



the mind of movement

PTV Route Optimiser

Service Description



Shorttitle	Service Description PTV Route Optimiser CL
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1 Brief profile

PTV Route Optimiser is a cloud-based software solution for transport planning. It is characterised by great flexibility and a wide range of functions. PTV Route Optimiser can be used to reduce operating costs, increase the efficiency of processes and improve the level of service provision – all online.

- ▶ Better corporate management – better control of resources by linking sales processes to storage and transport systems
- ▶ Optimise the flow of information
- ▶ Strategic logistics network design: the resources are available at the perfect location
- ▶ Integration of separate operating processes to optimise overall efficiency
- ▶ Incorporation of collections into delivery routes
- ▶ Optimisation of the depot network
- ▶ Planning efficient areas
- ▶ Changing the size of main fleets
- ▶ Changing the composition of vehicles in each fleet
- ▶ Double shifts for the vehicles used
- ▶ Planning for seasonal peaks and troughs
- ▶ Minimisation of the carbon footprint – environmental advantages from using fewer resources

1.1 Compatibility

PTV Route Optimiser is compatible with most modern web browsers. We recommend using Google Chrome or Internet Explorer.

1.2 Maps and mapping materials

The digital map shows orders with collections and delivery points, depots, planned trips and routes.

The mapping materials and country combinations depend on the licence.

2 Overview of the program sections

The following program sections are available in PTV Route Optimiser:

- ▶ Homepage (account settings)
- ▶ Profile (profile management)
- ▶ Parameters (parameter management)
- ▶ Import (import management)
- ▶ Orders (order management)
- ▶ Optimise (optimisation)
- ▶ Routes (route management)
- ▶ Map (visualisation)
- ▶ Reports
- ▶ Speed Table
- ▶ Other optional additional modules (see chapter 13 "Extra modules")

3 Home program section

The home section contains information on the program status, current messages, such as updates, and information on the amount of storage space taken up by your account

Furthermore, the homepage shows practical tips which make it easier to start using PTV Route Optimiser.

3.1 My Account program item

The "My Account" program item contains the four sections Account Details, Preferences, Activities and Data Usage.

Account Details

The Account Details show the user name, the organisation that the account is registered to, the registered email address, the level of the account, when the account was created and when the current licence expires. It will also show the amount of storage space utilised and whether the registered user is a member of a group. The password and email address can also be changed on this page, if necessary.

Preferences

In Preferences, the software can be adapted to suit personal use. The page is split into five sections: General, Import, Orders, Routes and Map. There you can change the language, the chosen currency symbol and import, order, route and map settings.

Activities

The "My Activities" section shows a graphical overview of program access in the past year. It also shows how many profiles have been created, how many files have been imported, routes edited, optimisations run and reports created.

Data Usage

"Data usage" contains a detailed list of how many projects, profiles and speed tables have been created and the amount of storage space that these take up.

4 Profile program section

Projects are created and managed in the Profile program section. Projects are required so that profiles can be saved within them.

Multiple profiles can be assigned to a project. Different parameters are saved in a profile and orders, depots and vehicles are assigned to a profile.

When a profile is created you can specify whether the profile should be blank, whether it contains basic parameters such as general vehicle types or work regulations for drivers, or whether an existing template should be used as a basis for the profile.

Furthermore, a map can be assigned to the profile. The map which was selected for the most recently created profile is preselected.

The available maps depend on the agreement which has been concluded and the region where one is located.

5 Parameters program section

Parameters are set and calibrated in this program section according to the user's requirements. Data on vehicles, depots and products are specified, as is information such as working hours or shift time.

5.1 General program items

The company name can be changed and the chosen distance unit (kilometres or miles) and the currency symbol set in the General program item.

Speed Variations

PTV Route Optimiser uses speeds from a time and distance matrix for route optimisation. These speeds can be increased or decreased depending on the time of day.

Minimum times and minimum distances

If there are multiple stops at the same location or if the locations are different but very close together, PTV Route Optimiser assumes that it does not need to take time or distance into account. However, there may still be time expended and distances to be taken into account in such cases, for example if the stops are in different buildings on a factory premises. For this reason, you can set a time and distance which should be taken into account as a minimum at each stop. The set minimum time and minimum distance are added to a route if the time and distance calculated are below the set value.

Opening times

For opening times you can specify when in the week the resources which are relevant to planning are available.

5.2 Load program item

Every order that is planned in PTV Route Optimiser is composed of one or more products. Quantifying a product requires a unit of measurement, such as weight or volume. A unit of measurement is also required in order to set vehicles' capacity.

Primary and secondary unit

Two units of measurement can be specified in PTV Route Optimiser. You must enter a primary unit of measurement; there is an option to enter a secondary unit of measurement.

For example, a secondary unit of measurement may make sense if products are measured in different units or the vehicle capacity is restricted by both volume and weight. The amount on an order or a vehicle's loading capacity can be entered in one of the two units or in both units.

Call times

Under call times you can enter a fixed time for each stop, e.g. for the driver's administrative tasks, such as obtaining a PDA signature. This fixed time is added to the time which is set for the loading and unloading of products.

Minimum and maximum idle time in minutes can also be specified here. The minimum or maximum idle time is used if more or less time is spent at a stop than the value entered.

Flags

There is an option to specify whether loading or unloading times at depot should be added to the shift time.

5.3 Depots program item

The "Depots" program item contains the five sections Location, Opening, Advanced, Throughput and Costs.

Location

Depots are created and edited here. A depot is placed in the correct location on the map by entering an address or coordinates. Alternatively, the depot can be created by clicking on a point on the map.

The following settings apply to each selected depot.

Opening

Two time slots can be defined as the opening times for a depot. The time slots can be activated or deactivated for each day of the week.

Advanced

Here a depot can be assigned to a depot group. Depot groups are used to collate depots with shared characteristics and can be taken into account in route optimisation. The depot can also be categorised using the characteristics Garage (depot as a storage area for vehicles), start of trip or end of trip.

Throughput

The throughput, measured in load units, can be used to restrict the amount of product that can be processed by the depot each day or each planning period.

Costs

Note: This area is only shown if the "depot costs" are activated under Advanced Options (see chapter 5.11 "Advanced options program item").

Here the costs which are assigned to the depot are entered. The depot costs are taken into account when determining a product's delivery costs. PTV Route Optimiser uses the delivery costs to work out which depot will be used for an order.

5.4 Products program item

In PTV Route Optimiser, products are goods or services.

For products, the number per load unit can be specified: for example, 10 of product A equals a pallet. Furthermore, the revenue and loading and unloading times can be entered for each product.

"Product compatibility" gives the option to set which products can be loaded into a vehicle at the same time.

5.5 Vehicles program item

The "Vehicles" program item is subdivided into the sections Settings, Attributes, Running Costs and Compartment. Here you can create the types of vehicle which are available as resources for planning.

The following settings apply to each selected vehicle type.

Settings

Here you can specify how many of the defined load units can be loaded into the vehicle (see chapter 5.2 "Load program item").

Using a depot's "start, turn and end time" parameters, you can set a mandatory time in minutes which a vehicle must spend at the depot on different stages of a route.

The loading rate is used to set how quickly the vehicle can be loaded.

The speed for vehicles can be altered in PTV Route Optimiser. The average vehicle speed is set to 100%. If the percentage increases, the vehicle's average speed on the road increases. In contrast, the percentage can be reduced to below 100 to make a vehicle slower.

Driver shifts and driver times (see chapters 5.6 "Driver shifts program item and 5.7 "Driver hours program item") can be assigned to vehicles. This can be useful if, for example, the company has a day shift and a night shift and different vehicles are available for each shift. Furthermore, the number of driving hours can be used to specify that a vehicle should only be available for a set part of the day (a set part of the day is handled by shifts; hours governs the length of time).

Vehicles can also be assigned to access groups. During route optimisation, PTV Route Optimiser checks whether such a restriction is present on the order.

The "Allow overnight" function can be used to define whether a vehicle is allowed to stay away from the depot overnight or whether it must be at the depot at the end of the driver's shift.

Attributes

The Attributes can be used to specify the requirements of a job. These characteristics are taken into account in route optimisation, for example, if an order can only be executed with a vehicle with a loading platform.

Running Costs

Here, running costs can be assigned to each vehicle. These costs are not used as part of route optimisation, just provided in the report.

Compartment

Note: The Compartment function is only available if it has been licensed.

Instead of one overall vehicle capacity, up to 16 separate compartments can be defined, each with an individual capacity.

5.6 Driver shifts program item

In this program item, different shifts that drivers work can be created, e.g. a day shift and a night shift.

The following settings apply to each selected shift.

The parameters "Earliest starting time" and "Latest finishing time" are used to define the earliest time the shift is allowed to begin and the latest time it has to finish.

When planning a route, the starting and ending time and the depot's opening hours are taken into account. When the shift ends, a off duty period is inserted and the route continues at the earliest start time the next day.

If the starting and finishing time are set as 00:00, PTV Route Optimiser chooses the optimum start and end times for the shift (the start time is governed by the Earliest Start time set).

The following optional parameters are also available (not used for scheduling):

- "Basic rate": This is used to set the length of time for which the normal hourly rate is paid. After this time, the overtime rate is used to determine costs.
- Minimum shift costs: If the driver's costs are calculated per day rather than per hour, the amount can be set here.
- Overnight allowance: If an overnight stay outside of the depot is permitted for a vehicle, you can specify the amount that is available to the driver for an overnight stay here.
- Attached hours: If different driver hours have been created, they can be assigned to the shift here.

5.7 Driver hours program item

Driver hours define the length of time when a driver is on duty. Different driver hours can be created in PTV Route Optimiser.

The settings apply to the respective selected driver hours entry.

The set values for driving times and rest periods and the duty period originate from the "Working hours guidelines". The values can be adapted to the drivers' working hours.

If the values are not adapted, the default values provided will always apply during route optimisation.

5.8 Revenue program item

The information on revenue is not used as part of route optimisation, but published in the report instead.

5.9 Planning data program item

PTV Route Optimiser can create a plan for up to seven days, from Monday to Sunday. If the option to "Display day as date" is activated, PTV Route Optimiser shows the relevant date from the plan rather than the day of the week. The option "Use extended period scheduling" gives the option to extend the planning period to a maximum of 90 days.

5.10 Optimiser settings program item

The Optimiser settings have a significant effect on the result of route optimisation and should therefore be tested carefully!

Clustering

If PTV Route Optimiser plans routes, orders which may be situated along a route can be collocated into groups (clusters).

The criteria used to form the clusters are set in the Optimisation program section (see chapter 8.1 "Auto schedule program item"). Depending on the selected cluster mode, there are different management options available in the "Clustering" area.

Weighting Factors

Orders are prioritised before planning using the weighting factors time, distance, load and access. If the weighting factor increases, the priority in route planning increases accordingly. If, for example, the loading factor increases to 100, orders with a large loading amount are given the highest score.

Penalties

Penalties can be used to specify how route optimisation responds to any periods of waiting caused by opening hours.

- Wait penalty %: The higher the set percentage, the less likely that waiting times are permitted in route optimisation. Additional stops are driven to instead, even if this leads to detours.
- Night penalty %: The higher the set percentage, the less likely that off duty periods will be inserted during route optimisation.

Multi Depot

If this option is activated, PTV Route Optimiser can be made to decide during route optimisation which depot should be used for individual orders.

5.11 Advanced options program item

In the "Advanced options" program item there are additional functions available for calibrating route optimisation.

- Extend opening: If the vehicle is already on location, deliveries and collections may be completed even if the opening times have been exceeded.
- End at depot: The return trip to the depot is always planned at the end of a trip such that the driver's shift time and the vehicle's availability are not exceeded.
- Depot costs: By default, time and distance are the key factors for route optimisation; depot costs can also be taken into account. If the "depot costs" option has been activated, a new "costs" section is shown in the "depots" program item, in which depot-related costs can be entered (see chapter 5.3. "Depots program item"). When optimising routes, PTV Route Optimiser will give preference to a depot with lower costs.
- Dynamic depots: If this option has been activated, PTV Route Optimiser determines the best depot for unloading/reloading at the start or end of a trip. This "initial depot" is the start and destination of the route. During the planning process PTV Route Optimiser will constantly evaluate whether the route could save time and distance by reloading or unloading at another depot. As PTV Route Optimiser builds routes and optimises the sequence of the orders, it also evaluates which depots are suitable for reloading or for use as "turn depots".
- Tramping: This function can be used to group collection and delivery as a tramped pair. This forces the collection and delivery to be made on the same route.

- ▶ Obey sequence: By default, PTV Route Optimiser obeys the sequence in which orders are created or imported. If this sequence is not obeyed, the function must be deactivated.
- ▶ Booking time tolerance: If a booking time (date and time) was recorded for an order, the temporal tolerance which will be accepted during route optimisation can be specified.
- ▶ Max. orders per route: Here, the maximum number of orders on a route can be specified.
- ▶ Consolidate on: During route optimisation, PTV Route Optimiser first seeks to group orders at the same place and time into a stop. "Consolidate on" can be used to specify that orders must also have the same reference number or the same company name to be evaluated as a stop.
- ▶ Pre-break limit: Indicates the amount of time by which the maximum continuous working hours or driving time must be exceeded for PTV Route Optimiser to insert a break rather than accepting waiting time.
- ▶ Paid breaks: Indication of whether drivers are paid during the rest periods.

6 Import program section

To run the planning process, PTV Route Optimiser uses two types of data:

- ▶ The static parameter settings (see chapter 5 "Parameters program section").
- ▶ The variable order data which needs to be imported.

The variable order data are details on deliveries and collections. They contain information like the addresses and opening hours for the orders. These need to be compiled in a file format that PTV Route Optimiser can interpret and import successfully.

The data can be generated by an external data source like an order system or a transport management system, or the import file can be created by hand.

The actions being run currently are permanently shown during the import process and progress is indicated by a bar. As soon as the import is complete, an overview is shown:

- ▶ Number of data records which have been successfully imported and geocoded
- ▶ Number of data records which could not be imported and geocoded

If the import completed with errors, there is an option to download an error file

The program item "Recent import files" shows the latest files to be imported into the profile. These can be re-imported as required.

The option "Show files from all profiles" shows the last 10 files to be imported by the logged-in user.

If the option "Delete available data prior to import" is activated, all current orders and routes can be deleted before the selected import file is processed.

If the option "Run auto-optimisation upon completion" is activated, a route optimisation is run straight after the import. The window "Auto-planning is in progress" shows the progress of the planning. If planning is complete, it shows how many orders have been planned successfully and how many could not be planned.

Variable order data can be deleted from the profile using the "Data purge options".

The option "Manual address entry" can be used to enter additional orders in your profile.

7 Orders program section

Imported or manually entered orders are shown and can be edited in this area. Orders can be added to routes and new orders created. A search function is available for orders and orders can be printed and exported.

Order details window

The "Order details" window shows the imported or manually entered data on the order, which can be changed if required. The data are shown in different tabs: address, information, restrictions, vehicle and products. As soon as an order has been assigned to a route, the route tab is inserted.

Address tab

Shows the order's location data. To manually specify or move an order's location, an address or, alternatively, a degree of latitude and longitude can be entered.

Information tab

Five fields for entering additional information on the order. If required, the information can be shown on the map and accepted into some of the reports.

Restrictions tab

This tab shows the Opening hours, Booking, Sequence and Settings areas.

- ▶ Opening hours: Shows the time slots and assignment to the days of the week.
- ▶ Booking: Shows whether the order should be executed on a particular day of the week/date and at a particular time.
- ▶ Sequence: This shows the position in the trip and whether the order is assigned to a particular group.
- ▶ Preferences:
 - ▶ Shows the order's priority within the optimisation from 1 (most important) to 9 (least important).
 - ▶ If the order is assigned to a zone, this will be shown here. Orders which are assigned to a zone are planned in a route, depending on the option selected.
 - ▶ "Load adjust" affects loading speed; "Shelf life" shows the time within which the order must be completed.
 - ▶ "Serving depot" is used to specify whether the order can be processed from any depot, or from a set depot or depot group.

Vehicle tab

This tab is used to show whether any of the vehicle attributes created in the Vehicle Parameters section are required or prohibited by an individual order. "Banned groups" can also be used to list the vehicle types which are blocked from executing an order. If a preference for a vehicle type is entered in the import file, the corresponding group letter is shown under "Preferred group".

Products tab

This shows which and how many products are to be transported and the corresponding order quantity in the set loading unit (see chapter 5.2 "Load program item"). Information is also shown on the revenue and the time required.

Route tab

As soon as a route has been calculated, information on the route, such as the depot, the vehicle and arrival and departure times, is shown here.

8 Optimise program section

Using the "Optimisation" function, PTV Route Optimiser can be set up to plan orders automatically using the data provided and the settings given in the "Parameters" area. The "Optimisation" program section has four areas for this.

8.1 Auto schedule program item

The Auto schedule program item lets you select the planning mode and the degree of optimisation ("performance scale")

The planning mode specifies the type of planning. Here you can select from the following options:

- Re-schedule: All orders in the active profile are re-planned and the routes optimised. Existing routes are deleted.
- Pre-allocated routes: This planning option is used if orders are to be planned which are already assigned to a particular route for the import which have a known position in the route. Planning is run without this information being changed.
- Continue schedule: This method continues a scheduling process which has been interrupted.
- Add to existing: This scheduling method adds unallocated orders to the routes that already exist.
- New routes only preserve all: This allows all existing routes to be kept in their current state, while new routes continue to be created for the remaining unallocated orders.
- Re-optimize routes: This method allows every route to be re-evaluated to see whether any further savings can be made by re-sequencing the orders.

The "performance scale" is used to choose how comprehensive the optimisation should be. The more comprehensive the optimisation, the longer it will take. The selected method can be specified in more detail in the planning settings or under parameters -> planning settings.

- Optimal: This setting provides the most thorough optimisation. However, this optimisation may take a long time depending on the number of orders.
- By cluster and degree of deviation (default): This is the Default and is the recommended starting option.
- By area and degree of deviation: planning orders by area and degree of deviation
- By area: planning orders by area only
- Basic grouping: planning by grouping orders according to stops

8.2 Scheduling parameters program item

The scheduling parameters program item is used to specify the basic settings for the optimisation process.

- ▶ **Planning day and scheduling period:** The planning day is used to set the day on which planning starts; scheduling period specifies the number of planning days. The planning period lasts a maximum of seven days.

If the option "Show day as date" is activated under planning data in the parameters program section, the planning days will be shown as a date in the selection list. The planning period can also be set to a maximum of 90 days there using "Extended planning period" (see chapter 5.9 "Planning data program item").

- ▶ **Max. nights en route and max. trips per route:** for planning, you can specify the maximum number of nights that the vehicle is permitted to be away from the depot. You can also specify how many trips back to the depot are permitted on one route.
- ▶ **Route name prefix:** by default, optimised routes are saved with a four-digit prefix. This prefix can be changed.
- ▶ **Collection at end:** If the deliveries have been completed, the collections are carried out. Collection can only be made after all deliveries have been done.
- ▶ **Fixed fleet size:** This option is used to show the number of drivers and vehicles for each depot in the "Fixed fleet size" field. The respective numbers can be altered for planning.

8.3 Advanced parameters program item

This program item allows you to change some parameters for planning which were set in the Parameters program section (see chapter 5.11 "Advanced options program item").

8.4 Optimiser settings program item

The main parameters which affect the planning and optimisation of routes are listed in the Planning settings program item. The parameter values can be increased or decreased. A subsequent plan and check on the resulting routes shows which settings are best for the existing orders.

The main settings for this are the following:

- ▶ Cluster Radius
- ▶ Deviation
- ▶ Time Weighting Factor
- ▶ Distance Weighting Factor
- ▶ Load Weighting Factor
- ▶ Access Weighting Factor

Through repeated calibration and evaluation of the results, a method develops over time which reduces the time needed for planning in future.

9 Routes program section - manual planning

In this area, all planned routes in a profile are shown in a list and can be edited. There is also the option to create routes manually and assign orders.

By default, the routes are sorted in ascending order; sorting can be altered and columns shown or hidden. Selected routes can be deleted, optimised, printed and visualised on the map or in a route plan.

New routes can be created as either empty or, alternatively, using the order list. Orders or depots can also be added to a route and selected routes analysed.

Planned routes can be exported to external devices such as satellite navigation devices (satnav) and GPS devices.

10 Map program section

In the Map program section, orders and routes can be shown on the map. The orders and routes shown can be set using various filters. It is possible, for example, to view all orders associated with a particular depot.

You can also use different options to specify the colours and labels used to visualise orders and how the map is shown.

11 Reports program section

As soon as data are imported and planned, reports can be analysed and exported in the "Reports" program section. PTV Route Optimiser offers different types of report for this. The reports provide an overview of planning, loading details, orders and other parameters. In many cases, the distance unit and the currency symbol can be chosen here.

Reports can be sent to email addresses.

The recommended formats for the export are PDF and CSV.

12 Speed table program section

The speed table is an additional module that can be used if required.

Every map in PTV Route contains different types of road, such as motorways or main roads. Every road type has a different speed assigned to it. The distance and time required to travel between several points on the map are calculated using the road types and the assigned speeds, as well as a vehicle profile. The results are stored in a speed table.

The default speed table was calculated in advance and is provided with the map. Here, the points on the map were chosen so that the full map has coverage. During planning, the stored times and distances are used to optimise routes more quickly.

PTV Route Optimiser offers the opportunity to create local speed tables. The speeds can be changed for the different types of road and the vehicle data. The times and distances are calculated using the existing orders and depots. The times and distances stored in this table are specific to each profile and are more precise than the data in the default speed table.

13 Extra modules

13.1 Function for publishing and sending trips

Route Optimiser (Cloud) is capable of interfacing with many different systems. Some of these systems have interfaces that are maintained and supported by the companies that supply them.

PTV Route Optimiser (Cloud) interfaces directly with systems such as TomTom, NavMan, Masternaut, Isotrack, Microlise and many more.

For those users with the option enabled, there is the ability to publish routes to TomTom WEBFLEET. The extra function "Publish" allows completed routes to be sent to TomTom. Use of this function requires a PTV Route Optimiser release and an account for the WEBFLEET software and interface with TomTom.

13.2 PTV Route Optimiser Territory

This is a strategic centre of gravity tool used to work out the ideal locations for depots based on a set of order data or customer addresses.

When Territory has been purchased and activated the tab will display next to the 'Speed Table' tab.

13.3 PTV Route Optimiser WebAPI

PTV Route Optimiser WebAPI is a cloud-based service which is offered as a "blind engine" and enables external applications to send and receive data over a direct XML interface. Thus the system communicates directly with PTV Route Optimiser without needing a graphical user interface.



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PTV GROUP

Haid-und-Neu-Str. 15

76131 Karlsruhe

Germany

www.ptvgroup.com