



## ORTEC Load Optimization

- ⊕ **Mathematical Optimization for Load Planning**
- ⊕ **Cloud-native, fully managed Software-as-a-Service**

Release 1.3

Product description

Public

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# 1 General

## 1.1 Introduction

ORTEC Load Optimization is a software for planning the packing of package items on or into load carriers (e.g. cartons, pallets) and loading into means of transport. The software uses advanced mathematical algorithms to determine the 'best' packing or loading configuration or selecting the 'most cost-efficient' mix of load carriers or means of transport. The software increases the planning productivity by providing multiple automation capabilities and improves the execution by providing packing and load lists. The software is highly adaptable to industry-specific needs and provides standard technologies for simple integrations with other business software.

The software is operated and offered by ORTEC as Software-as-a-Service (SaaS) in the public cloud in B2B business. Both web services are available for the connection and use of selected functions with third-party software as well as web applications for the interactive use of users. The software can be ordered for use in different subscriptions depending on the usage scenario.

## 1.2 Subscriptions

ORTEC Load Optimization is available in multiple variants (subscriptions), specifically designed to support certain business usage scenarios, such as

- ORTEC Load Optimization for Sales  
Enable Sales Representatives to see immediately the optimally required shipping and transportation capacity for a sales order in form of pallets and truck loads – right with order entry
- ORTEC Load Optimization for Replenishment  
Enable Replenishment Planners to maximize the truck utilization by having the optimization propose to fill up unused capacity with demands of lower priority ('pull forward')

## 1.3 Account

For the duration of the subscription, the customer will receive one account each in the production environment and in the test environment and, depending on the subscription, a unique identification key as access identification for the use of the software. This identification key must be specified by the third-party software via API in each request and automatically included in every request by an authorized user in the web application.

## 1.4 User management

Depending on the subscription multiple end-users of an account can be managed to use the web applications provided. The authorization per end-user is managed by the customer using the account administrator considering the terms of use agreement by using the relevant authorization tools.

## 1.5 Usage limitations

You can configure your client application / third-party software interface to make multiple concurrent calls to the ORTEC Load Optimization service (e.g. via multithreading) – for this purpose, we strongly recommend the use of the asynchronous model. These concurrent calls are treated as “optimization requests in progress” by the service and are currently capped by default to maximum 20 asynchronous calculations in the production environment. This limitation is flexible and can be adjusted when needed. As an example, this way of processing allows you to send 20 optimization requests at the same time, then poll for the solutions (as described in the API documentation) and issue a new optimization request (on the same thread) as soon as the optimization is finished on any of the threads. Consequently, your application can continuously maintain up to 20 optimization requests in progress until all optimization requests have been processed.

If your implementation of the ORTEC Load Optimization API relies on making a considerable number of concurrent requests, it is highly advisable:

- to contact ORTEC prior to the deployment of your application to production in order to organize a load test in the test environment. Note that the test environment is by default not scaling at all, so it needs to be prepared for such a test.
- to communicate to ORTEC your go-live date, so ORTEC can adjust service availability accordingly in the production environment

## 1.6 System requirements

ORTEC Load Optimization is a Software-as-a-Service, providing web services (API) for the system to system interaction, as well as web applications, where ‘human’ users can perform their interaction through standard internet browsers.

### 1.6.1 Web Services

For the use of the Web Services the customer needs to develop and operate the interfaces according to the description of the software interfaces (API) in the applicable product documentation. ORTEC ensures the availability of the respective interfaces as part of the SaaS subscription.

### 1.6.2 Web Applications

The following system requirements apply to the use of web applications:

### 1.6.2.1 Supported Browsers

- Google Chrome from Version 49,
- Mozilla Firefox from Version 46,
- Microsoft Internet Explorer 11,
- Microsoft Edge, from Version 40

### 1.6.2.2 3D Graphics

The software uses an ORTEC web component to display 3-dimensional graphics of the load. This component is using the standard internet browser technology Web GL 2.0 and can be used in any common browser supporting this technology. More information about this standard can be found here: <https://www.khronos.org/registry/webgl/specs/latest/2.0/>. In order to validate your environment please select the following link: <https://get.webgl.org/>. For more information about the Web GL 2.0 compatibility please refer also to: <https://www.khronos.org/webgl/wiki/BlacklistsAndWhitelists>.

#### Recommended Browser Settings:

Please check in your browser configuration if the use of Web GL 2.0 is activated or not, in case the 3D graphic is not shown or not shown correctly.

### 1.6.2.3 Identity and Access Management

The software can be used with Microsoft Azure Active directory services to identify users signing in the web applications (where required). For more information, visit <https://azure.microsoft.com/en-us/services/active-directory-b2c/>.

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Note: In order to enable a maximum convenience in collaborating with your supply chain partners, the solution hyperlink providing access to a solution in the solution viewer has no authentication mechanism and can be shared and then accessed through the supported web browsers without additional identification!

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## 1.6.3 Data Storage

Data storage capacity is included in any active subscription. Depending on the age of the data ORTEC can use technology to archive data to other storage areas and provides functionality to active subscribers to retrieve it.

## 1.7 Languages

ORTEC Load Optimization web applications are available with the following languages:

- English (US)
- German
- Dutch

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Note: All product documentation is provided in English language.

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## 2 ORTEC Load Optimization for Sales

### 2.1 General functional description

The user can use the API to create a request to optimize a list of package items and a selection of means of transport. The software uses the data provided to determine a solution that may consist of loading for one or more transport loads, using mathematical optimization techniques, considering various rules, objectives and strategies. The transport loads are graphically displayed in a 3-dimensional web application, as well as provided as a loading list with an allocation of the package items and quantities per transport load. The user can maintain specific data for packages and means of transport needed for the optimization via a web application. The API supports using references to the master data in the request ('partially qualified') or to define the relevant data in the request ('fully qualified'), e.g. the dimensions of a package item can be taken from the master data in OLO ('partially qualified') or being provided in the request ('fully qualified'). The plan will automatically be extended with additional details for the optimization from the configuration in OLO (such as packing and loading rules).

### 2.2 Overview

- Web Services (REST API)
  - Create, read, update and delete packages as reference to maintain applicable loading rules for one or multiple shipping scenarios
  - Create, read, update and delete means of transport as reference to maintain applicable capacity and dimension information
  - Create and change optimization requests/plans with automatic data extension of package items and means of transport data from the data storage
  - Read solution details or request a solution view to be used in combination with the solution viewer web application
- Web application (Run in supported Browser; See 1.6.2.1)
  - Data Manager to maintain applicable data for packages and means of transport
  - Solution Viewer to display transport load overview, loaded/not loaded packages and inspect transport loads including 3-D load graphics and loading list

### 2.3 Features

- Packages
  - Represent types of packages which can be used to define loading rules
  - Supported categories: Box, Crate, Pallet (cubic shaped objects)
  - Supported characteristics: Length, Width, Height, Weight
  - Supported loading rules: Allowed orientation for loading, stacking requirements by weight, by number or by group. Loading rules can be maintained by three shipping scenarios: default, road, sea
  - Stacking configuration between packages of different stacking groups (allowed, not allowed)
  - Each account can maintain packages; optimization requests /plans can be automatically extended with this data.
- Means of transport

- Represent types of means of transport where package items can be loaded
- Supported categories: Truck (2-axle, 3-axle, 4-axle), Full trailer (2-axle, 3-axle, 4-axle), Centre-axle trailer (1-axle, 2-axle, 3-axle), Tractor (no loading capacity; 2-axle, 3-axle, 4-axle), Semi-Trailer (1-axle, 2-axle, 3-axle), Vehicle combination (1 Truck + 1 Trailer, 1 Tractor + 1 Semi-Trailer), ISO Container (Box container)
- Each account can maintain as many means of transport as required. Means of transport defined in the optimization request / plan can be extended with this data.
- Optimization
  - Assignment and positioning of package items in means of transport
  - Different objectives possible: minimize loading length, minimize loading volume
  - Calculation of loading weight, loading volume, loading length, loading width, loading height per transport unit
  - Calculation of loading center of gravity per transport unit, determination and comparison with theoretical ideal center of gravity of the means of transport
  - Calculation of utilizations per transport unit by weight, volume, loading area, loading length
  - Calculation of theoretical axle weights per axle group based on the planned loaded package items and positions. Comparison with defined maximum axle load per means of transport
- Solution
  - Providing a hyperlink so that a user can access the solution in the solution viewer in the web application 'Solution Viewer'
  - Providing a list of solution KPI per unit (unit load, transport unit) and optionally a packing or loading list (depending on subscription type)



## 3 ORTEC Load Optimization for Replenishment

### 3.1 General functional description

The user can use the API to create a request to optimize a list of business document lines containing products and quantities and a selection of means of transport to run an optimization. The software uses the data provided to determine a solution that may consist of loading for one or more transport loads, using mathematical optimization techniques, considering various rules, objectives and strategies. The transport loads are graphically displayed in a 3-dimensional web application, as well as provided as a loading list with an allocation of the package items and quantities per transport load. The user can maintain specific data for packages and means of transport needed for the optimization via a web application. The API supports using references to the master data in the request ('partially qualified') or to define the relevant data in the request ('fully qualified'), e.g. the dimensions of a package item can be taken from the master data in OLO ('partially qualified') or being provided in the request ('fully qualified'). The plan will automatically be extended with additional details for the optimization from the configuration in OLO (such as packing and loading rules).

### 3.2 Overview

- Web Services (REST API)
  - Create, read, update and delete products and packaging units as reference to maintain applicable loading guidelines for one or multiple shipping scenarios
  - Create, read, update and delete locations as reference to maintain applicable loading guidelines for one or multiple shipping scenarios
  - Create, read, update and delete means of transport as reference to maintain applicable capacity and dimension information
  - Create and change optimization requests/plans with automatic conversion of document lines into package item lines and the extension of package items data and means of transport data from the data storage
  - Read solution details or request a solution view to be used in combination with the solution viewer web application
- Web application (Run in supported Browser; See 1.6.2.1)
  - Data Manager to maintain applicable data for products, packaging units, locations, means of transport, stacking configuration and loading guideline groups
  - Solution Viewer to display transport load overview, loaded/not loaded packages and inspect transport loads including 3-D load graphics and loading list

### 3.3 Features

- Products
  - Represent goods which are manufactured or traded by companies
  - Products are available in one or multiple packaging units for shipping and transportation
- Packaging units



- Represent packaging units which exists for a product and can be used to define loading guidelines
- Supported packaging units: Each
- Supported characteristics: Length, Width, Height, Weight
- Supported loading guidelines: Allowed orientation for loading, stacking requirements by weight, by number or by group. Loading rules can be maintained for different scenarios
- Stacking configuration between packages of different stacking groups (allowed, not allowed)
- Each account can maintain packages; optimization requests /plans can be automatically extended with this data.
- Load carrier
  - Represent types of load carriers where package items can be packed on or into.
- Locations
  - Represent places as part of a planned shipping route and which potentially have additional packing and loading guidelines which must be considered during optimization.
- Means of transport
  - Represent types of means of transport where package items can be loaded
  - Supported categories: Truck (2-axle, 3-axle, 4-axle), Full trailer (2-axle, 3-axle, 4-axle), Centre-axle trailer (1-axle, 2-axle, 3-axle), Tractor (no loading capacity; 2-axle, 3-axle, 4-axle), Semi-Trailer (1-axle, 2-axle, 3-axle), Vehicle combination (1 Truck + 1 Trailer, 1 Tractor + 1 Semi-Trailer), ISO Container (Box container)
  - Each account can maintain as many means of transport as required. Means of transport defined in the optimization request / plan can be extended with this data.
- Scenarios
  - Represent a shipping process with the option to specify and use different rules for different scenarios for the same product/packaging unit or for the same means of transport
  - The loading strategy describes the 'how to build a load' and can be selected in the scenario
- Optimization
  - Convert products and product quantities from business document lines to package items based on the packaging unit information of the product
  - Assignment and positioning of package items in means of transport
  - Different objectives possible: minimize loading length, minimize loading volume
  - Calculation of loading weight, loading volume, loading length, loading width, loading height per transport unit
  - Calculation of loading center of gravity per transport unit, determination and comparison with theoretical ideal center of gravity of the means of transport
  - Calculation of utilizations per transport unit by weight, volume, loading area, loading length
  - Calculation of theoretical axle weights per axle group based on the planned loaded package items and positions. Comparison with defined maximum axle load per means of transport
- Solution
  - Providing a hyperlink so that a user can access the solution in the solution viewer in the web application 'Solution Viewer'
  - Providing a list of solution KPI per unit (unit load, transport unit) and optionally a packing or loading list (depending on subscription type)

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