences are awarded by ComCom on the basis of a public tender.

ComCom issued a call for tenders in May 2018, in response to which two companies, DABcom SA and Romandie Médias SA, bid for the new DAB+ licence. ComCom awarded this licence to DABcom in a competition based on specific criteria. Please refer to the 2018 and 2019 activity 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 suspended the licence, DABcom was unable to use the frequencies until the FAC had issued its ruling.

The FAC dismissed the Romandie Médias appeal on all points on 30 March 2021. The Court thus upheld the licence award to DABCom, holding: "The FAC does not see any fault in the way ComCom evaluated the five main criteria" (see Media release of the Federal Administrative Court of 9 April 2021; Judgment A-2899/2019).

This FAC judgement rendered the licence award legally effective, because a further appeal to the Federal Supreme Court is not possible owing to the exception stated in Art. 83 let. p of the Federal Supreme Court Act.

Given that DABcom was unable to use the licence for approximately two years, in June 2021 it applied to have the term of the licence and the conditions of service provision it contains extended by two years in each case. ComCom approved this request in September 2021 and changed the end of the licence to 31 December 2031.

DABcom has now begun to build its network and began broadcasting in September 2021.

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. Above all, it improved transparency for customers about the services and packages offered by telecommunications providers. 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.

One of the most important consumer protection measures came into force on 1 July 2021 in the form of 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.

Another regulation that came into effect on 1 July 2021 is that providers of mobile communications services must inform consumers more comprehensively about the terms and arrangements that apply to international roaming when they conclude their contract or activate/reactivate roaming services. Moreover, calls must now 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 now measure the quality of fixed and mobile internet access services, and release this information publicly. In the case of fixed internet access, this duty applies to all providers with at least 300,000 customers. Where mobile internet access is concerned, it applies to all providers with a mobile radiocommunications licence and also at least 300,000 customers.

In a first step, since 1 September 2021 providers in Switzerland have offered customers a standardised tool to measure the quality of their own internet access. This is available at www.networktest.ch and in the app shops for mobile devices.

Providers must publish anonymised results from January 2022 onwards. In time this information should help consumers to make informed product choices, because they are able to compare different deals and make their decision on the basis of criteria other than the price or theoretical data transmission rate.

4. INTERNATIONAL RELATIONS

The new Article 64 of the Telecommunications Act that entered into force in 2021 states that ComCom: "shall carry out the tasks within the scope of its responsibilities at an international level and shall represent Switzerland in the related international organisations".

ComCom is one of the founding members of the Independent Regulators Group (IRG), the association of European national telecommunications regulatory authorities to which independent telecoms regulators of all European countries now belong.

The member states of the European Union have also formed 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 implementing 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.

Despite the Federal Council's 26 May decision not to sign the Swiss-EU institutional agreement, in 2021 ComCom and OFCOM were again able to participate in selected expert working groups.

5. OUTLOOK FOR 2022

In the interests of consumers, in 2022 ComCom will continue 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 2022:

1. **Universal service**: To ensure that the universal service is guaranteed at all times, in 2022 ComCom will extend the universal service licence for probably one further year (see explanation above). It will also begin preparations to appoint a licensee for the next licence period.

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.

3. **Access cases:** OFCOM will take the lead with instructions for pending cases and, as far as possible, submit them to ComCom for a decision.

4. **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). Also working with OFCOM, ComCom is in regular dialogue with the regulatory authorities of German-speaking countries, and also participates in the meetings of the FRATEL French-speaking telecommunications regulation network.

IV. FINANCES

Regulators from various infrastructure sectors report for administrative purposes to the Federal Department of the Environment, Transport, Energy and Communications (DETEC). Since 2012 ComCom has formed part of the Infrastructure Regulatory Authorities (RegInfra) administrative unit alongside 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). 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 independently.

ComCom collaborates very closely with OFCOM, which prepares most of ComCom's business and conducts the legal proceedings. Costs incurred by OFCOM for ComCom are also given below to permit an overview of the income and expenditure of the telecoms regulator.

OFCOM's costs in connection with its activities for ComCom totalled CHF 2.24 million in 2021.

On the income side, in 2021 OFCOM charged administration fees of CHF 204,786, and radiocommunications licence fees of CHF 47,948. Administrative fees connected with ongoing legal proceedings and invitations to tender can be billed only once the cases concerned are legally binding.

The Commission and its secretariat recorded expenses of CHF 1.017 million francs in 2021. ComCom thus closed its 2021 financial statements well under budget once again. Information on RegInfra is published in the federal government's estimates and state financial statements. Please see *www.efv.admin.ch*.

ABBREVIATIONS

5G = Fifth generation mobile radio

ADSL = Asymmetric Digital Subscriber Line

OFCOM = Federal Office of Communications

BBCS = Broadband Connectivity Service (commercial wholesale offering from Swisscom)

BEREC = Body of European Regulators for Electronic Communications

FAC = Federal Administrative Court

CATV = Cable television

ComCom = Federal Communications Commission

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

FDD = Frequency Division Duplex (two radio channels are needed for one connection)

TSO = Telecommunications Services Ordinance (CC 784.101.1)

TCA = Telecommunications Act (CC 784.10)

FTTB = Fibre to the Building

FTTC = Fibre to the Cabinet

FTTH = Fibre to the Home

FTTS = Fibre to the Street

FWA = Fixed Wireless Access

G.fast = Gigabit fast access to subscriber terminals (technology for bandwidths up to 500 Mbps 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

PSTN = Public Switched Telephone Network (traditional telephone network)

SMS = Short Message System

SVOD = Subscription Video on Demand

TDD = Time Division Duplex (bidirectional communication on only one radio channel)

UMTS = Universal Mobile Telecommunications System (standard for third-generation mobile radio networks)

DETEC = Federal Department of the Environment, Transport, Energy and Communications

VDSL = Very-high-bit-rate DSL

VoD = Video on Demand

VoIP = Voice over IP

VoLTE = Voice over LTE

COMCO = Competition Commission

Wifi = Wireless Fidelity (wireless local area networks, WLAN)

WLAN = Wireless Local Area Network

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