Infor LN Enterprise Planning User Guide for Lead Times

Important Notices

Trademark Acknowledgements

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About this document

This document describes the process of setting up lead times used by Enterprise Planning to calculate and plan order start and finish dates.

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Chapter 1
Introduction

1

Lead times in Enterprise Planning

Lead time offsetting in Enterprise Planning is crucial for correct planning results. Lead time offsetting enables a smooth coordination between sales, production, and purchase.

This offsetting of order dates depends on a series of lead times, which you can define in Enterprise Planning as well as in other LN packages.

Lead times and order planning

The planning of lead times is a part of order planning (RRP). Order planning includes the simulation of orders to meet demand. During the simulation, requirements for an item are determined, after which planned orders with their start and finish dates are generated.

The offsetting of an order's start and finish date includes the planning of lead times.

These steps are completed to plan the lead times:

1. Definition of lead times components
2. Use of lead time components in the order planning
3. Offsetting of the dates based on the lead times

Parts of the planning and offsetting are related to, or shared with packages other than Enterprise Planning.

Chapter 2
Lead time components

2

Defining lead time components

Lead time components are mostly defined outside Enterprise Planning, such as in Shop Floor Control or Purchase Control. The lead time components must represent the execution level as much as possible so that during planning, the lead times on execution level are reflected.

In the following sections, the relevant lead time components are listed that you can specify in LN for production, purchase, distribution, and general purposes.

Production lead time

Lead time component	Package	Unit	Defined in
Average setup time	Manufacturing	min	Routing Operations (tirou1102m000)
Cycle time	Manufacturing	min	Routing Operations (tirou1102m000)
Queue time	Manufacturing	days/hrs	Routing Operations (tirou1102m000)
Wait time	Manufacturing	days/hrs	Routing Operations (tirou1102m000)
Move time	Manufacturing	days/hrs	Routing Operations (tirou1102m000)
Order lead time (SFC)	Manufacturing	days/hrs	Items - Production (tiipd0101m000) Items - Production Defaults (tiipd0102m000)
Planned production time	Manufacturing	hrs	Configurable Item - Structure (tipcf3100m100)
Lead time offset	Manufacturing	days	Configurable Item - Structure (tipcf3100m100)

Purchase lead time

Lead time components	Package	Unit	Defined in

Safety time (BP)	Procurement	days/hrs	Items - Purchase Business Partner (tdipu0110m000)
Internal processing time	Procurement	days/hrs	Items - Purchase Business Partner (tdipu0110m000)
Supply time (BP)	Procurement	days/hrs	Items - Purchase Business Partner (tdipu0110m000)
Calculated lead time	Procurement	days	Items - Purchase Business Partner (tdipu0110m000)
Supply time	Procurement	days/hrs	Items - Purchase (tdipu0101m000) Items - Purchase Defaults (tdipu0102m000)
Transportation time	Common/ Freight	user defined	Addresses (tccom4530m000) Distance Table by City (tccom4537m000) Distance Table by ZIP Code/Postal Code (tccom4538m000) Route Plan Legs (fmfoc1151m000)

Distribution lead time

Lead time components	Package	Unit	Defined in
Supply time (Distribution)	Enterprise Planning	days/hrs	Items - Planning (cprpd1100m000)
Transportation time	Common/ Freight	user defined	Addresses (tccom4530m000)

			Addresses (tc-com4530m000) Distance Table by ZIP Code/Postal Code (tc-com4538m000) Route Plan Legs (fm-foc1151m000)

General lead time

Lead time component	Package	Unit	Defined in
Extra lead time	Enterprise Planning	days/hrs	Items - Planning (cprpd1100m000)
Safety time (item)	Common	days/hrs	Items - Ordering (tcibd2500m000)
Inbound lead time	Warehousing	days/hrs	Warehouses (wh-wmd2500m000) Warehouse - Item (wh-wmd2510m000)
Outbound lead time	Warehousing	days/hrs	Warehouses (wh-wmd2500m000) Warehouse - Item (wh-wmd2510m000)

Defining lead time horizons

In addition to the lead time components, you must define a horizon, which indicates a time period. In the period before the start date of the horizon, short-term, detailed planning of lead times is applied, using several lead time components on the basis of routing data.

After the start date of the lead-time horizon, long-term planning is applied. In long-term planning, only a reduced number of lead-time components is used to calculate lead times. Due to the limited number of lead-time components, the performance of the planning run is optimized.

Lead time horizon	Package	Unit	Defined in
Lead Time Horizon (Days)	Procurement	days	Items - Purchase Business Partner (tdipu0110m000)
Start of Fixed Lead-Time Horizon (SFC)	Enterprise Planning	days	Items - Planning (cprpd1100m000)

For planned production orders, the Start of Fixed Lead-Time Horizon (SFC) field in the Items - Planning (cprpd1100m000) session determines when short-term planning ends and long-term, fixed planning begins.

For planned purchase orders, the **Lead Time Horizon (Days)** field determines the periods for short-term planning and fixed planning.

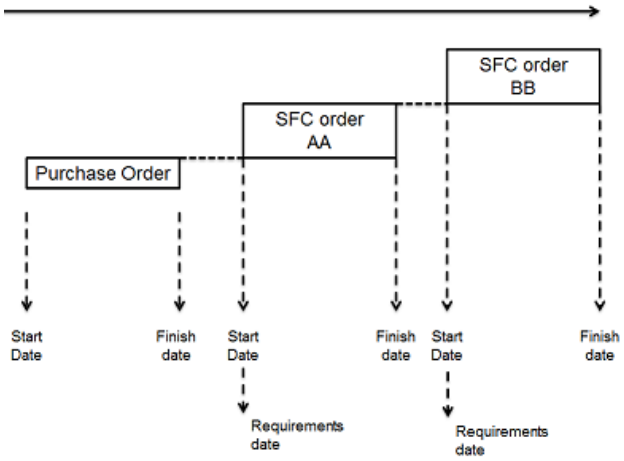
The distinction between detailed lead-time planning and fixed lead-time planning applies only to order planning. The distinction does *not* apply to master planning.

Lead-time offsetting

For lead-time offsetting, three dates are important:

- **Start Date**
  The date a production order is started, or the material of a purchase order is ordered.
- **Finish Date**
  The date a production order is finished, or the material of a purchase order is received.
- **Finish Date > Requirement Date**
  The date a specific material or item is required for an order.

The required material/item can be ordered through a purchase order, or it can be the result of a production order. The requirement date of a material can be equal to the start date of a production order, or can be later than the start date.



Sequence of orders, with start dates, finish date, and requirement dates

During the order-planning run in Enterprise Planning, in the Generate Order Planning (cprrp1210m000) session, orders are planned backwards based on the requirement date.

On plan-item level, the default supply source and the sourcing strategies determine the type of order that is created: production order, purchase order, or distribution order.

Chapter 3
Lead time offsetting

3

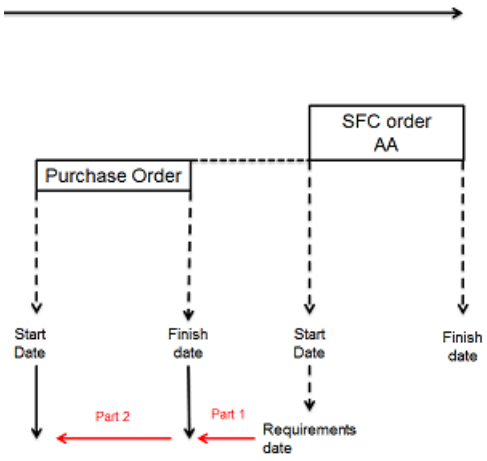
Order lead time offsetting

Lead time offsetting refers to a technique in which a planned order receipt in one time period requires the release of that order in an earlier period. The exact moment that the order must be released depends on the lead time for the item.

The length of the order lead time is calculated backwards, from the requirement date to the start date of the order.

The offsetting can be divided into these parts:

- From the requirements date to the finish date of the order (part 1)
- From the finish date to the start date of the order (part 2)



Order lead-time offsetting, divided into two parts

Legend

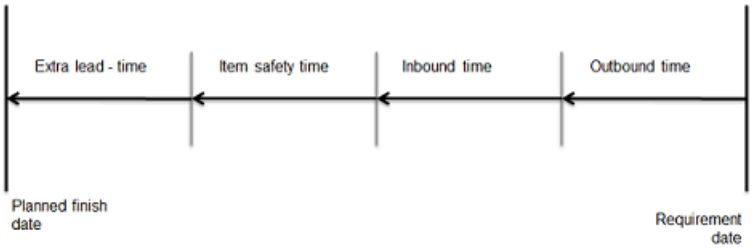
Part 1 Offsetting from the requirements date to the finish date, is the same for all order types. For more information, refer to *Offsetting from requirements date to finish date (p. 16)*.

Part 2 Offsetting from the finish date to the start date, depends on the order type. This part of offsetting differs for production orders, purchase orders, and distribution orders. For more information, refer to *Offsetting from finish date to start date (p. 20)*.

Offsetting from requirements date to finish date

The following lead time components are used to offset from the requirements date to the planned order finish date:

- **Extra Lead Time**
- **Safety Time**
- **Inbound Lead Time**
- **Outbound Lead Time**



Lead time components for offsetting from requirements date to finish date

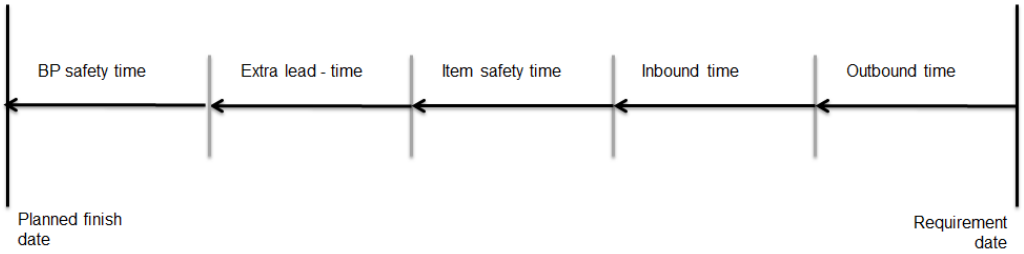
The **Extra Lead Time** can be specified in the Items - Planning (cprpd1100m000) session and can be used only in Enterprise Planning.

The other components are defined on general item level. To determine the inbound and outbound time, the data for the plan-item warehouse is used, which can be specified in the Warehouse - Item (whwmd2510m000) session. If the warehouse-item data does not exist, the outbound time that is defined in the Warehouses (whwmd2500m000) session is taken.

Lead time elements for planned purchase orders

For a planned purchase order, an extra lead time component, **Business Partner Safety Time**, is used to offset the planned order finish date. Therefore, the lead-time components for planned purchase orders includes these elements:

- **Business Partner Safety Time**
- **Extra Lead Time**
- **Safety Time**
- **Inbound Lead Time**
- **Outbound Lead Time**



Lead time components for offsetting from requirements date to finish date – purchase orders

Note

The BP safety time is additional to the safety time defined at item (or item-warehouse) level. The BP safety time covers insecurity of the supplier, whereas the item safety time is meant for insecurity of internal operations.

Exceptions that modify the planned finish date

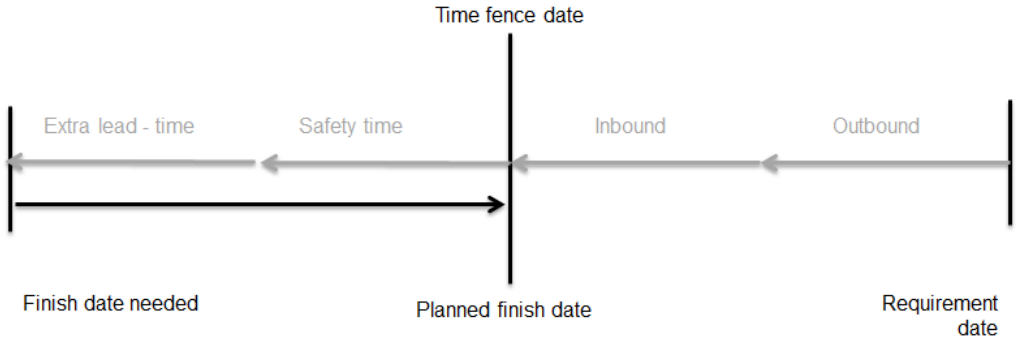
After the finish date is calculated, these exceptions can modify the planned finish date and move the date forward or backwards in time:

- The time fence is taken into account during order planning generation. The time fence can move the finish date *forward*.
- The finish date of the last firm planned or actual order can move the date *forward*.
- Fixed delivery moments can move the finish date *backwards*.

The following sections discuss each of these situations.

Time fence

If the **Generate Within Time Fence** check box is cleared in the Generate Order Planning (cprrp1210m000) session, order planning recognizes the requirements within the time fence, but shifts the requirements to the end of the time fence.



All orders, finish date corrected for time fence

In other words, if the **Generate Within Time Fence** check box is cleared, the requirement dates always fall beyond the time fence. If the finish date is offset *within* the time fence, the finish date is moved forward to the time fence date, consuming the subsequent lead times.

If the requirement date equals the time fence date, all four lead-time components are consumed.

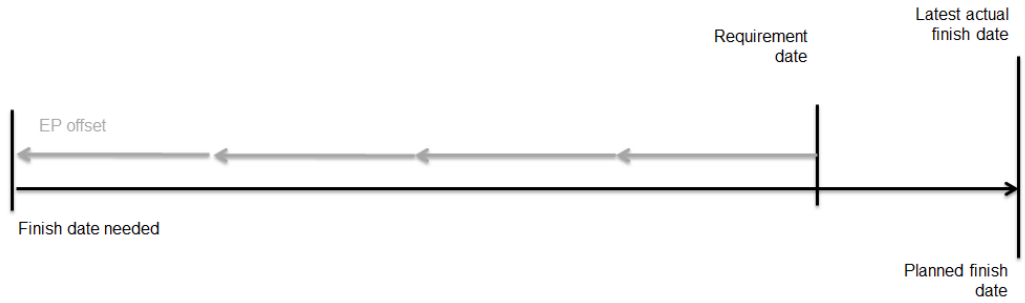
In the previous example, a warning is given that the finish date is too late for planning extra lead time and safety time.

Firm planned or actual orders

If the **Planned Order before Firm/Actual** check box is cleared in the Planning Parameters (cprpd0100m000) session, no planned orders can finish before any actual or firm planned order is finished. Therefore, the finish date of the planned order is moved forward to the finish date of the last firm planned order.

Note

In the following figures, Enterprise Planning offset refers to the offset of the requirements date to the planned finish date. The Enterprise Planning offset includes outbound time, inbound time, safety time, and extra lead time.



All orders, finish date corrected for firm/actual

If the **Planned Order before Firm/Actual** check box is cleared, the finish date is moved forward in the same way as when a time fence is involved. A planned **Purchase** order is not planned before actual purchase orders and firm planned purchase orders. A planned **Production** order is not planned before SFC production orders and firm planned production orders.

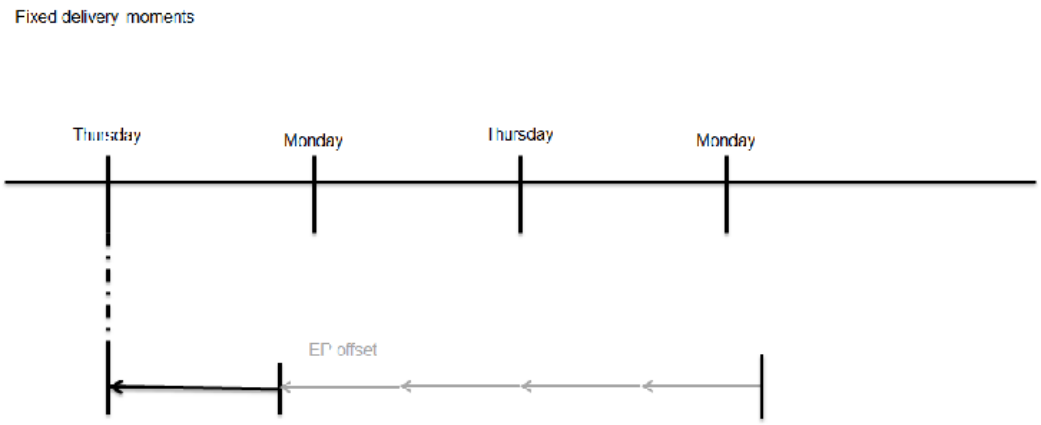
Note

The correction applies only to planned production orders and planned purchase, not to planned distribution orders.

Fixed deliveries

A plan item can be linked to a fixed delivery code. A fixed delivery code is used for order planning based on fixed delivery moments. If fixed deliveries are set up for the item, Enterprise Planning moves the calculated finish date backwards to find the nearest fixed delivery moment.

You can specify fixed delivery codes in the Fixed Delivery Codes (cprpd2110m000) session.



All orders, finish date set to fixed delivery

Offsetting from finish date to start date

Offsetting from the finish date to the start date, depends on the order type. Offsetting differs for production orders, purchase orders, and distribution orders.

Offsetting production orders

These factors determine how a production order is planned/offset:

- **Routing planning**
  If the estimated start date of the production order is *before* the date in the **Start of Fixed Lead-Time Horizon (SFC)** field of the Items - Planning (cprpd1100m000) session, you deal with short term planning. Therefore, production orders are planned in a detailed way. The production order is planned with routing, routing operations and quantity. The order lead time is the sum of the operation lead times.
- **Fixed order lead time**
  If the estimated start date of the production order is *after* the date in the **Start of Fixed Lead-Time Horizon (SFC)** field of the Items - Planning (cprpd1100m000) session, you deal with long term planning. Therefore, production orders are planned in a less detailed way (to gain performance). If the estimated start date falls after the date in the **Start of Fixed Lead-Time Horizon (SFC)** field, details are skipped. Instead, the fixed order lead time is used to plan, without using routing and operations.

  The estimated start date is determined by planning backwards the fixed **Order Lead Time** that is defined in the Items - Production (tiipd0101m000) session.
- **Generic items**
  Sometimes, the production order involves a generic item. The generic routing has a set of possible operations. The choice of operations depends on the configuration, so in a planned order, for a generic not yet configured demand, all operations are planned. This offsetting differs from normal items.

Routing planning

A production order includes a series of operations. The sequence of operations is managed by the routing. One item can have multiple routes, with various sets of operations, depending on order quantity.

In addition, you can model phantom items, which result in a network of parallel operations. The impact of phantom items on planning is described later.

One planned operation includes these lead time components:

- **Queue (Next Operation)**
- **Average Setup**
- Production run time, based on cycle time
- **Wait**
- **Move**

Production time can be either quantity dependent or fixed, which is determined by the **Fixed Duration** check box.

These options are available:

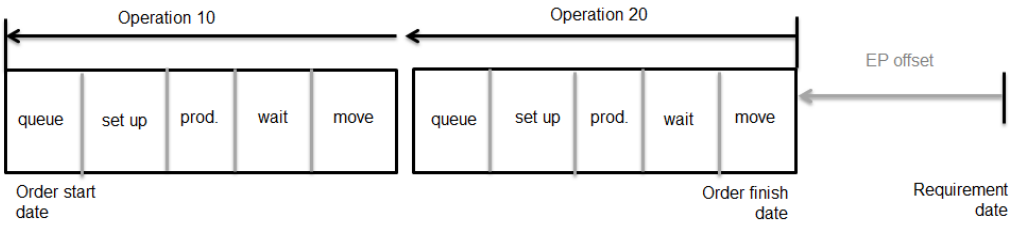
- Normal, no fixed duration (**Fixed Duration** check box is cleared)

```
Production time = cycle time * order quantity / routing quantity
```

- Fixed duration (**Fixed Duration** check box is selected)

```
Production time = cycle time
```

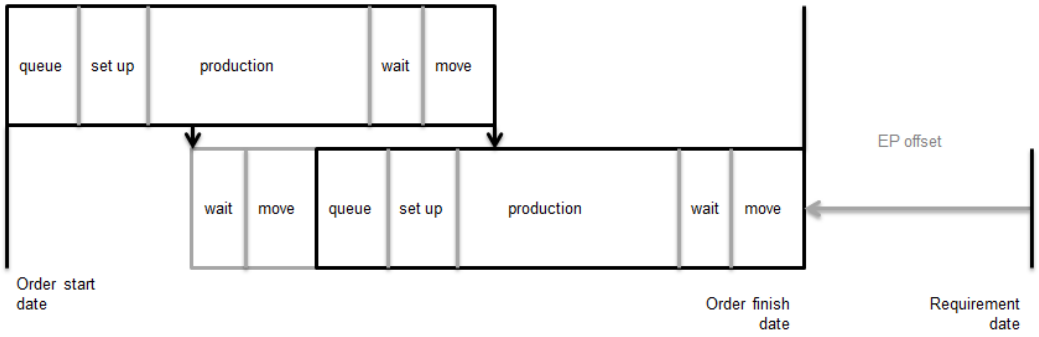
If you use the detailed routing information, the offsetting of two operations is as follows:



Production orders, offset operations

Operation overlap

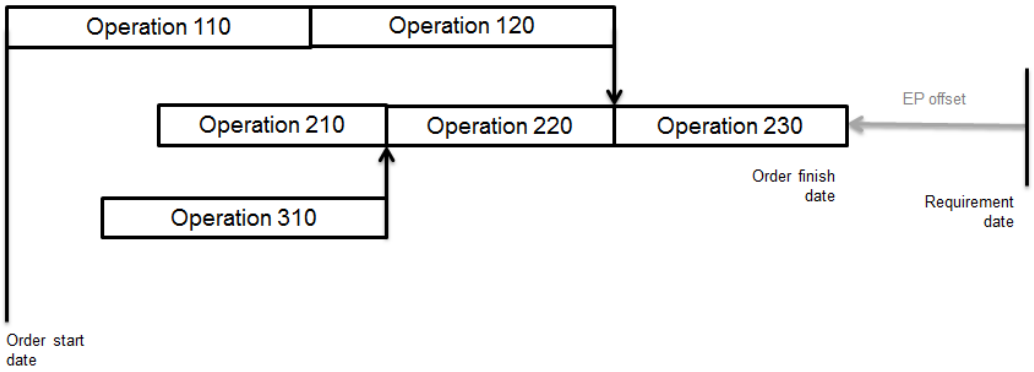
The previous figure shows how you can plan two operations sequentially. Operation 20 starts when operation 10 is finished. If you use a transfer batch quantity or percentage, operation 20 can start when operation 10 is partly finished.



Production orders, operation overlap

Network of phantom operations

If item A has phantom items B and C as components, the production order contains the operations of item A, as well as of items B and C. If, for example, phantom B is required on the third operation of item A, and C is required on the second operation, the planning is as follows:



Production orders, network of operations

Capacity

The required capacity for a production order is derived from the operation lead times. Occupation factors indicate how many men or machines are involved in the operation. Only the setup time and the production time require capacity.

For the two types of production times, the capacity calculations are as follows:

- Normal, no fixed duration:

```
Man hours = average set up * man occupation for set up + cycle time * order
 quantity  * man occupation for production / routing quantity

Machine hours = average set up * machine occupation + cycle time * order
quantity  * machine occupation / routing quantity
```

- Fixed duration:

```
Man hours = average set up * man occupation for set up + cycle time  * man
occupation for production / routing quantity

Machine hours = average set up * machine occupation + cycle time * machine
occupation / routing quantity
```

In the Enterprise Planning resource plans, either man or machine capacity is stored based on the **Critical Capacity for Planning** field in the Work Centers (tirou0101m000) session.

Production Order Planning With a Fixed Order Lead Time

If the estimated start date of the planned order is *beyond* the **Start of Fixed Lead-Time Horizon (SFC)**, you deal with long-term planning so no routing planning is performed.

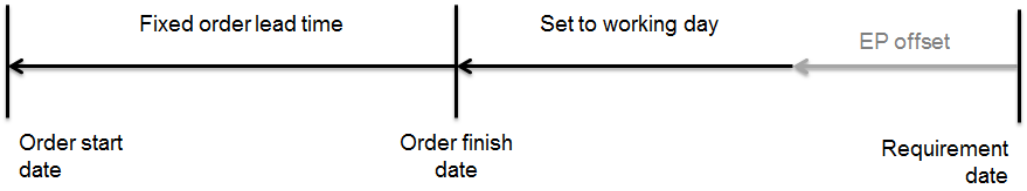
As a result, production orders are planned in a less detailed way. In that case, the lead time equals the order lead time that is defined in the Items - Production (tiipd0101m000) session. The estimated start date is found by offsetting the fixed order lead time.

Note

The fixed lead time is independent of the order quantity.

The order lead time can be either defined manually or calculated automatically in the Update Order Lead Times (tirou1202m000) session.

The following figure represents the planned order lead time offsetting when you use the fixed order lead time. Before you plan this order lead time, the finish date is offset by outbound, inbound, safety time, and extra lead time (Enterprise Planning offset), and then set to the last working moment in the appropriate calendar.



Production orders – planning with a fixed lead time

Production order planning of generic items

The generic routing, defined in the Configurable Item - Structure (tipcf3100m100) session, differs from the normal routing. Which operations are used in the routing, depends on the configuration.

Example

Two operations might be exclusive: either operation 10 is selected, or operation 20. As a result, a sequence of operations is not required.

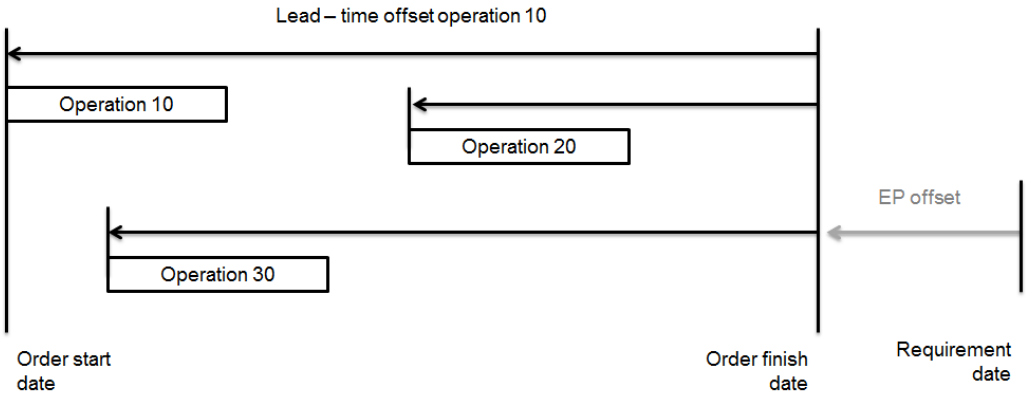
Therefore, the operation of a generic routing has several parameters for planning:

- **Planned Production Time**
- **Planning Percentage**
- **Lead Time Offset**

For the lead time, the planning percentage is taken into account.

```
Operation lead time = planned production time * planning percentage
```

The lead time offset is used to determine the start of the operation sequence.



Planned production order for generic item

Offsetting purchase orders

The planning of a purchase order depends on the supplier choice. The supply strategy, defined in the Supply Strategy (cprpd7120m000) session, determines a supplier from the Items - Purchase Business Partner (tdipu0110m000) session.

If no supplier is found, or if the supplier cannot deliver the required quantity due to capacity constraints, Enterprise Planning creates a purchase order without supplier.

An item supplier has a **Lead Time Horizon (Days)** defined. This horizon sets a date in the future. If the estimated start date is within this horizon, the purchase order is planned at a detailed level.

Otherwise, the **Calculated Lead Time (Days)**, which is defined in the Items - Purchase Business Partner (tdipu0110m000) session, is used for planning purposes. The reason for using a calculated lead time is the same as in the case of planned production orders: To gain performance.

Similar to production orders, first the start date is estimated using the calculated lead-time so that a choice can be made for detailed or rough planning.

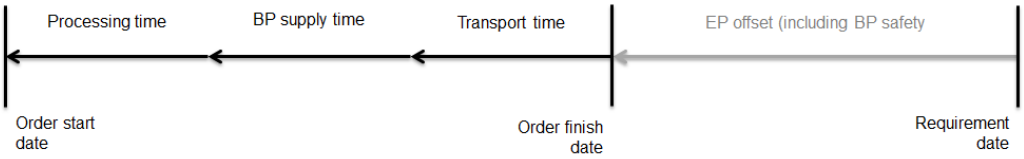
With supplier, within lead - time horizon

If you are planning at a detailed level, the supply order lead-time consists of the following lead-time components:

- Item supplier processing time
- Supply time
- Transportation time (from business partner to warehouse)
- Supplier safety time

The supplier safety time is already part of the Enterprise Planning offset, which determines the planned order finish date.

The planned finish date is the planned arrival date as communicated with the supplier. The offset of the order start date is then determined by transportation time, BP supply time, and internal processing time.



Purchase with supplier, within lead-time horizon

Transportation time

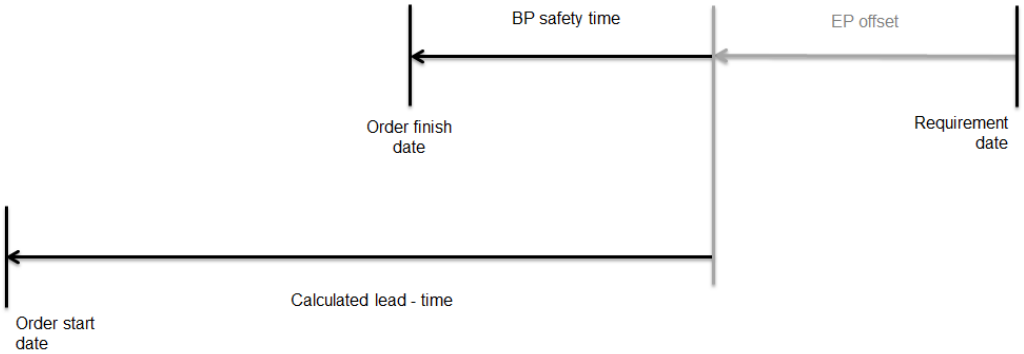
Transportation time is the time to deliver the goods from the ship-from BP address to the receiving warehouse. The transportation time is calculated either by means of Freight Management or by means of the distance tables in Common:

- If **Freight Management** (FM) is implemented, then FM tries to plan the shipment by means of a route. Also loading and unloading time is included. If no route is found, the distance tables in Common are used.
- If FM is not implemented, the distance tables are used to find a shipping time. The distance tables are based on the transport category. The transport category is linked to the carrier (defined per item supplier, or linked to the BP). If no carrier can be found, the shipping time is selected by means of the transport category **Not Applicable**.

With supplier, outside lead - time horizon

If the estimated planned order start date (the requirement date minus Enterprise Planning offset and calculated lead-time) falls outside the supplier's lead-time horizon, the start date is planned using the calculated lead-time. The calculated lead time is the sum of processing time, BP safety time, supply time, and transportation time, calculated in days. If one of the detailed components is defined in hours, it is converted to days using the average hours per day in the Standard Calendar (tcccp0140m000) session.

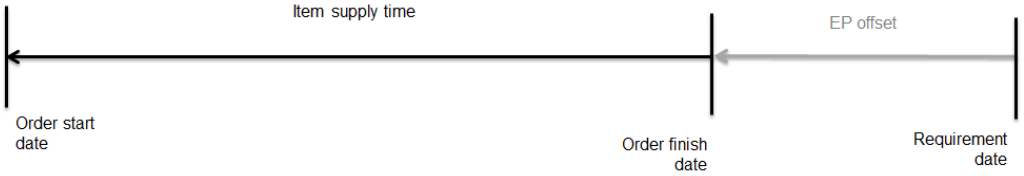
The availability type that deals with the BP safety time, supply time, and internal processing time for the purchase order is defined in the Purchase Parameters (tdpur0100m000) session. The availability type that deals with carrying goods (transportation time) is defined in the COM Parameters (tccom5000m000) session.



Purchase with supplier, outside lead-time horizon

Without supplier

If no valid supplier is found, only the supply time from the item purchase data is used. This supply time is a substitute for BP supply, internal processing and transportation time.



Purchase without BP

Offsetting distribution orders

Distribution planning is based on supplying relationships, as specified in the Supplying Relationships (cprpd7130m000) session. Similar to purchase planning, first a supplying source (warehouse cluster) is chosen, after which the distribution order is planned.

The lead time of the distribution order can be planned as follows:

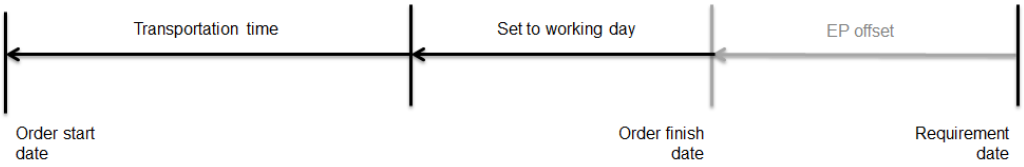
- If the carrier is specified for the supplying relationship, transportation time is used.
- Without a carrier, the supply time from the supplying resource is planned.

Transportation time

If a carrier is provided in the supplying relationships, transportation time is planned between the addresses of the supplying warehouse and the receiving warehouse. The logic is the same as for planned purchase orders.

Note

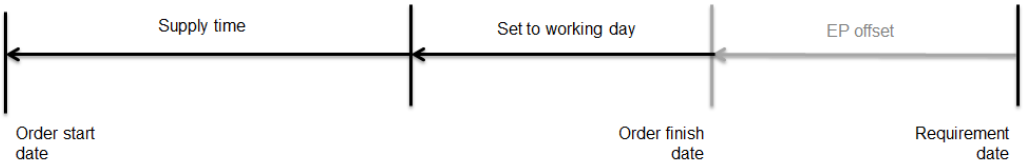
If no distance is defined for the addresses, the calculated transport time is zero (no warning is given).



Distribution orders with carrier

Supply time

If no carrier is provided, the supply lead time of the Supplying Relationships (cprpd7130m000) session is used instead. The supply resource is used to link to the calendar.



Distribution orders without carrier

Replanning

For orders that are already planned in the Planned Orders (cprrp1100m000) session, replanning can be performed.

To replan, click **Replan** in the Planned Orders (cprrp1100m000) session. Replanning works the same as lead time planning, but it can be performed forward as well as backwards.

The following calculations exist:

- Planning backward during the order planning run (normal planning)
- Replanning backwards
- Replanning forward

For forward planning, the start date is specified, while the planned finish date is calculated. Because the requirement date is not relevant in forward planning, item safety time, outbound lead-time, inbound lead time, and extra lead time are not planned.

Chapter 4
Lead time planning

4

Calendars

A calendar is a combination of a calendar code and availability type, both are defined on the resource.

The lead times are planned based on the calendar working hours which you can specify in the Calendar Working Hours (tcccp0120m000) session. Working hours are generated for a combination of calendar code and availability type.

The following fields identify the calendar:

- **calendar code**
  Specifies the period (start date and end date) and the available days, linked to a resource.
- **availability type**
  Defines the type of activity, for example, production, transport, and maintenance, the start date and end date of the work hours, the efficiency factor, and the capacity percentage.

As a result, using various availability types, a resource can perform multiple activities.

Note

Calendar refers to the combination of *calendar code* and *availability type*.

Calendar codes

A calendar code can be defined at several levels:

Resource	Package	Session
Company	Common	Companies (tcemm1170m000)
Enterprise Unit	Common	Enterprise Units (tcemm0130m000)
Buy-from Business Partner	Common	Buy-from Business Partners (tccom4520m000)
Department	Common	Departments (tcmcs0565m000)
Warehouse	Warehousing	Warehouses (whwmd2500m000)
Resource	Enterprise Planning	Resource (cprpd2100m000)

The calendar code is often related to the resource that performs the operation: *work center*, *warehouse*, *department*, *business partner*.

If no resource can be found for offsetting, the calendar code is searched for on global level: *enterprise unit level* or *company level*.

Which calendar is used for planning purposes depends on which levels the calendar is specified. LN checks all levels to determine which calendar must be used. For example, if a calendar is required for an activity on a resource, LN first searches for the calendar that is defined for the resource. If no calendar code is found, the department level, the enterprise unit level, and finally the company level are successively checked.

If all resources use the same calendar, you must only specify the calendar code on the company level.

Availability types

The availability type relates to the type of activity and is defined by package or module. Availability types can be specified in these sessions:

- Routing Parameters (tirou0100m000)
- Purchase Parameters (tdpur0100m000)
- Sales Order Parameters (tdsls0500m400)
- Warehouse Master Data Parameters (whwmd0500m000)
- COM Parameters (tccom5000m000)

In addition, Enterprise Planning needs some general availability types. General availability types are required for offsetting that is not directly related to an operational activity, for example, in case of horizons.

General availability types are specified in these sessions:

- Planning Parameters (cprpd0100m000).
- Scenario - Availabilities (cprpd4160m000). For every scenario, you can link an availability type to a calendar code.

Calendar usage

The following tables list the lead time components, the calendar, and availability type that are used to plan the production order lead times.

In addition, the calendar selection logic is described in the subsequent subsections.

Production order lead time

Lead time components for detailed planning	Sequence to find calendar code	Sequence to find availability type (AT)
Queue time	**1.** Resource **2.** Department **3.** Enterprise unit **4.** Company	**1.** AT by Scenario **2.** Routing Parameters
Average setup time	**1.** Resource **2.** Department **3.** Enterprise unit **4.** Company	**1.** AT by Scenario **2.** Routing Parameters
Production time	**1.** Resource **2.** Department **3.** Enterprise unit **4.** Company	**1.** AT by Scenario **2.** Routing Parameters
Wait time	-	-
Move time	**1.** Resource **2.** Department **3.** Enterprise unit **4.** Company	**1.** AT by Scenario **2.** Routing Parameters

Lead time components for fixed planning	Sequence to find calendar code:	Sequence to find availability type (AT):
Order lead time (JSC)	**1.** Enterprise unit **2.** Company	**1.** AT by Scenario **2.** Routing Parameters
Lead time offset	**1.** Resource **2.** Department **3.** Enterprise unit	**1.** AT by Scenario **2.** Routing Parameters

	4. Company	

Lead time components for generic item planning	**Sequence to find calendar code:**	**Sequence to find availability type (AT):**
Planned production time	1. Resource 2. Department 3. Enterprise unit 4. Company	1. AT by Scenario 2. Routing Parameters

The lead time components in these tables refer to planned production orders in Enterprise Planning as well as to JSC production orders. However, for JSC production orders, the first step in the sequence to find a calendar code or an availability type is always skipped.

Note

In case of a JSC production order, the calendar code for the planned production time is first searched on the department level. The resource level is skipped.

For planned orders in Enterprise Planning, the calendar code is first searched on the resource level.

Routing planning

When you plan with routing operations, each operation is linked to a work center. All lead times, except wait time, use the work center to find the calendar.

Wait time is not linked to any calendar and, therefore, directly subtracted from the finish date.

If no calendar is defined on a detailed level, retrieval of a calendar can require several steps. The first step is specific for Enterprise Planning, while the rest is analogous to lead time offsetting for JSC orders in Manufacturing.

Calendar retrieval by work center

A calendar is retrieved from these sessions:

1. Resource calendar in the Resource (cprpd2100m000) session
2. Calendar of the department related to the work center in the Departments (tcmcs0565m000) session
3. Enterprise unit of the department in the **Enterprise Unit** session
4. Company calendar in the Companies (tcemm1170m000) session

Fixed order time

If you use a fixed order lead time, no routing, and therefore no work centers, are involved. The calendar of the enterprise unit is used instead.

Calendar retrieval by item

A calendar is retrieved from these sessions:

1. Enterprise unit of the plan item in the Items - Planning (cprpd1100m000) session. The enterprise unit is taken from the default warehouse of the plan item.
2. Companies (tcemm1170m000)

The fixed order lead-time horizon itself is planned forward from the current date (date of order planning run) and uses the same calendar.

Generic routing

Both lead time offset and production time use the work center calendar. The logic of calendar selection is the same as for routing planning.

Purchase order lead time

The following tables list the lead time components, the calendar, and availability type that are used to plan the purchase order lead times.

Lead time component (detailed planning: with supplier, within lead time horizon)	Sequence to find calendar code	Sequence to find availability type (AT)
Internal processing time	**1.** Purchase Office **2.** Company	Purchase Parameters
Supply time (BP)	**1.** Ship-from BP **2.** Buy-from BP **3.** Company	Purchase Parameters
Transportation time *(transport part)*	**1.** Means of Transport **2.** Buy-from BP of Carrier **3.** Company	COM Parameters
Transportation time *(loading/unloading)*	**1.** Address **2.** Company	COM Parameters

Lead time component (fixed planning: with supplier, outside lead time horizon)	Sequence to find calendar code	Sequence to find availability type (AT)
Calculated lead time (BP)	Company	Purchase Parameters

Lead time component (no supplier)	Sequence to find calendar code	Sequence to find availability type (AT)
Supply time (item)	Company	Purchase Parameters

Planned purchase orders are planned in the same way as *actual* purchase orders (the same algorithm is used). A purchase order can be planned as follows:

- With supplier, within lead time horizon
- With supplier, outside lead time horizon
- Without supplier

The lead time horizon is planned forward from the current date. In other words, the date of the order planning run, using the company calendar.

With supplier, within lead time horizon

The internal processing time, the time required to ship an order, uses the purchase office calendar. If this calendar is not defined, the company calendar is used.

Supply time and supplier safety time do have a three-level fall-back mechanism:

- Ship-from business partner calendar
- Buy-from business partner calendar
- Company calendar

For more information on transportation time, refer to *Transportation time (p. 39)*.

Without supplier

If no supplier is present, you can use the company calendar to plan the item supply time.

Note

Distribution order lead times

The following tables list the lead time components, the calendar, and availability type that are used to plan the distribution order lead times.

Lead time component (with carrier)	Sequence to find calendar code:	Sequence to find availability type (AT):
Transportation time (transport part)	**1.** Means of Transport **2.** Buy-from BP of Carrier **3.** Company	COM parameters
Transportation time (loading/un-loading)	Address Company	COM parameters

Lead time component (without carrier)	Sequence to find calendar code:	Sequence to find availability type (AT):
Supply time (Distribution)	**1.** Resource **2.** Department **3.** Enterprise unit **4.** Company	**1.** AT by Scenario **2.** Routing Parameters

To plan a distribution order, you always use a supplying relationship. If a carrier is linked to the supplying relation, to perform the order offset, you can use transportation time. Otherwise, the supplying relationship supply time is used.

Transportation time

For more information on transportation time, refer to *Transportation time (p. 39)*.

Supply time

For the planning of supply time, you can use the calendar of the supplying relationship's work center. The calendar is retrieved as follows:

1. Resource calendar in the Resource (cprpd2100m000) session
2. Calendar of the department related to the work center in the Departments (tcmcs0565m000)) session
3. Enterprise unit of the department in the Enterprise Units (tgbrg0130s000) session
4. Company calendar in the Companies (tcemm1170m000) session

If no work center is defined, the item enterprise unit calendar is retrieved as follows:

1. Enterprise unit of the plan item in the Items - Planning (cprpd1100m000) session
2. Company calendar in the Companies (tcemm1170m000) session

General lead times

The following table lists the lead time components, the calendar, and availability type that are used to plan the general lead times.

Lead time component	Sequence to find calendar code:	Sequence to find availability type (AT):
Safety time (BP)	1. Ship-From BP 2. Buy-From BP 3. Company	Purchase Parameters
Safety time (item)	1. Enterprise unit 2. Company	1. AT by Scenario 2. EP Parameters
Extra lead time	1. Enterprise unit 2. Company	1. AT by Scenario 2. EP Parameters
Inbound lead-time	1. Warehouse 2. Company	Warehouse Parameters
Outbound lead-time	1. Warehouse 2. Company	Warehouse Parameters

Safety time and extra lead time use the calendar linked to the plan item. The calendar is retrieved as follows:

- Enterprise unit of plan item in the Items - Planning (cprpd1100m000) session
- Company calendar in the Companies (tcemm1170m000) session

Warehouse inbound and outbound times are linked to the (item-) warehouse data of the planned order. The warehouse calendar is used to calculate inbound and outbound times.

Fixed lead time horizons

Calendar and availability type are used to link specific dates to a horizon.

Lead time horizon	Calendar	Availability type
Lead-time horizon (BP)	Company	Purchase Parameters
Start of Fixed Lead-Time Horizon (SFC)	Enterprise unit	AT by Scenario / Planning Parameters (cprpd0100m000)

Transportation time

Transportation time, one of the lead time components that is used in purchase orders and distribution orders, can be determined in several ways, depending on whether **Freight Management** is implemented:

- If **Freight Management** is implemented, transportation time is determined by means of **Freight Management**.
- If **Freight Management** is not implemented, the distance tables in Common are used to determine the transportation time.

Addresses

To calculate the transportation time, an original address and a destination address, are always involved. Which addresses are used depends on the order type:

- For distribution orders, the addresses of the sending warehouse (the original address) and the receiving warehouse (the destination address) are involved.
- For purchase orders, the business partner address (the original address) and receiving warehouse address (the destination address) are involved.

Carrier

For distribution orders, a carrier is always involved.

For purchase orders, a carrier is optional.

If travel time is planned for a carrier, the carrier’s calendar is retrieved indirectly by means of the business partner.

To indirectly retrieve a calendar, these calendars are consulted:

- Calendar on the **Ship-to Business Partner** role (in the Business Partners (tccom4500m000)) session) of the business partner that is filled as carrier **Buy-from Business Partner**, in the Carriers/LSP (tcmcs0580m000) session.
- Calendar on the **PO Buy-from BP** role, of the business partner that is filled as carrier **PO Buy-from BP**.
- Company calendar in the Companies (tcemm1170m000) session

For all lead times, the availability type for carrying goods, as specified in the COM Parameters (tccom5000m000) session, is used.

Transportation time in Freight

If Freight is implemented, transportation time is determined by means of Freight. The transportation time that is used in Freight includes these parts:

- Wait time at the sending address in the Addresses - Freight Management (fmfmd0110m000) session
- Load time at the sending address in the Addresses - Freight Management (fmfmd0110m000) session
- Travel time
- Wait time at the receiving address in the Addresses - Freight Management (fmfmd0110m000) session
- Unload time at the receiving address in the Addresses - Freight Management (fmfmd0110m000) session

Wait time and load time are planned on the address calendar that is determined in the Addresses (tccom4530m000) session. Travel time is planned on the calendar that is linked to the carrier.

Travel time

Travel time, which is part of transportation time in Freight, can be determined as follows:

- In the Route Plans (fmfoc1150m000) session
- In the Standard Routes (fmlbd0150m000) session
- By means of the carrier

The following sections describe each of these methods in detail.

Route plan

Neither the distribution order nor the purchase order specifies a route plan. Instead, the original address and the destination address must be determined for the order.

Using the Route Plans (fmfoc1150m000) session, the original address and the destination address must be retrieved from the Route Plan Legs (fmfoc1151m000) session.

The two addresses need not be in the same leg. However, the leg with the original address must always precede the leg that contains the destination address.

Example

The original address is in the second leg of the route plan, and the destination address is in the fifth leg.

The **Carrier/LSP Selection Criterion** field in the Freight Planning Parameters (fmlbd0100m000) session determines which of the available route plans is chosen:

- **Cheapest**
- **Fastest**
- **Shortest**

You can retrieve the travel time from the Route Plan Legs (fmfoc1151m000) session:

- The distance of a leg is divided by the average speed of a transport means group.
- If no distance is specified, the leg travelling time is taken instead.

The calendar is retrieved through the carrier.

Standard route

Similar to route plans, all standard routes that match the original address and the destination address are selected.

For a route plan, you can define a sequence of ZIP codes in the ZIP Codes by Standard Route (fmlbd0151m000) session, and a sequence of areas in the Areas by Standard Route (fmlbd0152m000) session.

The **Search Sequence Standard Route** field in the Freight Planning Parameters (fmlbd0100m000) session determines whether ZIP codes or areas are used.

The addresses must match either the ZIP code or the area reference address.

The travel time is calculated for the total distance of the standard route sequence. The distances are retrieved from the distance tables in Common, as is described in the following subsection.

The distances are based on the transport category:

- **Transport Means Group (TMG) of the standard route**
  Refer to the Transport Means Groups (fmfmd0150m000) session.
- **TMG of the order's carrier**
  Refer to the Transport Means Groups by Carrier/LSP (fmfmd0152m000) session.
- TMG of standard route carrier
- Carrier
- **TMG of the item**
  Refer to the Items - Freight Management (fmfmd1100m000) session.

The calendar is retrieved through the carrier.

Carrier

The travel time is retrieved from the Common distance tables. The calendar is retrieved from the carrier.

The transport category is retrieved as follows:

- From the carrier
- From the transport means group (TMG) of the item

Transportation time in Common

If Freight is *not* implemented, the distance tables in the Common package are used to determine the transportation time.

The distance tables in Common are defined per transport category, between cities or between ZIP codes. The time distances in these tables are expressed in variable time units.

Conversion factors from the Conversion Factors (tcibd0103m000) session and the **Time Unit for Seconds** field from the COM Parameters (tccom5000m000) session are used to plan it on the calendar.

The **Priority of Distance Tables** parameter in the COM Parameters (tccom5000m000) session determines how the ZIP code and city tables are used. This field can be set as follows:

- **City**
- **ZIP/Postal Code**
- **Both, by City First**
- **Both, by ZIP Code First**

The transport category is retrieved from the carrier. If no carrier is present, the transport category **Not Applicable** is used.

Chapter 5
Calendar logic

5

Time units

Planning days

Several lead times can be defined in days.

Because calendars are defined in hours/minutes, you must specify how the lead time days are calculated in the calendar.

The rule is that lead times in days are planned as working days, which means that the available time on a day is one day of lead time.

Example

Planning backwards

The calendar runs from 8:00 to 17:00:

- Planning one day backwards from *11:55* sets the start date on *8:00* (start of the day)
- Planning one day backwards from *Tuesday 7:55* sets the start date on *Monday 8:00*
- You work from Monday to Friday, planning two days backwards from *Monday 13:15* sets the start on *Friday 8:00*

Planning forward is just the opposite.

Example

Planning forward

The calendar runs from 8:00 to 17:00:

- Planning one day forward from *11:55* sets the start date on *17:00* (end of the day)

- Planning one day forward from *Monday 17:05* sets the end date on *Tuesday 17:00*
- You work from Monday to Friday, planning two days forward from *Friday 13:15* sets the end on *Monday 17:00*

You can also plan zero (0) days. This sets the dates to the nearest working moment.

Example

Planning 0 days

Therefore, if you plan:

- Zero (0) days backward/forward from 13:00 Monday, *nothing happens* because this time is already the working moment
- Zero (0) days backward from *Monday 18:00*, the date is set to *Monday 17:00*
- Zero (0) days forward from *Monday 18:00*, the date is set to *Tuesday 8:00*

Using days and hours

The list of available time units usually includes hours and days.

The granularities week and month are not supported to avoid problems with converting them into days.

The only exception is the definition of distances. In the distance tables by city and ZIP code, the time distance's unit is user definable. Unit conversion factors are used to calculate the length in seconds.

The lead time is then planned in seconds on the calendar, similar to the planning of hours.

Conversion of hours to days

In general, the lead times defined in days are planned as days, and lead times defined in hours are planned as hours. Still, you must convert hours into days in a number of situations. The situations related to Enterprise Planning are:

- The calculation of the calculated lead time in the Items - Purchase Business Partner (tdipu0110m000) session
- The calculation of the order lead time to determine the economic order quantity in the Optimize Lot Sizing (cprao3200m000) session
- The cumulative lead time calculation in the Check Horizons (cprpd1200m000) session

To carry out the conversion, you can also use the average basic day capacity of the availability type involved. Because each lead time is linked to an availability type, an availability type is always involved.

The basic day capacity is derived from the working times defined in the Standard Calendar (tcccp0140m000) session:

```
The total number of working hours defined / number of weekdays with working
 times
```

Extending the calendar

The lead times are planned by means of the calendar working hours.

The calendar working hours are generated for the period between the calendar start date and the calendar end date.

If planning must be performed outside the start/end period of the calendar, to extend the calendar, you can use the information from the Standard Calendar (tcccp0140m000) session.

For each lead time, an availability type is involved.

The working times defined for the availability type are used to extend the calendar. If the availability type is not defined in the calendar, a warning appears.

Appendix A
Glossary

A

availability type

An indication of the type of activity for which a resource is available. With availability types, you can define multiple sets of working times for a single calendar.

For example, if a work center is available for production on Monday through Friday and available for service activities on Saturdays, you can define two availability types, one for production and one for service activities and link these availability types to the calendar for that work center.

calendar code

An alphanumeric code to identify a calendar.

Index