

TETRA

Compatibility and Interference



Health+Safety Information

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What is TETRA?

→ TETRA is a term that describes 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 that most of us use, 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 in the non-ionising frequency band to provide communications services. Radio signals are part of our everyday lives, bringing us the benefits of television, radio, and mobile communications. This leaflet sets out to answer some of the questions we have been asked about compatibility and interference.

What is compatibility and why does interference occur?

→ Electro-magnetic compatibility (EMC) is defined as the ability of a piece of equipment to function properly in its own electro-magnetic environment without disturbing other equipment nearby.

As the number of electronic products we use increases - from phones and microwave ovens to car alarms, TVs and toys - the radio spectrum is becoming more crowded. Radio frequencies allocated to particular systems or product types are getting closer to the adjacent frequencies used by other systems or products.

If a product manufacturer does not make sure that equipment works strictly within its allocated frequency band and complies strictly with all the relevant regulations and directives, interference can occur.

Nearly all electronic devices are susceptible to interference - for example domestic television or radio reception can be affected by passing aircraft, automatic garage door relays, microwave ovens, or hairdryers. Interference from some domestic items and toys can be suppressed by adding special circuits to them, but this is not possible with radio transmitters.

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Equipment that pre-dates or does not comply with regulations on interference - for example some older television sets or car alarms - can be particularly susceptible to interference. This is often receiver interference as receivers do not need to be licensed or meet any regulatory standards. Examples are when the radio receiver on a car alarm or locking device, or an older TV aerial, does not filter out the signals it does not want, and is triggered by a signal transmitted by some other piece of equipment being used nearby, although the transmitter is probably working in accordance with all the rules and guidelines that apply to it.

Once a potential problem is identified, it can usually be managed or remedied.

What safeguards are there to prevent or minimise interference?

→ Various regulations mean that the transmitting characteristics of any electromagnetic equipment - like TETRA base stations and radio portable radios or terminals - must be confined to specified 'masks' or ranges within the radio spectrum. Manufacturers are required to ensure that power is at a minimum outside these allocated frequency ranges.

A European Directive (known as the RTTE), published in 2000, requires equipment to be constructed so that any disturbance it generates is too small to prevent other apparatus operating as intended, and that the equipment itself has an adequate level of protection against interference. Manufacturers have to certify that their equipment complies with these standards and mark equipment with the European 'CE' or similar mark.

All TETRA equipment manufactured and deployed by TETRA Industry Group member organisations complies fully with all relevant regulations and operates squarely within its allocated frequency bands.

TETRA and TV interference

→ Considerable care is taken in planning services offered using TETRA systems to avoid interference. Occasionally TV interference occurs, generally because the TV receiver is outdated, or is being used in an area where there is poor reception. The remedy is for the user to fit boosters or filters to improve the quality of the signal.

Guidance from the regulators who manage radio spectrum is that people using domestic receivers must make sure that their aerial installation performs to an adequate standard to avoid interference. In the UK, for example, an Ofcom document '[Television Interference Involving TETRA Radio Communication Systems](#)' offers advice to householders and aerial installers on the steps needed to achieve interference-free broadcast reception.

TETRA equipment and medical devices

→ Many hospitals have rules that *all* equipment that transmits radio signals is switched off on hospital premises in case it interferes with sensitive medical equipment, although some are reviewing the need for such rules. The use of TETRA in a hospital environment is no different from the use of any other radio equipment. However, unlike some other professional radio communications systems, TETRA users benefit from a feature called 'transmit-inhibit' - the radios can be prevented from transmitting, but can still receive communications. This feature can be particularly useful in medical environments.

Advice from regulatory agencies - like the UK Medicines and Healthcare Products Regulatory Agency (MHRA) - recognises that communications equipment can be essential in hospitals, but that there is a risk of interference with sensitive medical equipment. Recommendations about the use of mobile phones, TETRA devices, laptop computers and gaming devices in hospitals require the equipment to be switched off near critical care or life support equipment, and users should respect any local rules or guidelines.

In the case of the use of TETRA by the emergency services during an incident on a medical site, the authorities recognise that the risk of interference may need to be treated as secondary to managing the risks associated with the incident.

For general guidance visit www.dh.gov.uk.

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

TETRA-based systems designed for use by medical and paramedic staff in environments such as ambulances are designed specifically to suit the operating circumstances, and high standards of installation practice are followed. The professional users follow detailed operating procedures to make sure that interference is not an issue.

Use of TETRA devices at major incidents and in difficult environments

→ TETRA equipment offers a number of features – like encryption, setting up of talk groups and direct mode operation – that have substantial operational benefits in emergency situations like anti-terrorist operations or major road traffic accidents. These features can facilitate rapid and effective working within and between emergency services.

The emergency services have robust operational procedures for the use of TETRA equipment in these types of environments. Emergency services workers are all trained in the correct and safe use of the equipment and TETRA offers a user-activated transmit-inhibit facility to prevent the radio transmitting a signal. TETRA equipment is no more likely to trigger detonation of a suspected bomb or explosive device than any other radio or piece of electrical equipment.

Specialist intrinsically-safe devices have been designed to be used in environments where inflammable or explosive materials, gas or other chemicals may be present. Fire-fighters and other emergency services workers may need to use these at some incidents. Any TETRA equipment used in these circumstances would meet all appropriate standards.

TETRA use and other equipment

→ Emergency services professionals have a range of procedures and standards to follow when they are using a wide range of operational equipment, including vehicles. Transport professionals likewise have comprehensive operating procedures for using radio equipment in moving trains, with signalling equipment and so on.

In any modern operational environment there are many pieces of equipment that may cause or be susceptible to interference. TETRA is no different from other radio or electronic devices in this respect, but it has the advantage of the 'transmit-inhibit' feature.

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 World Health Organisation, International Commission on Non-Ionising Radiation Protection (ICNIRP), Advisory Group on Non-Ionising Radiation Protection (AGNIR), Independent Expert Group on Mobile Phones (Stewart Inquiry), Mobile Telecommunications and Health Research programme, Home Office, The TETRA Association, Mobile Manufacturers' Forum.

For advice on TV interference in the UK visit: www.ofcom.gov.uk.

For general information about electro-magnetic compatibility and interference visit:

- www.mhra.gov.uk/home
- www.intellectuk.org/policy/committees/emc

Leaflets

Other leaflets in this series published by the TETRA Industry Group are available in pdf form from our web site, or from the address below. These include:

- TETRA Health and Safety overview
- TETRA Base Stations
- TETRA Portable and Mobile Devices
- Science and Standards

Contact us

E-mail: enquiries@tetrahealth.info

Mail: TETRA Industry Group, PO Box 1005, Berkhamsted, Herts, HP4 3ZW, United Kingdom