## Current RF Exposure Limits

Please note official exposure limits are based on scientific studies that demonstrate so-called thermal effects, which are well studied and established. Precautionary recommendations by scientific, nongovernmental, and environmental organizations also include reported nonthermal effects whose explanations of their “plausible mechanisms” are still pending. Throughout this process of scientific knowledge finding to explain the why, various adverse health effects are being observed at much lower levels.

### Exposure Levels in µW/m²

<table>
<thead>
<tr>
<th>Exposure Levels in µW/m²</th>
<th>National and International Exposure Guidelines</th>
</tr>
</thead>
</table>
| 1,000,000,000 | Cataract formation, established (Steneck 1980)  
*Lens opacity may already occur from 10,000,000 µW/m².* |
| 100,000,000 | U.S. Standard C95.1-1966 (occupational exposure)  
*The first standard limiting exposure to microwaves in the Western world.* |
| Up to 10,000,000 | RF radiation exposure from cell phone handset held next to head |
| 10,000,000 | **ICNIRP International Guidelines** (1998) (new revision expected in 2018)  
1500–15 000 MHz  
900 MHz  
*These guidelines are based on biological effects of short-term, high-level exposures only, also referred to as thermal effects: e.g. Germany (1996), USA (1997), Japan (1997), Switzerland (2000), Australia (2002), Finland (2002), Sweden (2002), UK (2004), Austria (2006)* |
| 5,350,000 | **Canada Safety Code 6** (2015)  
2400 MHz (new limit about 50% lower than the previous one from 2009)  
900 MHz (new limit about 60% lower than the previous one from 2009) |
| ~2,400,000 | **Belgium**: Guidelines (2001)  
1900 MHz  
800 MHz  
*In 2009 a ruling of the constitutional court concluded that the setting of exposure levels for cell towers lies with the regional not the federal government. See further below.* |
| ~1,000,000 | **India**: Exposure limit of cell tower radiation for general public (2012)  
2–300 GHz  
900 MHz |
| 1,000,000 | RF radiation exposure from cell phone handset at 1 foot |
| 450,000 | DECT cordless phones at 1 foot: 100,000–400,000 µW/m² |
| Up to 200,000 | Wi-Fi access points/clients at 8 inches: 100,000–200,000 µW/m² |
| Up to 100,000 | In the vicinity of cell towers (400-m radius): 1,000–100,000 µW/m² |
~100,000 (6 V/m) **China: Ministry of Health Standard** (1987)
Exposure limit for “first grade” living environments or sensitive areas

**Toronto Board of Health**, Canada (1999)
Prudent Avoidance Policy for Siting of Cell Phone Base Stations, voluntary
In 2013, the Toronto Medical Officer of Health recommended to discontinue this policy. The motion did not pass; the policy is still in place.

Exposure limit for general public

**Italy: Council of Ministers** (2003):
Decree: precautionary attention level not to be exceeded in sensitive areas

**Brussels Capital Region** (2014)
Exposure limit for general public (increased again after lowered to 3 V/m in 2009)

~95,500
~42,500

~24,000 (3 V/m) **Ukraine Health & Safety Guideline** (1996)
Regional Ordinances in Belgium: **Wallonia** (2009), **Flanders** (2010)
In Wallonia, within a radius of 200 m of a cell antenna site, neighbors can request control measures, which are free of charge.

| 40,000 | DECT cordless phone at 1 m: 2,000–40,000 µW/m² |
| 20,000 | Wi-Fi router/access point/PC card at 50 cm: 1,000–20,000 µW/m² |
| 20,000 | Standard RF baby monitor at 30 cm: 2,000–20,000 µW/m² |
|         | Low-emission baby monitor (Germany) at 30 cm: only 35 µW/m² |

(2 V/m)
~10,000
3,000

**ECOLOG Institute** in Germany (2000)
Precautionary recommendation based on review of scientific literature
Emissions from single RF sources (e.g. cell tower) at max. 30% of precautionary limit

**Seletun Consensus Statement** (2010)
Precautionary recommendation, may be lowered in the future

500–1,000

**Health effects observed in populations near cell towers** (Kundi 2009)
Cardiac effects, headaches, sleep problems

1,000

**Salzburg Resolution** on Mobile Telecommunication Base Stations (2000)
Precautionary recommendation

**BioInitiative Working Group** (2007) (see also update from 2012 below)
Precautionary recommendation

**Parliamentary Assembly of Council of Europe**: Resolution 1815 (2011)
Precautionary recommendation for indoor environments

Precautionary target threshold level inside and outside a building
1,000 **EUROPAEM EMF Guideline** for EMF-related health problems (2016)
Nighttime exposure: radio broadcasting (FM)
Daytime exposure: TETRA, DVBT

100 Working Group of EU **STOA Panel** (2001)
Precautionary recommendation

**BUND** (Friends of the Earth Germany) (2008)
Precautionary recommendation for hazard protection

**Parliamentary Assembly of Council of Europe** (2011)
Precautionary recommendation for indoor environments for medium-term

**EUROPAEM EMF Guideline** for EMF-related health problems (2016)
Sensitive populations: radio broadcasting (FM)
Nighttime exposure: TETRA, DVBT
Daytime exposure: GSM, DECT, UMTS, HSPA, LTE

10 **Health Department of the Federal State of Salzburg** (Austria 2002)
Precautionary recommendation for outdoor environment (GSM sum total)

**TOB Green Building Rating System** (Austria 2009)
Largest number of credit points for indoor environment

**EUROPAEM EMF Guideline** for EMF-related health problems (2016)
Sensitive populations: TETRA, DVBT
Nighttime exposure: GSM, DECT, UMTS, HSPA, LTE
Daytime exposure: Wi-Fi 2.4/5.6 GHz, DAB+, GPRS with PTCCH

Precautionary recommendation

1 **Health Department of the Federal State of Salzburg** (Austria 2002)
Precautionary recommendation for indoor environment (GSM sum total)

**BUND** (Friends of the Earth Germany) (2008)
Precautionary recommendation for general protection

**EUROPAEM EMF Guideline** for EMF-related health problems (2016)
Sensitive populations: GSM, DECT, UMTS, HSPA, LTE
Nighttime exposure: Wi-Fi 2.4/5.6 GHz, DAB+, GPRS with PTCCH

0.1 **Building Biology Evaluation Guidelines** (SBM-2015) "No Anomaly"
Specifically designed for sleeping areas associated with long-term risks

**EUROPAEM EMF Guideline** for EMF-related health problems (2016)
Sensitive populations: Wi-Fi 2.4/5.6 GHz, DAB+, GPRS with PTCCH

<table>
<thead>
<tr>
<th>0.000 01–0.001</th>
<th>Minimum power level required for cell phone communication</th>
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<tbody>
<tr>
<td>~0.000 001</td>
<td><strong>Natural background</strong></td>
</tr>
<tr>
<td>~0.000 01</td>
<td>Ambient atmospheric noise in kHz range</td>
</tr>
<tr>
<td>~0.000 01</td>
<td>Stormy sun (30 MHz – 30 GHz)</td>
</tr>
<tr>
<td>~0.000 000 01</td>
<td>Quiet sun (30 MHz – 30 GHz)</td>
</tr>
</tbody>
</table>

0.1 W/m² = 100 mW/m² = 100,000 µW/m² = 10 µW/cm²

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