



Radio Safety

“Exposures due to the emissions from point-to-point microwave radio will generally be very many times below the restrictions advised by both NRPB and ICNIRP guidelines at locations accessible to the public. Most people’s exposure to point-to-point microwave radio emissions will also be less than their exposure to mobile telecommunications emissions, either from mobile phone handsets or base stations.”

Dr T. G. Cooper of the Health Protection Agency



“...microwave radio links operate at rather low power and with narrow beams in a direct line-of-sight between the antennas, so that any stray radiation from them is of much lower intensity than the lower frequency radiation transmitted to the phones [by mobile phone base stations].”

Statement from Clause 4.8, The Stewart Report, The Final Report of the Independent Expert Group on Mobile Phones.

This document aims to explain these links while stressing MLL Telecom’s commitment to operating our state-of-the-art technologies with the highest regard to health, safety and any environmental impact of our products and services.

Background

Electromagnetism

All electromagnetic radiation consists of oscillating electric and magnetic fields. The frequency – oscillations per second – determines the properties and use of the radiation. Frequencies are measured in Hertz (Hz), where 1Hz is one oscillation per second.

Radio frequencies

Radio waves, like light waves, are simply part of the electromagnetic spectrum and, like radio waves, light waves have different frequencies. For example, red has a frequency of 430THz and violet has a frequency of 750THz. Frequencies between about 30kHz and 300GHz comprise the radio frequency (RF) band. These are used for telecommunications. In the UK, the band is split between many different uses. MLL Telecom’s microwave links generally operate near the frequencies of 5.4GHz up to 80GHz.

Introduction

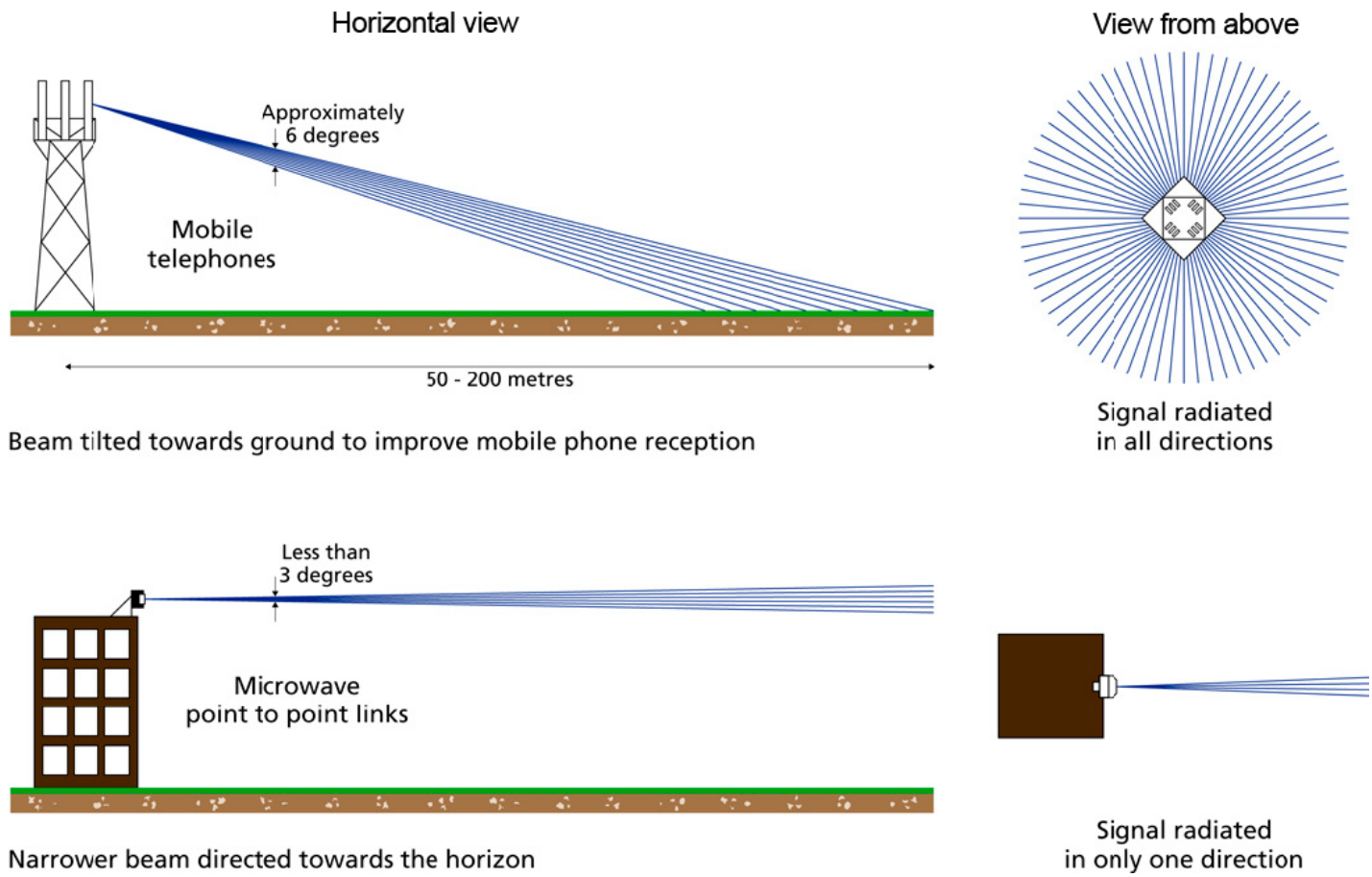
MLL Telecom is committed to providing safe, technologically advanced equipment. Our microwave point-to-point and point-to-multipoint links use electromagnetic waves, a type of radiation.

Naturally-occurring radiation is all around us – from the life-giving heat of the sun, as well as from man-made sources such as essential police and fire service radios.

Different types of radiation provide TV and radio signals; they have very high power levels, as they are designed to serve large areas from a single location. Other high power transmitters are used for air traffic control and surveillance radar.

Microwave point-to-point technology however, employs some of the lowest powered varieties of electromagnetic radiation – which is one of the safest varieties of radiation.

Comparison of transmission patterns from omni-directional sources (such as GSM and media broadcast) and Microwave point-to-point links



Beam tilted towards ground to improve mobile phone reception

Narrower beam directed towards the horizon

Diagram 1.0: Since the point-to-point equipment is directed towards the horizon and only operates with a clear line of sight towards its destination, the general public will not experience excessive exposure in front of the antenna, even using the most restrictive recommendations.

Radio frequency transmissions and health

Scientific investigation is continuous, with major public health bodies such as the World Health Organisation (WHO) and the Health Protection Agency (HPA) providing on-going research.

Current guidelines

National and international safety guidelines concerning exposure of the public to the radio waves produced by all kinds of antennas exist, and MLL Telecom pays close heed to these guidelines.

The majority of national and international recommendations are based upon agreed scientific evidence assessing the thermal effects of RF emissions. The most commonly recognised guidelines are those of ICNIRP (the International Council on Non-Ionising Radio Protection). These guidelines incorporate a safety factor to protect against possible hypersensitive or vulnerable subjects in the population, such as young children.

In typical installations, microwave point-to-point links exceed all safety standards for the general public by a wide margin.

Three key features of microwave point-to-point link equipment make them safe:

Antenna characteristics

A microwave point-to-point link is a narrow beam of energy between two dish antennas, separated by up to 40 kilometres. The antennas are designed to ensure very little emission of radio frequency energy outside this beam. For example, 50 metres from the antenna, the beam is typically less than 80 centimetres in diameter.

Radio frequency emissions at the edge of the beam are half of the maximum energy directly in front of the dish. Further away from the beam, the energy falls to a level 100 or more times lower.

Behind the dish, where it is mounted, (such as a building), the energy level is negligible – around 10,000 times lower than in the main beam.

Guided by Ofcom, MLL Telecom's planning and installation engineers ensure the main beam is directed away from buildings, avoiding areas where the general public may be.

Frequencies used

As referenced earlier, MLL Telecom links use frequencies of between 5.4GHz and 80GHz. Radio waves operating in this range of frequencies operate by 'line-of-sight', which means they do not penetrate solid objects by more than a few millimetres.

This has three consequences:

- The main beam has to be directed towards the receiving antenna on a path that is clear of physical obstructions.
- Since dishes are installed on rooftops or against the side of a building, surrounding building materials will absorb any stray emissions, preventing exposure for building occupants.
- At frequencies around and above 10 GHz, the outer layer of the skin absorbs any radiofrequency energy that impacts upon it, limiting the possibility of any physiological effects.

Power output

As explained earlier if the electromagnetic radiation is lower powered it is one of the safest varieties. The power emitted from the majority of MLL Telecom microwave link equipment is no more than 50 milliWatts – approximately one thousandth of the energy of a light bulb. In addition, Ofcom ensures emissions are kept to a minimum. Each link is individually licensed to strict criteria, which includes a requirement to transmit with the minimum power that still offers the required reliable service.

Guidelines for schools

As explained above, the beam of greatest intensity from a microwave point-to-point link is very narrow and never falls on grounds or buildings within the vicinity of the transmitting dish antennas. There is, therefore, no reason to take additional precautions during the installation of a microwave point-to-point or point-to-multipoint link antenna on or close to a school. As testament to their safety, several UK County Councils and Education Authorities are actively deploying wireless technology in schools including East Sussex, Cheshire East, Cheshire West and Chester, and Gateshead MBC.

MLL - conducted tests

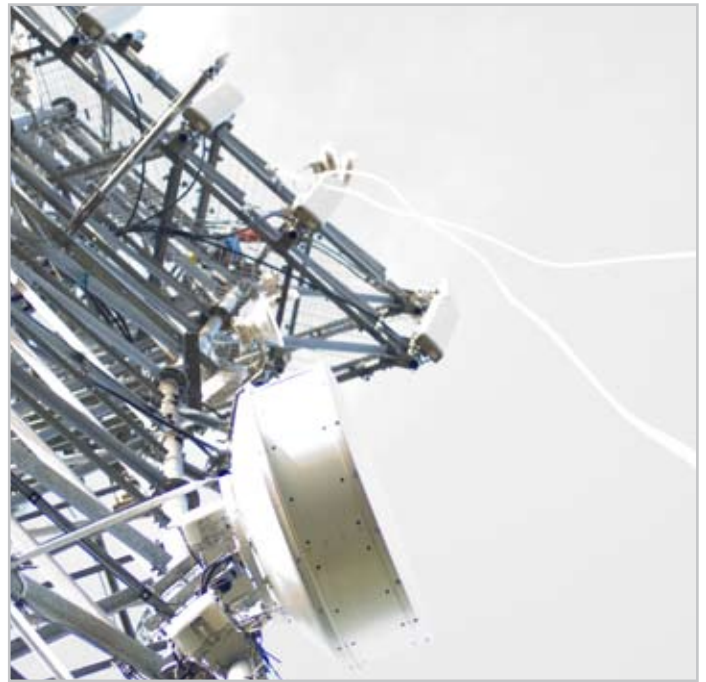
MLL Telecom, in late 2006, conducted tests on our Alvarion Breeze Access VL products in order to verify the Alvarion Base Station and Subscriber Unit do not infringe the ICNIRP guidelines regarding exposure to RF emissions. The aim of these tests was to give customers confidence in the safety associated with the relatively low levels of electromagnetic transmissions emitted by this equipment.

The RF Radiation Meter used in the test showed power density results, displayed as a percentage of the limit value as specified in the standard covering the E field between 30MHz & 40GHz. A consumer model radio transmitter showed a percentage of 9.32%; a typical mobile phone showed 5.59%; and Alvarion breeze access VL6 Subscriber Unit 0.43%; Alvarion Breeze Access VL Access Unit 0.32%.¹ This confirms the level of emissions from the kit is minimal and well within guidelines. For more information about these tests, please contact us: enquires@mlttelecom.com.

Conclusion

Extensive research from Ofcom, HPA (Health Protection Authority) and independent scientists² has concluded that exposure to radio frequency electromagnetic fields around mobile base stations is safe for humans:

*"The measurements made by Ofcom and the CRCE show that exposure at publicly-accessible locations near to base stations is very much below the ICNIRP guidelines."*³



The latest research into base station safety from the World Health Organisation concurs:

*"Considering the very low exposure levels and research results collected to date, there is no convincing scientific evidence that the weak RF signals from base stations and wireless networks cause adverse health effects."*⁴

The World Health Organisation: Electromagnetic fields and public health: base stations: Fact sheet N°304, May 2006

The safety of exposure to radio frequency electromagnetic fields is reflected in the recommendations and standards developed by experts such as NCRP Scientific Committee 53, IEEE Standards Coordinating Committee 28, IRPA/INIRC and the NRPB.

Manufacturers design their wireless networking products to operate within these standards and so are considered safe. There is a sensible degree of caution simply because the technologies used remain relatively new.

MLL Telecom will continue to pay close attention to these guidelines and ensure our operations fall within them.

Mobile phone usage

The WHO states:

*"A large number of studies have been performed over the last two decades to assess whether mobile phones pose a potential health risk. To date, no adverse health effects have been established as being caused by mobile phone use."*⁵

The World Health Organisation: Electromagnetic fields and public health: mobile phones: Fact sheet N°193, June 2011

Although they do note the need for further research into the effects of long term mobile use.

MLL Telecom recognises that there has been some concern around mobile phone usage, however the equipment we use and the consequential exposure is different to, (and less than), the exposure experienced through mobile phones (as demonstrated by diagram 1.0).

In summary

- Radiation occurs naturally, all around us
- Microwave point-to-point and point-to-multipoint technology employs some of the lowest powered – and therefore safest – varieties of electromagnetism
- Numerous independent scientific tests show microwave point-to-point technology is safe
- Microwave point-to-point links provide a very narrow beam of energy, which greatly weakens the further away you are from the antenna
- The frequencies of the beams we use in this technology means they cannot penetrate solid objects
- The power emitted from our equipment is less than 1,000th the power of a light bulb
- MLL adheres to strict current standards and adapts its operations where necessary as new guidelines are introduced

Further reading:

- World Health Organisation Factsheet: <http://www.who.int/mediacentre/factsheets/fs304/en/>
- Health Protection Agency: <http://www.hpa.org.uk/Topics/Radiation>
- The Stewart Report: <http://www.iegmp.org.uk/report/text.htm>
- E-mail: info@mlltelecom.com or call: 0870 241 7315

1. The above maximum results were obtained using a Wandell & Goltermann EMR300 RF radiation meter fitted with a type 26 Probe in the quietest spot (RF-wise) that could be found in Marlow, Buckinghamshire and it should be noted that background levels were approximately 0.05. All measurements were carried out with the probe approximately 10 cm away from the device under test.

Such tests are indicative of results obtained using the best possible, and correctly calibrated, equipment available at the time, and may vary under different conditions, and in the future. MLL Telecom accepts no responsibility for actions or statements made as a result of reliance on these results.

2. For example: Schüz, J; Jacobsen, R; Olsen, JH; Boice, JD; McLaughlin, JK; Johansen, C (December 2006). "Cellular Telephone Use and Cancer Risk: Update of a Nationwide Danish Cohort". *Journal of the National Cancer Institute* 98 (23): 1707–1713. doi:10.1093/jnci/djj464. PMID 17148772. Retrieved 2008-01-20.
3. Last reviewed: 8 March 2011
http://www.hpa.org.uk/Topics/Radiation/UnderstandingRadiation/UnderstandingRadiationTopics/ElectromagneticFields/MobilePhones/info_BaseStations/ Accessed on 29/06/11
4. <http://www.who.int/mediacentre/factsheets/fs304/en/> May 2006 – the latest report from the WHO on base station safety. Accessed on 01/07/11
5. <http://www.who.int/mediacentre/factsheets/fs193/en/> June 2011 – the latest report from the WHO on mobile phone safety. Accessed on 01/07/11

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