



## TetraFlex® for Mining – when reliable communication is crucial

The most rugged, reliable and easily scalable TETRA communication system for open pit mining operations.

Today's integrated mining operations need to be able to respond rapidly to changes in demand, producing greater tonnages more efficiently, with minimised environmental impact and with improved health and safety conditions for workers. These challenges continue to increase as new exploration takes mining companies into more and more remote areas. There can be great distances between operational centres, mining sites, crushing plants and transportation logistics, while production often needs to continue 24 hours a day, 7 days a week. Communications play an increasingly vital role in ensuring operational coordination as well as the safety of the many people involved.

DAMM fully understands the critical importance of fail-safe voice and data communications. We specialise in providing equipment perfectly suited to the remote, harsh environments and severe working conditions of mining operations. Through our solutions, we provide crucial communications integration between the mining site, rail and port operations and centralised administration, enhancing both efficiency and the safety of personnel.



## DAMM's TetraFlex® Solution for mining

DAMM's TetraFlex® Solution provides a reliable and complete trunked TETRA communications system, enabling private and secure voice and data communications across all mining activities for increased efficiency and optimised safety.



*TetraFlex® outdoor base station.*



### Typical mining site voice and data coverage

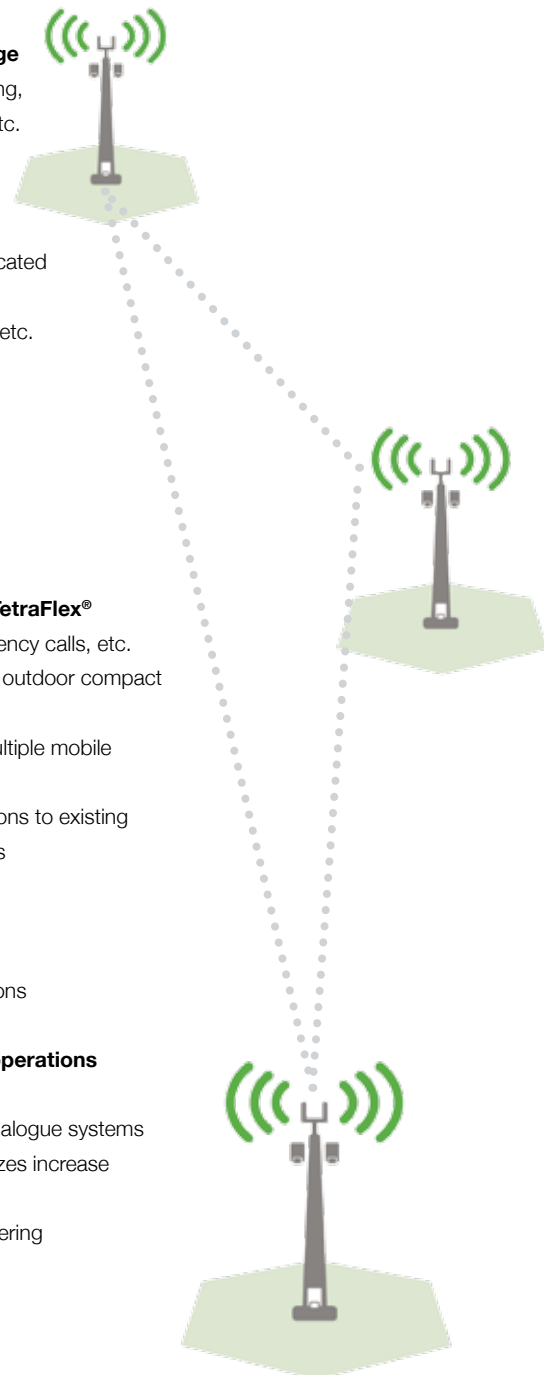
- Exploration areas at mining sites; e.g. drilling, maintenance and supervision personnel, etc.
- Machinery; surface miners, dump trucks, excavators, bulldozers, fuel tankers
- Truck and rail transportation
- Operational centres; on-site or remotely located
- Port operations
- Production sites; e.g. aluminium smelters, etc.
- Emergency units
- Technical maintenance teams
- Remote facilities; e.g. fuel dumps or water filtering systems
- External suppliers and contractors
- Mobile coverage on trailers

### Examples of mining site applications for TetraFlex®

- Worker safety; man-down facilities, emergency calls, etc.
- Mobile coverage as mining sites shift, with outdoor compact base station mounted on trailers
- Telephone PSTN calls to avoid carrying multiple mobile communication devices
- Analogue gateway to ensure communications to existing systems and external contractors/suppliers
- Geo-fencing
- SCADA and other telemetry solutions
- Data and security alarms
- Blast Alarm with audible and text notifications

### TetraFlex® features important for mining operations

- Full site coverage
- Easy set-up and transition from existing analogue systems
- Easy and quick scalability as mining site sizes increase
- Redundancy, fail-safe and back-ups
- Low power consumption allows solar powering
- Own GIS map upload to dispatcher
- Free choice of terminal suppliers
- Remote management capabilities
- Long-term cost effectiveness





“ TetraFlex® provides complete site coverage and easy scalability as needs change. ”



**Secure voice communications**

With the TetraFlex® Communications System used for mining, user-defined groups and work teams can easily be defined and coordinated. The highly flexible voice communication services support individual private calls, group calls, telephony communications (PSTN) and more; always with crystal-clear voice quality, even in the noisiest areas of the mining operation. For emergency incidents, the system provides emergency calls, man-down facilities and override functions.

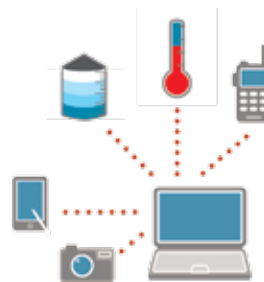


*TetraFlex® Voice Gateway*

**Efficient Data Communications**

TetraFlex® data services are the key to achieving operational efficiency. This service provides data for monitoring GPS vehicle and personnel locations and is also used, for example, to provide geo-fencing for hazardous work areas, with alerts to the site dispatcher if vehicles move into danger zones. Logging GPS coordinates can

also be used for monitoring and optimising the routes and speed of a wide variety of machines, including surface miners, dump trucks, excavators, bulldozers or fuel tankers. This creates improved efficiency and also results in considerable lubricant savings, as well as providing information to support automated traffic dispatch. TetraFlex® data services enable SCADA and telemetry data to be used in support of a wide variety of secondary applications. These include such things as vehicle management systems and optimising the operation of machinery, such as average load levels of trucks or receiving security alarms and data from remote locations like fuel dumps, railway operations or water filtration systems. Data and alarms can be sent either to operational centres or direct to vehicles or handheld TETRA terminal displays. Existing data and telemetry systems can be seamlessly integrated via the easily accessible TetraFlex® API.



*TetraFlex® Packet Data Gateway*

**Our customers**

Some of the world's largest mining companies have already put their trust in the TetraFlex® Communications System and are enjoying the benefits of increased control, efficiency and cost-effectiveness. Our customers number some of the most famous names in mining:

- Coal India Limited**
- RioTinto**
- Xstrata**
- Fortescue Metal Group**
- BHP Billiton**
- Hillgrove**
- Newcastle Coal**
- Gindalbie Metals**
- Erdemir**
- Boliden**



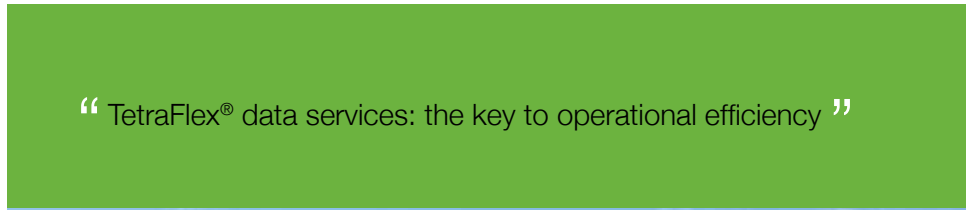


## About TETRA

TETRA (terrestrial trunked radio) is a digital-trunked professional mobile radio standard and was developed by ETSI, the European Telecommunications Standards Institute. In recent years, TETRA has proved to be the ideal technology choice for mining communications.

TETRA was initially developed to provide more spectrum-efficient digital voice and data technology for users of private mobile radio systems. This group extends from country-wide Government Radio Networks with hundreds of thousands of users, right down to small single-site systems with as few as 15 users. TETRA technology is currently being used in more than 160 countries.

The core technologies used in the TETRA standard – such as Digital, Trunking and Time Division Multiple Access (TDMA) – provide a number of inherent advantages and benefits, including voice quality, RF coverage, data services and security.



### Mining dispatch solution

Effective mining and transport dispatch is a vital tool for achieving increased productivity. Using the TetraFlex® Dispatcher solution, all users – from the truck drivers who transport the minerals or metals to the trains, or port terminal and maintenance staff – can easily be dispatched. In addition, all radio system users can be efficiently managed by the dispatch operators. Thanks to the built-in GPS positioning system, dispatch personnel can track and optimise movements of mobile equipment inside the mines in real time. TetraFlex® Dispatcher can operate using either Google maps or via up-loaded customised GIS-format mining site maps.



*TetraFlex®Dispatcher*

### Voice and data collection for increased operational productivity

For many modern mining enterprises, TetraFlex® infrastructure plays a vital role in providing data from mining operations used in decision-making for improved operational processes, recommendations and forecasts, planning, costing and report preparation.

The TetraFlex® Voice and Data Management solution provides full voice and data logging facilities, as well as replay, across the entire network. This enables effortless incident reconstructions while also gathering valuable statistics on operational performance. TetraFlex® comes with an easily accessible API that provides fast and efficient data transfer to mining operation performance and cost analysis systems.



*TetraFlex® Voice and Data Logging and Replay*



*TetraFlex® High Capacity Indoor Base Station*



“ TetraFlex® works flawlessly under even the most severe temperature and humidity conditions.”



### **Complete site coverage and up-time reliability**

The 100% IP-based technology used by TetraFlex® enables full scalability of both capacity and coverage. This makes it possible to create integrated communications across multiple mining sites, logistics facilities and centralised operational control centres. It also means that the system can support any capacity, from small mining sites with a few hundred users to large sites with several thousand terminals. To guarantee 100% up-time, the system is delivered with full redundancy.



Further security is provided by the Tetra Flex® intelligent distributed network architecture. This means that all system information is always replicated to all sites in the network, allowing call and data traffic to continue uninterrupted if one or more sites lose connection with the rest of the network. It further enables simple self-configuring site expansions and automatic re-establishment following a network interruption.

At remote mining locations, the IP backbone for site communications is typically provided through fibre-optics, microwave or satellite networks.



### **Optimised installation for mining sites**

The TetraFlex® system is optimised for installations at mining sites.

The TetraFlex® IP65 encapsulated outdoor base station is well suited for outside installations in harsh mining site environments, directly in masts even under severe temperature and humidity conditions, and provides providing coverage for the entire mining site.

The compact design of the TetraFlex® outdoor solution also makes it ideal for portable deployment, i.e. on trailers that can be moved as the mining location changes or along haul roads, etc. The low power consumption of the system allows a completely independent solar-powered solution to be mounted on the trailers or in masts.

The system can be installed with any combination of outdoor base stations and high-capacity indoor base stations where desired.

### **Remote network management and surveillance**

By supporting remote connection, the TetraFlex® Network Management system provides easy access to configuration and surveillance of the entire network and all subscribers. It comes with a Google map already installed, where the alarm status of all site positions is monitored.



## Stay in touch

At DAMM, you will find straightforward business processes and lean sales and support organisations that make it easy for you to do business with us anywhere in the world.

DAMM Cellular Systems A/S is a world leader in the provision of scalable, flexible, user-friendly and cost-effective TETRA infrastructure products to industrial, commercial and public safety customers. As a key player within professional radio communications for more than 30 years, DAMM holds a leadership position in developing TETRA technology through superior engineering and a constant focus on customer needs and reduced complexity.

The DAMM TetraFlex® system is a highly cost-effective solution offering rapid deployment of TETRA infrastructure, easy access to responsive expert support and the full benefits of cutting-edge technology. DAMM solutions are available worldwide through an exclusive network of partners.

For more information, please visit [www.damm.dk](http://www.damm.dk)



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