

TETRA

Portable and
Mobile Devices



**Health+Safety
Information**

Published by the TETRA Industry Group

What is TETRA?

→ 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 needed by demanding professional users like the emergency services and commercial organisations with mobile workforces or large vehicle fleets. TETRA has characteristics in common with the mobile communications networks most of us use to make calls when we are on the move, but offers extra features to provide secure, reliable and versatile communications. These include digital call quality, transmission of voice, data and pictures, encryption, direct mode operation to allow local communication groups to be set up, and managed fallback for extra resilience.

Like all wireless systems, TETRA uses radio signals or radio waves in the non-ionising frequency band to provide communications services. Radio waves are part of our everyday lives, and they bring us the benefits of television and radio, and communications on the move. A number of questions have been raised about whether radio waves might have an effect on the health and safety of users or the general public. There is an extensive base of scientific knowledge on the subject and this leaflet sets out to answer some of the questions that have been asked about TETRA portable and mobile devices.

Compliance with international safety standards

→ TETRA devices, like other wireless equipment, are subject to rigorous, science-based safety guidelines, set by independent expert groups like the International Commission on Non-Ionising Radiation Protection (ICNIRP). These guidelines govern human exposure to radio frequency emissions and incorporate substantial safety factors to protect both users and the general public. All TETRA devices supplied by members of the TETRA Industry Group comply with these safety guidelines which are endorsed by the World Health Organisation.



TETRA radio devices

→ There are various manufacturers offering TETRA products to meet different customer needs, including hand-held portable radios, those worn on lapels or belts, those designed to be installed in vehicles and personal digital

assistants.

A TETRA radio device can be used to communicate in a variety of ways:

- as a two-way radio, via a control room or direct to another user in the same talk group
- as a phone
- to send and receive data such as images and short text messages.

A TETRA system uses a network of base stations, which provide the necessary radio coverage to enable TETRA devices to emit lower power than those of most other conventional professional systems.

If a TETRA radio is awaiting or receiving a call the human exposure to radio wave emissions is so low as to be virtually un-measurable. When it is transmitting the power levels are comparable to those of a mobile phone. The typical transmitted power from a portable radio is 1 Watt, and from the mobile radios typically installed in vehicles the power is 3 Watts. TETRA devices use a feature called Adaptive Power Control, which adjusts the power output to the lowest level needed to maintain reliable communication with the base station.

The exposure standard for portable and mobile devices employs a unit of measurement known as the Specific Absorption Rate (SAR) which is measured in Watts per kilogram. The ICNIRP guidelines set a localised exposure limit for occupational use of 10 Watts per kilogram, averaged over 10 grams of body tissue.

Whilst there may be differences between the SAR levels of various devices, and variations depending on the way they are used and how they are carried or worn, all the products supplied by members of the TETRA Industry Group comply with the ICNIRP guidelines for radio frequency exposure.



TETRA devices and pulsing

→ TETRA portable and mobile devices pulse at 17.65Hz. Concern about pulsed 16Hz radio frequency emissions arose as a result of some inconclusive research dating back to the 1970s. This study suggested that 16Hz emissions affected the movement of calcium, which is important in the human nervous system. The Stewart Inquiry suggested that *"If such effects occur as a result of exposure to mobile phones, their implications for cell function are unclear and no obvious health risk has been suggested. Nevertheless, as a precautionary measure, amplitude modulation around 16 Hz should be avoided, if possible, in future developments in signal coding"*.

Since the Stewart report there have been further research studies around the world, including the work of a team at the UK Defence Science and Technology Laboratory, published in the International Journal of Radiation Biology in December 2005. Importantly, none of these studies has found any impact on calcium movement or any other adverse health effects.

What the experts say

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

"there is a common misconception that heat from TETRA handsets can negatively affect the brain or body due to a warming effect. These claims are unrealistic as TETRA handsets emit less than one tenth of the energy needed to raise the body temperature by one degree centigrade and therefore operate many times below the international guidelines on exposure to non-ionising radiation" – Professor Colin Blakemore, Chief Executive of the Medical Research Council, member of the Stewart Inquiry and former member of the Advisory Group on Non Ionising Radiation (AGNIR)

"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, Chairman of the Mobile Telecommunications and Health Research (MTHR) programme, Vice Chairman of the Stewart Inquiry, and member of AGNIR

UK 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"*.

"in applying the cognitive testing regime we had used previously on analogue and GSM phones to TETRA-type phones with only the 17.65Hz modulation pattern, we were not able to demonstrate any effect on human cognition. The work needs to be repeated.....but it does suggest that no specific effect can be attributed to 17.65Hz modulation" - Dr Alan Preece, University of Bristol

"it was clear to our public safety organisations that they needed a dedicated, secure private communications network to deal with life-threatening situations, day in day out. The terrorist attacks reinforced this belief. Unlike the cellular network, which did not handle the situation due to a communications overload, the TETRA system worked very well. We are pleased that we made the decision in 2001 to choose TETRA" – Senor Javier Quiroga, SAMUR, Madrid Municipality Medical Services, Operations Director.



Compatibility and Interference

→ Nearly all electronic devices are susceptible to electromagnetic interference (EMI). When a potential problem is identified, it can usually be managed or remedied.

Laboratory and clinical tests have found that digital wireless phones might interfere under certain conditions with some pacemakers and hearing aids. Often, there are steps users can take to minimise or prevent interference, such as keeping an operating phone six inches (15 cm) from an implanted pacemaker or adopting other measures to accommodate the use of hearing aids. Users should follow the advice provided by the manufacturers of medical equipment.

Unlike some other professional radio communications systems, TETRA devices have a transmit-inhibit function. They can be prevented from transmitting, while the user can still receive communications. This feature is particularly useful in medical environments. For more information on compatibility and interference, see our leaflet on the subject.

Conclusion

→ TETRA, like most newer wireless communications systems, employs the same fundamental technologies and scientific principles as previous wireless systems. It is also covered by the same rigorous, science-based safety guidelines. These are based on decades of substantial research and establish exposure limits for radio frequency emissions which have built-in margins of protection.

Research continues to enhance scientific understanding about radio waves and health. Over a period of more than 50 years, it has covered wide range of radio frequencies and signal types. The international scientific consensus is that there is no evidence of any adverse health effects within accepted exposure limits, regardless of frequency or modulation. Science and standards continue to provide a sound basis for public confidence in the safety of these products and services.

TETRA products meet the same rigorous safety guidelines as other radio products for safe human exposure to RF energy. While tomorrow's products may differ from those used today, they will continue to be designed, manufactured and tested to meet all relevant safety guidelines, based on the large and ever-growing body of scientific knowledge.

Where to find out more

→ Web sites

If you would like further information about TETRA, please visit our web site: www.tetrahealth.info. The site contains links to many other useful independent sites including the World Health Organisation, ICNIRP, AGNIR, Independent Expert Group on Mobile Phones (Stewart Inquiry), MTHR, Home Office, The TETRA Association, Mobile Manufacturers' Forum.

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. Other leaflets in the series include:

- TETRA Health and Safety Overview
- TETRA Base Stations
- Science and Standards
- Compatibility and Interference.

Contact Us

The TETRA Industry Group can be contacted by email at:

enquiries@tetrahealth.info,

or by writing to:

TETRA Industry Group
PO Box 1005
Berkhamsted
Herts
HP4 3ZW
United Kingdom.

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