Field Service

Using Routing

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Preface

This preface introduces information sources that can help you use the application and this guide.

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1 Overview of Routing

Routing Definitions

Routing automates many routing tasks, making the process faster and easier and ensures that properly skilled resources are assigned activities within their working areas. Routing satisfies more customer activities within the promised service window. It minimizes the cost of delivering service by minimizing resource travel time, work time, idle time and overtime.

How does routing work?

Oracle Field Service Routing leverages a sophisticated algorithm to optimize resource utilization. It learns about your resources and activities through the information you enter and through the real-time data that it collects about resources and activities. The application then uses this information to generate routes that optimize the mobile workforce utilization details.

Oracle Field Service Routing includes the logic to consider the resource arrival time communicated to the customer, so that the company's commitments can be fulfilled. If the customer has been notified of the arrival period (both the start and end time of the arrival period have been communicated), and such arrival period overlaps the Service Window, the module uses this overlap as the interval within which the activity start is preferred to be scheduled.

Here is the data flow of the routing process:

- Oracle Field Service receives activities from the activity booking system. The application identifies the necessary skills and skill levels for the activity as well as any other requirements and then identifies resources with a matching set of skills, skill levels, working areas and other constraints. Then Oracle Field Service Routing assigns the activity to the resource that best matches the requirements. If a resource is selected as the Preferred resource for an activity, the resource is given priority. However, when a Preferred resource is inactive or unavailable, other appropriate resources are selected. The company realizes cost savings through efficiencies, resources receive routes that are tailored to their skill levels and their locations, and customers receive quality service on time.

- Oracle Field Service Routing always considers the assignment requirements established for activities and resources in Oracle Field Service. This includes - work skills, work zones, activities forbidden, required resources, activity links constrains and resource calendars. Routing plan level settings let you configure additional constrains and priorities; however, it is not possible to minimize the standard constrains at the plan level.

Note: Routes are optimized using a number of different goals, not just the ones that you select. For example, if you build a routing strategy that optimizes travel and work time, the application prioritizes not just the optimization of travel time and work, but it also maximizes a number of assigned activities and minimizes resources overtime as additional optimization goals.

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Routing Rules to Locate Resources

When a resource is in the field, the application sends the GPS coordinates of the resource to the routing engine, if they are available. This helps Routing determine the location of the resource.

these rules are used:

If the route is not yet started or no activity is started on the route, the coordinates sent to the routing engine are as follows:

- If the resource's GPS coordinates are obtained between 0–20 minutes, the GPS coordinates are used.
- If no GPS coordinates are available, or if GPS coordinates are greater than 20 minutes, the resource's Start Location is used if it is available.
- If no GPS coordinates are available, or if GPS coordinates are greater than 20 minutes, and no Start Location is assigned to the resource then the resource's location remains undefined.

If the route has a started or a completed activity:

- If the resource's GPS coordinates are newer than the address of the started or completed activity and the resource is at a distance more than 20 minutes from the address of the started or completed activity (using airline distance and default company airline distance speed), the GPS coordinates are used.
- If no GPS coordinates are available, or if GPS coordinates are older than the address of the started or completed activity, or the resource is at a distance less than 20 minutes from the address of the started or completed activity (using airline distance and default company airline distance speed), the address of the started or completed activity is used.

Redwood Theme

Routing screens have new user interfaces based on Redwood styles.

These features are new in Routing:

- Ability to choose days of week for Immediate Routing Plans and for activities which fit the filter. This is to define specific business rules for immediate activities based on specific days such as, working and non-working days.
- Look and feel of routing plan Add and Edit screen is changed in accordance of latest Oracle Redwood guidelines, so the screen now looks similar to other Oracle CX applications.
- Particular dialog window translations are changed for better clarity and to correspond to Oracle Redwood guidelines.
- Routing plans within the routing profile are now listed alphabetically, which makes it easier to find the needed routing plan.
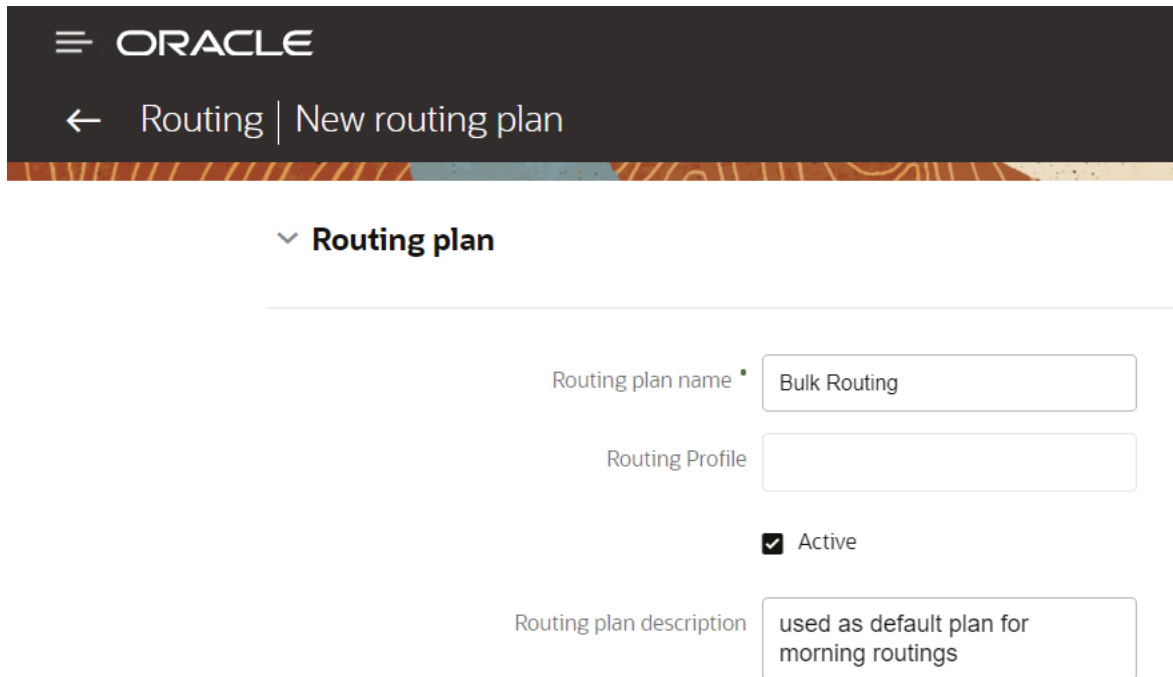
To change the days of the week for which an Immediate routing plan is to run, navigate to the Run Schedule section and choose the needed days under Activity days.

To keep current behavior unchanged, all days are selected by default for all existing plans and newly created plans.

Examples are listed below:

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Add Routing Plan screen

This image shows the Add Routing Plan screen.

Immediate Routing Plan Screen

This image shows the Immediate Routing Plan screen:

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← Routing | Routing with inventory

> **Routing plan**
  Routing with inventory

∨ **Run schedule**

Run routing *   immediately ▾

Start time   hh:mm AM/PM

End time   hh:mm AM/PM

Activity days * ☑ Sun ☑ Mon ☑ Tue ☑ Wed ☑ Thu ☑ Fri ☑ Sat

                 ○ Apply for Urgent Activities

                 ● Apply to activities corresponding to the filter:

                 Other ▾

Scheduling will be performed immediately after the activity that corresponds to the selected filter is detected on the bucket.

> **Assignment and Fallback**
  Assignment - automatic

∨ **Filters**

Activities in the routing bucket that should be scheduled and assigned.

Activities	Resources
Other	Other Normal

To reorder activities, drag and drop the grid rows.

☑ Use resources outside the routing bucket

                                        Dismiss   Update

Activate Routing Plan dialog box

This image shows the Activate Routing Plan dialog box:
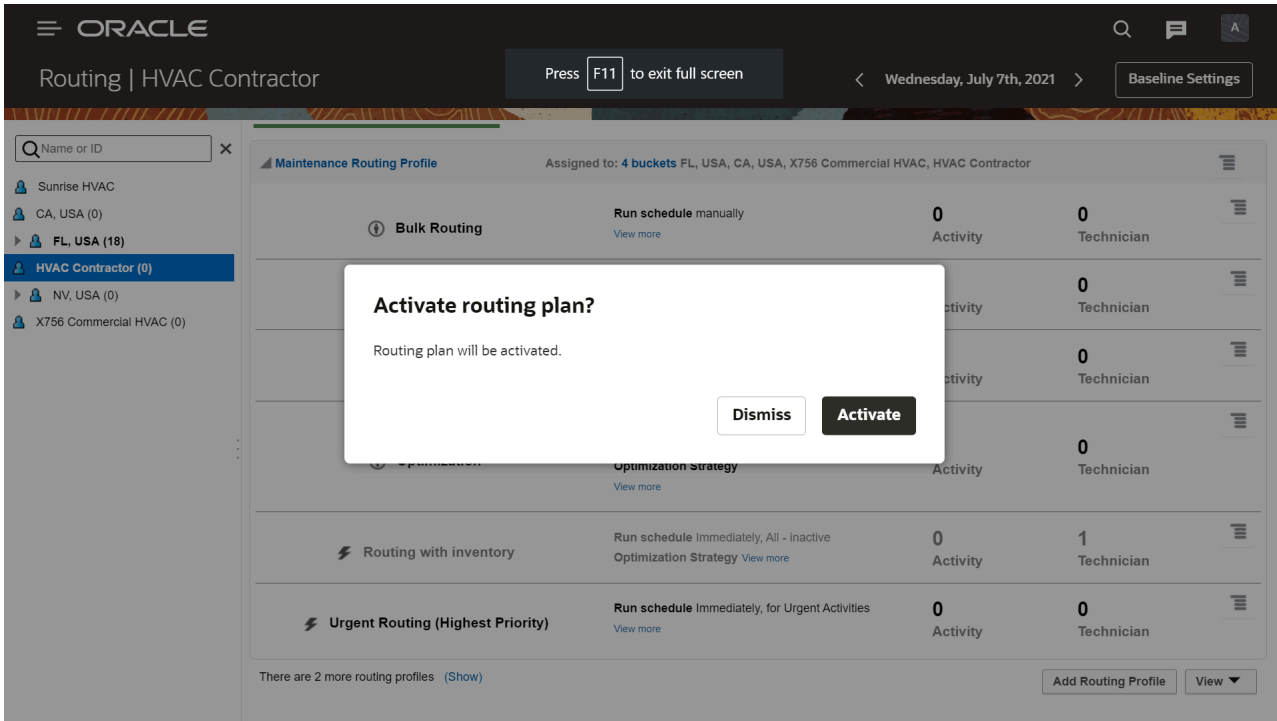
Activate Routing Profile dialog box

This image shows the Activate Routing Profile dialog box:
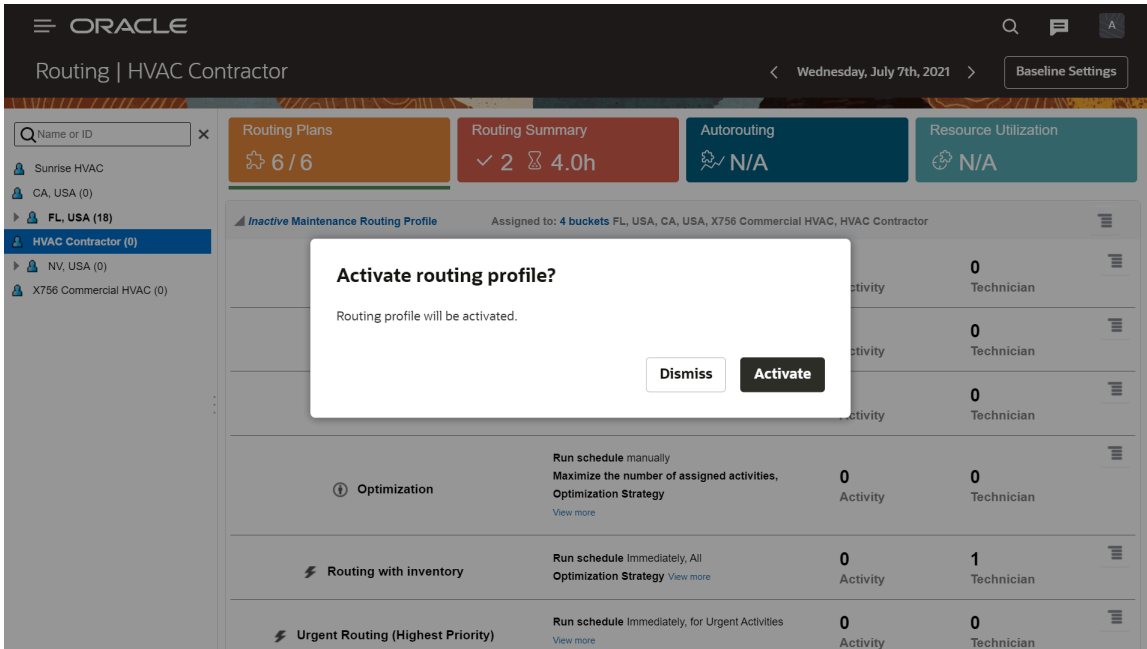
Deactivate Routing Profile dialog box

This image shows the Deactivate Routing Profile dialog box:
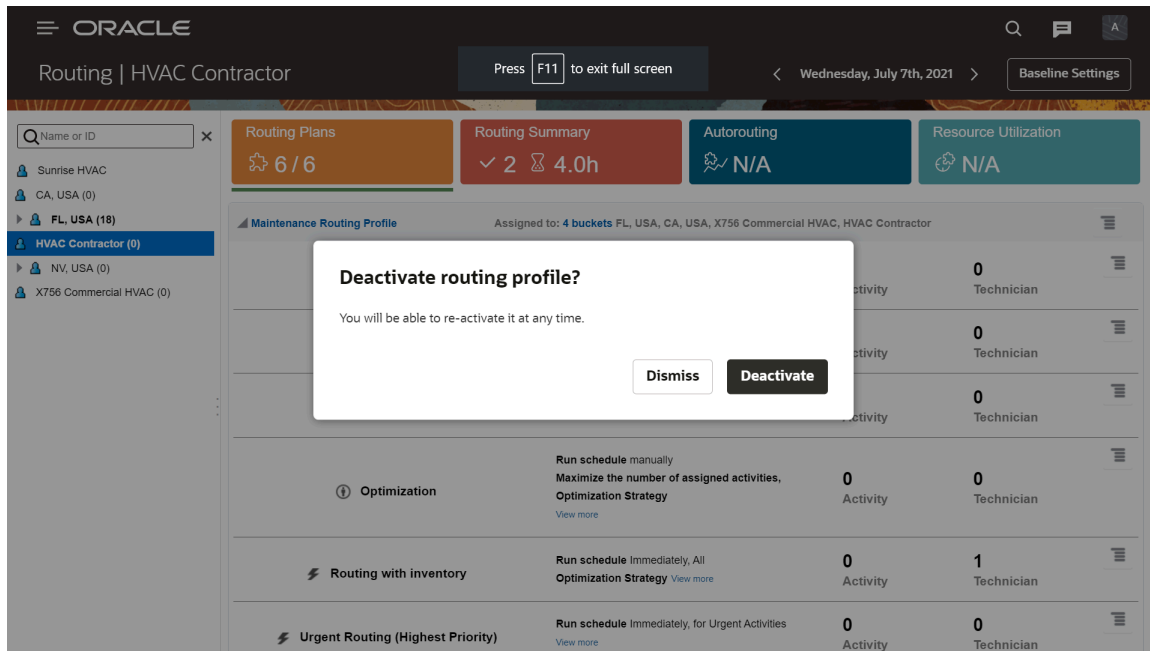
Routing Improvements

Starting with Update 22A, improvements have been made to Routing.

Here is the list of improvements:

- Routing quality has been improved for those high load runs that don't have highly utilized Service Window or Access Hours constraints, but do have thousand of nearby activities similar to each other based on service windows, skills and zones by having routing always try an option to travel from one activity to the next closest one. As a result of these implemented changes to the routing engine, you may see improvements in both activity assignments and travel savings, though the amount of improvement will in part depend on activity and travel duration, as well as the number of activities and resources.

- Routing runs quality was additionally improved for those high load runs with thousand of activities that highly utilize the Service Windows or Access Hours constraints. Now, routing also tries an option to travel from an activity to the closest one with compatible Service Window/Access Hours. As a result of these implemented

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changes to the routing engine, you may see improvements in both activity assignments and travel savings, though the amount of improvement will in part depend on activity and travel duration, as well as the number of activities and resources.

- Routing performance have been improved by automatically switching to "faster" algorithms for those routing runs which include a lot of activities per a lot of providers for a rather short period of time - either due to routing service high load or due to mis-configuration of routing plan. As a result of these implemented changes to the routing engine, you may see improvements in both activity assignments and travel savings, though the amount of improvement will in part depend on activity and travel duration, as well as the number of activities and resources.

- In the case where one recurrent routing run is an exact duplicate of another run (meaning that activities and resources are the same or indistinguishable from a routing perspective), instead of re-running it thru the routing engine and spending routing time on it, we're taking the result from cache. This improvement is intended to slow down the consumption of High Priority routing time, which in turn leads to more routing requests being processed with priority.

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2 Configure the Application for Routing

Resource Tree Structure Requirements

Oracle Field Service Routing uses a number of settings to decide how to match activities to resources. Your configuration of these settings can have a significant influence on the routing results. Verify that the resources that should receive the activities are in the same bucket as the activities that you want them to receive.

When organizing the *resource tree* consider the following limitations:

- Routing is started from a Routing Bucket—a resource type with the *bucket* role.

- Routing can only distribute activities from the routing bucket to child resources

- Only those child resources are considered for routing that have the **Routing can assign activities** option selected at the resource type level

Resource Calendar Requirements

Verify that your calendars are current and accurate. Routing uses this informationto determine whether a qualified resource is available to take an activity.

> **Note:** Resources inherit calendars from parent objects such as buckets or organizations unless you override the settings at a lower level.

> **Tip:** Put all of the resources that you want to use the same calendar in one bucket and assign the calendar to the bucket. The resources inherit the calendar settings from the bucket and you only have to configure the calendar only once.

Work Skills and Work Skill Conditions

Verify that the *work skills*, *work skill levels*, and the *work skill conditions* that you configured are accurate. If you do not assign work skills to a resource, the application assumes that the resource has all of the work skills at the highest level.

Work skills: identify the expertise that a resource has. Work skills are the links that enable Oracle Field Service match activities with resources.

Work skill conditions: identify the work skills that are necessary to complete each activity.

The **required level** setting and the **preferable level** settings in the work skill have a strong impact on routing. The required level identifies the minimum work skill level that the resource must have to be eligible for the activity.

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> **Tip:** If the application is not able to match activities to resources, consider relaxing your work skill levels and work skill conditions so that more resources match the work skills and work skill levels required by the activities.

See the Using Capacity Guide for detailed instructions for configuring work skills and work skill conditions.

Work Zones

If you are using *work zones*, verify that work zones and activities are accurately configured for your resources. In addition, ensure that the work zone dictionary is correctly configured to assign activities with correct work zones. Activities that support work zones on activity type level must have all the fields that are used in work zone key correctly populated.

You can use work zone levels to influence those work zones in which they receive work. Assign a higher level to more desirable work zones and a lower level to less desirable work zones. Resources inherit work zones from parent objects like buckets or organizations unless you override the setting at a lower level. If you do not assign a work zone either to a resource or to any of its parents, the application assumes that the resource has no work zones and is thus incompatible with all activities.

> **Tip:** If Oracle Field Service Routing is not able to match activities to resources, consider assigning each work zone to more resources so that more resources are available for the activities in that work zone.

Resource Start and End Locations

Start and End locations can be defined for a resource. Oracle Field Service Routing considers the travel time from start location to first activity and travel time from last activity to end location. This section also discusses how SLR is used to improve travel between the last unfinished activity to the resource end location.

To configure locations, click **Settings** > **Locations**. Home zone center locations can also be defined here.

Once Activities are routed within a Technician's route, the application tries to get better travel estimations between pairs of keys using location services where the travel was estimated using less reliable methods (expansion, coordinate based only or default). The application applies this correction in travel estimation only for Activity to Activity travels and not from the Last Activity to the Resource End Location.

Now, the application tries to correct the estimated travel and considers travels from the last Activity to the Resource end location post routing. If the travel between last Activity to the Resource end location are calculated using company default, expansion or coordinate based method then the application sends the travel complaint from the last activity in the route to the resource end location to SLR, to get a better estimate of the travel between the two keys of last unfinished activity to the resource end location.

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Resource Preferences

You can specify preferred resources for different activities. The application considers these requirements when routing activities. These settings are enabled in the activity type and are set on the individual activity.

These are the preference settings:

- **Required:** Only resources identified as required can be assigned these activities.
- **Preferred:** When no resources are identified as Required, any resource defined as Preferred is given priority over the rest of the pool of resources. However when a Preferred resource is inactive or unavailable, other appropriate resources are selected.
- **Forbidden:** Any resource defined as Forbidden for an activity cannot be assigned to the activity.

See the Using Core Application guide for detailed instructions.

Create a Filter

You can use filters as a part of the routing process to prioritize resources (or organizations) or activities (or activity groups) above others. First you must create the filter. Then you can add it to a routing plan and configure it for that plan.

The following preference settings are important:

- Select the **Routing** check box to see the filter on the **Add routing plan** screen.
- Select the **Routing** check box only for those filters that do not have the filter condition set to **Dynamic**.

Related Topics
- How do I add an activity filter to a routing plan?
- Configure an Activity Filter for Routing

Use the Calendar View

Select a different date on the **Routing** screen to refresh the routing runs for the selected bucket.

To use the Calendar view:

1. Click the calendar icon on the Routing screen.
2. Select a date you wish to use.

   The routing runs for the selected bucket and child buckets (if any) which are selected in the Resource tree gets updated.

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3 Set Up Routing Profiles and Plans

What are routing profiles and plans?

You can create or modify a custom routing profile or plan.

Routing Plan

Routing plans define the optimization strategies for a company. A company may have several strategies such as:

- a strategy for customer facing activities and employees
- a strategy for internal maintenance activities and employees (if the organizations are managed separately)
- a strategy for morning time, for noon, and for after hours (for example, the morning strategy prioritizes the travel optimization most, noon prioritizes activities that are older then 3 days, after hours works with VIP customers activities, or highest priority problems only)
- a strategy for weekdays
- a strategy for weekends (weekends have a different number of field employees, different service layer agreements, which can be similar to morning but running morning, noon, and after hours)

Routing Profile

A routing profile is a group of all the required routing plans. A routing profile can be assigned to many buckets, so that the customer need not copy the plans for each bucket, and only the plans that are from the assigned profiles are available for the bucket. This ensures that the strategies for different buckets, related to different lines of business or regions are not mixed with other buckets. To run routing on a bucket, you must have a non-empty routing profile assigned to the bucket.

How Access Schedule Impacts Routing

Generally no work is done beyond the hours defined by the *Access Schedule*. Therefore, routing plans including urgent, immediate, and bulk routing will not schedule activities outside of the *Access Schedule*. The only exception is when the activity is manually scheduled to be performed beyond Access Hours. In this case, routing ignores the access hours and uses the service window for routing activities.

If a Service Window is configured for an activity with Access Hours then the Access Hours will be not be used for routing assignment. The Service Window will override the provided Access Hours.

Multi-day Routing

Some business environments deal with several days of workload. They must be able to understand how many days are required to process the backlog. In addition, the businesses must estimate when each of the activities could be processed, recognize gaps in skills and zones assignments, and manage logistics, such as parts and tools requests. To perform all these tasks, the businesses must be able to route all or majority of the booked activities. This is where the multi-day routing feature helps. As the name suggests, a multi-day routing plan runs for several days. You can create multi-day routing plans that can be started manually, that can be run once a day, or run recurrently. Further, you can roll back a multi-day routing plan as a single activity. The existing plans can be migrated; however, they will be migrated as

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single-day routing plans and you must change them to multi-day manually. In addition, changing a routing plan from single day to multi-day will not automatically reschedule activities from one day to another. You must select the **Allow rescheduling of activities from one day to another within the routing plan period** setting for each activity filter individually.

The benefits of multi-day routing are provided here:

- All the jobs are assigned and constantly reoptimized.

- Important activities are pulled from future to previous days.

- The number of routing plans you must create is reduced.

- You can roll back a multi-day routing plan as a single action.

- You can see a summarized report of routing results including multi-day routing.

Multi-day Routing, Reoptimization and Rescheduling

By default, multi-day routing does not allow reoptimization or rescheduling of activities between days. So, the results of running a multi-day routing run without rescheduling is the same as running single-day runs for the same number of days. However, you can reschedule each activity using a filter in the Filters section. This filter lets only the activities that fit to multi-day rescheduling moved from one day to another during the routing run. However, this restriction doesn't apply to the sequence of routing runs.

If you allow multi-day rescheduling for a particular filter then routing ignores the scheduled date during rescheduling process for given activities. However, all other constraints like SLA and Access Hours will be included.

Routing Screen Widgets and Routing Run Summary Report

Routing screen widgets display the multi-day routing results. The result of a single multi-day routing run is the same as the result of a series of single-day routing runs, if both runs provide the same resulting routes. The Routing Run Summary includes the duration for which the routing plan has run. It also displays one entry per run regardless of the number of days in the routing run application period. The date in the entry is the date the plan starts.

The following table describes how these values are calculated:

Calculated against total values of the whole run	Calculated against total values of current run, where provider number is (provider * days)	Calculated as a total of daily values
- Average working time - Average overtime - Average travel time - Average downtime - Resource utilization	- Resources used - Routed activities - Resources - Activities	- Working time optimization savings - Overtime optimization savings - Travel time optimization savings - Total savings

Resource Filters

In case of multi-day plans, resource filters are calculated for the period covered by the multi-day plan once and for all. If a resource must be excluded due to plan conditions for at least one day then it is excluded for all the days.

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Routing Plans

When you create a routing plan, you fill the **Apply to activities within __ day interval** field. Use this field to create a multi-day routing plan. The number of routing plans in the list of routing plans includes multi-day routing plans as well.

Roll Back

A multi-day routing is rolled back as a single action and rolls back the whole run result. If you click Stop while the plan is running, all the activities routed during this routing run are returned to their initial states. You can roll back routing run results until the last date of the run application period. For example, if you ran a multi-day routing run yesterday for three days, you can roll it back today. In this case, partial rollback is applied, that is, all the Not Started activities are rolled back.

How do I add a routing profile?

Routing profiles contain one or more routing plans that run against a bucket.

To add a routing profile:

1. Click **Routing** to open the **Routing** screen.
2. Select **Routing Plans** to display the routing plans and routing profiles available for the selected bucket or resource.
3. Click **Add routing profile** located on the toolbar.

   The **Add routing profile** dialog box displays.
4. Type the name of the routing profile in the **Routing profile name** field.
5. Select the **Active** check box.
6. Click **Add**.

   The new profile displays in the **Routing Profiles** list.

Clone an Existing Routing Profile

If you want to add a routing profile that is similar to an existing routing profile, you can create a clone. A clone is an exact copy of the existing routing profile. You can change the clone to differentiate it from the existing routing profile.

To clone a routing profile:

1. Navigate to the **Routing Profiles** screen.
2. Find the routing profile that you want to clone in the list.
3. Click **Clone**.

   The **Clone Routing Profile** dialog box is displayed.
4. Type the name of the new profile in the **Routing Profile name** field.
5. Select the **Active** check box.
6. Click **Clone**.

   The new profile displays in the **Routing Profiles** list.

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Modify a Routing Profile

You can modify a routing profile on the **Routing Profiles** screen.

To modify an existing routing profile:

1. Navigate to the **Routing Profiles** screen.
2. Find the routing profile that you want to modify in the list.
3. Click the **Modify** link to display the **Modify routing profile** dialog box.
4. Optionally, modify the **Routing profile name**.
5. Optionally, select the **Active** check box to change the status of the profile.
6. Click **Update** to save your changes.

Activate and Deactivate Routing Profiles

Active routing profiles are used to route activities to resources. Inactive routing profiles are not used. You deactivate a routing profile if you want to save it for future use, but you don't want to use it right now.

To activate (or deactivate) a routing profile:

1. Navigate to the **Routing Profiles** screen.
2. Find the row for the routing profile that you want to activate or deactivate and click **Modify**.

   The **Modify routing profile** dialog box displays.

3. Select or clear the **Active** check box to activate or deactivate the profile respectively.
4. Click **Update**.

Results:

You may filter the active and inactive routing profiles and plans using the **View menu** button on the Routing Profiles screen. This button has these options:

- **All** clears the filtering and shows all plans and profiles;
- **Active** shows all the active routing plans and profiles along with active plans that belongs to inactive profiles;
- **Inactive** shows all the inactive routing plans and profiles along with inactive plans that belongs to active profiles.

Set Up Routing Plans

Routing plans provide the rules that are used to route activities to resources. The rules are based on the business goals of your organization. Routing plans are assigned to routing profiles. Routing profiles are assigned to the buckets that you run the routing plan against.

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Assign a Selected Routing Plan to a Routing Profile

Routing profiles are used to group more than one routing plan together so that you can run them all against the same bucket.

You can assign several routing plans to a routing profile so that you have plans available to run against a bucket.

Be cautious when running more than one plan against a *bucket* to avoid conflict between plans for shared resources and activities. When plans conflict with each other or try to use the same resources and activities, the routing results are typically less than optimal.

For best results:

- Use caution when running multiple routing plans against the same resources. Second and later generation routing plans will yield less successful results because they run against the resources remaining from the previous runs.

- Do run the same resources through multiple plans that run against the same bucket, but do so with caution. For example, run one routing plan against the bucket in the evening to assign most of the activities for the day. Then run a second routing plan against the bucket around mid-morning. This second run might find openings for some of the activities that were not assigned in the first run. It can also assign the activities that came in after the first run.

- Do use the fewest number of routing plans necessary. Doing so can minimize the chances of accidental sharing of resources and activities across plans.

- Do run routing plans against large sets of resources and activities. When the pool of resources and activities is small, the application has fewer options for making a good match. As a result, routes will be less optimal and more activities will be unassigned.

How do I create a routing plan?

Routing plans provide the rules to use when deciding how to route activities to resources. When you create a new routing plan, you select the routing profile to assign it to in the first step.

Before you start

You must create a Routing Profile before creating a routing plan.

To create a routing plan:

Here's what to do

1. Navigate to the **Routing Profiles** screen.
2. Find the routing profile to which you want to add the routing plan.
3. Click **Add routing plan** in the **Actions** column.

   A new routing plan template displays.
4. Expand each section and add values as necessary.
5. Click **Add**.

   Before you can run a routing plan against a bucket, you must assign the routing profile that contains the routing plan to the bucket.

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Related Topics
- How do I add a routing profile?
- How do I assign a routing profile to a bucket?

Clone an Existing Routing Plan

If you want to add a routing plan that is similar to an existing routing plan, you can create a clone. A clone is an exact copy of the existing routing plan. After you create the clone, you can change it to differentiate from the original routing plan.

To clone a routing plan:

1. Navigate to the **Routing Profiles** screen.
2. Find the routing plan that you want to clone.
3. In the Actions column, click **Clone**.

   The plan that you want to clone displays.

4. Change the values as necessary.
5. Click **Clone**.

What to do next

Before you can run a routing plan against a bucket, you must assign the routing profile that contains the routing plan to the bucket.

Related Topics
- How do I assign a routing profile to a bucket?
- Configure the Routing Plan Section of a Routing Plan
- How do I configure the run schedule for a routing plan?

Modify a Routing Plan

You can modify a routing plan from the **Routing Profiles** screen. Before you can run a routing plan against a bucket, you must assign the routing profile that contains the routing plan to the bucket.

To modify an existing routing plan:

1. Navigate to the **Routing Profiles** screen.
2. Find the routing plan that you want to modify.
3. Click the **Modify** link in the **Actions** column.

   The Edit routing plan screen displays.

4. Expand the sections and change the values as necessary.
5. Click **Update** to save your changes.

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Related Topics
- How do I assign a routing profile to a bucket?
- Configure the Routing Plan Section of a Routing Plan
- How do I configure the run schedule for a routing plan?

Activate and Deactivate Routing Plans

Active routing plans are used to route activities to resources. Inactive routing plans are not used. You might decide to deactivate a routing plan if you want to save it for future use, but you don't want to use it right now.

To activate (or deactivate) a routing plan:

1. Navigate to the **Routing Profiles** screen.
2. Locate the row for the routing plan that you want to activate or deactivate and click the **Modify** link in that row.
3. Click **Routing plan** to expand the section.
4. Select or clear the check box next to **Active**.
5. Click **Update**.

How do I delete a routing plan?

You can delete a routing plan from the **Routing Profiles** screen, as long as it doesn't have a Routing Summary report.

Before you start
A Routing plan belonging to a sequence cannot be deleted unless detached from the sequence.

To delete a routing plan:

Here's what to do

1. Navigate to the **Routing Profiles** screen.
2. Select the routing plan to delete.

   You cannot delete the routing plans for which the activities that were routed are still available in the application (including the activities that are not yet deleted by your retention policy).
3. Click the **Delete** link in the **Actions** column.

   A confirmation message displays.
4. Click **Yes** to delete the selected routing plan.

Related Topics
- How do I configure a sequential routing plan?

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How do I assign a routing profile to a bucket?

You must assign a routing profile to each bucket so that the routing plans in that profile can run against the buckets.

To assign a routing profile to a bucket:

1. Click **Routing**.
2. Select the bucket for which you want to assign the routing profile from the resource tree.
3. Click **Routing Plans**.

   Bucket has no Routing Profile is displayed.
4. Click **Assign Routing Profile**.

   The **Select Routing Profile** dialog box displays.
5. Select the routing profile that you want to assign to this bucket from the drop-down list.
6. Click **Update**.

   > **Note:** If you select the blank value from the **Routing Profile** drop-down list and click **Update**, any previous profile assignments for the selected bucket are removed.

Results:

The Routing Plans block shows the routing plan for the selected bucket.

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4 Configure a Routing Plan

Overview of Routing Plan Configuration

Routing plans provide the rules to use when deciding how to route activities to resources. After you add or clone a routing plan, you must configure it. This includes defining the run schedule and creating filters that prioritize activities based on a variety of conditions and situational factors. When you configure a routing plan, your choices can have a significant influence on the routing process.

> **Note:** It is not recommended to have more than 100 routing plans or buckets running routing plans simultaneously, for example: 1 routing plan for 100 buckets and 10 routing plans for 10 buckets. If the number of routing plans or buckets exceed this limit, it causes routing runs to be queued for processing. If your current configuration exceeds this value, you must review and adjust your routing configurations to get an efficient routing run.

Configure the Routing Plan Section of a Routing Plan

You must provide general details about the routing plan including the profile on which it is based, the routing method and the number of minutes and seconds it will run.

To configure the routing plan section:

1. Click **Routing** to open the **Routing** screen.
2. Select **Routing Plans** to display the routing plans and routing profiles available for the selected bucket or resource.
3. Click the **Modify** link to open the Edit routing plan screen.

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4. Click **Routing Plan** to expand that section.

5. Identify the routing name and profile and provide other basic details.
- ○ **Routing plan name:** Enter a name that makes this plan easy to identify.
- ○ **Routing profile:** Identify the profile to which this routing plan belongs.
- ○ **Active:** Select the check box to make this plan available for routing. You can deactivate a routing plan to avoid running it accidentally. For example, if you have routing plans that you run during certain seasons or other busy times of the year, you can make them inactive until you are ready to use them.
- ○ **Description:** Enter a description for the routing plan. This is an optional field.

6. Click **Add**.

> **Tip:** If you find that routing is regularly running until the time limit, consider increasing the time limit and monitor the results to see if they are more efficient.

If the Time Limit shows any value between 5 seconds and 20 minutes, the routing plan runs over and over again until it either finds the best match or the time limit expires, whichever comes first.

How do I configure the run schedule for a routing plan?

The run schedule identifies when you want the plan to run, how often you want to run it, and whether you want to run it over multiple days. You can also specify the day's activities to run the plan against. The run schedule that you choose affects the information you can share with your customers through notifications. For example, to launch a notification the afternoon before an activity, but you don't run routing until the evening, your notification will not include the time slot.

To configure the run schedule for the Routing Plan:

1. Navigate to the **Routing Profiles** page and locate the routing plan that you want to configure.

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2. In the **Actions** column, click **Modify**.

   The **Edit Routing Plan** screen appears.

3. Expand **Run Schedule**.

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4. Configure one of the following routing plans:

a. Create a plan to start routing manually:

i. Select Manually from the **Run routing** drop-down list.

ii. Enter a number in the **Apply to activities within day interval** field. The activities selected for this routing plan are executed within the number of days selected in this field, starting the selected day.

iii. Select the duration for which the plan must run in the **Time limit** field.

This figure shows an example of a manual routing plan:

b. Create a recurring routing plan:

i. Select Recurrent from the **Run routing** drop-down list.

ii. Enter a number in the **Apply to activities within day interval** field. The activities selected for this routing plan are executed within the number of days selected in this field, starting the selected day.

iii. Select the start and end time at which the routing plan must run, in the **Start time** and **End time** fields.

iv. Enter the interval between each run in the **Interval between runs in minutes** field.

v. Check the boxes corresponding to the days on which the routing plan must run recurrently, in the **Activity days** field.

vi. Select the duration for which the plan must run in the **Time limit** field. This time denotes the maximum number of minutes and seconds that the routing plan will run before producing a result. When the application launches a routing plan, it runs the plan over and over again until it either finds

        the best match or the time limit expires, whichever comes first. Three minutes is usually sufficient. The maximum time limit possible is 20 minutes.

c. Create a plan that runs once a day:

  i. Select **once a day** from the **Run routing** drop-down list.

  ii. The activities selected for this routing plan are executed within the number of days selected in the **Apply to activities within day interval** field, starting the selected day. The default value is 1.

  iii. The **Start day for activity processing** field is used in the Once a Day and Recurrently plans. New values for Start day for activity processing allow to run routing starting at 2, 3 or 4 weeks in future.

     Select one of these values from the drop-down list:

- yesterday
- today
- tomorrow
- +2 days
- +3 days
- +4 days
- +5 days
- +6 days
- +7 days
- +8 days
- +2 weeks
- +3 weeks
- +4 weeks

  iv. Enter the time at which the routing plan must run, in the **Time of run** field.

  v. The **Activity days** field specifies the days on which activities are scheduled.

  vi. Select the duration for which the plan must run in the **Time limit** field. This time denotes the maximum number of minutes and seconds that the routing plan will run before producing a result. When the application launches a routing plan, it runs the plan over and over again until it either finds

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the best match or the time limit expires, whichever comes first. Three minutes is usually sufficient. The maximum time limit possible is 20 minutes.

This figure shows an example of a plan that runs once a day:
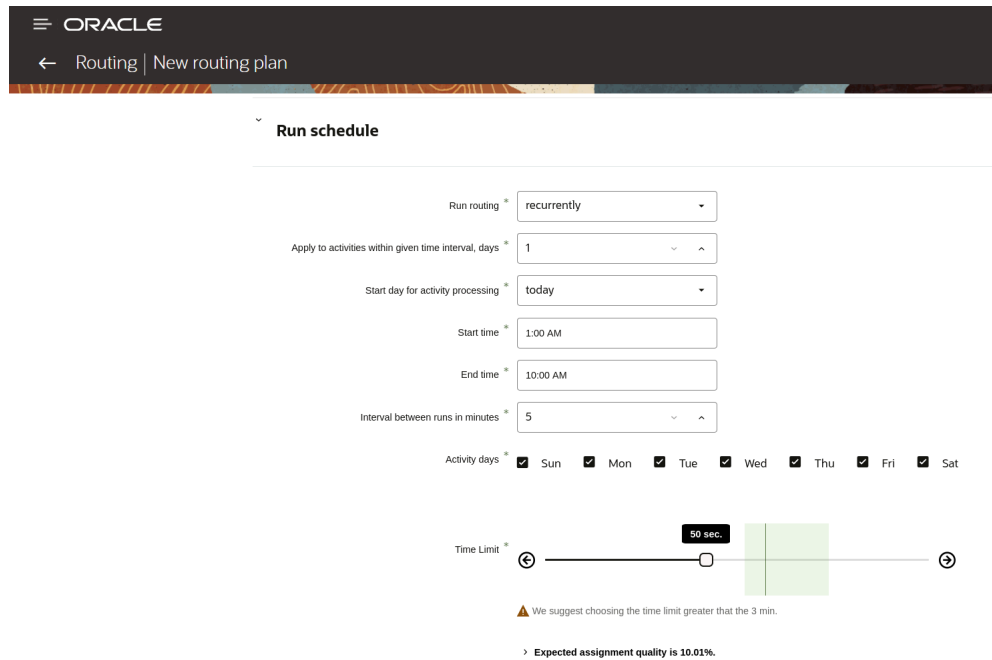
d. Create a plan that runs immediately:

i. Select Immediately from the **Run routing** drop-down list.

ii. Select one of the following options:

   o **for Urgent Activities**: Activities are assigned and scheduled the same day, regardless of whether this assignment disrupts other scheduled activities. In this case, the SLA is not honored for the activity.

   o **activities that correspond with filter**: Only those activities that correspond to the selected filter are assigned immediately. Such activities can also be bundled with other activities that are scheduled for the same location and bucket in the near future.

   The image shows the Run routing field in the Add Routing Plan screen:

        iii. Use the **Assignment and Bundling within __ day interval starting** fields to configure bundling activities.

    e. Create a plan that runs sequentially after another plan:

        i. Select Sequentially from the **Run routing** drop-down list.

        ii. Select the plan that must run before the current plan, from the **after the completion of** drop-down list.

        iii. Select the duration for which the plan must run in the **Time limit** field. This time denotes the maximum number of minutes and seconds that the routing plan will run before producing a result. When the application launches a routing plan, it runs the plan over and over again until it either finds the best match or the time limit expires, whichever comes first. Three minutes is usually sufficient. The maximum time limit possible is 20 minutes.

5. Use Street Level Routing (SLR) to obtain travel data in your routing plan:

This feature can be used with routing runs that run Manually, Once a Day, Recurrently and Sequentially; it is not available for Immediate routing runs. To improve the quality of the routing run with SLR, configure the plan with adequate time to gather enough SLR data. We recommend that you allocate a minimum of five (5) minutes for Once a day and Manual routing plans. This time will vary based on your business and the amount of activities to be optimized. You may increase the time if needed.

The Run schedule section shows the **Use SLR to obtain travel data** check box. This indicates that the time limit includes extra time for SLR data.

    a. Select the **Use SLR to obtain travel data** check box.

    b. Select the duration in the **Time limit** field to adjust the time limit accordingly.

    The routing run time includes both gathering SLR data and using that data to run Routing.

    In some situations when there are a large number of pending activities, every point to point travel combination cannot be obtained in the allotted time period. When this occurs, routing will use SLR data

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and learning travel data to optimize the routes. This ensures routes are optimized quickly with the optimal combination of travel data.

The figure shows the Run schedule section in the Add Routing Plan screen:

> **Note:** SLR in Routing requires a subscription to Oracle Field Service Enterprise and Oracle Field Service Standard Map Service with Google Maps or Oracle Field Service Standard Map Service with Baidu Maps.

6. Click **Add** to save your changes.

> **Note:** In some cases, when routing's evaluation has to terminate due to time limit, it consumes slightly more time than configured. This is because termination cannot occur at the arbitrary point; it occurs only after the completion of the current block of computations.

Restriction of Activities Routed Through Immediate Routing Plan

You can now restrict activities routed through a particular Immediate Routing plan. This is useful to avoid any confusion in technicians' routes or in case if the you want to bulk route all the activities created in late hours through a nightly routing plan.

To restrict activities routing through a particular Immediate routing plan, enter values in the **Start time** and **End time** fields as needed and save the Immediate routing plan.

After Start time and/or End time fields are filled, no activities will be routed before Start time and after End time.

- If both **Start time** and **End time** fields do not show any values in the Immediate routing plan by default, there are no restrictions; activities are routed through Immediate routing plan 24 x 7.

- If only**Start time** field is populated, End time is considered to be equal to midnight (or time set by Overnight settings section in the Business rules screen).

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- If only **End time** field is populated, Start time is considered to be equal to midnight (or time set by Overnight settings section in the Business rules screen).

  Note: Scheduled Immediate routing plan routes those activities that were created after End time and before Start time and not routed during this period by another routing plan, after the Start time.

Segmentable Activities Assignment Using Bulk Routing

You can now route segmentable activities using Bulk Routing. Whether you route the segmentable activity from the bucket using Immediate Routing or Bulk Routing, the assignment rules are the same; the routing plan (Immediate or Bulk Routing) either assigns the whole activity to a single resource or leaves it in the bucket.

Note: Earlier, you could assign segmentable activities to a resource either using manual move or through Immediate Routing.

Both Immediate and Bulk Routing observe these rules for segmentable activities:

- Work zones—the resource's work zone must match the work zone of the activity
- Work skills—the resource's work skills must match the work skills required by the activity
- Resource preference—routing should assign the activity to preferred resources or only to required resources, if specified
- Service window—routing should observe the activity service window for all the segments
- Access hours – routing should observe the activity access hours for all the segments
- SLA start—the SLA start of the activity observed for the first segment
- SLA end—the SLA end of the activity observed for the last segment
- Minimum segment duration for a single day <> minutes – indicates that those segments having lesser than minimal duration are not created
- Maximum segment duration for a single day <> minutes – indicates that the total daily amount of segments cannot exceed the configured value. (with the exception for the days containing the last segment of activity, which can exceed the configured amount but the remainder cannot be more than the minimum segment duration)

However, during the initial activity assignment, Immediate Routing optimizes only start/finish time of the segmentable activity. Bulk routing also tries to optimize travel time to and from each activity segment and overtime, overdue and other parameters of the segment the same way as they are optimized for single-day activities.

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Link a Segmentable Activity With Another Segmentable Activity

You can link a segmentable activity with another segmentable activity using the same link types that you use to link a regular activity with a segmentable activity.

Follow these steps to route a linked segmentable activity.

1. Run the multiday routing plan where the segmentable activities fit to the filters.
2. Set a Bulk routing plan running for a scheduled time to cover all the linked segmentable activities that you want to route.

   Note: Only Bulk routing supports routing linked segmentable activities. Immediate routing ignores all segmentable activities that have links.

Results:

Supported Link Types and Constraints

Here are the link types and constraints supported for links between segmentable activities:

- Simultaneous (Segmentable and Segmentable activities): no constraints available
- Segmentable activity Finish to Segmentable activity Start:
  - Same Day: earliest (as of calendar means) segment of a latter activity should start the same day as the latest (as of calendar means) segment of former activity finishes
  - Same Provider: all segments of latter activity should be done by the same resource(s) participated in doing of any segment of former one
  - Different Providers: all segments of latter activity should be done by the different resource(s) then participated in doing of any segment of former one
- Segmentable activity Start to Segmentable activity Start:
  - Different Providers: all segments of latter activity should be done by the different resource(s) then participated in doing of any segment of former one
  - If you try to add unsupported activity link type and/or constraint, a warning is displayed and no link is added.
- For Segmentable Activity Finish linked to Segmentable Activity Start:
  - Same Day: earliest (as of calendar means) segment of a latter activity should start the same day as the latest (as of calendar means) segment of former activity finishes
  - Same Provider: all segments of latter activity should be done by the same resource(s) participated in doing of any segment of former one
  - Different Day: An activity that needs technical break between - first segment of a latter activity should start at least a day after the last segment of the former activity finishes
  - Different Providers: all segments of latter activity should be done by the different resource(s) then participated in doing of any segment of former one

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- For Segmentable Activity Start linked to Regular Activity Start (or vice versa):
  - Different Providers: all segments of latter activity should be done by the different resource(s) then participated in doing of any segment of former one

Control Resource Overtime Through a Routing Plan

Overtime is calculated differently by each organization. Therefore, the Oracle Field Service Routing module does not calculate overtime as an absolute dollar value, but instead calculates it as time beyond a resource's assigned work schedule that might be required to fulfill an activity.

Using the **Resource overtime** options within the routing plan enables you to determine how activities that might extend past the end of the resource's shift are handled.

The following figure shows the **Resource overtime** settings:

Choose from the following options:

- **Assign activities even if the assignment causes overtime:** This option provides the best chance of getting many activities assigned, though some may extend past the end of a shift.

  For best results, do not use this setting if you have significantly more work than resources can complete in a regular workday. If you run routing, results will include a large amount of overtime. This setting is most useful for certain types of work where you are willing to incur the additional cost, for example VIP work.

- **Do not assign overtime activities and leave them in the bucket:** This means that any jobs that have service windows and/or predicted durations that could push a resource into overtime are left in the bucket.

- **Do not assign activities with more than _____ minutes overtime:** This enables you to control the amount of overtime allowed, essentially extending a shift in order to accommodate more work assignments.

- **Do not assign activities unlikely to be finished in ____ minutes before end of resource's day:** This also limits the possibility of overtime, but with the consideration of whether a resource needs additional time (return to depot, drive home, etc.) before the end of their shift.

  Note: If you use restrictive overtime settings, fewer good matches might be found and more activities could be left in the bucket to be routed manually.

Control Travel Time Through the Routing Plan

Routing has been improved by better utilizing point-to-point SLR travel distances and timings along with travel statistics. Subscribers of Oracle Field Service Enterprise Cloud Service have the option to limit the travel time for a resource to reach an activity.

You can control travel time through the Routing Plan. With improved Travel time section of the routing plan settings, you can add the option to choose the optimization type and set distance limits.

To control Travel time

1. Open the Routing Plan. Scroll down to display the **Travel time** settings.
2. Choose either time or distance depending the routing plan settings as follows:
   - **Prefer fastest routes, even if it means the increase of a total travel distance**—Indicates that activities might require lengthy travel but the total travel time for the entire bucket is optimal. This option is the default option and results in the most optimized routes.
   - **Prefer shortest routes, even if it means the increase of a total travel time**— Indicates that activities might require a longer travel time but the total distance travelled will be optimal.

   You can minimize summary travel if some specific activities are getting long travel or some activities are left unassigned and summary travel may be increased. This enables you to limit the amount of travel time or distance a resource can spend travelling for any one activity. This results in fewer assigned activities and less optimal routes, but eliminates any travel that is beyond the specified amount of time or distance.

3. Check the following fields and enter the time limit in minutes and the distance limit in miles:
   - **Avoid travel longer than __ minutes**
   - **Avoid travel longer than __ miles**

   Note: If no value is set in the in the **Individual travel limit, minutes** field, it will use a default value, 240 minutes. Similarly if no value is set in the in the **Individual travel limit, kilometers** field, it will use a default value, 200 kms.

Set the SLR Time Limit

You can now choose separate time limits for Routing and SLR.

Use these steps to choose the time limit for SLR.

1. Scroll down to the Travel Time section.

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2. Enable the **Use SLR** check box and select a value from the **SLR time limit** drop-down list.

   Do not choose SLR Time Limit to be more than or equal to the Routing time limit for the following reasons:

   - ○ Routing time limit defines the time frame within which the whole routing plan should finish.

   - ○ SLR time limit defines which part of this time can be used for SLR-related tasks, allowing you to fine tune routing performance.

   > **Note:** If you use SLR functionality in Routing, you should subscribe to the corresponding SKU.

3. For those plans having **Use SLR** check box enabled, **SLR time limit** field is populated based on the value in the **Routing time limit** field during migration using these rules:
   - ○ 5 seconds 5 seconds

   - ○ 10 seconds 5 seconds

   - ○ 15 seconds 10 seconds

   - ○ 30 seconds 15 seconds

   - ○ 1 minute 30 seconds

   - ○ 2 minutes 1 minute

   - ○ 3 minutes 2 minutes

   - ○ 5 minutes 3 minutes

   - ○ 10 minutes 5 minutes

   - ○ 15 minutes 10 minutes

   - ○ 20 minutes 15 minutes

   - ○ 40 minutes 20 minutes

   - ○ 60 minutes 40 minutes

4. Here are some examples:
   - ○ If you choose the Total routing time limit to be 5 minutes and SLR time limit as 3 minutes, you should expect the overall routing result in about 5 minutes, the SLR module uses up to 3 minutes and routing engine uses the remaining time.

   - ○ If you choose the Total routing time limit to be 60 minutes and SLR time limit as 40 minutes, you should expect the overall result after an hour, from which time the SLR module uses up to 40 minutes.

Results:

To obtain better quality of routing run with SLR, you must allow adequate time for SLR time limit depending on the number of activities to be routed. We recommend that you allocate a minimum of five (5) minutes for Once a day and Manual routing plans.

> **Note:** Despite the policy chosen, bulk routing is always observing SLA start and will not allow activity assignment before SLA start with the only exception of activities assigned manually before routing run with such a violation.

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Support for Neutral Language

Routing now supports neutral language use. Both user interface and documentation use neutral language.

This table lists the user interface changes that have been made for neutral language support:

Term	Renamed Term
Routing **Execution** tab	List of Routing Runs
Execution Summary Block	Routing Run Summary
Execute Routing Plan	Run Routing Plan
Sequential Routing Plan **Execution**	Run of Sequential Routing Plan
Immediate Routing Plan **Execution**	Run of Immediate Routing Plan
Execution Summary	Routing Summary
Resource can **execute** activities	Resource can start activities
No Routing runs have been **executed** yet.	No routing runs have been done yet.
Routing **execution** log ID	Routing run ID
Execution order	Run order
Execution order value cannot be applied as chosen plan already has successor. Please choose another execution order plan.	The selected order cannot be applied as chosen plan already has a successor. Please select another plan.
This resource cannot **execute** activities	This resource cannot start activities
SLA is penalized, but late **execution** within SLA window is preferred	Scheduling activity start after the end of the activity's SLA window is penalized, but if within the SLA window, then it is preferred to place the activity close to the end of the activity's SLA window
Execution after SLA End is penalized with shortened aging period	Scheduling activity start after the activity SLA window end is penalized with shortened aging period
Execution Summary	Routing Run Summary
Routing **Execution** Errors	Routing Activity Assignment Errors
Routing Plan **Execution**: Result	Routing Plan Run: Result
Routing Plan **Execution**: Type	Routing Plan Run: Type

The *Cannot start routing* error message now displays the reason why routing run cannot start:

- Cannot start routing: System is busy. Please try later.
- Cannot start routing: Feature 'Routing' is disabled.
- Cannot start routing: The routing plan is taking part in running sequence. Please try later.

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Compatibility Parameters

You can view displays those parameters that are not deprecated but not recommended to use in the Compatibility Parameters section.

These parameters are not recommended to use:

- **Try to schedule activities to service window start** parameter is not recommended for use.

  Alternatively, you can select the **Override default service window reservation** check box under the **Compatibility Parameters** section and set the **Service window reservation, %** value as 100%.

- **Use Dynamic Routing** parameter is not recommended for use.

  You can achieve similar results by just limiting the number of visible activities in the route for Technicians.

  However, if you must set this parameter, you can enable the relevant check box under the Compatibility Parameters.

Sequential Routing Run

Oracle Field Service Routing allows you to configure the Routing plans that run automatically in a strict finish-to-start sequence. Such sequential assignment may be quite important in certain business environments where some activities must be assigned only after a different category of activities has been assigned.

Configuring several Routing plans to run at specified times so that the routing plans follow each other may be a solution. However, this solution is not too reliable. Depending on the number of activities in the bucket, a Routing run may take longer or shorter than estimated which may either create unproductive gaps in the Routing operation or even ruin the sequence. Sequential Routing run has become the optimal solution for this challenge. Two or more Routing plans are configured to start one after the other. The sequence is automatic, thus, any unusually long or short Routing runs will not affect it.

The **Routing plan** configuration window now has an additional **Run Routing** option – **sequentially**. When it is selected, the **Routing Run** window changes to include the field where the preceding Routing plan is to be chosen. For sequential Routing plans, the selection of a predecessor is mandatory; so, at least one Routing plan has to be created priorly.

How do I configure a sequential routing plan?

The configuration of a sequential Routing run always includes selection of a predecessor Routing plan, that is, the one to be completed before the current one starts. Any Routing plan, regardless of its schedule, can be selected as predecessor. However, any Routing plan can have only one successor, therefore, whenever a sequence has already been created, the predecessor Routing plan of such sequence can no longer be selected for other sequences. Its name is disabled in the list.

This screenshot shows the settings for a sequential routing plan:

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Sequential Routing plans can be used as predecessors creating longer sequences, if the business needs so require. Other routing plan settings depend on the company specifics and are not influenced by the sequential nature of the Routing plan.

> **Note:** Routing plan sequences can only be created within one routing profile. Sequences of Routing plans between different Routing profiles are not supported. The Routing plan summary shown in the Routing plan header contains its schedule – Sequentially after [predecessor_Routing_plan_name].

A Routing plan belonging to a sequence cannot be deleted unless detached from the sequence. On an attempt to delete such Routing plan, the action is rejected with the [Routing_plan_name] is already in use and cannot be deleted error message. To detach a Routing plan, change the schedule from **sequentially** to any other, starting from the last plan in the sequence. This restriction applies to all plans in a sequence regardless of their position. The system prevents creation of Routing plan chains forming closed loops in which the first plan is to be started after the completion of the last one. If the first Routing plan in the sequence is changed to the sequential schedule to start after the completion of the last plan in the same sequence, the modification is rejected with the Routing plan {plan_name} cannot be processed error message.

Run of Sequential Routing Plan

A sequence of Routing plans is started with the start of the first Routing plan. The first plan is started according to its schedule settings – automatically (timed), manually or immediately after a certain activity appears in the bucket. After its completion the second Routing plan starts automatically followed by the subsequent Routing plans, if any.

The **Routing** widget on the **Activities** screen shows the first Routing plan in the sequence with an icon appropriate to its schedule. The subsequent Routing plans are marked with the 'chain' icon meaning that the plan is part of a sequence. When the first Routing plan in the sequence is started, the user if offered two options – to run only the current Routing plan or the entire sequence. If the user chooses to run only the current Routing plan, it will be run as any other Routing plan. If the user chooses to run the whole sequence, the completion of the first Routing plan will automatically trigger the second plan, and so on. Sequential Routing plan runs are identified on the Routing screen by

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the 'chain' icon in the **Initiated** column and the **runs after [predecessor_Routing_plan_name]** note in the **Routing Plan** column.

Any Routing plan belonging to a sequence can be rolled back without influencing other plans in the same sequence. Activities assigned or not assigned as the result of other plans in the sequence will remain in their places. A deactivated Routing plan is skipped in the sequential Routing run. Other plans in the sequence start according to their settings.

Related Topics
- Video: Create a sequential routing plan

How does immediate activity assignment work?

The Routing module can now prioritize activities and assign urgent ones to technicians immediately, even if it's at the cost of other activities. If the priority of the new activity is high enough, Routing can rearrange technicians' routes and insert urgent activities in front of other activities. This rearrangement happens even when the technician is already on the way to an activity or in the middle of an activity.

Oracle Field Service Routing automatically assigns activities created in the bucket to resources matching the requirements of such activities. Depending on your company requirements, you can select a routing schedule that's the most suitable for a particular bucket. Routing can be started manually or once a day or recurrently with the specified interval. These options covered most of the operational patterns used by different companies. If the company preferred to distribute the workload the day before and provide its technicians with complete routes at the beginning of their working day, then once-a-day Routing is the best option. If the company needs to respond quickly to new tasks received during the day, then recurrent Routing running several times a day is the solution.

Routing schedule options have been enhanced to handle urgent activities. Routing can assign activities meeting certain criteria immediately after they're created in or moved to the bucket so that the time between the activity creation and its assignment is minimal. Routing now has an additional schedule option, **immediate**. Depending on the schedule settings, Routing either assigns urgent activities identified by the activity priority or assigns certain activities from the bucket keeping the time till assignment to the minimum.

Urgent and immediate activities with SLA end that have a preferred resource are assigned to preferred resources. If a preferred resource has the work day start after SLA end time and other resources are available to execute this activity, then the activity is assigned to the other resource. Further, if a preferred resource isn't available for an urgent activity assignment, the activity will be assigned to another resource with the matching work skills (and work zone based on the routing plan configuration).

Urgent routing doesn't assign activities to those technicians who just have on-call working calendars but their route isn't activated. Urgent routing assigns activities to those technicians who have on-call working calendars and their route is activated.

> **Note:** Resources that have activated routes are considered eligible to be assigned activities, assuming all other conditions are met, even if they activated the route before their scheduled start time.

Here's the difference between an Immediate Routing plan for Urgent activities and activities meeting filter conditions-- Immediate routing for urgent activities can reassign activities, whereas Immediate routing for activities that satisfy the filter conditions can't reassign.

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Basic Principles of Immediate Activity Assignment

Immediate-assignment functionality is aimed at assigning certain activities immediately following their creation in or moving to the bucket. It serves the following purposes:

- Assignment of activities with the minimum ETA possible. The activities to be assigned are determined by the **Activity Priority** settings.

- Assignment of activities within the configured interval. The activities to be assigned are determined by applying a filter.

- Support segmentable activity assignment when the Activity Type = segmentable activity flag is set.

  > **Note:** Segmentable activities aren't supported by urgent routing plans.

- Segmentable activities are available for Immediate Routing when you create them and when you move them to the bucket.

- Immediate routing of segmentable activities will use the required work skill ratio and not the preferred work skill ratio. This is different from regular activities.

Immediate Routing may not route those activities that are linked with hard constraints if they're assigned to the Bucket and linked before Immediate Routing triggers and starts the processing of such new Activities. Activities linked with other constraints will be routed via Immediate routing without any issues.

Start-start and finish-finish are considered hard constraints as one linked activity is assigned to a resource while another linked activity is in the bucket; this violates the constraint for an assigned activity.

Immediate Routing may still assign one of the linked activities (say activity A) in case if:

- Activities linked to A are assigned to the field resource

- Activity A is assigned in such a way that its links will not be violated (apart from other Routing's conditions) .

  > **Note:** Assigning simultaneous links isn't supported using Immediate Routing; such activities are skipped and unassigned.

Immediate Routing and SLA

Here's how Immediate Routing plans work with the SLA fields:

- To minimize the chance of a resource to be retained on an activity that's nearing SLA End, Immediate Routing doesn't route activities (that satisfy the filter conditions) if the ETA is greater than the remainder of SLA End and SLA Window Threshold (that is, ETA > SLA End - SLA Window Threshold).

- This automatically applies to activities for which SLA ends earlier than the SLA Window Threshold, before the current time. These activities can't be routed by Immediate Routing, even if they satisfy the filter conditions.

- If you try to assign activities manually in such a way that ETA > SLA End - SLA Window Threshold, it leads to the warning that the SLA Window may be lost.

You can configure the SLA Window Threshold using the **Activity has not been completed XX minutes before the end of SLA Window** setting on the **Configuration** > **Display** > **Alerts** section.

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Resource Filters in Immediate and Urgent Routing

Immediate and urgent routing plans contain resource filters similar to Bulk Routing plans. The Filters section is similar to the Bulk Routing with the following exceptions.

To set resource filters:

1. Navigate to the **Routing** screen.
2. In the row for the Immediate or urgent routing plan, click the **Properties** icon and select **Modify**.
3. In the Edit Routing Plan screen for Urgent and Immediate routing plan, expand the **Filters** section, set the filters as needed. The Filters section is similar to the Bulk Routing with the following exceptions:
   - Only one predefined filter is available for non-scheduled activities in the routing bucket.
   - You can't add other filters or delete existing filters.
   - You can't add/modify/delete activity filters.

Activity Priority

Activity priority used by Routing to assign urgent activities is defined for the whole company as one of the Business Rules settings.

By setting the activity priority the company defines the activity property and its values which will make the activity urgent. For example, the company must always perform repairs as soon as possible to reduce service disruptions to the minimum. In this case the company may select **Activity Type** as the property and **Repair** as its value to consider an activity urgent. Only one activity property can be used to identify urgent activities. Several values of the same property can be used as criteria of activity urgency. In this case the values must be separated by commas or carriage returns (new lines) in the **Urgent activities have the following values of the property** field. Values in the Normal activities have the following values of the property field define the values for the Activity Type field, to consider an activity as normal.

> **Note:** For enumeration properties, use the enumeration value Id to define activity urgency criteria.

The following figure shows the **Activity priority** section of the **Business Rules** page:

> **Note:** The order of property values defines the priority level. The value listed first will have the highest priority, with other values following in the descending order.

Priority activity ETA does not include SLA, it includes the service window. This may result in SLA violation. In priority activities, such SLA violations are considered to be expected behavior. However, SLA is included for all rest activities.

SLA Policies Available at Filter Level

In Routing, four additional SLA policies are available to be set up on a filter level. With Default policy, you may prefer to ignore SLA, reduce SLA aging, place activity as late as possible within SLA window or prefer to not route activities out of SLA window. To support more SLA policies, four additional Non Assignment Costs for activity is added and maximum Center Zone cost may now be up to 999 999.

SLA Policy

We recommend that you define the needed SLA policy based on activity's properties. You may create a new SLA policy or use the existing policies. To utilize this feature, make sure that you have activity filters available for use in routing, and clearly differentiate the activities having different SLA treatment policies.

These choices are available for selection in the SLA Policy drop-down list on the Activity Filter parameters window:

- Default - Running after SLA End is penalized with prolonged aging period
- Ignore SLA - SLA is less important than other constraints
- Reduced Aging - Running after SLA End is penalized with shortened aging period
- As Late As Possible - SLA is penalized, but late running within SLA window is preferred
- Do Not Allow SLA Overstep - Prevent routing activities out of SLA window

This section discusses these SLA policies in detail.

Default

This is the default policy used for all migrated plans and for newly created plans and filters. This policy provides good balance between SLA and other constraints. while it is possible for routing to assign an activity outside of SLA window, such an assignment is penalized and the penalty is increased day to day, which urges routing to assign an activity either within the SLA window or at least not too far away from SLA End.

Ignore SLA

You must use this policy when SLA is less important than other constraints, for example pure internal SLAs. In this case, routing may prefer another activity to an activity with outdated SLA (which is to be ignored) to the activity being within non-ignorable SLA but having e.g. less travel or higher non-assignment cost. However, when routing is to choose between two activities and for both SLA is to be ignored, routing will prefer one with the most outdated SLA.

Reduced Aging

You must use this policy when your SLA is important but the penalty for breaking the SLA window is either fixed or daily penalty is negligible (at least after the first 7 days). In this case routing will try to assign an activity within SLA window. If it's not possible due to resource restrictions or other constraints, routing will put an activity to a most suitable date instead of trying to do it as soon as possible at all the costs.

As Late As Possible

You must use this policy when your contractual SLA window for repeating work (for example regular maintenance) is calculated based on the date of previous work. While it is important to start (and finish) the work within SLA window, the user may prefer to pull the work closer to SLA End so that no extra work is done. However, this may be altered by other ways of route optimization, for example bundling - if a Technician is already on site for the urgent work and the date of maintenance is approaching, the same Technician may do maintenance as well).

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NOTE: For Routing to effectively assign the activity having SLA policy As Late As Possible, you should allow routing plan decent view period in days in advance. It is recommended to route such activities with the plans having Apply to activities within day interval set to two weeks or more.

Do Not Allow SLA Overstep

You must use this policy when your SLAs are dictated by law or government rather than being contractual and overstepping the SLA window may imply serious consequences. If this policy is chosen, routing will either place an activity within SLA window, or reject the assignment with corresponding error message (either 6019 - Unacceptable SLA overdue or more detailed message, providing insights why activity is impossible to be done within SLA window).

Non-Assignment Costs

If there is a chance that an activity that meets the conditions of a given filter might not be assigned, then the application selects a setting that it will weigh against other considerations to determine who will be assigned which jobs – and which might remain in the bucket. In essence, this helps the application prioritize certain types of activities.

This table helps you to decide which non-assignment cost to choose for a particular activity. Note that the higher the non-assignment costs, the lesser the chances of this activity to be left in the bucket or being moved from resource's route to the bucket.

Name	Comment
Minimal	non-assignment is acceptable
Low	assign if it costs almost nothing
Normal	assign if it is not expensive
High	assign if there is good match between a technician and an activity
Highest	assign if there is an acceptable match between a technician and an activity
Extreme	assign even if there is poor match between a technician and an activity
Topmost	do the best to assign activity
Ultimate	activity should be assigned in almost any case
At All Costs	non-assignment is unacceptable

For a higher non-assignment cost, use a bigger value for the Center point home zone radius overstep weight value to restrict routing from assignment of important activities outside of this area.

By default, SLA penalty is increasing every day of SLA overstep, so if you have a lot of outdated activities, you should either consider using custom SLA policies (Ignore SLA, Reduced Aging) or use higher non-assignment costs for important activities (while using lower non-assignment costs for not so important activities having outdated SLA).

Follow these steps to configure the SLA policy:

1. Create a new routing plan or select an existing routing plan to Modify.

2. Choose an activity filter for a given plan or click Add activity filters group.

This image shows the Add activities assignment rule dialog box.

3. In the Filter parameters dialog box, choose the needed value for SLA policy and save the changes.

To configure the Cost of not assigning an activity:

1. Create a new routing plan or select an existing routing plan to Modify.

2. After you choose an activity filter, click the Add activity filters group row to edit.

   This image shows the Update activities assigment rule parameters dialog box.

3. Choose the needed value for Cost of not assigning an activity and save the changes.

Constraints and Limits

As of now, only bulk routing supports the SLA Policy and only at the routing plan level. You must make sure that assignment of routing plan having non-default SLA Policy setting is not rewritten by other routing plans with non-default settings and/or manually.

Routing Plan Settings

To assign urgent activities, you must create a special Routing plan.

ETA calculation for priority and normal activities include:

1. On applying of routing output application moves activities to corresponding resources in accordance with order which is returned in the output.
2. Priority activity ETA calculation takes into account service window (as it is the time agreed with final customer), but not SLA. This can result in SLA violation. In case of priority activities such SLA violation is expected behavior. At the same time, SLA is taken into account for the rest activities.

The **Run schedule** field now has the **immediately** option, which is used to assign the activities meeting the defined criteria as they appear in the bucket.

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Once **immediately** is selected, two options of activity selection appear. Here the user has to choose the group of activities to be assigned immediately. The following options are available:

- for Urgent Activities (Routing will assign the activities matching the 'property+value' combination defined in the **Activity Priority** field)

- for activities that correspond with {filter_name} filter (Routing will assign the activities matching the selected activity filter)

Run schedule

Scheduling will be performed immediately after the activity that corresponds to the selected filter is detected on the bucket.

The option assigning activities matching a filter can be useful when certain categories of activities have to be assigned as soon as possible, so that the time between the customer's order and the assignment confirmation is reduced to a minimum. Also, it may be necessary to quickly estimate the remaining available time in a bucket. The main goal is to assign all activities, even if such assignment results in sub-optimal routes. Routes can be reoptimized in subsequent Routing runs. All activities not matching the defined criteria will remain in the bucket until the next Routing run is scheduled according to a different Routing plan.

Urgent activities must be assigned as soon as possible, therefore, other factors, such as resource overtime, cost of assignment or non-assignment, route optimization and reoptimization, etc. are ignored. When **immediately** is selected as the Routing mode, sections containing other settings (Assignment Parameters, Filters, Reoptmization, Resource Overtime, and Travel Time) are hidden as irrelevant.

> **Note:** Only one routing plan intended to assign Urgent Activities can be created per Routing profile. Multiple Routing plans intended to assign urgent activities may interfere with each other. As soon as one Routing plan is created, the **for Urgent Activities** option becomes inactive for subsequent Routing plans. For the same reason, the **Clone** option is not available for a Routing plan configured for assignment of urgent activities.

Assignment of Urgent Activities

When the routing plan is set to **Urgent activities**, Routing refers to the Business Rules settings defining the urgent activity properties.

If an activity created in or moved to the bucket matches the urgent activity parameters Routing will assign it immediately to the most appropriate resource, even if such assignment violates SLA's of other activities in the resource's route. Urgent activity assignment observes the following constraints:

- Work zone—the resource's work zone must match that of the activity.

- Work skills—the resource's work skills must match the work skills required by the activity.

- Resource preference—the activity may be assigned only to those resources that meet the required or preferred resource preferences, if specified.

- Service window—the activity service window must be observed.

- SLA end—the SLA end of the activity must be observed. Activities with expired SLA will not be routed using Immediate Routing.

- Working Calendar: the resource must have a working calendar to be considered for assignment.

Selection of Resource for Urgent Activity Assignment

Since the principal objective of urgent activity assignment is to reduce its ETA to the minimum, it is important to assign it to the resource, which is the closest to the activity site, so that the travel time is the shortest. Depending on their priority (the priority property value) urgent activities can be placed at different points in the route:

- At the beginning of the route

- After a started or completed activity

- After a pending activity

The position in route which the urgent activity is to take defines the method of determining the resource location. The following cases are possible:

- The urgent activity is to be placed at the beginning of the route:

  - If the resource has GPS coordinates newer than 20 minutes ago, the GPS coordinates are used.

  - If no GPS coordinates are available or if GPS coordinates are older than 20 minutes, the resource's Start Location is used.

  - If no GPS coordinates are available or if GPS coordinates are older than 20 minutes and no Start Location is assigned to the resource able to ensure the minimum ETA from among those matching the activity requirements, the resource's location is undefined, thus such a position is not suitable for urgent activity assignment.

- The urgent activity is to be placed after a started or completed activity:

  - If the resource's GPS coordinates are newer than the address of the started or completed activity, the GPS coordinates are used.

  - If no GPS coordinates are available or if GPS coordinates are older than the address of the started or completed activity, the address of the started or completed activity is used.

- The urgent activity is to be placed after a pending activity:

  - The address of the pending activity is used.

Urgent activities may be assigned to a resource that is already traveling to a different activity or is even in the process of performing a different activity. In this case the urgent activity still has priority, and the resource either has to change direction or interrupt another activity. Any activities for which a different property value is set are not considered urgent and will be assigned in the usual manner.

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If an urgent activity is to be assigned at a specific slot and the resource has an existing activity at the same slot, then the existing activity is assigned back to the bucket. If the existing activity also has the Urgent priority, it may be re-assigned to another resource by the same routing run instead.

Assignment of Non-Urgent Activities

When choosing the **for activities that correspond with {filter}** option, you must select that filter based on which Routing will identify activities to assign immediately.

The drop-down list contains all activity filters applicable for routing which have been created on the **Filters** screen. When you create an activity matching the selected filter in the bucket, Routing immediately assigns it to an appropriate resource. However, unlike urgent activities, Routing assigns a non-urgent activity to an available time slot (no constraints of other activities will be violated) and only when it causes no overtime to the resource. A Routing profile may contain several routing plans designed to assign non-urgent activities immediately. Such plans may be based on different activity filters, so that activities meeting the criteria of several filters are assigned immediately after creation.

If the **All** option is selected from the filter list, all activities appearing in the bucket will be assigned immediately.

Non-urgent activity assignment observes the following constraints:

- Work zone—the resource's work zone must match that of the activity.
- Work skills—the resource's work skills must match the work skills required by the activity.
- Resource preference—the activity may be assigned **with preference to preferred or only to required resources**, if specified.
- Service Window—the activity service window should be observed. **Note that schedule date is not observed thus, the activity may be scheduled to any date within the routing period.**
- SLA start—the SLA start of the activity should be observed.
- SLA end—the SLA end of the activity should be observed.
- Required inventory - the activity may be assigned only to those resources that have enough inventory to handle the activity, if specified.

Note: Immediate routing supports segmentable activities only if they are non-urgent activities.

When Routing is set to assign non-urgent activities, it does not perform route optimization. The goal is to assign all activities as soon as possible. The next scheduled routing run may reoptimize the routes created as the result of immediate assignment according to its settings.

Bundling of Activities

You can bundle activities (in immediate or bulk routing) with other activities that are scheduled for the same location and bucket in the near future.

For more details about bundling of activities, see these sections:

- *Bundling of Activities in Immediate Routing*
- *Bundling of Activities in Bulk Routing*
- *Bundling Conditions*
- *Order of Activities in Bundles*

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- *Bundling Urgent Activities*
- *Bundling Non-urgent Activities*

Activity Duration Estimation for Bundled Activities

Oracle Field Service estimates the ratio of the average duration of activities that are part of a bundle (excluding the first activity) to the duration that is currently estimated for such activities. The calculated ratio is applied to the original estimate to get the estimated duration of bundled activities. Again, this ratio is not applied to the estimated duration of the first activity of the bundle. The first activity continues to have the same duration similar to a standalone activity.

Only one single ratio is calculated for a particular instance. This ratio is based on reported duration of non-first bundled activities and duration that is currently estimated for similar activities.

Example:

Here is an example to understand on how the ratio will be used

Consider four activities that are part of the same visit bundle - A, B, C and D. Assume that as standalone activities, the estimated durations (based on resource's ratio for each activity and company level estimation) for the four activities would've been 30 mins, 20 mins, 50 mins and 40 mins respectively. Assume that the final ratio of bundled activity duration is 80% (based on calculated value and limits set).

The final estimated duration, when these activities are assigned to the resource's route, would be as follows:

Activity A - 30 mins (ratio is not applied since it is the first activity of the bundle)

Activity B - 20 * 80% = 16 mins

Activity C - 50 * 80% = 40 mins

Activity D - 40 * 80% = 32 mins

As with all other statistical values, the value of this ratio is recalculated on a daily basis, typically overnight. For an activity type, if the Configuration, Activity Types, Calculate activity duration using statistics check box in the Activities page is unchecked then the ratio is not applied to the activity durations of that activity type.

View and Control Ratio for Bundled Activities Duration

The **Lower and upper limits of ratio for bundled activities duration** field under Visit bundling keys on the **Business Rules** page allows you to control the lower and upper limits for the ratio to be used. In addition to setting the limits, the field displays the value calculated by the application based on the durations reported by field resources. You can set the limits using the slider to a value from 1% to 100%, provided the lower limit does not exceed the upper limit.

The final ratio is applied to estimation durations of non-first bundled activities between the lower and upper limits set here. So, if the calculated ratio lies within the limits, that value is used. If not, the limit closest to the calculated value is used.

Here are some examples:

- Case 1:

  Lower limit = 70%, Upper limit = 90%, Calculated value = 80%. In this case, the duration of all non-first bundled activities be 80% of the duration of similar normal activities.

- Case 2:

  Lower limit = 70%, Upper limit = 90%, Calculated value = 60%. In this case, the duration of all non-first bundled activities be 70% (lower limit) of the duration of similar normal activities.

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- Case 3:

    Lower limit = 70%, Upper limit = 90%, Calculated value = 95%. In this case, the duration of all non-first bundled activities be 90% (upper limit) of the duration of similar normal activities.

If data reported is not enough to make meaningful calculations, there is no calculated value; the default value of 100% is displayed. The set limits are respected and the default value of 100% is used only if the upper limit is also set to 100%. If not, the value set as the upper limit is used.

Set Overriding Ratio for Bundled Activities Duration

Using the limits, administrators can also override the ratio to be used for the duration of non-first bundled activities. Administrators can set both lower and upper limits to the value they want to use. As the system always respects the limits, it uses the value that is set.

For example if the desired ratio is 80% then you may set both lower and upper limits to 80% so that the system uses that value regardless of the calculated value.

To disable this feature altogether and to have the system behave the way it earlier used to, you may set the lower and upper limits to 100%.

Bundling of Activities in Immediate Routing

Immediate activity assignment may result in certain additional costs related to the violation of other activity SLA or the resource's travel to a different location. To compensate for such additional costs, sometimes it is reasonable to combine the urgent activity with other activities that are located in the same place. Another situation is when the urgent activity requires admission to a restricted area. In this case, the company may assign other activities in the same facility to the same resource and request access only once. Such assignment type is called bundling.

Routing determines which activities may be bundled together by the same criteria that are used in creation of visits. For example, if activity asset (which, depends on activity type, may be translated to activity address or equipment id or area code) is used as a visit bundling key then the activity asset will also be considered in the assignment of urgent activities, and, should any activities be found on the same asset as the urgent one, such activities will be *bundled* that is, assigned together to the same resource, same day and one immediately after the other.

Bundling of Activities in Bulk Routing

Bulk routing also uses visits bundling key and address (i.e. address, city, state, zip/post code and country) to determine which activities can be performed as a bundle. This provides improved optimization due to time saved on travel and other operations.

Bundling in Bulk Routing is a soft rule enforced with each routing run. If a lesser cost-fit method is available or if it is more optimal to perform two or more activities by two or more resources, you can assign multiple resources instead of creating a bundle.

For more details about bundling of activities, see *Visit Bundling*.

Bundling Conditions

The application uses these conditions to determine the activities which activities can be bundled together:

- activities must be in the **Pending** status
- activities must have the same bundling key (for Immediate Routing)
- activities must have the same bundling key or the same address (for Bulk Routing)
- activities must be within the defined interval of dates (for Immediate Routing, see below)

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- non-scheduled activities must have an empty SLA start value or a SLA start value within the defined interval of dates (for Immediate Routing, see below)

When the application finds the acceptable destination route, it checks these assignment constraints for all activities in the bundle:

- work zones—the resource's work zone must match that of the activity
- work skills—the resource's work skills must match the work skills required by the activity
- Resource preference—the activity may be assigned only to required or preferred resources, if specified
- Service window—the activity service window should be observed
- Access hours – the activity access hours should be observed
- SLA start—the SLA start of the activity should be observed
- SLA end—the SLA end of the activity should be observed
- Maximum duration if a single bundle— 8 hours

Order of Activities in Bundles

When a bundle is formed, the sequence of activities within is determined according to thes constraints:

1. activity link constraints
2. activity priority
3. service window end
4. service window start
5. SLA end
6. SLA start
7. activity ID

All bundled activities are analyzed for constraints in the order stated previously. If no activities belong to any links, the activity priority, if any, determines the sequence. If no priorities are set for the bundled activities, the activities with the earliest service window end will be placed first, and so on.

Bundling Urgent Activities

When activities are bundled to an urgent activity (the one with the priority defined in the **Business Rules** screen), the urgent activity is assigned first. When the destination route has been found for the urgent activity, other activities are analyzed to find whether the route can be joined with the urgent activity. While creating a Routing plan for immediate activity assignment, the user can define the period within which Routing has to search for activities to bundle with the urgent one. For that purpose, the **Run schedule** settings include the **Bundling within [ ] day interval** field.

The **Bundling within [ ] day interval** field defines the period within which Routing has to search for activities to bundle with the urgent one. The interval can be set in the range between 1 and 99 days. If no activities matching the bundling criteria are found within the bundling range, no bundles are created.

Bundling Non-urgent Activities

When non-urgent activities are to be assigned immediately, the system checks if any activities in the already existing routes have the same bundling keys. Upon finding such routes, the system checks other assignment constraints and assigns a non-urgent activity only if all assignment constraints are satisfied. A non-urgent activity will be assigned to the route containing the largest number of activities with the same bundling key or to the route with the earliest date. If no such route has been found, the non-urgent activity is assigned to the first acceptable route with no bundling. The bundling date range is defined as part of the Routing plan settings.

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The following assignment and bundling settings can be made:

Assignment and Bundling within [ ] day interval starting [ ] – the start and duration of the period within which the application has to assign scheduled activities and create bundles with the already assigned ones. The bundling interval can be set in the range between 1 and 99 days. Assignment and bundling of activities will start on the selected day and continue for the defined duration of the interval. For example, if the following settings have been made: **Assignment and Bundling within 10 day interval starting Today +2**, the application searches for activities matching the visit bundling keys two days from today and continue for 10 days. Non-urgent activities will be assigned to form bundles with the found activities within the same period. If no bundles can be formed, non-urgent activities will be assigned to routes within the same period

Visit Bundling

You can specify a bundling policy that alters the default visit bundling rules in routing with a new non-assignment reason.

Routing tries to group activities with the same address and close coordinates to minimize travel time and improve customer satisfaction by default. However, for stronger bundling of activities that belong to the same visit, you must have a visit bundling key defined explicitly. We recommend that you enable the visit functionality and set up the bundling key before using the advanced functions of bundling. The bundling key can be defined on the Business Rules page by choosing parts of activity fields that are being combined and this value is used as a bundling key value. Activities with the same values for the bundling key fields may be considered as part of the same bundle.

By default, all types of routing plans including bulk, immediate and immediate for urgent activities try to bundle all those activities sharing the same visit bundling key values and scheduled for the same day to form a visit (that are to be performed in sequence, one after another). For routing purposes it is assumed that the activity being a part of the bundle satisfies its service window and/or SLA constraints, even if the activity ETA is out of those windows, but there is an activity that:

- Satisfies those constraints and
- Is part of the same bundle

Apart from performing bundled activities in sequence, Oracle Field Service also sends a single notification for all the activities that form a bundle, if such notifications are configured.

Activities are eligible for visit bundling unless there are some mismatch factors that prevent them from being performed as a single visit.

Here are the mismatch factors:

- **skills or zones mismatch** when no resources capable of performing all of the considered activities due to their skills and zones configuration are available.
- **inventory shortage** when using required inventory and the 'routing by inventory' feature enabled, but no providers have the whole stack of inventory needed.
- **other activity constraints** when activities have incompatible preferred/required/prohibited resource preferences.
- **link constraints** when activities are linked together with a link type that prevents assigning them to the same day and/or resource.
- **queue date** when activities scheduled for different dates are not intended to be bundled together, in general. However, it may be possible with a specially configured multi-day routing plan, in which you've enabled moving activities between dates through filters that cover the activities to be bundled.
- **incompatible service windows/SLAs** when activities have service windows/SLAs that cannot be combined into a single visit.

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- **exceeded duration** when the overall visit duration is longer then the available resource's working day.

Example

Consider an example where two jobs with the same bundling key are already scheduled and a third one comes in. If there are no mismatching factors, all those jobs (that are expected to be routed together) form a single visit. If a resource can't perform these jobs together because of overtime or availability constraints, Routing tries to move them to another day (provided SLA/service windows are not lost).

You can define additional options to push eligible activities to be bundled together. To push bundle-able activities, you must modify activity filters of a particular routing plan's **Bundling policy** from **Default** to **All or None**. Such routing plans (including bulk, immediate and immediate for urgent activities) do not assign another activity sharing the same bundling key and same date as an existing one. Moreover, if **un-assigment to bucket** is allowed within a routing plan's settings, bulk routing with such a setting may return those activities back to the bucket.

Bundling policy options are as follows:

- **Default** bundling policy bundles all the activities that share the same visit bundling key value, belong to the same queue date, and are found within the same bucket. However, if some of the activities are already assigned to one or more resource then those activities may be left in their places if it is impossible to place them on the

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Update activities assignment rule parameters Dialog Box Showing All Available Bundling Policy Options

Consider an example of an **All or None** bundling policy and a multi-day routing plan that routes two activities with the same visit bundle key value, has the bundling policy **All or None**. These conditions are true:

- If both activities have the same queue date and there is a technician capable of doing both activities sequentially - then both activities are assigned.

- If both activities have the same queue date and there are no technicians capable of doing both activities sequentially - then both activities are returned to the bucket.

- If the activities have different queue dates, the routing plan allows moving activities between dates, and there is a technician capable of doing both activities sequentially then both activities are assigned.

- If the activities have different queue dates, and the routing plan doesn't allow moving activities between dates or there are no technicians capable of doing both activities sequentially then activities may be assigned without any sequence, not forming a bundling visit.

- Any activities that were not assigned (or unassigned) due to an **All or None** bundling policy result display this error message:

  6028 Unable to fit bundling policy constraints

  Activities that were marked with **All or None** bundling policy and scheduled for the same day cannot be assigned together to the same route.

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Configure Visit Bundling

This section discusses how to configure visit bundling.

Set up the bundling key

Before you use the advanced functions of bundling, you must enable the visit functionality and define the bundling key. To define the bundling key, navigate to Configuration, Business Rules and choose parts of the activity fields that are being combined in the Business Rules page. This value is used as a bundling key value.

Set bundling activities for the same customer

To make sure that all activities for the same customer/same date form a single visit (so that they are assigned to the same resource and a single notification is sent to the customer), you may set the bundling key to include **Account**, **Account Number**, **CustomerID** or similar fields.

Set bundling activities for the same location

By default, routing doesn't automatically bundle same location activities as keeping such activities together may lead to increased workflows and decreased travel time. In many cases Routing may prefer such a combination though. However, you can increase the chance of getting such a preference by adding a bundling key.

For example, if you want to bundle all activities sharing the same day and location by Routing as a single visit (and if this is not possible, then return them to the bucket so that a dispatcher can assign them manually), follow these steps:

1. Set up the bundling key using the **Address** field.
2. Open the routing plan you want to edit.
3. Change all of the activity filters by selecting each activity filter, choosing **Settings**, and then changing the **Bundling policy** to **All or None**.
4. Under the **Assignment Parameters** section, set the **Handling of preassigned activities** to **Move activities between resources routes and reorder within the same route**.
5. Make sure that activities covered by **Preassigned activities filters** have the **Possible routing actions** set to **Unschedule and move to the routing bucket**.

Configure Bundling Activities for a Complex Scenario

Active routing profiles are used to route activities to resources. Inactive routing profiles are not used. You deactivate a routing profile if you want to save it for future use, but you don't want to use it right now.

To activate (or deactivate) a routing profile:

1. Make sure that you have an activity filter for all the smart home-related activity types. If not, then add it by navigating to **Configuration** > **Filters**.
2. Navigate to **Configuration** > **Business Rules**. Make sure that the Visit functionality is enabled.
3. Set up the bundling key to the Account field (or another field that uniquely identifies the customer).
4. Navigate to Routing Plans and open the desired routing plan for editing.
5. Review the Filters section and make sure that it includes the activity filters for smart home-related activities for all possible destinations. For activity filters:
    - Non-scheduled activities in the routing bucket that should be scheduled and assigned
    - Activities in the routing bucket that should be assigned
    - Preassigned non-scheduled activities that should be scheduled
    - Activities in the existing routes

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6. Change all of the activity filters for smart home-related activities by selecting them and choosing Settings, and then changing the Bundling policy to **All or None**.

7. Under Assignment parameters, set the Handling of preassigned activities to Move activities between resources routes and reorder within the same route.

8. Under the Preassigned activities filters, make sure that there is a filter that covers smart home-related activities.

9. For this filter, set its Possible routing actions to Unschedule and move to the routing bucket.

Immediate Routing Plan Run

Immediate Routing Plan is triggered by the creation of an urgent activity or an activity matching the filter in the bucket. If activity is not routed immediately after it is placed in the bucket (due to lack of resources or not matching the filter), Immediate Routing Plan may be re-triggered periodically and also by any activity property change. Immediate Routing plans can never be started manually and, therefore, have no **Run** link in the list of Routing plans for a bucket.

The results of an immediate Routing run include the following data:

- If the plan was set to assign Urgent Activities:

    - Assigned activities – the number of successfully assigned urgent activities

    - Bundled activities – the number of other activities joint with the urgent ones

- If the plan was set to assign non-urgent activities matching the selected filter:

    - Assigned activities – the number of activities assigned without creating bundles

    - Assigned with bundling activities – the number of activities matching the selected filter assigned in bundles

    - Bundled activities – the number of activities from the bucket or non-scheduled pool joined with the filtered activities to create bundles

Assignment and Fallback Options for Activity Broadcasting

The Assignment and Fallback section is displayed when you create a routing profile with the option, immediately from the **Run routing** drop-down list.

> **Note:** You must enable the Collaboration service to view the **Assignment and Fallback** section. View the **About** screen to verify whether the service is enabled.

The **Assignment and Fallback** section is used to configure the following settings:

- To trigger activity broadcasting to multiple users, use one of the following options:

    - **Automatic**: Assigns activity directly to matching resources in the bucket.

    - **via Collaboration**: Triggers activity broadcasting to users in collaboration.

    > **Note:** The **Bundling** option is not available when you assign activities using the **via collaboration** option.

- Enter the time in minutes in the **Activity should be assigned in _ minutes** field to set the time out period for broadcasting. If no user accepts the activity within the defined period, broadcasting is timed out. Limit is set to 99 minutes.

- **Fallback** option: Select the configured message scenario for the **Fallback** option that must run when the activity fails or when the system times out. The configured message scenario sends the failure message to the user.

How can I fine-tune a routing plan to achieve specific goals?

You can set the Assignment Parameters to further configure or fine-tune the routing plan to achieve specific goals such as creating an inventory pickup activity or creating the activities close to the service window start time.

To set assignment parameters:

1. Navigate to the **Routing** screen and locate the routing plan to which you want to configure.
2. Click **Actions** and select **Modify** to open the **Edit Routing Plan** screen.
3. Expand the **Assignment Parameters** section.
4. Select the following options, as necessary:
   - **Enable Routing by Inventory:** When this check box is selected, routing considers the required inventories for all activities that are sent to routing, and assigns activities only to those resources that can meet these requirements. This could result in some activities being unassigned. Activities which have no inventory requirements are not affected by this setting. They are routed in the same way as before. Activities are unassigned if there are no resources that meet their inventory requirements. Such activities are rejected with the reason code: 6003 and message: no appropriate resources. Regular activity filters and resource filters, work zone, work skill restrictions apply as usual. For example, if a resource which has the inventory X is not selected by a filter for the activity that requires inventory X, then that activity is not assigned to that resource.
   - **Enable Inventory Pickup:** Bulk routing may auto-create an inventory pickup activity to obtain the required inventory pieces from the nearest warehouse and handle the changes during intra-day routing re-optimization runs. This increases the autorouted percentage value and improves the routing quality as the same technician completes more activities.
   - **Dynamic Routing:** This option helps you set the limits on how long the module runs based on the number of minutes and/or the number of activities routed. The screenshot (below) shows a different location for

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setting minutes/activities (described as the Dynamic Routing check box of the Add/Edit routing plan dialog box):

- o **Limit work by points:** Select the box to enable Routing to limit how many activities technicians can have in their routes. Note the following:
    - Overload by points may still happen if an activity was added to the route or updated after routing was performed.
    - Routing will not remove previously-assigned activities back to bucket nor assign to another resource if a route was already overloaded before the Routing run.
    - Zero points activities may be assigned to any resource, including but not limited to, resources with already overloaded routes and resources that have zero or negative points capacity.
- o **Try to schedule activities to service window start:** This option (formerly named Route Uniformity) schedules activities as close to the start of service windows as possible. As a result, routing options will typically include a broader selection of resources and the possibility of burdening some resources with many activities and under-utilizing others is minimized. Note, however, the following consequences are there:

    - Idle time may collect closer to the end of the service window.
    - Summary travel time may increase.
    - Summary work time may increase.
- o **Override default service window reservation value:** Select this check box to enable modification of service window reservation. Default *Service window reservation* is up to 20% of the service window but no more than 60 minutes. See 'Service window reservation %' description for more details
- o **Service window reservation %:** This field determines the percentage of the service window from its end that must be reserved. Routing tries to avoid assigning activities with ETA within the reserved part of their service windows by pushing the activities to an earlier ETA. Routing tries to push the activity to an earlier ETA as higher is the late arrival penalty for this activity. This setting applies to all the activities that are part of the routing plan.

    For example, an activity has a service window from 10:00 AM to 5:00 PM:
    - If 15% is specified in the **Service window reservation %** field, the last 63 minutes of this 420 minutes service window are reserved.

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- If 50% is specified in the **Service window reservation %** field, 210 minutes are reserved.

Higher **Service window reservation %** increases the 'buffer time', which may result in the degradation of the other metric.

Lower percentage may result in a higher risk of resource appears to be late for the appointment.

> **Note:** Service Window Reservation % is not applied (its effective value is 0%) when (a) bundling the activities on the same address or (b) having the same bundling key and assigned to same technician for activities starting from second one in the bundle. For bundled activities, both SLA and Service Window are calculated by the start of the first activity in the bundle.

○ **Center point home zone support:** This option defines the home zone radius, that is, the number of miles in any direction from the starting point and the penalty to be applied if a resource must leave the home zone to complete an activity. The default penalty (Overstep Weight) is 4.

○ **Automatic ordering:** This option places activities without service windows on the route in the most efficient order. If cleared, the application places these activities on the route, but does not assign a time slot. In this case, resources decide when to do the work.

Automatic Ordering can help you complete more activities over the course of the day, but it also reduces the resources' ability to use their own judgement in completing activities.

○ **Limit work by points:** This option is only necessary if you use points to estimate activities. It limits the number of activities assigned to a resource based on the maximum points allowed within a resource's shift. You must also enable Points Support in Business Rules, enable a Points property, and send the point value for the activity through the API.

○ **Move activities to the bucket instead of assignment to contractor's resource:** This option assigns the relevant activities to a contractor's bucket instead of the contractor's resource. For this option to work, you must run the plan from an In-house Organization bucket that has contractor buckets (and, possibly, in-house ones) as children. In this case activities routed to in-house technicians will be assigned to technicians, but activities routed to contractor technicians will be assigned to contractor buckets. However, if you run the plan from a contractor bucket, the activities will be assigned to the underlying contractor technicians.

> **Note:** Routing runs that assign or reassign all activities to the contractor's personnel will be moved to the parent bucket of such resources, regardless of the optimization destination selected. To prevent activities that are already assigned to the contractor resources before the routing run, of being taken from contractor's resources to the bucket, select the **Do not move activities between routes and do not reorder activities for Handling of preassigned activities** check box.

When you close **Assignment Parameters**, you'll see your selections summarized on screen.

Automate Required Inventory Pickup Creation Using Bulk Routing

Bulk routing may auto-create inventory pickup activities to obtain required inventory pieces from the nearest warehouse and handle the changes during intra-day routing re-optimization runs. This increases the autorouted percentage value and improves routing quality as the same technician completes more activities.

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This feature includes these options:

- Bulk routing auto-creates activities to pickup inventory from the nearest warehouse if such an inventory pickup allows more optimal routes creation according to chosen optimization goal

- New settings are available in the routing plan to support automated creation of required inventory pickup

- New activity type group and new pre-defined activity type are available for Warehouse visits

- Viewing the amount of inventory booked via the automated required inventory pickups creation by bulk routing is available on the warehouse inventory page

- Calendars and locations may now be added to resources of all roles excluding Organization Units but including Buckets and Tools

You will learn how to automate required inventory pick-up using bulk routing in this section.

Follow these steps to utilize inventory pickup functionality:

1. Review Warehouse Visit activity type and modify if necessary or create a new activity type.
2. Add a warehouse resource type
3. Create and configure a warehouse resource.
4. Fill the Warehouse inventory.
5. Update the inventory identifier screen configuration.
6. Add resource filter for use in routing plans.
7. Configure a routing plan.
8. Plan for recurrent optimization.

Results:

This section discusses the above steps in detail:

Review Warehouse Visit Activity Type

The 20D version of OFS automatically includes a Warehouse Visits activity type group, and the default Warehouse Visit activity type is included for your convenience. If the default activity type meets your organization's needs, you don't have to do anything else regarding this step.

If it doesn't meet your needs, you can edit it by defining the default duration, selecting time slots, and disabling any of the selected features (except for "Support of Inventory" and "Support of not-ordered activities," which are enabled by default). Notice that pending Warehouse Visit activities use purple color-coding to help identify them on the Manage view and Dispatch Console.

If you want to create a new warehouse activity, you must select Warehouse Visits for the activity group. The Warehouse Visits activity group automatically limits the available features for any activity type created within that group. For example, "Support of inventory" is selected by default. Other constraints include the inability to select the activity to be mass or repeating activities, to move or reschedule activities of this type, and to support work skills or work zones. Additional limitations exist, and the Features list is specifically configured to enable only the allowable features for activity types in this activity group.

Add a Warehouse Resource Type

Add a warehouse resource type that uses the Bucket resource role. Be sure that it's active. The "Routing can assign activities" and "Used for quota management" features can be enabled at your discretion.

Create and Configure a Warehouse Resource

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Decide whether the warehouse routing resource should be a child of the bucket that contains the activities to be routed. Another option is to locate it outside the routing bucket's hierarchy. If you choose this option, the following conditions must be met before Routing can create an automatic pickup activity for required inventory:

- The warehouse resource must have at least one of the same work zones as the routing bucket.

- The Filters section of the routing plan must have "Use resources outside the routing bucket" enabled.

- The activity's work zone must match the warehouse's work zone.

Now, you'll create a warehouse resource. For Resource Type, select the one you just created. And for Org Unit/Bucket, select either the routing bucket or the entity where you want to warehouse to reside in the resource tree.

You must add a Start location for the warehouse resource, which is simply its address, and that you set that Start location for each day of the week the warehouse is open. You must also ensure that the warehouse resource's calendar is set for the days of the week and hours of the day when field resources can pick up required inventory. Routing can create Warehouse Visit activities only if the warehouse resource has both location and calendar information specified.

Fill Warehouse Resource with Inventory

You can create inventory for the warehouse resource via API (see the Integration section under Additional Information), or you can do so manually by selecting Resource Inventory on the Resource Info screen for the warehouse resource, selecting Add to Resource, and adding inventory items.

Update the Inventory Identifier Screen Configuration

This step updates the "Identify equipment by" identifier screen configuration to display the Booked Quantity value for each inventory item. The regular Quantity value does not change when the Warehouse Visit activity is created, although OFS does note that the required inventory is booked. And OFS knows that the remaining available inventory is the total quantity minus the booked quantity. Adding this step simply lets you see what's been booked.

To do this, under the Collaboration and Identifiers section of the user type screen configuration, open the "Identify equipment by" screen context and add the Booked Quantity property. If no required inventory has been booked, this value will not appear in the equipment list.

Add Resource Filter for Use in Routing Plans

Routing needs to be able to identify warehouse resources, so the next step is to create a resource filter that uses the condition "Resource Type (ptype) In Warehouse." (Creating a custom property to distinguish a warehouse resource type from other resource types is also an option.)

Configure Routing Plan

You can configure the automatic creation of Warehouse Visits to pick up required inventory for any type of routing plan.

The first thing you need to do is modify the Assignment Parameters section by selecting Enable Routing by Inventory. Then select Enable Inventory Pickup and select the Warehouse Visit activity type from the "Inventory pickup activity type" drop-down menu.

Next, you'll make some changes to the Filters section of the routing plan. Select one of the activity filters, select Resources, and then select the Warehouse resource and set its priority to "Treat as warehouse." (This step needs to be done for only one filter within the routing plan, regardless of the total number of filters being used.)

Plan for Recurrent Optimization

Throughout the day, if activities get added, canceled, or deleted, it may affect the booked and available quantities of inventory at the warehouse.

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Here's what happens in those circumstances:

- If the activity requiring inventory is deleted or canceled before inventory pickup, the inventory in the Warehouse Visit activity is not changed, but a warning appears to let the technician know that inventory needs have been changed. It is possible that the Warehouse Visit is for picking up inventory for multiple jobs, the Warehouse Visit activity is not deleted automatically.

- In these additional situations, no changes are made to the Warehouse Visit activity:
    - If the activity requiring inventory is suspended or changed to non-ordered
    - If the activity is moved (manually or via API) to another day and/or resource

It is recommended that you follow the best practice of running recurrent optimization plans on the bucket. This practice can add, modify, or remove Warehouse Visit activities and update the warehouse inventory list. This is true even if multiple Warehouse Visit activities were scheduled for a single customer activity.

You may want to set up a recurring daily Warehouse Visit activity to maintain a placeholder for that activity in every route to account for a resource's time. Then, when a day-before or intraday optimization plan is run, if no missing required inventory is identified, Routing will automatically remove the Warehouse Visit activity from the route.

Additional Information

Moving Automatically Created Warehouse Visit Activities

Although you can manually edit Warehouse Visit activities that were created automatically, we recommend against it to avoid jeopardizing other activities in the route. If manual editing makes changes that do jeopardize other activities or the Warehouse Visit activity, a warning message appears.

Working with Both Regular and Automatically Created Warehouse Visits

Although Routing will automatically create Warehouse Visit activities when needed for activities with required inventory, it's possible that you also have "regular" warehouse visit activities that were created either manually or via API for example to replenish trunk stock. Both of these types of warehouse activities can appear in the same route. And you may want to continue to manage the regular activities manually. However, it may be possible that the inventory needed by regular visits is available at the same warehouse as the automatically created visit, it makes sense to pick up all inventory at the same time.

One way to accomplish that is through two different activity types for warehouse visits: one created in the Internal activity group for manually managed warehouse activities, and the other created in the Warehouse Visits activity type group. When you do that, Routing will create, update, and delete required inventory pickups automatically, and it will bundle regular visits with the automatically created visits if they both have the same address – the warehouse resource's Start location.

Another way to accomplish that is to create regular Warehouse Visit activities as placeholders in every route. You can even use the same activity type in the Warehouse Visits group for both manually and automatically created Warehouse Visit activities. Then, any required inventory that needs to be picked up is automatically added to the pre-created activity, and if no required inventory is needed, the activity is removed. If you want to ensure that Warehouse Visit activities remain on future days' routes, you can set your optimization plan to remove only today's warehouse activities if no required inventory needs to be picked up.

Working with Multiple Warehouse Visit Types

By default only one predefined Warehouse Visit activity type is available to automatically create a visit activity to pick up required inventory. You can, however, create additional types for use in different routing plans. For example, you might want to differentiate Warehouse Visits for in-house workers and contractors. You can set up one activity type with

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a default activity duration for the contractor Warehouse Visit, while setting up another that uses learned statistics to estimate pickup duration for in-house resources.

Working With Visits Created by Order Parts Plug-in V.2

If you created an order pickup plug-in based on the sample code of plug-in-order-parts-collection_v2.zip placed at https://www.oracle.com/downloads/samplecode/ofsc-samplecode-downloads.html with the option to create follow-up activity turned on, and you would like to use plug-in and the feature under the same routing bucket, make sure that these options are available:

- The inventory items ordered via Order parts plug-in are not the same inventory items the warehouse is filled with

- Moving activities between providers and reordering is prohibited for activities being created by Order Parts plug-in.

Integration

To fill the inventory list of the warehouse, use REST API the same way as filling the field resource inventory: Use the standard API requests, and refer to:

- https://docs.oracle.com/en/cloud/saas/field-service/20c/cxfsc/op-rest-ofsccore-v1-resources-resourceid-inventories-post.html for individual requests

- https://docs.oracle.com/en/cloud/saas/field-service/20c/cxfsc/op-rest-ofsccore-v1-resources-custom-actions-bulkupdateinventories-post.html for bulk requests

The Events API can be used to track the initial activity booking by filtering the events for the creation of Warehouse Visit activity types. You can also track changes made to inventory booking through routing optimization by filtering the events of inventory creation/deletion for the activity type. These are the events produced when Routing automatically creates required inventory pickup activities:

- activityCreated – Routing creates warehouse visit activity.

- activityMoved – Initiated when rollback occurs and a Warehouse Visit is deleted. An Undo Rollback action is available because Routing does not actually delete the Warehouse Visit activity but instead moves it to a hidden queue of the same resource for the same day. Then, if no Undo Rollback occurs, Routing deletes those hidden visits in the next routing run.

- customerInventoryCreated, customerInventoryUpdated, customerInventoryDeleted – Routing performs adjustment of inventory reservation. The created inventory items belong to the customer pool and has references to both the Warehouse Visit activity and warehouse bucket. A reference to the warehouse bucket can be used to distinguish the reserved inventory from the regular customer inventory. Also, although the reserved inventory can be serialized, it doesn't have serial number values.

Capacity/Quota

Routes that have multiple Warehouse Visits can affect capacity and quota because these activities require time to pick up inventory from warehouse. To compensate for this, you can reserve quota by setting the threshold lower than 100% of capacity for activities in capacity categories that might be affected by inventory pickup.

Limitations

Routing by inventory functionality does not support segmentable activities. It does not create required inventory pickups for such activities.

Warning Messages/Troubleshooting

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If the warehouse resource cannot be used, you will see one of the following messages. This table provides the steps to correct the problem:

Warning	How to fix
Field resource cannot be used as a warehouse	Fix the filter used for "Treat as warehouse" to exclude field resources. Do note that buckets are recommended to be used for warehouses.
A resource sharing inventory in teamwork cannot be used as a warehouse	Disable ability to share resources in teamwork for a given resource type.
A resource without Start Location cannot be used as a warehouse	Make sure that Start Locations are assigned for warehouse resources for all the days covered by routing plan
A resource without working calendar cannot be used as a warehouse	Make sure that Working Schedules are assigned for warehouse resources for all the days covered by routing plan
A resource without inventory cannot be used as a warehouse	Make sure that warehouse could have an inventory. Make sure that inventory was assigned to a warehouse.

How do I lock preassigned activities in bulk routing?

You can prevent preassigned activities from being unscheduled or rescheduled during optimization by a bulk routing run. This eliminates unnecessary changes in the activity assignment and retains the existing activities in the route.

Changes have been made to the translations within the filter section of Optimization Strategy section. This table lists the old and new translations within the filter section:

Old translation	New translation
Filter parameters	Preassigned activities handling rules
Activities	Preassigned activities filter
Destination	Possible routing actions
Destination of unassigned activities	Possible routing actions
Non-scheduled activities in the routing bucket	Unschedule and move to the routing bucket
Activities in the routing bucket	Move to the routing bucket
Preassigned non-scheduled activities	Unschedule and leave in the same route
Resources' routes	Reassign to another route
Prevent optimization *	Do not move to the routing bucket and do not reassign

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Old translation	New translation
To reorder activities, drag and drop the grid rows	To reorder rules, drag and drop the grid rows

To prevent rescheduling selected activities to another resource or day or to prevent unscheduling of selected activities to bucket by means of bulk routing, follow these steps:

1. Make sure you've a filter describing such activities.
2. Select the **Do not move to the routing bucket and do not reassign** option for the Possible routing actions of the given Optimization strategy filter.
3. Corresponding activities may not be assigned to another resource due to routing optimization. Routing engine doesn't change the planned start time of such activities. However, Routing may insert other activities before if there's enough time for them.
4. You may use this functionality effectively to lock the activities or to imitate the En route status for activities not eligible for fully pledged En route status usage.

For example, you may like to create a special property Locked (Yes/No) for an activity, and have two action buttons - Lock and Unlock, setting the property values correspondingly. If you've filter Locked activities, filtering those activities having Locked set to Yes, you may add this filter to the Optimization strategy filters for a routing plan allowing activities to be moved between routes and/or being reordered within the same route.

Technicians may lock the activity by clicking Lock when it was aligned with the customer that this particular resource at this particular time will do the activity.

Then, activities having Locked = Yes before routing will retain their ETA and resource assignment unchanged. Moreover, if an activity has had Locked = No when routing started, but changed the Locked value to Yes after routing started, but before routing results were applied, such an activity will not be changed by the routing results and thus retain the same ETA and assignment it had.

However, a manual intervention to routes during the time of routing run may lead to suboptimal routing results, so ensure that you've regular recurrent routing runs to constantly re-optimize the routes.

You can prevent activities from being reassigned or their ETA changed. Follow these steps:

1. Navigate to the Optimization strategy filter.
2. In the **Preassigned activities handling rules** dialog box, click the **Do not move to the routing bucket and do not reassign for the Possible routing actions** check box of the selected Optimization strategy filter.

Bulk Routing (High Uniformity) Routing Profile

The routing plan in the Bulk Routing (High Uniformity) routing profile distributes activities evenly across the entire workforce while still minimizing travel and work costs where possible.

The following table describes the values you must set in the **Routing plan** section:

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Setting	Value	Explanation
Routing Plan Name	Uniform – Bulk Routing	N/A
Routing Profile	Bulk Routing (High Uniformity)	N/A
Active	Checked	The routing plan must be active before the application can use it to run routing.
Time Limit	3 minutes	The amount of time that the plan runs. Three minutes is usually sufficient. In some cases, running the plan longer might produce a result that better matches your objectives.

The following table describes the values you must set in the **Routing schedule** section:

Setting	Value	Explanation
Run routing	N/A	N/A You can use any run schedule with this goal. Most companies that use bulk routing run the plan once a day in the evening or early morning.

The following table describes the values you must set in the **Filters** section:

Setting	Value	Explanation
Resources link	Activities	*Bulk Routing does not use filters. You can add filters to prioritize certain types of activities or certain resources over others.
Scheduled	Assignment Cost	Normal

The following table describes the values you must set in the **Filter parameters** section:

Setting	Value
Assigning Activities which are about to be late	Do not assign "overdue" activities and leave them in the bucket
Cost of not assigning an activity	Normal - default setting
Late arrival penalty	Normal - late arrival may result in rescheduling if the customer is no longer at home

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The following table describes the values you must set in the **Assignment parameters** section:

Setting	Value	Explanation
Enable routing by inventory	Check box is cleared	• Routing takes into account required inventories for all activities that are sent to routing. Activities which have no inventory requirements are not affected by this setting. • They will be routed in the same way as before. Activities which have inventory requirements can only be assigned to resources which meet all inventory requirements. • Activities will be left unassigned if there are no resources which meet their inventory requirements.
Enable Inventory Pickup	Check box is selected	Bulk routing may auto-create an inventory pickup activities to obtain required inventory pieces from the nearest warehouse and handle the changes during intra-day routing re-optimization runs. This increases the autorouted percentage value and improves routing quality as the same technician completes more activities.
Dynamic Routing	Check box is cleared	Dynamic routing enables you to control the number of activities or the amount of time that should be filled on the resources' schedules. Routing plans that use dynamic routing are typically run recurrently throughout the day.
Limit work by points	Check box is cleared	• This option is necessary only if you use points to estimate activities. • This option limits the number of activities assigned to a resource based on the maximum points allowed within the shift. • The point value for each activity must be sent through the API.
Try to schedule activities to service window start	Check box is selected	This option schedules activities as close to the start of service windows as possible. As a result, the activities are divided evenly across all of the resources in the bucket. Activities are typically more evenly distributed, but routes may be less efficient.
Center point home zone support and Home zone radius	4	An optional setting that permits you to specify a radius spans a technician's starting location. Penalties are assessed for assigning activities outside the circle of the defined radius. The further away the activity is, the higher the penalty.
Home zone radius overstep weight	4	This option defines the penalty to be applied if the resource leaves the home area to complete the activity. This option is displayed when **Center point home zone support** is selected.
Automatic Ordering	Check box is selected	This option places activities without service windows on the route in the most efficient order. Checking this option makes routes more efficient, but reduces the resources' freedom to exercise judgement in completing activities.

The following table describes the values you must set in the **Optimization Strategy** section:

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Setting	Explanation
Optimization Goal	Select the goal from the drop-down list: Reduce overdue, optimize routes, or assign high priority activities.
Filters	Filters compare routing results with the activities in the bucket and reassign activities based on the priorities set in the new filters. Click**Add filters** to add activities which can be optimized. Under Activities, select the filter that you want to run against the activities in the bucket. Under Destination for unassigned activities, select the status that you want to assign to activities that are not assigned to routes and are, instead, returned to the bucket.

This table describes the values you must set in the **Resource overtime** section:

Setting	Value
Assign activities even if the assignment causes overtime	Check box is cleared
Do not assign "overtime" activities and leave them in the bucket **Note:** When you select this option, resources do not receive activities that will extend their workday past their scheduled working hours.	Check box is selected
Do not assign activities with more than __ min. overtime	Check box is cleared
Do not assign activities that unlikely to be finished in __ min. before end of resource's day	Check box is cleared

This table describes the values you must set in the **Travel time** section:

Setting	Value
Minimize summary travel even if some activities require long travel times.	Check box is selected

Setting	Value
Note: This option produces routes with optimized travel times for the entire organization, but not necessarily for each individual resource. As a result, a few activities might require long travel times, but the amount of travel for the whole group is optimized.	
Avoid travel longer than __ minutes, even though some activities might not be assigned and summary travel might increase.	Check box is cleared

Related Topics

- Control Resource Overtime Through a Routing Plan
- Configure the Routing Plan Section of a Routing Plan
- How do I configure the run schedule for a routing plan?
- How do I add an activity filter to a routing plan?
- How do I fine-tune a routing plan to achieve specific goals?
- Control Travel Time Through the Routing Plan

Dynamic Routing Profile

The routing plan in the Dynamic Routing (2 Activity/120 min) routes activities frequently. This routing plan is useful when activities are booked shortly before the activity time or when you do not know in advance which resources will be available to accept the activities. Routing results are not as optimal as using bulk routing, but activities are routed closer to their actual activity time.

The following table describes the values you must set in the **Add routing profile** screen to create a dynamic routing profile:

Setting	Value	Explanation
Routing Plan Name	2hr in advance - Dynamic Routing	N/A
Routing Profile	Dynamic Routing (2 Activity / 120 min)	N/A
Active	Check box is selected	The routing plan must be active before the application can use it to run routing.

The following table describes the values you must set in the **Run schedule** screen to create a dynamic routing profile:

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Setting	Value
Run routing	Recurrent
Apply to activities within	1 day interval (Range of 1 and 99 days)
starting	Today
Start time	6:00
End time	20:00
Interval between runs	30 minutes
Activity days	Mon, Tue, Wed, Thu, Fri
Time limit	5 minutes

Three minutes is usually sufficient. In some cases, running the plan longer might produce a result that better matches your objectives. When activities are added to the system throughout the day and require a quick turn around, you must run routing plans frequently. Choose the recurrent option and run the plan to Today's activities. Set the interval between runs to a short interval, typically 30-60 minutes is optimal. The following table describes the values you must set in the **Assignment parameters** section to create a dynamic routing profile:

Setting	Value	Explanation
Home zone radius overstep weight	4	This option defines the penalty to be applied if the resource leaves the home area to complete the activity. This option displays only when Center point home zone support is checked. The default value is 4.
Try to schedule activities to service window start	Check box is selected	This option schedules activities as close to the start of service windows as possible. As a result, the activities are divided evenly across all of the resources in the bucket. Activities are typically more evenly distributed, but routes might be less efficient.
Automatic Ordering	Check box is selected	This option places activities without service windows on the route in the most efficient order. Checking this option makes routes more efficient, but reduces the resources' freedom to complete activities when they want to.
Center point home zone support and Home zone radius		An optional setting that enables you to specify a radius that spans a technician's starting location. During the routing process penalties are assessed for assigning activities beyond this radius. The further away the activity is, the higher the penalty.
Limit work by points	Check box is cleared	This option is only necessary if you use points to estimate activities. This option limits the number of activities assigned to a resource based on the maximum points allowed within a resource's shift. You must send the point value for each activity

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Setting	Value	Explanation
		through the API. This option displays only when **Center point home zone support** is checked.

The following table describes the values you must set in the **Filter parameters** screen to create a dynamic routing profile:

Setting	Value	Explanation
Load Resources for	120 minutes 2 activities	Dynamic routing enables you to control the number of activities that should be placed on the resources' schedules, or the amount of time that should be filled on the resources' schedules. 120 minutes means that the routing plan fills the resource's next 120 minutes with activities and 2 activities means that the routing plan assigns, at most, two activities to the resource.
Stop loading when any limit is exceeded	Check box is cleared	When checked, this option instructs the routing plan to stop adding activities to the resource's schedule when **either** the activity limit **or** the time limit is reached.
Stop loading when both limits are exceeded	Check box is selected	When checked, this option instructs the routing plan to stop adding activities to the resource's schedule when **both** the activity limit **and** the time limit is reached.
Assign activities even if the assignment causes overtime	Check box is selected	When you select **Assign activities even if the assignment cause overtime**, routes are optimized for travel time and work, but resources might need to work past their scheduled working hours.
Do not assign "overtime" activities and leave them in the bucket	Check box is cleared	When checked, this option instructs the routing plan to stop adding activities to the resource's schedule when **both** the activity limit **and** the time limit are reached.

The following table describes the values you must set in the **Resource overtime** screen to create a dynamic routing profile:

Setting	Value
Do not assign activities with more than __ min. overtime	Check box is cleared
Do not assign activities that are unlikely to be finished in __ min. before end of resource's day	Check box is cleared

> **Note:** When you select **Assign activities even if the assignment cause overtime**, routes are optimized for travel time and work, but resources might need to work past their scheduled working hours.

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The typical selection for this setting is Minimize summary travel even if some specific activities have long travel. This option produces routes with optimized travel times for the entire organization, but not necessarily for each individual resource. As a result, a few activities might require long travel times, but the amount of travel for the whole group is optimized.

How do I change the optimization goal for a routing plan?

You can now select optimization goals for the routing plan and set the routing plan parameters in the best way. When you select an Optimization Goal, routing tweaks the variable parameters (costs) and suggests changes to the routing plan parameter.

Migration

During the migration process, re-optimization goals are migrated to optimizations.

This table provides the re-optimization goals and new optimizations goals:

Legacy Re-optimization Goal	New Optimization Goal
Optimize routes	Default
Assign high priority activities	Maximized assigned activities number
Reduce overdue	Reduce activities overdue

To set optimization goal for a routing plan:

1. Navigate to the **Routing** page.
2. Select the routing plan that you want to modify in the list.
3. Click the **Modify** link to display the **Modify routing plan** dialog box.

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4. Expand the Optimization Strategy section and select an **Optimization goal** from the drop-down list:

This figure shows the Modify routing plan dialog box with the Optimization goal options:

↑ Routing

Bulk Routing

Time Limit - **3 min.**

Default	
Maximize the number of assigned activities	
Maximize activities per resource ratio	
Minimize total travel	
Prioritize earlier start of most important activities	
Reduce activities overdue	

∨ Optimization Strategy

Optimization goal | Default ▾ |
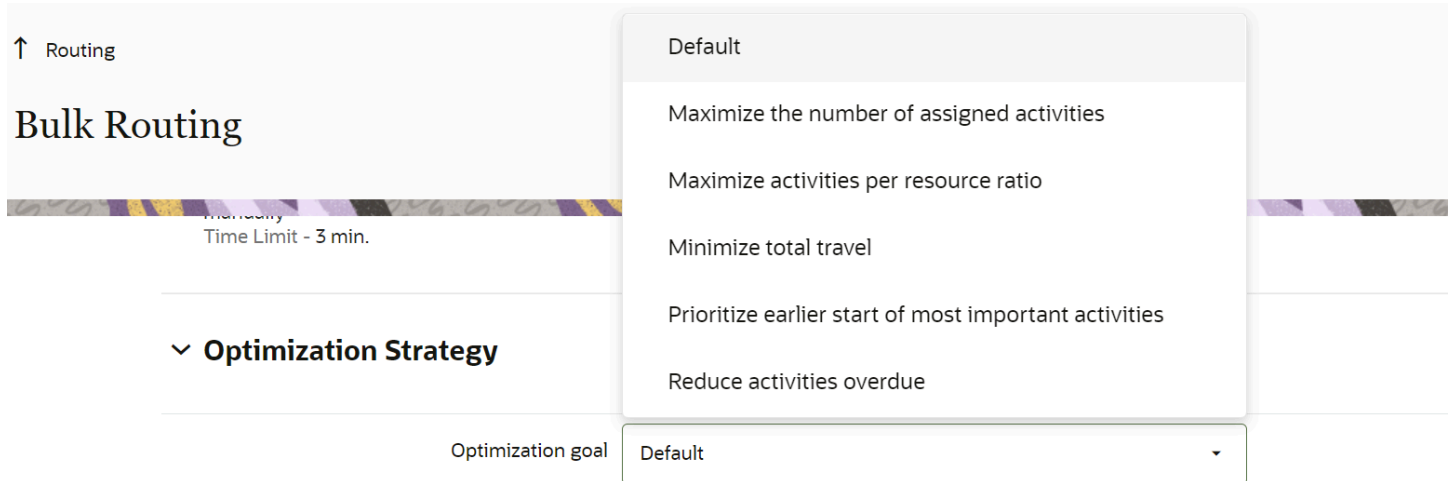
It is the default behavior. The reoptimization will only be started if it has the ability to assign new activities or change existing routes. There are no acceptance criteria.

5. When you select an Optimization Goal, routing tweaks the variable parameters (costs) and suggests changes to the routing plan parameter.

   o Default—Ensures that there are no changes in the general routing behavior in comparison with previous versions. This is the default value. Reoptimization starts only if routing can assign new activities or change existing routes.

   o Maximize assigned activities number—Slightly pushes the routing optimization behavior so that more activities are taken to the routes in total even if it requires more travel. If moving the activities between resource routes is ON, the routing plan will start only if there are non-assigned activities with high or highest non-assignment cost and the results are applied only if at least one such activity is assigned. The suggestions listed also help in setting up a routing plan to assign activities more aggressively.

   o Minimize total travel—Slightly pushes the routing optimization behavior such a way that less travel is involved even at the cost of lesser total activities number. The suggestions listed also helps to set up a routing plan to minimize travel more aggressively.

   o Maximize activities per resource ratio—Slightly pushes the routing optimization behavior in accordance to real travel time or distance in such a way that activities are assigning to less number of resources, leaving some of them completely free if possible. This option is recommended if there more personnel in the bucket that are needed for today and user would like to transfer resources to another bucket for some time. The suggestions listed also helps to set up a routing plan to minimize number of assigned resources.

   o Prioritize earlier start of most important activities—Pushes the activities with a higher cost of non-assignment closer to the beginning of the working day. This works only for Bulk Routing plans and works when you've selected Cost of not assigning an activity as the highest. Optimization starts only if routing can assign new activities; optimization results are automatically applied.

   Bulk routing tries to optimize the entire set of routes, rather than each individual route. Because of this, it's possible (although not likely) for a particular activity with a higher non-assignment cost to be scheduled

later than the one with a lower non-assignment cost, if such an assignment provides better overall optimization when travel time is considered.

To achieve the desired result, keep your non-assignment costs consistent among all the filters, including the ones for non-scheduled activities, for the activities that are already in the routes, and across all the routing plans within the profile, including optimization plans.

These constraints are applied:
- This optimization goal applies to bundled visits. It is expected that the technician at the job site for the first activity in a given bundle completea all the activities in the bundle. However, activities in the bundle must also be ordered by non-assignment costs, and the activity with the highest non-assignment cost must represent the entire bundle in the route.
- The activity's work skill, work zone, and calendar requirements are met.
- The activity's Delivery Window, Service Window, Time Slot and Access Hours are met.
- Late arrival penalties are considered for activities that have the same non-assignment cost priority.
- Travel is optimized while it doesn't affect activity order.
- An activity's SLA is observed, but only for activities that have the same non-assignment cost priority.

Nine main priority levels are used to prioritize an activity's start, ranging from Minimal to At All Costs. If additional levels are required, you can use the Late arrival penalty to distinguish the activity priorities further for the activities that have the same non-assignment cost (from Minimal to High). For example, an activity that has the Cost of non-assignment set to High and the Late arrival penalty set to Normal has a higher priority than an activity with the Cost of non-assignment set to Normal and the Late arrival penalty set to Normal. However, the first activity has a lower priority than an activity with the Cost of non-assignment set to High and the Late arrival penalty set to High.

○ Reduce activities overdue—If moving the activities between resource routes is ON, the routing plan will only start if there are activities to be processed with high or highest overdue penalty and actually assigned with overdue and the results are applied only if the resulting overdue was decreased by given percentage. The suggestions listed helps to set up a routing plan to minimize number of activities having overdue and total overdue value.

Based on the selected option, internal routing optimization strategy is tweaked for better achieving the goal (with the except of default Balanced mode, which leaves costs untouched). If there are other parameters that are set to suboptimal values according to the selected goal, the suggestions for their values will also be displayed in this section.

6. Click **Update** to save your changes.

If a resource within a team is made inactive or has a non-working day, their work skills aren't shared with the team anymore, so the work skills are recalculated. As a result, the activity may be moved to a bucket or assigned to another resource.

Are there any known constraints for optiimzation goals?

Here are some known constraints for optimization goals.

We don't recommend mixing routing plans with different optimization goals in the same bucket, especially if the plans having an optimization goal set to **Prioritize earlier start of most important activities** are combined with plans having other optimization goals. If such a combination is inevitable, we recommend preventing the ability to move

activities between routes and reorder activities within the same route for all the plans, except the ones that have the optimization goal set to **Prioritize earlier start of most important activities**.

We don't recommend using Immediate Routing for activities matching the filter for the same set of activities that are used by the plan having the optimization goal set to **Prioritize earlier start of most important activities** as the assignments may be handled differently. However, you can combine an Immediate Routing for Urgent activities plan along side of a plan having the optimization goal set to **Prioritize earlier start of most important activities**, providing that activities with Urgent priority levels have the maximum non-assignment costs in the plan settings.

Optimize Travels Within a Single Route

Routing allows you to optimize travels within a single route. Routing reorders the activities within the same route and reassigns them to another resource to achieve better travel results.

To set travel optimization within a single route, follow these steps.

1. Navigate to the **Routing** screen.
2. Find the row for the routing plan that you want to modify.
3. Click **Modify** to display the Modify routing plan dialog box.
4. Expand the Optimization Strategy section and select an **Optimization goal** from the drop-down list.
   - Choose **Do not move activities between routes and do not reorder activities** if you want the routing plan to add activities to the existing routes without moving the existing preassigned activities either between resources or within the same route.
   - Choose **Reorder activities within resource route** for the routing plan to reorder activities within the same route without moving them between different provider routes.
   - Choose **Move activities between resources routes only** for the routing plan to reassign the activities, but keep the order of activities in the same route unchanged.
   - Choose **Move activities between resources routes and reorder within the same route** so that the routing plan can both reassign and reorder activities.
5. Based on the selected option, Routing tweaks the internal routing optimization strategy to achieve the goal better.
6. To manage the chances of activities being moved within different routes, set the value Moving activities penalty value.

   If you set this value to 0, activities are moved whenever there are better routes according to the selected optimization goal and routing plan settings.

   The higher this value is, the bigger gain such a reassignment should bring for being applied, otherwise routes remains unchanged.

7. If the route reordering is applied, it allows routing improvement according to selected optimization goal and routing plan settings.
8. Click **Update** to save your changes.

   Routing observes activity work zones even if an activity is assigned back to the bucket from the resource route during re-optimization. So, if an activity and bucket work zones are different, such an assignment is impossible. For example, if a bucket has work zones A and B but not C, activities with work zone C can't be assigned back from the resource route during bulk routing, even if such an assignment is allowed at the filter level.

   If a resource within a team is made inactive or has a non-working day, their work skills aren't shared with the team anymore. So, routing recalculates the work skills and assigns activities accordingly.

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How to I add an activity filter to a routing plan?

You can use filters to prioritize certain types of activities or resources over others during the routing process. Filters are an alternative to using another routing plan for prioritization.

Before you start

You must create the filter, set the conditions, and make the filter available for routing first. To make the filter available for routing, ensure that the Routing check box is selected. In addition, ensure that the filter designated for routing doesn't have any dynamic filter conditions.

To configure routing parameters:

Here's what to do

1. Navigate to the **Routing Profiles** screen and find the routing plan that you want to add the filter to.
2. Click the **Modify** link.
3. Expand the **Filters** section of the **Edit Routing Plan** screen.
4. Click the **Add activity filters group** button.
5. Select the filter that you want to add to the routing plan from the **Activities** drop-down list.

   A drop-down list is displayed.
6. Select the type of activities to which the filter should be applied from the second drop-down list (if any).
   - **Non-scheduled activities in the routing bucket**. These activities are not currently on any route. They are not assigned to time slots or resources. Routing will attempt to route them during the next run.
   - **Activities in the routing bucket**. These activities are not currently on any route. They are assigned to time slots, but are not assigned to resources. Routing will attempt to route them during the next run.
   - **Preassigned non-scheduled activities**. These activities are already assigned to resources, but they are not assigned to time slots. You can use reoptimization to automatically move these activities during the routing process.

   You can add the filter for **Activities in existing routes** by clicking the **Add activity filter** link. These activities are already assigned to resources and time slots. You can use reoptimization to automatically move these activities during the routing process.
7. **Optional:** Under Assignment Cost, assign a cost to this filter.

   In general, the higher the cost, the less desirable the assignment. If you select **Do not assign**, activities of that type can never be assigned to a resource that meets this filter condition.
8. Repeat these steps to add additional filters to the routing plan. Arrange the filters in the order that you want them to be applied using drag and drop. The filters are applied in chronological order starting at the top of the list. The * (Other) filter is always applied last.
9. Click **OK**.

Assignment Cost for Multiple Activity Filters

In this example, the routing strategy includes these steps:

- Do not assign work to contractors.
- Assign activities to In-house resources before all others.

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The **Contractors** filter has the assignment cost **Do not assign** so that activities are never assigned to contractors.

The **In-House** filter has a lower assignment cost than the *** (Other)** filter so that in-house personnel receive activities before all other resources.

Configure an Activity Filter for Routing

Once you have added a filter to a plan, you can adjust some additional settings that affect how the Oracle Field Service Routing module processes the filtered activities.

> **Note:** Evaluate these settings carefully before changing them. They add constraints to the routing process that can significantly restrict the number of activities that are assigned to routes.

To configure an activity filter:

1. Navigate to the **Routing Profiles** screen and find the routing plan that you want to add the filter to.
2. Click **Actions** and select **Modify** to open the **Edit Routing Plan** screen.
3. Expand the **Filters** section of the **Edit Routing Plan** screen.
4. Find the filter that you want to configure and click **Settings**.
5. Select options for this filter based on your business goals and click Submit:
   - **Late arrival penalty:** The weighting options regarding lateness penalties range from "minimal" to "highest." Examples are provided to assist in selecting the best option. The application uses this information to weigh activity assignment decisions when there's a chance that a resource will arrive late to an activity.
   - **Assigning activities which are about to be late:** You can set a "lateness tolerance" that the application will accommodate when assigning new activities to resources.

     > **Note:** For preassigned activities, use the **Do not assign activities with more than X minutes overdue** option with a high X (for example 1000) value. Do not use **Assign activities even if resource is unlikely to arrive inside time slot** option.

   - **Cost of not assigning an activity:** If there is a chance that an activity that meets the conditions of this filter might not be assigned, then this option provides the application with a setting that it will weigh against other considerations to determine who will be assigned which jobs – and which might remain in the bucket. In essence, this helps the application prioritize certain types of activities.

     > **Tip:** The **normal** setting sometimes leaves too many activities unassigned. When this happens, test your results with the **high** setting or the **highest** setting.

   - **Allow rescheduling of activities from one day to another within routing plan period:** Use this option to reschedule activities in a segmentable activities routing plan. When this option is selected, only the activities for which the option is selected are rescheduled within the period that the routing plan runs. For example, if you have a segmentable activities routing plan that spans for five days, and you want to reschedule an activity that was supposed to be started on the second day, the activity will be rescheduled either for the third, fourth, or the fifth day. If an activity cannot be rescheduled, an appropriate message is displayed. Remember, the results of running a segmentable activities routing run without rescheduling is the same as running single-day runs for the same number of days.

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Alter Automatic Ordering for a Routing Plan

The **Not Ordered Activity Behavior** option in the **Add or Edit Routing Plan** dialog box places the activities that are without service windows on the route in the most efficient order. If you set it to Do not order, the application places these activities on the route, but does not assign a time slot. In this case, resources decide when to do the work. If you set the option to Order, it helps you complete more activities through the day, but it also reduces the resource's ability to use their own judgment in completing activities.

You can alter automatic ordering for the routing plan at a filter level.

Follow these steps:

1. In the Add/Edit Routing Plan, navigate to the Assignment Parameteres section.
2. In the **Not Ordered Activity Behavior** field, select the **Order by** filter option and click **Update**.
3. Alternatively, you can set this option in the Filters section. For each filter, select the row, click **Settings** to open the Update activities assignment rule parameters dialog box.

   This image shows the Update activities assignment rule parameters dialog box with Not ordered Activity Behavior drop-down list.

Update activities assignment rule parameters

⌣ time slot, are not to be assigned *

ⓘ * This only applies to new assignments. Activities already assigned may be "pushed" outside their time-limits due to other rules.

Cost of not assigning an activity

| Normal ▼ |

ⓘ Assign if it is not expensive

SLA policy

| Default ▼ |

ⓘ Scheduling activity start after the activity SLA window end is penalized with shortened aging period

Not Ordered Activity Behavior

| Order ▼ |

Do not order

Order

Order by filter

Dismiss   **Update**

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4. Select one of these options from the **Not Ordered Activity Behavior** drop-down list and click Update.
   - **Do not order**—Select this option if you do not want to change the activity ordering status – status of all activities will be as Ordered after the routing.
   - **Order**—Select this option if you want to make all of the activities as automatically ordered during the routing plan. This is a default value for new routing plans.
   - **Order by**—Select this option if you want to make all eligible activities as automatically ordered or unordered during the routing plan.

By default, when you choose the Order by filter option for Not Ordered Activity Behavior on routing plan level, all activity filters will have their Not Ordered Activity Behavior set to Order. The same setting is default for newly added filters.

> **Note:** When creating, routing plans will have Not Ordered Activity Behavior on routing plan level set up to Order. You must manually set this option.

What to do next

Migration from Oracle Field Service versions prior to 19D

Routing plans having **Automatic ordering** option set to **ON** after migration will have **Not Ordered Activity Behavior** on routing plan level set up to **Order**. Routing plans having **Automatic ordering** option set to **OFF** after migration will have **Not Ordered Activity Behavior** on routing plan level set up to **Do not order**, so the behavior of migrated routing plans remains unchanged after the migration.

Assign Activities to Temporary Resources

Normally routing considers activities from a given bucket and routes it down through the children in the hierarchical tree. However, there could be a situation where a resource must be temporarily assigned to work in an area, which is not part of the parent resource hierarchy. To handle such situations, routing can be configured to use resources from different parts of the resource tree.

To enable the feature, follow this process:

1. Select the **Work zone support** check box on the **Business Rules** screen.
2. Assign one (or more) work zones common with the routing bucket to the resource on the **Resource work zones** screen. You must assign the Work Zone to the resource, and not to the parent organization unit. Work Zones assigned to the parent Organization Unit (bucket or organization) will not be used for this purpose.
3. On the routing plan editor, open the **Filters** section and check the **Use resources outside the routing bucket** check box.

After you have followed the steps mentioned earlier, resources that are permanently located in the bucket and the resources that are temporarily assigned are treated equally while assigning activities. This is available for manual, once a day, recurrent or sequential routing plans. The Routing screen shows the number of resources available for the given bucket and routing plan. As with other routing plans, Routing takes into account the work skill levels, work zone ratios, work schedules, locations and all other parameters while routing activities for temporary resources.

> **Note:** The assign activities to temporary resources feature is not available for immediate or urgent routing plans.

Suppose that you have enabled the **Organizations** option and you have more than one organization defined. In this case, the activities are routed to the temporary resource only if the resource's organization matches with either the bucket's organization or the organization of any bucket or organization unit down the hierarchical tree. Suppose that

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you run a routing plan simultaneously on two (or more) buckets, which could be at different levels, but share the same resources that are either temporarily assigned or present in the tree hierarchy. The subsequent plans are paused until the previous plans finish running. This might lead to a delay in displaying the routing run results.

5 Routing Strategy

Test a Routing Strategy

After you set up a new routing strategy or make changes to an existing routing strategy you can review the effectiveness using three different reports.

The reports are as follows:

- Routing Comparison Report: This report displays the same statistical data about two separate routing runs so that you can compare the results. See Comparing two Routing Runs for more information.

- Routing Module Report: This report displays statistics about the routing results so that you can assess the effectiveness of your routing strategy. See Assess Summary Data about Routing Strategies for more information.

Tip:

- Do not make changes to your routing strategy until you have accumulated at least five days of data. The more data the system has to interpret, the more meaningful the results are.

- Change one routing setting at a time. If you change more than one setting at a time, you cannot be sure which setting caused the effect you see in the results.

Identify Errors in a Routing Run

You can view routing results in the Routing Runs list under **Routing Run Summary** in the Routing screen.

You can see the detailed report displaying any errors that the application might have encountered during the routing process.

To identify errors, follow the steps:

1. In the resource tree, select the bucket used for the routing run.
2. Navigate to the **Routing** screen.
3. Click **Routing Run Summary** to display the list of routing runs.
4. Locate and select the routing run that you want to view.
5. Click the **Report** tab.

   The routing results window is displayed, listing where each activity was routed from and which resource it was routed to. Errors are also displayed in this screen.

   The following figure shows the routing results, including errors and comments:

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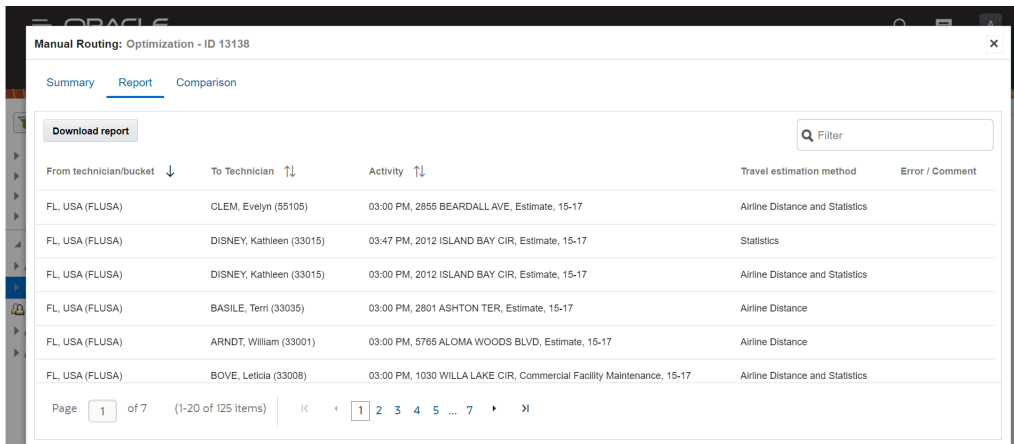
6. Review the Report tab.

- o **Initial resource**—Specifies the resource from whom the activity was routed.
- o **Destination resource**—Specifies the resource to whom the activity was routed.
- o **Activity**—Specifies the activity.
- o **Travel estimation method**—Shows the method of distance and/or time estimation for travel to each activity in the routing report. These methods are available for travel estimation:

    - Not estimated—Indicates that no travel estimation is done; This is a rare status in this report.
    - Using Defaults—Travel estimation uses company default values (see Default travel average time in minutes in the Configuration, Statistics page).
    - Statistics—Travel estimation uses company travel statistics
    - Airline Distance—Shows the airline distance using Airline distance speed in km/h parameter in the Configuration, Statistics page.
    - Airline Distance and Statistics—Shows the weighted average of value from company travel statistics and airline distance (see Coordinate calculation weight in the Configuration, Statistics page.
    - Manual Adjustment—Travel estimation is manually adjusted via interface
    - Street Level Routing—Time and distance are obtained from the Street Level Routing, provided the External Adjustment is adjusted via API.
    - Same Location—Indicates that no travel is needed as both activities take place in the same location.
- o **Error/Comment**—Displays any error or comment if available.

What are the routing error messages?

The following table provides the message codes:

Error Code	Error	Explanation
6000	Dynamic routing	This is a common error that you can expect to see when using dynamic routing. It means the activity was filtered out because it falls outside the dynamic routing

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Error Code	Error	Explanation
		time or activity limitations. If you want to route the activity, change either the dynamic routing time or activity limitations, or turn dynamic routing off.
6001	Both work length and key are undefined	This is a data validation error. The application needs to know the estimated activity length. It can be specified either through stats or directly in the case of activities. If this error message displays it means this value is not specified and therefore the activity cannot be routed. You should never see this error message under normal circumstances. To correct this error specify the estimated activity length.
6002	Negative cost is not allowed	This is a data validation error. Activity cost is used as a multiplier for all activity related penalties and to implement activity priorities. You should never see this error message under normal circumstances.
6003	No appropriate resources	This means that the activity has requirements that cannot be met by any available resources. This message does not necessarily indicate an error. It informs you that the application could not find a matching resource for the activity. Check the following settings to confirm that they are accurate for your mobile workforce: • Work Zones • Work Skills • Points (if you use them) • Resources Calendars
6005	Service window start is greater than service window end	This is a data validation error. The service window end time falls before the service window start time on the activity.
6007	Unacceptable overdue	The activity was not scheduled because it would be late and would start after the lateness settings specified in the filter parameters. Check the settings in the filter parameters. Go to the Filters section of the routing plan and click Settings to view filter parameters.
6008	Resource overloaded or has not enough resources	The activity was left unscheduled because of the Limit work by points parameter. The assignment of this job would have caused a tech to incur more points than his max threshold. You can adjust the resource's point allotment in Daily View.
6009	Resource workday stop	The activity was left unscheduled because it would have caused overtime for the resource. If you want to allow overtime for resources, change the Resource Overtime settings in the routing plan.
6010	Unacceptable travel time	The activity was left unscheduled because the travel time would have exceeded the maximum travel time allowed. If you want to allow longer travel, change the Travel time settings in the routing plan.
6011	Linked activity cannot be scheduled	Activity was unscheduled due to the *master* activity in the linked activities (activity link) hierarchy. The activity was unassigned due to link requirements.
6012	Link Cycle	Activity was unscheduled for break dependency cycle between linked activities (activity link).
6013	Unable to fit activity link	Activity was unscheduled because the application was unable to find route that didn't violate linked activity requirements.
6014	Effective service window start is greater than effective service window end	This is a data validation error. After applying all time related constraints, the activity should be ended before it can be started. Usually, this occurs because of an error in the data.

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Error Code	Error	Explanation
6015	SLA window start is greater than SLA window end	This is a data validation error. Activity claims that the SLA window will end before/earlier than the SLA window will start. Usually, this occurs because of an error in the data.
6016	May cause SLA violation	Activity was unscheduled because it would cause a SLA violation by another following activity. It is normal to obtain this unscheduling reason when using SLA windows.
6017	Other	Reserved for cases where there are no other specific or precise unscheduling reasons. There is a very low chance to see this error code.
6018	Cost configuration	Activity was not routed as either its non-assignment cost is too low or resources' time and travel costs are too high.
6019	Unacceptable SLA overdue	Corresponds to the Unacceptable SLA Overdue protection.
6020	Provider preferences	Activities cannot be assigned without Provider Preferences violation. Insufficient Capacity: There is no available employees to handle the activity among required/allowed employees.
6021	May cause unacceptable overdue on another activity	Assignment will cause unacceptable overdue on another activity Insufficient Capacity: The activity assignment pushes another, more important or non-movable, activity into unacceptable overdue.
6022	May cause unacceptable overtime on another activity	Assignment will cause unacceptable overtime on another activity Insufficient Capacity: The activity assignment pushes another, more important or non-movable, activity into unacceptable overtime.
6024	Unable to reach activity	Street level routing engine cannot make a route from the giving activity to any of the activities in the route. This occurs due to an error in the data. Other factors include travel restriction violations (if travel distance is over 200KM or 240 minutes, the error is returned). Check the activity address and the coordinates.
6025	Unacceptable travel distance	The activity was left unscheduled because the travel distance would have exceeded the maximum travel distance allowed. If you want to allow longer travel, change the Travel distance settings in the routing plan.
6063	Link constraint violation	Linked activities: Assignment will cause link constraint violation
6064	Result is not accepted according to optimization criteria	Routing run was either not started or run results were not applied because the conditions set for the given Optimization Goal were not met
6067	No required Work Zones	No technicians with required Work Zones available Insufficient Capacity: there is not enough resources in the required work zone to handle the activity.
6068	No required Work Skills	No technicians with required Work Skills available Insufficient Capacity: there is not enough resources with the required work skills set to handle the activity.
6069	No required inventory	Technician does not have the required inventory Insufficient Capacity: there is not enough resources with the required inventory available to handle the activity.
6070	Resource preferences	Assignment will cause Resource Preferences violation. See error code 6003 to understand and resolve this error.

Error Code	Error	Explanation
6071	Not enough points	Technician does not have enough points to perform this activity
6072	Calendar	No providers with working calendar
6077	No field resources having right work skills and/or able to work in particular work zones found	The activity's requirements cannot be met by any available resource. While this error does not necessarily indicate an error, you must check these settings to confirm that they are accurate for your mobile workforce: • Work Zones • Work Skills
6092	Activity is not movable	Activity type constraints or routing plan settings prevent the activity from being moved between days and/or resources.
6093	No field resources available calendar-wise to handle the particular activities found	The activity's requirements cannot be met by any available resource. While this error does not necessarily indicate an error, you should check the following settings to confirm that they are accurate for your mobile workforce: • Resources Calendars

Compare Two Routing Runs

You can compare two runs on the same day to see which run was more optimal. This information can help you determine the routing strategy or routing settings that are best for your organization.

This report is most helpful when you use it to compare runs that use the same set of resources and activities. This minimizes the likelihood that influences other than the routing plan are affecting the results.

> **Note:** Run this report in the Training instance where the set of activities and resources changes only once every 24 hours. Compare runs that have limited differences so that you can easily identify the setting having the desired effect.

To compare two routing runs:

1. In the Resource Tree, select the bucket for which you want to see routing results.
2. Navigate to the **Routing** screen.
3. Select the day that the routing runs occurred.
4. Click **Routing Run Report**.
5. Find and click the rows for the routing runs that you want to compare.
6. Click the **Comparison** tab.
7. Select the run you want to compare from the **Compare with** drop-down list.

   The **Routing Comparison Report** displays.
8. Review the results in the Routing Comparison Report.

   For example, the **Average mileage** field shows the average mileage per route for travel-enabled activities (in Average Mileage or Average Kilometer based on the units chosen) for each routing run.

   Results with a green check mark are the most optimal. Results with a red X are the least optimal. Apart from differentiating the results in colors, you can also review them as text.

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Assess Summary Data About Routing Strategies

The Routing Report provides statistics about the results of your routing runs. It is difficult to assess the success of your routing strategy when looking at individual runs or routes. This report consolidates the information from several runs and demonstrates the combined results so that you can measure productivity and drive time.

You can generate report data over almost any time frame and include both historical data and future data.

Among other pieces of data, this report presents travel time, work time, and number of activities. This report displays route statistics for each resource in the bucket and a summary of the statistics for the entire bucket. The report helps you:

- Determine the quality of routes.

- Understand past routing performance and the acceptability of future routes in an objective manner.

- Measure performance of the routing engine over time.

The Routing Report presents a summary of the following information about each resource's route:

- Minutes of travel

- Work

- Activity fit %

- Overtime

- Idle time

The report presents either the data for pending activities or the data for completed activities, depending on the time of day that you run it. The report includes the following sections:

- **End of the day, or days later:** Completed activities

- **Beginning of the day:** Pending activities

- **Mid-day:** Part pending activities, part completed activities

To view the Routing report:

1. Select **Routing Report** from the navigation menu.

   The Routing report is displayed.
2. Click **View** and select the date range for the report.
3. Optionally, change the value in the **Rows** field to change the number of visible report rows.
4. Click **Apply**.
5. Review the **Routing Report**:
   - **Aggregator:** Displays the name of the organization to which the resource is assigned.
   - **Resource:** Displays the resource's name as it appears on the Resource Tree.
   - **Date:** Indicates the date of route in Month/Day/Year format.
   - **Jobs:** Displays the number of jobs on the resource's route for that day.
   - **Travel, minutes:** Displays the resource's travel time for the day. Travel time represents total travel time to and from known locations. If an activity (such as lunch) is not a known location, the application will not

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represent that time in travel time. Similarly, time spent on activities (meetings or lunch), is not represented in the Routing Report.

- ○ **Work, minutes:** Displays the resource's time spent working on activities for the day.

- ○ **Job Fit %:** Displays the percentage of appropriate fit of resource based on his / her skills compared to the skills required by the activities.

- ○ **Overtime, minutes:** Displays the number of minutes estimated to exceed the resource's shift for that day. Overtime is defined as any work performed outside the resource's shift for that day. The application does not take into account the hours worked earlier in the week or the length of shift scheduled for that day. The application just looks for work that is performed outside the shift represented in that day's working calendar.

- ○ **Idle time, minutes:** Specifies the number of minutes on the route not allocated to activities or travel time.

Results:

At the bottom of the report, see the total for the page displayed and total for the report in aggregate.

Roll Back a Routing Run

You can return your activities and resources to the state they were in before you ran a routing plan. You can roll back a single day or a segmentable activities routing plan. Rolling back a routing plan returns the routed activities to the bucket and removes routes from the resources' calendars. You might want to roll back a routing run during testing or when a configuration mistake causes routing results that are not optimal.

Before you start

The following conditions must be met for a rollback to be successful:

- The activities must still be in Pending status.

- The activities must still be assigned to the resources that the application assigned them to. Any activities that do not meet these conditions will remain in place on the resources' routes after the rollback. You can move them back to the bucket manually.

To enable a routing run rollback:

Here's what to do

1. In the Resource Tree, select the bucket used for the routing run.
2. Navigate to the **Routing** screen.
3. Click **Routing Run Summary** to display the list of routing runs.
4. Click the row for the run that you want to roll back.
5. Click the **Rollback** button in the routing results window.

Results:

All activities and resources are returned to their previous states before a routing run.

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6 Routing Visualization

Introduction to Routing Visualization

The **Routing** screen gives a graphic, visual, and transparent display of what is actually happening in the Routing module.

Looking at the **Routing** screen, you can see the summary of the Routing Plans assigned to the selected bucket, the autorouting efficiency ratio, the resource utilization ratio and the actual savings achieved as the result of Routing.

To open the Routing screen, click the Navigation button and click **Routing**.

The **Routing** screen consists of the resource tree and the Summary Bar. The resource tree in the left part of the screen allows selecting buckets for which data is to be displayed. The resource tree has a hierarchical structure, that is, when a parent bucket is selected, the screen shows aggregated data of its child buckets.

The resource tree on the Routing screen now contains only those resources that are of resource type **Bucket** with the **Routing can assign activities** check boxes enabled. For each resource that you select in the resource tree, the Routing screen displays the number of activities for that resource. The calendar widget in the top part of the screen is used to select the date for which Routing data is to be displayed.

Reading the Routing Plans Block

The Routing Plans block shows the number of scheduled routing plans.

The number next to the **puzzle** icon is the number of routing plans assigned to the selected bucket or its child buckets, if any.

You can click the **Routing Plans** block to open the list of profiles assigned to a current bucket and its child buckets (if any).

- If there are no child buckets, only the profile of the current bucket with the list plans will be displayed.
- If no routing profile is assigned to the bucket, it is possible assign routing plans using the **Assign** link.

Reading the Routing Run Summary

The Routing Run Summary shows the list of available resource plans and resource profiles that are active. This Summary section has been updated to display the **Priority time left** and **Priority time spent**. This allows Oracle Field Service Professional and Enterprise users to visually see how much of the daily High Priority queued time xxx remains allowing for improved routing plan configurations.

The Routing Run Summary displays the aggregated data of the statuses of the routing plans assigned to the selected bucket. The following statuses are available:

- **Scheduled:** Indicates routing plans to be run according to the schedule
- **Completed:** Indicates finished routing plans
- **Running:** routing plans run currently in progress

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> **Note:** The **Rollback** option is not available in the Execution Summary block for new activity broadcasting.

Launched column contains information about users who ran the routing plan for Manual and Recurrent plans and special icons for Once a day, Sequential and Immediate plans.

When you select the **Immediate routing via Collaboration** option, the **Report** tab in the **Automatic Routing** window is updated with the following details:

- **Destination Resource**: Displays the user to which the activity is assigned.
- **Average Mileage**: Displays the Average Mileage per route for travel-enabled activities (either Average Mileage or Average Kilometer, depending of the units chosen)
- **Error/Comments**: Displays the Activity Status, namely, error messages or success messages.

When you select another bucket from the resource tree, the Routing Run Summary refreshes to display only those resource profiles and resource plans that are available for the selected resource. The Routing Run Summary shows 0 of 0 for **Assigned activities**, when activities are reassigned between resources or assigned back to the bucket during re-optimization. Only activities assigned from the bucket to a resource during optimization are added in **Assigned activities**.

You can now plan your routing runs in such a way that the routing runs at the expected time without waiting for any pending runs.

Daily queue would start at 00:00 UTC (aligns with new API limits for the new SKUs). For the initial release, all routing plans will run at high priority until it exceeds the limit after which all plans will run at low priority until the next day. For routing plans that take less than 1 second to execute, Routing considers 1 second as the runtime precision is 1 second.

The Routing Run Summary section shows the current state of the priority time limits for routing.

In the Routing screen, click Routing Run Summary to display the priority time left for routing and the overall time spent in routing at the bucket (or group of buckets) level.

This image displays the Routing Run Summary.

Routing Plans	Routing Summary	Autorouting	Resource Utilization	Savings
6 / 10	✓ 114 ⧗ 4.0h	N/A	N/A	N/A
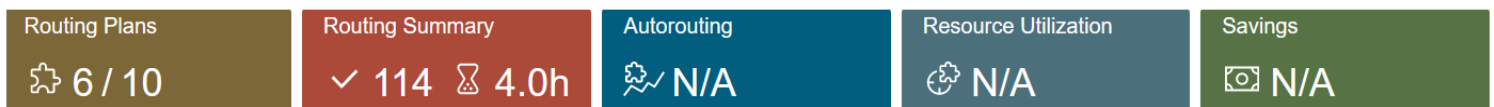
Priorities for routing include:

- Highest - Contains all routing runs for companies that are not yet exceeded their daily limits.
- Lowest - Contains all routing runs for companies which daily limits is spent.

You can switch to the **Lowest** priority option in case routing runs have exceeded the daily limit set for high-priority.

Routing limits are as follows:

- Professional:
    - TEST instances:
        - Priority Queueing = 1 hr/day
        - After priority is exceeded everything is low
    - PROD:
        - Priority Queueing = 2 hrs/day
        - After priority is exceeded everything is low

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- Enterprise:

  - TEST instances:

    - Priority Queueing = 4 hrs/day

    - After priority is exceeded everything is low

  - PROD:

    - Priority Queueing = 10 hrs/day (due to SLR if based on routing plan run time)

    - After priority is exceeded everything is low

In the Routing screen, click the Routing Summary tab.

The Routing Run Summary shows the current state of the priority time limits for routing. It displays the high priority time left and the overall high priority time spent in routing across the buckets.

What information is displayed in the Autorouting block?

The Autorouting block shows the efficiency of automatic Routing in percentage. The Autorouting block includes both scheduled activities for the date selected and non-scheduled activities that were routed but not necessarily by the date selected.

The Autorouting efficiency is calculated as the ratio of the number of autorouted activities to the total number of routed activities (both automatically and manually). This statistics takes into account the number of operations resulting in 'meaningful' changes to the activity routing, that is, changes to the date of the route or the resource to whose route the activity has been assigned. Operations bringing no changes to the activity date or resource to which the activity is assigned, are ignored. Similarly, reverse operations resulting in no change to the initial activity assignment are ignored, as well.

The figures shown in the **Autorouting** block are aggregated results of all resources in the selected bucket and its child buckets, if any. If no activities were routed manually, the Autorouting efficiency is 100%. The Autorouting drop-down menu contains the following data:

- **Manually processed:** Displays the number of manually routed activities

- **By Dispatcher / By Resource:** Allows viewing the number of manual operations performed by the dispatcher or by the resource. This section contains the breakdown of manual operations in the following types:

  - **Assigned:** Activities moved from the bucket to resources' routes

  - **Reassigned:** Activities moved between resources

  - **Unassigned:** Activities moved from resources' routes to the bucket

  - **Reordered:** Activities moved to a different position in the route. The **Reordered** category is not available in manually processed **By Resource** column

- Total amount of manually processed activities {number} (of {number})

Reading the Resource Utilization Block

The **Resource Utilization** block shows the efficiency of resources working time use in percent.

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The resource utilization ratio is calculated as the ratio of the actual resource useful time to the useful time defined by the baseline settings. The resource utilization block displays the aggregated result of all routes created as the result of Routing in the selected bucket.

The **Useful Time** section consists of **Working Time** (the time spent by the resources for actual activities performance), **Overtime** and **Travel Time**. The window also includes the **Idle Time** section, which is the waiting time between activities.

Configure Routing

The Routing functionality shows the savings achieved for the selected bucket as the result of Routing runs. This requires setting the average company parameters based on the existing statistics of the company business. In Oracle Field Service these parameters are called Baseline Settings.

To configure routing parameters:

1. Click **Baseline Settings** to open the list of parameters that need to be configured.
2. Set the following parameters:
   - **Fully-loaded resource hourly cost:** Cost of 1 hour of the resource's work based on the resource's salary, benefits, training, overhead costs, equipment costs or depreciation in US dollars. When the **Time savings view** is selected, this setting is disabled as it has no influence on time savings
   - **Cost per mile:** Cost of one mile of the resource's travel in US dollars (or cost of one kilometer of the resource's travel in your local currency). When the **Time savings view** is selected, this setting is disabled as it has no influence on time savings
   - **Overtime increase:** Resource's hourly cost increase in case of overtime in per cent
   - **Average resource daily work time:** Average time the resource spends on activities performance in a day in hours
   - **Average resource daily travel time:** Average time the resource spends on travel between activities in a day in hours
   - **Average resource overtime:** Average acceptable overtime per resource in hours
   - **Travel speed:** Average speed with which resources travel in miles per hour

Analyze Routing Run Results

In Routing Run Reports, we have improved the ability to analyze routing results.

Routing Run Summary Changes

- Routing Run ID have been added to Routing Run Summary table as an additional column
- Routing Run Summary table is redesigned to include pagination, sorting and filtering

Routing Report Changes

- Routing report window is shown by default in full screen mode to maximum the view

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- Routing report table was redesigned to include pagination, sorting and filtering

- Routing report may be downloaded in XML, CSV or Excel format for additional analysis

- Standard resources and activities hints were added to routing report

Routing Run Report Changes

To access results of a particular routing run, open Routing Run Summary. In the table displayed under Routing Run Summary, you may find a list of all the routing plan runs for a particular date.

To select the routing run needed, sort the table. To sort the table, click the column header of any column (for example Time or Run Id) . To select the sorting order (ASC or DESC), click the triangle next to the column header. The following columns are sortable:

- Run Id

- Time

- Bucket name

- Plan name

- User name

- Activities

- Resources

- Status

If the number of routing runs is too large to fit on a single page (for example, more than 20), you can switch to another page by using paging at the bottom of the list.

You can also use filtering to narrow the list. Just start typing the content (three or more symbols) by which you would like to filter the list, and when you type, only the records having the filtering symbols in the content of one (or more) of the columns are visible. The whole record is shown if at least one of the following fields contains a string to filter by:

- Run Id

- Bucket name

- Plan name

- User name

Follow these steps to access the results of the routing run.

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1. Click Routing Summary.

   The table displays the list of all the routing plan runs for particular date.

   This image shows routing plan runs in Routing Run Summary table.

2. Click a column header and select the sorting order (ASC or DESC) by clicking the triangle next to the column header. You can sort these columns:

3. Select the routing run.

   a. Switch to another page if you can't find the routing run listed on the existing page. Search results may run across multiple pages if the number of routing runs is more.

   b. Use filtering to narrow the list. As you start typing the content to filter the list, only those records that match the filtering symbols in one or more columns appear.

   c. You can see the entire record if at least one of these fields contains a string to filter by:

      - Run Id
      - Bucket name
      - Plan name
      - User name

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4. Click the row of the routing run to open the Summary window and to access the results of that routing run.

This image shows the Routing report window with Filter Results
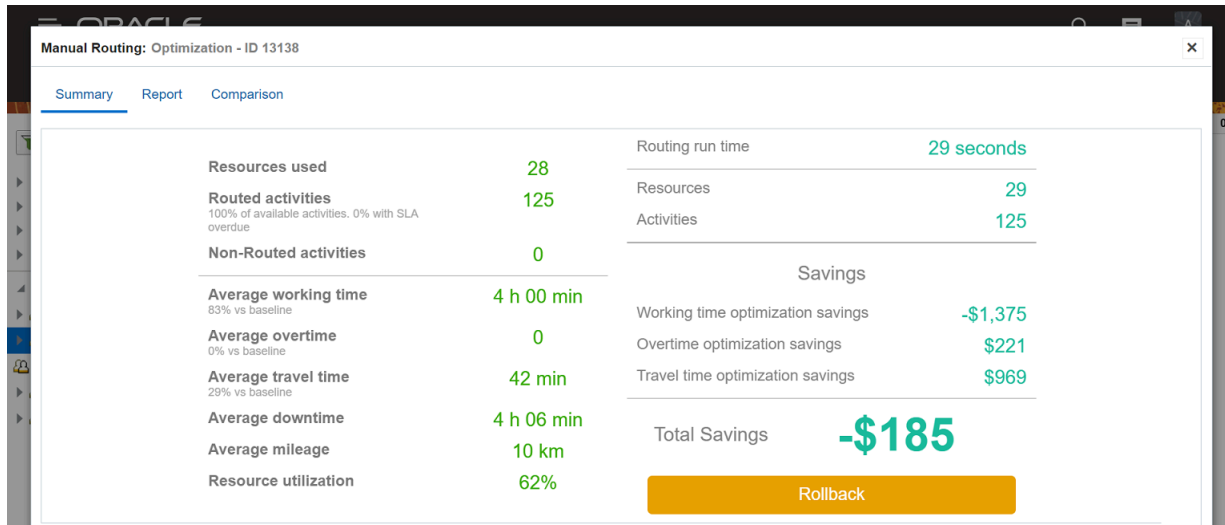
5. To review particular routing run results:

a. To find the needed record, you may order the table by the particular column and/or filter the data by typing the content (3 or more symbols) in the Filter field.

You can see the entire record if at least one of these fields contains a string to filter by:

- - Initial resource
- - Destination resource
- - Activity ID (Depends on the value of Activity time view label)

b. To view more information regarding activity or resource, hover the mouse over resource or activity ID to show the hint popup.

c. To use standard actions like accessing resource or activity details, reassigning activity or getting directions right from the routing run report, click on resource or activity ID and use the actions link on the bottom of the hint popup.

d. To further analyze routing run results, click Download report and select a format to initiate download. You may import the file into spreadsheet or analytical software.

e. Steps to configure:

- - To choose the format of downloading the report, for Legacy Manage go to My Display and select the required value under the Default export format drop-down list. In case of Core App, open the Edit Resource/User for given resource and select the required value from the Default export format drop-down list.
- - To configure activity label on routing report, click Configuration, User types, Select user type, Screen configuration. In the Screen Configuration tab, select Collaboration and Identifiers, Identifiers, Activity identifier and set up the fields needed. If it is empty, the value set for Activity time view label (click Configuration, User Types, Select user type, Screen Configuration, Application screens, Main menu, Dispatch console, Activity time view) is used. If both are empty, standard format "Activity type - activity id" is used.

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View Routing Run Results Analysis

Starting Update 22C, Routing allows you to collect routing run statistics over different days and different buckets for further analysis to identify more effective ways to route data and apply preventive measures if needed.

This feature offers these new functionalities:

- routingRunEvent has some new fields added to it, and two fields - *routingRollbackRunId* and *type* are obsolete as of now

- Option to export daily routing run results into OAC and Daily Extract

- Calculations of Not Routed Activities, Average Working Time, Average Overtime, Average Travel Time, Average Downtime and Average Mileage that are shown in Routing Summary and Report Screens fixed for correctness to cover corner cases

- Messages for non-successful routing runs (skipped, failed or terminated) slightly corrected for clarity

Before analyzing routing runs, make sure that you have an existing OAC or Daily Extract integration or add a new one.

Follow these steps:

1. Navigate to Configuration, Applications.
2. In the Applications page, add the new integration by adding an application.
   This image displays the Add application dialog box:

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3. Once this is done, open the integration application. In the Add Configuration dialog box, add the **Routing Run Results** field set to it.

This image displays the Add configuration dialog box:

4. Choose the fields needed from the list.

This image displays the Add field dialog box:

Results:

This table lists the fields you can add:

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Event Field name for REST API	Recommended Field Label for OAC	Type of the field	Definition of the field
routingRunId	ROUTING_RUN_ID	int	The unique ID of the specific routing run
routingPlan	ROUTING_PLAN_NAME	string	The name of the routing plan that was run. Is not unique.
routingPlanId	ROUTING_PLAN_ID	int	The unique ID of the routing plan that was run.
routingProfile	ROUTING_PROFILE_NAME	string	The name of the routing profile that the routing plan belongs to. Is not unique.
routingProfileId	ROUTING_PROFILE_ID	int	The unique ID of the routing profile that the routing plan belongs to.
startType	TYPE_OF_ROUTING_START	string	Type of routing start: • When routing is started automatically on schedule, the value is 'automatic'. • When routing is started manually by user, the value is 'manual'.
resourceId	RESOURCE_INTERNAL_ID	int	The internal ID of the routing bucket.
targetDate	ROUTING_TARGET_DATE	string	The date for which the activities are routed. The format is 'YYYY-MM-DD'.
numberOfDays	NUMBER_OF_DAYS ROUTED	int	For a single day routing, the value is 1. For multi-day routing, the value is the number of days routed, starting from 'targetDate' and going into the future.
result	ROUTING_RESULT	string	• When the routing is executed successfully, and some activities are moved as a result, the value is succeeded. • When the routing execution is stopped by the user, the value is stopped. • When the routing execution fails, the value is failed.
message	FAILURE_MESSAGE	string	The field contains the error description when 'result' is 'failed' or 'skipped'. List of possible errors and solutions are available under

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Event Field name for REST API	Recommended Field Label for OAC	Type of the field	Definition of the field
			Troubleshoot Routing in the Using Routing guide.
routingRunDuration	ROUTING_RUN_DURATION	int	The duration (in seconds) of the routing run.
activitiesMatched	ACTIVITIES_MATCHED_FILTERS	int	The number of activities and per-existing activity segments matching the routing plan filters.
activitiesInRoutesBeforeRouting	ACTIVITIES_IN_ROUTES_BEFORE	int	The number of activities and per-existing activity segments that were in routes of resources before the routing run.
activitiesRouted	ROUTED_ACTIVITIES	int	The number of activities scheduled and assigned by the routing run.
activitiesNotRouted	NOT_ROUTED_ACTIVITIES	int	The number of activities matching the routing plan filters but not routed.
resourcesMatched	RESOURCES_MATCHED_FILTERS	int	The number of resources matching the routing plan filters.
resourcesUsed	RESOURCES_WITH_CHANGES	int	The number of resources with assigned or removed activities by the routing run.
averageWorkingTime	AVERAGE_WORKING_TIME	int	The average working time of the resources (in minutes).
averageOvertime	AVERAGE_OVERTIME	int	The average overtime time of the resources (in minutes).
averageTravelTime	AVERAGE_TRAVEL_TIME	int	The average travel time of the resources (in minutes).
averageDowntime	AVERAGE_IDLE_TIME	int	The average downtime time of the resources (in minutes).
extendedStatus	EXTENDED_STATUS	string	The field includes: • routing • routing_rollback If type is 'routing', then next position in the field shows routingAlgorithmType. This field may take values: bulk, urgent, and immediate.

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Event Field name for REST API	Recommended Field Label for OAC	Type of the field	Definition of the field
			If type is 'bulk' or 'routing' then next position in the field shows shows result if it differs from possible values of the field result. When there are no activities found, the value is 'skipped'
			The next position in the field is set to notAccepted and points at the case when it is 'bulk' 'routing', 'result' is 'succeeded' but was not applied
			Allowed combinations: • routing-rollback • routing-bulk • routing-urgent • routing-immediate • routing-bulk-skipped • routing-bulk-notAccepted • routing-immediate-skipped • routing-broadcast
averageMileage	AVERAGE_MILEAGE	int	The average travel mileage of the resources (in miles or km).
reoptimizedActivities	REOPTIMIZED_ACTIVITIES	int	The number of activities re-optimized by the routing run.
createdActivities	CREATED_ACTIVITIES	int	The number of activities were created automatically for the routing run.
removedActivities	REMOVED_ACTIVITIES	int	The number of removed activities (which may be warehouse visits or activity segments)
startTime	ROUTING_RUN_START_TIME	string	The time when the routing run started in UTC time zone. The time format is YYYY-MM-DD HH:MM:SS.
assurancePercentage	ASSURANCE_OF_ROUTING_RESULT	double	The assurance of routing result, from 0 to 100. The lesser assurance is, the less confident is the result, which, in most cases, may be connected to sub-optimal results.

Event Field name for REST API	Recommended Field Label for OAC	Type of the field	Definition of the field
			Typically, for good results one may expect assurance 85 or more.
consumedTime	CONSUMED_TIME	int	Actual time (in seconds) that was consumed by SLR and routing engine during the routing run.
routingPlanTimeLimit	TIME_LIMIT	int	Time limit for the routing plan (in seconds).
routingPlanOptimizationGoal	OPTIMIZATION_GOAL	string	If there is an optimization goal at the routing run, the field shows the goal. May be one of the following: • balanced • minimize_travel • maximize_jobs • maximize_jobs_density • reduce_overdue"
routingPlanTimeLimitSlrPercenta	PERCENTS_OF_TIME_LIMIT_FOR_SLR	int	Part of total time limit which is time limit for SLR service
notAssignedDueToValidationIssue	NOT_ASSIGNED_VALIDATION	int	Configuration / Data validation errors
notAssignedDueToChangesWhileI	NOT_ASSIGNED_ROUTING_RUNNING	int	The assignment is impossible due to changes that happened while routing was running
notAssignedDueToActivityConfig	NOT_ASSIGNED_ACTIVITY_CONFIG	int	Not-assignment reason: configuration of an activity
notAssignedDueToResourcesConf	NOT_ASSIGNED_RESOURCES_CONFIG	int	Not-assignment reason: configuration of resources
notAssignedNeedsManualAssignr	NOT_ASSIGNED_ASSIGN_MANUAL	int	Not-assignment reason: the constraint violation. Try to assign the activity manually
notAssignedOtherIssuesCount	NOT_ASSIGNED_OTHER	int	Other Not-Assignment Reasons
partiallyAssignedSegmentableAct	PARTIALLY_ASSIGNED	int	Partially assigned segmentable activities
notAssignedDueToDynamicModel	NOT_ASSIGNED_DYNAMIC_MODE	int	Activities were not assigned in accordance with routing plan dynamic mode settings

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Event Field name for REST API	Recommended Field Label for OAC	Type of the field	Definition of the field
notAssignedDueToCostSettingsCo	NOT_ASSIGNED_COSTS_ SETTINGS	int	Not-assignment reason: routing plan and/or resource type cost settings may be suboptimal
notAssignedDueToTravelRestricti	NOT_ASSIGNED_TRAVEL_ SETTINGS	int	Not-assignment reason: activity locations and routing plan travel settings prohibits assignment
notAssignedDueToOptimizationCr	NOT_ASSIGNED_THRESHOLDS	int	Activities were not assigned in accordance to optimization criteria chosen
resourceBlockedDueToRoutingSch	BLOCKED_RESOURCES	int	Resource are blocked by another run as of sub-optimal routing plan schedule
notAssignedNeedsOvertimeOverd	NOT_ASSIGNED_OVERTIME_ OVERDUE	int	Not-assignment reason: the overtime/overdue constraint violation. Try to assign manually with relaxed constrains or just relax business rules on overdue/ overtime for the routing plan
subcategory	SUBCATEGORY	string	Reserved for future needs
resourceExternalId	RESOURCE_EXTERNAL_ID	string	The external ID of the routing bucket.
routingRollbackRunId	RUN_ID_ROLLED_BACK	int	obsolete
type	TYPE_OF_THE_RUN	string	obsolete

Routing Results Optimization Through Routing Run Data Analysis

You can analyze the routing run data to optimize the routing results.

To optimize the routing parameter, export the Routing Runs Result Data into Oracle Analytics or any other analytical tool. Then calculate the total of every notAssigned* field (see table below) and choose one to three main reasons, for which the sum of corresponding error category is maximal.

After this is done, see the table below for the possible corrective actions.

We recommend to perform this analysis on a bucket-by-bucket basis, as the situation may differ slightly due to geographical differences or lines of business.

Category	Routing Error Numbers	Event Field Name	Description	Corrective actions
Configuration / Data validation errors	6005, 6015, 6023, 6076	notAssignedDueToValidation	Customer should never see this error message under normal circumstances.	N/A
Reasons related to Dynamic mode of routing	6000	notAssignedDueToDynamicl		Reconsider Dynamic mode settings in routing
Reasons related to the Configuration of an activity	6056, 6057, 6061, 6090	notAssignedDueToActivityC	Activity doesn't have work zones or work skills; activity type is not configured for routing; activity links don't supported by chosen routing type	Revise the specific activity configuration
Reasons related to the Configuration of resources	6073	notAssignedDueToResource	Resources do not have active users	Revise the specific resource configuration
Reasons related to routing plan cost settings	6017, 6018	notAssignedDueToCostSetti	Routing plan settings do not correspond to resource costs	Revise balance of the following costs:
Reasons related for travel existence and restrictions	6010, 6024, 6025	notAssignedDueToTravelRes	Activities cannot be assigned as routing either unable to calculate travel or calculated travel is bigger then the limit set at the routing plan level	Revise the following: • Activity non-assignment cost • Activity overdue penalty • Resource working hours cost • Resource overtime cost • Resource travel cost • Coordinates availability for activities and resource locations; • Travel keys availability for activities and resource locations; • Routing plan settings for unacceptable travel time and distance. In addition, check if your routing plan includes SLR and processes more then 6000 activities and/or 600 providers. If yes, consider splitting it into several routing runs using more precise filters.
Reasons related to the constraint violation	6003, 6008, 6011, 6013, 6020, 6028, 6063, 6067, 6068, 6069, 6070, 6071, 6072, 6077, 6078, 20188	notAssignedNeedsManualA	Activity cannot be assigned due to all possible providers miss needed work zone, work skill, inventory or points, don't have active	Assign activities manually with relaxed constraints

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Category	Routing Error Numbers	Event Field Name	Description	Corrective actions
			calendars, do not fit the activity preferences or activity link constraints.	
Reasons related to the not enough time in routes to place activities into	6007, 6009, 6016, 6019, 6021, 6022, 6079	notAssignedNeedsOvertime	There are too many activities for the same time slot or too less time left in the routes for resources, capable of doing most of the activities.	• Check the average idle time (see **averageDowntime** for details). If it is big enough - check if the resource configuration as of work zones, work skills and time slots corresponds to existing activities. • Relax routing plan settings as of on overdue/overtime for the routing plan; • Assign activities manually with relaxed constraints; • It may also be a good idea to check quota/ booking configuration to reduce overbooking of activities.
Reasons related to not routing of particular activities segments	6027	partiallyAssignedSegmentab	Some segments were routed, but others are not due to routing plan settings and/or activity type configuration	Revise minimum and maximum segment size for the given segmentable activity type;Increase routing plan days interval for multi-day routing plan interval.
The assignment is impossible due to changes that happened while routing was running	6050, 6051, 6052, 6054, 6055, 6058, 6059	notAssignedDueToChangesW	Manual changes during routing run made assignment impossible.	N/A
Reasons related to optimization goals	6064	notAssignedDueToOptimiza	The optimization threshold is higher then what was routing able to achieve.	Revise the optimization thresholds
Reasons related to routing plan schedule	6091	resourceBlockedDueToRouti	It is responsibility of a person setting up routing to create such a schedule so routing plans using the same resource would not run within the same time period.	Reconsider routing plans schedule so routing plans using the same resources do not intersect.
Other issues	all others	notAssignedOtherIssuesCou	N/A	N/A

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Manual and Automatic Routing Run

Routing Plans scheduled to run according to the **Run schedule** settings are run automatically at the scheduled time. However, each Routing Plan assigned to the selected bucket can be started manually when necessary.

Run a Routing Plan Manually

You can run a routing plan that is assigned to a bucket either manually or automatically. This procedure describes how to run a routing plan manually.

Before you start

The puzzle icon that is used to run a routing plan manually is controlled by the **Routing** visibility. When the visibility is disabled for a user, the **puzzle** icon is hidden and the user cannot start routing plans manually.

To run a routing plan manually:

Here's what to do

1. Navigate to the **Activities** screen (Time View, List View and Map View).
2. Select a bucket in the resource tree and click the puzzle icon.

   The list of all routing plans assigned to the bucket is displayed. The list also shows the number of non-assigned activities in the bucket and the number of available resources.

   > **Note:** When a resource other than bucket is selected, the puzzle icon is hidden.
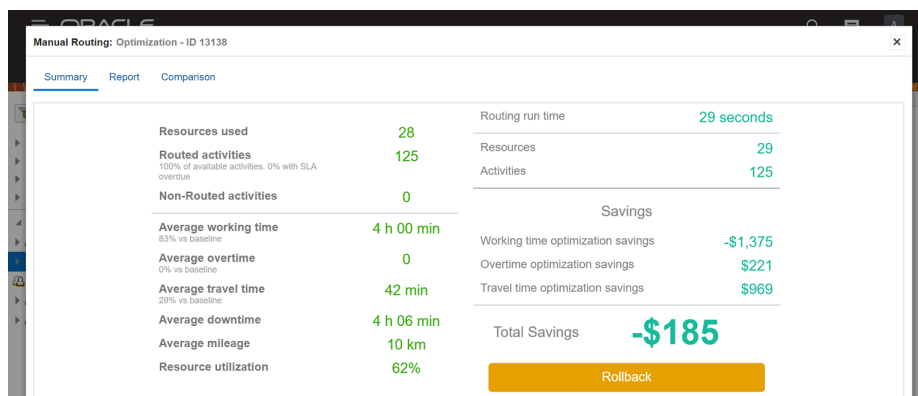
3. Click **Run**.

   A confirmation dialog box appears prompting you to confirm that you want to manually start the selected plan.
4. Click **OK**.

   The **Manual routing** window with processing icon is displayed. The title of the window displays the Routing Plan name and the ID. When the routing plan is running, the window shows a shuffling puzzle representing the progress of the routing run. The right pane shows the Routing run statistics.

   This image displays the Summary tab in the routing results window:

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5. Review the following fields on the Results window

Field	Description
Resources used	Indicates the total number of resources to which activities have been assigned.
Routed activities	Indicates total number of activities assigned by Routing. This section also includes the percentage of the assigned activities in the total number of activities in the bucket and the percentage of activities assigned with SLA overdue.
Non-Routed activities	Indicates the total number of activities not assigned by Routing in the current run with their breakdown by non-routing reasons.
Rejected activities	Specifies the number of activities which could never be assigned in the current conditions and the reasons for their non-assignment. For example, if some activities cannot be assigned as no resource in the selected bucket meets all their requirements, such activities will be rejected. The number of rejected activities is included in the total number of non-routed activities.
Average working time	Indicates the average time resources spend on performing activities in a working day and its ratio against the baseline figure.
Average overtime	Indicates the average overtime created as the result of the Routing run and its ratio against the baseline figure.
Average travel time	Specifies the average travel to be performed by resources as the result of the Routing run and its ratio against the baseline figure.
Average down time	Indicates the average idle time created as the result of the Routing run and its ratio against the baseline figure.
Average Mileage	Specifies the average mileage per route for travel-enabled activities (in Average Mileage or Average Kilometer based on the units chosen).
Resource utilization	Specifies the efficiency of resources working time use in per cent.
Routing run time	Indicates the time in which the Routing run was completed.
Days	Indicates the total number of days in the period for which segmentable activities routing run is planned for.
Resources	Indicates the total number of resources in the bucket.
Activities	Indicates the total number of activities in the bucket
Savings	Specifies the financial savings achieved by the Routing run broken down into: o **Working time optimization savings:** Savings achieved as the result of resources' working time increase o **Overtime optimization savings:** Savings achieved as the result of overtime reduction o **Travel time optimization savings:** Savings achieved as the result of travel time reduction
Total savings	Indicates the sum of Working time optimization savings, Overtime optimization savings, and Travel time optimization savings.

When the routing run completes, its results are immediately applied, that is, the activities are placed in the resources' routes. To reject the routing run results, you can click **Rollback** (the activities will be returned to the bucket).

Automatic Routing Run

Automatic Routing runs require no user actions to start. When a Routing Plan is run automatically, no pop-up windows appear. The Routing plans that are currently running are shown in the **Running** status under the **Routing Run Summary**. Click the line of a running Routing Plan to open the **Automatic Routing** window that has the behavior and functionality similar to that of the **Manual Routing** window described previously.

Unlimited Queued Routing

Oracle Field Service Professional and Enterprise Cloud subscribers will have access to unlimited queued routing. Routing runs will be prioritized into High Priority and Standard Priority runs with High Priority runs being processed prior to Standard Priority routing runs. Each subscription and Instance type will have a number of high priority hours allocated per day where the hours will reset daily at 00:00UTC.

Subscription Type	Oracle Field Service Professional	Oracle Field Service Professional	Oracle Field Service Enterprise	Oracle Field Service Enterprise
Instance Type	TEST	PROD	TEST	PROD
High Priority (hours/day)	1	2	4	10
Standard Priority (hours/day)	Unlimited	Unlimited	Unlimited	Unlimited

Users can manage the routing run time using the Time Limit parameter in the Run Schedule section of the Routing Plan. The actual run time used is displayed on the Routing Run Summary page for each individual routing plan that has been executed. Any routing plan that take less then 1 second to execute with consume 1 second in the calculation.

Beginning daily at 00:00 UTC, any configured and executed 'manually', 'once a day', 'recurrently' and 'sequentially' routing run will be automatically assigned a High Priority status. Each executed routing run will reduce the number of High Priority hours available that day. After the allotted number of High Priority hours is consumed for an instance, all subsequent routing runs will default to the Standard Priority where they will be processed based on their priority.

Example Scenario

Following is an example scenario:

- Subscription Type = Oracle Field Service Professional
- Instance Type = TEST
    - High Priority (hours/day) = 1 hour
    - Standard Priority (hours/day) = Unlimited
- Routing setup:
    - Routing Plan = Bulk
        - Routing Run = Once a Day
        - Run Time = 07:00

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- Time Limit = 15 minutes
  - o Routing Plan = Daily
    - Routing Run = Recurrently
    - Run Time = 08:30-18:30
    - Interval = 60 minutes
    - Time Limit = 10 minutes
- Outcome:
  - o Bulk routing runs in 5 buckets with each bucket's routing run takes 4 minutes to execute.
  - o Daily routing runs in 5 buckets with each bucket's daily run takes 1 minute to execute.

Type	Time	Total Minutes Used	Priority	Notes
Bulk	07:00	20	High	o 5 Buckets * 4 minutes = 20 minutes o High Priority since this is the first run after 00:00 UTC
Daily	08:30	5	High	o 5 Buckets * 1 minute = 5 minutes o High Priority since total time used is 25 minutes
Daily	09:30	5	High	o 5 Buckets * 1 minute = 5 minutes o High Priority since total time used is 30 minutes
Daily	10:30	5	High	o 5 Buckets * 1 minute = 5 minutes o High Priority since total time used is 35 minutes
Daily	11:30	5	High	o 5 Buckets * 1 minute = 5 minutes o High Priority since total time used is 40 minutes
Daily	12:30	5	High	o 5 Buckets * 1 minute = 5 minutes o High Priority since total time used is 45 minutes
Daily	13:30	5	High	o 5 Buckets * 1 minute = 5 minutes o High Priority since total time used is 50 minutes
Daily	14:30	5	High	o 5 Buckets * 1 minute = 5 minutes o High Priority since total time used is 55 minutes
Daily	15:30	5	High	o 5 Buckets * 1 minute = 5 minutes o High Priority since total time used is 60 minutes
Daily	16:30	5	Standard	o 5 Buckets * 1 minute = 5 minutes o Standard Priority since Priority Time is used
Daily	17:30	5	Standard	o 5 Buckets * 1 minute = 5 minutes

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Type	Time	Total Minutes Used	Priority	Notes
				o Standard Priority since High Priority Time was consumed
Daily	18:30	5	Standard	o 5 Buckets * 1 minute = 5 minutes o Standard Priority since High Priority Time was consumed

Receive Routing Advice from Oracle

Oracle provides services to assist you in assessing your routing needs, developing a routing strategy, and implementing that strategy in Oracle Field Service. Oracle representatives can also assess your current routing strategy and assist you in improving the results. For details about these services, contact Oracle support.

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7 Run and Manage Routing

Start a Routing Plan Automatically

If your routing strategy includes running the module automatically, the routing process requires little in the way of management. In special circumstances, you might need to fine-tune the routing results, or run routing manually. The section includes instructions for performing manual routing tasks. You can configure routing to run automatically.

Start a Routing Plan Manually

Routing is typically run automatically at specific times as determined by your business goals. Sometimes, however, you may need to run routing manually. For example, you might want to run routing manually during the testing phase or if the bucket unexpectedly fills up mid-shift.

You can run any routing plan manually except the immediate ones. You can also have a plan that typically runs automatically or that is scheduled to recur. Manually starting the routing plan once a day or recurrently will cause the next scheduled run to be skipped. The scheduled runs after the skipped one will automatically run according to the schedule.

To run a routing plan manually:

1. In the Resource Tree, click the bucket for which you want to run routing.
2. Click **Dispatch**.
3. Click **Routing** from the drop-down menu.

    The **Routing** screen is displayed.
4. Optionally, click **Routing Plans** to open the Routing Plans block.
5. Locate the row for the routing plan to start.
6. Click **Actions** and select **Start manually**
7. Click **OK**.

    The activities are routed to appropriate individuals and the routing statistics are updated. The **Rollback** button is displayed.

Related Topics
- Identify Errors in a Routing Run

Route an Individual Activity Manually

If an activity is not routed during a routing run, or if you are not satisfied with the way it was routed, you can manually move it to a resource's route.

Note: If a scheduled activity is not completed before the end of the day, you must recreate it for the following day. You cannot move or route the activity after the end of the day.

8 Troubleshooting

Troubleshoot Routing

If the routing results are not what you expect, try the solutions in this section.

Symptom	Possible Explanations and Solutions
More than one resource is in the same neighborhood over the course of the day. How can this be the most efficient route? Resources are crossing paths over the course of the day. How can this be an efficient route? A resource is travelling a long distance to reach an activity even though another resource appears to be closer to the activity. How can this be an efficient route? A resource's activities seem to be all over the map. How can this be an efficient route?	• The application considers a number of factors when routing activities, including work skills and preferred resources. The resource that was already in the neighborhood might not be qualified to take the other activity in the neighborhood, or might be required on an activity at the same time in another location. • The application optimizes routing for the entire workforce, not just one or two individual resources. As a result, you might occasionally notice an individual route that seems to be less than optimal, but overall, the results of the entire routing run are optimized. • To verify the optimization of the routing run for the entire bucket, view the statistics in the Routing Report.

Symptom	Possible Explanations and Solutions
When I ran routing a second time, the results were not the same.	• The application considers many factors when routing activities, many of which are continually changing. As the system learns more about your resources, their skill levels and your activities, it makes different, more informed, choices. • There are a high number of possible routing combinations. the application considers all of your business goals and then provides a routing result that is as close to your goals as possible. Sometimes there are several routing results that are equally efficient. The results of two routing runs are rarely exactly the same, even with all of the same inputs.

Symptom	Possible Explanations and Solutions
Routing does not run at the time of day or frequency that I expected.	The Run Schedule is not configured correctly.

Symptom	Possible Explanations and Solutions
Automatic routing ran, but not all activities were assigned to resources.	• The application did not find a resource whose qualifications and availability match the activity. • An error occurred during the routing process.

Activity not routed to the resource

Symptom	Possible Explanations and Solutions
An activity was not routed to the resource that I expected.	• The resource and the activity are not in the same bucket. Check the Resource Tree to verify that the resource is in the same bucket to which the activity was sent. • The resource is either not qualified or not available to take the activity. Verify that work zones, work skills, work skill conditions and resource calendars are all accurate. • The application uses a complex algorithm to optimize the routes for the entire workforce, not just individual routes. Also, the application considers a number of factors when routing activities. After considering all parameters for the entire workforce, that resource was not the best match.

Symptom	Possible Explanations and Solutions
Segmentable activity cannot be assigned due to missing required work skills, work zones or mismatch of working calendars	Symptom: • Routing applied to segmentable activity. • The activity cannot be routed for various reasons for various days. Solution: • Make sure your resources have work zones, work skills and working calendars that are compatible with segmentable activities, which you would like to assign.

Related Topics

- Work Zones
- Work Skills and Work Skill Conditions
- Resource Calendar Requirements
- How do I configure the run schedule for a routing plan?
- Assess Summary Data About Routing Strategies
- Identify Errors in a Routing Run

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Revision History

This document will continue to evolve as existing sections change and new information is added.

Date	What's Changed	Notes
February 2023	These topics are updated: • Routing Message Codes • Change the Optimization Goal	
August 2022	These topics are added: • Visit Bundling • Configure Visit Bundling • Configure Bundling Activities for a Complex Scenario • View Routing Run Results Analysis • Routing Results Optimization Through Routing Run Data Analysis	
February 2022	This topic is added • Routing Improvements	

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