

# Compliance boundary for UMTS radio base stations

In mobile communication systems the phones communicate with so called base stations. These have antennas that are usually placed in masts, on building roofs or facades. The antennas transmit and receive radio waves. The base stations for the third generation mobile communications systems (3G, UMTS) transmit radio waves in the frequency band 2110-2170 MHz.

ICNIRP, an international expert group endorsed by the World Health Organization (WHO), has laid down guidelines limiting the exposure of the general public to radio waves and other electromagnetic fields. These guidelines are recommended within the European Union and in many other countries all over the world. The limits have been set with wide safety margins in order to ensure that people, both adults and children, are protected from health effects that extremely high levels of radio waves are known to have.

In houses and other places where the general public reside the exposure levels from radio base stations are normally much below the limits. Only in the close vicinity of can the antennas the exposure limits sometimes be exceeded. That area is defined by the so called compliance boundary. It is the responsibility of the network operator who puts the base station into operation, to ensure that unauthorized persons stay outside of the compliance boundary. For those who, in their work need to pass or stay within the compliance boundary, there are special rules.

The Ericsson radio base station RBS 3202 is used in many 3G networks all over the world. By calculations, Ericsson has determined compliance boundaries for the most common types of antennas that are connected to this base station. The results have been compared to measurements both on a test base station and on a roof-mounted antenna connected to a base station in operation in Stockholm (Svenska UMTS Nät). At the latter measurements, persons from the Swedish Radiation Protection Authority (SSI) attended. These calculations and measurements are described in an open technical report.

The size and shape of the compliance boundaries vary with output power level and antenna type, and they can be difficult to use in reality. The figure below shows a simplified compliance boundary that encloses the calculated volumes for the most common antennas (14.5-18 dBi antenna gain, 60-130 cm height) with output power levels up to the maximum level for RBS 3202 (25 watt, including transmission losses). The compliance boundary has the shape of a cylinder with a diameter of 3 m and a height corresponding to the antenna height plus 20 cm (10 cm above and 10 cm below). The cylinder starts 10 cm behind the back of the antenna.

Additional measurements are not necessary unless the antenna is installed in close vicinity of another transmitting antenna or if there are any objects in the vicinity that can disturb the radio transmission properties. In those cases measurements or calculations might be needed to examine if changes of the compliance boundary possibly are needed.

