

Small cells and health



**Mobile Manufacturers
Forum**



SMALL CELL FORUM
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This brochure has been designed to answer questions you may have about small cells. We have all read or heard about concerns raised from time to time regarding the safe use of radio waves and wireless communications equipment. The wireless industry takes these concerns seriously and welcomes ongoing research. The consensus of international health authorities today is that there are no established health effects from wireless communications devices such as small cells.



What are small cells?

'Small cells' is an umbrella term for operator-controlled, low-powered radio communications equipment (base stations) that provide mobile and internet services within localised areas. Small cells typically have a range from ten metres to several hundred metres. These contrast with a typical mobile macrocell that might have a range of up to several tens of kilometres. The term 'small cells' covers femtocells, picocells, microcells and metrocells that are used in residential, enterprise, urban and rural environments.

quality of service and number of simultaneous multiple users.

Urban small cells typically transmit at power levels between around 0.25 and 6.0 watts, giving extra coverage and capacity to serve multiple users. Small cells that provide wider geographical coverage such as for users in a small village in rural or outer metropolitan areas can typically transmit up to 10 watts per access point.

Small cells typically allow mobile phones to work at very low powers, increasing their battery life and reducing interference.

What power levels do small cells transmit?

Residential-type small cells (femtocells) operate at very low transmit powers, covering a typical sized residence and transmitting less than 0.1 watts (making them comparable with standard WiFi access points). More usually they operate at powers below 0.02 watts.

Enterprise small cells typically transmit at power levels between around 0.02 watts and 0.25 watts, with a range of up to around 200 metres, depending on the desired

What research has been undertaken?

Small cells transmit very low levels of radio waves (also known as radiofrequency electromagnetic fields). The safety of radio waves has been extensively studied for more than 60 years and the research is subject to constant review by government health agencies and standards setting bodies.

Are there safety limits for small cells?

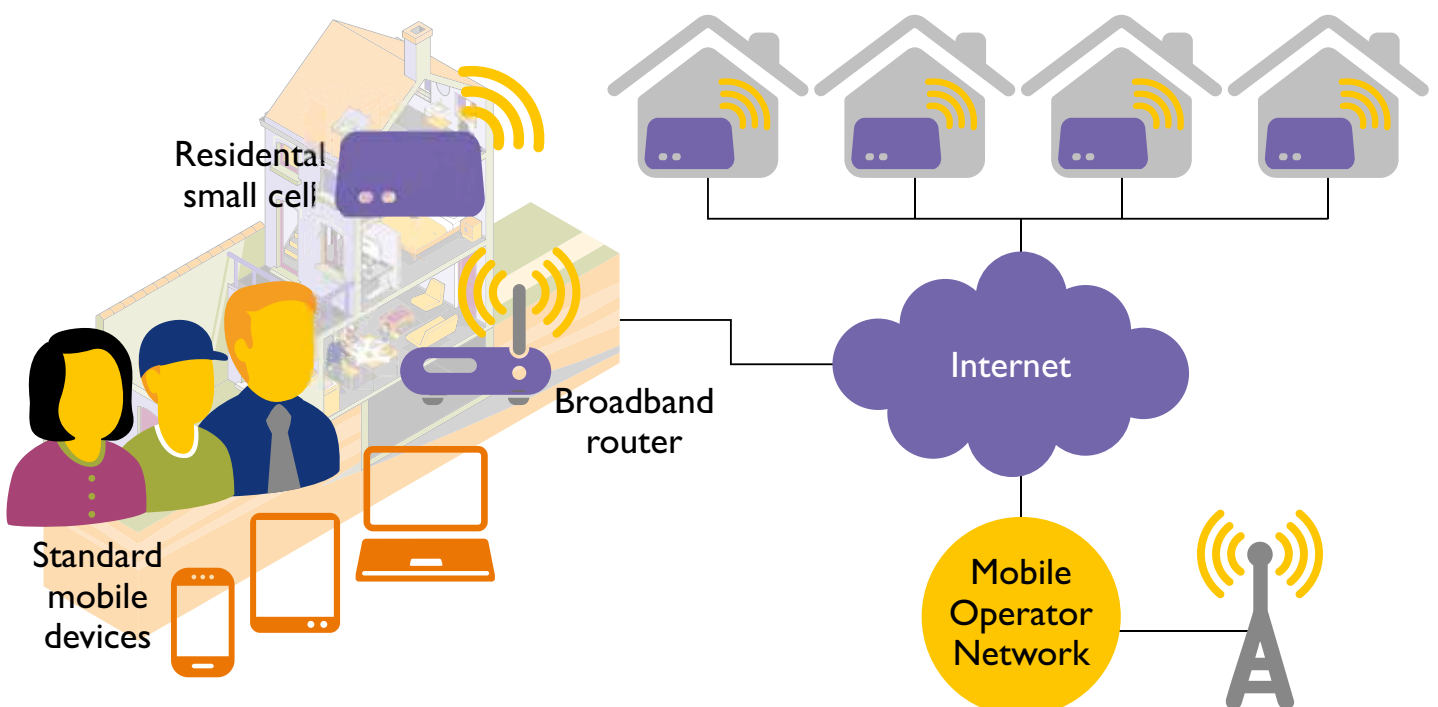
Small cells have to comply with the same safety limits that are applied to other wireless equipment such as mobile phones and macrocell base stations for wide-area coverage. These are based on guidelines for human exposure to electromagnetic energy issued by the International Commission on Non-Ionising Radiation Protection (ICNIRP) and other relevant regulatory authorities.

What do health experts say?

Numerous independent scientific expert panels, health agencies and standard-setting organisations around the world regularly review the RF research. These organizations have all reached the same general scientific conclusion: that there are no established health hazards from exposure to radio waves below the limits applicable to wireless communications systems. More detailed information on the views of these bodies can be obtained from the sources listed in the 'Further Information' section.

What about children?

The health and safety of children is important to all of us. Substantial safety margins are already incorporated in the standards with which small cells and other wireless products must comply. These safety margins are designed to provide protection for everyone, including children.



Where can I obtain further information?

To find more information, please visit the following websites:

- **International Commission on Non-Ionizing Radiation Protection (ICNIRP)**
www.icnirp.org/en/applications/wi-fi/index.html
- **World Health Organization – Base Stations and Wireless Technologies**
www.who.int/peh-emf/publications/facts/fs304/en
- **Public Health England, Radio Waves and Health**
www.hpa.org.uk/Topics/Radiation/UnderstandingRadiation/UnderstandingRadiationTopics/ElectromagneticFields/Radiowaves/WiFi/
- **Health Canada**
www.hc-sc.gc.ca/ewh-semt/radiation/cons/wifi/index-eng.php
- **US Federal Communications Commission**
www.fcc.gov/oet/rfsafety/rf-faqs.html



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What is Small Cell Forum? www.smallcellforum.org

Small Cell Forum supports, promotes and helps drive the wide-scale adoption of small cell technologies to improve coverage, capacity and services delivered by mobile networks.



Mobile Manufacturers Forum

What is the MMF? www.mmfai.info

The Mobile Manufacturers Forum is an international association of telecommunications equipment manufacturers. The MMF was established specifically to support ongoing international research into the safety of wireless technology in conjunction with national and international health agencies around the world.



What is the GSMA? www.gsma.com/health

The GSM Association represents the interests of mobile operators worldwide. Spanning 220 countries, the GSMA unites nearly 800 of the world's mobile operators with 250 companies in the broader mobile ecosystem, including handset makers and device makers, software companies, equipment providers and internet companies, as well as organizations in industry sectors such as financial services, healthcare, media, transport and utilities.

