



## **TETRA for the Extraction Sector: Mining, Oil and Gas Industries**

### **Important Note**

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## Introduction

This paper highlights the suitability of TETRA (Terrestrial Trunked RAdio) for use in the extraction sector, specifically mining, oil and gas. These industries play a crucial role in supporting the world economy. TETRA provides the solution to support their need for critical communications – a crucial requirement for a market sector where safety is paramount.

TETRA is an ETSI<sup>1</sup>-defined technology standard that provides digital radio technology for those for whom mobile radio communications are critical to their business. Globally established, proven and mature, TETRA is a feature rich technology standard designed specifically for the needs of professional users who rely on communications for safety, security and protection.

There is no technology that has the combined and dynamic voice and data capabilities, or the industry-specific applications of TETRA, for critical communications users. This paper will demonstrate that TETRA is the most suitable choice, able to deliver the speed, security, reliability and robust performance needed for industry, now and in the future.

## TETRA – General Characteristics

TETRA is the industry-leading de-facto standard for critical communications. TETRA's open standard means that network operators and end users are free to choose from the many manufacturers and suppliers of TETRA infrastructure and radios for a solution to meet their precise needs. This helps to sustain a competitive, innovative and vibrant ecosystem of suppliers, manufacturers and operators, and drives down prices to provide a cost-effective choice for end users. The unrivalled TETRA Interoperability Certification Process (IOP), managed by the TCCA<sup>2</sup>, gives TETRA users complete confidence that certified interoperable TETRA equipment will work seamlessly in multi-vendor systems.

As markets around the world continue to develop, the competitive cost of TETRA systems is making the technology an increasingly popular choice in Asia, Africa, the Middle East and the Americas, as well as in its long established European markets. TETRA is respected around the world.

## Why choose TETRA for the extraction Industry?

Oil and Gas, and the extraction industry generally, face key communications challenges. Sites are often in geographically inhospitable areas, where the first and foremost requirement of radio networks is to provide security for the personnel. Communications systems have to be robust, capable of dealing with the everyday operational tasks and maintenance of the site, sometimes in extremely hazardous conditions.

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<sup>1</sup> ETSI – European Telecommunications Standards Institute, the body responsible for producing standards for communications systems such as GSM, TETRA and DECT. ETSI is officially responsible for standardization of Information and Communication Technologies (ICT) within Europe

<sup>2</sup> TCCA – TETRA and Critical Communications Association, responsible for this white paper. For more information see [www.tandcca.com](http://www.tandcca.com)

TETRA is a technology with a proven track record when it comes to mining. In addition, the availability of products in several frequency bands meets frequency licence demands in a variety of geographies. TETRA can operate in the frequency range from about 300 to 900MHz, giving it great flexibility to be awarded blocks of spectrum for extraction industry projects.

## Unrivalled voice service

The most critical application for industrial markets remains voice, and TETRA's voice capabilities are second to none. With instant connection and excellent voice clarity, TETRA also has the options of Trunked Mode Operation (TMO) and Direct Mode Operation (DMO).

Trunked Mode highlights TETRA's capability to prioritise one-to-many group communication over one-to-one or person-to-person calls. Trunked Mode pulls together users into groups. Essentially this allows users to be linked into dynamic groups for faster communication in emergencies and for operational tasks. Centralised control allows the ability to prioritise certain groups. Trunked mode provides a very efficient method of sharing a single infrastructure by different virtual private groups.

Direct Mode Operation is the ability to communicate between terminals outside the coverage of a radio network, which is an essential element in emergency situations if users find themselves outside the range of the network. Direct Mode gives users several advantages. It can operate back-to-back, from one terminal to another. Coverage can be increased via a DMO repeater, and can be connected to Trunked Mode via a DMO gateway.

Gateway Mode Operation (GMO) is particularly well suited to the mining industry. Gateways are designed to provide coverage between two geographically different sites when there is no network coverage available. Given the changing landscape of open cast mines, gateways provide a communication in-fill.

## TETRA's Data Capabilities

TETRA delivers integrated voice and data services over an IP network. TETRA Enhanced Data Services (TEDS) is the wideband solution delivering higher speed data transfers for richer applications interworking within the secure TETRA communications environment. On the latest TETRA radios, databases can be organised and stored. TETRA also offers Status messages and Short Data Service (SDS) which can be delivered over a TETRA system's main control channel. Shortcuts sent via these services can direct users to information stored locally on their radio, or point them to a page on a WAP server across the TETRA network. Packet-switched data or circuit switched data can also be provided over specifically assigned channels.

## SCADA

TETRA's data capabilities are also well suited for SCADA (Supervisory Control And Data Acquisition) applications. Specialised terminals are available that take advantage of TETRA's Trunked Mode operation and can be set up to provide unattended monitoring of plant and equipment as well as remote control of various functions. SCADA, other data services and voice can all be accommodated on a single network.

## **Dedicated terminals for hazardous environments**

TETRA manufacturers also provide Intrinsically Safe (IS) terminals, designed to operate in hazardous environments and inhospitable geographical areas where a conventional radio may not withstand the challenging conditions.

TETRA IS radios offer additional features over and above the IS specification, including the ability to withstand being dropped, being fully submerged underwater (IPx7 rating), and completely dustproof (IPx6) as well as many advanced user safety features such as man-down motion sensing capabilities to automatically alert the control room should the user become incapacitated.

## **Instant alerts for rapid response**

Priority and pre-emptive calls are a key feature for the challenging environments of the extraction industry. A priority call is treated by the network as being more important than a standard call, and is given instant access to a voice channel, enabling situations such as man-down or alerts to override a standard call. Additionally, a pre-emptive priority call is a service that ranks calls based on their criticality, the highest priority being the emergency call. Unlike 911, 112 or 999 initiated public network emergency calls (which can also be supported on TETRA) the TETRA emergency call can be initiated by using a dedicated switch located on the terminal. TETRA emergency calls alert the control room dispatcher, and other users in the talk group, simultaneously.

## **Accurate location tracking for enhanced safety**

TETRA is also compatible with GPS technology. GPS location data can be transmitted during emergencies and used to track missing and potentially endangered personnel. TETRA devices are equipped with a GPS receiver and antenna to receive and decode data from GPS satellites and establish the geographic location of the device. Software in the device is programmed to regularly send a message containing the location information to the network location server, which tracks and records the movements of the sending devices. This is an ideal feature for the extraction industries as TETRA systems can work underground, where rugged geo-location repeater devices can be installed to triangulate the position of a terminal. Tracking systems can also be used to locate terminals indoors. This affords extra protection for mission critical lone worker situations.

## **Security**

The TETRA standard is designed to provide the utmost security of communications. TETRA uses Over-the-Air encryption, End-to-End encryption and Authentication to achieve this. Over-the-Air encryption provides protection for all signalling, and identities such as user voice and data. End-to-End encryption secures the entire network in addition to the radio signalling. It is a necessary feature for national security organisations. Authentication confirms that the mobile station is valid to the network and provides a derived cipher key for use in Over-the-Air encryption. These three features ensure that TETRA delivers confidentiality, authenticity, integrity, availability and accountability.

## Inter-network Gateway Benefit

Gateways to third party networks have been a feature of TETRA from its standardisation. The TETRA gateway enables users to connect to other technologies and user groups outside of the TETRA network. Gateways include, for example, connections to legacy radio and telephone networks, ISDN, Ethernet Local Area Networks, audio and visual recording devices; control rooms and data users, creating seamless voice communications.

## Conclusion

TETRA is the leading technology for industries that rely on critical mobile communications, delivering the applications and services that mission-critical users need. TETRA's ability to interconnect to legacy systems delivers an integrated seamless communications solution, ensuring cost-effective investments and a strong foundation for future communications needs.

The on-going development of mobile broadband solutions for users of mission and business critical mobile communications will eventually lead to high bandwidth data services being delivered over LTE. TETRA solutions are future proof as well as backward compatible, and will give manufacturers the potential to combine a broadband service with the proven, stable and reliable core TETRA network for voice and data.

Find out more about TETRA at work at [www.tandcca.com](http://www.tandcca.com)

## Glossary

DMO	Direct Mode Operation – A means of establishing communications between two radios without the intervention of a radio infrastructure
ETSI	European Telecommunications Standards Institute
GMO	Gateway Mode Operation – enables users outside of the network coverage to communicate back to the network via a ‘Gateway’ radio that is within network coverage
Group Call	A means of setting up a radio call to a large number of users simultaneously
GPS	Global Positioning System – a means of establishing the location of a device by measuring signals from an array of satellites
IOP	Interoperability Process – a process designed to ensure compatibility between products from different manufacturers. The TETRA IoP process is run by the TCCA.
IS	Intrinsically Safe – equipment that has been purpose designed to operate in hazardous and potentially explosive environments
LTE	Long Term Evolution – the latest standard for cellular communications. LTE provides higher data rates than 3G UMTS but is not quite a 4G technology
SCADA	Supervisory Control And Data Acquisition – a means of exchanging data for purpose of monitoring and controlling equipment remotely
SDS	Short Data Service – a highly efficient means of sending small amounts of data. Can be compared to the TEXT Messaging service of GSM
TCCA	TETRA and Critical Communications Association (see <a href="http://www.tandcca.com">www.tandcca.com</a> )
TEDS	TETRA Enhanced Data Services – a means of transmitting higher data speeds using wider channel bandwidths
TETRA	Terrestrial Trunked Radio – a digital trunked mobile radio technology
TMO	Trunked Mode Operation – a system of sharing channels amongst a variety of user groups and enabling each to operate as a self contained and private virtual group. Such groups can remain private or be interconnected with other groups.
WAP	Wireless Application Protocol – a technical standard for accessing information over a mobile wireless network

## Version Control

Version No.	Date	Changes/additions made
1.0	June 2014	First published version