TECHNICAL ARTICLE

Getting there quickly and easily

Navigation for urban public transport

Various navigation apps are available for private transport. But what about navigation support for urban public transport? Does it make any sense at all, and can the same solutions be used?

First of all, it must be said that: navigation solutions for private transport are only conditionally suitable for use in urban public transport vehicles. Special driving and turning rights apply to public transport and have to be taken into consideration accordingly, and it must also be possible to depict the planned path in pedestrian zones. Navigation on tram lines should also be supported.

Tried-and-tested solution for transport operators

ebblo has developed a navigation solution specially for urban public transport vehicles that covers the requirements of transport operators with optimum coverage of their use cases. This offers great functional diversity and has already been used successfully for years by several ebblo customers. A short list illustrates the main advantages of the Navigation Assistant.

The Navigation Assistant

- clearly accelerates the training of new drivers, who no longer need local knowledge and can be deployed productively already at an early stage.
- offers chances for more flexible dispatch – already trained drivers can be deployed on new routes without additional training.
- permits free updates of the map material at any time.
- supports navigation on both roads and rails.
- is available not only for planned trips but also in the event of dispatch actions and when the vehicle leaves the planned path.
- is fully integrated in ebblo's LIO control system – dispatchers in the control centre and drivers in buses, trams and trains see exactly the same map view.

The following sections present these and other advantages and functions in more detail.

Navigation Assistant

Advantages for the drivers

ebblos's Navigation Assistant solution provides drivers with all important information about the path at a glance. The path and the turning instructions are displayed on the user terminal of the on-board computer.

- **Display of the path**
  Based on map material from OpenStreetMap (OSM), the path is shown including the current position of the vehicle. The patterns run on streets, on rails and even on non-public paths. Stops or stopping points are also shown.

- **Live information**
  The map view shows information about the next stop and the next turn-off point. For planned or spontaneous path dispatch actions, the driver will see both the old and the new path, as well as the effective exit point.

- **Acoustic navigation and warnings**
  The driver can always concentrate on the road, thanks to acoustic turning instruction which can be activated as an option. The voice output is always in the language chosen by the driver on the user terminal. The driver receives a warning on exceeding the speed limit or on taking a curve too quickly.

- **Navigation on dispatch paths**
  The navigation shows which path is to be taken, also when a driver is taking the diversion, short or long turn for the first time. The effective exit point from the planned path is announced acoustically with voice output.

- **Navigation for trams**
  The navigation support makes it easier for the driver to find the way when using the rail network. The system uses visual and acoustic symbols to show how to take the next track switch so that the speed can be adjusted in good time.

- **Geo zones and geo objects**
  The map can also show geo zones (areas with traffic restrictions) and geo objects (e.g. toilets, staffrooms). This information offers important additional benefit for the drivers.

Advantages for transport operators

The navigation solution offers transport operators considerable operational benefit for their daily workflows. The functions support dispatch and driving staff both in normal operations and in the event of operating incidents.

- **Navigation on planned paths**
  The driver is guided on the optimum route to the next stopping point if the vehicle leaves the path deliberately or unintentionally. This minimises the operational impacts of the diversion. But the Navigation Assistant is also very helpful even when there are no deviations from the planned path. The fact that the path is visible on the screen at all times reduces the familiarisation period for new drivers. Or drivers can be deployed on routes they don't know without the need for training, which makes driver dispatch more flexible.

- **Routing algorithm**
  The same map material is used in the data supply, in the control system and on the on-board computer, so that the staff in the control centre and in the vehicle see the same route. Before data release, routing is carried out for every pattern to take account of the height, length, width and weight of the individual vehicles, comparing these details with the restrictions provided in the map material. If a higher or heavier vehicle is deployed for operational reasons, the route is adjusted accordingly.

- **Optimum map material**
  ebblo uses freely available osm map material that is capable of depicting special driving rights for public transport. the map material is of a very high quality because it is constantly updated by the users. free map updates are also available at all times. if changes are necessary, the data supplier makes these accordingly and downloads the adjusted version immediately. the map data can be adjusted with an openstreetmap editor that is available on the internet (e.g. adding roads or railway lines, marking special driving rights or passage restrictions).

Optional information and communication functions

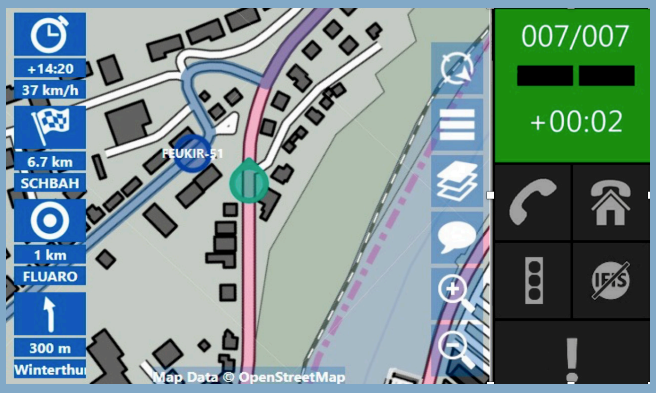
Based on map-supported visualisation in the vehicle, it is also possible to show data from the control system, such as the live positions of other vehicles and predicted arrivals and departures at the stops. To make optimum use of these possibilities, ebblo offers additional information and communication functions as add-ons to the navigation solution.

Information functions

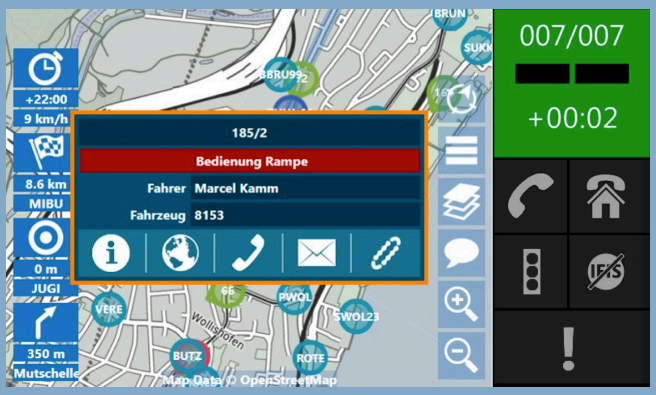
Information about journey continuation options can be accessed with just a few clicks so that the driver can deal competently with any passenger queries. The driver of a receiver vehicle sees the respective feeder on the map or in the connection table.

Communication functions

Drivers can communicate with each other using voice or text messages. For example, they can inform the driver of a receiver vehicle that they have transfer passengers on board, or let them know that there are no transfer passengers in the event of a delay. This avoids waiting unnecessarily for a feeder vehicle. Up to now, this kind of communication was called “short range radio channel” or “radio channel for shunting assistance”. The navigation add-on ensures that this is still possible in the digital age.



Map view with path dispatch



Map view with vehicle event

Touch a vehicle to open a context menu.

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