

# TETRA

## Base Stations and Safety



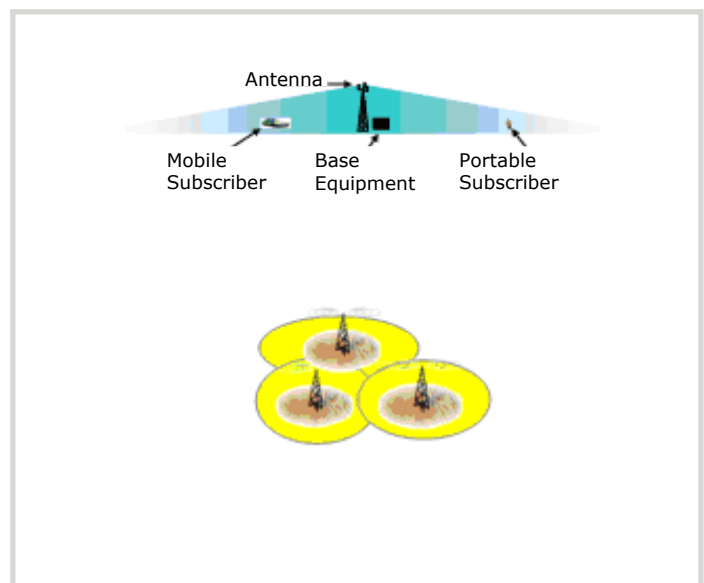
### Health+Safety Information

Published by the TETRA Industry Group

## How does a TETRA network operate?

→ TETRA is a term used to describe the technology known as Terrestrial Trunked Radio. It is used to provide the resilient, robust, private mobile communications services that are needed by organisations like the emergency services and commercial users such as transport and construction companies with mobile workforces or large vehicle fleets, who need reliable radio coverage. This requires the planning of TETRA base station sites to provide the level and extent of coverage the user organisation needs.

Like the cellular phone networks, a TETRA network operates by dividing an area into a number of cells, each served by a base station. This network of base stations enables business users to move from one cell to another without losing communications. The system works through the exchange of radio signals between portable and mobile devices and base stations. Signal levels are carefully managed to optimise network performance.



## Why are TETRA base stations needed?

→ A base station transmits and receives signals from handsets or other mobile equipment. The base station antenna can be mounted either on a building, a freestanding tower or a single pole. For aesthetic reasons, antennae are sometimes built to blend into their environment, for example, integrated into the design of buildings or on masts disguised as

trees. In some applications, cables called leaky feeders may be used as antennae.

Base stations allow low-powered portable and mobile equipment to communicate over a much wider area than would otherwise be possible. Professional radio technologies have been used for many years, and the current cellular configuration enables the use of lower-powered base stations to cover large areas.



## Network planning

→ Radio network planning is very similar to planning lighting. To avoid shadows or dark areas you need to plan the locations of the lights carefully. Similarly, when planning a radio network, the base stations and antenna locations need to be planned carefully to avoid places where there is patchy, unreliable, or non-existent communication.

For any radio system the strength of the signal diminishes rapidly as distance from the transmitter increases. Many factors affect the distance that radio waves can travel; for example the distance is reduced by obstacles such as trees or buildings. So base stations are placed where users need to communicate, and sited to provide seamless coverage.

Many countries have planning and consultation guidelines that govern the siting of base stations. These guidelines often recommend sharing sites with other operators as a preferred option, siting base stations on an existing building or other structure as the next best option, and building a new mast or tower only if there is no other suitable alternative.

## TETRA base station signalling

→ TETRA base stations emit a continuous signal at either 400 or 800 MHz (400 or 800 million cycles per second), depending on the part of the world in which they are used. They do not pulse as some people have claimed, and this has been confirmed by the 2004 AGNIR report - see 'What the experts say' below.

TETRA portable and mobile devices, which all operate within safety guidelines of the International Commission on Non-Ionising Radiation Protection (ICNIRP), do pulse at 17.65Hz. There is no reputable scientific evidence to suggest that these radio frequency emissions have any adverse effect on the users' health. A number of attempts have been made to replicate research first carried out in the 1970s, which had suggested that calcium levels in the human brain might be affected by pulses close to 16Hz. None of these, including the latest commissioned by the Home Office from the UK Defence Science and Technology Laboratory (DSTL), published in the International Journal of Radiation Biology in December 2005, found any such effect.

## What the experts say

→ A number of expert bodies have reviewed the scientific evidence on radio frequency emissions. Here are some of the things they say:

Statement from the Advisory Group on Non Ionising Radiation (AGNIR) on 14 January 2004: *"exposure levels from living near to base stations are extremely low and the overall evidence indicates that they are unlikely to pose a health risk."*

National Radiological Protection Board (now part of the Health Protection Agency) report in November 2001: *"It is notable that the signals from TETRA base stations are not pulsed whereas those from mobile terminals and repeaters are. Although areas of uncertainty remain about the biological effects of low level RF in general, including modulated signals, current evidence suggests that it is unlikely that the special features of the signal from TETRA terminals and repeaters pose a hazard to health."*

Professor Lawrie Challis, Vice Chair of the Stewart Inquiry and Chair of the Mobile Telecommunications and Health Research (MTHR) programme: *"emissions from TETRA base stations are not pulsed and, apart from the lower emission frequency, there is no reason to suppose that TETRA base stations have characteristics any different from mobile base stations in general"*.

DSTL research team, in the International Journal of Radiation Biology, December 2005: *"the results reported here do not provide support for the notion that TETRA-modulated RF fields affect intra-cellular calcium physiology in neurones or cardiac tissue"*.

## Compliance programmes

→ A number of countries have base station compliance programmes in place. In the UK for example, the radiocommunications division of the UK communications regulator Ofcom, has a duty to test base stations to make sure their emissions comply with safety guidelines. It has a programme to audit base stations, including TETRA, for compliance with ICNIRP guidelines.



## Conclusion



The World Health Organisation holds a database of many hundreds of studies on radio frequency emissions, conducted by recognised experts and replicated by others.

The consensus view of recognised scientific experts is that exposure to radio waves at levels below the ICNIRP guidelines does not result in any adverse effects on human health.

For the general public, measured levels of exposure to radio frequency emissions from TETRA base stations are typically hundreds or thousands of times below the levels permitted by the ICNIRP safety guidelines. The level of exposure decreases rapidly as distance from the base station increases.

The members of the TETRA Industry Group take safety extremely seriously. The Group believes that the extensive body of scientific research - regularly reviewed by independent expert bodies - and the existence of scientifically-based exposure limits, provide a sound basis for confidence in the safety of TETRA and other radio technologies.

## Where to find out more



### Web sites

If you would like further information about TETRA, please visit our web site: [www.tetrahealth.info](http://www.tetrahealth.info).

The site contains links to many other useful independent sites including World Health Organisation, ICNIRP, AGNIR, Independent Expert Group on Mobile Phones (Stewart Inquiry), MTHR, Home Office, The TETRA Association, Mobile Manufacturers' Forum.

For information on UK planning related issues visit [www.communities.gov.uk](http://www.communities.gov.uk).

For information about the UK Code of Practice for responsible network development visit [www.mobilemastinfo.com](http://www.mobilemastinfo.com).

For information on TV interference and base station audit programmes, visit Ofcom's site at [www.ofcom.org.uk](http://www.ofcom.org.uk).

### Leaflets

A range of leaflets published by the TETRA Industry Group is available in pdf form from our web site, or from the address below. The series includes:

- TETRA Health and Safety Overview
- TETRA Base Stations
- TETRA Portable and Mobile Devices
- Science and Standards
- Compatibility and interference

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