



Media background material 26.11.2010 relating to the invitation to tender for mobile radio frequencies

1 Background

As early as 2008 the Federal Communications Commission (ComCom), together with the Federal Office of Communications (OFCOM), had discussed initial ideas for awarding available mobile radio frequencies and frequencies which would become available in 2014 (GSM) and 2017 (UMTS)¹. It envisaged a new award of the entire Swiss mobile radio spectrum by way of an auction. It therefore requested OFCOM to put up for discussion possible procedural variants within the framework of a public consultation. On the basis of the results of the consultation and further in-depth analyses, ComCom decided to award all the currently available frequencies and all those which will become available from 2014 (GSM) and 2017 (UMTS) within the framework of an auction.

Stimulating competition

In view of the high level of tariffs in the Swiss mobile market, ComCom also considered the possibility of stimulating the market by the preferential award of a licence to a new network operator. However, it rated the chances of success of such a scenario as low: considerations of a technical, economic and legal nature led to the conclusion that promoting the entry of an additional provider with its own infrastructure would meet with little success. ComCom is therefore dispensing with any special measures aimed at promoting the entry of a new operator into the market. ComCom has consequently decided that the auction for the entire available spectrum will be open on equal terms to both the existing network operators and all other interested parties.

As a result of awarding the spectrum in small blocks of frequencies, the participants in the auction will be able to exercise flexibility and acquire a range of frequencies which corresponds to their needs and business models. Bidding restrictions in certain frequency ranges will ensure that individual auction participants cannot purchase all the frequency blocks. In the given circumstances, such an approach can best contribute to stimulating competition in mobile radio in Switzerland. The existing mobile operators in particular will have an opportunity to acquire a promising range of frequencies. The prime objective is that consumers in Switzerland will continue to benefit in the future from high-quality, reasonable priced mobile telephony products.

An early allocation of frequencies

For both current and potential new licensees, it is important to ensure clarity as early as possible regarding the allocation of frequencies after the licences have expired. This will make planning easier and will guarantee investment security. The award process should therefore begin as early as possible. This means that the distribution of frequencies will be known at an early stage, before the expiry of the GSM licenses at the end of 2013, and the existing licensees will be able to make any necessary adjustments to their network in good time.

2 The procedure

All currently available mobile radio frequencies, as well as those which will become available by 2014 and 2017 in the 800 MHz, 900 MHz, 1800 MHz, 2100 MHz and 2600 MHz bands are being put out to tender. The award will take place within the framework of an auction which is open to all interested undertakings.

¹ The GSM licences expire at the end of 2013 and the UMTS licences at the end of 2016

Authorisation

Those companies which can demonstrate that they can meet the licensing requirements (in accordance with Article 23 of the Telecommunications Act, TCA) and that the award of a radiocommunication licence to them will neither eliminate nor substantially adversely affect effective competition will be allowed to take part in the auction. Before the auction commences, they will also have to submit a bank guarantee which covers the minimum bid for the frequencies they are applying for.

Interested candidates can submit a candidature dossier to OFCOM by 18 March 2011. OFCOM will examine the applications received on behalf of ComCom. Candidates which meet the requirements will be authorised by virtue of an official ComCom decision to participate in the auction.

3 Frequencies, constitution of blocks and minimum prices

3.1 Frequency overview

Category	Period of use	Number of blocks (lots)	Block size	Minimum price per lot [million CHF]
A: 800 MHz	16 years 1.1.2013 - 31.12.2028 ²	6	2 x 5 MHz	21.3
B: 900 MHz	15 years 1.1.2014 – 31.12.2028	7	2 x 5 MHz	21.3
C: 1800 MHz	18 years Immediately - 31.12.2028 ³	1	2 x 10 MHz	16.6
D: 1800 MHz	15 years 1.1.2014 – 31.12.2028	13	2 x 5 MHz	7.1
E: 2100 MHz TDD ⁴	18 years Immediately 31.12.2028	1	1 x 5 MHz	4.15
F: 2100 MHz TDD	12 years 1.1.2017 – 31.12.2028	3	1 x 5 MHz	2.7
G: 2100 MHz FDD ⁵	18 years Immediately - 31.12.2028	3	2 x 5 MHz	8.3
H: 2100 MHz FDD	12 years 1.1.2017 – 31.12.2028	9	2 x 5 MHz	5.4
I: 2600 MHz FDD	18 years Immediately - 31.12.2028	14	2 x 5 MHz	8.3
J: 2600 MHz TDD	18 years Immediately - 31.12.2028	3	1 x 15 MHz	12.45
K: 2010 – 2025 MHz	18 years Immediately - 31.12.2028	1	1 x 15 MHz	12.45

² Subject to limitations in Grisons and Upper Valais until 31.12.2013

³ 8.6 MHz can be used immediately (ex Tele2 frequencies); the entire bandwidth will be available for use from 1.1.2014

⁴ Available frequencies of the former Telefonica (3G Mobile) UMTS licence.

⁵ Cf. footnote 3.

3.2 Description of the frequency bands

800 MHz

These frequencies are part of the so-called "digital dividend", i.e. the radio frequencies which have become available as a result of more efficient use of the frequency spectrum following the switchover from analogue to digital terrestrial television. These frequencies are used primarily to provide mobile broadband services. With a view to a technology-neutral award of frequencies ComCom is not prescribing any specific transmission technologies. However, on the basis of international developments, it is expected that this frequency band will witness rapid deployment of the new technology for data transfer LTE (Long Term Evolution), which is the successor to UMTS. For LTE the 800 MHz spectrum is a complement to use of the 2.6 GHz spectrum.

900 MHz

Since the 1990s and for the next years also, this frequency band has been and will continue to be used for the second-generation mobile telephony standard, the GSM standard (including GPRS and EDGE). With the growing availability of suitable terminals, the UMTS standard, which is the successor to GSM, will also be increasingly used in this frequency band. The frequencies in the 800 MHz and 900 MHz ranges are of particular interest because of their good propagation characteristics.

1800 MHz

The 1800 MHz band, like the 900 MHz band, is a classic GSM band. The 1800 MHz frequencies are used on the one hand to provide adequate transmission capacities in areas of high mobile traffic and on the other hand they can be used to deploy nationwide mobile GSM networks. In the medium term, the use of LTE transmission technology within this frequency band is also expected.

2100 MHz

This frequency band is the classic UMTS band. In addition to UMTS-based voice services, it is also used for mobile data transfer (e.g. mobile TV, mobile internet), using the HSPA and HSPA+ extensions to UMTS.

2600 MHz

These frequencies have worse propagation characteristics and poorer coverage inside buildings than lower frequencies. They do, however, allow the use of LTE technology with very high transmission bandwidths. This means that very high data rates can be provided for coverage of areas with a high population density. Improved LTE provision, including the corresponding penetration of buildings, can, for example, be achieved by a corresponding complementary use of frequencies in the 800 MHz band.

3.3 Constitution of blocks

In principle, the bidders are closer to the market than the licensing authority; they are better able to evaluate possible developments and better able to assess the optimal frequencies from their perspective. It is therefore appropriate to assign the available frequencies in small blocks and hence to leave the decision on how many licences and their spectrum to the market.

Depending on when individual frequency ranges become available, a fundamental breakdown of the frequencies into abstract frequency blocks of 2 x 5 MHz is being undertaken. Exceptions arise in the case of individual frequencies already available in the 1800 MHz, 2100 MHz and 2600 MHz bands, where individual blocks with different bandwidths are being awarded. The timing of availability and technical spectrum-based reasons make the constitution of large frequency blocks essential in this case. For the auction, the available frequen-

cies are being split into a total of 11 categories. The categories differ in terms of frequency range, block size, period of use and minimum price (cf. the above table).

3.4 Minimum prices

When radiocommunication licenses are awarded by auction, ComCom, as the licensing authority pursuant to Article 39 para. 4 TCA, must set a minimum bid. Moreover, Article 23, para. 1 of the Ordinance on Frequency Management and Radiocommunications Licences (OFMRL) states in this regard that in the case of award of licences by auction, appropriate licence revenue should be achieved and that the licensing authority may set a minimum bid for this purpose. The lower limit of this statutory minimum bid is equal to the sum:

- a. *of the licence fees discounted by the industry-standard interest rate congruent with the term, for the full term of the licence; and*
- b. *the administrative fees for the tender process and the award of the licence.*

The ordinance merely lays down the amount at which the lower limit of the minimum bid is to be calculated. An upward revision of this may be made when defining a minimum bid.

For frequencies > 1 GHz, ComCom has specified a minimum bid equal to the legally prescribed lower limit. For the frequencies < 1 GHz which are technically interesting with regard to propagation (800 MHz, 900 MHz), a minimum bid which is three times higher than the legally prescribed lower limit has been laid down, in the light of the expected high level of interest and the legal requirement for an appropriate return from the auction. In particular, this is also intended to guarantee an efficient auction process.

3.5 Bidding restrictions (spectrum caps)

In order to prevent undesirable auction results which would endanger competition in the mobile telephony market, ComCom has imposed bidding restrictions ('spectrum caps') in individual frequency bands. Spectrum caps lay down the maximum extent of the frequencies which one bidder can acquire in the corresponding frequency band. The spectrum caps have been defined in such a way that on the one hand competitive bidding takes place in the auction and on the other hand the existing operators in particular have an opportunity to acquire adequate spectrum. The following spectrum caps have been set:

- a maximum of 2 x 30 MHz in the bands <1GHz (general restriction across the combined 800 MHz and 900 MHz bands)
- and furthermore a maximum of 2 x 20 MHz in the 900 MHz band (GSM).

The choice of these restrictions is designed in particular to prevent the acquisition by a financially strong bidder of the entire 900 MHz spectrum, enabling it to drive an existing operator with a network based on 900 MHz frequencies out of the market.⁶

- a maximum of 2 x 30 MHz in the 2100 MHz band (UMTS)

This restriction was chosen so that all three existing operators, given a corresponding willingness to pay, have an opportunity to acquire at least the same frequency range in the 2100 MHz band as they currently have allocated.

- a maximum of 2 x 30 MHz in the 1800 MHz band (GSM), if a bidder in the 900 MHz band acquires 2 x 15 MHz or more.

This restriction is being introduced so that a single operator cannot "control" the major part of the GSM spectrum (900 MHz, 1800 MHz).⁷

⁶ Both Swisscom and Sunrise currently operate GSM networks whose structure is based primarily on the 900 MHz frequencies. Orange also has a few 900 MHz frequencies, but its network is based mainly on 1800 MHz frequencies.

⁷ It is expected that GSM technology will remain in use for several years (probably until after 2020), so corresponding frequencies are very important for all three existing operators.

4 The auction

In an analysis, different auction formats which might be candidates for the upcoming award were assessed. The most appropriate format was determined to be a combinatorial clock auction (CCA - see Section 4.1). With a CCA, both the possibility of substitution of the individual frequency bands and their complementary character are optimally taken into account, as it allows combinatorial bidding on different frequency packages. The bidders consequently have the opportunity to assemble frequency packages which best suit their business model. Thus, in particular the risk that at the end of the auction individual bidders will be encumbered with a frequency spectrum which they did not wish to acquire or which does not correspond to their needs (the aggregation risk) is greatly reduced.

With the exception of the frequencies in category K (see table above), strong interdependencies exist between the frequencies in the different frequency ranges. On the one hand, the bidders need frequencies in the lower frequency ranges which are of greater interest in terms of propagation characteristics, and on the other hand they also need frequencies in the higher frequency ranges, in particular to increase capacity in densely populated areas. All the frequencies in the categories A - J are therefore being awarded simultaneously within the framework of the CCA. After the award of the categories A - J, the auction for the frequency block in category K will take place in an additional round with sealed bids being submitted (single round, sealed bid). In particular, this reduces the complexity of the CCA.

An experienced auctioneer

DotEcon Ltd, a company which specialises in spectrum auctions, has been involved in the choice of the auction format and will also be involved in the holding of the auction. The chosen auction system has already been used successfully in England, Norway, Sweden, Hong Kong and India and is now being adapted for the Swiss auction. This system allows secure bidding over the internet and has the advantage that the auction can be held remotely - i.e. bidders can bid from their company headquarters.

To prevent possible collusion and arrangements between the bidders, as far as possible, ComCom will not make known the names of the bidders. The names of the candidates, the winners, the acquired frequencies and the auction price will only be notified after at the end of the auction.

4.1 Combinatorial clock auction CCA

The CCA is a multi-stage auction, which is composed of the **principal stage** and the **assignment stage**.

In the **principal stage** it is determined which (abstract) frequency range a bidder can bid for, taking into account the bidding restrictions (see Section 3.5). On completion of the main stage it is therefore clear how many blocks of frequencies the individual participants in the auction have acquired in the different frequency ranges and at what base price.

The **assignment stage** will take place after the principal stage and will be used to determine the specific position of the acquired frequencies in the individual frequency bands. The aim is to award frequency blocks which are as contiguous as possible. The winners emerging from the principal stage have the possibility of bidding, in a secret auction, for those combinations specified by the auctioneer which they consider to be the most valuable.

Total price

The total price which a winner has to pay consists of the sum of the prices from the principal stage (base price) and from the assignment stage. In both stages the combination which maximises revenue will be calculated from all submitted bids. In this context, a maximum of one bid per bidder will be taken into consideration. The price to be paid by the individual winners is set so that it corresponds to the minimum necessary bid which would have led to the same auction result. Essentially, the auction price is not the highest bid but the amount of the

second-highest bid (so-called Vickrey or second prices). This provides an incentive not to bid strategically but to substantially disclose one's own willingness to pay.

Candidates must bindingly and irrevocably specify in their candidature dossier the maximum number of frequency blocks in each category which they wish to acquire at the respective minimum prices. If, after analysis of these data, it turns out that the demand for frequency blocks is greater than the number of blocks available in the respective category in **none** of the categories, there is no scarcity and the first stage of the auction is not held. In this case, the respective candidates are awarded the abstract frequency blocks they have applied for at the minimum price and the specific location of each block is determined within the framework of the assignment stage.

5 Technological development

With regard to providing the population with broadband multimedia mobile services (e.g. mobile internet), the mobile radio networks in Switzerland use the EDGE GSM data extension as well as UMTS with HSPA. HSPA (High Speed Packet Access) is an evolution of UMTS for the provision of higher data rates from the network to a mobile terminal and vice versa.

In view of the expected rapid increase in global mobile data traffic, the industry is developing new powerful, reasonable, spectrum-efficient mobile radio standards in order to further increase data rates and transmission capacities.

The foreseeable development stages are:

- **HSPA+** (Evolved High Speed Packet Access)

Market-ready devices which support this standard are available today. The standard allows:

- a doubling of voice capacity and a tripling of data capacity on the existing UMTS networks,
- a doubling of the data rate from the network to the mobile device and vice versa, compared to the existing HSPA,
- a reduction in network costs thanks to purely packet-switched transmission of voice and data,
- migration of networks to LTE.

- **LTE technology** (Long Term Evolution of UMTS)

LTE is a step further in the evolution of UMTS which has a completely new air interface. Characteristics of LTE are:

- 3 to 4 times higher spectrum efficiency than UMTS/HSPA (High Speed Packet Access) - at relatively low network costs (i.e. lower costs per transmitted bit),
- a significant increase in data rates on the downlink, up to 100 Mbps, and up to 50 Mbit/s on the uplink with a 20 MHz channel bandwidth,
- flexible channel bandwidths of 1.4 MHz, 2.5 MHz, 5 MHz, 10 MHz, 15 MHz and 20 MHz, requiring the smallest possible fragmentation of the frequency bands.

6 Licence

6.1 Term of the licence

The term of the licenses is until the end of 2028 for all frequencies. This is intended to give operators sufficient certainty, so that they can recoup the high investment in new technologies such as LTE. During the public consultation, the existing licensees considered a licence term of at least 15 years to be essential. This also reflects the general trend at the European level. A term which extends until the end of 2028 corresponds to a period of 15 years, in relation to the GSM licenses which expire at the end of 2013.

6.2 Technology

The licences are being awarded essentially in a technology-neutral manner. The licensees are free, within the assigned frequency ranges, to use those mobile radio technologies which they consider appropriate to the implementation of their business models. The general technical conditions will be laid down in the annexes to the licence.

6.3 Conditions relating to utilisation

In order to ensure that the assigned frequencies are actually used for the provision of telecommunications services, the licences include a general obligation to use the assigned frequencies to provide telecommunications services. Additionally, the following conditions of use, classified according to frequency bands, are imposed:

- Licensees which have the right to use frequencies below 1 GHz are obliged, by 31 December 2018, to ensure coverage of 50% of the population of Switzerland with mobile radio services via their own infrastructure;
- Licensees which have the right to use frequencies in the 1800 MHz and 2100 MHz FDD bands are obliged, by 31 December 2018 (1800 MHz) and by 31 December 2021 (2100 MHz FDD) respectively, to ensure coverage of 25% of the population of Switzerland with mobile radio services via their own infrastructure.
- Licensees which have the right to use frequencies in the 2100 MHz TDD and 2600 MHz bands shall be subject to the general obligation of utilisation from 1 January 2019 onwards.

The aim of these requirements is to ensure that the assigned frequencies are actually used and that any violations in the context of a supervisory procedure can be punished. More extensive provision of the population with high-quality mobile services will be achieved within the framework of competition between the mobile operators.

6.4 Protection from immissions and spatial planning

As with the current licences, the new licenses will include provisions regarding compliance with the Ordinance on Protection from Non-Ionising Radiation (ONIR). In addition, licensees are in principle obliged to co-use sites outside building zones and to inform the cantons in good time about their network planning.