Integrated Operations Control System

Trapeze™
Here for the journey

The LIO operations control system by Trapeze provides transport authorities and public transport bus operators with technological, environmentally friendly and economic expertise. It offers dispatchers a constant overview of all operational processes. Service disruptions are quickly detected and eliminated, and personnel and vehicle resources are deployed effectively. In short: LIO boosts the efficiency of your public transport system while minimising disruptions and the use of resources.

WHY CONTROL SYSTEMS?

Service providers operating in the local public transport sector are under increasing pressure to offer better services with fewer resources - which means paying close attention to the efficiency of day-to-day operations.

Our LIO operations control system successfully supports transport authorities and bus operators in this task.

LOWER COSTS, HIGHER EFFICIENCY.

LIO offers transport authorities potential for cutting operating costs. It optimises personnel deployment, fleet operations and travel times.

Traffic light pre-emption, gives your buses and light rail services right-of-way, getting your passengers to their destinations faster.

Our system supports dispatchers and drivers in completing their tasks quickly and reliably.

In turn, the passengers benefit from faster, more punctual connections, improved transfer protection and up-to-the-minute information.

Our LIO-IDS (Intelligent Decision Support) and LIO-BI (Business Intelligence) applications supplement the LIO operations control system by improving the quality of decision making within the transport authority. Incident management with LIO-IDS supports rapid and proper processing by the dispatchers; data analysis with LIO-BI clarifies any trouble spots in the operational procedures and generates information as a decision-making basis for the management.

BENEFITS

Benefits for transport authorities

- Greater efficiency, lower costs
- Improved reliability
- Overview of the current situation
- Rapid reaction to problems
- Standard interfaces are supported
- Reporting and statistics

Benefits for passengers

- High on-time services
- Short trip times
- Optimal transfers
- Comprehensive Real-time information

Integrated Operations Control System

EVALUATION AND OPTIMISATION

Software packages for creating timetables and rosters, as well as driver scheduling, are integrated via standardised interfaces so transport authorities have freedom of choice of their preferred software package.

During daily operations, the control system automatically collects extensive operational data. LIO-BI analyses the data to give an insight into the punctuality of the individual vehicles, as well as information on specific problem areas.

Statistics applications make the operational process more transparent. The transport authority can introduce suitable changes based on the corresponding results.

This allows for the on-going optimisation of the operational processes and performance.

COMPREHENSIVE SERVICES

For us, we provide our customers with the best possible support.

Within the context of service contracts, we offer an extensive range of services, including round-the-clock care, seven days a week.

A remote connection lets us access customer systems from our offices - which means remote support is always available should problems arise.

ADVANTAGES FOR TRANSPORT AUTHORITIES

- **Greater efficiency, lower costs**
- **Improved reliability**
- **Overview of the current situation**
- **Rapid reaction to problems**
- **Standard interfaces are supported**
- **Reporting and statistics**

Advantages for passengers

- **High punctuality**
- **Short travel times**
- **Optimised transfers**
- **Real-time information**

Advantages for multi-agencies

- **Comprehensive passenger information for urban and regional transport authorities**
- **Passenger information in the vehicle, display of transfer and connection possibilities**
- **New structures and IT solutions for services and fares**

Integrated Operations Control System

LIO IN ACTION: COMPONENTS AND APPLICATIONS

There is one crucial advantage for transport authorities and passengers alike: Trapeze offers a wealth of experience, based on the installation of more than 100 operations control systems worldwide.

THE MAIN FUNCTIONS OF LIO

- **Representation of the current vehicle locations**
- **Different types of voice radio, e.g. announcements or priority calls**
- **Control centre instructions to the vehicles**
- **Vehicle messages to the control centre**
- **Data exchange via various radio systems**
- **Signalling threshold values (e.g. timetable deviations)**
- **Transfer protection and monitoring**
- **Display of the vehicle passenger load**
- **Recording all relevant data for reports/statistics**
- **Incident management with LIO-IDS**
- **Vehicle log-on/log-off**

CENTRAL CONTROL CENTRE

The central control centre is the heart of our LIO system. From here, dispatchers have access to all functions of the composite system. All workstations have a graphic, intuitive user interface that applies the latest ergonomic principles.

The control computer software can be highly customised, making it possible to take account of the individual requirements of every transport authority.

Thanks to Voice over IP (VoIP), visual display units for dispatchers and system administrators are used as remote workstations, regardless of geographic location - all that is required is a LAN connection. This is particularly advantageous in control centres managing vehicles for several different transport companies, or in a remote depot.

The operations control system makes the control centre staff more efficient - in particular when dispatching or communicating with vehicles. LIO also actively informs the dispatchers about any incidents. The workstations can be personalised by configuring the user interface to match the individual's needs.

INCIDENT MANAGEMENT

Thanks to our LIO system, the current operational status is known at all times. The system can issue an early warning if incidents are looming. Deviations from normal operations are displayed clearly, and dispatchers can react promptly and effectively to any disruptions to the service.

After a disruption, the control system helps dispatchers restore regular operations as quickly as possible. The LIO-IDS application offers immediate access to automated workflows with action templates, forms and checklists. The swift restoration of normal operations means that fewer relief vehicles and drivers are required to cover emergencies - which generates extensive cost savings.

Any technical faults on vehicles are recorded automatically and communicated to the control centre. This helps minimise the number of maintenance staff required to undertake repairs and reduces vehicle downtimes.

Integrated Operations Control System

CENTRAL DATA MANAGEMENT

All system components benefit from central data supply, management and distribution. As a result, data for the control system and all participant components needs to be recorded only once. This leads to a consistent supply, greater operational flexibility and lower labour costs.

The Depot Data Management (DDM) application developed by Trapeze distributes data between the central data preparation, and the target devices in the vehicles (e.g. on-board computer, Multifunctional Displays). Devices can be updated via WiFi contained at the depot, or via 3G connection for wireless data exchange between the depot servers, and the vehicles. The DDM web client acts as the user interface used to operate the DDM system.

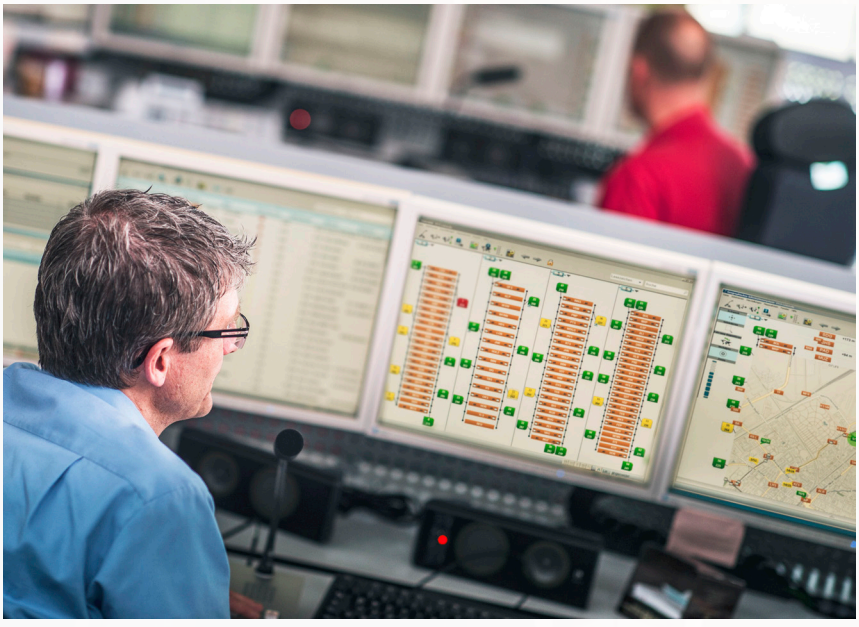
The radio system forms the backbone of a modern automatic vehicle location and control system - as all centralised and decentralised components are connected via radio. Our system works well in combination with digital radio, analogue radio and public radio networks. Within the control system, vehicles en route communicate on available communication channels: analogue data radio, digital radio (TETRA, TETRAPOL, GSM, GPRS, UMTS, VoIP), or future systems.

Voice and data radio: analogue or digital The radio system forms the backbone of a modern automatic vehicle location and control system, as all centralised and decentralised components are connected via radio. Our system is outstanding for use in combination with digital radio, analogue radio and public radio networks.

Analogue and digital radio systems can also be operated in parallel. Depending on reception conditions, communication occurs via a private radio network, or in the absence of coverage, via a public network.

The radio systems are operated in the vehicle and the control centre via a uniform, consistent interface that is transparent for the user.

Our customers can depend on their control system producing optimum results, working together with all digital radio systems established on the market, in both private and public networks.



ON-BOARD SYSTEMS

As a communication centre, Trapeze's on-board computers offer multiple interfaces for integrating a wide range of vehicle peripheral devices. Features are tailored to road and rail vehicles, used in local public transport. The on-board computers offer the driver a highly automated working environment.

CENTRALISED, INTEGRATED CONTROL: TRAPEZE DEPOT DATA MANAGER

The Trapeze depot data manager is central to the efficient management of your fleet of vehicles.

It web interface allows the easy management of equipment and software on vehicles. It allows for the management of data and statistics, as well as the updating of Time tables, software and drivers on the vehicle devices.

This easy to use interface allows the allows for the management of hundreds (or thousands) of devices, quickly and easily. Without the need for technicians to visit every vehicle.

Integrated Operations Control System

USER INTERFACES

There are different user terminals for our touch screen on-board computers. The driver automatically receives all relevant information via the user terminal. Voice connection with the control centre can be set up at the touch of a button, with data transferred via whichever radio system is available.

Trapeze offers a range of on-board computers, customisable according to the functionality needed by the customer. These devices integrate with popular device standards like IPxPT and VDV, allowing them to work with a wide range of third party accessories.

The on-board computers use GPS positioning logic to compare the planned position according to the timetable, with the actual location of the vehicle. Based on this information, the system automatically calculates whether a service is on time, or if it is too early or too late. It also allows for headway management, where a predetermined time between vehicles is used to calculate if services are too early or too late.

Information is sent to the control centre in real-time. Dispatchers know the current operating status throughout the transport authority's entire route network and can take the corresponding action when the need arises. The on-board computer safeguards communication with the control centre and controls various devices in the vehicle, for example, stop signs or announcements.

Integration of a passenger counting system within the vehicle allows better planning of the required vehicle resources, with corresponding timetable optimisation.

PASSENGER INFORMATION

Passengers appreciate the advantages of our operations control system. They benefit from optimum punctuality, the shortest possible journey times, and tailored connections, and are also fully informed both before, and during their journeys. Thanks to our SmartInfo stop signs, they know in real-time when their bus or tram will be running. During the trip, MFDs and announcements provide up-to-the-minute information.

Dynamic, automated, visual, and acoustic passenger information is provided at stops and within vehicles - which also includes messages from the control centre. Integration of passenger information in the operations control system provides a reliable display of actual departure times. Passengers can use the Internet, social media like Facebook, Twitter and WhatsApp, or SMS messaging to find out about imminent departures before they leave home or while en route.

Trapeze offers an elegant Multifunctional Display (MFD) for displaying passenger information in the vehicle.

The MFD shows passenger information in colour and high resolution, with video playback also possible. As a single or double display, it is seamlessly integrated with the control system and complements other components, to provide high-quality dynamic passenger information. The MFD also permits partnerships with third-party companies, to display tourism information or advertising to passengers.

Integrated Operations Control System

Trapeze is the world's leading supplier of comprehensive solutions for driver and vehicle deployment, operational control systems, passenger information and ticketing. Our solutions have been tried and tested for over 50 years in hundreds of cities, towns and regions worldwide.

TRAFFIC LIGHT PRE-EMPTION

Public transport appeals to commuters if it offers fast, punctual services, running in quick succession within an optimised network. However, analyses repeatedly show that buses and trams spend around one-third of their travel time at red lights.

Our LIO system includes a solution for traffic lights to give priority to buses and trams. The system reduces travel times, meets timetables and resources are optimised as fewer vehicles are required for the same service, thanks to block optimisation.

STATISTICAL EVALUATIONS

The Business Intelligence module (LIO-BI), a Trapeze innovation, permits detailed evaluation and analysis of operational data. For the first time, structured databases and tools reveal associations which may otherwise not be obvious. User-friendly reports visualise developments and processes and offer a reliable basis for process improvements, and management decisions.

The on-board computer records large volumes of data during the trip, which can be evaluated using our statistics software. BI offers many functions, for example, checking and documenting the efficacy of introduced improvement measures. The transport authority and its management have the data and facts to support their arguments and justify their decisions.

DATA ANALYSIS AND REPORTING

The spatial add-on offers intuitive representations of complex distance-based data, sourced from GIS maps - which provides effective data analysis access for the data volumes accumulated by a transport authority daily. It is possible to make the right conclusions and actions to improve quality and efficiency. The integration of LIO-BI with MicroStrategy allows for the easy 'drag and drop' customisation of reports by the customer, ensuring that the data you need is at your fingertips.

The statistics also offer a sustainable approach, as operations are managed with the best possible use of resources. The use of acceleration and tyre pressure sensors reduces fuel consumption, reduces wear and tear, and improves passenger comfort levels.

A user-friendly web-based application makes it easy to send reports to all interested parties within the organisation. Operational quality control figures can be published daily, with full transparency.

PLANNING OPTIMISATION

The automatic recording of operating data with our operations control system serves as a basis for dispatch planning. The results of the statistical evaluations make a significant contribution to optimising operations and service. Accrued data can be condensed into long-term statistics for detailed analyses of incident causes - such as location, time and type of incident.
In this way it is possible to work out concrete suggestions in order to exclude trouble spots. The long-term statistics can also be used to check the success of improvements to operations.

TRAPEZE GROUP

We value long-term partnerships and stay involved post-implementation to ensure your use of the solution is a successful one. Why Trapeze Group?

- **We run many of the world's largest systems, including London and Singapore**
- **Complete real-time management solution**
- **Improve your passenger experience with shorter trip times and better trip information**
- **Drive network wide improvements, including multimodal connectivity**
- **Increased efficiencies and reduced costs**

Request a personalised demo today:

info@trapezegroup.com.au

India	+91 98104 07444
Australia	+617 3129 2092
US	+01 319 743 1000
Canada	+01 905 629 8727
UK	+44 0 8445 616 771
Switzerland	+ 41 58 911 11 11
Africa	+27 11 025 9970

www.trapezegroup.com.au