



The ComCom proposal for future-proof mobile networks in Switzerland

The "Mobile Radio and Radiation" expert group convened by Federal Department of Energy, Traffic and Electronic Communication has presented five options for how the new 5G mobile communications technology can be introduced in high quality, efficiently, and without harming the health of humans, animals or plants. ComCom contributed to this working group by introducing an own approach that is presented as "Option 4" in the group's report.

Why expanding network capacity is vital:

- Many already existing antennas in Switzerland have already reached their capacity limits, resulting in a loss of reliability and quality in mobile communications connections.
- The steady rise in demand for mobile communications services demands network expansion – even now, for the use of the 4G standard, which will remain the basic mobile communications technology over the next few years.
- The next-generation 5G mobile communications technology will bring a substantial improvement and expansion of the mobile communications services, benefiting both Swiss business and private users (for information on 5G, please visit the [OFCOM website](#)). This development can only be realised by further expansion of the networks.
- Mobile communications networks can be expanded by increasing the density of the antenna network, and by raising transmission power.

The dilemma:

- A large number of mobile communication installations in Switzerland cannot be used to their full capacity because of the very low site radiation limits.¹ As these limits are currently exhausted to the full at many antenna sites, it is not possible either to increase transmission power, or for several operators to share existing antenna masts.
- Consequently, the only way to increase network capacity under the actual site limits is to erect a multitude of new antennas on new sites. However, building new antennas requires a great deal of time and costs, which negatively effects the prices of mobile communications services, and also the attractiveness of Switzerland as a place for living and working.

¹ There are actually two kinds of radiation limits in Switzerland, namely (1) the immission limit ("Immissionsgrenzwert"), which must be observed everywhere, and (2) the considerably lower installation or site limit ("Anlagegrenzwert"), which may not be exceeded at locations in the vicinity of antenna sites where people stay for long periods of time (e.g. apartments, work places, schools, playgrounds, hospitals). Both limits are measured at the receiving end and not at the transmitter. For compliance with the radiation limit it is irrelevant whether an antenna site is used by one or more operators.



The two cornerstones of the ComCom proposal:

1. Shared use of existing antenna sites

- ComCom advocates the shared use of existing antenna sites by several operators. To achieve this goal, the relevant site limits should no longer apply to the entire antenna site, but to each individual operator separately. A mobile network operator would no longer have to fear that its potential transmission capacity will be diminished because the same site is being used by a competitor under the same maximum radiation limit.
- The population as well as the mobile network operators have a great interest in the joint use of existing antenna sites: The population benefits from a good coverage. For the operators, the search for a new location and the construction of new antennas is expensive and takes a lot of time. Both can considerably be reduced by shared use. Shared use can even be enforced by the authorities, based on legislation that is already in effect.
- Exposure to radiation would yet exceed the existing limits if a site were to be used by several providers operating at the maximum permitted transmission power. However, emissions from individual antennas cannot simply be added together, but the physical superposition of electromagnetic waves, which carry the mobile phone signals will result in a lower overall radiation value. The authorising bodies have been using the relevant calculation formula for many years in connection with the shared use of installations.²

2. Moderate increase of installation radiation limits to a maximum of 11.5 V/m

- Although the shared use of most locations would reduce the need for new antennas, it would not eliminate it entirely. ComCom is therefore also proposing an increase of the current limits of 4 to 6 V/m to a maximum of 11.5 V/m per operator.
- According to OFCOM studies, approx. 50 per cent of all existing sites in urban, suburban and rural areas seem to be suitable for shared use. This will expedite the rollout of 5G especially in urban areas.
- Most recent developments in antenna technology can support efficient network expansion even further. With the so-called adaptive antennas, the transmission power is no longer emitted in a wide range, but focused on an identified receiver. This leads to a lower radiation exposure in places where there are no users. ComCom proposes to take advantage of this technical progress and include it in the further considerations.

² The formula for calculating the field strength is as follows: $E_{total} = \sqrt{E^2_{Swisscom} + E^2_{Sunrise} + E^2_{Salt}}$ (see also website FOEN, [Enforcement aids](#) in German and French). If the performance is optimised to the site limit of 11.5 V/m, maximum field strengths between 11.5 and 16.3 V/m are generated at the most exposed location with sensitive use (LSU). The maximum theoretical exposure will reach approx. 20 V/m, which only occurs if the most exposed LSU is identical for all three operators. Actual exposures can be assumed to be below these values, as it is rare for all three operators to transmit simultaneously at maximum power towards the most exposed LSU (see Report "Mobile radio and radiation", 18.11.2019, chap. 8.4.2.2).



Implementation of ComCom's proposal:

- If the ComCom proposal is adopted, existing sites could be used to roll out 5G across Switzerland in a comparatively short time, without the need to build thousands of new antennas. It is expected that it will take five to ten years to modernise 3,000 existing antennas and to reach a shared use of 3,500 sites. The necessary investment is estimated at around 900 million Swiss francs. In terms of both capital spending and operating costs, this is the lowest-cost approach, which will also positively affect the consumer prices.
- By virtue of its greater potential transmission capacity, the ComCom proposal facilitates the parallel use of 3G, 4G and 5G technologies, thus also allows a soft transition from existing to new and more efficient technology.
- Furthermore, ComCom supports the proposal of the "Mobile Radio and Radiation" working group that the expansion of 5G networks should be supported by *accompanying measures*. These include a comprehensive, fact-based public information campaign, the rapid introduction of continuous radiation monitoring, and the promotion of research into very high frequency (millimetre) waves, which some countries already use for mobile communications. The use of millimetre waves in Switzerland has not yet been decided.

The ComCom proposal poses no risk to public health:

- First of all, the Swiss population is protected by standardised international "*immission limits*" (36 - 61 V/m). These limits are also recommended by the World Health Organization WHO, resp. the IC-NIRP. 20 years of research in Switzerland and around the world has shown that no detrimental effect on health has been found or should be feared below these immission limits. Indeed, the report of the "Mobile Radio and Radiation" working group confirms that potential risks to health are attributable to the mobile devices themselves, rather than to mobile communications antennas.
- Under the ComCom proposal, radiation from individual and also shared site use would fall well short of the immission limits even if all antennas were operating at full capacity by three operators.
- In Switzerland, an additional radiation limit has been introduced for locations where people stay for a longer period of time. This additional limit is known as "*site or installation limit*" (4 to 6 V/m). This limit is up to ten times lower than the immission limit. Examples of such locations include apartments, work places, schools, playgrounds, hospitals. Most other countries have no such additional limits that are comparable to Switzerland's peculiar site limits.
- Unlike the international immission limits, the site limits are not based on science, but are a result of the so-called precautionary principle provided by the Swiss environmental protection act. According to this principle, immissions of any kind must be kept as low as is economically and operationally viable. The site limit was determined 20 years ago on the basis of the prevailing technical and economic operating conditions *at the time*, and it is this site limit alone which is significantly restricting the rollout of 5G networks today.
- ComCom's proposal does not question the precautionary principle in general or the maintenance of a site limit for certain sensitive locations. With the proposed moderate increase of the site limit and its calculation based on individual operators instead of entire sites, Switzerland's radiation limits would still be several times stricter than in most other countries.



Further information:

- **Report of the expert group "Mobile Communication and Radiation"** (see FOEN's website):
<https://www.bafu.admin.ch/bafu/de/home/themen/elektrosmog/dossiers/bericht-arbeitsgruppe-mobilfunk-und-strahlung.html> (*entire report only in German, French or Italian*)
Management Summary in English:
<https://www.news.admin.ch/news/message/attachments/59387.pdf>
- **Frequently asked Questions regarding 5G** (see OFCOM's website):
<https://www.bakom.admin.ch/bakom/en/homepage/telecommunication/technology/mobile-communications-evolution-towards-5G/5g-faq.html>
- **Legal Basis in Switzerland** (Environmental Protection Act EPA and non-ionising radiation ordinance; see FOEN's website):
<https://www.bafu.admin.ch/bafu/en/home/topics/electrosmog/law/acts-ordinances.html>