Routing a Call

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Properly Route Calls

To properly route calls, three independent systems must work together:

- The routing client
- The system software
- The peripheral that ultimately receives the call

The *routing client* requests a route from the system software, receives a response, and delivers the call to the specified destination.

The *system software* receives a routing request and determines the appropriate destination for the call. The destination is an announcement (which is played by the routing client), a scheduled target, or a specific target at a peripheral (represented by a trunk group and dialed number identification service [DNIS]).

A *peripheral* is a switch at a call center, such as an ACD, a PBX, or Unified Communications Manager (Unified CM). The peripheral completes the routing by dispatching the call to the specific target determined by the system software.

Route a Call

The process of routing a call consists of the following steps:

1. A routing client requests a route from the system software.

2. The system software, using information supplied by the routing client, categorizes the request as a specific call type.
3. The system software runs a routing script scheduled for the call type to find a destination for the call. The destination can be a routing label, an announcement, or a skill target: a service, skill group, or agent. (If the script fails to find a destination, the system software uses a default destination based on the dialed number.)

   A *routing label* is a character string value that the routing client maps to a destination trunk group and, optionally, a DNIS value for the call.
4. The system software passes the routing label back to the routing client.
5. The routing client interprets the label to find the destination.
6. The routing client dispatches the call to the destination (with the appropriate DNIS value, if any).
7. The call is sent to a peripheral; the peripheral must determine the specific target for which the call is intended.

   The peripheral typically makes this determination based on the trunk group on which the call arrived and, optionally, the DNIS value sent with the call. The peripheral then completes the routing by dispatching the call appropriately.

The following sections describe the process in detail.

Related Topics

Determine Label, on page 7
Peripheral targets

Routing a Call

Understanding the call-routing process helps you set up the configuration of your system software and create effective scripts.

Routing Requests

The system software receives routing requests from routing clients, where the type is either the specific IXC (for example, AT&T or MCI) or the specific type of the peripheral (for example, voice response unit (VRU) or a specific type of ACD).

Routing clients send messages to the system software. One type of message is a *route request*. In this case, given a call, the routing client asks the system software for a destination, or route, for that call. If the routing client is an IXC, this is the only type of message that it sends.

Routing requests are of two types: *pre-routing* and *post-routing*. A Pre-Routing request is sent by an IXC to determine the initial destination for a call. A Post-Routing request is sent by the peripheral that receives the call to either refine the original route or redirect the call.

A routing request includes the following information about the call to be routed:

- **Dialed Number (DN)**. The number the caller dialed.

- **Calling Line ID (CLID)**. The billing telephone number for the caller. This value is also referred to as Automatic Number Identification (ANI).
- **Caller-Entered Digits (CED)**. Digits the caller entered on a touch-tone phone in response to prompts.

Post-Routing messages vary depending on the type of the peripheral.

Targets

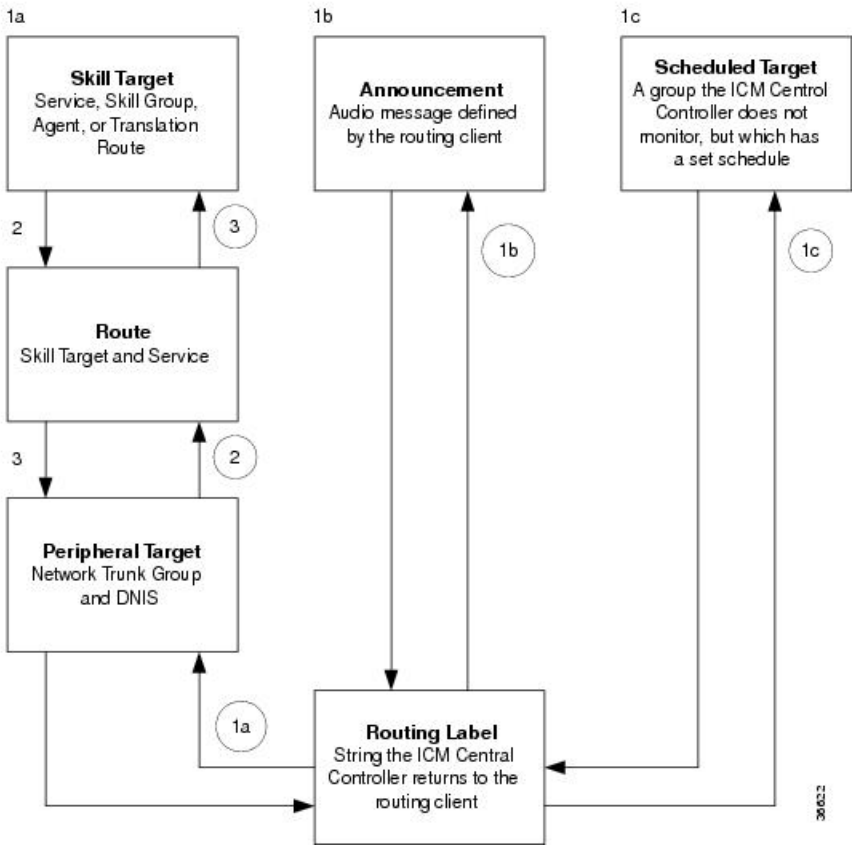
A target is the destination for a call. The target can be a label, an announcement defined by the routing client, or a target at a peripheral.

A target at the peripheral is a service, skill group, or individual agent that the system software selects to handle the call. This is called the *skill target*. Regardless of the specific skill target, every call routed by the system software must also be associated with a service. The combination of a skill target and a service is a *route*.

A target represents a network trunk group at the peripheral and, optionally, a DNIS value. The routing client uses this type of target, called a *peripheral target*, to route the call. Each peripheral target or announcement maps to a routing label.

The following figure shows the relationships among skill targets, routes, peripheral targets, announcements, and labels.

Figure 1: Targets, Routes, and Labels



The system software works from top to bottom in the preceding figure:

1. A routing script determines a destination for the call.

   The destination is a routing label that the system software can return directly to the routing client.

   Otherwise, the destination is one of the following:

   - A skill target to receive the call
   - An announcement to be played
   - A scheduled target to receive the call

   If the destination is a skill target, that skill target has an associated route.

2. The system software uses the route to find an associated peripheral target supported by the routing client.
3. The peripheral target is associated with a label. The system software returns that label to the routing client. If the destination is an announcement, the system software needs only to find the label associated with that announcement and return the label to the routing client.

   The routing client processing depends on the type of the label. Some labels instruct the routing client to take a special action: playing a busy signal for the caller, playing an unanswered ring for the caller, or making a special query.

   For normal labels, the routing client converts the label to an announcement, scheduled target, or peripheral target by working up from the bottom of the above figure.

4. The routing client receives a label from the system software in response to its route request. It translates that label into one of the following:

   - A peripheral target
   - An announcement
   - A scheduled target
   - An unrouted task that gets routed to a local agent

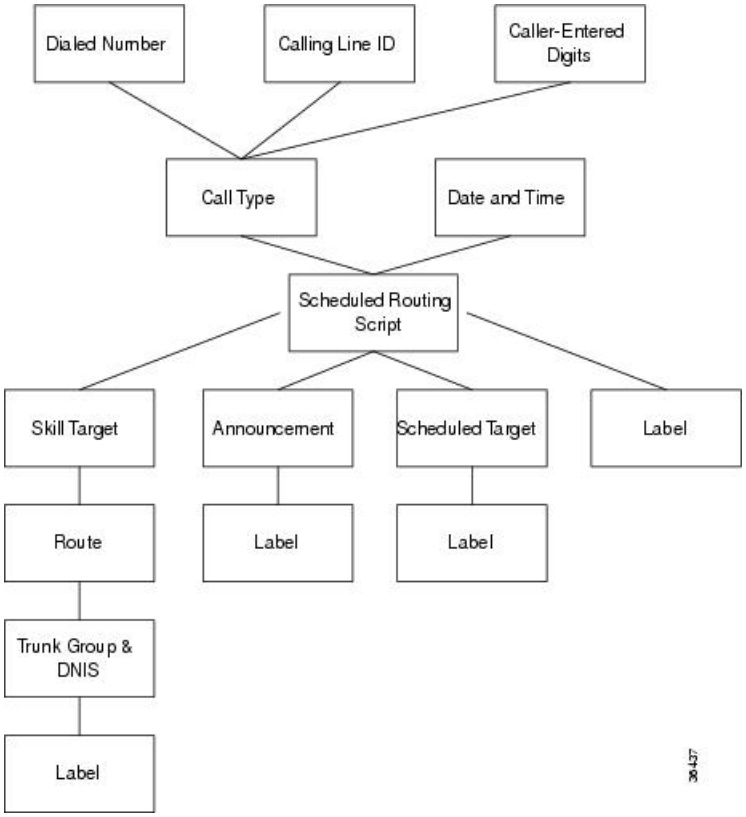
   The result is an announcement, which plays the announcement for the caller. The result is a scheduled target, which delivers the call to that target.

5. The routing client delivers the call to the specified *network trunk group* at the peripheral and sends the specified DNIS value, if any, with it.
6. The peripheral itself must then recognize the network trunk group and DNIS for the call as it arrives and determine the associated service and skill target. The peripheral then completes the process by locating the appropriate agent to handle the call.

System Processing

The following figure summarizes how the system software processes a route request.

Figure 2: Unified ICM Route Request Processing



The following subsections describe this processing.

Determine Call Type

When the system software receives a route request for a call, it first determines the call type of the call. A *call type* is a category of incoming Unified Intelligent Call Management (Unified ICM) routable tasks. Each call type has a schedule that determines which routing script or scripts are active for that call type at any time.

There are two classes of call types:

- Voice (phone calls)
- Non-voice (for example, email and text chat)

Voice call types are categorized by the dialed number (DN), the caller-entered digits (CED), and the calling line ID (CLID).

Non-voice call types are categorized by the Script Type Selector, Application String 1, and Application String 2.

In either case, the last two categories of the call type are optional. For voice call types, the caller-entered digits and the calling line ID are optional, depending on the call. For non-voice call types, Application String 1 and Application String 2 are optional, depending on the application.

While chat sessions and blended collaboration are different from email and require call variables, the call variables are not part of the call type definition.

For example, you might define three call types to correspond to three sales regions within the country. You might have a network prompt that lets the caller enter 1 for sales, 2 for support, and 3 for information. If a call arrives for the dialed number 800.486.0029, with a CLID from the 403 (San Jose region) area code, and the caller enters 1 (sales) in response to the prompt, that call is classified as Western Sales.

If another call arrives with the same dialed number, but with a CLID from the 212 (New York City) area code, and the caller-entered digit 1, that call is classified as Eastern Sales.

You can define a general default call type and a specific default call type for each routing client. If the call qualifiers do not map to a specific call type, the system software uses a default call type defined for the routing client. If no default call type is defined for the routing client, the system software uses the general default call type.

Run Script

Each call type has specific routing scripts scheduled for different times of day and different days of the year. The system software finds the script currently scheduled for the call type and runs it. If that script fails to find a suitable destination (that is, a label, announcement, or skill target) for the call, the system software uses a default target associated with the DN value.

If the system software finds an announcement or scheduled target for the call, it can immediately resolve that to a label to return to the routing client. If the system software finds a skill target for the call, it must perform a few extra steps before it finds a label.

Determine Route

If the system software finds a skill target for the call, that target has an associated route. You specify the route when you set up the target within the routing script. A route represents the combination of a skill target and a service. That is, a route represents the destination for a call and the type of service to be provided to the caller. Every call routed to a peripheral must have an associated service.

For example, the skill target for a call might be the skill group *Denver.PostSales* and the associated service might be *Denver.TechSupport*. Another call might also be routed to the *Denver.PostSales* group with the associated service *Denver.Upgrades*.

Note If the destination is itself a service, for example *Chicago.Sales*, the associated service must also be *Chicago.Sales*. To associate a service skill target with a route for a different service would skew the statistics for those services.

Determine Trunk Group and DNIS

After it has determined a route for a call, the system software finds an associated peripheral target (trunk group and DNIS). It is possible to have several peripheral targets associated with the same route, but typically only one of those targets is valid for the routing client. For example, if you have switched access lines, two IXCs could direct calls to the same trunk group and DNIS, but each requires a different label value for that target. Therefore, you need to define two separate peripheral targets for the route. If more than one peripheral target is associated with the route, the system software chooses the first peripheral target that maps to a valid label for the routing client.

Determine Label

Each peripheral target, scheduled target, or announcement maps to one or more labels. The system software finds the first label that is valid for the routing client and dialed number and returns that label to the routing client. It is then up to the routing client to interpret the label.

Default Label

It is possible that the system software may fail to find a call type for a route request. Also, the system software may run the script currently scheduled for a call type and fail to find a destination for the call. In these cases, it uses a default label that is defined for the dialed number. If no default label is defined for the dialed number, the system software returns an error to the routing client.

The routing client itself also has some default action defined. When you set up each routing client, you can specify the maximum time that client can wait for a response to a routing request. It may happen that the system software has not returned a destination for the call before the time limit is reached. Also the system software may return an error. In both these scenarios, the routing client performs its own default action.

Routing Client

The routing client begins by requesting a route for a call from the system software. The system software processes the request as described in the preceding section and returns a label to the routing client.

The routing client has its own internal mappings for labels to announcements, scheduled targets, and peripheral targets.

It uses these mappings to interpret the label from the system software:

- **Busy**. Routing client plays a busy signal for the caller.
- **Ring**. Routing client plays an unanswered ring for the caller.
- **Normal** and the label maps to an **announcement**. Routing client plays the announcement for the caller.
- **Normal** and the label maps to a **scheduled target**. Routing client delivers the call to that target.
- **Normal** or **DNIS Override** and the label maps to a **peripheral target** (that is, a trunk group and a DNIS). Routing client delivers the call and the specified DNIS value to that trunk group. The peripheral then has responsibility for dispatching the call to the appropriate skill target.

Peripheral Processing

When a peripheral receives a call, it determines the trunk group on which the call arrived and the DNIS value, if any, associated with it. The peripheral must be programmed to map these values to the same service and skill target determined by the system software.

The peripheral, acting as a routing client, can also send a routing request to the system software.

Translation Routes

Translation routes allow you to send additional information to a skill target along with the call..

A translation route is a temporary destination for a call. When the system software returns a translation route label to the routing client, it also sends a message directly to the peripheral gateway (PG) at the targeted peripheral. This message alerts the PG that a call will be arriving that requires route translation.

The message contains the following information:

- The trunk group on which the call will arrive and the DNIS value associated with it.
- A label to be used by the PG to determine the ultimate skill target of the call. This is a label that the PG can interpret to find the correct destination.
- Instructions for further processing to be performed by the PG. This further processing might include, for example, looking up an account number in a database.

When the peripheral sees the call arrive on the specified trunk group and with the specified DNIS value, it passes this information to the PG. The PG then combines it with the information it has received from the system software. It then sends the call along with this information to the skill target specified by the label it received. At the same time, the peripheral might, for example, send a message to a host computer that controls the display on the agent's workstation. This allows data, such as the caller's account information, to be displayed on the screen when the call arrives. The PG coordinates communication among the network, the peripheral, and the computer application that controls the display.

To set up translation routing, you must do the following:

- Set up a translation route associated with the peripheral. You do not need a separate translation route for each possible skill target at the site, but you need at least one for each peripheral that performs translation routing.
- Set up one or more routes and associated peripheral targets for the translation route. Typically, all peripheral targets for a translation route refer to the same trunk group, but with different DNIS values.
- Set up a label for the original routing client for the call to access each of the peripheral targets associated with the translation route. For example, if the routing client is an IXC, you must set up a label to the targets with the IXC. This allows the call to be initially sent to the translation route at the peripheral.
- For each peripheral target that you want to be able to ultimately access via a translation route, set a label with the peripheral as the routing client. For example, you might want to be able to send calls to the Atlanta Support skill group through a translation route. To do this, you must configure a label for that skill group with the Atlanta peripheral as the routing client. This allows the peripheral to determine the ultimate destination for the call.
- To display data on the agent's workstation when the call arrives, you must configure the peripheral to inform the PG which agent is receiving the call.

Timeouts and Thresholds

In setting up your configuration, you need to specify several timeout and timing threshold values.

For routing clients, you must specify the maximum time the system software can spend before responding to each routing request. You must also specify the maximum time for the routing client to wait for a response before it stops sending new requests to the system software.

For each service at a peripheral, you must specify your goal for the maximum time a caller must wait before the call is answered. The system software uses this value in calculating the service level.

You can specify how to count abandoned calls in the service level calculation. You can also specify the minimum time a call must be in the queue before it can be considered abandoned.

For specific information about configuring routing clients, peripherals, and services, see Chapters 4 through 7.

Routing Client Wait Time

In some cases, a routing client might be unable to receive routing responses from the system software. Sometimes this affects only a single request, but other times the routing client loses contact with the system software for longer periods. You can specify the amount of time for the routing client to wait before giving up on a single request and the amount of time to wait before it stops sending any requests to the system software.

Timeout Threshold

For AT&T Intelligent Call Processing (ICP) connections, set the timeout threshold to 1500 milliseconds.

Late Threshold

You can specify a second threshold, the AT&T Intelligent Call Processing (ICP) connections, by setting the late threshold to 500 milliseconds.

Timeout Limit

The system software is designed to be a highly reliable system. Distributed duplicated hardware and software fault-tolerance ensure very high availability. However, the NIC uses a timeout limit to provide a safety net to ensure that your calls continue to be routed even if the system software were to become completely unavailable. If the routing client receives no responses from the system software within the timeout limit (and a minimum number of requests have been made), it stops sending requests to the system software. You can set the minimum number of requests that must be made (the consecutive timeout limit) when you set up the NIC software. The default is 10.

When a routing request first exceeds the timeout threshold, the NIC for the routing client starts a timer. If the timer reaches the timeout limit before the routing client receives any on-time routing responses from the system software, the NIC tells the routing client to stop sending routing requests to the system software. An on-time response is a response within the timeout threshold. You can specify the timeout limit in seconds. For example, for AT&T ICP connections, set the timeout limit to 10 seconds.

Abandoned Call Wait Time

When a call is delivered to a peripheral, the caller might be placed in a queue waiting for an agent to become available. Generally, if the caller hangs up before they connect with an agent, the call is considered abandoned. A high number of abandoned calls might mean that you are losing business because callers are being made to wait too long.

However, if a caller hangs up almost immediately after they are placed in a queue, you might not want to count that as an abandoned call. In these cases, caller impatience or excessive queue times are not the problem; the caller probably hung up for another reason. Tracking these as abandoned calls can be misleading.

Therefore, you can specify a minimum amount of time that a caller must wait before the call can be considered abandoned. This value is called the *abandoned call wait time*. You can set this value for each peripheral. A typical value might be 10 seconds. This means that if the caller hangs up in the first 10 seconds, the call is

not considered abandoned, nor is it counted as a call offered. If the caller waits at least 10 seconds and hangs up, the call is counted as both offered and abandoned. (In the real-time data, a call is counted as offered as soon as it arrives at the peripheral. Therefore, a short call might appear as a call offered in the real-time data, but is not counted as offered in the historical data.)

Service Level

Service level is a measure of how well you are meeting your goals for answering calls. For each service, you can set a goal for the maximum time a caller spends in a queue before being connected to an agent. This value is the *service level threshold*. The service level is usually expressed as the percentage of calls that are answered within the threshold.

To calculate the service level for a period of time, the system software determines the number of calls that have had a service level event within that period.

A service level event occurs when one of three things happens to a call:

- It is answered within the service level threshold.
- It is abandoned within the service level threshold.
- It reaches the service level threshold without being answered or abandoned.

All calls that have a service level event within a specified period are considered as service level calls offered for that period. This differs from a simple call's offered value, which counts each call at the time it is first offered to the service.

Service Level Threshold

The *service level threshold* is the number of seconds you set as a goal for connecting a call with an agent. When you set up a peripheral, you can specify a default service level threshold for all services associated with that peripheral. When you set up each service, you can choose to either use the default threshold set for the peripheral or specify a threshold for the service itself in the Service Level Threshold field. If you do not specify a service level threshold for an individual service, the default threshold you specified for the peripheral is used. Typically, you must set these values to match the service level thresholds being used by the peripheral itself.

Service Level Types

Different peripheral types use slightly different formulas to calculate service level. The system software provides a uniform calculation across all peripherals. This allows you to apply uniform metrics and performance goals across all peripherals. However, the system software also tracks the service level as calculated by the peripheral itself. This is called the *peripheral service level*. You can use this value, for example, to continue to compare performance to historical norms.

Some peripherals let you select one of several types of service level calculation. You can specify which of these types of service level you want the system software to track.

The uniform service level calculation performed by the system software can be done in any of three ways:

- **Abandoned calls ignored**. The number of calls answered within the threshold divided by the number of calls that had a service level event minus the number of calls that were abandoned before exceeding the service level threshold. Calls abandoned before the service level threshold expired are removed from this calculation.

- **Abandoned calls have a negative impact on service level**. The number of calls answered within the threshold divided by the number of calls that had a service level event. This treats these abandoned calls as though they had exceeded the threshold.
- **Abandoned calls have a positive impact as service level**. The number of calls answered within the threshold plus the number of calls abandoned within the threshold, all divided by the number of calls that had a service level event. This treats these abandoned calls as though they were answered within the threshold.

The following example illustrates these different ways of calculating service level.

Example service level calculations

```
Call Counts

Answered within service level threshold: 70

Abandoned within service level threshold: 10

Exceeded service level threshold: 20

Total service level events: 100

Service Level Calculations

Abandoned calls ignored: 70 / (100 - 10) = 77.7%

Abandoned calls negatively impact: 70 / 100 = 70.0%

Abandoned calls positively impact: (70 + 10) / 100 = 80.0%
```

The value of the service level type field for the service determines how the system software treats abandoned calls. You set this value when you configure the service.

Configure Service Levels

Service level is set in various configurable windows in Configuration Manager, which you can define in different ways depending on the kind of information you want it to provide. See:

- Configure Service Level for All Call Types, on page 11
- Configure Service Level for Specific Call Types, on page 12
- Configure Service Level for the MRD, on page 14
- Configure Service Level for a Peripheral, on page 15
- Configure Service Level for Skill Groups, on page 15
- Configure Service Level for the Precision Queue, on page 16
- Configure Service Level for an Aspect Call Center PG, on page 16

Configure Service Level for All Call Types

Service levels are set at the System Information level for all call types. To view or change the default system-level settings for all call types:

Procedure

Step 1 In the Configuration Manager, select **Tools** > **Miscellaneous Tools** > **System Information**.

Step 2 Specify a value for Service level threshold in seconds.

The default is *20 seconds*.

Step 3 Select the Service level type.

The options are: *Abandoned Calls have Negative Impact*, *Abandoned Calls have Positive Impact*, and *Ignore Abandoned Calls*.

The default is *Ignore Abandoned Calls*.

Step 4 Click **Save**.

Configure Service Level for Specific Call Types

To configure service levels for specific call types that override the System Information settings:

Procedure

Step 1 In the Configuration Manager, select **Tools** > **List Tools** > **Call Type Lists**.

Step 2 Click **Retrieve**.

Step 3 Select the call type whose service level you want to set.

Step 4 For service level threshold, check the box to the right of the field to override the default from the System Information (*20 seconds*).

Specify a service level threshold value in seconds for this call type.

Step 5 For service level type, check the box to the right of the field to override the default.

Select from *Ignore Abandoned Calls*, *Abandoned Calls have Negative Impact*, and *Abandoned Calls have Positive Impact*.

Step 6 Click **Save**.

Configure Service Level for MRDs, Peripherals, and Skill Groups

Service level settings for media routing domains (MRDs), peripherals, and skill groups are hierarchical and are interpreted as follows:

Procedure

- **MRD** - The highest level. It is set in **Configuration Manager** > **Tools** > **List Tools** > **Media Routing Domain**.

The default settings for the MRD are service level threshold = *30 seconds* and service level type = *Ignore Abandoned Calls*. Ignore Abandoned Calls is the only value, and it is protected.

- Peripheral - Is set in **Configuration Manager** > **Tools** > **List Tools** > **Service Level Threshold List**.

  The default settings for a peripheral are taken from its MRD. You can override them.

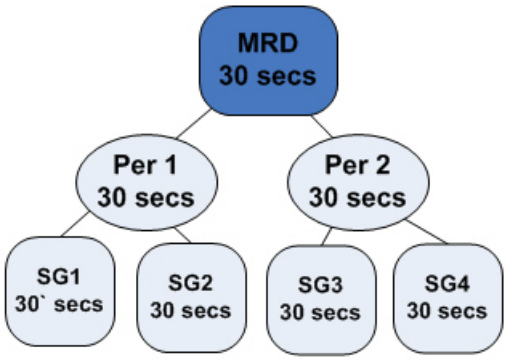
- Skill group - Is set in **Configuration Manager** > **Explorer Tools** > **Skill Group Explorer** > **Advanced** tab.

  Skill group default settings are taken from their peripheral. You can override them.

This example explains the configuration.

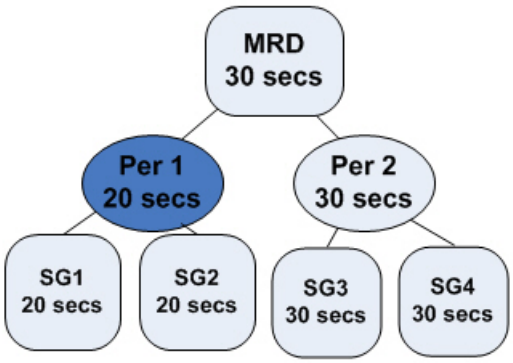
1. The MRD has two peripherals. Each peripheral has two skill groups. The service level threshold for the MRD is set to the default of 30 seconds, By default, the service level thresholds for both peripherals is 30 seconds and the service level thresholds for all four skill groups is 30 seconds.

   Figure 3: MRD Hierarchy Example 1: Service Level Threshold at the MRD



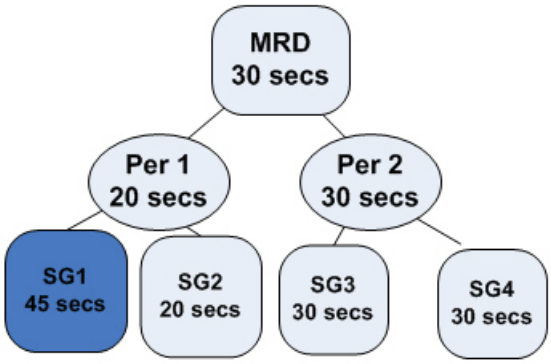
2. If you change the service level threshold of peripheral 1 to 20 seconds, the service level thresholds of skill groups 1 and 2 become 20 seconds. The service level thresholds of skill groups 3 and 4 remain at 30 seconds.

Figure 4: MRD Hierarchy Example 2: Changing the Peripheral



3. If you want the service level threshold of skill group 1 to be 45 seconds, you can independently configure skill group 1 to have a service level threshold of 45 seconds.

Figure 5: MRD Hierarchy Example 3: Changing the Skill Group



Configure Service Level for the MRD

To configure the service level settings for the MRD:

Procedure

Step 1 In the Configuration Manager, select **Tools** > **List Tools** > **Media Routing Domain List**.

Step 2 Select the routing domain with the service level you want to modify.

Step 3 Click **Retrieve**.

Step 4 Select the MRD that has the service level you want to set.

Step 5 Specify a value in seconds for service level threshold. The default is 30 seconds.

Step 6 Service level type is protected and always shows *Ignore Abandoned Calls*.

Step 7 Click **Save**.

Configure Service Level for a Peripheral

To configure service level settings for a peripheral:

Procedure

Step 1 In the Configuration Manager, select **Tools** > **List Tools** > **Service Level Threshold List**.

Step 2 Click **Retrieve** to populate the list with the peripherals.

Step 3 Select the peripheral that has the service level you want to modify.

Step 4 Specify a value for service level threshold. The default is inherited from the MRD.

Your options are to:

- Retain the default from the MRD.
- Check the Override MRD default box to unprotect the value and enter a new value in seconds for the peripheral service level threshold.

Step 5 For Service level type, check the box to override the default. Select from *Abandoned Calls have Negative Impact*, *Abandoned Calls have Positive Impact*, and *Ignore Abandoned Calls*.

For a non–Unified CCE peripheral and a voice MRD, select from *Abandoned Calls have Negative Impact*, *Abandoned Calls have Positive Impact*, and *Ignore Abandoned Calls*. For other MRDs, service level type is protected and always shows Ignore Abandoned Calls.

Step 6 Click **Save**.

Configure Service Level for Skill Groups

To configure service level settings for a skill group:

Procedure

Step 1 In the Configuration Manager, select **Explorer Tools** > **Skill Group Explorer**.

Step 2 Click **Retrieve**.

Step 3 Select the skill group and click the Advanced tab.

Step 4 The service level threshold defaults to that of the peripheral.

Your options are to:

- Keep the service level threshold setting of the peripheral.
- Check the Override Peripheral default box to unprotect the value and enter a new value in seconds for the skill group service level threshold.

Step 5 The service level type defaults to that of the peripheral.

Your options are to:

- Keep the setting of the peripheral.
- From the drop-down menu, change to: *Abandoned Calls have Negative Impact, Abandoned Calls have Positive Impact*, or *Ignore Abandoned Calls*.

Step 6 Click **Save**.

Configure Service Level for the Precision Queue

To configure service levels for precision queues:

Procedure

Step 1 Use the Precision Queue gadget to select the precision queues whose service level you want to set.

Step 2 Specify a value for service level threshold.

Step 3 Click **Save**.

Configure Service Level for an Aspect Call Center PG

To configure service level settings for an Aspect Call Center PG:

Procedure

Step 1 In the Configuration Manager, select **Explorer Tools** > **PG Explorer**.

Step 2 Click **Retrieve**.

Step 3 Select and expand the PG.

Step 4 Select the peripheral and click the Peripheral tab.

For all peripherals except Aspect Call Center, the peripheral service level type field is protected and shows *Calculated by Call Center*.

For Aspect Call Center, choose the type of calculation to be performed by default. You can override the default for each individual service.