



## TetraFlex® for Rail and Metro – when reliable communication is crucial

The most rugged, reliable and easily scalable TETRA communication system for rail and metro operations.

Mobility is a basic need of our society. To grow, we need to move people and goods faster and more efficiently than ever before. As mobility increases, so do passenger expectations. We want to reach our destinations safely, as quickly as possible and on time. And we expect up-to-the-minute information on departure times, transfers and deviations. This challenges operations management within the public transport companies to optimally employ their vehicles, improve punctuality and enhance efficiency.

With the right communications platform in place, operators will be able to achieve significant performance improvements. Through the efficient use of information, resource allocation and communication between key people, critical and informed decisions can promptly be taken, empowering efficient and confident management of operations.

DAMM fully understands the critical importance of reliable voice and data communications for the rail and metro sector. Our high feature TetraFlex solution provide crucial communications integration between operations, staff, passengers and emergency units, enhancing efficiency and the safety and satisfaction of personnel and passengers. Full reliability and 100% up-time of the communications system is guaranteed through full redundancy of components and critical system information. We specialize in providing rugged, high-performance equipment, perfectly suited for installing directly in the dusty and humid environments of metro tunnels or the severe environmental conditions found alongside rail tracks.



# DAMM's TetraFlex Solution for rail and metro

DAMM's TetraFlex Solution provides a reliable and complete trunked TETRA communications system, enabling private and secure voice and data communications across all activities in rail and metro operations for increased efficiency and optimized safety.



TetraFlex outdoor base station.

### Typical voice and data requirements

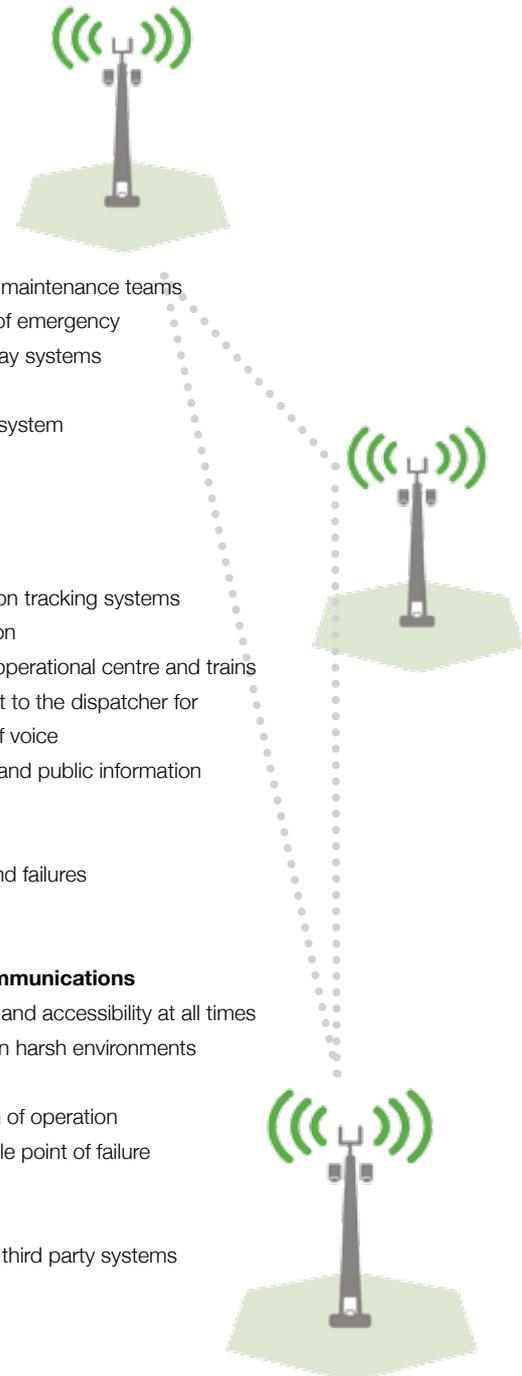
- Dispatchers and operational centre
- Drivers
- Trackside workers
- On-board communication system
- Security personnel
- Ticketing and service personnel
- Shunting yards, depot workers and technical maintenance teams
- Fire brigades, ambulance and police in case of emergency
- Public announcements and information display systems
- Signalling control and status
- Technical data and telemetry for train control system

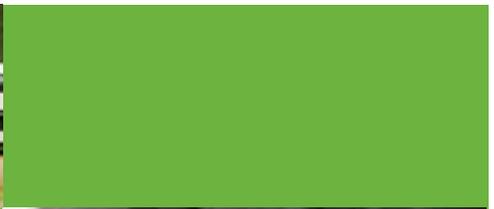
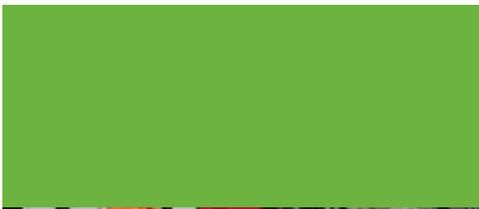
### Examples of TetraFlex applications

- Integrated on-train communication system
- Central traffic management
- Geo-positioning integration into vehicle location tracking systems for real-time timetables and journey information
- Open or predefined text messages between operational centre and trains
- Emergency procedures with call-back request to the dispatcher for activating ambience listening and recording of voice
- Integration into personal announcement (PA) and public information display systems
- Integration into signalling systems
- Integration into SCADA systems for alarms and failures
- Central voice recording

### Key TetraFlex features for rail and metro communications

- Full redundancy for 100% channel availability and accessibility at all times
- IP65 protected housing for direct installation in harsh environments
- Compact design
- Easy and quick scalability without interruption of operation
- Reliability: redundancy, back-ups and no single point of failure
- Low power consumption
- Free choice of terminal suppliers
- Easily accessible API for easy integration into third party systems
- High cost effectiveness





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



**Complete site coverage**

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 stations, logistics facilities, depots, maintenance facilities and centralised operational control centres. It also means that the system can support any capacity, from use at single site stations with few users to large railway and metro infrastructures with several thousand users. The 100% IP-based technology also ensures easy integration to existing IP backbones like fibre-optics, microwave or satellite networks.

TetraFlex is also delivered with High Power Base Stations, delivering high output power to distributed antenna systems and leaky feeder solutions for extended coverage in indoor areas, such as tunnels and depots. The TetraFlex internal synchronisation system ensures seamless handover from one node to another, even for tunnel operations.

**100% up-time reliability**

To guarantee 100% up-time, the system is delivered with full component redundancy. Further security is provided by the TetraFlex intelligent distributed network architecture. This means that all system information is constantly 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, without interruption of operation.

**Optimized installation for rail and metro requirements**

The TetraFlex system has been optimized for installation within rail and metro operations. The TetraFlex IP65 encapsulated outdoor base station is well suited for installations in harsh environments, including metal dust and high humidity, which are often the case in metro tunnels. The system's compact design makes it ideal for installation in narrow metro tunnels. It can also be mounted outdoors directly on buildings or masts alongside the railway or in stations. The system can be installed using any combination of outdoor base stations and high-capacity indoor base stations, as required.



*TetraFlex High Capacity Indoor Base Station*

“ TetraFlex data services: the key to operational efficiency ”



## About TETRA

TETRA (terrestrial trunked radio) is a digital-trunked professional mobile radio standard developed by ETSI, the European Telecommunications Standards Institute.

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.

In recent years, TETRA has proved to be the ideal technology choice for transport communications. Transport is today the second largest sector using TETRA communication technology after Public Safety, with installations across the globe.

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.

### Dispatch solution

Effective dispatching is a vital tool for achieving increased efficiency. Using the TetraFlex Dispatcher solution, all users – from the drivers, on-train and ticketing staff to maintenance staff or security – can easily be dispatched by the operational centre.



*TetraFlex Dispatcher*

### Unlimited 3<sup>rd</sup> party application integration

TetraFlex is supplied with an easy accessible Application Programming Interface (API), that allows straightforward development and integration of customer-designed applications.

### Voice and data collection for increased operational productivity

For many modern enterprises, TetraFlex infrastructure plays a vital role in providing data from 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 reconstruction while also gathering valuable statistics on operational performance.



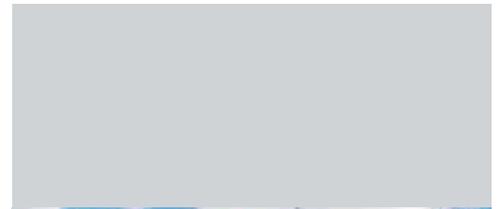
*TetraFlex Voice and Data Logging and Replay*

### 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, which monitors the alarm status of all site positions.



“ TetraFlex provides full redundancy of components and critical system information. ”



## Complete Coverage

### Secure voice communications

With the TetraFlex Communications System used in rail and metro, user-defined groups and staff 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. For emergency incidents, the system provides emergency calls, man-down facilities and override functions.



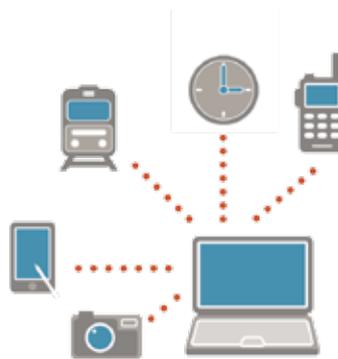
TetraFlex Voice Gateway

### Efficient Data Communications

TetraFlex data services are the key to achieving operational efficiency. For instance, this service provides data for vehicle-tracking systems to provide real-time timetable and journey information to customers at train stations or onboard trams and metros, and for signalling control and status.

Logging GPS coordinates can be used for monitoring and optimizing the routes and speed of trains. TetraFlex data services further enable SCADA and telemetry data to be used for reporting of alarms and failures or collecting data for improving operational performance in support of third party applications, such as vehicle management systems.

Data and alarms can be sent 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

We have already cooperated successfully with a series of worldwide rail and metro operations. Their choice of DAMM's Communications System means that they and their passengers are today enjoying the benefits of increased control efficiency and safety.

**Moscow Metro, Russia**

**Mumbai Monorail, India**

**SNCF, Hardware technology to Thales, France**

**Wuppertal Schwebebahn, Germany**

**Almaty Metro, Kazakhstan**

**Samsun Light Rail, Turkey**

**St Petersburg Citywide Network, Russia**

**Bayerische Zugspitzbahn, Germany**

**FMG, Heavy Haul Railway, Australia**





## 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)



DAMM Cellular Systems A/S  
Møllegade 68  
6400 Sønderborg  
Denmark