ebblo

SOLUTION BROCHURE

Keeping an eye on operations and the fleet

Operations Control System LIO | Lead, inform, organise

Operations Control System LIO

Keeping an eye on operations and the fleet

ebblo's operations control system LIO supports companies involved in the local public transport sector with technological, environmentally friendly and economic expertise. It offers the dispatchers in the control centre a constant overview of all operational processes. Any incidents can be detected and dealt with quickly; furthermore, precise information is a basic prerequisite for correct, real-time passenger information.

A control system allows for optimised deployment of crews and vehicles, makes company workflows more efficient while minimising the necessary use of resources at the same time.

What speaks in favour of a control system or Automatic Vehicle Location & Control system (AVLC)?

Local public transport companies today are under increasing pressure to offer better services with fewer resources. They have to pay strict attention to having economically efficient daily operational processes, which is where our operations control system LIO offers such successful support.

Passengers want reliable connections and punctual service. Both before the trip and while en route, they always expect precise information about departure and arrival times and feasible transfers.

There is one crucial advantage for transport companies and passengers alike: ebblo has decades of experience in developing operations control systems – we installed our first system in Zurich already way back in 1969.

LIO – Lead, Inform, Organise

Operations Control System LIO

Lower costs, higher quality

LIO offers transport companies great potential for cutting their operating costs: besides travel times, it also optimises the deployment of crews and vehicles. Traffic light preemption gives your buses and lightrail services right-of-way at all times, bringing your passengers faster to their destinations. All in all, you will need fewer vehicles – or can offer a more frequent service with your existing fleet. Battery-operated buses are integrated efficiently.

Our system helps dispatchers and crews do their work quickly and reliably. In this way, the passengers benefit from faster, more punctual connections, improved transfer protection and up-to-the-minute information.

Evaluation and optimisation

Software systems for intelligent decision-making, incident management and wide-ranging analytics are an ideal addition to our operations control system LIO.

Our incident management helps the dispatchers to act swiftly and correctly, thus improving work quality within the transport operator.

During ongoing operation, the control system constantly records a large number of data, from travel times and delays to the time spent at stops and technical incidents. Specific analysis of this information with Business Intelligence visualises the circumstances involved, which often remain concealed in daily routines.

This allows for early detection of incidents in operational workflows as well as the identification of patterns and weak points, allowing systematic investigation of the causes, for example when there are frequent delays on certain routes, or when specific sections are prone to problems.

The evaluations supply a reliable basis for taking decisions about operative and strategic measures. Whether this refers to adjustments in the timetable, targeted crew training or improvements to the infrastructure, the findings from data analysis support continuous optimisation of operational quality.

The result is more transparency in daily business, higher punctuality and measurably better service quality in public transport.

Planning and dispatch

We use standardised interfaces to integrate software packages for producing timetables and duty rosters, as well as for crew scheduling. Every transport company working with our LIO thus has free choice of its preferred planning software solution.

Comprehensive services

Our customers can expect that we always provide them with the best possible support. They receive a service agreement tailored to their own specific needs with comprehensive services. 24/7 support is possible as a complete package. ebblo customers also benefit from us having online access to their systems with a secure remote connection to allow for remote diagnosis at all times when incidents happen.

Highlights Operations Control System LIO

Advantages for transport operators

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

Advantages for multi-agencies

- Inter-operational passenger information
- Protection of transfers and display of journey continuation options
- IT solutions for services and fares

Advantages for passengers

- High punctuality
- Short journey times
- Optimised transfers
- Real-time information about departures and arrivals
- Fast situational information about incidents
- Consistent implementation of the 2-senses principle

LIO components

Central control centre

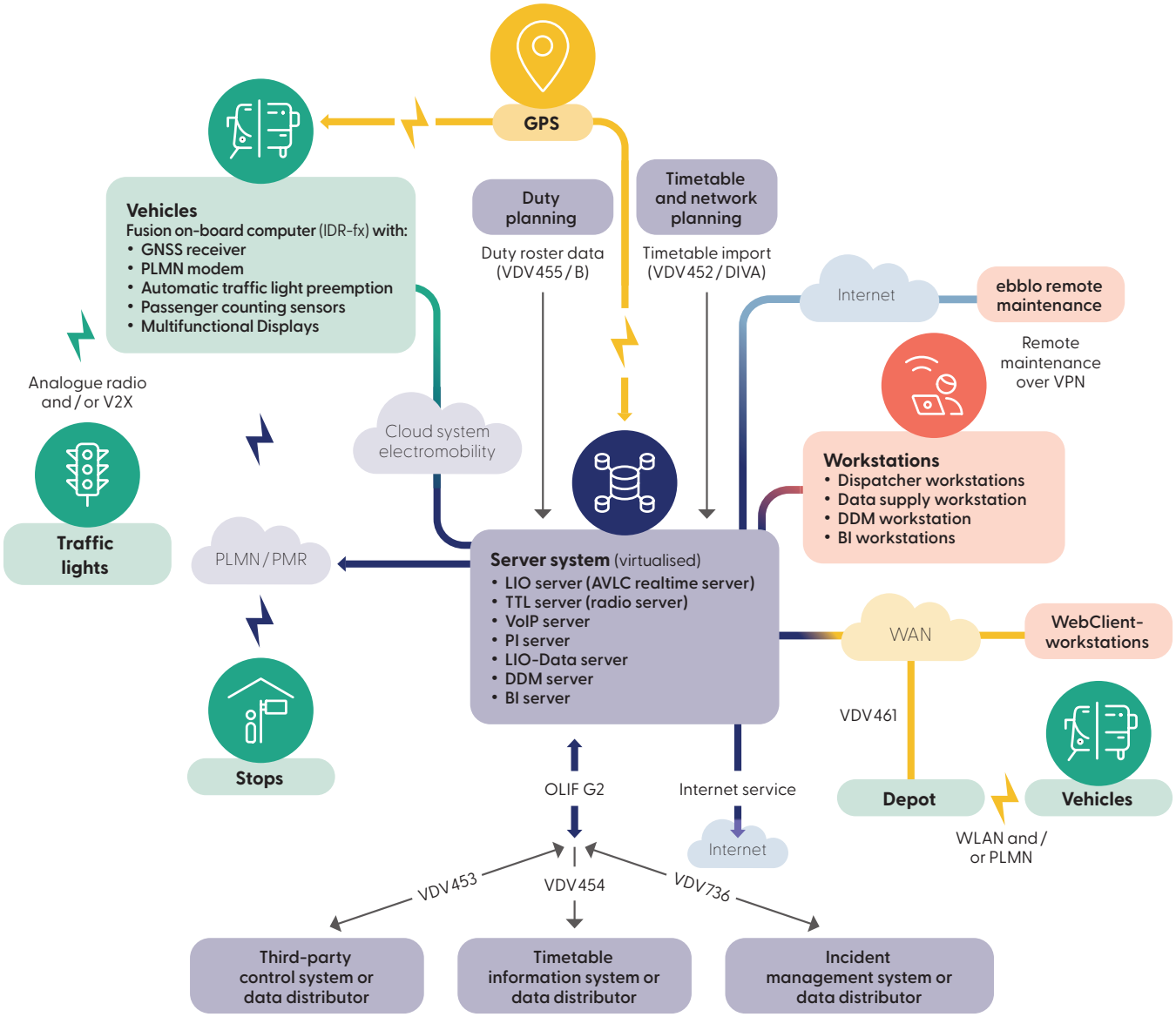
The central control centre is the heart of our LIO system. The dispatcher workstations have a graphical intuitive user interface in line with the very latest ergonomic concepts. The control computer software is highly configurable so that due consideration can be given to the individual requirements of every transport company.

IP connections mean that dispatcher VDU workstations can be located almost anywhere. This is particularly advantageous in control centres that manage vehicles for several different transport operators or in remote depots.

The operations control system makes the control centre staff more efficient, particularly when dispatching vehicles or communicating with the crews. LIO actively informs the dispatchers about incidents and provides decision support. Control centre staff can basically adjust their workstation user interface to their own personal preferences.

Our control system gives transport companies an overview of all vehicles, regardless which drive technology is being used. Solutions for electromobility, autonomous vehicles and mobility on demand are already integrated in our control system.

System overview



Operations Control System LIO

Monitoring and dispatch of e-bus fleets

Our innovative LIO-Volta software solution makes it easier for transport companies to integrate and dispatch electric vehicles. LIO-Volta assists dispatchers with optimum timetable-compliant operation and monitoring of the e-bus fleet.

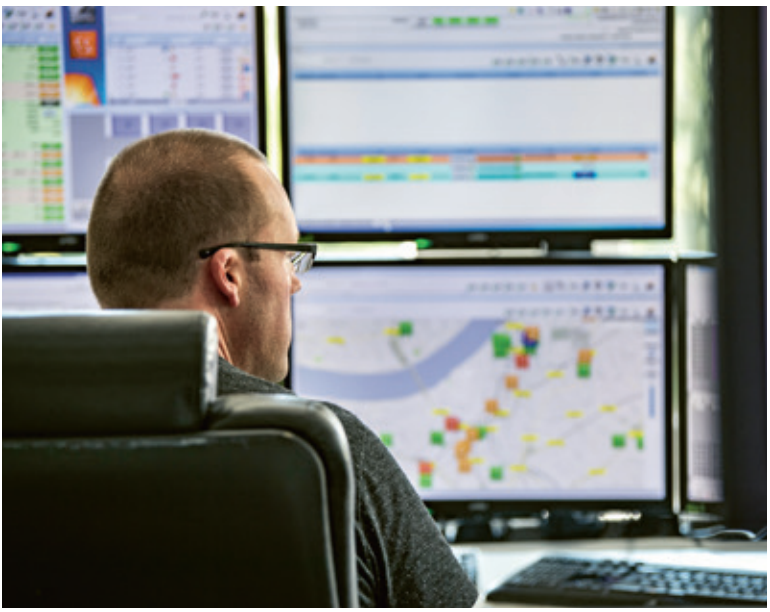
Control centre staff can see the SoC (state of charge) of the batteries in their e-buses thanks to LIO-Volta. LIO-Volta allows for dispatch actions that safeguard the energy balance in the vehicles even in case of incidents. The control system gives the dispatchers early warning of any deviations from the planned values, i.e. insufficient range and energy reserves.

Incident Management

Our AVLC LIO ensures that the current operational status is known at all times. The system issues early warnings of any emerging incidents. Deviations from the status quo are displayed understandably and clearly. Dispatch staff can thus respond to incident situations immediately and effectively, thus minimising the impacts.

The AVLC helps the dispatchers to restore regular operation as quickly as possible. The LIO-IDS software is particularly helpful, offering immediate access to predefined incident definitions, action plans and checklists. Thanks to faster activation of all necessary actions and assistance with restoring normal operations, fewer spare vehicles and crews are necessary for emergencies, resulting in clear cost savings.

Any technical faults in vehicles and dynamic passenger information systems are recorded automatically and passed on to the control centre. This makes it easier to calculate capacities for repairs and maintenance, and clearly reduces vehicle and DPI downtimes.



Central data management

All system components profit from central data supply, management and distribution in the LIO-Data data management system. The data for the control system and all participant components need only be recorded at one single point, resulting in consistent supply, greater operational flexibility and lower labour costs.

The LIO-DDM Depot Data Management application developed by ebblo distributes data between the central data preparation and the target devices in the vehicles and DPIs. Wireless data exchange between depot servers and vehicles takes place with Wi-Fi in the depot and with PLMN elsewhere.

Integration of the vehicles in a comprehensive data management system permits reliable updating of the entire vehicle fleet. Current data, configurations, announcements and display texts together with operating systems are downloaded onto the on-board computer. At the same time, statistics and operational data are uploaded to give the company an overview of the capacity usage and condition of the vehicles at all times as the basis for efficient dispatch planning and for maintenance of the vehicles.

Voice and data radio – analogue or digital

The radio system forms the backbone of every modern computerised operations control system because all central and remote components are connected to each other by radio. Our system is ideal for use in combination with digital radio, analogue radio and public radio networks. Within the control system, the vehicles use whichever communication channel is available en route.

Digital and analogue radio systems can also operate in parallel. Depending on the given reception conditions, communication is either achieved via a private radio network, or in the absence of radio coverage, via a public mobile network. The radio systems are operated in the vehicle and in the control centre via a uniform, consistent interface. The crews and control centre staff notice no difference, regardless which system is being used at any specific time.

The availability and bandwidth of voice and data communication are central prerequisites for secure, economic operation of the AVLC. While operational radio systems – so-called PMR systems – safeguard exclusive quality of service, the public mobile network facilitates fast transfer of large data volumes. Our Agile Hybrid solution optimises cost-effective use of both radio systems.

Communication in the vehicle

Our on-board systems for bus and tram support the crews in their work and also permit precisely-timed vehicle deployment by the transport company.

Countless on-board computers by ebblo are in operation worldwide, convincing customers and users with their simple installation, high efficiency, reliability, durability and simple maintenance.

On-board computer as a communication plattform

ebblo's on-board computers as communication centre have diverse interfaces for integrating many different peripheral devices, such as Multifunctional Displays or ticketing solutions such as ticket vending machines. The on-board computer safeguards communication with the control centre and controls various devices in the vehicle, e.g. destination displays.

With satellite-based positioning logic, the on-board computer regularly compares the planned position according to the timetable with the actual position of the vehicle. Based on this information, the system then automatically calculates whether the vehicle is keeping to its timetable, is too early or too late. These details are transferred to the control centre so that the dispatchers know the current operational state of the transport company's entire route network and can take appropriate action when the need arises.

Reliable voice connections

The voice connection to the control centre, to other vehicles and to other subscribers is the basis for smooth operations. Here the on-board computer supports several radio systems at the same time. It automatically switches the radio devices over depending on radio availability, while microphones, operating buttons and loudspeakers are also automatically switched over at the same time.

As well as voice communication with the crew, the control centre can also use the on-board computer to inform the passengers directly or to listen in to the vehicle in emergencies or priority situations.

On-board systems

Advantages for crews

The on-board computer ensures that the crew automatically sees all relevant information on 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.

The on-board computer constantly ascertains the current position of the vehicle and calculates its timetable adherence. The crew, passengers and control centre are thus provided with real-time information about the current situation. Tasks such as announcing and displaying the next stop, changing the destination text on the interior and exterior DPI signs and switch control are triggered automatically by the on-board computer. En route, the on-board computer influences traffic lights in order to clear the path for bus and tram.

ebblo has developed the Navigation Assistant solution specially for local public transport vehicles. The solution is fully integrated in LIO so that dispatchers and vehicle crews see exactly the same map view. The Navigation Assistant permits navigation on roads and rails. It is available not only for planned trips but also in the event of dispatch actions and when the vehicle leaves the planned pattern.

Crew support and dispatch with smartphone or tablet

On-board computers have numerous interfaces and functions that are not necessary for every purpose. ebblo's WebVLU solution is a slim and cost-effective on-board computer alternative for tablets or smartphones. It offers the most important basic functions to support the crew, such as location of the vehicle or voice connections with the control centre.

WebVLU can be integrated into the operations control system LIO with little installation effort. The solution can be used in regular service buses, but also just for locating service vehicles or on buses in temporary service.

Traffic light preemption

Public transport will appeal to passengers if it offers fast, punctual services running in quick succession. However, journey time analyses repeatedly show that buses and trams spend too much time at red lights.

Our AVLC LIO includes an on-vehicle solution for traffic light preemption to give priority to buses and trams. Journey times are noticeably reduced, timetables are met and resources saved as block optimisation means that fewer vehicles and less crew are needed to offer the same service.

A further improvement in terms of traffic flow and sharing information comes from V2X, or vehicle-to-everything technology, which is part of Cooperative Intelligent Transport Systems, C-ITS. For the first time, V2X applications allow bidirectional communication between vehicles and traffic lights.

Feedback from the junction controllers lets the crew know exactly when the next green phase begins. That means they can select the speed accordingly, or leave a stop at exactly the right time, thus saving energy and increasing passenger comfort.

Always up-to-date: visually and acoustically

Passengers appreciate the advantages of our AVLC. They benefit from optimum punctuality, the shortest possible journey times and perfectly tailored transfers.

At the same time, passengers are always kept up-to-date before and during their journey with reliable real-time information about departure times, transfers, pattern sequences and any current particularities.

Visual and acoustic information

ebblo's integrated passenger information system provides information using all desired communication channels. Online information on websites or mobile phone apps is an ideal way for transport companies to keep passengers fully up-to-date with real-time information.

The on-board computer plays a central role in visual and acoustic passenger information. It prepares all data for the Multifunctional Displays in the vehicle and for exterior displays, and sends the data to the devices, including for example data about the pattern sequences, the next stops or transfers, construction sites or incidents, advertisements or information for tourists. Acoustic passenger information intended to be sent via the on-board computer for the vehicle interior or for the exterior loudspeakers to inform passengers at the stops, is triggered automatically or manually in the control centre.

Online interfaces

Passengers frequently travel on vehicles from different transport companies. That is why it is important to provide inter-operational passenger information. We have integrated numerous standardised VDV interfaces in LIO to ensure that information is shared with data distributors respectively timetable information systems or third-party control systems.

Interfaces VDV453 and VDV454 ensure that third-party vehicles operating in overlapping service areas can be seen in the control centres of affected transport companies so that transfer protection works successfully and the passengers benefit from dynamic passenger information.

Interface VDV736 is used to transfer incoming incident messages, for example from external incident management systems, to our AVLC so that the messages can be displayed to the passengers. It also provides outgoing incident messages from our AVLC to other systems.

Passenger information

Multifunctional Displays

ebblo offers Multifunctional Displays for displaying real-time information in the vehicle. They show passenger information in colour and in high resolution; videos can also be played. Single or dual displays or even extra-wide screens are seamlessly integrated in the control system and complement the other components to provide dynamic passenger information.

Passengers receive comprehensive information in the vehicle about pattern sequences, journey times and feasible transfers. As well as delays, incidents and alternative journeys, non-operational information can also be shown, such as maps of the surroundings. Furthermore, the Multifunctional Displays also permit partnerships with third-party companies, for example in tourism or advertising.

AI-supported announcements

A Text-to-Speech function for neuronal voices has been added to LIO-Data which converts the entered texts into high-quality announcement files. This eliminates the need for expensive studio sessions to record stop, route and destination announcements. Short-term announcements about construction work or events can be created directly at any time and in several languages. The attractive neuronal voices sound so natural and professional that there is almost no longer any need for phonetic reworking. New algorithms based on AI deep learning make this possible.

Mobility Assistance System

Using public transport vehicles is a particular challenge for blind and visually impaired passengers and for people with restricted mobility. Our ebblo Assist mobility assistance system offers them valuable support for a barrier-free journey. The solution consists of a vehicle module and the Intros ÖV-Radar smartphone app developed by sbv, the Swiss Association for the Blind and Visually Impaired, from affected people for affected people. Users can plan their journey with the app, have information announced while en route, trigger a stop request and communicate with the crew.

Statistics & Business Intelligence

Data precisely prepared for optimising operations

Targeted evaluation reveals the true value of operational numbers. Statistics and Business Intelligence turn large amounts of individual data into a clear picture: Where are things going well? Where does something need to be changed?

Statistics & Business Intelligence

Clear benefit on all levels

Punctuality, travel times and dwell times show how reliably operations are working. Obvious delays or bottlenecks can be detected and eliminated with a targeted approach. Extrapolations make passenger numbers available even when a complete count is not possible. This improves service planning.

Operational data from the control centre include interventions, diversions, dispatch decisions and system reports. Analysis shows when, where and how controlling interventions were necessary, and with which consequences. As a result, patterns can be detected and actions evaluated, with continuous improvements in control centre efficacy. Transfer protection can be measured by analysing transfer relations, allowing for systematic detection and prevention of missed connections.

The use of electromobility becomes transparent with targeted evaluations regarding energy consumption, charge behaviour and range. In this way, electric fleets can be efficiently planned, controlled and integrated in normal operations. Verification of vehicle mileage permits automatic, audit-compliant documentation of all driven sections and blocks, differentiated according to routes, vehicles and times. This is essential for transport contracts, internal evaluations and funding accounting.

Analyses of time lost at traffic lights show where traffic light phases make vehicles lose time unnecessarily. Visualisation in GIS maps allows for swift detection and targeted acceleration of interchanges that are prone to problems, by giving public transport vehicles priority, for example, or by making adjustments to the timetables.

Distances and coordinates are automatically registered and evaluated so that pattern sequences and deployment patterns can be analysed, also with AI. Device messages and radio quality give an indication of the technical condition and help to prevent failures in good time.

Important advantages at a glance:

- Overview of operational quality and punctuality
- Reliable passenger data despite incomplete counts
- Clear bases for taking decisions about service frequency and route planning
- Systematic weak-point analysis for transfers and at junctions
- Verification and accounting records for contracts and funding
- Controllable, comprehensible electromobility
- Early-warning systems for technical problems in ongoing operations
- Basis for data-based strategy development in public transport

Functional enhancements and new technologies

Public transport has gone through many changes in recent decades, for example with new drive technologies in the vehicles or with stipulations for barrier-free accessibility.

ebblo always keeps a keen eye on current issues in the industry and also contributes its expertise in the VDV bodies when new standards are being defined. Looking to the future, we are constantly developing further innovative solutions for our customers.

About us

ebblo helps public transport providers move confidently into the future. Our advanced Intelligent Transport Control Systems (ITCS) adapt as mobility evolves – powered by future-proof technologies and decades of expertise. We deliver robust, best-in-class solutions, scalable platforms and next generation architectures – ensuring flexibility, control, and security. Our solutions streamline operations, improve accuracy, and enable cleaner, faster, and more accessible and barrier-free networks – making public transport the natural choice for everyone. With proven reliability and transformative innovation, ebblo is your trusted partner for what's next.

ebblo is part of Modaxo, the global collective of people transportation technology companies within Constellation Software Inc. (TSX: CSU).

Ready for what's next?

Transform your public transport operations with innovation engineered for change.

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