Public transport, as a basic mean of providing mobility for the general population, is a key factor in the development of our society.

Buses, trams, subways, railways, and high-speed trains, including sophisticated driverless vehicles, need an efficient communications system which grows at the same pace as their own operations, all the while as they meet the service availability and safety expectations of their customers.

For this kind of environment, POWERTRUNK provides a complete and professional solution adapted to the specific requirements of each project.

Professional Communications Solutions for Transport

POWERTRUNK’s radio communications solutions, based on the TETRA standard and complemented with broadband technologies, provide continuous voice and data communication between vehicles and control systems. This combination provides powerful and reliable support for various applications:

1. Voice: Communications with the driver, PA and Intercom systems, etc.
2. Critical data: Alarm management, vehicle diagnostics, location, emergencies, etc.
3. Vital data: Signaling data for driving instructions.
4. Non-critical data: Video surveillance and other applications.

Some of the key differentiating aspects which make POWERTRUNK a leader in the supply of radio solutions for the transport sector are shown as follows:

<table>
<thead>
<tr>
<th>CHARACTERISTICS</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design and manufacturing control</td>
<td>Product and solution customization. Flexibility</td>
</tr>
<tr>
<td>Wide range of solutions according to the functionality required</td>
<td>Adaptation to the needs of each project</td>
</tr>
<tr>
<td>Integration of all elements of the solution</td>
<td>Warranty of correct performance, savings in maintenance.</td>
</tr>
<tr>
<td>Unified, multiservice system</td>
<td>Profitability and economic viability</td>
</tr>
<tr>
<td>Mobility</td>
<td>Radio technologies specially adapted to mobile environments</td>
</tr>
<tr>
<td>Redundancy</td>
<td>Maximum availability and reliability</td>
</tr>
<tr>
<td>Standardized services such as authentication, encryption, etc.</td>
<td>Data integrity and security</td>
</tr>
<tr>
<td>On-board equipment adapted to the transport sector</td>
<td>Compliance with railway regulation EN50155</td>
</tr>
<tr>
<td>Useful standard services: Group calls, broadcast, ambience listening call, etc.</td>
<td>Functionality specifically applicable for the transport environment</td>
</tr>
<tr>
<td>Technology with capacity for growth</td>
<td>Future integration of new services. Possibility of evolution</td>
</tr>
<tr>
<td>Gradual installation, easy maintenance, turnkey projects</td>
<td>Cost-effective solutions</td>
</tr>
</tbody>
</table>
The set of applications described sometimes is resolved by means of several independent communications systems which are not integrated among themselves. This fact, as well as coordination problems, especially in critical situations, can result in high investment and maintenance costs. The unified and multiservice solution provided by POWERTRUNK unites all communications into an integrated system, thereby optimizing operational costs and maximizing ROI (Return of Investment).
Transport Products Range

RTP-300
- Railway regulation compliant
- Several on-board configuration options
- Functionality:
  - TETRA voice and data communications
  - Interconnection with PA and Intercom systems
  - Location via GPS
  - Power supply according to EN50155
  - Serial Communication interface (RS-232/RS-422/RS-485) and Ethernet
  - Digital I/Os
  - Communications rack managed from touch-screen user interface designed for railway environment or from external application

In addition to the RTP-300 features:
- Dual equipment: up to two internal radio interfaces
- Advanced functionality integrated in the communications rack:
  - Railway specific communications interfaces such as MVB bus
  - Interconnection with TCMS for the integration with other train subsystems
  - Interface to connect a beacon reader
  - Voice synthesizer
  - 100% availability, full redundancy of:
    - Power Supply
    - Radio Equipment
    - Communications Rack
  - Support for signaling systems such as ETCS, CBTC, PTC and others

RTP-603
- User interface to access to the different on-board radio equipment functions.
- Connection to the audio accessories: handset with PTT, loudspeaker, ambience microphone.
- Touch-screen version with advanced functions and capacity for management and display of video.

ON-BOARD CONTROL CONSOLE
- Critical voice communications with the driver and other operational groups:
  - Individual calls
  - Group calls / Broadcast
  - Emergency calls
  - Ambience listening calls
  - Direct Mode calls (DMO)
  - Interconnection calls with maintenance teams
  - Interconnection calls with public safety agencies

- Critical data communications:
  - Interconnection with on-board control systems (TCMS: Train Control and Management System)
  - Operational, security, and maintenance commands management
  - Train diagnostics
  - Alarm and event management
  - Advanced location function (by beacons or GPS)

- Interconnection with other train subsystems:
  - Public Address systems
  - Intercom systems
  - Passenger Information Systems
  - Ticketing and counting systems

- Vital data communications:
  - Railway signaling data transmission (integration with ETCS, CBTC, PTC systems and others)

- Non-vital data communications:
  - Fixed video surveillance (monitoring of tunnels, crossings and stations)
  - On-board video surveillance (displaying real-time images from trains)
  - Advertising and entertainment for passengers
  - Download and upgrade of operational files in depots

CeCo-TRANS
- This range of on-board products is complemented by CeCo-TRANS, a Control Center designed for the transport environment, from which voice and critical data communication is managed. The location and status of each radio unit in the system are also monitored.
CeCo-TRANS, POWERTRUNK’s control center application designed for the transportation sector, integrates solutions for the most common voice and data requirements of this environment, providing operators and supervisors an advanced support tool to interact with the system resources easily and intuitively.

This application is oriented specifically to the management of the transportation fleets and provides a graphical interface, called “synoptic line”, which facilitates the operator’s tasks to communicate with vehicles.

Based on TETRA technology, the main functions provided by CeCo-TRANS are as follows:

- AVL (Automatic Vehicle Location) by means of different methods of vehicle positioning
- Calls priority management assuring that there will be available radio resources in the system in critical situations.
- Voice communications management widely used in the railway environment, for example:
  - Group calls between drivers
  - Authorized calls between trains
  - PA calls to passenger’s areas
  - Intercom calls to the emergency handles located on coaches
  - Ambience listening calls
  - Emergency calls
  - Group calls with other staff related to the operation: security, maintenance, etc.
- Information to passengers by means of playing prerecorded audio messages
- Circulation number management
- Basic data exchange between the train and the control center
- Fleet management according to the operation: definition of one communications group for each railway line, for each railway section of the line, for depots, stations, etc.
- Automatic communications group change according to the location information
- Alarms and events management: Real time monitoring of the state of the elements of the vehicle
- Call recording

In addition, CeCo-TRANS includes other multiple key points to be highlighted:

- The graphical user interface is modern and user-friendly. Monitors are available in different sizes (17” and 22”) and can be standard monitors, with touch screen, or a combination of both.
- The synoptic line display is configurable and adaptable to the railway line structure.
- CeCo-TRANS provides a web-based interface through which information with an external management application, such as a Railway Control Center, can be exchanged (location, circulation number, etc.).
- The system is compatible with POWERTRUNK’s optimized Synchronous Data Manager (SDM) application, by which means CeCo-TRANS continuously obtains updated information, graphically displaying it in real-time on the synoptic display.
- The CeCo-TRANS architecture is based on Ethernet, allowing systems to be designed with maximum availability by means of redundant elements, even in different geographic locations.
Voice
TETRA provides group calls, broadcast calls, emergency calls, calls between trains, etc., for communication among the main players in the transport environment: drivers, stations, depots, control center, passengers, and security and maintenance staff.

Furthermore, it allows integration with external communications networks (police, firefighters, etc.) in critical situations for emergency coordination.

Vital Data
Signaling systems are responsible for assuring comfort, punctuality, availability, and safety in passenger and freight transportation, managing driving operations of the trains.

POWERTRUNK radio solutions, focused to optimize costs, provide the data communication means required for these kinds of applications such as, for example, ETCS European standard for railways, CBTC systems oriented to underground or trams, or PTC systems, etc.

Critical Data
POWERTRUNK on-board equipment is responsible for obtaining the location information and sending such data to the control center (CeCo-TRANS), so that the position of all vehicles is known within seconds and can be presented over various types of maps and/or synoptic line displays.

Another common application is the monitoring and management of alarms and events which take place regarding the on-board equipment and other train subsystems.

On the other hand, the on-board equipment has also auto-diagnostic functions and is able to be integrated with Passenger Information Systems, which allows passengers to be informed in real-time about next stops, arrival times, and incidents, reducing traveling and waiting times for the users.

Video and Other Applications
The POWERTRUNK TETRA solution for critical voice and data communications is complemented with a broadband radio access layer which supports applications such as:

- Real-time video to monitor at the control center images from inside the trains
- Real-time video to display in the driver cabin images of the station as the train approaches
- File transfer between the control center and trains for various required operations

References
Some of our highlighted projects worldwide include: New Jersey Transit (USA); Seoul Metro Line 7 and Daegu Line 3 (South Korea); Kazakhstan Temir Zholy (KTZ), the first ever TETRA network to support a rail signaling solution based on the European Traffic Control System (ETCS); Moscow-St. Petersburg Railways (Russia); VAG Nürnberg and KOR (Germany); Bogota Buses, Transmilenio and Penico Northern Railways (Colombia); Supervia Rio de Janeiro Trains and VLT Guabá (Brazil); Mexico City Metro lines 2 and 12, and Buenavista-Clavijar Train (Mexico); Santiago Underground (Chile); Algiers Underground, Oran Tramway, and Constantine Tramway (Algeria); Warsaw Underground Line 2 (Poland); Nottingham tramway (UK); Lima Electric Light Train (Peru), Barcelona Metro, Tenerife Metro, Palma de Mallorca Metro, Parla Trams, Madrid Trams, Alicante-Altea Light Railway, Euskotren, and Zaragoza Tram (Spain); Toulouse and Reims Buses (France); Geneva Buses (Switzerland); CVAG Chemnitz (Germany); Bergen Trams (Norway), etc...