



Schweizerische Eidgenossenschaft  
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Federal Department of the Environment,  
Transport, Energy and Communications DETEC  
Federal Office of Communications OFCOM

# **Analysis report on the public consultation**

**concerning**

**the re-tender for and award of mobile radio frequencies in Switzerland  
by 1 January 2014**

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# 1 Situation analysis

The situation analysis is intended to indicate the current situation regarding the frequency and allocation situation. In addition, the most important general conditions and influencing factors relating to the definition of a strategy for the award of the available frequencies and the frequencies which will become available by end of 2013 are indicated and analysed.

## 1.1 Allocation and frequency situation

In Switzerland, mobile radio frequencies in the GSM bands (GSM900 and GSM1800) and in the so-called UMTS core band are currently allocated to a total of 4 operators. The following figure clarifies the allocation situation between the 4 operators. As a result of the take-over of Tele2 by Sunrise, Tele2's frequencies reverted to the licensing authority and will become available again at the beginning of 2009.

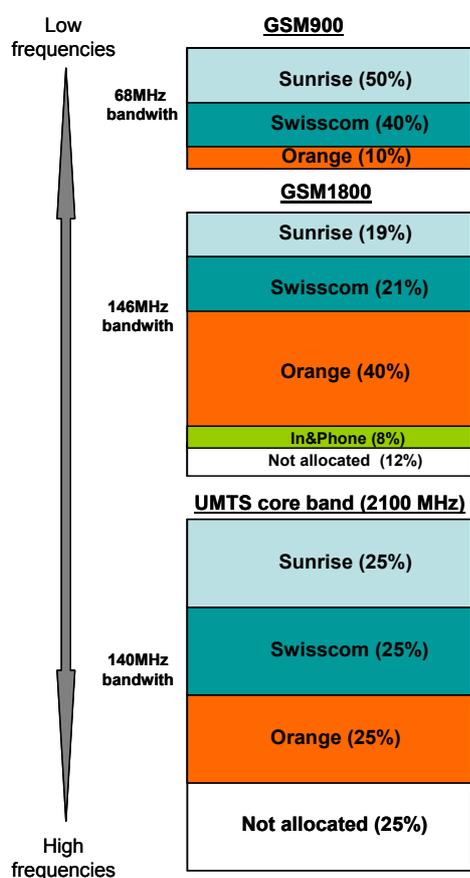


Figure 1: Allocation of GSM and UMTS frequencies in Switzerland

### 1.1.1 GSM

In the GSM band, 4 licences are currently awarded to Swisscom, Sunrise, Orange and In&Phone. The term of all the licences ends on 31 December 2013. At that time the entire GSM spectrum will be available for re-allocation. The current distribution of frequencies to the licensees is not uniform. For example, Sunrise has the most frequencies (50%) in the GSM900 band, followed by Swisscom with 40%. Orange has more than 10% of the GSM900 frequencies whilst In&Phone has no frequencies at all in this band. In the GSM1800 band, Orange has the most frequencies, at 40%, followed by Swisscom (21%) and Sunrise (19%).

In&Phone has more than 8% of the GSM1800 frequencies. The reasons for this asymmetry are:

- In 1998, Orange was launched as an exclusive GSM1800 operator in Switzerland. Orange received the frequencies in the 900MHz band at that time only after other frequencies became available in the so-called E-GSM band
- Tele2 and In&Phone launched in 2004 as exclusive GSM1800 operators for city networks and campus solutions in the Swiss market
- In the course of the allocation of GSM900 frequencies to Swisscom and Sunrise, the regulator's intention was to achieve frequency ranges which were as cohesive as possible, with a uniform distribution of the preferential frequencies at the national borders. Since these preferential frequencies are not uniformly distributed over the available frequency band, the result is a certain shift in favour of Sunrise in terms of the total quantity of available frequencies.

The frequencies allocated to Tele2 in the 1800 MHz band (12%) became free again as a result of the take-over of Tele2 by Sunrise at the end of 2008. In the 900 MHz band, with the exception of a few guard channels for separation of the frequency ranges allocated to the individual licensees, no frequencies are currently available.

With regard to the technology, the frequency bands under consideration are currently still limited to exclusive use by GSM. With the entry into force of the renewed licences of Swisscom, Sunrise and Orange, utilisation by UMTS technology will also be permitted for these licensees, given the availability of corresponding cohesive frequencies. The use of the GSM900 band by UMTS technology is of particular interest in this context. The GSM900 band has propagation characteristics which are considerably better for UMTS than the frequencies allocated in the UMTS core band and those envisaged in the extension band.

### **1.1.2 UMTS**

In the UMTS band (UMTS core band), 3 licences are currently awarded to Swisscom, Sunrise and Orange. A fourth licence awarded to 3GMobile (Telefonica) was revoked by ComCom in 2006.

The term of the licences ends on 31 December 2016. At that time the entire UMTS core band spectrum will become available for re-allocation. In contrast to the distribution in the GSM bands, each of the licensees has the same share (25%) of frequencies, a bandwidth of 35 MHz each. At present a bandwidth of 35 MHz is still available in the UMTS core band as a result of 3GMobile's revoked licence. Apart from the free frequencies in the UMTS core band, since the beginning of 2008 a bandwidth of 190 MHz has become available in the UMTS extension band.

### **1.1.3 UHF**

Within the framework of the "Regional Radio Conference 2006" (RRC-06) the UHF spectrum 470-862 MHz in Region 1 (Europe, Africa, Russia, Arab states and Iran) was re-planned (the GE06 Plan) and allocated to digital terrestrial television. According to this new plan, digitisation of terrestrial broadcasting in Region 1 is to be completed by 2015. Europe is attempting to complete the migration from analogue to digital terrestrial broadcasting by 2012.

After RRC-06 the mobile radio industry put strong pressure on the European Commission and a number of European countries and called for access to the frequency resources in the UHF spectrum. It was argued that on the basis of the now more efficient utilisation of the UHF spectrum, broadcasting would no longer require the entire frequency resources. The difference between the frequency resources originally needed for analogue broadcasting of TV programme services and the frequency requirement which is necessary today to broadcast these programme services using digital technology is termed the "**digital dividend**".

On the occasion of the last World Radiocommunication Conference in 2007 (WRC-07), the mobile radio industry succeeded in ensuring that mobile radio services in Region 1 were co-allocated the frequency sub-band 790-862 MHz from 2015 onwards. This means that this frequency sub-band can be used in future for broadcasting and/or mobile radio services. It is now up to the European administrations to decide whether mobile radio services are to be introduced in this frequency range or whether this frequency sub-band will continue to be used for broadcasting services.

Some administrations, such as Spain, Portugal and Italy are currently of the opinion that they will continue to operate digital broadcasting in this frequency band beyond 2015. This would mean that neighbouring administrations which are inclined to introduce mobile radio services would have to cope with fairly major technical restrictions in the border areas (such as Switzerland and Italy). The European Commission is attempting to avoid such a situation and is applying corresponding pressure to oblige member states to use the 790-862 MHz sub-band exclusively for mobile radio services on a Europe-wide basis. Switzerland supports the introduction of mobile radio services in the 790-862 MHz sub-band.

The 790-862 MHz frequency sub-band is of great interest to operators as it allows low-cost, large-area coverage with mobile services. However, it is currently necessary to await the completion of corresponding European standards on the utilisation of these frequencies in the standardisation bodies. Work on this has already been started by the CEPT. At present, it is assumed that these fundamentals for utilisation of the frequencies will be available in 2013.

According to the GE06 Plan, Switzerland was allocated 7 national UHF coverages for digital terrestrial broadcasting, for DVB-T or DVB-H. A maximum of 2 of the 7 national UHF broadcasting coverages are affected by the decision of the World Radiocommunication Conference to open up the upper UHF 790-862 MHz sub-band from 2015 onwards to mobile radio services as well, on a co-primary basis. OFCOM is of the opinion that the remaining capacity of 5 coverages for Swiss terrestrial TV coverage is sufficient.

Fortunately, OFCOM has not allocated any frequency resources situated in the upper UHF band to the SRG for construction of national digital terrestrial TV coverage. Hence the TV channels in the upper sub-band, apart from a few exceptions<sup>1</sup>, would already be available today for the introduction of mobile radio services. In principle it can be stated that the availability of the upper UHF sub-band for mobile radio services in Switzerland is dependent not on national restrictions but rather on the rate of migration from analogue to digital terrestrial broadcasting in neighbouring countries. On the basis of the as yet incomplete digitisation of terrestrial broadcasting in our neighbouring countries, the introduction of mobile radio services in Switzerland will probably not be realistic before 2014/15.

In October 2008, the French government announced that the upper sub-band will be used for mobile services in France from 2012. In Switzerland, the Federal Council communicated in November 2008 that the 790-862 frequency sub-band will be released for mobile radio services before 2015. In February 2009, Germany and Great Britain followed with comparable decisions in principle concerning the 790-862 MHz UHF band. The two administrations also envisage mobile radio services in this frequency band in the future.

From today's viewpoint, it can be assumed that it will be possible to introduce mobile radio services from 2014/15 at least in German-speaking and French-speaking Switzerland.

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<sup>1</sup> For historic reasons, a few digital TV channels in the upper sub-band are used by the two companies "Telerätia" and "Valais-com" in Grisons and Upper Valais. Measures relating to the necessary frequency changes have been introduced by OFCOM.

### 1.1.4 Summary of the frequencies and bandwidths expected to be available at the end of 2013/2016<sup>2</sup>

Range	Mode	Bandwidth <sup>3</sup>
800 MHz <sup>4</sup>	FDD	2 x 31 MHz <sup>5</sup>
	TDD	1 x 10 MHz
900 MHz	FDD	2 x 35 MHz
1800 MHz	FDD	2 x 75 MHz
2100 MHz	FDD	2 x 60 MHz
	TDD	1 x 20 MHz
2600 MHz	FDD	2 x 70 MHz <sup>6</sup>
	TDD	1 x 50 MHz

## 1.2 General conditions and environmental factors

### 1.2.1 The legal foundations

According to article 24 para. 1 of the Telecommunications Act (TCA, SR 784.10), as a rule a public invitation to tender is issued for the award of a radio licence if telecommunication services are to be provided by way of the frequency utilisation which is being applied for and if insufficient frequencies are available for all current or foreseeable future interested parties. According to art. 24, para. 2 TCA, the principles of objectivity, non-discrimination and transparency are decisive for the procedure. The procedure is regulated by art. 20 ff. of the Ordinance on Frequency Management and Radiocommunication Licences (OFMRL, SR 784.102.1).

According to art. 19 para. 1 OFMRL, the licensing authority may renew or extend the term of a licence if a public invitation to tender is not justified according to art. 24 para. 1 TCA.

The term “as a rule” indicates that it lies within the authority’s discretion to organise a public invitation to tender. If the demand for frequencies exceeds the supply (a scarce commodity), for example in the case of the award or renewal of the last GSM mobile radio licences (renewal of the GSM licences of Swisscom, Orange and Sunrise), only a public tender procedure can guarantee providers non-discriminatory and transparent access to the market, as required by art. 24 para. 2 TCA. In the case of the award of national mobile radio licences it can be assumed that the demand for frequencies generally exceeds supply and that a tender procedure should take place.

In addition, according to art. 21 OFMRL, the licensing authority determines whether the award is made on the basis of a beauty contest or an auction. A pre-selection procedure may precede the auction.

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<sup>2</sup> Utilisation for new technologies such as LTE at the national borders has not yet been clarified

<sup>3</sup> Rounded-up value.

<sup>4</sup> Possibly not useable at all borders with neighbouring countries.

<sup>5</sup> The partition of bandwidth to FDD – TDD is not yet definitive at present.

<sup>6</sup> The partition of bandwidth to FDD – TDD is not yet definitive at present.

### **1.2.2 The ordinance on non-ionising radiation (ONIR)**

Opposition to non-ionising radiation (NIR) due to worries about damages of health continues, but is currently less pronounced than in previous years. Relevant factors include on the one hand the results of scientific studies and on the other hand the strengthened legislation. The situation relating to building permits which are handled by municipalities or cantons continues to be problematic. Among other things, they make it more difficult for existing operators to construct their networks if they co-use an installation. In the event of a modification by one operator, all the co-users have to apply jointly for a new building permit. The result is that the other co-users are unable to make any changes themselves whilst this procedure is ongoing. This is sometimes a reason why individual operators frequently do not wish to make their equipment available to other co-users.

In future operators will be obliged to make their cells smaller and smaller in order to be able to handle the increasing traffic. Peak radiation will therefore be reduced and the average exposure will be distributed more uniformly. Numerous new transmitter installations will have to be constructed to achieve the corresponding increased network density. Co-use of these installations will continue to be possible and appropriate only in special cases. It is to be expected that parts of the population will continue to oppose these new sites. Network expansion for existing operators and network deployment for new operators will therefore be difficult to achieve and will be very time-consuming.

From the radiation exposure viewpoint, the deployment of a single infrastructure network is hardly appropriate, as with a single network radiation would not be greatly reduced and in any event only in a few locations. The exposure to radiation is primarily determined by the traffic handled, not by the number of networks or operators.

The results of the international epidemiological Interphon cancer research study should be published soon, along with the conclusions. The individual studies already published indicate that no ground-breaking results can be expected. In addition, National Research Programme 57 (NRP 57) on non-ionising radiation will be completed in 2010. Depending on the results, there is the possibility that it will be possible to discuss limit values and strict implementation.

It is important that the dialogue between operators and the population is maintained and that legal disputes are avoided as far as possible.

### **1.2.3 Spatial planning**

In Switzerland there are well over 10,000 transmitter sites and base stations in total for GSM and UMTS. Further expansion of the mobile radio networks will be indispensable given the forecast increased demand for mobile transmission of large volumes of data. If existing antenna sites cannot be expanded for this purpose, new sites will have to be built. Within housing development areas or built-up areas, mobile radio installations are generally appropriate. If a project meets the requirements under building laws and environmental protection legislation, the applicant has an entitlement to the granting of the necessary building permit. However, federal jurisprudence has repeatedly emphasized that municipalities are fundamentally entitled, within the framework of their building and planning law competencies, to issue building and zoning regulations relating to mobile radio installations, in so far as there is a local planning interest and no environmental protection interests (protection from non-ionising radiation). This increased latitude of action for municipalities may mean that network deployment will continue to be made more difficult as a result of restrictive conditions.

### **1.2.4 Attractiveness of different frequency bands**

The attractiveness of different frequencies is determined by their propagation characteristics (coverage, penetration of buildings). On the basis of the physical properties (wavelength, lower attenuation), lower frequencies have better propagation characteristics (greater ranges) than higher frequencies. Thus larger areas can be covered by lower frequencies and

better coverage within buildings can be achieved than with higher frequencies. This applies in particular to coverage of large areas, as is the case in rural, sparsely populated regions.

In densely populated areas, towns and cities, another key factor, apart from mobile radio coverage of an area, is the provision of corresponding capacities (a commensurate number of transmission channels) for mobile voice and data connections. Capacity expansion (increasing the number of transmission channels) can be achieved in a base station by the additional installation of more transmitter units. Transmitter units are technical components which provide a corresponding number of transmission channels for voice and data for a frequency (for example, 8 channels in the case of GSM). However, physical limitations regarding the number of transmitter installations which can be incorporated must be taken into account. Since the radiation emissions from a base station increase as the number of transmitter units in use increases, the applicable limit values for a transmitter installation according to the ONIR restrict their expansion in the form of extra capacity. In such areas, therefore, a planning concept for mobile radio coverage must be adopted which aims not for fewer large radio cells with many transmitter units but for a larger number of smaller radio cells with fewer transmitter units. If more channels are needed at high-traffic locations – say in city centres, rail stations and airports – multiple base stations with a smaller range must be installed in the corresponding area, regardless of the theoretical range of the transmitter installations. “cell size reductions” must therefore be achieved. In this context the advantage of lower frequencies regarding the maximum possible coverage area is less important. Nevertheless, with regard to coverage within buildings, lower frequencies always have an advantage over higher frequencies.

From these considerations, for the frequencies considered in section 1, there are different degrees of attractiveness for utilisation by mobile services, as is shown in the table below.

Range	Band	Attractiveness
Digital dividend UHF 800 800 MHz	low	Very attractive <ul style="list-style-type: none"> <li>• Excellent propagation characteristics</li> <li>• Ideal band for wide-area and indoor coverage</li> </ul> <p>However, relatively few frequencies are available</p>
GSM 900 / UMTS 900 900 MHz	low	Very attractive <ul style="list-style-type: none"> <li>• Excellent propagation characteristics</li> <li>• Ideal band for wide-area and indoor coverage</li> </ul> <p>However, relatively few frequencies are available</p>
GSM 1800 / UMTS 1800 1800 MHz	medium	Not as attractive as UHF and GSM900, but a good addition with a view to coverage of densely populated areas and towns <ul style="list-style-type: none"> <li>• Good propagation characteristics</li> <li>• Good band for area/indoor coverage and capacity extension</li> </ul> <p>More frequencies are available compared to UHF; currently a certain number of frequencies are not used</p>
UMTS core band 2100 MHz	higher	Less attractive for wide-area coverage <ul style="list-style-type: none"> <li>• Suitable for provision of capacities relating to broadband data services</li> <li>• Coverage inside buildings more difficult compared to lower frequencies</li> </ul> <p>At present, free frequencies are still available in this range</p>
UMTS expansion band 2600 MHz	very high	Currently not very attractive, as suitable exclusively for expanding capacity of existing networks. <p>Free frequencies currently available, but there is little interest</p>

## 1.2.5 Development of frequency policy

### 1.2.5.1 Neutrality with regard to services and technology

The introduction of the greatest possible neutrality with regard to technology and services is essential to increase flexibility in the utilisation of frequencies and to promote efficient use of resources, i.e. spectrum efficiency in the economic sense. Neutrality with regard to technology and services do not constitute independent instruments; they find their particular application in the configuration of frequency utilisation rights, e.g. licences.

**Neutrality with regard to technology** means that the regulator should not impose any conditions on the use or against the use of a specific technology.

**Neutrality with regard to services** means that when utilisation rights are defined no conditions are imposed concerning the provision of specific services, in terms of the ITU Radio Regulations.

The principle of the above-mentioned neutrality in respect of services and technology is the key to efficient frequency utilisation. Innovations which are dependent on radio frequencies may occur if, with regard to access to frequencies, no restrictions, or as few as possible, exist concerning the services which are provided on a specific bandwidth, or the technology by means of which these services are provided.

The EU's Wireless Access Policy for Electronic Communications Services (WAPECS) initiative is one approach to implementing neutrality with regard to technology and services. WAPECS is a paraphrase for wireless access platforms for electronic communication services, independently of the frequency bands and technologies which are used by them. Different WAPECS platforms can provide mobile, portable or even fixed access for a series of telecommunication services on a licensed or licence-free basis.<sup>7</sup>

The EU-Commission has asked the CEPT to draw up the minimum technical requirements for implementing the WAPECS concept.

At present, the following bands are envisaged for the WAPECS model (more may follow):

- 470-862 MHz (UHF band IV/V)
- 880-915 MHz / 925-960 MHz (GSM900 band)
- 1710-1785 MHz / 1805-1880 MHz (GSM1800 band)
- 1900-1980 MHz / 2010-2025 MHz / 2110-2170 MHz (UMTS core band); (e.g. in Sweden and Germany, the corresponding decision on allocating these frequency ranges as WAPECS licences has already been taken)
- 2500-2690 MHz (UMTS extension band); (e.g. Sweden, England and Germany)
- 3.4-3.8 GHz (BWA cf. Germany)

The list includes all mobile radio bands (IMT).

This means that in the above-mentioned frequency ranges no further regulations will be imposed with regard to the technologies and services to be used in the licence. In addition, neutrality with regard to services and technologies has an immense effect on the potential marketability of the licence. Furthermore, it may prevent frequency bottlenecks, as the use of a technology in connection with a service is no longer defined with regard to a few areas (e.g. currently GSM 1800 and 900 MHz, UMTS 2.1 GHz), so potential hoarding of frequen-

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<sup>7</sup> REPORT of the European Parliament on the path to a European frequency policy (2006/2212(INI)) Committee for Industry, Research and Energy; reporter: Fiona Hall

cies can be countered. But this does not mean that WAPECS licences will have the same weight in all frequency ranges. Qualitative differences remain, on the basis of the physical properties of specific frequency bands, in particular with reference to propagation and penetration characteristics. The possible applications of mobile radio technology will be extended by the implementation of the WAPECS concept.

## 1.2.6 Technological developments

### 1.2.6.1 Standards

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 and UMTS/HSPA as transmission technologies. HSPA (High Speed Packet Access) is a further development of UMTS for the provision of higher data rates from the network to a mobile terminal and vice versa.

With regard to the rapid worldwide increase in mobile data communications predicted by some market studies, new, powerful, more economical and spectrum-efficient mobile radio standards will be developed by the industry to further increase data rates and transmission capacities.

The foreseeable stages of evolution are:

- HSPA+ (Evolved High Speed Packet Access)
  - Ready-to-market devices which support this standard are expected in the course of 2009. The standard permits
    - doubling of voice capacity and tripling of data capacity on the existing UMTS networks,
    - doubling of data rates from the network to the mobile terminal and back compared with the existing HSPA,
    - reduction of network costs thanks to purely packet-switched voice and data transmission.
- LTE technology (Long Term Evolution of UMTS)
  - LTE designates a further expansion stage of UMTS, which will be introduced from around 2010/2012 and which has a brand new air interface. Features of LTE are
    - spectrum efficiency some 3 to 4 times higher than UMTS HSPA (High Speed Packet Access), at relatively low network costs (i.e. lower costs per bit transmitted),
    - a significant increase in data rates in the downlink to up to 100 Mbit/s and in the uplink to up to 50 Mbit/s 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; this requires as little fragmentation of frequency bands as possible.

Mention should also be made here of the development of the IEEE 802.16 standard for BWA-based mobile radio systems. The development of this standard, however, is currently much less advanced than the further development of UMTS systems. In this connection, reference should also be made to the award of a licence in the UHF band (790 – 862 MHz) for mobile radio providers, which has already taken place in the USA. It is expected that these licensees will be among the first to apply LTE technology in the next three years.

Approaches such as Cognitive Radio are still in the development stage and are not yet ready for launching on the market. Cognitive Radio is an SDR-based system (Software Defined Radio), which additionally observes its environment (the interference situation) and if necessary reacts independently to it (adaptation of transmission and reception parameters). Cognitive Radio requires a flexible use concept which it will not be possible to introduce in the foreseeable future.

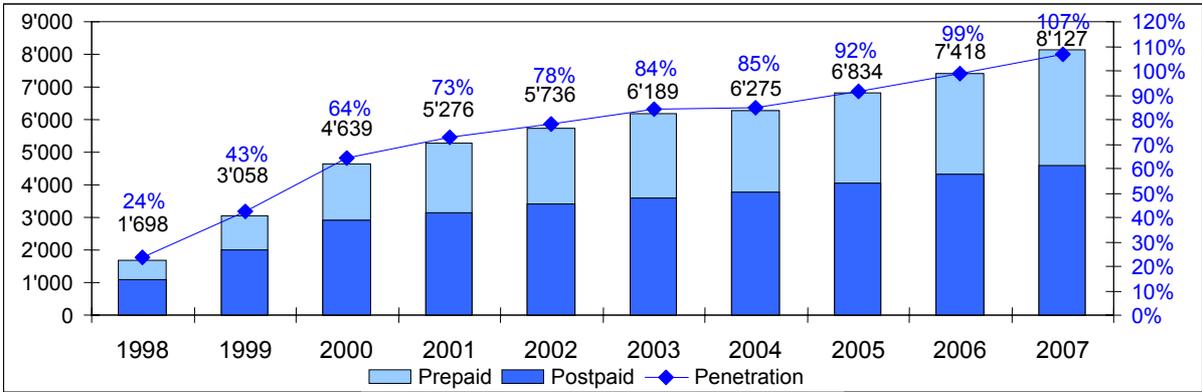
**1.2.7 The market situation**

**1.2.7.1 Market penetration and market structure**

The mobile radio market in Switzerland is still growing. Growth rates are stable at about 7% in recent years. At the end of 2007, the number of mobile radio users exceeded 8 million. Just short of 1.5 million customers (19.5% of all mobile users) who had taken up UMTS offerings were recorded (only 5.3% in 2006).

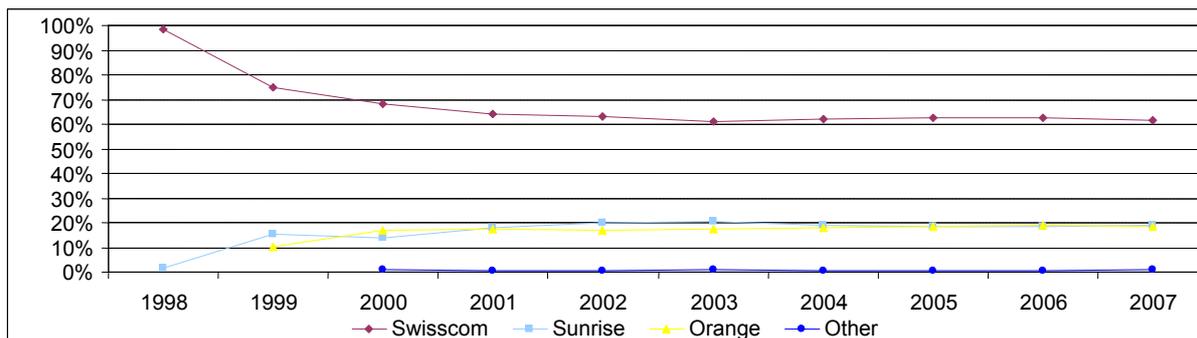
The mobile radio penetration rate has reached 107%. This means that some mobile users have at least 2 SIM cards. It should be remembered that as a result of campaigns such as giving away prepaid cards to existing customers, numbers of subscribers are artificially inflated without any actual growth in users. In comparison with other European countries, the Swiss penetration rate is somewhat modest. The European average is considerably higher and the maximum penetration rate is about 165% (Luxemburg). Switzerland is therefore in the lower third among the EU countries.

More than half of mobile users (57%) chose a contract in 2007, although prepaid offerings are distinctly cheaper for many user profiles. One important reason for this is probably handset subsidies, which are more common with subscribers than with prepaid offerings. Also, for many customers when a choice has been made it is not changed.



Market penetration: Number of users/penetration (source: OFCOM)

Eight years ago the mobile radio market was split between the three large providers. Since then, the structure of the market has remained virtually unchanged.

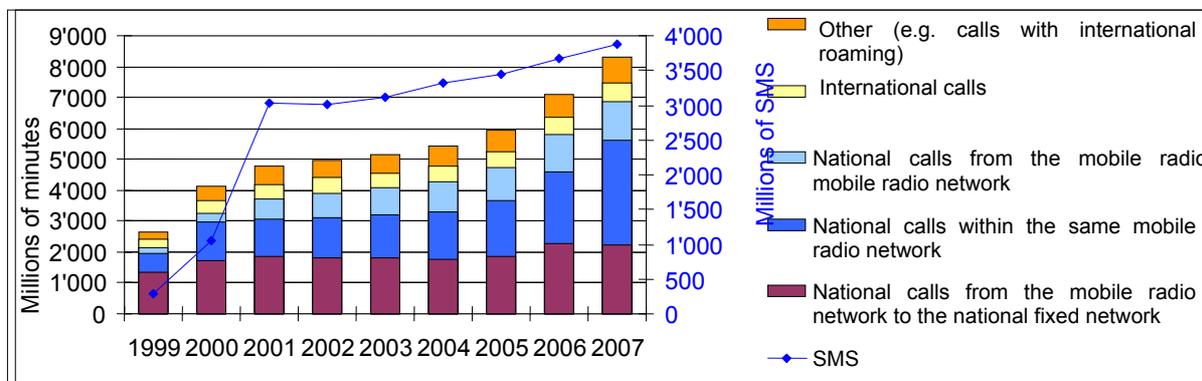


Market shares of mobile radio providers (source: OFCOM)

Swisscom has a market share of approximately 62%. The market shares of Orange and Sunrise have levelled off at about 19% respectively. In&Phone, as a campus network operator, has gained less than 1% of customers to date. Moreover, Tele2 left the Swiss market at the end of 2008. National roaming under unregulated conditions does not seem able to help providers with low network coverage to achieve a level playing field with national networks.

### 1.2.7.2 Market performance

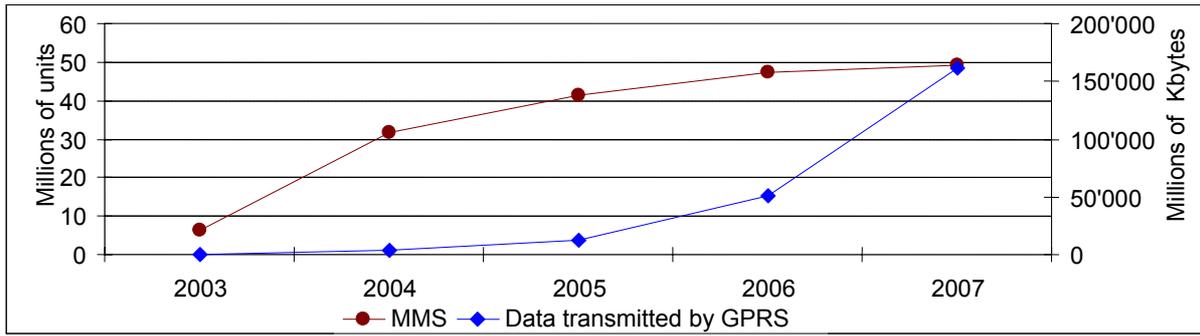
Mobile radio traffic has increased markedly over the last two years. In 2007, the main contribution to this was national calls within the same mobile network. Increased demand is determined by new offerings which offer lower prices for calls on the same network. International calls and roaming make up a rather small share of total mobile radio traffic. They are considerably more expensive and less in demand.



Mobile radio traffic (source: official telecommunications statistics)

Since then, there has been a trend towards greater demand for data services. The number of SMS and MMS<sup>8</sup> is increasing from year to year. Since 2001, however the demand for SMS has been developing at a rather moderate rate. The increase in the number of MMS sent is gradually levelling off. On the other hand, mobile internet use has increased markedly. The volume of data transmitted over mobile radio networks (GSM/GPRS, UMTS/HSDPA) increased rapidly between 2005 and 2007.

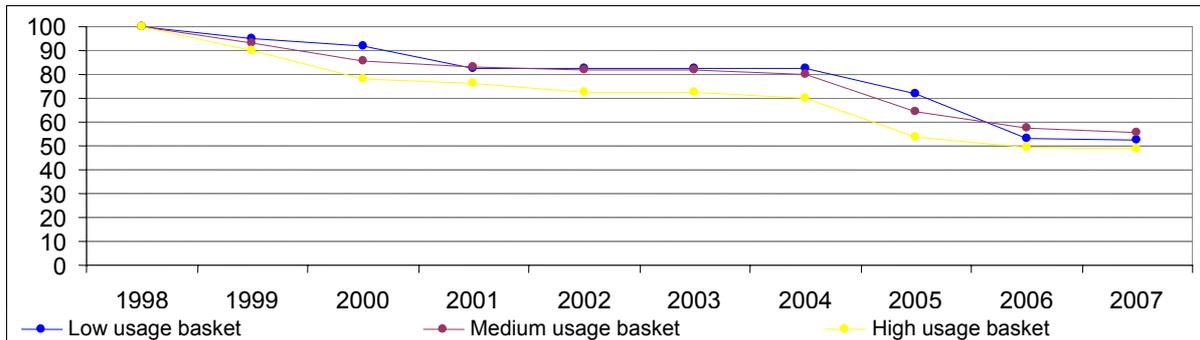
<sup>8</sup> Only "peer-to-peer" SMS and MMS considered.



Data use (source: official telecommunications statistics,) left scale for MMS, right scale for GPRS

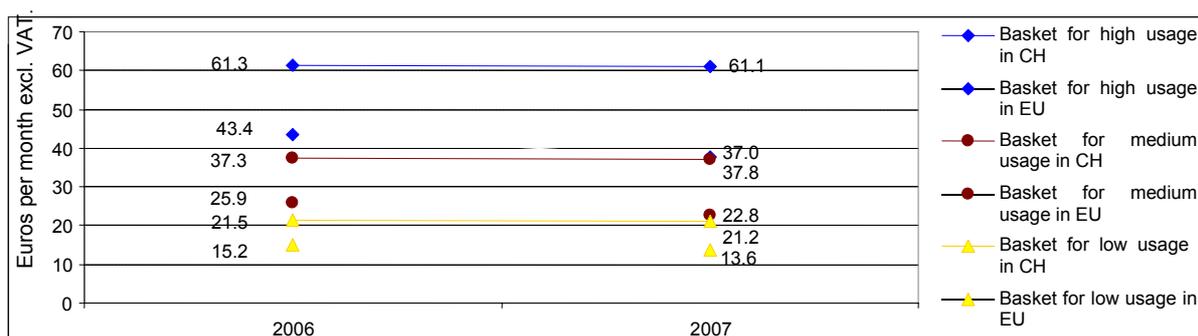
In the next few years, the mobile radio industry is expecting strong growth in the use of mobile multimedia services both in the private sphere (video streaming, mobile TV and games) and in the business sector. Major factors in continued development are opening up the market for appropriate terminals, network expansion using corresponding technologies for mobile broadband coverage and increasing marketability of services.

If one observes the evolution of prices in recent years, a marked reduction of mobile radio prices is evident. Since 1998 prices have fallen by up to 50%. Between 2001 and 2004 the level of prices remained practically unchanged, though prices fell considerably in 2005. This is attributable to the appearance of new re-selling offerings from Migros, Coop, Yallo, Cablecom and Mobilezone, for example. The reduction in prices levelled off in 2007.



Evolution of the price index: source OFCOM)

In European terms, the price level continues to be high, as shown by the illustration below of the price level in comparison with the EU. Three baskets of goods were taken into account, i.e. one each for low, average and high usage. In all three categories, prices in Switzerland are considerably higher than in the EU. In particular it is worth noting that the cost of a low usage basket in Switzerland is very close to that of a medium usage basket in the EU. The same applies to a medium usage basket in Switzerland which is close to a high usage basket in the EU (conversion according to exchange rates).



Price level compared with the EU (source: EU Commission and OFCOM)

Competition on prices also tends to be less pronounced in comparative terms. Swisscom is able to impose considerably higher prices on the market than its competitors and yet retain the same share of the market for years. Swiss operators are also comparatively expensive in terms of termination charges, which represent a substantial component of wholesale costs in mobile communication pricing. Though there is a constant reduction in these charges, this is more tentative than in the EU.

### 1.2.7.3 International trends

In many European countries there are discernible trends towards concentration at national level towards 3 or a maximum of 4 mobile radio operators (e.g. Austria, the Netherlands). At the European level, concentration on multinational operators is also taking place (Telefonica, T-Mobile, Orange, Vodafone). The international trend towards increasing competition on prices in mobile radio and the competitive relationship with the fixed network demands that the mobile operators concerned fully exploit all economies of scale (the economic pressure on concentration).

## 1.3 Findings from the situation analysis

The most important findings from the situation analysis can be summarised as follows:

- All available frequencies are currently allocated in the 900 MHz band. In the 1800 MHz GSM band, the frequencies allocated to Tele2 became free again at the end of 2008 as a result of the take-over of Tele2 by Sunrise. The corresponding GSM licences expire at the end of 2013. Within the framework of the procedure to renew the licences of Orange, Sunrise and Swisscom, these operators attempt to use the GSM spectrum also for UMTS. The procedure regarding the use of these frequencies after 2013 should be arranged as soon as possible.
- In the UMTS core band (2100 MHz), bandwidth of approximately 2 x 15 MHz FDD and 1 x 5 MHz TDD is available. The remaining frequencies are currently allocated. The corresponding licences expire at the end of 2016. From today's viewpoint, additional spectrum in the UMTS core band for existing licensees is not essential in the next few years.
- In the UMTS extension band (2600 MHz), a bandwidth of 190 MHz is available. Interest in these frequencies is low, among both existing licensees and other companies.
- It can be assumed that a bandwidth of 72 MHz resulting from the digital dividend in the UHF band (< 1GHz) will be available from about 2013 for the provision of mobile radio services, including the technical standards necessary for their utilisation. Given

their very good propagation characteristics, high interest is expected for these frequencies. If neighbouring countries decide to continue using the 790-862 MHz frequency band for broadcasting services, this might lead to technical limitations near national borders for Swiss mobile radio operators. In October 2008, the French government announced that the upper sub-band will be used for mobile services in France from 2012. A corresponding decision still has to be taken in Germany. From today's viewpoint, it can be assumed that it will be possible to introduce mobile radio services in this band from 2013/15 at least in German-speaking and French-speaking Switzerland. Since Italy intends to use this frequency band for broadcasting beyond 2015, there is a risk that in the border areas with Italy, fairly major technical restrictions will have to be taken into consideration.

- Frequencies in low frequency ranges (UHF, GSM) are more attractive, given their propagation characteristics and good penetration of buildings, than frequencies in higher frequency ranges (UMTS core band and extension band, BWA).
- Internationally, the objective will be frequency utilisation which is as flexible as possible. Frequency utilisation rights must be awarded in a technology-neutral and service-neutral manner and the licences should include as few technical and regulatory conditions as possible.
- Technical development is heading towards mobile broadband connections with bandwidths >100 Mbit/s. It is to be expected that LTE (Long Term Evolution), a further development of the UMTS standard, will make its mark and will provisionally be available by 2012.
- There is potential for increasing competition in the Swiss mobile radio market. However, the possibilities of stimulating competition through the award of frequencies and licences are limited.

## **2 Scenarios / strategy variants**

### **2.1 Important questions in defining the scenarios**

#### **2.1.1 New invitation to tender vs. renewal**

##### **2.1.1.1 From the legal viewpoint**

A public invitation to tender is as a rule issued for the award of a radio licence if telecommunication services are to be provided by way of the frequency utilisation which is being applied for and if insufficient frequencies are available for all current or foreseeable future interested parties (article 24 para. 1 TCA). The procedure is regulated in art. 20 ff OFMRL.

According to art. 19 para. 1, the licensing authority may renew or extend the term of a licence if a public invitation to tender is not justified according to art. 24 para. 1 TCA.

Concerning the expiring licences, the basic question posed is whether these should be extended or renewed without a public tender procedure. Extension is to be understood as setting a new term for the licence without substantive adjustments to the licence. With a renewal there is the possibility of making changes not only to the term but also other adjustments to the licence (conditions, frequency distribution).

With regard to the GSM licences which have expired on 31 May 2008, ComCom, for its part, decided to renew these with partial refarming, on a technology-neutral basis, with a view to use with GSM or UMTS. The experience acquired from this process showed that a renewal of existing licences is associated with a number of difficulties. On the one hand there is the question of which companies are to be included as parties to such a process and on the other hand the question of distribution of the spectrum within the framework of a possible refarming may lead to time-consuming discussions. A renewal process therefore involves high legal risks which can lead to extensive delays. From a legal point of view, a new invitation to tender for expiring licences is therefore preferable.

##### **2.1.1.2 From the economic viewpoint**

From the economic viewpoint, an extension or renewal of radio licences may lead to possible inefficiencies and asymmetries in the structure of the market and in frequency utilisation being maintained. Such a procedure also leads to established structures being maintained and no possibilities of innovation arise. In contrast, an invitation to tender or a new award provides a possibility of reconfiguring the market structures. Since operators are more closely involved with the market than the licensing authority, they are also better able to estimate future market evolution and the related size of the required spectrum. From an economic viewpoint too, a new invitation to tender for expiring licences therefore appears more appropriate than an extension or a renewal.

##### **2.1.1.3 From the viewpoint of the existing licensees**

Generally speaking, existing licensees have a great interest in being able to continue using the spectrum allocated to them even after the licences expire and in having the licences extended or renewed. This enables them on the one hand to avoid the major effort and expense of any candidature within the framework of a tender procedure, to enjoy long-term security in respect of planning and not to fear any new competitors.

As experience shows in connection with the current procedure to renew the GSM licences, however, renewal of a licence may also lead to discussions on the distribution of the spectrum and possible appeals to delay the procedure as a whole.

#### **2.1.1.4 Summary**

An invitation to tender, as the normal case provided for in the TCA, is preferable to a renewal from a legal and economic viewpoint.

#### **2.1.2 Auction vs. beauty contest**

According to art. 21 of the Ordinance on Frequency Management and Radio Licences (OFMRL), in a tender procedure the licensing authority determines whether the award is made on the basis of a beauty contest or an auction. If a beauty contest takes place, the licensing authority evaluates the submissions on the basis of the decision criteria listed and weighted in the tender documents (art. 22, para. 1 OFMRL). If an auction takes place, appropriate proceeds must be achieved, according to art. 23 para. 1 OFMRL. The licensing authority may specify a minimum bid for this purpose.

In connection with various award procedures, ComCom has already addressed the issue several times of the procedure to be chosen and in the process has discussed the advantages and disadvantages of the two procedural variants. It comes to the conclusion that on the basis of the many advantages of holding an auction, such as objectivity, transparency and speed of implementation of the procedure, plus the fact that given an appropriate procedural structure an efficient allocation of frequency blocks more in keeping with participants' needs is possible, preference is to be given to an auction. Furthermore, this avoids the problem that beauty contests in complex award situations are difficult to handle in terms of conception and administration.

In addition, the Competition Commission has repeatedly expressed its position on possible award procedures in connection with earlier tender procedures and has in each case maintained that it considers an auction as the most appropriate procedure.

#### **2.1.3 Sequential vs. simultaneous award**

In connection with the availability of frequencies in the different frequency ranges and their extent, the question is posed as to whether individual frequency blocks or frequency ranges should be awarded in isolation, sequentially or simultaneously.

##### **2.1.3.1 No value interdependencies**

Without value interdependencies a candidate is able to assess the value of the individual frequency blocks or licences in isolation and independently of a possible, chronologically delayed award of other frequencies or licences in different frequency ranges. The acquisition of frequencies in a specific quantity or in a specific frequency range is thus not influenced by a possible award of other frequencies at a later time. In so far as no value interdependencies exist between the individual frequency blocks, it is therefore immaterial whether a sequential or a simultaneous award is carried out.

##### **2.1.3.2 Value interdependencies are present**

In the event of value interdependencies between the individual frequency blocks or licences, it is important for a candidate that as part of the award they have the possibility of acquiring a frequency configuration which best suits their business model, with frequencies from different frequency blocks and in different quantities. A simultaneous award is therefore preferable if value interdependencies apply. Candidates are then able to express the value of these interdependencies as part of their bid (during an auction). If a sequential award is made in such a case, there is a risk of strategic behaviours and irrational bidding behaviour. This may result in economically inefficient outcomes. In particular, a premature award of substitutable "lesser value" frequencies would be especially problematic and inefficient.

### **2.1.3.3 Simultaneous award as the preferred procedure**

In view of the extent of the frequencies available in the different frequency ranges at the end of 2013, it is apparent that there are major interdependencies in terms of value. On the one hand, providers need frequencies in the lower frequency ranges, which have better technical propagation characteristics, and on the other hand frequencies in the higher frequency ranges are also required, particularly for expanding capacity in densely populated areas are also required. A simultaneous award of the frequencies to be awarded by the end of 2013 is therefore preferable to a sequential award.

### **2.1.4 Small vs. large blocks of frequencies**

When the award procedure is designed, the possible distribution of the available spectrum must be defined. In principle, two approaches can be applied.

#### **2.1.4.1 Large blocks of frequencies**

The licensing authority prescribes a fixed frequency configuration for the licences and puts full licences out to tender. In this way it determines the number of licences to be awarded, as well as the market structure. One problematic area of this procedure is that candidates have no possibility of achieving the ideal frequency configuration for their business models, and this may lead to inefficient spectrum utilisation. There is also the risk that by specifying the number of licences, a market structure is predefined which makes no sense from an economic viewpoint.

#### **2.1.4.2 Small blocks of frequencies**

In this procedure, the entire available spectrum is split into individual small frequency blocks (e.g. 5 MHz blocks). The licensing authority prescribes neither the frequency configuration nor the number of licences to be awarded. Within the framework of the procedure, the candidates can acquire different individual blocks and in this way determine the frequency configuration of their licence, to a large extent. This can ensure that the frequency utilisation rights go to those who can use the spectrum most efficiently. Since the number of licences to be awarded is not defined, possible newcomers also have greater opportunities of acquiring a licence tailored to their conditions.

#### **2.1.4.3 Small frequency blocks as the preferred procedure**

Since the providers are more in tune with the market than the licensing authorities and are better able to assess possible developments, they are also better able to estimate the optimal frequency configuration from their point of view. The licensing authority can develop guidelines for a competitive final result through the introduction of spectrum caps. Award of the frequencies available as of 2013/2016 in small blocks therefore appears to be a reasonable procedure.

### **2.1.5 No special promotion of newcomers**

In view of the limited competition in the Swiss mobile radio market, the question is posed as to whether a sustainable stimulus of the market might result from the entry of a newcomer. However, the probability that a new operator without its own infrastructure and customer base in Switzerland could develop as a genuine competitor with the established operators must be assessed as rather low.

Continuing resistance of parts of the population to the construction of antenna installations would mean, particularly for a new operator, that it could only construct its own network slowly. Co-use of existing installations belonging to other operators within the construction zone would hardly be possible because of the very strict enforcement laid down in the ONIR

for a large number of the necessary antenna sites. A new provider would therefore have to expect slow and expensive network deployment.

Also, with regard to the increasing market saturation and the stable distribution of market shares which has now existed for several years, it could hardly be expected that a new operator would be able to build up an adequate customer base within a reasonable period. A typical example of this is Tele2. Despite its own infrastructure, national coverage via national roaming and attractive products, the company was unable to achieve on a long-term perspective a successful establishment at the Swiss market.

For the above-mentioned reasons, it does not appear appropriate to actively encourage a newcomer, for instance by reserving frequencies or licences. However, to ensure that possible new providers are not excluded from the award procedure, it should be designed so that it is possible even for a newcomer to acquire individual packages of frequencies, but without them being exclusively reserved for it.

### **2.1.6 Neutrality in respect of technology and services vs. harmonised application**

An attempt is being made to achieve more flexible utilisation of frequencies by means of the EU's WAPECS (Wireless Access Policy for Electronic Communications Services) and the CEPT's Flexible Bands concept. In this context, frequencies are to be allocated in a manner which is as neutral as possible in terms of technologies and frequencies, and the corresponding licences must contain as few technical conditions as possible. It is to be expected that the frequency bands which are to be used in accordance with these principles will be harmonised at the European level. From today's perspective, an award which is neutral in terms of technology and services should be the aim of the allocation of the frequencies which will become free at the end of 2013/2016.

### **2.1.7 Relevant aspects with regard to demand**

In terms of the frequencies already available today in the different frequency bands, the question arises in connection with the development of different scenarios as to when these should be awarded. Generally speaking, it should be noted that the mobile radio operators prefer frequencies in the lower frequency ranges because of their good propagation characteristics. In addition, a change in the use of existing frequency bands or the use of new frequency ranges involves considerable network investment costs and cannot be achieved from one day to the next, in particular because of the essential approval procedures.

With regard to the free frequency bands in the UMTS core band (the former Telefonica frequencies), the interest of any newcomer is questionable. In principle, there is interest on the part of the established operators. Considering the current good frequency configuration of the licensees, with 2 x 15 MHz respectively, and the possible utilisation in the foreseeable future of the GSM spectrum for UMTS, it can be assumed that additional frequency spectrum in the UMTS core band is probably not essential in the next few years for the existing operators.

The interest in frequencies in the UMTS extension band is currently low, from both existing operators and potential new operators.

The digital dividend frequencies in the UHF band are already available, with some restrictions. It can be assumed that from 2013 this band will be available in its entirety, apart from possible border coordination restrictions. The CEPT is currently drawing up the necessary technical standards for utilisation of these frequencies (a process which could take several years). Availability of useable equipment both for network deployment and for end user terminals is not expected much before 2013.

### **2.1.8 The objectives of an award**

The end user has to be the major consideration in setting out objectives for a frequency award. According to the preamble to the Telecommunications Act, these users must be provided with a range of affordable, high-quality services which are competitive nationally and internationally. Basically this objective is pursued by means of an adequate number of strong providers, with their own network infrastructure and their own frequency utilisation rights, which can generate intensive and sustainable competitive pressure. With particular regard to the currently high price level in the Swiss mobile radio market, ComCom has considered the possibility of stimulating the mobile radio market by means of a new operator. In view of the prospects of success of such a scenario, generally classed as low, however, it is considering not taking any special measures to promote a new entry into the market.

An award should be designed so that the following points in particular are taken into account:

- Frequency users applying same business models should have the possibility of achieving an approximately equal frequency configuration;
- Different business models should be possible;
- No degradation of the status quo regarding market structure and the range of services available;
- Prompt allocation of available frequencies, insofar as efficient utilisation is to be expected;
- Prevention of hoarding of frequencies;
- Minimising the negative effects of frequency utilisation (e.g. minimising the population's exposure to radiation, spatial effects).

With regard to minimising radiation exposure, it should be noted that this essentially depends not on the number of networks but generally on the prevailing volume of traffic.

### **2.1.9 Transition period**

Particular attention must be paid to the organisation of a transition period from the existing to the new allocation of frequencies. This applies especially with regard to protection of users from interruption of services and premature ageing of terminals. Allowing a transition period is particularly important if existing providers wish in future to provide their existing services on the basis of a different technology or the utilisation of different frequencies. For example, if operators wish in future to offer mobile radio services almost solely on the basis of UHF frequencies, they should be given the option, for a specified period during which the new infrastructure is being constructed, to continue to provide their existing services using the GSM or UMTS frequencies. On conclusion of the transition period, the services would then have to be definitively switched to the new technology or frequency. The duration of such a transition period should not be too short, to avoid any coverage problems. On the other hand, the transition period must not be too long either, to ensure incentives for a rapid change-over.

## **2.2 Scenarios**

With regard to an auction of the entire Swiss mobile radio spectrum, two scenarios are identified, taking into consideration the analyses carried out in the preceding sections:

- Scenario 1: a staggered procedure with allocation of all frequencies available at the end of 2013, in 2010/2011, and another, later allocation of the UMTS core band frequencies allocated by the end of 2016.
- Scenario 2: Award of all frequencies available at the end of 2013 including all UMTS core bands available from end of 2016 in 2010/2011.

## **2.2.1 Scenario 1: Award of all frequencies available at the end of 2013**

### Description:

This approach assumes, when the renewed GSM licences expire at the end of 2013, an award of the frequencies free at that time in the 900 MHz and 1800 MHz band, together with the UHF frequencies, the revoked 3GMobile frequencies in the UMTS core band and the frequencies in the UMTS expansion band. Auctioning of the UMTS core band frequencies which will be free at the end of 2016 will take place at a later point in time, still to be determined.

The frequency utilisation conditions could be specified in a technology-neutral and service-neutral manner, in harmony with the European recommendations.

The question of the allocation units in which the free frequencies are offered is very complex and requires further investigation. In principle, however, a breakdown into minimum units on the basis of frequency technology or economic grounds is recommended.

A traditional simultaneous multi-stage auction with specific auction rules or a combinatory clock auction is conceivable as an auction procedure.

Specifying a minimum bid which would be higher than the lower limit set out in art. 23 para. 1 OFMRL is conceivable

With regard to the coverage conditions, it must be considered whether these would still be necessary in the new licences. If it were possible to do without them, on the one hand there would be no additional network deployment obligations for the established mobile radio licensees and on the other hand barriers to the entry of newcomers into the market would be avoided.

As far as the licence term is concerned, an adequate duration of frequency utilisation should be specified, particularly with regard to potential newcomers.

### Valuation:

This approach permits efficient re-allocation or re-distribution of frequency utilisation rights in the frequency ranges available at the end of 2013. In view of the complexity of the procedure, the outcome is foreseeable only to a limited extent. If the transition period is too short, existing licensees might be obliged to acquire frequencies at auction which they will not need in the long term. If existing operators do not acquire by auction those frequencies which they urgently need to provide current mobile radio services, a restriction in services offered might result.

## **2.2.2 Scenario 2: Award of all frequencies available at the end of 2013 incl. all frequencies of the UMTS core band available from end of 2016<sup>9</sup>**

### Description

In the second scenario, the frequencies in the UMTS core band which will not become available until end of 2016 (expiry of the UMTS licences) will also be awarded as early as 2010/2011. The new allocation for all frequencies available at the end of 2013 applies from 2014; the allocations for the UMTS core band frequencies becoming available only at the end of 2016 apply from the beginning of 2017.

### Valuation

In comparison with scenario 1, an even more efficient frequency allocation will be made possible. In addition the probability of success for potential newcomers is increased, as even more frequencies will be available. Since two award procedures will not have to be organised, the administrative expense is reduced compared with scenario 1.

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<sup>9</sup> In order to achieve an adequate transition period, an attempt should be made to achieve the earliest possible implementation of the award process.