PRODUCT INFORMATION

Data management in the control system: exact data in the right place

LIO-Data

The data supply of an AVLC system is one of the most important prerequisites for seamless operation of a control system. LIO-Data is a powerful tool for recording and preparing all AVLC data, among others for components such as the control centre, vehicle, dynamic passenger information and Business Intelligence, as well as integrating systems from other suppliers.

Precise recording of the specific AVLC data requires a consistent database. This results on the one hand from automated transfer of timetable and duty planning data from planning systems. On the other hand, precise recording of route network and timetable data is also essential for optimum operation. Data quality has a direct influence on the accuracy of all calculations, for example timetable deviation and departure predictions, as well as statistics and evaluations.

Basic functions

Central tasks of LIO-Data
The basic data management functions can be summarised as follows:

- Central interface for importing and exporting planned data (e.g. data transfer from planning systems) as well as forwarding data to third-party systems
- Central administration of the data for operation of the control system
- Supporting the operational workflow with precise planning targets (e.g. passenger information, traffic light preemption, path dispatch and transfer protection)
- Data supply and provision of data for all system components

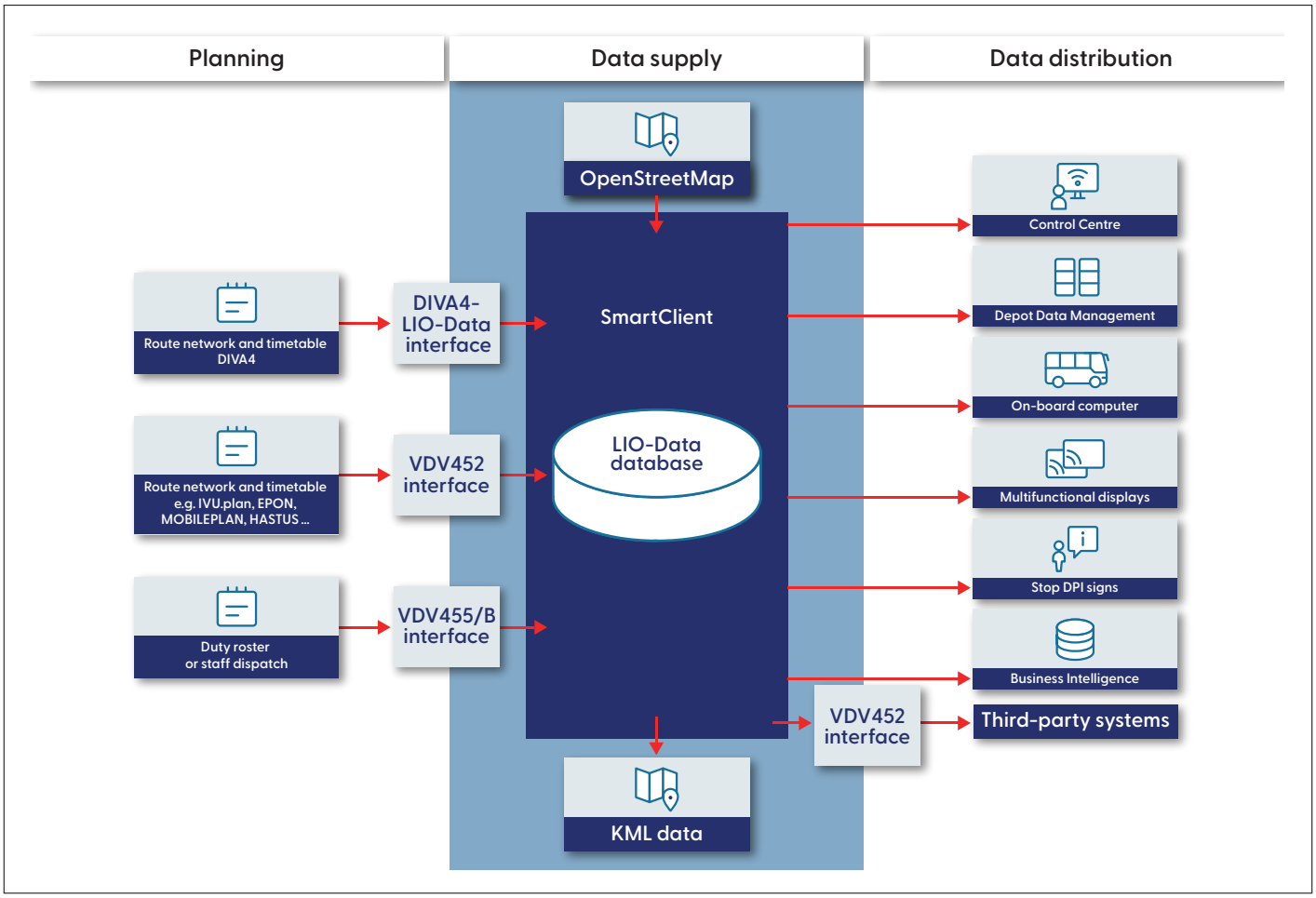
Modular structure
LIO-Data allows targeted use of the specific modules according to the respective customer needs. The basic module "LIO-Data Basic and Timetable Processing" can be supplemented with modules that cover the following aspects: vehicle data supply, wayside components, MFD data supply, LIO control system, DPI data supply, map data, data import and data export.

User interface
The LIO-Data representation is based on a simple, standard concept. Tables are usually used for data entry and representation. In some cases, dialogue windows and drop-down lists are used to give a better overview or for pleasanter user guidance. The user interface provides the user with context-sensitive support and copying functions.

Planning

Besides manual data input, the LIO-Data data management program also facilitates various data imports. Planning data can be automatically integrated in the AVLC data supply – as data import from DIVA or via the standard VDV452 and VDV455 interfaces.

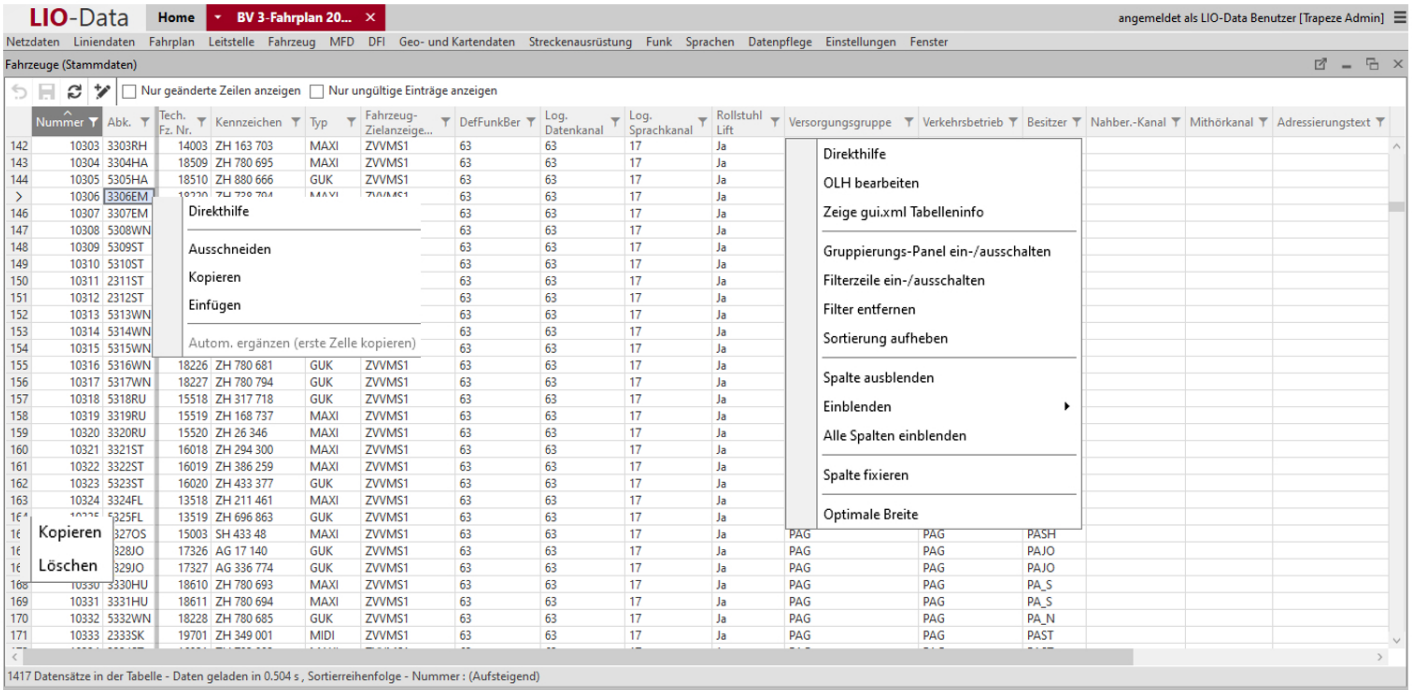
Import interface from DIVA
If DIVA is used as planning system, manual entry of route network and timetable data is not necessary in LIO-Data. The route network and timetable data entered in DIVA are transferred to LIO-Data by DIVA import. During transfer, the data are checked for consistency to ensure data integrity.



VDV452 import interface for data from various planning systems
The LIO system has a VDV452 interface for transferring route network and timetable data from the planning system – e.g. IVU.plan, EPON, MOBILEPLAN or HASTUS. LIO-Data can be used to import data from the planning systems into the central AVLC database and also to export the route network and timetable data used in the control system to other systems.

VDV455 import interface
The VDV455 standard interface makes it possible to import driver data from roster and driver scheduling programs.

When new route network and timetable data are imported, the previously supplied AVLC data are preserved. Data allocation is based on the so-called operational keys, which are the numbers for stops, stopping points, route number, pattern etc. After the import, only the newly imported data have to be supplemented with AVLC data. The newly imported data, the changed data and the no longer supplied data are marked in the corresponding tables with a so-called import status and marked in colour. In addition, the user receives a delta protocol that lists the changed data on the table and attribute level. From this delta protocol, the user is navigated directly to the respective data table. For example, if a pattern has been changed, the user can go directly to the corresponding pattern sequence.



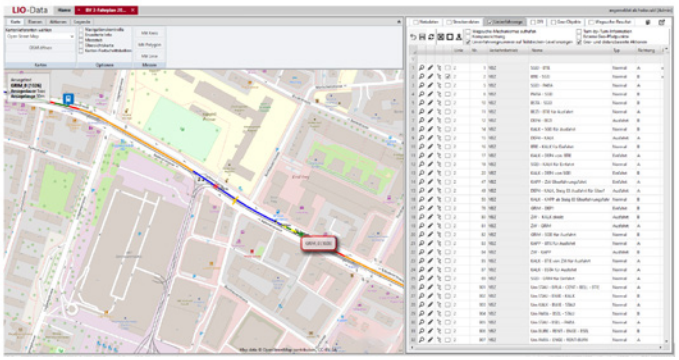
View of the vehicle table with the context menus for the columns, rows and cells

Data supply

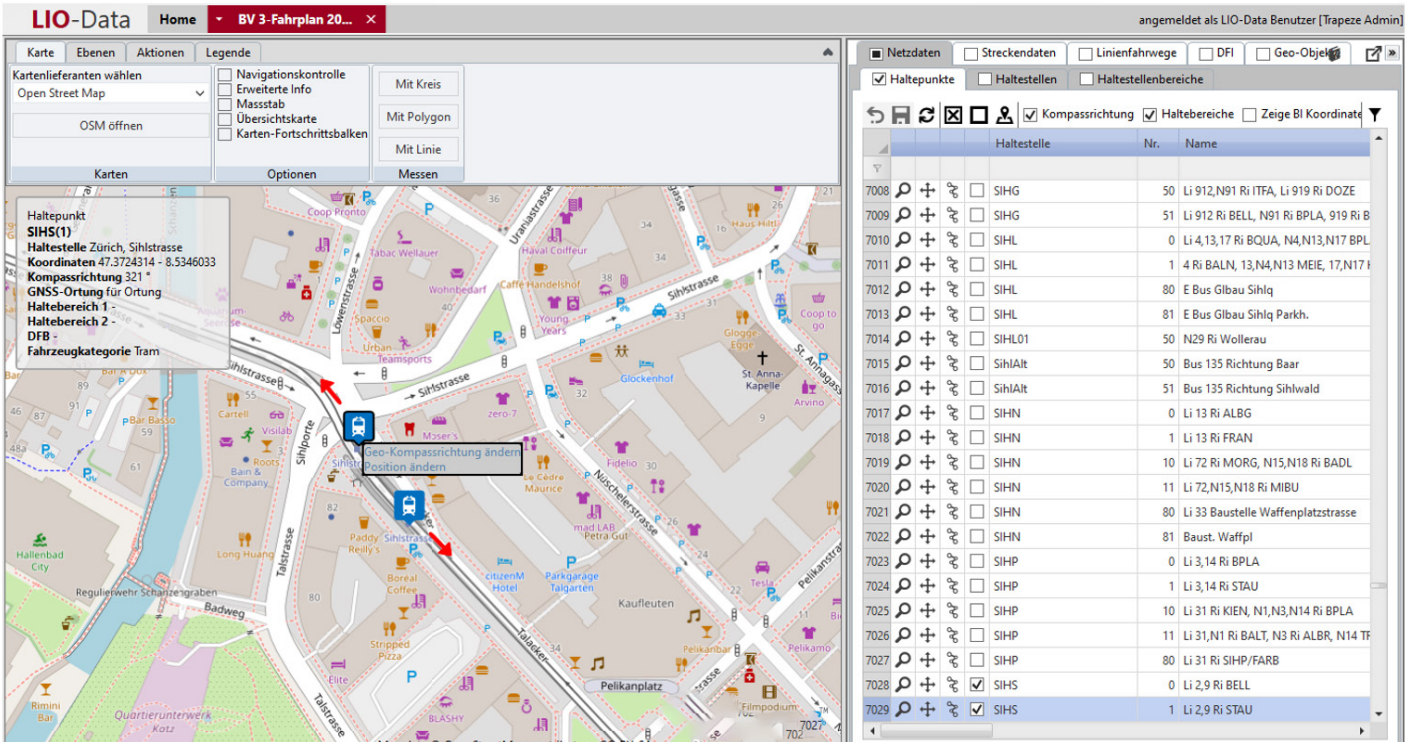
In the Table Editor, the users enter all data for AVLC operation in the form of tables. The following data aspects are supported:

- network data (e.g. stops, stopping points, links)
- route data (e.g. operational branches, routes, patterns, pattern sequences, travel times and dwell times)
- timetable (e.g. day types, calendar, trips, blocks)
- control centre (e.g. driver instructions, messages, transfer protection, path dispatch, online interfaces)
- vehicle (e.g. vehicle types, vehicles, announcements, Text-to-Speech, destinations, pattern destinations, control outputs)
- multifunctional displays (e.g. segments, layouts, connection advice)
- stop DPI sign (e.g. display units, PA units, layouts)
- wayside (beacons and traffic light requests)
- geo and map data (KML export and routing)
- voice data (radio areas, voice and data channels)

The geographical supply is carried out in Geo Editor on the map. This is done after importing the map data from OpenStreetMap. During import, the map background is calculated for control centres, the routing network and the road and rail vectors. These formats then form the basis for the many geographical functions of the control system, e.g. map background and routing in the Navigation Assistant, GIS in LIO-Data, in the control centre and in BI. They are also the basis of map matching for geo-based traffic light preemption.



Geo Editor visualising the stopping points on the map



Geo Editor visualising the route sequence on the map

Data distribution

Among others, LIO-Data can prepare data for the control centre, the on-board computers, passenger information with DPI and MFD, Depot Data Management and Business Intelligence.

In the case of customer installations, only those data consumers are configured that are actually required. Data preparation runs in the background. If possible, the processes are worked through in parallel to shorten the overall data preparation runtime.

LIO-Data is also the supply system for third-party systems. VDV452 export provides the route network and timetable plans from the AVLC data supply to third-party systems – including passenger counting, disabled passenger counting, timetable information, DPI systems, operational logs, third-party control centres, ticket printers or data distributors – for further processing in the format of the standard interface VDV452.

Technical details

System prerequisites

- The software package runs as multi-user system under Windows 2022 Server.
- Oracle 19/23c is used as the database management system.

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