Reporting Concepts for Cisco Unified ICM/Contact Center Enterprise, Release 12.5(1)

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Change History

This table lists changes made to this guide. Most recent changes appear at the top.

Change	See	Date
Added support to scale to 36000 Agents from 24000 Agents Reference Design	Change Limits for Calls Per Second to Support 36000 Agents	February, 2021
Initial Release of Document for Release 12.5(1)		February, 2020
Added support for Cloud Connect	About Cloud Connect	
Added support for Smart Licensing	Smart Licensing	

About This Guide

This guide explains how to interpret reporting data that is stored in, and retrieved from, the Cisco Unified Contact Center Enterprise (Unified CCE) Unified Contact Center Enterprise database. This guide also helps you understand the importance of planning, configuration, and scripting for accurate reporting data.

Audience

This guide is written for anyone who uses Cisco Unified Intelligence Center (Unified Intelligence Center) to generate reports using the stock Cisco reporting templates. Stock templates are Cisco templates that are

installed with the reporting application, that are populated from the Unified CCE database, and that are qualified by Cisco Systems, Inc.

Contact center supervisors and administrators who are responsible for configuring and scripting Unified CCE will also find this guide useful.

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Documentation Feedback

To provide comments about this document, send an email message to the following address: contactcenterproducts_docfeedback@cisco.com

We appreciate your comments.

PART I

Understanding Call Center Reporting

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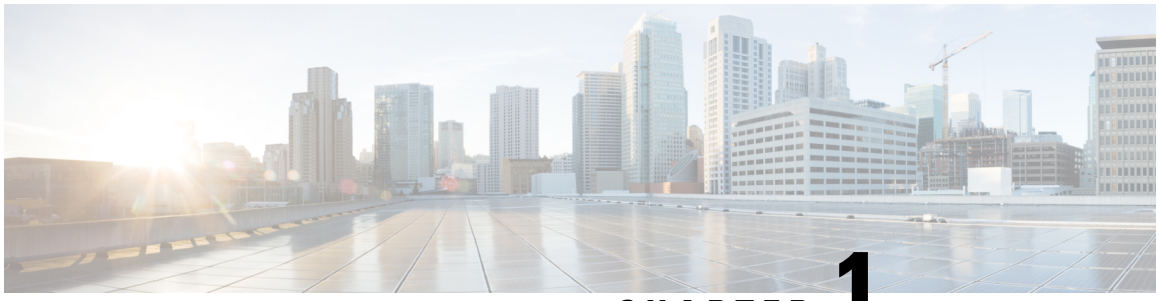
- Reporting Data, on page 5
- Why Report Data Can Differ, on page 13
- System Architecture and Reporting, on page 17
- Importance of Configuration and Scripting, on page 27



CHAPTER 1

Reporting in Unified CCE

- Overview, on page 1
- Access Unified Intelligence Center, on page 2
- Stock Reports, on page 2
- Customize Report Templates, on page 3

Overview

Cisco Unified Intelligence Center is a reporting platform for users of Cisco Contact Center products. It is a web-based application that provides Historical, Real-time, and Live Data reporting and dashboards.

Unified Intelligence Center serves the following primary purposes:

- Obtains data from the base solution's database. The base solution can be any of the Contact Center products.
- Allows you to create custom queries to obtain specific data.
- Customizes the visual presentation of the reports.
- Customizes the report data.
- Allows different groups of people to view specific data based on their roles.

Customer Journey Analyzer

Unified Intelligence Center users can use the reporting platform to launch Customer Journey Analyzer using **Analyzer** from the left navigation pane.

You can customize the default Analyzer URL using the CLI **set cuic analyzer url <urlname>**.

For more information on the CLI, see *Cisco Unified Intelligence Center Administration Guide* at https://www.cisco.com/c/en/us/support/customer-collaboration/unified-intelligence-center/products-maintenance-guides-list.html.

The Customer Journey Analyzer mines historical data from multiple data sources and systems to generate specific business views of data. The Analyzer visually displays trends to help you identify patterns and gain insight for continuous improvement.

Note You must have completed the on boarding process for Cloud Connect to access Customer Journey Analyzer. Cloud Connect allows Cisco Contact Center on premises customers to connect to cloud services, such as Customer Journey Analyzer to use Business Metrics.

For more information, see *Business Metrics* related information in *Cisco Unified Contact Center Enterprise Features Guide* at https://www.cisco.com/c/en/us/support/customer-collaboration/unified-contact-center-enterprise/products-feature-guides-list.html.

Access Unified Intelligence Center

The URL for logging in to the Unified Intelligence Center reporting application is:

HTTPS

https://<HOST>:8444/cuicui/Main.jsp

Where HOST is the DNS name of a Unified Intelligence Center node.

Note Cisco Unified Intelligence Center does not support HTTP.

Stock Reports

The following report bundles are available as stock reports for Cisco Unified Intelligence Center:

- Realtime and Historical Transitional templates - Introductory templates designed for new users. These templates are simplified versions of the All Fields templates, and are similar to templates available in other contact center solutions.
- Realtime and Historical All Fields templates - Templates that provide data from all fields in a database. These templates are most useful as a basis for creating custom reports, and include templates for precision queue routing data.
- Realtime and Historical Outbound templates - Templates for reporting on Outbound Option activity. Import these templates if your deployment includes Outbound Option.
- Live Data templates - Templates for reports that use the Live Data stream processing system as a data source. Refresh rates for these reports are much faster than the Realtime or Historical reports--usually less than every 3 seconds. Reports are available for Agent, Agent Skill Group, Precision Queue, Skill Group, Recent State History and Recent Call History.
- Contact Sharing templates - Templates for reporting on a Contact Sharing system. You can use the Contact Sharing reports to understand the current configuration and behavior of the Contact Sharing system. You can view data on the active configuration of the Contact Sharing routing, the number of calls routed to each target system for each group, and the calls that have errors during the routing process.
- Cisco Unified Intelligence Center Admin Security templates - Templates to report on Cisco Unified Intelligence Server audit trails, permissions, and template ownership.

- License Consumption Report - Use this report to monitor the agent license consumption and other related ports such as the VRU-IVR ports and the outbound dialer ports. It helps you ascertain the number of licenses you must procure to cover the peak or maximum license usage during the license agreement period.

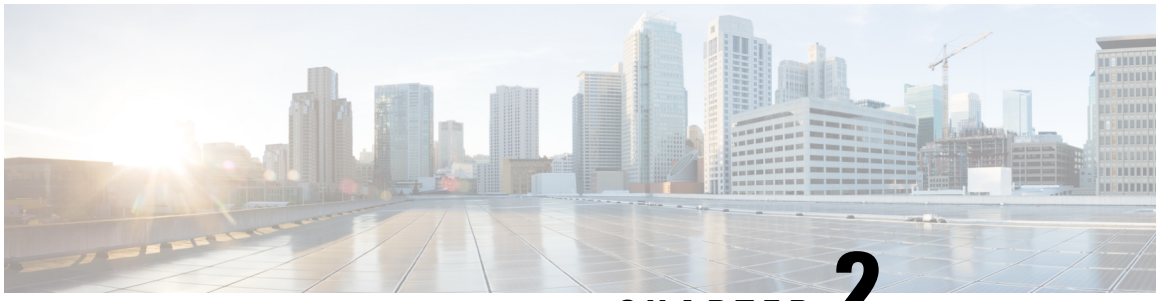
The report bundles are available as downloads from Cisco.com. Click the **Intelligence Center Reports** link on the downloads page (https://software.cisco.com/download/type.html?mdfid=282163829&catid=null). Depending on how it was deployed, your installation of Unified Intelligence Center may include all or a subset of these reports.

For information on importing report bundles or custom reports, see the *Cisco Unified Contact Center Enterprise Installation and Upgrade Guide* at https://www.cisco.com/en/US/products/sw/custcosw/ps1844/prod_installation_guides_list.html. Navigate to Initial Configuration>Configure Cisco Unified Intelligence Center>Import Report Bundles.

Customize Report Templates

You can modify existing report templates or create custom reports templates if you determine that the stock report templates do not meet your reporting needs. For example, you might customize an existing report template to monitor a department's activity and performance by creating a collection with objects from only that department.

See the *Cisco Unified Intelligence Center Report Customization Guide* at https://www.cisco.com/en/US/products/ps9755/tsd_products_support_series_home.html for directions on customizing report templates.



CHAPTER 2

Reporting Data

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- Configuration Data, on page 9
- Call Detail Data, on page 9
- Event Data, on page 10
- Miscellaneous, on page 11
- Database Tables That Hold Reporting Data, on page 11

Real Time Data Collection

Every 15 seconds (by default), both the Unified CCE Peripheral Gateway and the Call Router produce data that is forwarded and stored in the databases. This current (real time) data includes data about agents, skill groups, services, call types, Precision Queues, and other entities. Unified Intelligence Center queries the database periodically to retrieve the data stored in the Administrative Workstation (AW) database and presents it to clients, such as reports and message boards. Old real time data is constantly overwritten by new real time data. No history is kept. Real time data is stored in data fields that reflect four time increments, as described in the following table:

Table 1: Real Time Data Time Increments

Real time data time increments	Description
Half	"Half" values contain a value for the current half-hour. Real time half-hour values are not affected by Interval configuration. That is, if you set the historical reporting interval to 15 minutes, the Half values in real time tables represent the current half-hour time period falling between xx:00:00 and xx:29:59, or xx:30:00 and xx:59:59. For example, if it is currently 09:18:33, the CallsOfferedHalf column in the Call_Type_Real_Time table contains a value that reflects the first 18 minutes and 33 seconds of the specific half-hour. When a new half-hour begins, at time 09:00:00 or 09:30:00, the database element is reset to zero.

Real time data time increments	Description
Now	"Now" contains a snapshot of the activity at a particular instant (the last check). For example, Unified CCE software tracks CallsQNow, which is the number of calls currently in queue for a route. When a call is answered, the CallsQNow count is reduced immediately by one (-1) because the call has left the queue. This change is seen at the next real time update for reports that query for that value.
To5	The "To5" values track data on a rolling five-minute basis. The rolling five-minute data employs a "sliding" five-minute window. The To5 data is updated every ten seconds in the database.
Today	To arrive at values for "Today", Unified CCE software adds the values at the end of each interval since midnight. It also counts the values for the current half-hour. At the end of each half hour, half-hour data (for example CallsOfferedHalf) is summed into the Today data. At midnight, the real time Today count is cleared in the database. Midnight is defined using the time of the peripheral.

Historical Data Collection

Unified CCE stores historical data in several types of database tables. These tables hold summaries of data over different periods.

Interval Tables

The Interval tables replace previous Half_Hour tables. The Interval tables have more fields than their corresponding Half_Hour tables.

Note The database schema retains the replaced Half_Hour tables for backward compatibility. The solution does not populate them with data. Their views present the data from their corresponding Interval tables.

You can configure some of these tables to present either 15-minute or 30-minutes summary data. Your solution requires Unified Intelligence Center to use 15-minute reporting intervals. This table lists the Interval tables and details of their reporting intervals.

Table 2: Reporting Interval Details

Table	Reporting Interval (Minutes)		Where to Set Reporting Interval	Notes
	Default	Allowed Values		
Agent_Interval	30	15 or 30	**PG Explorer** > **Logical Controller**	
Agent_Skill_Group_Interval	30	15 or 30	**PG Explorer** > **Logical Controller**	

Table	Reporting Interval (Minutes)		Where to Set Reporting Interval	Notes
	Default	Allowed Values		
Call_Type_Interval	30	15 or 30	**Configuration ICM** > **Enterprise** > **System Information**	
Call_Type_Skill_Group_Interval	30	15 or 30	**Configuration ICM** > **Enterprise** > **System Information**	
Campaign_Query_Rule_Interval	30	30	NA	The Campaign_Query_Rule table contains only configuration data. The Campaign_Query_Rule_Interval table contains the reporting data. The superseded Campaign_Query_Rule_Half_Hour table contains a view of the Campaign_Query_Rule_Interval data for backward compatibility.
Dialer_Interval	30	30	NA	
Peripheral_Interval	30	15 or 30	**PG Explorer** > **Logical Controller**	
Router_Queue_Interval	30	15 or 30	**Configuration ICM** > **Enterprise** > **System Information**	The solution generates the Precision Queue interval records from the Router_Queue_Interval and Skill_Group_Interval records. If you use PQs, use the same interval setting on the **PG Explorer** > **Logical Controller** and**Configuration ICM** > **Enterprise** > **System Information**.
Service_Interval	30	15 or 30	**PG Explorer** > **Logical Controller**	
Skill_Group_Interval	30	15 or 30	**PG Explorer** > **Logical Controller**	The solution generates the Precision Queue interval records from the Router_Queue_Interval and Skill_Group_Interval records. If you use PQs, use the same interval setting on the **PG Explorer** > **Logical Controller** and**Configuration ICM** > **Enterprise** > **System Information**.
System_Capacity_Interval	30	15 or 30	**PG Explorer** > **Logical Controller**	

Half_Hour Tables

The Half_Hour tables that do not have Interval tables are populated for *completed* half-hour intervals. The completed interval is the time period falling between xx:00:00 and xx:29:59, or xx:30:00 and xx:59:59.

For example, it is now 15:50:00. An error occurred at 15:47:00. The half-hour interval reported on right now is for the 15:00:00 to 15:29:59 interval. The error that occurred at 15:47:00 is written to the database at 16:00:00, when the 15:30:00 to 15:59:59 half-hour interval is complete.

The active Half_Hour tables are:

- Application_Gateway_Half_Hour
- Campaign_Half_Hour
- Dialer_Skill_Group_Half_Hour
- Network_Trunk_Group_Half_Hour
- Physical_Controller_Half_Hour
- Route_Half_Hour
- Translation_Route_Half_Hour
- Trunk_Group_Half_Hour

Five_Minute Tables

The Five_Minute tables contain a subset of the real-time data. These tables provide a "snapshot" of the real-time data for use as historical data. Every five minutes, the Router copies the real-time data to the five-minute tables in the Central Database.

By default, the solution enables only the Routing_Client_Five_Minute historical reporting by default.

To enable the historical reporting of other Five_Minute tables, set the corresponding registry key values to 1. The registry hive is at `HKEY_LOCAL_MACHINE\SOFTWARE\Cisco Systems, Inc.\ICM\<Instance_Name>\Router<A/B>\Router\CurrentVersion\HistoricalData\FiveMinute`. The changes are effective dynamically and do not require a router restart on either side.

Note Enabling five-minute data can substantially impact your solution performance. Before you enable reporting on five-minute data, consider that performance impact.

Reporting Interval Configuration for Interval Tables

For the Interval tables with configurable reporting intervals, you control those reporting intervals through the **Configuration Manager** on these dialogs:

- **PG Explorer** > **Logical Controller**

  You can change either 15 or 30 minutes, but the same setting applies to all the tables.

  You can also select a Time Source option to use either Central Controller time or Automatic Call Distributor (ACD) time. You can only use the ACD option for 30-minute data for the supported ACD types. See the *PG Explorer Tool Online Help* for details.

- **Configuration ICM** > **Enterprise** > **System Information**

You can set the reporting interval on the **Logical Controller** and **System Information** dialogs to different values unless you use Precision Queues. The solution generates the Precision Queue interval records from the Router_Queue_Interval and Skill_Group_Interval records. Because the two tables are controlled by different

tools, you must use the same setting for both to record accurate PQ data. However, Precision Queue interval records are generated from the Router_Queue_Interval and Skill_Group_Interval records and therefore these intervals need to be the same for complete Precision Queue data.

When you change the reporting interval, the solution begins writing the data to the corresponding tables when the next 30-minute interval starts. So if you change to 15-minute data at 11:13, the new setting takes effect beginning at 11:30.

Configuration Data

Configuration tables define the entities and entity names that are defined in Configuration Manager. They contain EnterpriseName fields that associate the key values in the historical tables with the text labels that are used in reports.

Examples of configuration tables are the Agent, Agent Team, Skill Group, and Call Type tables. For example, adding a new Agent Team in Configuration Manager adds an EnterpriseName for that team in the Agent Team database table.

Configuration Data and Routing Scripts are created and edited on the Administration & Data Server, stored on the Administration & Data Server database, replicated to the Central Database. and then to other Administration & Data Servers.

Call Detail Data

The following database tables store call detail records as described below:

- **Route call details**

  For every call routing request it handles, the Router records detailed data about the call and how it was routed to a peripheral by Unified CCE. This *route call detail data* (RCD record) is stored in the Route_Call_Detail table.

  RCD data is written to the database when the script ends. Non-routed calls, such as direct dials, transfers, and conferences, have no RCD records.

  You can use the data in the Route_Call_Detail table to see the starting point of the call. For example, you can see the Automatic Number Identification (ANI), any Caller Entered Digits (CED) entered, and the type of request made. A typical Route_Call_Detail record might describe a call that originated with a Pre-Routing request, had an ANI of 9785551000 and CED such as an account number. In addition, route call detail tells you how long the call was held in a enterprise queue.

- **Route call variable**

  The Route_Call_Variable records are associated with the Route_Call_Detail records. The Route_Call_Variable records are created at the same time as the corresponding Route_Call_Detail record. The Route_Call_Variable table stores expanded call context variables that are configured as persistent in the system and are employed during the routing.

- **Termination call detail**

  Detailed *termination call detail data* (a TCD record) is written for each call that arrives at a peripheral (provided the proper monitoring is enabled for the peripheral).

  The TCD record is written after the call segment terminates and the after-call work is complete.

Specifically, the CallRouter creates the Termination_Call_Detail record when it receives a "ClosedCallInd" message from the Open Peripheral Controller (OPC). OPC generates the ClosedCallInd message when a call is terminated (that is, when any after-call work associated with the call has completed, or when a call that was not connected to an agent is terminated).

For example, typical Termination_Call_Detail data might show that the call was an Inbound ACD Call, that it was handled by a particular Skill Group; and that a particular agent handled the call. The Termination_Call_Detail record also describes the final disposition of the call (for example, how the call terminated; abandoned in network, disconnect/drop, and abandoned delay).

There can be many TCDs created per call, and it is possible for a call to have TCDs records but no RCD records.

- **Termination call variable**

  The Termination_Call_Variable records are associated with the Termination_Call_Detail records. The Termination_Call_Variable records are created at the same time as the corresponding Termination_Call_Detail record. The Termination_Call_Variable table stores expanded call context variables that are configured as persistent in the system and are set either through the agent desktop or received on the PG when the call was routed to it.

Note The above tables can become very large. You must extract the data from the Historical Data Server and Detail Data Server (HDS-DDS) into your own custom database on a separate server (one that is not used for otherUnified CCE components). Use only DBDateTime (date and time of the record that was written to the HDS-DDS database) to perform the extraction. The tables on the custom database can be indexed according to the custom reporting needs.

To use Call Detail data in reports, you must create custom reports that populate from your custom database. These detail tables are constrained by the sizes of the databases. The sizes of the databases are estimated based on configuration and storage durations. Use the ICMDBA tool to estimate the sizes of the databases. Add an external database (AW/HDS/DDS) to the configuration to fulfill your reporting requirements.

Related Topics

Pre-routing , on page 147

Event Data

Two database tables store system and application event data that is generated by the various components of Unified CCE software:

- **Event**

  The Event table stores all system events that are generated by the various Unified CCE components.

- **Application_Event**

  The Application_Event table stores all application events that are generated by the various components. This is a subset of the events reported in the Event table.

Note By default, the Event and Application_Event data is not replicated to the HDS database.

Miscellaneous

For the following tables, the data is recorded as and when event or agent state changes occur:

Agent_Event_Detail

Agent_State_Trace

Network_Event_Detail

Database Tables That Hold Reporting Data

All report data is pulled from tables and rows in the Unified CCE database. Many fields are direct database values, as reflected in their displayed column names in the reports.

For example:

- The *direction* of the active task on which the agent is currently working is derived from *Agent_Real_Time.Direction*.
- The number of calls to the trunk group that have been abandoned in queue since midnight is derived from *Trunk_Group_Real_Time.CallsAbandonedToday*.

Other report data fields are less obvious for the following reasons:

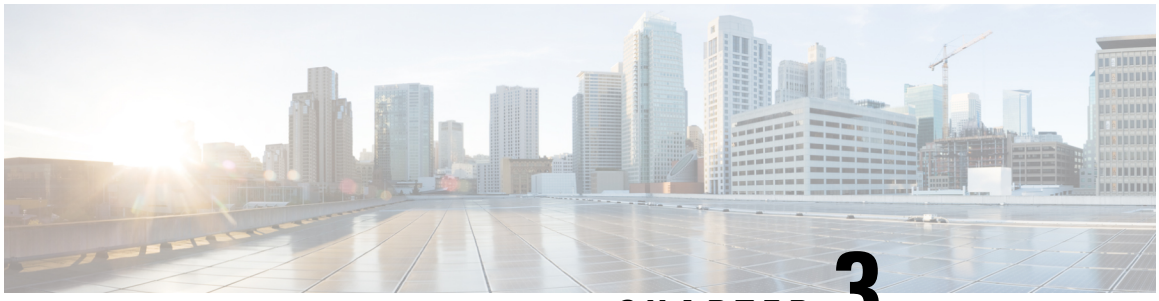
- The data fields represent calculated values because the same data-entity name is used in multiple contexts.
- The data fields call database values whose names are not clearly indicative.

Calculated fields. Many report values are the result of calculated fields. For example, in reports that present Skill Group Real Time activity, the Average Active Time (AAT) is calculated as follows: `Skill_Group_ Real_Time.HandledCallsTalkTimeTo5 /Skill_Group_ Real_Time.CallsHandledTo5`. Refer to the *Unified Intelligence Center Report Template Guide* for details on the calculated fields.

Fields used in many tables and context. Examples are the fields *Deleted*, *Description*, and *EnterpriseName*, which appear in many tables.

See the *Database Schema Handbook for Cisco Unified Contact Center Enterprise* at https://www.cisco.com/c/en/us/support/customer-collaboration/unified-contact-center-enterprise/products-technical-reference-list.html for descriptions of these database values and any calculations they can take in reports.

The Database Schema Handbook also lists field values such as Agent State values and Call Disposition flags.



CHAPTER 3

Why Report Data Can Differ

- Automatic Call Distributor and Unified Contact Center Enterprise Reports, on page 13
- Real Time and Historical Reports, on page 14
- Interval Boundaries, on page 14
- Skill Group and Enterprise Skill Group Reports, on page 15
- Call Type, Skill Group, Precision Queue, and Service Reports, on page 15
- Reports That Show Base Skill and Sub-skill Groups, on page 15

Automatic Call Distributor and Unified Contact Center Enterprise Reports

Data collected and presented in Unified CCE reports to measure customer experience and agent performance differs from data collected and presented in ACD reports. This is also the case for parent/child reporting in a Unified CCE deployment.

Unified CCE reports give an enterprise-wide view of all your call centers. Each ACD report is specific to a particular call center. **For most accurate data, report at the source.**

Here are some of the reasons that cause variations:

- **Differences due to timing and transmission delays.** All times computed in Unified CCE reports, such as various state transitions, are based on event arrival time at Unified CCE Central Controller, not on the actual event occurrence on the ACD. Network transmission delays cause variations in reported times between reporting data seen on Unified CCE reports and ACD reports.
- **Differences in supported concepts and terminology.** Differences in supported concepts and the way that similar concepts are implemented can cause variations in the data available to measure agent performance and customer experience.

  For example, while Unified CCE and an ACD might both support the concept of agent states, the ACD might not support as many state options as Unified CCE software. In addition, some similarly named agent states might not have the same definition on both systems.
- **Differences in configuration.** Differences in configuration on the ACD and the Configuration Manager can lead to discrepancies in reporting. If devices are not configured in Configuration Manager or if they are configured with different settings than on the ACD, reports might not track certain statistics at all or might report different metrics.

- **Different methods of measuring and storing data.** Unified CCE and the ACD might differ in how data segments are defined and counted. One example is how the individual agent's time is measured and stored in relation to how that agent's time spent in a conference call is measured and stored.
- **Different methodologies for sampling data.** For example, Unified CCE and the ACD might differ as to when an event is considered to start and to end.
- **Differences in terminology and in the definitions of data elements.** On the surface, naming conventions might appear to be the same but, in fact, are not. For example, Unified CCE and the ACD might use different criteria to evaluate what constitutes an 'offered call'.

Refer to the *ACD Supplement Guides* for details.

Real Time and Historical Reports

Counts in real time data (for example CallsHandledTo5) do not match up with counts in the historical interval records (for example, CallsHandled) because the real time data is moved to the historical database at the end of each half-hour interval.

Consider this example: at 8:55 a call comes into the contact center and is answered by an agent.

- The real time count for CallsAnswered increases by one (+1).
- Between 8:55 and 9:00, the real time data shows the answered call.
- The answered call does not populate the Historical half-hour data until 9:00, when the 8:30 to 8:59:59 interval ends.

Interval Boundaries

Counts that would typically match up for a day, such as CallsOffered and CallsHandled, might not always match up over specific intervals. This discrepancy occurs because the counts for some data elements might be increased across boundaries.

Consider this example: at 8:55, a call comes in to the contact center and is answered by an agent. The agent completes the call at 9:05.

- In the historical database, the call is counted as offered in the 8:30:00 to 8:59:59 interval.
- The call is counted as handled in the 9:00:00 to 9:29:59 interval.
- If you run a report for the 9:00:00 to 9:29:59 interval, it appears that tasks handled does not equal tasks offered for the interval.

You also might notice that tasks offered does not equal task abandoned + tasks handled for an interval. Tasks offered reflects the number of calls and tasks that were offered to agents in this interval, while tasks handled and tasks abandoned might include calls that were offered in the last interval and completed in this interval. Some historical report templates group statistics into "Completed Tasks" to indicate that the statistics represent all calls and tasks that completed in this interval.

In general, interval boundary issues are reduced if you run daily reports. However, if your contact center runs 24 hours a day, you might still notice discrepancies for intervals such as the 11:30:00 to 11:59:59 and 12:00:00 to 12:29:59 intervals.

Skill Group and Enterprise Skill Group Reports

You can expect double counting in Enterprise Skill Group reports when a call is queued to multiple skill groups on the same peripheral and those skill groups are associated with the same Enterprise Skill Group.

Call Type, Skill Group, Precision Queue, and Service Reports

Do not compare Call Type reports to Skill Group, Precision Queue, or Service reports. Skill Group, Precision Queue, and Service reports might have statistics for calls that were routed directly to the ACD and not routed by Unified CCE.

Certain statistics are computed differently when Enterprise queues are used.

In Unified CCE with ACD environments, services define call treatment. All skill groups belong to specific services and, therefore, skill group data rolls up to the service. Reports for services provide call treatment information for all of the skill groups assigned to those services.

Call Type reports in Unified CCE primarily provide call routing statistics and contain no other call handing statistics, unless they used translation routing. You might notice that data for a Call Type and the skill groups or Precision Queues related to the Call Type through a routing script do not match. If a skill group or Precision Queue is used in multiple scripts, reporting for that skill group or Precision Queue includes data for all of the Call Types to which it is assigned. If a Call Type routes to multiple skill groups or Precision Queues, data for the Call Type is distributed among those skill groups or Precision Queues.

Reports That Show Base Skill and Sub-skill Groups

Some ACDs available to Unified CCE support the concept of prioritized skill groups (subskill groups). For these ACDs, Configuration Manager supports this concept and allows you to distinguish priority levels (primary, secondary, and so forth) of a base Skill Group.

The Configuration Guide for Cisco Unified ICM/Contact Center Enterprise lists these ACDs.

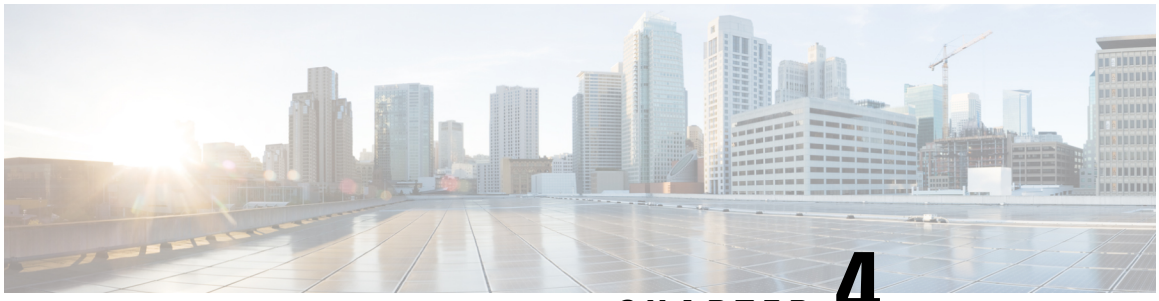
When subskill groups are configured, Unified CCE configuration creates a base skill group for these subskills. If subskill groups exist, when you generate a report from the Agent By Skill Group and Skill Group By Peripheral categories, select the sub-skill groups (and not the base skill groups) from the Skill Groups item-selection list.

If you select both the base skill group and the corresponding subskill groups from the Skill Groups item-selection list, the reports display data for both base and subskill groups, making the report summaries incorrect. (The data in the base skill group is a roll-up of data from the subskills.)

If no subskill groups are configured, select the base skill group from the Skill Groups item-selection list.

For Skill Group By Enterprise reports, determine which skill groups to include in the Enterprise skill group. If you configured subskill groups from several peripherals or from different media, group only the subskill groups into the Enterprise Skill Group and not both base and subskill groups.

Note Subskill groups are not supported for Unified CCE.



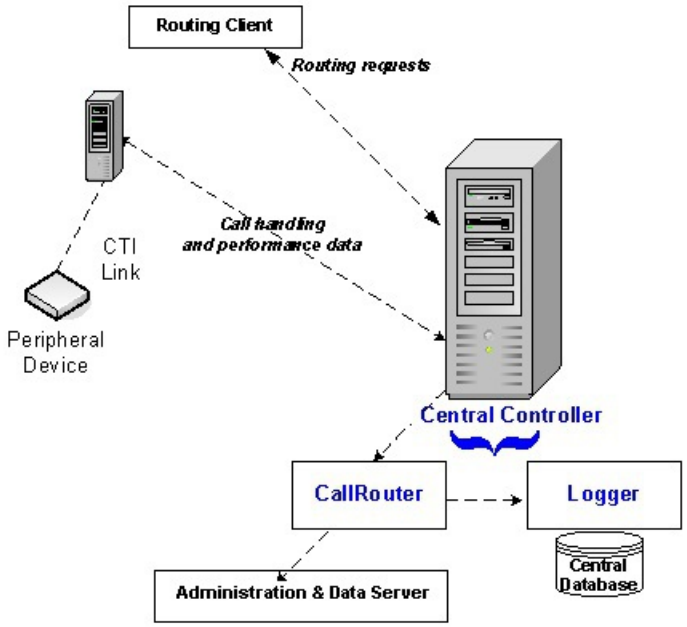
CHAPTER 4

System Architecture and Reporting

- Central Controller, on page 17
- Peripherals and Peripheral Gateways, on page 19
- Administration & Data Server and Administration Client, on page 21
- Historical Data Server, on page 22
- Cisco Unified Communications Manager, on page 24
- Reporting Servers, on page 24
- Agent and Supervisor Desktops, on page 24
- Voice Response Units, on page 24

Central Controller

Figure 1: Central Controller



The Central Controller serves as the clearinghouse for routing and reporting data. It does this by receiving route requests, making routing decisions, and monitoring data messages about what is happening in the system.

The Central Controller is installed on one or more servers and comprises three major components: the CallRouter (Router), the Logger, and the Central Database.

Note The CallRouter, the Logger, and the Central Database can be installed on the same computer—or—the CallRouter can be installed on one computer, and the Logger/Central Database can be installed on another computer. The Logger and the Central Database are always co-located on the same computer.

- **CallRouter (Router)**

  The CallRouter receives notification from a routing client (such as a Network Interface Controller or a Peripheral Gateway) that a call is in need of some form of routing. It then runs a user-defined routing script that specifies how the routing client is to handle the call.

  These routing scripts are created on the Administration & Data Server, replicated and stored in the Central Database, and loaded into CallRouter program memory.

  In addition to receiving routing requests, the CallRouter receives messages from all Peripheral Gateways that monitor real-time status events in the network.

  These messages update the system's current representation of agents and system resources. Awareness of the current status of these resources is essential to the routing scripts.

  The CallRouter serves as a real-time server by immediately forwarding this data directly to the Administration & Data Server so that it is available to appear in reports. The CallRouter also writes records to the Central Database on the Logger.

- **Logger and Central Database**

  The Logger receives data from the CallRouter (such as detail messages about calls and summary messages that have been computed by the Peripheral Gateways) and serves as the interface between the CallRouter and the SQL Server database manager.

  The following data-management processes occur at the Logger:

  - Data is written first to temporary tables.
  - Data is then written to actual tables on the Central Database.
  - Historical records on the Central Database are replicated to the Historical Data Servers on one or more Administration & Data Servers.

  The Central Database serves as a buffer where data is committed to quickly support the performance of the CallRouter. The Central Database stores the following data:

  - Configuration data, as entered and changed on the Administration & Data Server
  - Routing scripts, as entered and changed on the Administration & Data Server
  - Summary historical data passed from the CallRouter
  - Termination and CallRouter call detail data

Note The Central Controller Database stores no real-time data.

Related Topics

Call detail data, on page 9
Historical Data Server, on page 22
Historical and interval data
Peripherals and peripheral gateways, on page 19

Peripherals and Peripheral Gateways

The Central Controller obtains the routing and reporting data that it processes by communicating with each network peripheral.

A peripheral is a device (such as an ACD, a Private Branch Exchange (PBX), or an Interactive Voice Response (IVR)) that receives calls that are routed by Unified CCE software. A peripheral can also distribute calls or nonvoice media contacts.

The Central Controller communicates with each peripheral through a monitoring node called the *peripheral gateway* (PG).

Each peripheral requires a connection to a PG, and Unified CCE software has unique PGs for each device it supports. PGs connect to Voice Response Units (VRUs). Media Routing (MR) PGs send routing requests from multichannel options that are integrated into the system.

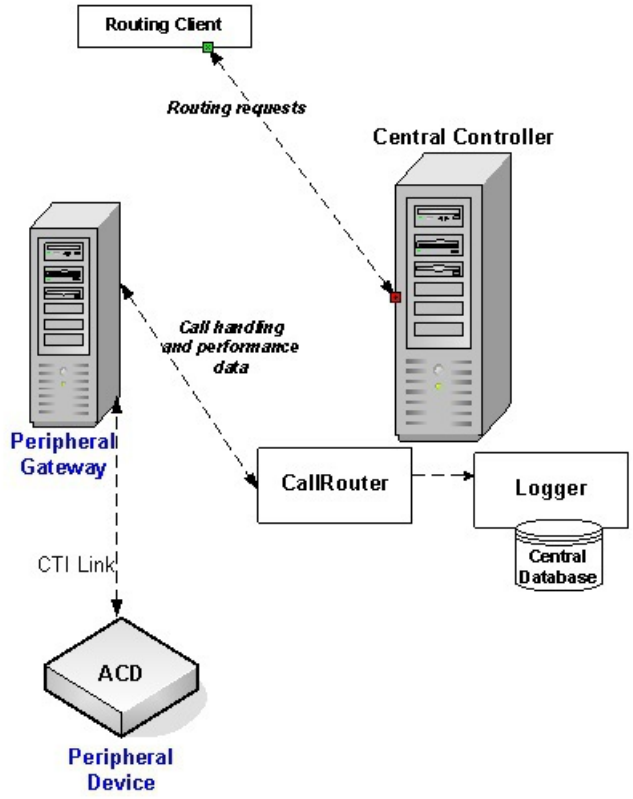
An example of specific PGs that connect to ACDs is the Definity Enterprise Communications Server (ECS) PG connects to an Aspect and Avaya ACD, respectively, for enterprise routing and reporting.

If multichannel options or Outbound Option are integrated into the system, the configuration also includes Media Routing Peripheral Gateways (MR PGs) used to send routing requests from the multichannel applications to Unified CCE software. A single MR PG can support multiple applications; you configure a separate Peripheral Interface Manager (PIM) for each application.

It is important to understand the type of peripheral gateway used in your deployment. In real time, the CallRouter receives performance and monitoring information from each PG every few seconds. The CallRouter holds this data in memory and uses it to make routing decisions. New data constantly overwrites this real-time information in the CallRouter memory.

The following illustration shows a Unified CCE, and the peripheral is an ACD.

Figure 2: Peripherals and Peripheral Gateways



Processes on the PG interpret messages on the peripheral and provide data to Unified CCE as follows:

1. By extracting status information from the peripheral through the peripheral's proprietary CTI interface,
2. By normalizing that information and converting it into the format that Unified CCE uses,
3. By forming database objects (Call object, Agent objects, Routing objects, and so forth) from the information, and
4. By passing the normalized data to the CallRouter.

Related Topics

Different Unified ICM/CCE deployments , on page 157

Peripherals in Unified CCE Deployments

In Unified CCE deployments that use a Generic PG (which allows multiple peripherals of different types to reside inside a single PG), or separate PGs for Unified CM and the VRU, Unified CM and the VRU appear as separate peripherals to the software. Each time a task switches between Unified CM and VRU peripherals, it appears as a new task to the system.

From a reporting perspective, this separation has an impact on how and when data is collected:

- A call that comes into Unified CM, is then transferred to the VRU, and then back to an agent looks like three separate tasks (calls). A Termination_Call_Detail is written for each call.
- A call that is queued to a skill group or Precision Queue and later answered by an agent is not considered as offered to a skill group or Precision Queue until the call is answered.

In this deployment, data is collected as follows:

- A call that comes into Unified CM, is then transferred to the VRU, and then transferred back to an agent, looks like a single call to the Unified CCE software. A single Termination_Call_Detail is written.
- A call is considered as offered to a skill group or Precision Queue when the call is queued to a skill group or Precision Queue.

Administration & Data Server and Administration Client

Administration & Data Server

The role selected at setup for the Administration & Data Server determines the data that is available for reports. The Administration & Data Server was formerly named the Distributor Admin Workstation (AW).

Depending on the setup selection, the Administration & Data Server can capture some or all the following:

- Real time data
- Historical data
- Configuration data
- Detail Data Store (DDS)

  A DDS comprises:

  - Call Detail data (Termination Call Detail and Route Call Detail for custom reporting)
  - Call Variable data

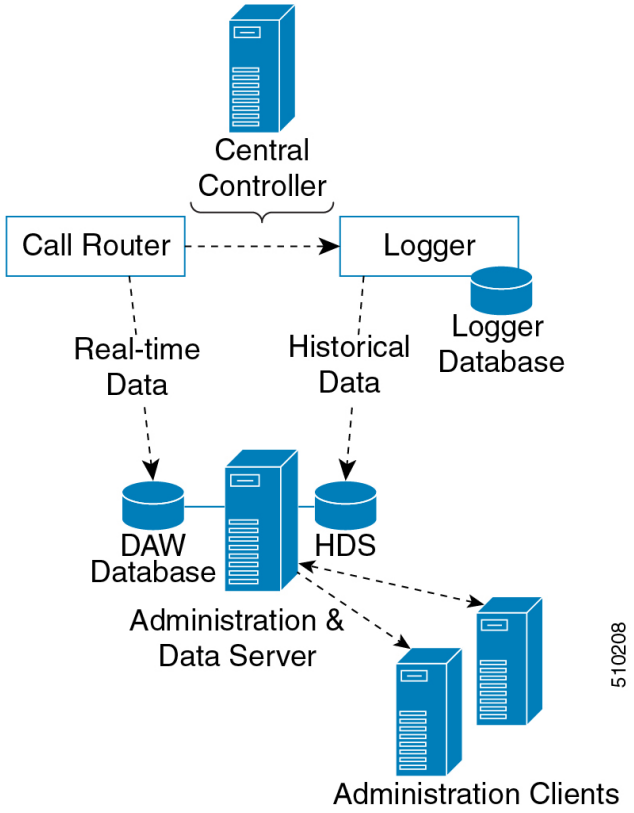
Unified CCE can support multiple Administration & Data Servers.

Administration Client

The Administration Client (formerly named the Client AW) allows you to access the Configuration Manager tools without installing a full Administration & Data Server with databases. The Administration Client must point to an Administration & Data Server.

The Administration Client is typically installed on a laptop or personal desktop where installation of a full Administration & Data Server is not desirable. There is a separate, small installer for the Administration Client, which provides a configuration utility specific to the Administration Client.

Figure 3: Administration & Data Server



Historical Data Server

A Historical Data Server (HDS) is required if you plan to use historical reports. The Historical Data Server (HDS) must reside on an Administration & Data Server.

The HDS is enabled at setup and created using the Intelligent Contact Management database administration (ICMDBA) tool.

Note As a fault-tolerant strategy, two Administration & Data Servers are typically set up at a site as HDS machines, each with its own HDS database.

Depending on your selection at setup, the HDS can contain only historical data or both historical data and call detail data forwarded from the Logger.

This historical data is not accessed directly, but rather through views that exist in the local Administration & Data Server database. To retrieve information for historical reports, the reporting application connects to the Administration & Data Server where the HDS resides.

Follow these guidelines to ensure that your Historical Data Server is configured to meet reporting needs:

1. **Decide how many Historical Data Servers you require.**

The number of Historical Data Servers that you configure depends on how long the HDS takes to back up and on your reporting demands. If you store large amounts of data, backup can take several hours. If you want to run reports while the HDS is backing up, configure at least one additional HDS to use to run reports.

2. **Determine the types of HDS, based on the deployment size and the role of the Administration & Data Server.**

3. **Determine the size of the HDS.**

   The size of the database depends on the size of your configuration and on how long you want to retain data.

   Configuration that affects the size of the HDS includes the number of call types, skill groups, agents, skills per agent, routing clients, trunk groups, services, peripherals, scripts, calls routed daily, and calls terminated daily.

   The larger the configuration, the bigger the HDS must be to store data. For example, the historical call type database tables store data for each call type for each 5-minute and 15- or 30-minute interval.

   The amount of time that you want to retain data on the HDS also affects database size. Decide how long you want to retain reporting data before it is automatically purged from the databases. Data beyond the configured retention time is purged each day at 12:30 PM.

   You can use the ICMDBA tool to estimate the sizes of your databases. The tool prompts you for your configuration information and the amount of time that data is retained in the databases.

4. **Determine how you want to back up the HDS.**

   You can back up the HDS either while the HDS is running or while it is offline (generally when the contact center is closed or during a time with low call volume).

   Performing a backup during peak hours while the HDS is running can impact performance, especially if you are backing up a large amount of data. While the HDS database is being backed up, new data from the Logger is stored in the transaction log. If the transaction log reaches maximum capacity before the HDS has completed the backup, updates to the database stop until an administrator manually empties the log.

   It is appropriate to back up at a regularly scheduled time when the contact center is not busy. You can also take the HDS offline and perform a backup. However, the HDS is not available for reporting when it is offline. If you plan to back up the HDS database while it is offline, you might want to configure a secondary HDS to use for reporting during the backup interval.

5. **Determine the HDS backup schedule and the number of days for which data is retained on the Logger.**

   You can configure the number of days for which data is stored in the Logger Central Database and the HDS.

   The Logger stores data for less time than the HDS. For example, you might store two weeks of data on the Logger and a year of data on the HDS. Configure the amount of time that data is stored on the Logger in relation to the schedule for HDS backups to ensure that you do not lose data in the event that the HDS goes offline.

Note When the HDS database is newly created, the replication from the Logger to HDS does not copy the first record for historical tables. The impact to historical reporting is negligible, as the records are queried based on the interval datetime.

Related Topics

Administration & Data Server and Administration Client, on page 21
Call detail data, on page 9
Data flow from Logger to Historical Data Server, on page 131
Historical and interval data

Cisco Unified Communications Manager

For the Unified CCE environment, Cisco Unified Communications Manager (Unified CM) provides features comparable to those of a traditional PBX system to Voice over IP telephony devices such as Cisco IP phones and VoIP gateways.

Unified CM handles the switching requirements of the Unified Contact Center system and allows deployment of voice applications and the integration of telephony systems with Intranet applications.

Reporting Servers

Depending on the deployment model, there might be from one to eight Unified Intelligence Center servers.

The Unified Intelligence Center web server application on the Unified Intelligence Center server(s) is configured to connect to a Unified CCE Administration & Data Server and to populate reports with the databases on that data source.

To select and generate reports, reporting users log in to the Unified Intelligence Center web application from their browser.

Agent and Supervisor Desktops

Cisco Unified CCE supports Cisco Finesse Agent and Supervisor desktops for contact center agents and supervisors.

Voice Response Units

Voice Response Units (VRUs) are computers that run Interactive Voice Response telephony applications.

Your enterprise might implement one or more types of IVR applications on a VRU platform to serve several purposes:

- **Information gathering.** The IVR prompts for certain information through dual-tone multi-frequency (DTMF) digit or ASR (Automatic Speech Recognition) collection. The information is used in the routing decision and is passed to the agent desktop.

- **Self service.** The IVR prompts for and provides certain information to the caller, such as account balance. The entire call transaction might take place within the VRU.
- **Queuing**. The VRU serves as the queue point by playing announcements or music to the caller until an agent is available.

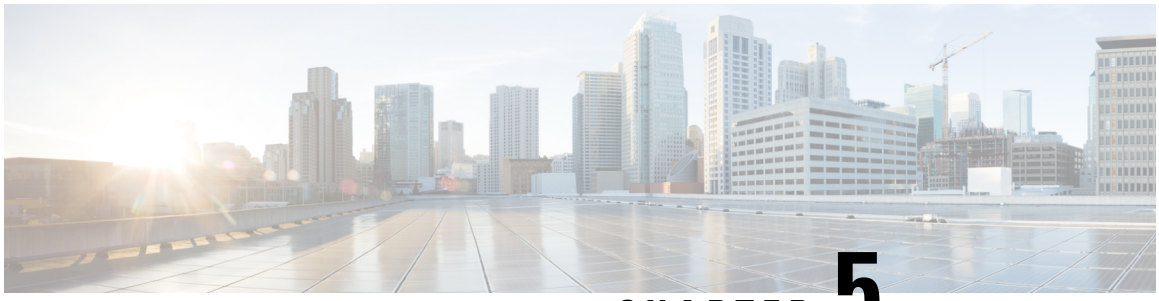
VRUs can be integrated into Unified CCE software in several ways: at an enterprise (network) level, as a premise-based VRU for an ACD, or as a Virtual VRU on an ACD/PBX. The way in which a VRU is integrated into Unified CCE systems affects the flow of call processing and determines the type of data Unified CCE can collect from the IVR.

For example, a Network VRU provides data used in call routing, monitoring, and reporting. Only Service Control VRUs can be used as Network VRUs. A Service Control VRU is a VRU that implements the Service Control Interface protocol. The Service control protocol allows the VRU to utilize ICM to control call treatment and queuing; for example, by providing the capability of running VRU scripts as commanded by the ICM. A VRU that has an interface only to the ACD has more limited capabilities.

Because VRUs support different features and behave differently, reporting data is affected by the type of VRU you have deployed in your system.

Related Topics

VRU application reporting , on page 104



CHAPTER 5

Importance of Configuration and Scripting

- Configuration, on page 27
- Scripting, on page 27

Configuration

Open the Configuration Manager from the Unified CCE Tools folder on your desktop to enter and update information about the entities that are part of your enterprise.

Configured entities are stored as records in the Central Controller database tables. These entities include agents, call types, devices, PGs, services and service members, skill groups, and translation routes.

For error-free routing and accurate reporting, it is crucial to configure all peripheral targets—that is, any and all destinations to which a call can be sent. Reports show no data for devices that are not configured and monitored.

Changes and additions that you make in Configuration Manager are immediately applied to the Central Database on the Logger and are copied to all local databases.

Naming Conventions in Configuration

Before configuring the system, consider how you want to name the reporting entities that you will be configuring—such as peripherals, skill groups, and agents.

The configured names for these entities appear in the Unified IC user interface as selection criteria for filtering reports. They are selected from Value Lists and Collections.

Use meaningful naming conventions to help reporting users interpret and locate the appropriate report selection items. For example, append the same prefix for all items associated with a particular site and use descriptive text to identify call types.

Scripting

After your configuration is defined, create routing scripts using the Script Editor. Unified CCE software uses these routing scripts to determine the best destination for a call by assessing the current call center activity that is extracted and forwarded by the PGs . The call flow defined in the script determines the data that is gathered for reporting.

Routing scripts contain instructions that:

1. Examine the call information provided by the routing client and use that information to classify the call as a particular call type.
2. Determine the best destination for the call.
3. Direct the call to an appropriate routing target; for example, to an individual agent, to a skill group, or to an appropriate announcement.
4. Post-route transfers and conferences.

Routing scripts are a representation of your business rules. You can create a specific set of scripts to be run for each call type, such as Sales or Support. For more granular reports, you might want to create multiple scripts; for example, you might create a script for initial call classification and create scripts that route calls that are sent to particular services or skill groups on different ACDs.

You can also schedule different scripts to be used at different times of the day or different days of the week and year for each call type, and you can use dialed numbers to direct calls to scripts that handle transfers.

Routing script data are stored in the Central Controller database. Scripting changes that you make are applied to the local database, immediately update the Central Database on the Logger, and are copied to all local databases. You cannot alter scripts directly. Instead, you create and maintain routing scripts with the Script Editor, one of the tools on the Administration & Data Server.

See the *Scripting and Media Routing Guide for Cisco Unified ICM/Contact Center Enterprise* at https://www.cisco.com/c/en/us/support/customer-collaboration/unified-contact-center-enterprise/products-user-guide-list.html for more information.

ACD Script Considerations

Refer to your *ACD Supplement Guide* for any modifications you need to make in your ACD scripts. For example, you might need to modify your ACD scripts to include *SEND INFO* commands that notify Unified CCE when a call state transition occurs.

Also, ensure that the script the ACD follows to route the call to the appropriate agent takes into account the Services and the Service Members (skill groups) that are configured in Unified CCE.

Unexpected Scripting Conditions

Decide whether you want calls that encounter unexpected scripting conditions to be counted as default-routed or as errors.

If you want the calls to count as default-routed:

- Plan to configure default labels for each dialed number. When a call is routed to a default label, the call is added to the count of default-routed calls for the call type. If the call cannot be routed and a default label is not assigned, the call is counted as an error.
- Also, plan to include a Termination Node with Termination type of default label for all scripts in which there is some unexpected input (else condition).

In all scripts, account for failure by creating a path for calls that encounter unexpected conditions. You might want to route these calls to voicemail, an announcement, or a busy signal.

PART II

Reporting Entities and Reporting Concepts

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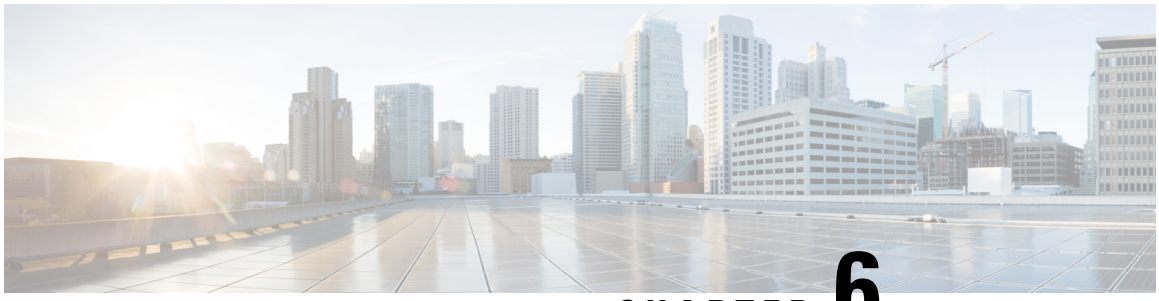

CHAPTER 6

Agents

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Agent States

Agent states are determined from an agent's activity *within a skill group or precision queue*. Agent state is recorded in numerous database tables and is presented in reports as both a number (*Not Ready*) and as a percentage (*% Not Ready*).

You can monitor agent states in real time to view current agent activity. You can also review past performance data to identify trends in agent states. For example, historical reports can show how much time an agent spends in Not Ready state, which indicates whether the agent is adhering to the schedule.

Note For Unified CCE, agent state data is forwarded from the peripheral. Agent states reported by the ACD might not be equivalent to agent states reported by Unified CCE. And for some ACDs, certain agent states might not be applicable at all. For example, an ACD might support the *Work Ready* state but not the *Work Not Ready* state. See the appropriate *ACD Supplement Guide* for information on ACD agent state definitions and how they correspond to Unified CCE Agent States.

Information for some states is different when an agent is configured to handle multiple concurrent tasks in a Media Routing Domain (MRD). This table highlights these differences.

Table 3: Agent States That Appear in Reports

State in Skill Group or Precision Queue	Description for single-session MRDs	Description for multisession MRDs
Active or Talking	The agent is working on a task or a call in this skill group or precision queue. For agents who handle nonvoice tasks, this state is reported as *Active*. For agents who handle voice tasks, this state is reported as *Talking*.	The agent is working on one or more tasks associated with this skill group or precision queue. For these agents, the state is reported as *Active*.
Work Ready	The agent is performing wrap-up work for a call or task in this skill group or precision queue. If the agent is handling a voice call, the agent enters Ready state when wrap-up is complete. If the agent is handling a nonvoice task, the agent may enter Not Active or Not Ready state when wrap-up is complete.	The agent is performing wrap-up work for a task associated with this skill group or precision queue. The agent is not in the Active state for a task associated with this skill group.
Work Not Ready	The agent is performing wrap-up work for a call in this skill group or precision queue. The agent enters Not Ready state when wrap-up is complete. This state is not used for agents signed into Enterprise Chat and Email skill groups or precision queues. This state is used during failover for agents signed into skill groups or precision queues for third-party multichannel applications that use the Task Routing APIs.	This state is used during failover for agents signed in to skill groups or precision queues for third-party multichannel applications that use the Task Routing APIs.
Paused or Hold	For agents who handle nonvoice tasks, the state is reported as *Paused*. For agents who handle voice tasks, the state is reported as *Hold*. For agents handling Outbound Option calls, the Hold state indicates that the agent has been reserved for a call because the Outbound Dialer puts the agent on hold while connecting the call.	The agent is *Paused* for a task associated with this skill group or precision queue.

State in Skill Group or Precision Queue	Description for single-session MRDs	Description for multisession MRDs
Reserved	The agent has been offered a call or task associated with the skill group or precision queue. For voice calls, agents are Reserved when their phones are ringing. Agents handling Outbound Option calls are never placed in Reserved state; the Outbound Option Dialer puts the agent on hold when reserving the agent for a call.	The agent is not in Active, Work Ready, or Paused state in this skill group or precision queue. The agent has been offered one or more tasks associated with this skill group or precision queue.
Busy Other Busy Other is a state in which the agent handling calls is assigned to other skill groups during the interval. For example, an agent could be talking on an inbound call in one skill group while simultaneously logged on to, and ready to accept calls from, other skill groups. The agent can be active (talking on or handling calls) in only one skill group at a time. Therefore, while active in one skill group, for the other skill group the agent is considered to be in the Busy Other state.	The agent is Active, Work Ready, Reserved, or on Hold/Paused in another skill group or precision queue in the same MRD.	The agent is not in Active, Work Ready, Reserved, or Paused state for a task associated with this skill group or precision queue. The agent is in Active, Work Ready, Reserved, or Paused in another skill group or precision queue in the same MRD.
Not Active or Ready	The agent is not working on a task or call associated with this skill group or precision queue.	Same as single-session MRD.

State in Skill Group or Precision Queue	Description for single-session MRDs	Description for multisession MRDs
Interrupted	The agent has been interrupted by a task from another MRD. If an agent is Interrupted in one skill group or precision queue, the agent is Interrupted in all skill groups or precision queues within the same MRD. Voice calls cannot be interrupted. This state is not used for agents signed in to Enterprise Chat and Email skill groups or precision queues. This state is used for agents signed in to skill groups or precision queues for third-party multichannel applications that use the Task Routing APIs, if the agents are configured to accept interrupts.	Same as single-session MRD
Not Ready	The agent is not available to be assigned a call or task. If an agent is Not Ready in one skill group or precision queue, the agent is Not Ready in all skill groups or precision queues within the same MRD.	Same as single-session MRD

How Agent States Are Calculated in Reports

Agent states are presented in many reports as percentages.

Table 4: Calculations for Agent State Percentages

Table.Field	Calculation
%Active	Agent_Skill_Group_ Interval.TalkInTime + Agent_Skill_Group_ Interval.TalkOutTime + Agent_Skill_Group_ Interval.TalkOtherTime + Agent_Skill_Group_ Interval.TalkAutoOutTime + Agent_Skill_Group_ Interval.TalkPreviewTime + Agent_Skill_Group_ Interval.TalkReserveTime / Agent_Skill_Group__ Interval.LoggedOnTime
%BusyOther	Agent_Skill_Group _Interval.BusyOtherTime / Agent_Skill_Group_ Interval.LoggedOnTime
%Hold	Agent_Skill_Group_ Interval. HoldTime / Agent_Interval.LoggedOnTime
%NotActive	Historical: Agent_Skill_Group_ Interval.AvailTime / Agent_Interval.LoggedOnTime Real Time: Agent_Skill_Group_Real_Time.Avail / Skill_Group_Real_Time.LoggedOn
%Reserved	Agent_Skill_Group _ Interval.ReservedStateTime / Agent_Skill_Group _Interval.LoggedOnTime

Table.Field	Calculation
%WrapUp	(Agent_Skill_Group _Interval.WorkReadyTime + Agent_Skill_Group_ Interval.WorkNotReadyTime) / Agent_Skill_Group_Interval.LoggedOnTime)
%Not Ready	Agent_Skill_Group _Interval.NotReadyTime / Agent_Skill_Group_Interval.LoggedOnTime

Agent States, Skill Groups, and Precision Queues

Agents can belong to multiple skill groups or precision queues in a Media Routing Domain (MRD). When an agent is handling a task that was routed to a skill group or precision queue, the agent is Active in that skill group or precision queue.

- For Unified CCE routed calls or transferred Unified CCE routed calls that use the dialed number, the active skill group or precision queue is the skill group or precision queue to which the task was queued.
- For direct incoming calls or transferred routed calls on the ACD, the active skill group is the first skill group defined for the agent or the skill group assigned by the ACD.
- For direct incoming calls or transferred routed calls that do not use the dialed number, the active skill group is the default or first skill group defined for the agent.
- For new outgoing calls (AgentOutCalls or InternalCalls) or transferred outbound calls, the active skill group is either the ACD-picked skill group or the first skill group defined for the agent.

Agents can be configured to work on more than one task at a time, such as multiple chat sessions. When reporting on these agents, gather state information from both the Available in MRD and Agent State columns.

The agents' state in the active skill group or precision queue determines the state in the other skill groups or precision queues in the MRD, as follows:

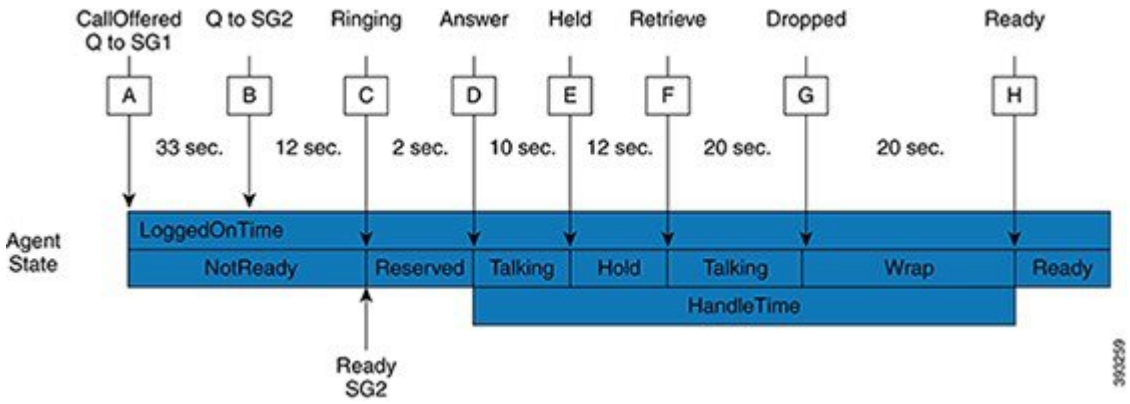
- If the agent is Not Ready in one skill group or precision queue in the MRD, the agent is Not Ready in all skill groups or precision queues in the MRD.
- If the agent is Active, Work Ready, Reserved, or Hold/Paused in one skill group or precision queue in the MRD, the agent state is Busy Other for all other skill groups or precision queues in the MRD.

Agent State and Task State Relationship

Agent state times are reported on interval boundaries regardless of whether the call or task is finished. Call and task state times are reported only when the task ends. The call or task ends when wrap-up is complete.

The following figure illustrates the correlation between agent state and call state for a voice call. The agent reserve time includes network time and offer/ring time. Network time is the time it took the call to arrive at the agent’s phone or desktop. Offering/ring time is the amount of time that the call rang on the agent’s phone or waited on the agent’s desktop.

Figure 4: Agent State and Task State Relationship



1. Call Arrives and queues against SG1 (A) after 33 seconds the call also queues for agents in SG2 (B).
2. The call remains queued to SG1 and SG2 for an additional 12 seconds, until it is routed to an agent who goes ready in SG2 (C).
3. Call rings on the agent's phone (C) and is then answered by the agent (D), who talks on the call for 10 seconds before putting the call on hold (E).
4. After 12 seconds, the agent retrieves the call (F) and talks for another 20 seconds.
5. At (G) the call is dropped which results in the agent going into Wrap state to perform after after-call work for 20 seconds at which time the agent becomes ready (H).
6. If the interval boundary ends when the call is ringing on the agent's phone, the reserved time for the agent includes the network time and part of the ring time. At the next interval, the remaining ring time is reported in the reserved time of the agent. However, the call's time does not appear on a report until wrap-up has been completed on the call.

Agent State Hierarchy for Multisession MRDs

An agent's state on a task determines the agent's state in a skill group or precision queue. The agent's state in a skill group or precision queue determines agent's state in the MRD. For example, if an agent is Active on a task for Skill Group A, then the agent state is Active in Skill Group A. The agent's state is Active for the MRD to which Skill Group A belongs.

Agents working on nonvoice tasks, such as chat, can be configured to handle more than one concurrent task in the same MRD. These agents may be routed multiple tasks in a single skill group or precision queue, or across several skill groups or precision queues in the same MRD. For these cases, a state hierarchy determines the agent's overall state in the skill group or precision queue and in the MRD.

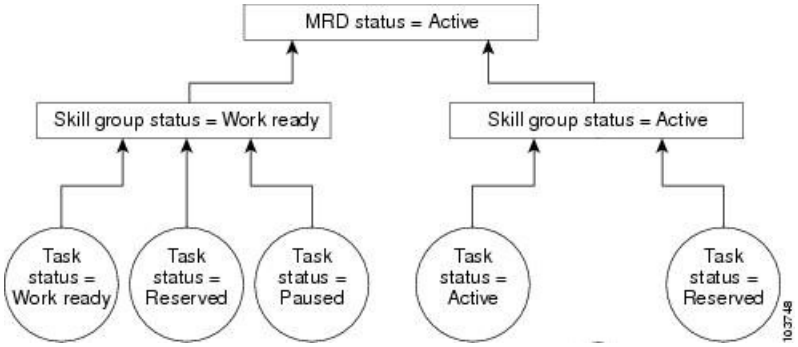
The agent state hierarchy is:

1. Interrupted
2. Active
3. Work Ready
4. Paused
5. Reserved
6. Busy Other (for different skill groups in the same MRD)

7. Not Active

Consider the following diagram:

Figure 5: Agent State Hierarchy in Skill Group and MRD



In the previous diagram, an agent belongs to two skill groups in a chat MRD. The agent is configured to work on up to five concurrent chat tasks in each MRD.

In the first skill group, the agent is working on three tasks, and the agent's states for those tasks are Work Ready, Reserved, and Paused. The agent's overall state in the skill group is Work Ready, because Work Ready is higher than Reserved and Paused in the state hierarchy.

In the second skill group, the agent is working on two tasks, and the agent's states for those tasks are Active and Reserved. The agent's overall state in the skill group is Active, because Active is higher than Reserved in the state hierarchy.

The agent's state in the MRD is Active, because Active is higher than Work Ready in the hierarchy.

Reports That Show Agent States

The following reports that show information on agent state:

- Unified IC Agent Team State Counts Real Time
- Unified IC Agent Real Time All Fields
- Unified IC Agent Team Real Time All Fields

Agent Logout Reason Codes

Agent logout reason codes are defined in the agent desktop software and appear in historical reports as their numeric equivalent, with no text code. For example, if reason code 1 equals “end of shift” and the agent selects that reason for logging out, the report displays “1”.

In addition to the codes configured at the desktop, some codes are generated automatically when the software logs out the agent. The following table describes these built-in logout reason codes, which are available for Unified CCE.

Note Check your *ACD Supplement Guide* to make sure that agent logout reasons codes are supported for your ACD.

Table 5: Agent Logout Reason Codes

Built-in Logout Reason Code	Description
-1	The agent reinitialized due to peripheral restart.
-2	The PG reset the agent, usually due to a PG failure.
-3	An administrator modified the agent's extension while the agent was logged in.
999	The agent was logged out from Finesse by a supervisor.
50002	A CTI component failed, causing the agent to be logged out. This could be due to closing the agent desktop application, heartbeat time-out, a CTI server failure, or a CTI server client failure (such as Finesse).
50003	The agent was logged out because the ACD reported the agent's device as out of service.
50004	The agent was logged out due to agent inactivity as configured in agent desk settings.
50020	The agent was logged out when the agent's skill group assignment dynamically changed.
50030	The agent was logged out when the agent's skill group assignment dynamically changed on the Administration & DataServer.
50040	The mobile agent was logged out because the call failed.
50042	The mobile agent was logged out because the phone line disconnected when using nailed connection mode.

Agent Not Ready Reason Codes

There are reports that show the codes agents select when entering Not Ready state, that calculate the percentage of time spent in the Not Ready state, and that show specific Not Ready reasons based on the time range you specify.

These reports help you identify whether agents are taking the appropriate number of breaks and whether their breaks are the appropriate length.

Some reports display both the text of the reason code (if configured) *and* the corresponding number. For example, if an agent enters Not Ready state and selects “Break” as the reason code, and if you have configured text for this code, reports display “Break [1]”. Other reports display the numeric Not Ready reason code only.

In addition to Not Ready reason codes that you define, there are built-in Not Ready reason codes for situations in which the software automatically makes the agent Not Ready. The following table describes these built-in Not Ready reason codes.

There are no predefined Not Ready Reason codes for Unified CCE.

Table 6: Built-In Not Ready Reason Codes

Built-in Not Ready Reason Code	Description
-1	Agent reinitialized (used if peripheral restarts).
-2	PG reset the agent, usually due to a PG failure.
-3	An administrator modified the agent's extension while the agent was logged in.
999	A Finesse supervisor changed the agent state.
50001	The CTI client disconnected, logging out the agent. **Note** This reason code is converted to a 50002, so 50001 does not display in the agent log out records.
50002	A CTI component failed, causing the agent to be logged out. This could be due to closing the agent desktop application, heartbeat time-out, a CTI server failure, or a CTI server client failure (such as Finesse).
50003	Agent was logged out because Unified CM reported the device out of service.
50004	Agent was logged out due to agent inactivity as configured in agent desk settings.
50005	For a deployment where the Multi-line Agent Control is enabled in the peripheral, and the Multi-line Agent Behavior is configured to impact agent state, the Agent is set to Not Ready with this code while talking on a call on the Non-ACD line.
50010	The agent did not receive multiple consecutive routed calls. The system makes the agent Not Ready automatically so that additional calls are not routed to the agent. By default, the number of consecutive calls missed before the agent is made Not Ready is 2.
50020	Agent was logged out when the agent's skill group dynamically changed on the Administration & Data Server.
50030	Agent was logged out because the agent was logged in to a dynamic device target that is using the same dialed number (DN) as the PG static device target. **Note** Device targets are deprecated. Use Agent Target Rules instead.
50040	Mobile agent was logged out because the call failed.
50041	Mobile agent state changed to Not Ready because the call failed when the mobile agent's phone line rang busy.
50042	Mobile agent was logged out because the phone line disconnected while using nailed connection mode.
50041	The agent's state was changed to Not Ready because the agent's phone line rang busy and a call failed.

Built-in Not Ready Reason Code	Description
32767	The agent's state was changed to Not Ready because the agent did not answer a call and the call was redirected to a different agent or skill group.
Supervisor Not Ready	This code is reserved.
Supervisor Logout	This code is reserved.

By default, built-in Not Ready reason codes do not have associated textual reason codes. They appear as numbers in reports. To see a textual code for these Not Ready reason codes, enter the built-in Not Ready reason code into the Reason Code list tool with the related text. For example, you can label the 32767 Not Ready reason code "Redirection on No Answer."

Note

- To report on Not Ready reason codes, ensure that the reporting of agent event detail data is enabled on the PG with the Unified CM peripheral. This is enabled by default.
- For Unified CCE deployments, check your *ACD Supplement Guide* to make sure that Not Ready Reasons codes are supported for your ACD.

Reports That Show Agent Not Ready Reason Codes

The following reports contain information on Not Ready codes and the time spent as Not Ready:

- Unified IC (Intelligence Center) Agent Skill Group Real Time All Fields
- Unified IC Agent Not Ready Detail

Agent Reporting for Outbound Option Campaigns

For agent reporting per campaign, Outbound Option provides report templates that accurately represent the outbound agent activity for a contact center, including information grouped by skill group.

Agent Task Handling

Agents can receive and place many different types of tasks. There are reports that show you what kind of tasks agents are handling and how well they are handling them. For example, there are reports that display statistics for calls placed, received, transferred, and conferenced, and there are reports that indicate how many calls were rerouted when the agent failed to answer the call.

Types of Tasks

Tasks can be internal or external, incoming, or outgoing.

- **Internal tasks** are calls made to an agent from another person on the same ACD (for Unified CCE) or on the same cluster (for Unified CCE).
- **External tasks** are calls that are placed off-switch, go through a voice gateway or Media Routing PG, or tasks that are routed to an agent from a person on a different ACD or cluster. For example, calls from the call center to customers are considered external.
- **Incoming tasks** are tasks that an agent receives, typically originating from an ingress gateway. Multichannel tasks are always incoming.
- **Outgoing tasks** are calls that an agent places. For example, if a customer calls an agent, the call is incoming for the agent. If an agent calls a supervisor, the call is outgoing for the agent.

For voice calls only, agents can place consultative calls and engage in conference calls.

Agents can transfer voice calls and nonvoice tasks that were routed to Unified CCE from third-party multichannel applications that use the Task Routing APIs. Agents cannot transfer non-voice Enterprise Chat and Email tasks.

The following table describes the tasks that an agent can receive and place and how those tasks are reported.

Table 7: Types of Tasks

Type of task	Description	Reported As
Incoming direct/internal	Incoming Direct Tasks are tasks that come directly to the agent's extension. These calls can be either internal (agent or device on same ACD) or within the network from another switch. Examples of this call type include calls that another agent directly transfers without going through a script and calls that result from agent-to-agent calling. Data for these calls are stored in the InternalCallsRcvd fields of the Agent_Skill_Group_Interval historical database table.	Internal In
Outgoing external	Agents start these calls from their extension. Calls are placed off-switch or pass through a voice gateway. Outgoing External Tasks are always voice tasks. Consultative, conference out, and transfer out calls count as outgoing external calls if you place them off-switch or to remote agent extensions at another site. Agent-to-Agent dialing is outgoing external for the agent initiating the call if the call has to be placed off-switch to get to the destination agent. Data for these calls are stored in the AgentOutCalls fields of the Agent_Skill_Group_Interval historical database table.	External Out Tasks

Type of task	Description	Reported As
Outgoing internal	Agents start these calls from their extension to another extension within the ACD or to another ACD within the network. Outgoing Internal Tasks are always voice tasks. Consultative, conference out, and transfer out calls are counted as outgoing internal calls if they are placed to another device. The device could be another agent line or any other extensions to the VRU. Agent-to-Agent calls are outgoing internal for the agent initiating the call if the destination agent is on the same ACD as the source agent. Data for these calls are stored in the InternalCalls fields of the Agent_Skill_Group_Interval historical database table.	Internal Out Tasks
Unified CCE/ACD calls	All calls that Unified CCE or the ACD routes to the agent. Data for these calls are stored in the CallsHandled fields of the Agent_Skill_Group_Interval historical database table. **Note** The **Handled** field includes all ACD calls and Unified CCE calls, including calls that are transferred and conferenced, consultative calls, and Outbound Option calls routed to the agent. **Handled** provides a high-level view of routed tasks. Other report columns such as Transfer In and Conf Out provide more details about how the task was handled. More information about Outbound Option results are available in Outbound Historical and Outbound Real Time reports.	Handled
Transferred in	Calls transferred to an agent from another agent. Calls that are blind transferred by one agent to CVP for re-routing **are** counted in this column for the agent who receives the rerouted call. **Note** Calls that are transferred to IP-IVR or other vendor IVRs for rerouting are **not** included in this column for the agent who receives the rerouted calls. Those calls appear as new incoming calls. Nonvoice tasks from third-party multichannel applications that are blind transferred are also counted in this column for the agent who receives the rerouted task. Data for these calls are stored in the TransferredIn fields of the Agent_Skill_Group_Interval historical database table.	Transfer In

Type of task	Description	Reported As
Transferred out	Calls that are transferred from an agent. An agent can transfer both incoming and outgoing calls. Nonvoice tasks from third-party multichannel applications that are transferred from an agent are also counted in this column. Data for these calls are stored in the TransferredOut fields of the Agent_Skill_Group_Interval historical database table.	Transfer Out
Consultative	Calls in which an agent consulted with another agent or supervisor while having another call on hold. Data for these calls are stored in the ConsultativeCalls fields of the Agent_Skill_Group_Interval historical database table.	Cons Out
Conference in	Incoming calls that are conferenced. Data for these calls are stored in the ConferencedInCalls fields of the Agent_Skill_Group_Interval historical database table. **Note** For blind conferences, this field is updated when another agent answers the call that was blind conferenced to an IVR. Calls that are transferred to IP-IVR or other vendor IVRs for rerouting are **not** included in this column for the agent who receives the rerouted calls. Those calls appear as new incoming calls.	Conf In
Conference out	Outgoing calls that are conferenced. Data for these calls are stored in the ConferencedOutCalls fields of the Agent_Skill_Group_Interval historical database table.	Conf Out

Task Times

For each type of task that an agent can place, the amount of time that the agent spent working on that task is recorded in the Agent_Skill_Group_Interval database table, as follows:

- Unified CCE Packaged CCE–routed tasks and ACD–routed tasks - The time for these tasks begins when the agent answers the task, and ends when the agent completes wrap up. The time is stored in the HandledCallsTime field.
- Incoming direct tasks - The time for these tasks begins when the agent answers the task, and ends when the task disconnects. The time is stored in the InternalCallsRcvdTime field.
- External outgoing tasks - The time for these tasks begins when the agent starts the task, and ends when the task disconnects. The time is stored in the AgentOutCallsTime field.
- Internal outgoing tasks- The time for these tasks begins when the agent starts the task, and ends when the task disconnects. The time is stored in the InternalCallsTime field.
- Transferred-in tasks - The time for these tasks begins when the agent answers the transferred task, and ends when the task disconnects. The time is stored in the TransferredInCallsTime field.

- Transferred-out tasks - The time for these tasks begins when the agent activates the transfer button, and ends when the transfer is complete. The time is stored in the TransferredOutCallsTime field.
- Consultative tasks - The time for these tasks begins when the agent activates the transfer button, and ends when the target agent answers and the held task is restored (drop consultative call) or consult party drops. The time is stored in the ConsultativeCallsTime field.
- Conferenced-in tasks - The time for these tasks begins when the agent answers the task, and ends when the task disconnects. The time is stored in the ConferenceInCallsTime field.
- Conferenced-out tasks - The time for these tasks begins when the agent activates the conference button, and ends when the agent disconnects from the conference call and the supervisor drops out of the call. The time is stored in the ConferenceOutCallsTime field.

You might notice overlapping data in your reports for the amount of time for different types of calls. Overlapping data happens because incoming tasks, such as ACD routed tasks and calls directly to an agent, can be Transferred In and Conferenced In. Both incoming calls and outgoing calls placed by agents can be Transferred Out and Conferenced Out. The total time for the incoming or outgoing call includes transfer and conference time.

Note Agents can transfer and conference incoming calls both in and out. However, they can transfer and conference outgoing calls out only. This difference means that if an agent transfers an outgoing task to another agent, it is still considered an outgoing task.

Reports That Show Agent Task Handling

The Unified IC Agent Historical All Fields report contains information on Not Ready codes and the time spent as Not Ready.

Agent Utilization: Full-Time Equivalents and Percent Utilization

Because agents can work on multiple media and in multiple skill groups, they typically do not spend all of their time handling tasks for a single skill group. Determining staffing needs based on agents whose time is divided among skill groups and media can be difficult.

Report templates provide two types of statistics that give you a improved view of how agents are being utilized and how many full-time agents would be required to handle the amount of work performed during an interval for a particular skill group.

These statistics are:

- % Utilization (percent utilization)
- FTE (full-time equivalent)

Percent utilization (% Utilization in reports) shows you how well agents are being utilized within a skill group. This metric is computed in reports by dividing the total time agents spend handling calls in a skill group by the total time agents were ready to handle tasks. To calculate the time that an agent was ready, the system subtracts the Not Ready time from the total time that agents were logged on. For example, if the agent

spent 20 minutes of the log on duration handling calls and was available to handle calls for 40 minutes, the percent utilization is 50%.

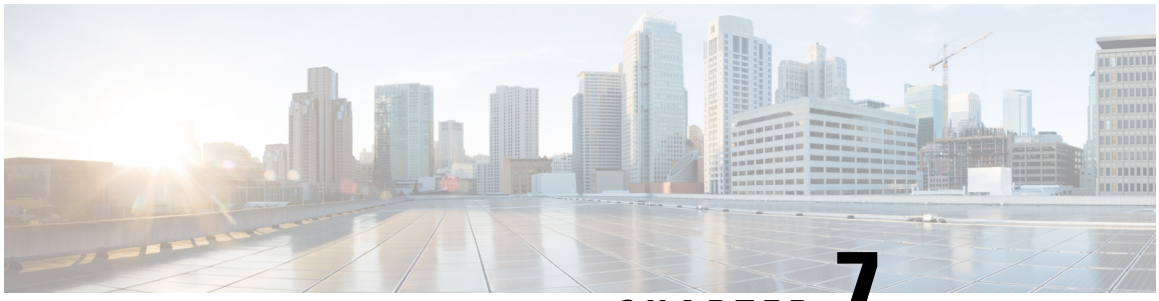
The **full-time equivalent** (FTE in reports) is the number of full-time agents that would be required to perform the work done during that interval for a skill group. To calculate the FTE, the system divides the total time that work was performed by the total time in the interval. For example, if agents spent a total of 3 hours handling tasks during a 30-minute interval, the FTE for task handling during the interval is 3 hours / 0.5 hours, which equals 6 full-time persons. This means that if all agents handled tasks full-time, the work could have been done by 6 agents.

Note If you select a report interval that is less than 8 hours, the resulting value will be lower than expected.

Reports That Show Percent Utilization and FTE Metrics

The following reports contain operational information on percent utilization and FTE:

- Enterprise Skill Group Historical All Fields
- Peripheral Skill Group Historical All Fields Report
- Peripheral Skill Group Real Time All Fields Report
- Precision Queue Real Time All Fields
- Precision Queue Interval All Fields



CHAPTER 7

Skill Groups

- Enterprise Skill Groups, on page 47
- Base Skill Groups and Sub-skill Groups, on page 47
- Default Skill Group, on page 48
- Reports on Skill Group Operations, on page 49
- Reports on Agent Activity in Skill Groups, on page 50
- Skill Group Reporting for Outbound Option Campaigns, on page 51

Enterprise Skill Groups

An Enterprise skill group is a configured entity that serves to group a collection of skill groups on different peripherals.

For example, you may have a skill group called Boston_Sales on one peripheral and a skill group called NewYork_Sales on another peripheral. You could create an Enterprise skill group called Enterprise_Sales.

In a Unified CCE environment, configuring Enterprise Skill Groups allows you to report on skill groups across all ACDs, thus providing an enterprise view.

If you are using a Cisco Contact Center Gateway deployment, in which Unified CCE acts as an IP ACD to a parent Unified CCE system, decide which skill groups on the Unified CCE system are to be grouped into Enterprise skill groups at the parent level.

Note If you group skill groups from the same peripheral into an Enterprise skill group, you will see double counting of some metrics in your reports.

Base Skill Groups and Sub-skill Groups

For Unified CCE deployments, you can configure only one type of skill group: base skill groups.

For Unified CCE, existing sub-skill configurations that are in place for Unified CCE. Unified CCE and time-division multiplex(TDM) based ACDs are supported to enable you to phase them out gracefully.

Refer to the *Administration Guide for Cisco Unified Contact Center Enterprise* for instructions on manually removing sub-skill groups.

Default Skill Group

The default skill group acts as a bucket to capture information about voice calls and non-voice tasks.

You can configure the default skill group per agent. If a default skill group is not set, the system automatically creates one. The default skill group has a peripheral number of 0.

Role of Default Skill Group in Reporting

The default skill group captures information in these situations:

- For calls that are not routed by a Unified CCE Packaged CCE routing script
- If a skill group is not specified in a routing script
- If the Agent to Agent node is used in a routing script for agent-to-agent dialing
- When the Queue to Agent node queues a task to an agent and the agent is not logged into the skill group specified in the Queue to Agent node

Using a default skill group helps to:

- Ensure the agent/skill group reports balance with the service and call type reports, since service and call type reports include only Unified CCE Packaged CCE-routed calls, and
- Isolate/identify non-Unified CCE Packaged CCE-routed calls within the agent and skill group report.

Statistics for the default skill group are affected by different types of calls, including new calls, agent-to-agent-dialing, and transferred and conferenced calls.

If you deploy Multichannel options in a Unified CCE Packaged CCE system, default skill groups are created for each Media Routing Domain that is configured.

How New Calls Increment Default Skill Group Statistics

Call statistics for all new outbound and incoming direct calls are incremented for the default skill group as follows:

- AgentOutCalls for external outbound calls

Note When an agent makes an outbound call as part of a consultative call, the call is not attributed to the default skill group. It is attributed to the skill group for the consulting agent on the original call.

- InternalCalls for the internal outbound calls
- InternalCallRcvd for the direct incoming calls

Note CallsHandled is not incremented for the default skill group, since the default skill group can not be referenced in any script.

How Agent-to-Agent Dialing Increments Default Skill Group Statistics

Agent-to-agent dialing using the agent to agent node in the script also affects the default skill group. OutgoingExternal or OutgoingInternal are incremented for the default skill group of the agent initiating the agent to agent call. The default skill group InternalCallsReceived is incremented for the default skill group of the agent receiving the agent to agent call.

How Transferred and Conferenced Calls Increment Default Skill Group Statistics

The default skill group is also affected by transferred and conferenced calls. If agent A transfers or conferences a Unified CCE Packaged CCE-routed call to another agent directly without using a script, OutgoingExternal or OutgoingInternal for agent A are incremented against the skill group of the Unified CCE Packaged CCE-routed call. However, IncomingDirect calls for agent B are incremented against the default skill group.

However, if the agent (agent A) transfers or conferences a Unified CCE Packaged CCE–routed call to a dialed number that accesses a transfer or conference script that has an agent to agent node, OutgoingExternal or OutgoingInternal for the agent A is incremented for the skill group of the Unified CCE Packaged CCE routed call. IncomingDirect calls for agent B are incremented for the default skill group.

Reports on Skill Group Operations

Use the skill group templates to gain insight into operations, to see how one skill group is performing compared to other skill groups, and to track whether calls are being distributed evenly by your routing scripts and configuration.

- In a Unified ICM environment, you can select and report on data for base skill groups only, when sub-skill group are configured.

Note If you have configured sub-skill groups, data from sub-skill groups automatically rolls up into base skill groups.

- You can report on skill groups associated with a specific single peripheral in Unified CCE.
- You can report on call statistics by agent skill group assignments.
- You can report on enterprise skill groups. An enterprise skill group is a collection of skill groups, mapped across multiple peripherals.

  If you group skill groups from the same peripheral into an enterprise skill group, you might see double-counting of some metrics in your reports.

Note For agents in more than one skill group, you can also use the agent by skill group templates as a tool for monitoring agent performance.

Calls Offered Calculation for Skill Group

The completed state for RouterCallsOffered at the skill group is calculated using these fields from the Skill_Group_Interval table:

- RouterCallsAbandToAgent
- CallsHandled
- RouterCallsDequeued
- RedirectNoAnsCalls
- RouterError
- ReserveCalls
- RouterCallsAbandQ
- RouterCallsAbandDequeued

Reports That Show Skill Group Operations

These are some of the reports that contain operational information on skill groups:

- Unified IC Enterprise Skill Group Historical All Fields
- Unified IC Enterprise Skill Group Real Time All Fields
- Unified IC Peripheral Skill Group Historical All Fields
- Unified IC Peripheral Skill Group Real Time All Fields

Reports on Agent Activity in Skill Groups

A skill group is a collection of agents at a single contact center who share a common set of competencies that equip them to handle the same types of requests. Some examples of skill groups are a collection of agents who speak a specific language or who can assist callers with billing questions.

An agent can be a member of zero, one, or more skill groups (depending on the peripheral) up to a maximum specified in the *Solution Design Guide for Cisco Unified Contact Center Enterprise*.

You can generate reports for skill groups that show agent activity (for example, the number of agents talking, available, or in wrap-up for a particular skill group).

In addition to generating Agent Skill Group reports, you can also use Skill Group reports to monitor operational performance. For example, you might want to see how a skill group is performing compared to other skill groups or to see if calls are being distributed evenly by your routing scripts and configuration.

Reports That Show Agent Skill Group Activity

These are some reports that show information on Agents by Skill Group:

- Agent Skill Group Real Time All Fields
- Agent Skill Group Historical All Fields
- agtskg21: Agent Skill Group Summary Half Hour
- agtskg03: Agent Skill Group Media Status Logout Report

Skill Group Reporting for Outbound Option Campaigns

For skill group reporting per campaign, Outbound Option provides report templates that accurately represent the skill group activity for a contact center.

Skill group reports provide information on agent activity for outbound and inbound agents.

If the same skill group is used for both inbound and outbound, then the campaign consolidated reports will provide a consolidated overview of business activity for both inbound and outbound calls.

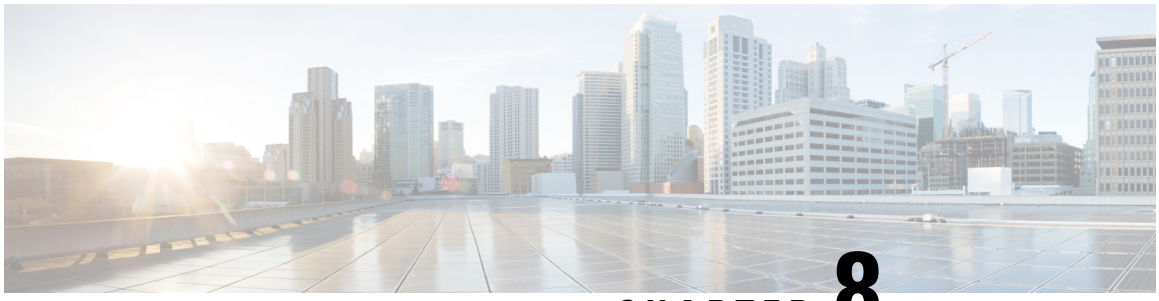
Reports That Show Skill Group Activity on Outbound Option Campaigns

These are some of the reports that show skill group activity per campaign:

- Perskg11: Outbound Option (Blended Agent) Statistics By Skill Group Report
- Perskg12: Outbound Option (Blended Agent) Task Detail Performance In Skill Groups Half Hour Report

Related Topics

Agent reporting for Outbound Option campaigns, on page 40



CHAPTER 8

Agent Teams and Supervisors

- Agent Teams and Supervisors, on page 53
- Agent Team Reports, on page 53
- Supervisor Activity, on page 53

Agent Teams and Supervisors

This chapter provides information about agent teams and supervisors.

Agent Team Reports

Supervisors can report on the agents in teams that they supervise to monitor the performance of a particular team.

Teams are peripheral-specific. All agents on a team and the supervisors for the team must reside on the same peripheral. An individual agent can be assigned to one team only.

Supervisors are a special type of agents who were configured in the Configuration Manager with limited reporting privileges to see information in the agent report categories, and within those categories, to see data for only those agents on teams that they supervise.

You can select 0 or 1 primary supervisor for an agent team, and you can select multiple secondary supervisors for each team. Each supervisor can be a supervisor for multiple teams.

Note To use agent team reports, configure teams and supervisors in Configuration Manager. The team structure you choose is up to you. You can use your ACD configuration. You can also use your ACD reports to monitor agent teams.

Supervisor Activity

Agent team supervisors can take advantage of supervisory features available on their desktops. Use reports to see when supervisors had to use the Barge-In and Intercept features.

Note These supervisory features are not available to agents using MRDs other than Voice.

Barge-In (Unified CCE)

When the supervisor activates the Barge-In desktop feature, the agent's desktop completes a conference to the supervisor so that the supervisor can join into the conversation with the call. The following fields increment for both the agent and the supervisor in the agent skill group and skill group tables.

Note If you deployed Unified CCE as the VRU, data is not gathered for Barge-In.

Table 8: Supervisor Barge-In

Fields incremented for agent's skill group to which the call was routed	Fields incremented for supervisor's default skill group
CallsHandled, InternalCalls, BargeInCalls	BargeInCalls, InternalCallsRcvd

For the agent, the call is reported in Tasks Handled and Barge-In report fields. For the supervisor, the call is reported in Tasks Handled and Barge-In report fields.

Intercept (Unified CCE)

If the supervisor decides to intercept (take over) the call, the supervisor activates the Intercept desktop button. This interception drops the agent out of the conference, which allows the supervisor to take over the call. The following fields are incremented during the intercept operation for both the agent skill group and skill group tables.

Note If you have deployed Unified CCE as the VRU, data is not gathered for Intercept.

Table 9: Supervisor Intercept

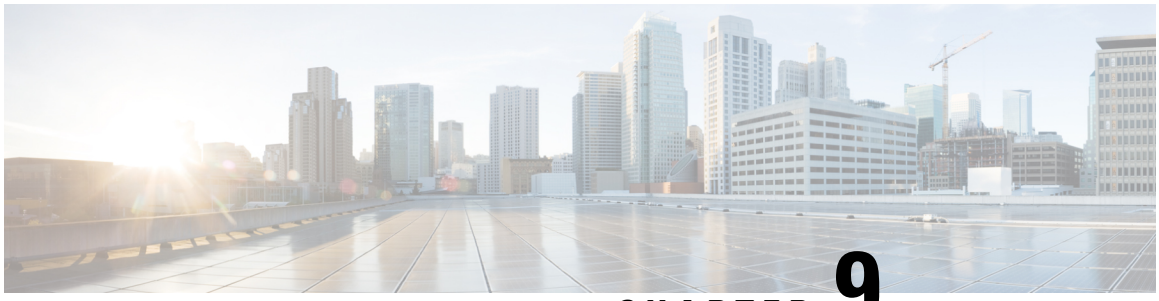
Fields incremented for agent's skill group to which the call was routed	Fields incremented for supervisor's default skill group
InterceptCalls	InterceptCalls

For the agent, the call is reported in the Intercept report field. For the supervisor, the call is reported in the Intercept report field.

Reports That Show Information on Agent Teams

The following reports contain information on agent teams:

- Unified IC Agent Team Real Time All Fields
- Unified IC Agent Team Historical All Fields
- Agent Team State Counts Real Time



CHAPTER 9

Average Speed of Answer

- How ASA Is Calculated, on page 57
- ASA for Agent and Skill Group, on page 58
- ASA for Call Type and Service, on page 59

How ASA Is Calculated

Calculations for ASA differ based on the type of system associated with the reporting object.

Table 10: Calculating ASA

Reporting Object	Calculation
Skill_Group_Interval	Skill_Group_ Interval.AnswerWaitTime / Skill_Group_ Interval.CallsAnswered
CallType _Interval	Call_Type_ Interval.AnswerWaitTime / Call_Type_ Interval.CallsHandled
Call_Type_Skill_Group_Interval	Call_Type_Skill_Group_Interval. AnswerWaitTime / Call_Type_Skill_Group_Interval.CallsAnswered
Route_Real_Time. AvgSpeedAnswerTo5	N/A
Route_Half _Hour	Route_Half _Hour.AnswerWait TimeToHalf / Route_Half _Hour.CallsAnswered ToHalf
Service_Real_Time Service_Real_Time. AvgSpeedToAnswerTo5	Service_Real_Time.AnswerWaitTimeTo5 / Service_Real_Time.CallsAnsweredTo5
Service_Interval. AnswerWaitTime Service_Interval. AvgSpeedToAnswer	N/A
Precision Queue ASA	Skill_Group_ Interval.AnswerWaitTime / Skill_Group_ Interval.CallsAnswered

Note The method used to calculate ASA differs based on the type of system associated with the reporting object Unified CCE). The following table shows the calculations. X means that the value is included in the calculation.

Table 11: Calculations for ASA

	Call_Type _Skill_Group	Call_Type _Interval	Skill_Group _Interval (Unified ICM)	Skill_Group (Unified CCE)	Service_Interval (Unified ICM)	Service_Interval (Unified CCE)
Delay Time/ Switch Time				Contains Network Delay	X	Contains Network Delay
Local Queue Time	X	X	X	Not Avail	X	Not Avail
Network Queue Time	SG Time	X	X	SG Time		X
Ring Time	X	X	X	X	X	X
Network Delay Time	X	X	X			

ASA for Agent and Skill Group

Agent. The ASA is calculated for the agent at the PG level.

The internal queuing time is sent to the PG by Unified CCE Packaged CCE when an agent becomes available for the call. The PG adds up the internal queue time, ring time, and network time and adds that into AnswerWaitTime in the agent skill group table. AnswerWaitTime is then divided by the CallsAnswered for the agent.

skill group. The ASA is calculated for the skill group at the PG level.

For Unified CCE Enterprise Queuing, the time spent in the enterprise queue is not used in the calculation of AnswerWaitTime. The calculation includes the ACD queue time only.

For ACD queuing, the queue time is reported by the PG based on events received from the ACD.

Consider this example:

- A call is queued at skill group X.
- At Time T, the call is then queued at skill group Y at time T+30 seconds.
- An additional 10 seconds transpire before the call is answered by an agent at skill group Y.

In this case, the internal queuing time will be 40 seconds. This is the total length that the call has been queued even though it was only queued at skill group Y for 10 seconds.

The agent's PG adds the internal queue time, ring time, and network time to create the total AnswerWaitTime for the call and adds it to AnswerWaitTime in the skill group table. AnswerWaitTime is then divided by CallsAnswered within the skill group table to arrive at the ASA for the skill group.

Precision queue. The ASA is calculated for the precision queue by summing skill groups across PGs which are associated with the precision queue.

Reports That Show ASA for Agents

The following reports show ASA statistics for agents and skill groups:

- Unified IC Peripheral Skill Group Real Time All Fields
- Unified IC Peripheral Skill Group Historical All Fields

ASA for Call Type and Service

The call type ASA is calculated as AnswerWaitTime divided by CallsAnswered.

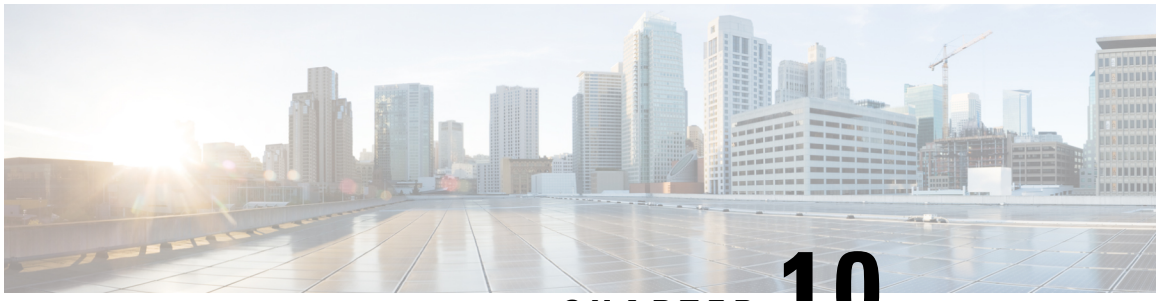
Call type ASA is applicable only when calls are translation routed and includes time spent in the Enterprise Queue as well as time spent in the ACD queue.

ASA for the service is computed based on the AnswerWaitTime as reported from the peripheral. This value includes the time spent on the ACD after the call was offered up until the time the call was answered. If an Enterprise Queue is used, ASA reported for the service does not include time spent in the Enterprise Queue.

Reports That Show ASA for Call Type and Service

The following report contains ASA statistics:

- Unified IC Call Type Historical All Fields



CHAPTER 10

Redirection on No Answer

- Guidelines for RONA, on page 61
- RONA for System PG, on page 62
- RONA Metric Reports, on page 62

Guidelines for RONA

For voice calls, follow these guidelines to obtain accurate and useful data when using Redirection on No Answer (RONA) to respond to unanswered calls:

- Within the routing script, plan to enable the Target Requery option in the routing script. Target Requery is available from the Queue, Queue to Agent, Label, Select, and RouteSelect nodes.
- Decide and configure how long a call is to ring before being redirected to a new agent or skill group.

  When deciding how long a call is to ring, consider how RONA calls affect the Service Level. If you want RONA calls to adversely affect the Service Level, the amount of time the call is allowed to ring before being redirected must be above the Service Level threshold time.
- Configure the number to dial to redirect calls that agents do not answer within the ring no answer time. You configure the ring no answer dialed number in the Agent Desk Settings tool in Configuration Manager.
- Plan to create a separate call type for RONA situations and to associate this call type with the ring no answer dialed number.

  Using a separate call type enables you to redirect calls that are not answered to a script that queues the calls at a higher priority. It also enables you to report on activity for the RONA call type. Viewing data for this call type helps you gain insight into the number of calls that redirect on no answer. Viewing data for this call type also helps you see how the calls are finally handled.
- Plan to create a separate script that is associated with the RONA call type.

  In the Redirection on No Answer Script, queue the calls at a higher priority. The call variables set in the first script are carried over into the second script and you can use these variables if you choose.

  Change the call type in the script after the requery and create a path for calls that are required within the script.
- A redirected call is considered as a new call.

For nonvoice tasks routed to Unified CCE by third-party multichannel applications that use the Task Routing APIs, follow these guidelines when using Redirection on No Answer (RONA) to respond to unanswered tasks:

- Within the routing script, plan to use the ServiceRequested call variable to identify RONA tasks. This call variable is set to 3 when Task Routing tasks RONA. You can raise the priority of tasks that RONA so that they go to the front of the queue.

  For scripting information for Task Routing for third-party multichannel applications, see the *Scripting and Media Routing Guide for Cisco Unified ICM/Contact Center Enterprise* at https://www.cisco.com/c/en/us/support/customer-collaboration/unified-contact-center-enterprise/products-user-guide-list.html.

- Configure the Start Timeout setting for the MRD to specify how long a task is to wait on an agent's desktop before being redirected to a new agent or skill group. This setting is in the Unified CCE Administration Media Routing Domain tool.

  Consider how RONA calls affect the Service Level. If you want RONA calls to adversely affect the Service Level, the amount of time the call is allowed to ring before being redirected must be above the Service Level threshold time.

  For configuration instructions for Task Routing for third-party multichannel applications, see the *Cisco Unified Contact Center Enterprise Features Guide* at https://www.cisco.com/c/en/us/support/customer-collaboration/unified-contact-center-enterprise/products-feature-guides-list.html

RONA for System PG

Redirection on No Answer calls update Peripheral tables (Peripheral_Real_Time and Peripheral_Interval) differently in Unified CCE environments than in Unified CCE deployments with the System PG.

Consider this example:

An incoming ACD call is sent to an agent, but the agent does not answer it. The RONA call redirects to an IVR (queued to a skill group), and is answered later by another agent.

In a Unified CCE deployment that does not use the System PG (with or without Unified CVP support), the CallsOffered fields (CallsOffered and CallsOfferedToday in Peripheral_Interval and Peripheral_Real_Time) are updated twice:

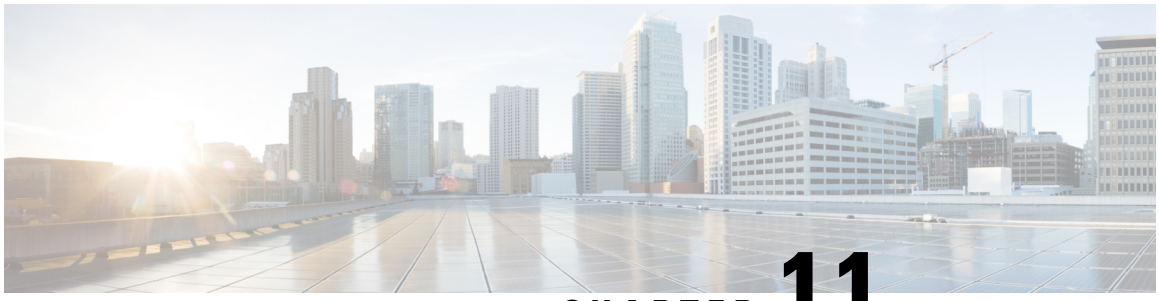
- When the call first arrives, the Peripheral CallsOffered metrics for the CallManager peripheral are incremented.
- When the call is sent to the IVR, the metrics for the IVR peripheral are incremented.

In Unified CCE with a System PG deployment, this metric is updated only when the call first arrives.

This feature is implemented differently depending on whether you install Unified IP-IVR or Unified CVP as the VRU for your system.

RONA Metric Reports

For Unified CCE, Redirection on No Answer metrics are reported directly from the ACD.



CHAPTER 11

Call Types and Services

- Call Type and Service Type Reports, on page 63
- Call Types, on page 63
- Call Type Reporting, on page 67
- Services, on page 71

Call Type and Service Type Reports

Key statistics provided by service and call type reports include:

- Average Speed of Answer (ASA)
- Number of calls received, handled, and abandoned
- How long callers waited in queue
- Number of calls queued for an available agent
- Whether service level objectives are being met
- Whether the caller was transferred
- Number of callers who heard a busy signal
- Number of calls who encountered an error

Skill group and agent reports provide many of these same metrics—such as ASA, Avg. Handle Time, abandons, redirects, and calls handled. The call type and service reports show these metrics in a format that gives a more complete picture of the customer experience. The call type reports also helps you review statistics organized by application.

Call Types

A call type is a category of incoming call. Based on the call type, the CallRouter selects the routing script that ultimately transfers the call to an appropriate agent. Each call type has a schedule that determines which routing script or scripts are active for that call type at any time.

Call types are also the highest level reporting entity and are peripheral-independent.

There are two classes of call types: voice (phone calls) and nonvoice (for example, email and text chat).

- Voice call types are categorized initially by the dialed number (DN) and, optionally, by the caller-entered digits (CED) and the calling line ID (CLID).
- Nonvoice call types are categorized initially by the Script Selector. For Enterprise Chat and Email, call types also can be optionally categorized by Application String 1 and 2.

For reporting statistics that reflect the customer's experience, create call types that reflect the caller's needs and change call types during the call when necessary.

Note Configuring a separate call type for each type of call treatment that you offer can eliminate the need for most custom reporting.

Note

- Call types cannot span ACDs and PGs. If your system uses both Unified CCE components and legacy ACDs, create separate call types for the ACDs and the Unified CCE components.
- The software allows routing that can offer calls simultaneously to multiple skill groups. The Call_Type_Skill_Group_Interval table records details for call types associated with specific skill groups. Reports generated from this table show how scripts routed the calls and other call-handling issues.
- The system does no create or report Call Type Skill Groups records if they exceed the Call Type Skill Group limit. Routing of contacts continues even when you exceed this limit. To view the limits, see the Solution Design Guide for Cisco Unified Contact Center Enterprise at https://www.cisco.com/c/en/us/support/customer-collaboration/unified-contact-center-enterprise/products-implementation-design-guides-list.html.

Guidelines for Call Types

Consider the call types that meet your reporting needs and configure a separate call type for each type of call treatment that you want to offer.

Based on the deployment model, scripting, queuing, and on whether calls are translation-routed, you can define call types to:

- Provide enterprise-wide routing statistics for the call center. For example, the number of calls to route to different peripherals or the number of calls that encounter routing errors.
- Group calls to report on certain types of activity that occur within the contact center. For example, you might create separate call types for calls that redirect on no answer or calls that are transferred to another agent.
- Report on statistics for a self-service VRU application.

Do you want to configure a separate call type associated with call transfers and conferences?

Doing so enables you to direct the transfer to a different routing script.

Do you plan to report on individual transactions within Network VRU Self-Service or Information Gathering applications?

If so, you might configure a separate call type for each transaction.

Do you want to separate Information Gathering VRU metrics from queue metrics?

If so, you might configure a separate call type for queuing.

Do you plan to use Outbound Option?

If so, create a separate call type for Outbound Option calls. Outbound Option uses a routing script in addition to a physical call to reserve agents. The call type real-time and half-hour reports contain data that pertains only to reservation calls and do not include reporting information for any outbound calls.

Do you want to configure a separate call type associated with RONA situations?

If you configure a separate call type associated with RONA, you can direct calls that Ring No Answer to a routing script designed for this situation. You can report on this Redirection on No Answer call type to see how calls that redirect on no answer are eventually handled.

You can also handle this situation with requery.

Do you want to determine the service level for call types?

Service level indicates how well you meet your goal for answering calls.

You can configure the service level setting individually for each call type or set a global Service Level for all call types.

Do you want to configure abandoned short calls to filter out calls that abandon quickly?

If you want to use abandoned short calls, configure the call type Abandon Wait Time. Calls that abandon within the Abandon Wait Time are reported as short calls.

If you do not want to use abandoned short calls, leave the Abandon Wait Time field blank.

Do you want to define "bucket intervals" for reporting on answered and abandoned calls for the call type (Unified CCE)?

These "bucket intervals" appear in call type reports that display the number of calls answered and abandoned for each interval. Bucket intervals are useful for monitoring when calls are abandoning or being answered.

Changing Call Types

You can change call type throughout the life of a call. You can direct the call to a new routing script or to gather report metrics for different legs or transactions.

Reasons for changing the call type within a routing script include the following:

- In a self-service network VRU application script, you might change the call type at specific points in the script to indicate that a transaction is complete.

  For example, if the customer calls a bank and successfully checks an account balance using a Self-Service script, you might change the call type to indicate that the account balance transaction is complete and a new transaction is started. In this case, you create a call type for each transaction on which you want to report.

- You might change the call type when a call enters a queue at the end of an Information Gathering VRU application in order to separate Information Gathering and queuing metrics. In this case, you would create call types associated with the Information Gathering applications and call types associated with queuing.

The service level threshold timer at the call type starts when the call enters the call type that has a service level defined. When the service level timer expires, the service level is applied to the current call type associated with the call.

If a call type is changed using the Requalify or Call Type nodes, then the service threshold timer is reset.

Service levels are defined only for call types associated with scripts that use the Queue To and LAA Select nodes.

Note If you use Unified CVP, the call type changes depending on the following factors:

- When you use a single CVP, the TCD record for each leg of the call is associated with the last call type.
- When you use multiple CVPs and VRUs, the controlling VRU (for example, CVP1) receives the updated call type in the last connect message. The call type of CVP2 is the same as the call type associated when the agent had received the call.
- When you use the Capture (CAP) micro-application, different TCD rows with multiple call types are populated.
- When a call is abandoned in a queue, the call type is not changed.

Enterprise Routing and Enterprise Reporting for Calls (Unified CCE)

When Unified CCE receives a route request for a call, it first determines the call type, finds the script currently scheduled for that call type, and routes the call to the desired destination (for example, to a service, skill group, agent, or announcement).

The call type can be changed throughout the life of a call to direct the call to a new routing script and to gather report metrics for different legs or transactions.

For legacy ACDs where Unified CCE software is used for Enterprise Routing, consider the following to ensure that your reports contain correct and relevant metrics:

- Ensure all calls are routed by Unified CCE software.
- Deploy a Service Control VRU to provide treatment and to queue calls in the enterprise while waiting for an available agent in a skill group. Queue calls to skill groups in Unified CCE (Enterprise Queuing) for all call centers. Avoid using ACD queues (site queues).
- Use Translation Routes for routing calls to the legacy ACD. Always use translation routing when routing calls between ACDs.
- Once the call is routed and is terminated on the legacy ACD, have no treatment at the ACD.
- Avoid having agents transfer calls directly to other agent stations or agent IDs. Instead, use post routing capabilities to provide treatment and queuing for transferred calls.
- Avoid handling RONA situations on the ACD, where possible. Instead, use post-routing capabilities to have the RONA calls routed by Unified CCE.

Related Topics

Changing call types, on page 65

Call Type Reporting

The use of call type reports is based on the business need for your enterprise and is determined by how you plan to use the functionality provided by Unified CCE Packaged CCE software.

Call type reporting provides full customer experience in Unified CCE, similar to Service reporting in Unified ICM.

Call type reports can be used for the following purposes:

- Calls answered by agents
- Calls abandoned at the VRU
- Calls that abandon while en-route to an agent or while being offered to an agent's phone
- Short calls
- Calls that are given the busy, ring, default-routed or network-routed treatment
- Calls that go to another call type within a routing script using the Call Type or Requalify node
- Calls that abandon en-route to the VRU
- Calls that have a bad label
- Calls that re-route on no answer from the agent's phone
- Calls that terminate the script using the Label node to a non-monitored device, such as voice mail
- Cradle-to-grave reporting for call-handling statistics when calls are translation routed
- Reporting on calls grouped for the purposes of global call treatment
- Reporting on Enterprise Queuing statistics
- Providing enterprise-wide routing statistics for your call center, such as the number of calls routed to different peripherals and the number of calls that encountered routing errors
- Reporting on statistics for a self-service VRU , if a Network VRU is deployed
- Reporting on certain activities such as calls that are transferred, provided call types are configured for those activities

Call Type Reporting and Outbound Option Campaigns

You can use call type reporting on Outbound Option reservation calls and transfer to IVR calls. However, because a routing script is not used for the outbound call to the customer, call type reporting is not applicable for the customer call.

Call Type Reporting in Parent/Child Deployment

Call Type reports on the Unified CCE parent help to determine the following:

- Number of calls received by the call type to route to different peripherals (example: multiple Unified CCE children, or different ACDs)

- Number of calls routed to different peripherals (example: multiple children, or different ACDs)
- Number of calls that encountered routing errors

However, there are a limited number of scenarios where you can use Call Type reports to measure customer experience at the parent:

- If you use translation routing at the parent, certain Call Type reports might be useful in measuring customer experience associated with those translation routed calls.
- If you use a network VRU at the parent for network queuing or network prompting, the Call Type reports are useful to provide information on the calls handled by the VRU applications. The Call Type reports also provide the queuing statistics. In a Contact Center Gateway deployment, if you queue the calls at the network, use Call Type reports on the parent to report on the queuing statistics. The number of calls queued and the network queue time is not available at the child.

Calls Offered Calculation for Call Type

The completed state for CallsOffered at the call type is calculated using these fields from the Call_Type_Interval table:

- CallsHandled
- ErrorCount
- ICRDefaultRouted
- NetworkDefaultRouted
- ReturnBusy
- ReturnRing
- NetworkAnnouncement
- OverflowOut
- IncompleteCalls
- ShortCalls
- CallsRoutedNonAgent
- CallsRONA
- ReturnRelease
- AgentErrorCount
- TotalCallsAband

How Call Errors Affect Call Type Reporting

The way call errors increment the database depends on the following conditions:

- Calls that abandon en route to the VRU/CCE scripts are calls that abandon in the network while they are being sent to the VRU. An example of this condition is if a call abandons while it is sent to the VRU

from a CTI Route point in Unified Communications Manager. These calls increment the ErrorCount column in the Call_Type tables.

If the caller abandons within the Abandon Wait Time, calls that abandon en route to the VRU might be counted as short calls, instead of as errors.

If an on-premise VRU is used, then the probability of calls abandoning en route to the VRU is low.

- Calls that abandon en route to agents are calls that encounter an error when the call is at the agent desktop. This call is counted as part of the AgentErrorCount in the Call_Type tables.

The Calls Error field in call type reports is a calculated field that combines both error columns. For example, the Calls Error field in the Call Type Historical All Fields report is derived from Call_Type_Interval.IncompleteCalls + Call_Type_Interval.AgentErrorCount.

How Calls with a Bad Label Affect Call Type Reporting

A bad label refers to an incorrectly configured label or missing label. It is always good practice to define a default label. Calls that do encounter an incorrectly configured label can at least go to the default label and get handled and get accounted for in the call type report.

Labels might be configured incorrectly in the following ways:

- The label specified in the script node might not exist on the routing client.
- The label points to the wrong agent: In this case, the pre-call message is sent to one agent, but the actual call is sent to a different agent. This call is reported as an incomplete call.

If the node does not define a label, the call encounters error conditions and is reported as an error.

How Calls That Experience Redirection on No Answer with IP IVR Affect Call Type Reporting

Redirection on No Answer calls are calls that redirect off the agent's phone because the ring time exceeds the Ring No Answer timer defined in the agent desktop settings. For Redirection on No Answer situations, you configure a separate call type and routing script to be used if agents do not answer ringing calls within the ring no answer time. In the Redirection on No Answer script, you queue the call at a higher priority so that the call does not fall to the bottom of the queue.

In a Unified CCE, environment, Redirection on No Answer situations increment call type statistics as follows:

- For the initial call type, CallsOffered is incremented. When the call redirects, the CallsRONA field is incremented.
- For the Redirection on No Answer call type, CallsOffered is incremented and also fields related to the completion of the call. For example, if the call is handled then the CallsHandled field is incremented.

  Because CallsOffered is incremented twice for the call, use a different call type for Redirection on No Answer calls. A different call type for Redirection on No Answer calls ensures that the call does not peg the same call type twice.

  In call type reports, these calls are grouped into the “Other” column. You can also view a count of Redirection on No Answer calls in agent and skill group reports.

How Calls That Experience Redirection on No Answer with CVPAffect Call Type Reporting

The Redirection on No Answer feature, configured in Agent Desk Settings in the Configuration tool and in CVP, ensures that when an agent does not answer a call, the call is taken away from the agent after a specified number of seconds and re-assigned to another agent or requeued. Redirection on No Answer is also used to change the agent state to Not Ready when a call is rerouted from the agent's phone. When the Ring No Answer time in the Agent Desk Settings expires, Unified CCE software makes the agent unavailable for routing requests. When the Unified CVP Ring No Answer timeout expires, the call is re-queried for routing to a different skill group or agent. You configure the Unified CVP Ring No Answer timer to be approximately 2 seconds longer than the Agent Desk Settings Ring no answer time so that the agent is made Not Ready before the call is requeried. If the agent is not made unavailable first, the script might reassign the call to the same agent.

Note The Unified CVP Ring No Answer timeout must be less than 30 seconds because the Central Controller waits up to 30 seconds for a response from the Unified CVP. If the response is not received within 30 seconds, the call fails.

Because the Ring No Answer time and Unified CVP Ring No Answer timeout are several seconds apart, it is possible that the call continues to ring on the agent's phone after the agent is made Not Ready. If the agent answers the phone in this brief interval, the context of the call is not reported and reports show that the agent went directly into Active state from Not Ready state.

You can configure the routing script to handle Redirection on No Answer situations in two ways: the script can change the call type when the call is requeried, or the script can continue to use the same call type.

The manner in which you script for Redirection on No Answer affects the report data that you see, as follows:

- If you change the call type, CallsOffered, CallsRequeried, and OverflowOut is updated for the initial call type. CallsOffered and fields related to the completion of the call, such as CallsHandled, are incremented for the second call type.

  Using two call types enables you to identify Redirection onNo Answer occurrences in call type reports. For example, if you create a specific call type for use in Redirection onNo Answer situations, then you can see whether calls are redirecting by monitoring the calls offered to that call type. You can also see whether the Flow Out field is incremented for other call types.

- If you do not change the call type, CallsOffered and fields related to the completion of the call, such as CallsHandled, are incremented. FlowOut is not incremented. You can't tell without looking at agent or skill group reports whether calls are redirecting on no answer. (You could write a custom report to see values for CallsRequeried.)

Note Because the Unified CVP application performs a requery to redirect the call to a different agent or skill group instead of branching to another script, the CallsRONA field is not incremented for the call type.

How Calls That Terminate Label Node and Route to Nonmonitored Devices Affect Reporting

The Label node is used to divert a call to voice mail or web attendant or some other device that Unified CCE does not monitor because of digits collected by the caller during a voice menu or due to some other conditions. These calls are counted as RoutedNonAgent and appear in the "Other" column of call type reports.

Note Use a Unified CCE routing scripting script, not a VRU script, to route calls to nonmonitored devices. If you use the VRU script, calls are reported as abandoned at the call type.

Call Type Reports

The following reports display call type data:

- Unified IC Call Type Abandon/Answer Distribution Historical
- Unified IC Call Type Historical All Fields
- Unified IC Call Type Real Time All Fields

Services

For Unified CCE deployments, a service refers to a particular type of processing required by the caller. Services are configured to map to an application on the peripheral that provides the service. For example, a Service on Unified CCE might map to an Application on Aspect or to a VDN on Avaya.

Every call routed to a peripheral must have an associated peripheral Service. The application on the peripheral provides the call treatment, and Service reports are used to measure the customer experience across peripheral services.

A single peripheral might have several services defined such as Sales, Technical Support, and Customer Accounts.

You can determine the service level for a service as well as how abandoned calls impact the service level.

In an Unified CCE environment, calls are routed through IVRs rather than services. Therefore most service reports are not applicable in a Unified CCE environment. For a Unified CCE environment, use the historical IVR peripheral service reports and the historical IVR trunk group reports to measure the performance of your IVRs.

Service Members

For Unified CCE, each Service has one or more skill groups whose members can provide the service. These skill groups are called service members. A skill group can be associated with (that is, can be a member of) more than one service.

Service and service members help track how scripts on an ACD are routing calls.

It is important to configure service members in Configuration Manager to accurately reflect their scripting in the ACD.

The system records calls that were offered to a service member, abandoned by that skill group, and reported against another skill group. (Call_Type_Skill_Group.CallsReportedAgainstAnother).

Enterprise Services (Unified CCE)

An Enterprise Service is a collection of services on different peripherals.

While an individual service is associated with a specific peripheral, an Enterprise Service can span several services from different peripherals in the contact center.

Creating and reporting on Enterprise Services gives contact center managers a consolidated measure of customer experience across similar services configured in different ACD peripherals distributed throughout the contact center.

Note Avoid queuing to multiple services on the same or on several peripherals. Instead, configure and queue to Enterprise Services.

Service Reports

In Unified CCE, a service is an ACD concept that identifies a particular type of processing that the caller requires and defines the call treatment. For example, in the contact center for a software company, callers with questions about installing software are directed to the Technical Support service.

In a Unified CCE environment, calls are routed to services or skill groups at the ACD. All skill groups belong to specific services and, therefore, skill group data rolls up to the service.

Reports for services provide call treatment information for all the skill groups assigned to those services. Service reports are useful to measure customer experience data for which call treatment is done on the ACD.

In a Unified CCE environment, calls are routed through IVRs. Most Unified ICM service reports are therefore not applicable in a Unified CCE environment.

The service reports that are relevant for Unified CCE are the Peripheral Service reports that display data pertaining to IVR services.

For Unified CCE, use Service reports only to report on IVR status and activity. Use Call Type reports for the most complete view of the customer's experience and to ensure that your system is performing optimally.

Service Data Reports

The following reports display service data.

For Unified CCE environments, there are two categories of service reports:

- Peripheral Services (Services)

  This service is tied to a specific peripheral (ACD). A single peripheral might have several services defined, such as Sales, Technical Support, and Customer Accounts.

- Enterprise Services

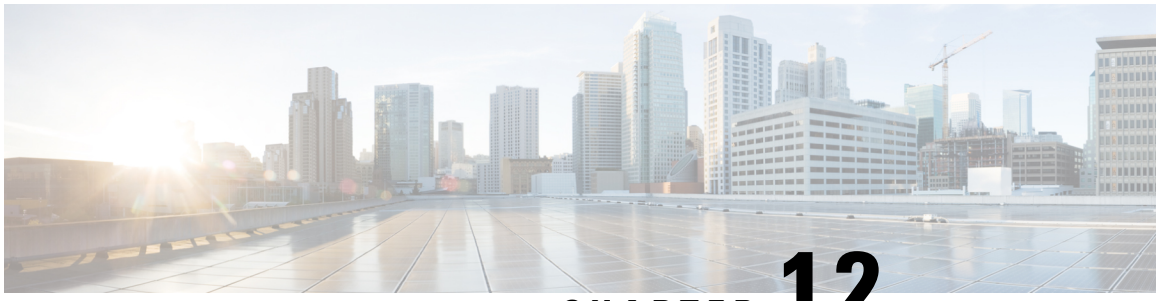
This service is a collection of services from several peripherals across an enterprise.

Reports include:

- Unified Intelligence Center Enterprise Service Historical All Fields

For Unified CCE environments, service reports include:

- Unified Intelligence Center Peripheral Service Real Time
- Unified Intelligence Center Peripheral Service Historical All Fields



CHAPTER 12

Bucket Intervals for Cisco Unified Intelligence Center

• Bucket Intervals, on page 75

Bucket Intervals

Bucket intervals allow you to track data for calls abandoned or answered within specific time increments. For example, you can track data for calls abandoned or answered between 0 and 8 seconds, or under 60 seconds.

Bucket intervals are associated with the following:

- Call types
- Skill groups
- Precision queues

You can set bucket intervals for the system as a whole and for individual call types, skill groups, and precision queues. Settings for individual entities override settings set at the system level.

Note Currently the global setting is available only for call types.

Service level tells you what percentage of calls are being answered within a certain time, but does not tell you how closely to the service level calls are being answered or abandoned. Call type intervals provide more insight into how long callers are waiting before their calls are answered or before they abandon.

For example, if your service level is two minutes, you might want to set up intervals for 30 seconds, one minute, 90 seconds, 120 seconds, 180 seconds, 210 seconds, and 240 seconds. Using these intervals, you can see whether calls are being answered in the 30 seconds after the service level threshold of 180 seconds or if most are waiting a full minute longer to be answered.

The intervals also give you insight into how long callers are willing to wait before abandoning. Many callers do not abandon until two minutes past the service level. This might indicate that you can modify your service level goal.

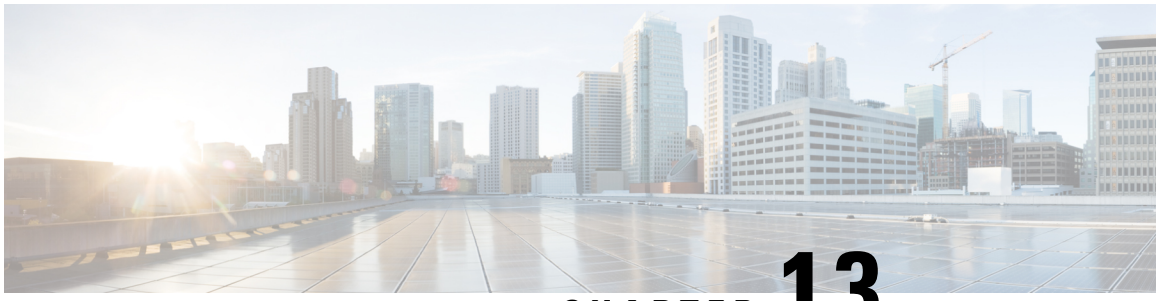
To avoid inconsistencies in reporting, create a new Bucket Interval List with your desired parameters. Follow this updated Bucket Interval parameter for Call Types, Skill Groups or Precision Queues only at specific times

(that is, end of the day, week, or month). Ensure that no one is running the reports for the intervals, while you modify the boundaries.

Bucket Interval Reports

The following reports display bucket interval data:

- Unified Intelligence Center: Call Type Abandon/Answer Distribution Historical
- Skill Group Abandon/Answer Distribution
- Precision Queue Abandon/Answer Distribution



CHAPTER 13

Service Levels

- About Service Levels, on page 77

About Service Levels

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

Note Service level is not affected for calls that are neither answered nor abandoned within the service level time. For example, calls that encounter an error condition or are sent to non-monitored devices (using the label node) within the service level threshold do not affect the service level.

Two important configuration parameters contribute to the calculation of service level:

- Service level threshold - the number of seconds you set as a goal to treat a call. To calculate the service level for a period of time, Unified CCE software determines the number of calls that have had a service level event within that interval.
- Service level type - the manner in which calls that abandon affect the service level.

Service Level Threshold

The service level threshold is the number of seconds you set as a goal for connecting a call with an agent.

For example, your goal might be to answer 80% of calls within two minutes. In this case, you would set the service level threshold to 120 seconds. Reports show you the percentage of calls that are answered within that time threshold, enabling you to see whether you are meeting your goal.

A service level threshold of 0 seconds means that no service level event will be set for the call; it will not be treated as a service level call.

Service Level Type

Service level type determines how calls that abandon before the service level threshold impact the service level calculation.

Service level type is presented as three options: positively, negatively, or not at all.

- **Abandoned calls positively impact**

  Some contact centers want abandoned calls to positively impact the service level. These contact centers consider a call abandoned within the service level threshold time a treated call. Abandoned calls are considered to positively impact the service level.

- **Abandoned calls negatively impact**

  Other contact centers might consider only those calls answered within the service level threshold time as treated calls. For these contact centers, the service level is detrimentally affected by calls that abandon within the service level time. Abandoned calls negatively impact the service level.

- **Ignore abandoned calls**

  Others might choose to exclude the abandoned calls from the service level calculation (abandoned calls ignored).

The calculations for service level are based on the service level type defined for the service level configuration. They are described in the following table.

Table 12: Formulas for Service Level Type

Service level type	Formula used to determine service level
Ignore abandoned calls	For call type and service: ServiceLevelCalls / (ServiceLevelCallsOffered – ServiceLevelAband)
Negative impact of abandoned calls	For call type and service: ServiceLevelCalls / (ServiceLevelCallsOffered)
Positive impact of abandoned calls	For call type and service (ServiceLevelCalls + ServiceLevelAband) / (ServiceLevelCallsOffered

For an example of how service level type is calculated, consider the following call counts:

- Answered within service level threshold (ServiceLevelCalls) = 70 calls
- Abandoned within service level threshold (ServiceLevelAband) = 10 calls
- Exceeded service level threshold (ServiceLevelCallsOffered – (ServiceLevelCalls + ServiceLevelAband)) = 20 calls
- Total service level events (ServiceLevelCallsOffered) = 100 calls

For these call counts, the service level is calculated for each type as follows:

Table 13: Calculations for Service Level

For this service level type:	The service level calculation is:
Abandoned calls ignored	70 / (100-10) = 77%
Abandoned calls negatively impact	70 /100 = 70%
Abandoned calls positively impact	(70 + 10) / 100 = 80%

Leave the Abandon Wait Time field blank if you prefer to *not* track abandoned calls.

Service Level at Call Type

For measuring overall customer experience, the call type provides the most insight into overall call treatment and how callers are experiencing the system.

When a service level event occurs and the service level threshold is exceeded, the service level calls offered are updated at the time of the event.

Only call types that are associated with scripts that use the Queue To and LAA Select nodes define service levels.

If a call type is changed using the Requalify or Call Type nodes, then the service level start time is reset. The service levels statistics for the previous call type also reset to zero if there is anything in the CallFlow.

For example, the CallType is set to CallType ID 5000.

- Use the CallType Node to change Call type to ID 5003.
- Service Level(SL) Timer expires for ID 5003.
- Again Use the CallType node and set it to the Calltype ID 5003.
- SL timer does not reset.

There are *service level events* that can occur for the call type:

- An agent answers the call before the service level threshold expires. In this case, the ServiceLevelsCallsOffered and ServiceLevelCalls database fields are incremented.
- The call abandons while in the VRU (prompt or queue) or at the agent's phone before the service level threshold expires. In this case, the ServiceLevelCallsOffered and ServiceLevelAband database fields are incremented.
- The call redirects on no answer before the service level threshold expires. In this case, the ServiceLevelCallsOffered and ServiceLevelRONA database fields are incremented.

If calls encounter an error before the service level threshold expires, the ServiceLevelError database field is incremented, but ServiceLevelOffered is not incremented. If the call encounters an error after the service level threshold expires, ServiceLevelOffered is incremented.

Unified CCE gathers metrics for calls that RONA (if you are using IP IVR as the VRU) and for several types of errors at the call type. You could write a custom report to exclude these metrics from call type service level.

To exclude calls that RONA:

- To exclude only calls that redirect on no answer before the service level threshold expires, adjust the ServiceLevelCallsOffered by excluding the ServiceLevelRONA calls. In this example, abandoned calls have a negative impact.

  ServiceLevel = ServiceLevelCalls / (ServiceLevelCallsoffered – ServiceLevelRONA)

- To exclude all calls that redirect on no answer irrespective of the service level threshold, adjust the ServiceLevelCallsOffered by excluding all RONA calls. In this example, abandoned calls have a negative impact.

  ServiceLevel = ServiceLevelCalls / (ServiceLevelCallsOffered – CallsRONA)

To exclude errors from your service level calculation, adjust the ServiceLevelCallsOffered by excluding error calls: adjusted SL Offered calls = SL Offered calls – (Total Error calls - ServiceLevelError).

In this example, abandoned calls have a negative impact: ServiceLevel = ServiceLevelCalls / (ServiceLevelCallsoffered – (AgentErrorCount + ErrorCount – ServiceLevelError)).

Service Level at Skill Group

At the skill group level, the service level metric is useful for monitoring agent and skill group performance. The service level threshold timer at the skill group starts as soon as the call is queued to a skill group.

You can use precision queues to enhance or replace skill groups.

Note By default, the service level threshold for a skill group is set to the default value of that skill group's peripheral. You can manually select a skill group in Configuration Manager and change its setting from that of the peripheral to another value.

There are five service level events that can occur for the skill group:

- The call is answered by an agent before the service level threshold expires. In this case, the ServiceLevelsCallsOffered and ServiceLevelCalls database fields are incremented for the skill group that answered the call. If the call is queued to more than one skill group, then the ServiceLevelsCallsOffered and ServiceLevelCallsDequeued database fields are incremented for the other skill groups
- The call is dequeued from a skill group before the service level threshold expires. In this case ServiceLevelsCallsOffered and ServiceLevelCallsDequeued database fields are incremented. Calls may be dequeued using the Cancel Queue node, when they are de-queued from the skill group to be routed to a different skill group.
- The call abandons while in the VRU (queue) or at the agent's phone before the service level threshold expires. In this case, the ServiceLevelCallsOffered and ServiceLevelAband database fields are incremented.
- The call redirects on no answer before the service level threshold expires. In this case, the ServiceLevelCallsOffered database field is incremented.
- The service level threshold timer expires. Example: the call reaches the service level threshold without being answered by an agent or abandoned. In this case, the ServiceLevelCallsOffered database field is incremented.

Calls can queue to more than one skill group depending on your scripting, and service level metrics are updated for each skill group to which a single call queues.

It is important to understand how service levels are impacted in such cases.

- If a call is queued to more than one skill group and then the call is answered before the service level threshold expires, ServiceLevelsCallsOffered and ServiceLevelCalls database fields are incremented for the skill group that answered the call. For the other skill groups, ServiceLevelsCallsOffered and ServiceLevelCallsDequeued database fields are incremented.
- If a call is queued to more than one skill group and the call abandons in queue before the service level threshold expires, ServiceLevelsCallsOffered and ServiceLevelCallsAband database fields are incremented for *all the skill groups*. This result will have a negative or positive impact on service levels in all the skill

groups depending on how you have decided to treat abandoned calls for service level calculations in your configuration for the individual skill groups.

- If a call is queued to more than one skill group and the call abandons in queue *after* the service level threshold expires, ServiceLevelsCallsOffered database field is incremented for *all the skill groups*. This result will adversely affect your service level.
- If a call is queued to more than one skill group and the call abandons after it was routed to a skill group (example: abandon while ringing at the agent) before the Service level threshold expires, ServiceLevelCallsOffered and ServiceLevelCallsAband database fields are incremented for the skill group that had the abandon, while other skill groups have ServiceLevelCallsOffered and ServiceLevelCallsDequeued database fields incremented.

Unified CCE gathers metrics for calls that RONA (if you are using IP IVR as the VRU) and for several types of errors at the skill group. You could write a custom report to exclude these from skill group service level.

To exclude RONA calls:

- If you would like to exclude only calls that redirect on no answer before the Service level threshold expires, adjust the ServiceLevelCallsOffered by excluding the ServiceLevelRONA calls. In this example, abandoned calls have a negative impact.

  ServiceLevel = ServiceLevelCalls / (ServiceLevelCallsoffered – RouterCallsDequeued - ServiceLevelRONA)

- If you would like to exclude all calls that redirect on no answer irrespective of the service level threshold, adjust the ServiceLevelCallsOffered by excluding all RONA calls. In this example, abandoned calls have a negative impact.

  ServiceLevel = ServiceLevelCalls / (ServiceLevelCallsoffered – RouterCallsDequeued CallsRONA)

If you want to remove errors from ServiceLevelCallsOffered, you can use this formula in a custom report: ServiceLevelCallsOffered – (Errors – SLErrors).

Service Level at Peripheral VRU Service (Unified CCE-Aspect Only)

Note Service Level at the Peripheral VRU is configurable for the Aspect ACD only.

The service level threshold timer at the VRU service starts as soon as the call arrives at the VRU service.

There are three service level events that can occur for the peripheral VRU service:

- Call is routed to an agent before service level timer expires. In this case the ServiceLevelsCallsOffered and ServiceLevelCalls database fields are incremented.
- Call abandons while in the VRU before service level timer expires. In this case the ServiceLevelAband and ServiceLevelCallsOffered database fields are incremented.
- Service level threshold timer expires. In this case the ServiceLevelCallsOffered database field is incremented.

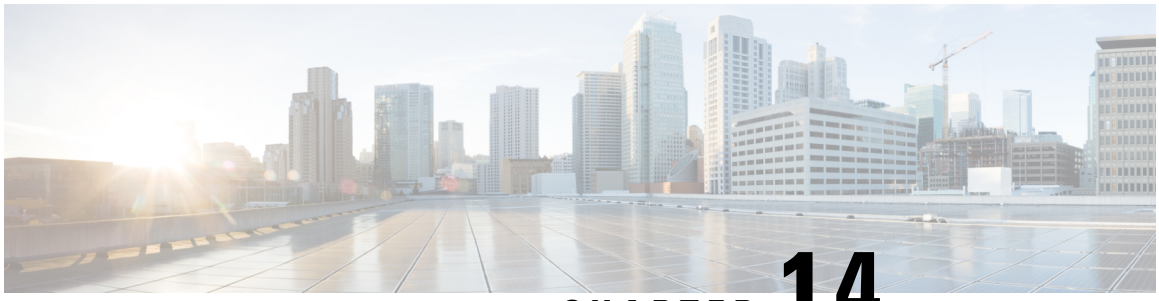
The VRU Service does not detect abandons that happen at the peripheral agent service, so these calls will not be part of the service level for the VRU service. The VRU service does not detect when the call is physically answered by the agent; it only knows when the call is *routed to* the agent.

Guidelines for Service Levels

Consider these guidelines when configuring and scripting service level:

- Service level time begins when the call enters a call type. Set up call type scripts specifically to collect queue and agent statistics. Set up the scripts so that service level time begins after a call queue to a skill group. Define service levels only for call types that point to a script that includes a Queue to Skill Group node.
- Set up one call type to collect statistics before the queue (that is, the initial call type designated for the script via call type mapping).
- Set up other call types used specifically to collect queue and agent statistics.
- In your routing scripts, include the Requalify or Call Type nodes to submit the call to the call type used to collect queuing information.
- Skill group/precision queue and service level metrics are updated for each skill group/precision queue to which a single call queues. Service levels could be adversely affected if calls abandon within or outside the service level threshold in such cases. Consider queuing to a single skill group/precision queue if you include abandons in your service level calculations and do not want abandons to affect service levels adversely.

If you follow these guidelines, the first call type to which the call was initially mapped gathers statistics before the call is queued to the skill group. The script then passes the call to the call type set up specifically to collect information after the call is queued to the skill group/precision queue.



CHAPTER 14

Short Calls, Abandoned Calls, and Overflow Calls

- Short Calls, on page 83
- Abandoned Calls, on page 85
- Overflow, on page 87

Short Calls

A short call is a call that is either abandoned very quickly or answered and terminated very quickly. By defining what you believe to be a short call, you can filter out from reporting metrics those calls that did not stay in the system long enough to be considered and counted as events.

The Abandoned Call Wait timer, set at the peripheral, defines the threshold under which the abandoned call will not be counted. If the abandoned threshold is lower than the service level threshold, the call will not affect the service level. If call wait time is higher than this threshold, the call is counted as Offered.

The Answered Short Call threshold, also set at the peripheral, defines the time under which the call will not be counted as answered and will not impact agent performance.

If you plan to use short calls to filter out false abandons or to detect when calls are answered and terminated too quickly to be considered handled, consider the following:

- You can configure abandoned short calls globally for all call types.
- You can configure abandoned short calls for the peripheral. These calls are tracked for the services that are configured for that peripheral.
- You can choose not to count any abandoned calls as short calls regardless of how quickly they abandon.
- You can choose how abandoned calls affect the service level—negatively, positively, or not at all.
- You can configure answered short calls for agents and skill groups.
- You cannot configure answered short calls for call type.
- You can choose not to count any answered calls as short calls regardless of how quickly they terminate.

Note The concept of short calls applies to the Voice media class only.

To access these short call capabilities, refer to the following section.

Use Short Calls as Filters and Detection Devices

Perform these general steps:

1. Access the AW (DataServer).
2. Go into the **Configuration Manager > Tools > Explorer Tools > PG Explorer**.
3. Click **Retrieve.**
4. Expand **Generic PG**.
5. Click **CUCM_PG**#.

On the right side of the screen there is a group of tabs.

- Peripheral
- Advanced
- Agent Distribution
- Peripheral Monitor
- Default route
- Routing client
- Skill Group Mask

Abandoned Short Calls

A call is considered abandoned if it abandons *after* the value set for the Abandon Call Wait time threshold. This value is set globally.

If the call abandons *before* the Abandon Call Wait Time threshold, the call is reported as a short call.

Abandoned short calls affect reporting because they update the CallsOffered field but not the CallsAbandon field.

Answered Short Calls

Answered short calls reflect when a caller ends the call quickly if there is no agent on the phone.

Answered short calls are reported for skill groups and agent skill groups.

The short call timer starts when the agent answers the call, and the CallsAnswered metric is updated for these calls.

The ShortCalls fields within the Skill_Group_Interval and Agent_Skill_Group_Interval tables are incremented if the Talk Time is less than or equal to the Answered short call threshold configured for the peripheral. The call is reported both as handled and as a short call.

If auto-answer is enabled for the agent, and if there are a high number of short calls within a certain interval, you can use reporting on short calls to determine which agents were not at their stations when a call was automatically answered. This conclusion assumes that the caller ends the call quickly when there is no agent on the phone.

Short Call Reports

Several All Fields Reports contain a Short Tasks column to enable you to track calls that are offered but are not handled or abandoned.

The following reports display operational information on short calls:

- Unified Intelligence Center Agent Historical All Fields Report
- Unified Intelligence Center Call Type Historical All Fields Report
- Unified Intelligence Center Agent Skill Group Historical All Fields
- Precision Queue Interval All fields

Abandoned Calls

A call is considered abandoned if the caller ends the call before being connected to an agent. This includes situations where the caller ends the call while queued and waiting at the VRU (CVP or IVR). A high number of abandoned calls might be an indication that callers are waiting in the queue for too long.

Service reports provide cumulative statistics for all abandoned calls. Call type reports provide additional visibility on where calls are abandoning.

Note If a call abandons before the Abandon Call Wait Time threshold, it is considered a short call. For example, if you configure the abandoned call wait time for 10 seconds, and a caller disconnects at nine seconds, that call is a short call—it is not considered offered or abandoned.

Related Topics

Short calls, on page 83

How Abandoned Calls Affect Reporting

There are three types of abandon metrics: abandon at the VRU (prompt or self-service), abandon in queue, and abandon at the agent.

Unified CCE/Unified ICM tracks the abandon counts for each of these abandon types separately. The time these abandoned calls spend before abandoning is also tracked.

The value represented by the Aban column on the call type reports provides total abandon count for the call type. This value includes:

- Calls that abandoned while at the VRU (prompting or self-service)
- Calls that abandon in queue
- Calls that abandoned while ringing at the agent's phone or en route to the agent's phone

This value derives from the TotalCallsAband database field.

Reports also provide average time spent by these abandoned calls in the Avg Aban Delay Time field. This field represents the average delay time of all abandoned calls that ended in this call type during the current

interval. This value derives from Call_Type_Interval.CallDelayAbandTime / Call_Type_Interval.TotalCallsAband.

To separate information gathering and queuing statistics, you can also determine how much time a call spends only in the call type where the call abandoned. This value is tracked in the CTDelayTotalAbanTime database field. It includes only the time spent in the call type where the call abandoned and not all call types.

Consider this example:

- A call spends 30 seconds in the information gathering call type, “Info_Call_Type”.
- The script then changes the call type to the queuing call type—For example, Queue_Call_Type. The call is queued.
- After 15 seconds waiting in queue, the call is abandoned.

In this case, the total time the call spends before abandoning is 45 seconds. However, the time the call spends in the “Queue_Call_Type” where the call abandoned is15 seconds. The call type statistics for the “Queue_Call_Type” are updated as follows:

Queue_Call_Type

- CallDelayAbandTime = 45 seconds
- CTDelayTotalAbanTime = 15 seconds.

Note You could write custom reports to able to report on the different abandons and the time spent by these abandons. To determine the counts and the time associated with the abandoned calls, for calls in the script, or at the VRU (prompt or self-service), subtract Agent Abandons and Queue Abandons from Total Abandons.

How Abandoned Short Calls Affect Reporting

A short call at the call type is a call that abandons within the call type's Abandon Wait Time threshold. If you define a short call, you can filter out calls that you believe did not stay in the system long enough to count as a real call. You can define short calls for call types and services.

Note Short calls are configured globally for all call types.

The short call timer starts when the route request is received for the call. The CallsOffered field is updated when the route request is received. If the call abandons within the Abandon Wait Time threshold, the ShortCalls field is updated, but the number of calls abandoned is not updated. Since the call type is the highest level reporting entity, calls that abandon at the VRU or at the agent's phone can also be considered short calls at the call type if they abandon within the call type's Abandon Wait Time threshold.

If you do not want to count any abandoned calls as short calls regardless of how quickly they abandon, you can disable abandoned short calls by leaving the Abandon Wait Time field for the call type blank.

Abandoned Call Reports

The following reports display Abandon statistics for call types and services:

- Unified Intelligence Center: Enterprise Service Historical All Fields
- Unified Intelligence Center: Peripheral Service Historical All Fields

Overflow

The software keeps counts of the number of calls moved out of each service or route (overflowed out) and moved into each service or route (overflowed in).

Overflow Out is incremented when the one of the following occurs:

- The call type associated with the current call is changed through use of a Call Type or Requalify node.
- The call is sent to a label using a label node.
- The call is redirected.

  When a call is redirected, the PIM no longer can receive events for the call and has no way of referencing or tracking the call.

  For example, the call might have been redirected to a non-Unified CCE monitored device and then returned to the switch with a different call ID.

  The Unified CCE Packaged CCE generates the termination call detail record with only the data originally tracked for the call. Calls marked as Redirected are counted as Overflow Out calls in the Unified CCE service and route tables.
- The call was not default-routed, and the label was not a ring, busy, or announcement label.
- The call hit a release node

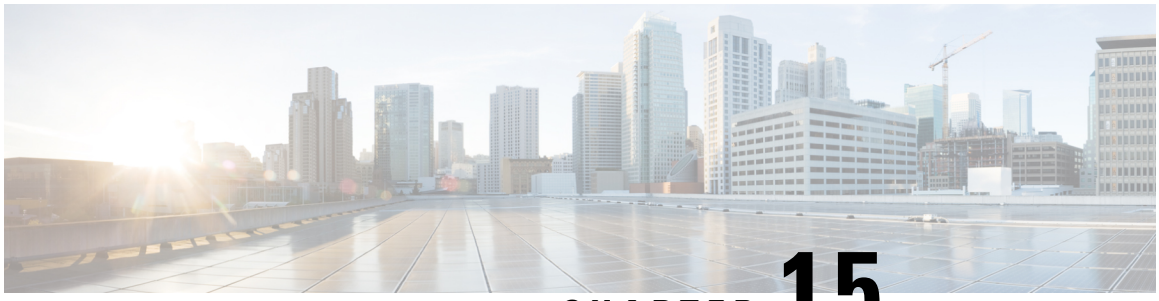
In Unified CCE , to more accurately reflect call status, CallDisposition is set to 15 (Redirected) instead of 4 (Abandon Delay) in the following cases:

- When a call leaves a CTI route point to be sent to IVR.
- When the agent transfers call to another skill group, no agent is available, and the call is sent to IVR.

Overflow Reports

The following reports display operational information on Overflow Out situations:

- Unified Intelligence Center Call Type Historical /Call Type Daily All Fields
- Unified Intelligence Center Call Type Real Time
- Unified Intelligence Center Peripheral Service Real Time



CHAPTER 15

Outbound Option

- Reports on Outbound Option Campaign Effectiveness, on page 89
- Reports on Agent Performance for Outbound Option Dialing Campaign Calls, on page 89
- Campaign Query Rule Reporting, on page 90
- Dialer Reporting, on page 91
- Import Rule Reporting, on page 91

Reports on Outbound Option Campaign Effectiveness

Use the templates in the Outbound Option reporting category to generate reports for campaigns, query rules used in those campaigns, Outbound Option record imports, and Outbound Option Dialer activity.

All Outbound Option reports are voice-only reports.

Reports on Agent Performance for Outbound Option Dialing Campaign Calls

Outbound Option, functionality that is automatically enabled at setup, provides automatic outbound dialing capability.

The Outbound Option Dialer, which places outbound calls to customers and connects these calls with agents, assigns and connects calls differently than regular Unified CCE routing. Report data for agents handling Outbound Option calls therefore differs from data for agents handling typical voice calls and multichannel tasks.

To interpret agent data for Outbound Option tasks, understand how Outbound Option reserves agents, reports calls that are connected to agents, and handles calls dropped by customers before the calls are connected.

When the Outbound Dialer starts a call to a customer, it reserves the agent assigned to handle the call. The Outbound Dialer places a reservation call to the agent and changes the agent's state to Hold. This reservation call is reported as a Direct In call to the agent.

For typical voice calls, the agent is placed into Reserved state when Unified CCE software reserves the agent to handle a call. The agent's state is reported as Reserved. For Outbound Option calls, reports show the agent in Hold state when reserved for a call. The time that agent spends reserved is reported as Hold Time.

When the customer answers the call, the Outbound Option Dialer transfers the call to an agent. The call reports as a Transfer In call to the agent. When the customer call transfers to the agent, the Dialer drops the reservation call and classifies it as Abandon on Hold.

For more information about Outbound Option termination call detail records, see the *Outbound Option Guide for Unified Contact Center Enterprise*.

The abandoned call wait time, set in the Campaign Configuration screen, determines how calls are reported if the caller ends the call. Calls are counted in the Customer Abandon field in both Real Time and Historical campaign query templates only if the customer ends the call before the abandoned call wait time is reached.

Related Topics

Agent reporting for Outbound Option campaigns , on page 40
Skill group reporting for Outbound Option campaigns , on page 51

Campaign Query Rule Reporting

The Campaign Query rule reports are the most useful reports for measuring the effectiveness of a campaign and can also be used for agent and IVR campaigns.

These reports show you what is happening in each campaign, including the number of calls closed, number of customers contacted, average talk time, and average wrap-up time for each query in a campaign.

There are two categories of campaign query rule reports:

- One category of reports indicates the number of records closed, those in Pending state, and total records in the query rule's dialing list.

  For example, the camqry20 report, Campaign Consolidated Half Hour Report, shows the overall view of how the system is running and can be used for troubleshooting reasons why agents are idle.

- A second category of reports provides different views into the call result activity. It breaks down call results into about a dozen categories.

  For example, the camqry14/15 reports show the breakdown of attempts (in percentage) of each campaign for the selected time period.

The Query Rule Call Activity and Pending Record reports are available as campaign rollups for multiple query rules within a campaign.

There are also consolidated reports available, which blend campaign call activity reporting information with skill group performance reports to give a improved overall view of the business activity. These reports provide a rough overview of agent activity, average time between calls, abandon rate, and so forth. Because these reports combine data from different reporting engines in a single report, there are a few caveats that are described in the reports themselves.

Observe the following guidelines when using the campaign reports:

- **Campaign Manager Restart**
  - When the Campaign Manager restarts, there will be some data loss.
  - Campaign Real Time reports capture call results since the last Campaign Manager restart only.
  - Campaign Real Time reports describe how many records are left in the campaign dialing list.

- Campaign and Dialer Half Hour reports provide call result counts since the last Campaign Manager restart in the half hour that it restarts.
- Dialer utilization fields in the Dialer Half Hour report will be unaffected, although the Half Hour record might be missing if the Campaign Manager was inactive during the half-hour boundary. When the Dialer restarts only the Dialer Utilization fields will be affected; therefore, the Dialer Utilization will only capture port status since the Dialer restarted during that half hour. Some records might be left in an active state for a short period of time after the Dialer or Campaign Manager restarts, but the Campaign Manager has a mechanism to reclaim those records.

- **Transfer to IVR**

  The campaign and query rule call activity reports display accurate call activity for calls that are not transferred to IVR. Calls transferred to IVR will simply be counted as being transferred to an IVR, but the Campaign and Query Rule Activity reports will not display what occurred after the call was sent to the IVR. If calls are queued and transferred back to an agent, they will be treated as new inbound calls in the reports.

Related Topics

Call Type reporting and Outbound Option campaigns, on page 67

Dialer Reporting

You can report on campaigns on a higher level using the Dialer templates. These reports provide information on how the ports are utilized during a campaign, which helps in determining whether the number of dialer ports effectively supports the number of agents and size of the campaign.

Each campaign is associated with a dialer. By reporting on a dialer, you can view the statistics that span all of the campaigns associated with the dialer. These reports show the number of customers dialed, the number of calls that were not answered, the number of calls that were abandoned, and detection of busy, voice, answering machine, and Standard Information Tones (SIT Tones).

Import Rule Reporting

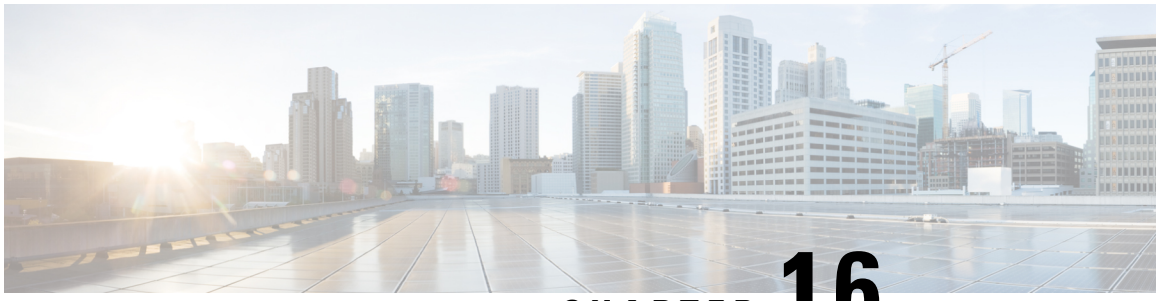
Outbound Option reports also enable you to view the success of record importation. Using the Import Rule templates, you can monitor whether records are being added successfully (good records) or are failing (bad records). Also, you can monitor how long it takes to import the records so that you can plan for future record importation.

The same import rule reports are used for Do Not Call and Contact List imports. The reports display an historical view of when imports were done, the number of records imported, and the number of records that were considered invalid due to length constraints or improper formatting.

For contact list imports, the reports also provide insight into the number of contacts that were assigned with the default time zone information for the campaign, as well as the number of contacts that were actually imported into the dialing list after the query rule and format validation was performed.

The following information is available in the Import Rule reports:

- Number of successful, unsuccessful, and total records imported by time range
- Current import status



CHAPTER 16

Transfers and Conferencing

- Reports on Agent Call Transfers and Conferences, on page 93
- About Transfers and Conferences, on page 98
- Configuration and Scripting for Transfers and Conferences, on page 99

Reports on Agent Call Transfers and Conferences

You can transfer or conference voice calls.

Transfer can be either blind or consultative and is supported only for agents within the ACD. A *blind transfer* is a transfer in which the agent transfers the call to another agent without first ensuring that another agent is available. A *consultative transfer* is a transfer in which an agent places the call on hold, calls the receiving agent to discuss the transfer, and then transfers the call to the agent. Consultative transfer is not supported when Unified CVP is used as the VRU.

It is best to discourage direct agent-to-agent transfers. Instead, use ACD numbers to transfer to a Skill Group and application service. This enables tracking of these calls and allows you to report on how calls were eventually handled. You can also post route calls to Unified CCE, which allows you to transfer calls to agents on other ACD sites and to be able to report on those calls.

Related Topics

About transfers and conferences, on page 98

Configuration and scripting for transfers and conferences, on page 99

Transfer and Conference for Non-voice Tasks

Enterprise Chat and Email Tasks

Transfer and conference are not supported for Enterprise Chat and Email tasks, such as email and chat tasks.

Third-party Multichannel Tasks

You can transfer non-voice tasks routed to Unified CCE from third-party multichannel applications that use the Task Routing APIs. Only blind transfer is supported. In this chapter, all blind transfer-in and transfer-out reporting information applies to these types of tasks.

You cannot conference these tasks.

For configuration instructions for Task Routing for third-party multichannel applications, see the *Cisco Unified Contact Center Enterprise Features Guide* at https://www.cisco.com/c/en/us/support/customer-collaboration/unified-contact-center-enterprise/products-feature-guides-list.html.

For scripting information for Task Routing for third-party multichannel applications, see the *Scripting and Media Routing Guide for Cisco Unified ICM/Contact Center Enterprise* at https://www.cisco.com/c/en/us/support/customer-collaboration/unified-contact-center-enterprise/products-user-guide-list.html

Transfers and Conferences Using ACD/Dialed Numbers (Unified CCE)

Transfers and conferences can be handled at the ACD, with ACD queuing, or through Unified CCE using ACD/Dialed Numbers, with Enterprise Queuing.

For ACD and local queuing, reporting statistics are accurate when the agent uses an ACD number and the script on the ACD queues and sends the call.

TransferOut or ConferenceOut is incremented for the source agent and TransferIn or ConferenceIn is incremented for the target agent.

For Enterprise Queuing, when the agent activates the transfer or conference button and selects a number to which to transfer or conference the call, the dialed number is sent to the CallRouter from the agent PG. This dialed number determines the Call Type, which in turn selects the transfer routing script. A Unified CCE script must include a Queue to Skill Group node that references the appropriate skill group based on the dialed number to which the call is to be queued.

If an agent is available in the selected skill group, a message is sent to the source agent PG, containing a label or dialable number. The PG transfers the call from the source agent phone to the target agent using the label returned from the Central Controller. For these types of transfers and conferences, TransferOut or ConferenceOut increments for the source agent and TransferIn or ConferenceIn increments for the target agent.

If no agents are available for a transfer in the selected skill group, the CallRouter sends the source agent's PG the label to forward the call to the VRU. For these types of transfers and conferences, TransferOut or ConferenceOut increments for the source agent. However, TransferIn or ConferenceIn increments for the target agent when the VRU routes the call to the target agent only in Unified CCE with a System PG. This difference is also applicable when you use a System PG with Unified CVP in Unified CCE deployments.

How Database Fields Are Affected by Transfers and Conferences

Transfers and conferences affect fields in the Agent_Skill_Group_Interval database table.

The TransferIn field is incremented for the target agent if all of the following conditions are true:

- The call was transferred (blind or consultative) by an agent to a Unified CCE Call Type script or to an application script on the ACD that checks for agent availability.
- For blind transfers only, an agent within the same peripheral was available at the time that the transfer was initiated.

The ConferenceIn field is incremented for the target agent receiving the conference call if all of the following conditions are true:

- The call was conferenced by an agent to a Unified CCE Call Type script or to an application script on the ACD that checks for agent availability.

- An agent within the same peripheral was available at the time that the conference was initiated.

The TransferOut field is incremented for the agent initiating either a blind or consultative transfer when the initiating agent disconnects from the transfer.

The Conference Out field is incremented for the agent initiating a conference when the initiating agent disconnects from the conference.

The ConsultativeCalls field is incremented for the initiating agent when the consultative call disconnects and wrap-up is complete.

Note

- Consultative transfer is not supported for systems using Unified CVP as the VRU and therefore this field is never incremented if you are using Unified CVP.
- If you are using Unified CVP as the VRU, the transfer can be performed through a network transfer. If the network transfer is used, the TransferIn and TransferOut fields do not display data for these transfers.

How Types of Calls Are Affected by Transfers and Conferences

The following table describes the fields that increment in the Agent_Skill_Group_Interval database table when different types of calls are transferred and conferenced.

Table 14: How Transfers and Conferences Affect Types of Calls

Type of call	How the call is affected
Outgoing internal	The InternalCall field increments for the source agent that starts a transfer or conference operation if the target agent is on the same ACD as the source agent. This field increments after the call disconnects.
Incoming direct/incoming internal	The InternalCallsRcvd field increments for the target agent who completes a transfer or conference if the agent dialed the target agent directly (that is, does not access a routing script). This field increments after the call disconnects.
Outgoing external	The AgentOutCalls field increments for the source agent who completes a transfer or conference to an external destination. This field increments after the call disconnects.
ACD calls	The CallsHandled field increments for the target agent if an ACD routing script sends the call to the agent. This field increments against the skill group to which the routing script queued the call. This field increments after the call disconnects and wrap-up completes.

How Skill Groups Are Affected by Transfers and Conferences

The skill group for which transfer and conference data is reported depends on how the original call was placed.

The transfer or conference is reported for the ACD-picked skill group if the original call is a direct call, placed to the agent's extension. For example, if an agent received a call directly to the agent's own extension and then

transferred the call, the transfer is reported for the ACD-picked skill group of both the agent who initiated the transfer and agent who received the transfer.

The transfer or conference is reported for the skill group to which the call was routed if the original call was routed via an ACD routing script to a specific skill group. For example, if an agent in the Sales skill group received a Sales call and then transferred the call, the transfer out is reported for the Sales skill group. The transfer in is reported for the skill group of the agent who received the transfer.

The following scenarios further explain how database fields are incremented for different types of transfers and conferences.

Call Scenario 1: Blind Transfer of ACD Calls—Agent Is Not Available

In this example, agent A is presented with an ACD call for skill group Y. Agent A selects skill group X via the ACD number (which accesses a script) and initiates and completes a blind transfer. The InternalCalls and TransferOut fields are then incremented for agent A against skill group Y.

After wrap-up is completed, the CallsHandled field is incremented for agent A against skill group Y. Since there are no agents available in skill group X, the call queues on the ACD. When agent B in skill group X becomes available, the ACD routes the call to agent B. Agent B answers the call and the call disconnects and wrap-up is complete.

Table 15: Blind Transfer of ACD Calls—Agent Is Not Available

Fields incremented for agent A against skill group Y	Fields incremented for agent B against skill group X
CallsHandled, InternalCall, TransferOut	CallsHandled, TransferIn

For agent A, the call is reported in the TasksHandled, Internal Out, and TransferOut report fields. For agent B, the call is reported in the Tasks Handled report fields.

Call Scenario 2: Consultative Transfer of an ACD Call—Agent Available

In this example, agent A is presented with an ACD call for skill group Y. Agent A selects skill group X via the ACD number and initiates a transfer. The script on the ACD realizes that agent B is available and requests that agent A's PG initiate a transfer to agent B on behalf of agent A's phone. Agent B answers the transferred call. After consulting with agent B, agent A completes the transfer. The InternalCall and TransferOut fields are then incremented for agent A against the skill group Y. After wrap-up is completed, the CallsHandled field is incremented for agent A against skill group Y.

Agent B now talks to the caller. When the call disconnects and wrap-up is completed, CallsHandled and TransferIn are incremented for agent B against skill group X.

Table 16: Consultative Transfer of an ACD Call—Agent Available

Fields incremented for agent A against skill group Y	Fields incremented for agent B against skill group X
CallsHandled, InternalCall, TransferOut, Hold	CallsHandled, TransferIn

For agent A, the call is reported in Tasks Handled, Internal Out, Transfer Out, and Incoming Hold and/or All Hold report fields. For agent B, the call is reported in Tasks Handled and Transfer In report fields.

Call Scenario 3: Consultative Conference of a Direct Call

In this example, a direct call comes into agent A's ACD extension.

Agent A selects skill group X via the ACD number and initiates a conference. The script on the ACD realizes that agent B is available and requests that agent A's PG initiate a conference to agent B on behalf of agent A's phone. Agent B answers the conferenced call. After consulting with agent B, agent A completes the conference.

Agent A disconnects from the conference. The InternalCalls and ConferenceOut and InternalCallsRvcd fields are then incremented for agent A against the ACD-picked skill group.

Agent B or the caller disconnects. InternalCallsRcvd and Conference Out are incremented against the ACD-picked skill group for agent B.

Table 17: Consultative Conference of a Direct Call

Fields incremented for agent A against ACD-picked skill group	Fields incremented for agent B against skill group X
InternalCallsRcvd, InternalCall, ConferenceOut, Hold	CallsHandled, ConferenceIn

For agent A, the call is reported in Tasks Handled, Internal Out, Conf Out, and All Hold (Internal Hold) in report fields. For agent B, the call is reported in Tasks Handled and Conf In report fields.

Call Scenario 4: Consultative Call

In this example, agent A is presented with an ACD call for skill group Y.

Agent A selects skill group X via the dialed number and initiates a consult. The script that uses the LAA Select node for skill group X realizes that agent B is available and requests that agent A's PG initiate a conference to agent B on behalf of agent A's phone. Agent B answers the consult call. After consulting with agent B, agent A activates the Reconnect button, which disconnects agent B and agent A resumes talking to the caller.

Agent A disconnects from the call. After wrap-up is completed, CallsHandled and Consultative Calls field are incremented for agent A against skill group Y.

Table 18: Consultative Call

Fields incremented for agent A against skill group Y	Fields incremented for agent B against skill group X
CallsHandled, InternalCall, ConsultativeCall, Hold	CallsHandled

For agent A, the call is reported in Tasks Handled, Internal Out, Cons Out, and Incoming Hold and/or All Hold report fields. For agent B, the call is reported in Tasks Handled report fields.

Agent Transfer and Conference Reports

The following report displays agent transfer and conference data:

- Unified Intelligence Center: Agent Historical All Fields

About Transfers and Conferences

Contact center enterprise solutions support transfers and conferences directly to agents and also to skill groups.

Follow these guidelines to obtain accurate and useful data from transfers and conferences:

- Configure the dialed numbers with associated route points for transfer and conference to agents and skill groups.
- Plan to create a separate script for transfers that use the dialed numbers you configured. In the initial script, change the call type such that when the call is transferred , it is directed to the transfer script. Having a separate script allows you to track data across call types and skill groups, instead of the agent's default skill group.
- The agent can manually transfer the call to another agent or can conference in another agent by dialing that agent's extension directly on the ACD.
- The agent can use the ACD number to access a routing script on the ACD or can optionally post-route the call to Unified CCE .

  The latter method is appropraite, because Unified CCE can track the transferred calls and how they are handled across the enterprise. This method also provides the ability to transfer the call to another ACD site.

  Avoid direct agent-to-agent transfers, as you must rely on the ACD for skill group and service assignment for the purposes of reporting. In situations where you are handling transfers and conferences on the ACD itself, use the ACD number to control how transfers are reported.

Note If the agent extension is not configured, Unified CCE is unaware of a direct transfer.

If you are planning to provide for transfers and conference calls using post-routing, follow these guidelines to obtain accurate and useful data:

- Configure the ACD number to post-route the call to Unified CCE.
- Consider creating separate scripts for transfer and conference scenarios if you are post-routing all transfers and conferences.
- Plan to create a separate script for transfers on Unified CCE that uses the dialed numbers you configured. Having a separate script on the ACD or on Unified CCE allows you to track data across all known skill groups.

Note If you do not do this, the skill group affected by reporting statistics is unknown, and results are unpredictable.

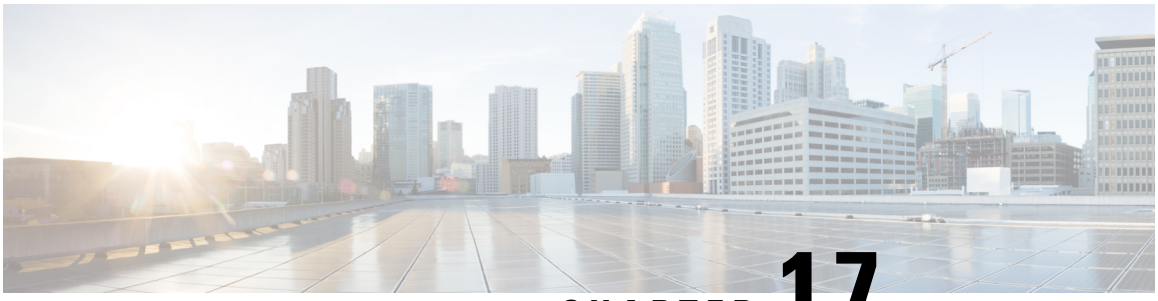
Note Refer to your *ACD Supplement Guide* for any restrictions that might affect the transfers and conferencing. For example, some ACDs do not support blind transfers.

Configuration and Scripting for Transfers and Conferences

Follow these guidelines when configuring and scripting for transfers and conferences to skill groups:

Procedure

- Configure dialed numbers.
- Create new call types or identify existing call types and associate the call types with the Dialed Numbers.
- Create a routing script for transferring to skill groups that includes a Queue to Skill Group node. This script ensures that transferred and conferenced calls are queued to the correct skill group.
- Associate the call type with the routing script.



CHAPTER 17

Operational Reporting

- Trunks and Trunk Groups, on page 101

Trunks and Trunk Groups

Every peripheral has one or more associated trunk groups, with each trunk group containing one, or more physical trunks.

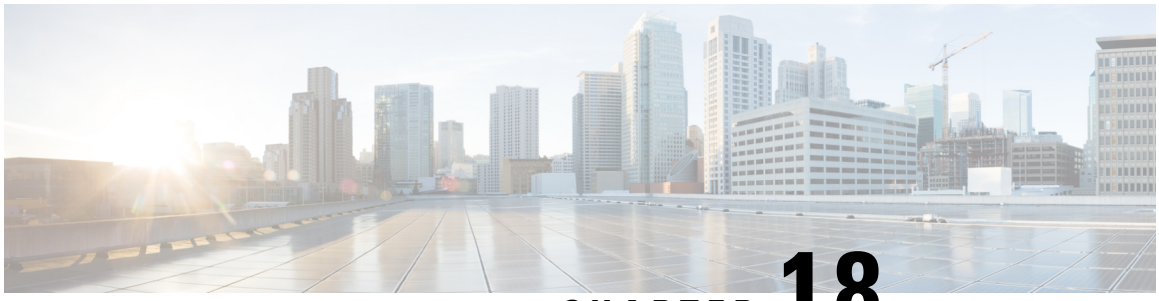
You configure trunks and trunk groups with the Configuration Manager.

Note Not all ACDs support trunk configuration. If your ACD does, make sure that the PG is accurately configured in Configuration Manager. For the ICM software to properly monitor ACD calls, all individual trunks and their corresponding trunk group assignments must be configured in the ICM database.

You can report on data such as the number of trunks in service, number of trunks idle, and the time during which all trunks in a trunk group were simultaneously busy (All Trunks Busy).

The following report contains operational information on trunk groups:

- Unified Intelligence Center IVR Ports Performance Historical Report



CHAPTER 18

VRU Self-Service

- About VRUs, on page 103
- VRU Application Reporting, on page 104
- Guidelines for Reporting on VRUs, on page 109

About VRUs

A VRU, or voice response unit, also called an Interactive Voice Response Unit (IVR), is a telecommunications device that plays recorded announcements and responds to caller-entered touch-tone digits. A VRU can also be equipped with Automatic Speech Recognition (ASR) or Text-to-Speech (TTS) capabilities.

In Unified CCE terms, the VRU is a device that corresponds to a peripheral and is integrated by means of a PG. A typical configuration consists of a VRU and a PG (or two PG's if duplexed).

A **Network VRU** supports Unified CCE software's service control interface. A Unified CCE routing script can divert a call to a Network VRU and instruct the VRU to perform specific processing before Unified CCE software determines the final destination for the call. There are multiple Network VRU types, and they are explained in the Scripting and Media Routing Guide for Cisco Unified ICM/Contact Center Enterprise.

There are two VRUs supported by Unified CCE: Cisco Customer Voice Portal (CVP) and Cisco IP-IVR. Because these VRUs support different features and behave differently, reporting data is affected by the type of IVR you have deployed in your system.

Uses for VRUs

Your enterprise might implement one or more types of VRU applications to provide initial call treatment and enterprise queuing.

These VRU applications can be used as follows:

- In **Self-Service** applications, the customer can obtain information through a series of VRU prompts, and the entire transaction occurs within the VRU . For example, if the customer calls a bank, the Self-Service application might prompt the user for an account number and password and then provide abilities to check account balance, review recent payments, modify PIN numbers, and so forth.
- In **Information Gathering** applications, the VRU prompts the caller for certain information, such as which department the caller wants to reach, and then uses the information in the routing decision and might pass the information to the agent desktop.

- The VRU is also used to **enterprise-queue** calls while a customer waits for an available agent. During queuing, the VRU might be configured to play music on hold or perform a VRU application.

VRU Application Reporting

You can use a VRU for a number of different purposes, including queuing, customer self-service, and information gathering.

Impact of VRU Type on Report Data

The types of VRU applications that you use in your enterprise determine what report data you should monitor.

For example:

- If your VRU performs queuing only, you might want to see how long callers waited in queue and the number of callers who abandoned while queued.
- If your VRU is used for Self-Service, you might want to see how many successful transactions occurred in the Self-Service application and whether the caller was transferred to an agent from the application.
- If you are using an Information Gathering application, you might want to see how many callers opted out of the digit collection to be transferred directly to an agent.

Impact of PG Setup Choices on Report Data

When you select a VRU on the Peripheral Gateway Properties page during PG Setup, certain VRU Reporting options affect the data available for reporting:

- **Event Feed**

  If you select this option, the VRU PG does not generate real-time trunk and service data update and does not write Termination Call Detail records for each Service Control Interface (SCI) dialogue. The VRU PG still generates real-time peripheral data update.

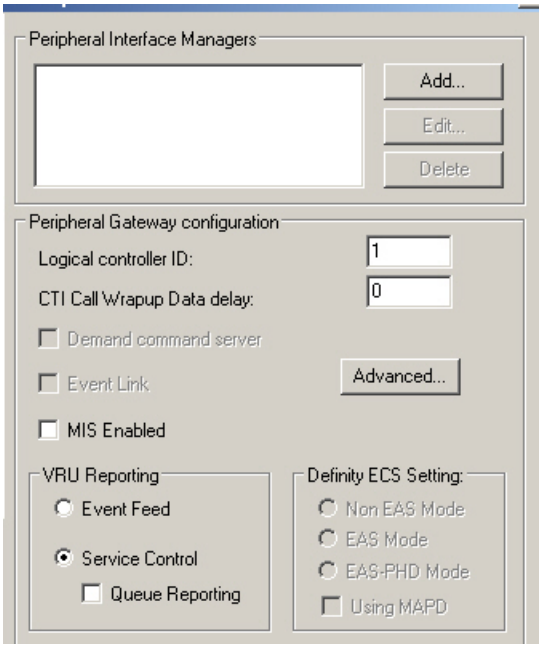
- **Service Control**

  This option is selected by default. This option allows the VRU PG to generate real-time peripheral, trunk and service data updates, and write one or more Termination Call Detail records for each SCI dialogue.

  Selecting this option also enables the **Queue Reporting check box**. If this box is unchecked, the only events generated for SCI dialogues are Delivered and Cleared and the only call statistic calculated is total call time. If this box is checked, the PG will also generate Queue events. Calculated call statistics will then include queue times and abandons in queue, as well as total call time.

  The Service Control option with Queue Reporting checked generates the most data.

Figure 6: VRU Reporting Options



See the chapter on VRUs in the *Scripting and Media Routing Guide for Cisco Unified ICM/Contact Center Enterprise*.

Self-Service, Information Gathering, and Queuing VRU Applications

Information gathering VRU applications are used to decide what skill group to queue the call to by walking the caller through a series of voice prompts. The Caller Entered Digits (CED) are passed back from the VRU to be used within the routing script, to decide the optimal skill group to answer the call.

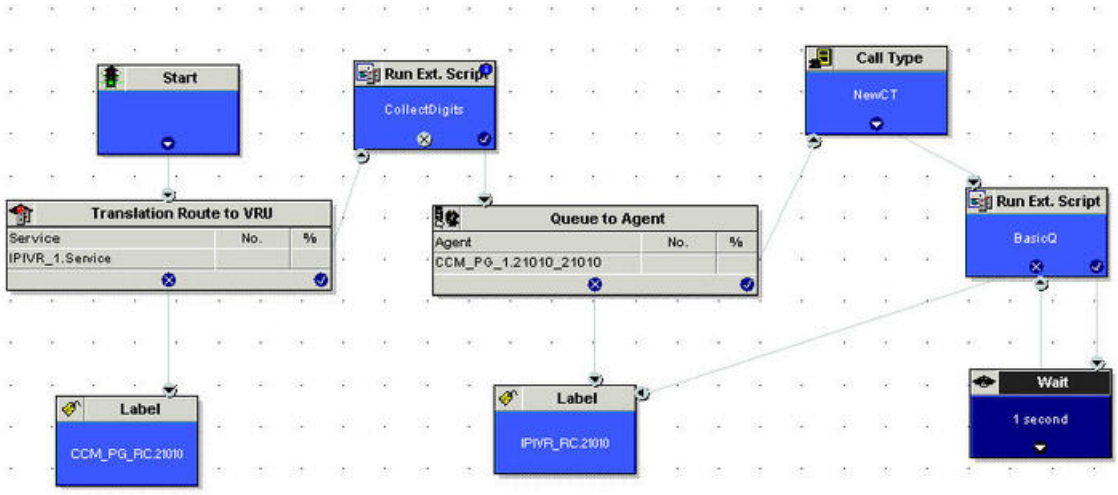
You must be able to determine the following from a VRU service used for information gathering:

- How many calls traversed the application
- How long each call remained in the information gathering application
- How many calls disconnected before being routed to an agent
- How many calls were eventually routed to agents

Several applications can reside on the same VRU PG. Self-Service and queuing can reside on the same VRU PG, and Information Gathering and queuing can reside on the same VRU PG. This means that all of the applications on that PG belong to the same VRU service.

The VRU service cannot be changed once the call is sent to the VRU. However, the call type can be changed with the Requalify or Call Type node. In the following script, the call type is changed via the Call Type node once it has been queued to separate Information Gathering (CollectDigits) and queuing.

Figure 7: Sample Routing Script for Information Gathering Queuing



Although a service level can be defined for both call types, it is more appropriate to define a service level for the call type that has the Queue to Skill Group node in it.

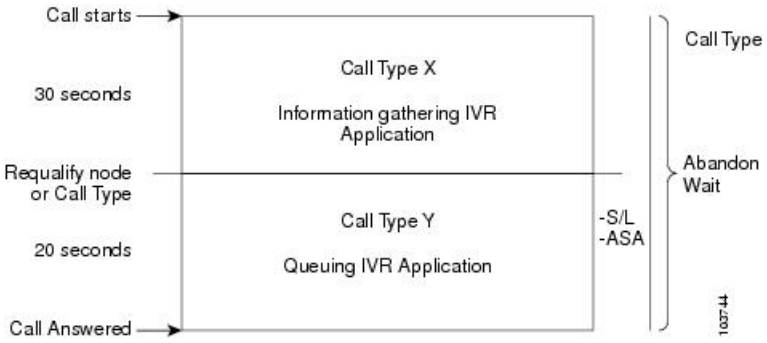
Calls that disconnect while in the Self-Service or Information Gathering application are considered abandoned calls since both Service Control and Queue reporting must be turned on for VRU Queuing applications. However, you can extract queuing metrics from information-gathering metrics by defining a separate call type for each, and then changing the call type in the routing script.

Note If the VRU performing Self-Service does not also provide queuing, you can enable Service Control reporting and disable the Queue reporting checkbox. If the caller opts to speak to an agent, then the Self-Service VRU transfers the call to the IP-IVR or CVP that performs queuing, and the call does not appear abandoned from the Self-Service application. This means that the call is considered answered when received by the VRU, not offered. When the call ends, it is counted as handled. If you implement this configuration, reports show the number of calls that were answered and terminated, and time spent on terminated calls.

The following illustration shows how a call moves from the Information Gathering application to the queuing applications.

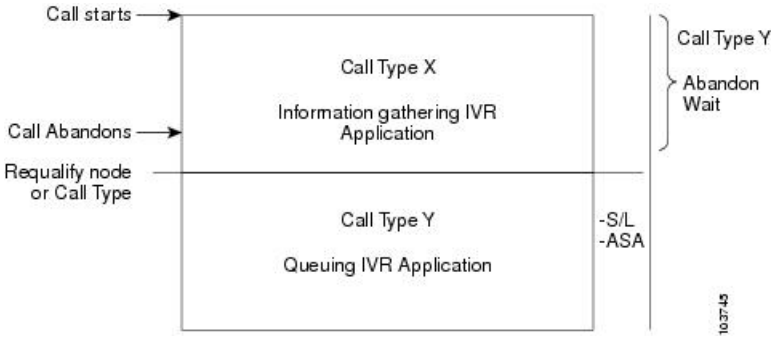
In this example, 20 seconds will be used to calculate ASA and decide the service level instead of 50 seconds (30 + 20 seconds).

Figure 8: Call Type Data for Calls That Abandon After Call Type Is Changed



Note If the call abandons before being requalified to the call type that handles queuing, the Call Abandon Wait time is not reset. Therefore, the Abandon Wait time for the information gathering call type starts when the call enters the first call type, and ends when the call abandons, as illustrated below:

Figure 9: Call Type for Calls That Abandon Before Call Type Is Changed



The following table illustrates how some basic metrics are defined at the call type and the IVR service.

Table 19: Self-Service and Information Gathering Application Metrics

Report metric	Call type	VRU service	Skill group
Abandon Wait Time	Starts when a call first enters a call type and ends when it abandons.	Starts when the call enters the service.	Not Applicable
Average Speed of Answer (ASA)	Starts at the first Queue to Skill Group node in the routing script.	Starts at the first Queue to Skill Group node in the routing script.	Starts at the first Queue to Skill Group node in the routing script.
Service Level	Starts as soon as the call enters the call type that has the service level defined.	Starts when the call enters the service.	Not Applicable

Related Topics

Impact of PG setup choices on report data, on page 104

Monitoring Self-Service and Information Gathering Application Progress

You might determine the effectiveness of a Self-Service application in several ways:

- Monitoring the effectiveness of the application as a whole. For example, you might only want to monitor whether a customer's need was satisfied through the VRU application and that the caller did not need to be transferred to an agent.
- Monitoring the effectiveness of individual transactions within the application. For example, in a banking application a customer might have the ability to perform multiple transactions, such as account lookup, obtaining balance information, and learning about recent payments. You might want to see which of these transactions was used and whether the caller successfully completed the transaction.
- Monitoring failure cases in which a system error, such as a failed database lookup, caused the caller to be transferred by an agent instead of continuing through the VRU application.

Similarly, you might determine the effectiveness of an Information Gathering application in several ways:

- Monitoring whether the caller used the system prompts to be routed to an appropriate resource or used a failout path, such as pressing “0”, to be routed directly to an agent.
- Monitoring failure cases in which system errors, such as a failed database lookup, caused the caller to be transferred to an agent instead of continuing through the digit collection prompts for more appropriate routing.

Capturing Script Application Data for CVP

If you deployed Unified CVP as the VRU in your enterprise system, you can use two advanced features to gather more details about a calls' progress through Self-Service and Information Gathering applications. These two advanced features are the capture microapplication and the metadata Exchange Carrier Code (ECC) variable. You can use the details provided by these microapplications only in custom reports; standard reports do not provide this information.

The Capture microapplication enables you to cause a Termination_Call_Detail (TCD) record to be written at any point in the script. This record includes information such as the current call variables, CallRouter call keys, date and time, caller entered digits, and metadata ECC variables.

The metadata ECC variable microapplication captures high-level details about a call's progress through a script. These details include whether the caller is using voice or digit dialing, percent confidence for Automatic Speech Recognition, number of attempts a user made before entering a prompt successfully, number of timeouts, number of invalid entries, microapplication duration, and the routing script used. This information is written to TCD records. If you plan to use the metadata ECC variable, configure the ECC variables in Configuration Manager.

Using the VRUProgress variable, the Capture microapplication, and the metadata ECC variable microapplication together in a script provides you with the ability to monitor details about the transactions performed by the caller and the VRU application's interface to the caller. For example, you could use the Capture microapplication to create a TCD each time the VRUProgress variable changes in the script. The TCD is written for that particular point in the application, which includes the information gathered by the metadata ECC variable. A custom report could show how many callers experienced timeouts at different points in the application, how many attempts callers made before successfully completing a transaction, and how long it took a caller to complete each transaction. This data could indicate problems with the VRU application. You could also run a custom report on an individual call to see how a particular caller used the application and whether they encountered difficulties.

Reports That Show VRU Metrics

This report shows metrics for VRU applications:

- Unified Intelligence Center IVR Ports Performance Historical Report

Guidelines for Reporting on VRUs

Follow these guidelines when configuring Self-Service applications, Information Gathering applications, and queue applications:

- If you have Self-Service or Information Gathering IVR applications and want to separate self-service and digit collection metrics from queuing metrics, plan to change the call type in the routing script before the call is queued. This action ensures that you can report on both the self-service/digit collection section of the call and the queuing section of the call using Call Type reports.
- Plan to enable Service Control and Queue Reporting at the VRU peripheral if you want to report on VRU applications, services, queuing, and trunk groups.
- Determine the Service Level for the VRU peripheral.

  If the peripheral type is not Aspect, the Service Level defaults to Calculated by Call Center.

  If the peripheral type is Aspect, choose the type of calculation to be performed by default. You can override the default for each individual service.
- Use the VRUProgress variable in the Set node of the routing script to indicate the status of the call at different points in the routing script. You can set the status to VRU unhandled, VRU handled, VRU assisted, VRU opt out unhandled, VRU script handled, or VRU forced transfer.

  For each transaction in the VRU Self-Service or Information Gathering application for which you plan to change the VRUProgress variable, create a separate call type. In the script, change the call type when a call reaches the end of a transaction and then change the VRUProgress variable. This action enables you to report on each transaction separately using the Call Type VRU Activity reports.
- Optionally, if you use Unified CVP as your VRU and want to perform advanced custom reporting on VRU application details, configure the following:
  - The Capture microapplication, which you can include in a script to trigger the creation of a TCD record at any point in a routing script. Configure the Capture microapplication as a VRU script; run the application using the RunExternalScript node. Name the script “CAP” or “CAP, xxx”, where xxx is any string that makes the script name unique. For example, CAP, bankingApplication.
  - The Metadata ECC variable microapplication, which collects high-level details about the script application. Configure an ECC variable in the Expanded Call Center Variables configuration tool. The variable length is usually 62 bytes but can be as low as 21 bytes to save space.
  - Use these microapplications in your scripts to trigger TCD creation at points in the script for which you want to capture data. For example, you can capture data when a transaction completes. Use the metadata ECC variable microapplication with the Capture microapplication to capture more details. These details include information about the performance of the script and the customer's experience for each point in the script for which a TCD record is created.

- There might be cases when a call is not queued, but instead sent to the agent directly (via the LAA Select node) from the VRU. Ensure that the VRU PG is configured correctly. Correct configuration ensures that such a call is considered answered at the VRU service rather than abandoned.

  To do this, set the configuration parameter to /ASSUME_ANSWERED.

- If you are using IP-IVR as the VRU, set the Configuration parameter in the VRU PG record to /ASSUME_ANSWERED to ensure that calls sent from the VRU to an agent without being queued are reported as Answered.

  With this parameter, calls are counted as successfully connected when the Connect message is sent to the VRU. This prevents calls from being counted as abandoned when a VRU fails to send an Event Report / Answered message in response to a Connect message.

- Configure services with peripheral IDs that match the information sent from the VRU.

  The peripheral ID that you enter depends on whether you are using IP-IVR or Unified CVP as the VRU.

  - If you are using IP-IVR, you configure a service with a peripheral ID that matches the ID you entered in Application Administration as the post-routing ID. Remember the post routing ID that you configure for use when creating services.
  - If you are using Unified CVP, the peripheral ID that you enter depends on the VRU type.

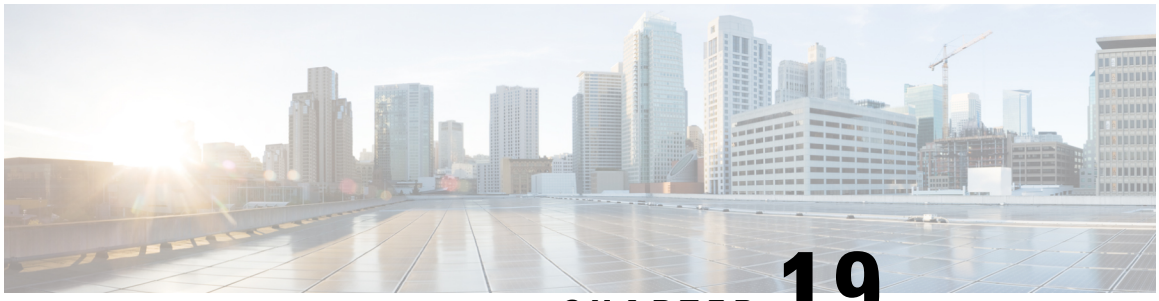
    If Unified CVP is a routing client that handles new calls (VRU type 5), the peripheral service ID should be 1.

    If Unified CVP receives pre-routed calls (for example, VRU types 2, 3, 7, or 8), the peripheral service ID should be 2.

PART III

Special Reporting Environments

- Reporting in a Multichannel Environment, on page 113
- Reporting in Contact Center Gateway Deployment, on page 117



CHAPTER 19

Reporting in a Multichannel Environment

- Multichannel Options, on page 113
- Media Routing Domains, on page 113
- Multichannel Reporting Data, on page 114
- Report Templates for Multichannel Applications, on page 115

Multichannel Options

When you include multichannel applications in a deployment, you can configure agents to handle nonvoice tasks such as chat and email in addition to voice calls.

Supported multichannel applications include:

- **Enterprise Chat and Email**: This application enables organizations to intelligently route and process inbound emails, webform inquiries, faxes, and letters. It also enables text chat messaging and page-push abilities. Agents can assist customers while on the phone, by navigating through web pages that the customer is currently browsing.
- **Third-party multichannel applications**: These applications use the Task Routing APIs to send new task requests and control agent state and task activity. Third-parties can develop applications to submit any type of task request for routing, such as chat, email, or SMS.

Media Routing Domains

Media Routing Domains (MRDs) organize how Unified CCE routes requests for each communication medium, such as voice and email, to agents.

You assign each skill group or precision queue to an MRD. Unified CCE then can route a task to an agent who is associated both with a specific skill group or precision queue and with a specific medium.

The Voice MRD is created by default for all deployments. You configure MRDs for each of the other media in your deployment, such as chat, email, or SMS.

You can report on activity for all of the configured MRDs.

Multichannel Reporting Data

Unified CCE databases store information about agent activity and tasks routed by Unified CCE, including nonvoice tasks such as chat and email. Reports contain a Media field, when appropriate, to identify the MRD of each task included in the report.

The following table describes major differences between voice and nonvoice tasks in reports.

Table 20: Report Data for Multichannel Applications

Type of Data	Data for Voice Tasks	Data for Nonvoice Tasks
Task direction	Task direction can be both incoming (agent receives a call) and outgoing (agent places a call). **Note** Calls placed by Outbound Option appear as incoming calls because of the manner in which the Outbound Option Dialer places calls between agents and customers.	Task direction is always incoming, and values of report fields pertaining to outgoing nonvoice tasks are set to null.
Session ownership changes	The ownership of a voice task can change through the life of the call. Agents can transfer the call or conference in another agent.	The ownership of a nonvoice task routed to Unified CCE from third-party multichannel applications that use the Task Routing APIs can change during the life of the task. Agents can transfer these tasks. Agents cannot conference these tasks, and supervisors cannot barge in or intercept the tasks. Nonvoice Enterprise Chat and Email tasks do not change session ownership. These tasks cannot be transferred or conferenced and supervisors cannot barge into or intercept the task. **Note** While it is possible for a Enterprise Chat and Email agent to allow another agent to join a session and then drop the session, leaving the second agent and the caller in session together, this is not the same as a voice call transfer. Unified CCE software interprets this scenario as two different sessions, one for the original agent and one for the second agent. Also, while Enterprise Chat and Email agents can forward messages to other agents, this is not the same as a voice call transfer. Unified CCE interprets message forwarding as two different sessions, one for the original agent and one for the receiving agent.

Type of Data	Data for Voice Tasks	Data for Nonvoice Tasks
Short calls	Voice calls are considered to be short calls if they disconnect within the time boundaries defined in the Agent Desk Settings for short tasks.	The Agent Desk Settings for short tasks do not apply to nonvoice tasks. The concept of short calls is not applicable for these tasks. Values of report fields pertaining to short calls are set to zero.
Service Level	You determine which Service Level type you want to use for voice tasks.	For third-party multichannel applications that use the Task Routing APIs, you determine the Service Level type you want to use. For Enterprise Chat and Email, the Service Level is always set to “ignore abandoned calls”.

Report Data for Multiple Tasks

Because multichannel agents can be configured to handle more than one task at once, task duration fields in reports can display a value greater than the reporting interval for nonvoice tasks. For example, the half-hour duration fields can have a value greater than 30 minutes.

The Voice MRD is not interruptible. An agent handling a voice call cannot be interrupted with a task from another MRD.

If the deployment includes third-party multichannel applications that use the Task Routing APIs:

- For nonvoice MRDs, agents can be configured at login to handle multiple concurrent nonvoice tasks.

  If an agent is engaged in several concurrent chat tasks, the reports contain data for each of the tasks.

- A nonvoice MRD can be configured to be interruptible; an agent handling a task in that MRD can be interrupted with a task from another MRD. The agent is configured at login to either accept or ignore interrupts:
  - **Accept:** The agent's state changes to Interrupted for the original task, and the time on that task stops while the agent is Interrupted.
  - **Ignore:** The agent's state is Active for both tasks, and the time on the original task does not stop.

If the deployment includes Enterprise Chat and Email:

- Chat is not interruptible. However, agents can be configured to handle multiple concurrent chat tasks.

  If an agent is engaged in several concurrent chat tasks, the reports contain data for each of the tasks.

- Email is interruptible. An agent handling an email can be interrupted with a voice call or a chat.

  Reports show the agent as Active for both the email and voice or chat task.

Report Templates for Multichannel Applications

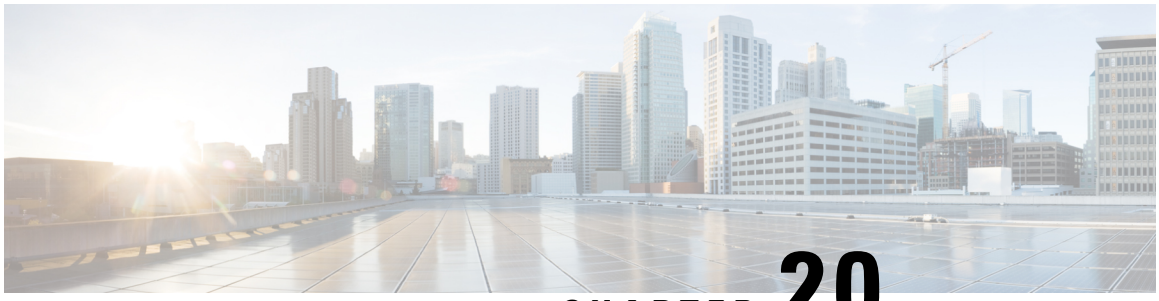
Cisco Unified Intelligence Center templates report on all voice and multichannel skill groups, agents, and tasks.

You can filter these Unified Intelligence Center report templates by Media Routing Domain:

- Agent Real Time
- Agent Skill Group Real Time
- Enterprise Skill Group Real Time
- Peripheral Skill Group Real Time All Fields
- Precision Queue Real Time All Fields
- Agent Precision Queue Historical All Fields
- Agent Skill Group Historical All Fields
- Peripheral Skill Group Historical All Fields
- Precision Queue Abandon Answer Distribution Historical
- Precision Queue Interval All Fields
- Skill Group Abandon-Answer Distribution Historical
- Precision Queue - Live Data
- Skill Group - Live Data

Reports generated from Unified Intelligence Center templates do not contain details about specific events that transpire during a task. For example, the reports show that an agent handled a task in the chat Media Routing Domain, but do not provide the text of a chat message.

Note If your deployment uses Enterprise Chat and Email for multichannel functionality, you can use the reporting tool provided with that application to view more details about the task events.



CHAPTER 20

Reporting in Contact Center Gateway Deployment

- Parent/Child Reporting, on page 117
- Call Types on Child Maps to Services on Parent, on page 124

Parent/Child Reporting

This section provides information to help you understand the differences between reporting on the parent and reporting on the child.

Whenever possible, *report at the source*; that is, at the call site where the activity is happening and where the data is generated. Use site (child) reporting for ACD activities such as agent-level reporting. Use parent reporting for cross-site, enterprise level reporting.

Things to keep in mind:

- **Agent Level Reporting**. To scale the parent optimally across the enterprise, disable agent-level reporting at the parent. Agent-level reporting is always enabled at the child.

  Agent level reporting can be enabled at the parent but increases the load on the PG and the Central Controller and limits the total number of agents in Unified CCE to around 8,000 for all PGs.

- **Call Types**. Call Types at the child are mapped to Services at the parent. Do not have call types that span peripherals at a child site that has more than a single System PG. Doing so causes service counts on the parent to be different than Call Type reports on the child. Use unique call types per system PG where possible.

- **Configuration** is simplified by autoconfiguration.

- **Enterprise Queue Time**. The EnterpriseQueueTime field in the child Termination_Call_Detail table reflects the duration for which a call was queued at the parent. This field is not available to child scripts and is not used in any other calculation at the child or in any of the standard reports. However, users who look at this field in the database have a improved idea for the Customer Experience as to queue time.

Note Both Parent and Child must be at the same Release.

- **Multichannel**. The reporting data collected is voice only (no enterprise-wide multichannel). Both the parent and the child can use multichannel independently. The parent and child cannot use each other's resources.

- **Network consultative transfer** is not possible in a parent/child deployment.
- **Outbound**. There is no enterprise-wide Outbound Option reporting in a parent/child environment. Both the parent and the child can use Outbound Option independently. The parent and child cannot use each other's resources.
- **Scripting** is consistent with traditional PGs, not Unified CCE. Scripts use Longest Available Agent (LAA) and Minimum Expected Delay (MED) and target services and skill groups, not agents.
- **RONA and RNA**. Redirect on No Answer (RONA) is defined and Ring No Answer (RNA) is handled at the ACD level (at the child).
  - RNA is defined as Ring No Answer handled by Unified CVP, generally at the parent or enterprise level and allows enterprise-wide consideration when a ring no answer event occurs. RNA is possible only when queuing is done with Unified CVP at the parent.
  - RONA allows consideration of resources only at the site (unless the call is post-routed to the parent, in which case the parent is unaware of the ring no answer condition).
  - Do not use both child RONA and parent RNA. Pick one or the other and be consistent. RNA is required when Unified CVP is the enterprise routing platform.
- **RNA handling when a call is redirected**. If a call is queued at the parent Unified CVP and translation-routed to the child and is later pulled back by the parent CVP and sent to another child or to the same child, when the original child requeries the call, then the parent sends RNA information to the original child as a TCD record that shows the appropriate disposition (Redirected) and not the disposition of Abandoned.

Note Both Parent and Child must be at the same Release.

- **Routing**
  - Avoid sending calls from one child to another without parent involvement. Cradle-to-grave tracking is lost if you do this.
  - Do not bounce calls. That is, do not queue the call locally at the child and periodically post-route the call to the parent to check if another resource is available. Leave the call queued at the parent or at the child.
  - Use translation routes to all children. This allows parent-to-child call data exchange and cradle-to-grave reporting.
  - All general ACD functionality is supported: pre-routing, re-routing with translation routing, and post-routing. Third-party call control on the parent is the exception.
  - Routing to the child is to peripheral targets (skill groups, service), as for all legacy PGs.
  - The child can send remote route requests to the parent for post routes and translation routes, provided that Permit Application Routing is checked on the Dialed Number. Remote routing takes priority over local routing if the parent exists, is connected, and the PG registers for control. This prioritizing allows backup local scripts to take over if the parent is unavailable.
- **Queuing**

- If queuing is done at the parent, the child call center does not have access to the queue time for some calculations such as Average Handle Time (AHT).
- CTI clients connect to the child's CTI and do not see calls queued by the parent; for example, with Unified CVP.

- **Supervisors and supervisory activity and statistics** are not reported at the parent. The parent is aware of the activities but does not know the reason for them; for example, an intercept is seen as a transfer.
- **Third-party call control**. There is no third-party call control through CTI. Agent desktops are connected to the child only.
- **Unified CVP** at the child is supported but is discouraged, as no queuing statistics are reported, since Unified CVP is on a peripheral other than the System PG.
- **Variables**. Full variable passing is done between parent and child. You can send/receive call variables 1–10 and ECC variables. Filtering is available to control data passing in each direction if necessary.
- **VRU call events** are not reported at the parent and do not appear in parent reports.

Related Topics

Call Types on child maps to Services on parent, on page 124
Autoconfiguration from child to parent, on page 122

Differences Between Unified ICM Parent and Unified CCE Child Reporting

If you compare data at the parent with data at the child over intervals, you are likely to find differences. This section lists some reasons why data collected and presented in reports run at the parent can differ from data collected and presented in reports run at the child:

- **Differences due to transmission delays** can cause variations between reporting data seen on reports run at the parent and at the child. All times computed on the parent, such as various state transitions, are based upon event arrival time in the parent, not on their actual event occurrence on the child.
- **Differences based on Central Controller Time or ACD Time**. Prior to this release, call type data was written to Call Type tables on Central Controller time. Other data (service, skill group, agent) was written to the respective tables based on Peripheral time.

  You can configure reporting intervals on either Central Controller time or on ACD (Peripheral) Time.

  To continue with existing parent/child behavior, select ACD (Peripheral) Time. With this selection, Call Type/Skill Group data at the parent might not be consistent with itself. However, Skill Group counts at the parent and the child should match.

  If your selection is Central Controller time, then the Call_Type/Skill_Group data at the parent should match. However, Skill Group counts at the parent and at the child might not match as they might no longer be synchronized.

Note Both parent and child must be at the same Release.

- **Differences in supported concepts at the parent and child** can cause variations. Certain concepts are supported only at the parent or only at the child. Therefore, certain agent performance and customer

experience statistics might only be available at the parent or at the child. For example, Skill Group Service Levels are supported on the child but not the parent.

- **Differences in implementation of similar concepts in the parent and child**. For example, to measure the Service Level experienced by incoming callers, reporting users at the parent would use Service Level statistics on Service Reports, while reporting users at the child would use Service Level statistics on Call Type Reports.
- **Differences in configuration of parent and child systems**. Although autoconfiguration minimizes this issue, discrepancies between child and parent configurations can lead to reporting differences.

  The following are some examples:

  - **Short Calls**:

    Abandoned Short Calls: For call types and services, you configure only abandoned short calls. Answered short calls are not reported for call types and services. On the parent, if the "Abandon Wait Time threshold" for services is not configured to be the same as the Aban Wait Time threshold in the global settings for Call Types on the child system, discrepancies can arise between abandon counts on the two systems. A call might be considered as abandoned on the parent and as a Short Call on the child and vice versa.

    Answered Short Calls: Answered short calls can also cause a difference in reporting. Answered short calls apply to the skill group and the agent skill group database tables. The short call timer starts when the agent answers the call. CallsAnswered is updated for these calls. However, the ShortCalls fields within the skill group and agent skill group tables are also incremented. Ensure that the "Answered Short Call threshold" configured on the Contact Center Gateway Peripheral on the parent matches the "Answered Short Call threshold" configured on the System peripheral configured on the child.

  - **Agent Reporting**: If you decide to use the parent system to report on agents, consider the following configurations.

    Ensure that you enable the Agent reporting on the Contact Center Gateway peripheral on the parent and identify the Administration & Data Server on the Agent Distribution list when configuring the Unified CCE Enterprise Gateway peripheral. If these configurations are not done, then reporting on the parent system does not show any agent data.

    If you plan to use **Agent Team** reports, configure Agent Teams and the Agent Team Members on the parent to match those on the child systems.

    If you plan to report on **Not Ready reason codes** on the parent system, configure the following on parent:

    1. Configure the Not Ready reason codes by entering numeric and text values for each reason code. For example, if you want Not Ready reason code 1 to equal "Break", enter "1" for the Reason Code and "Break" for Reason Code Text. These codes need to match and must be identical as configured on the child system.
    2. Ensure that agent event detail is enabled on the Unified CCE Enterprise Gateway PG that is configured to talk to the Unified CCE System PG on the child.

  - **Mapping of Call Types and Services**: The Call Types on the child are autoconfigured as Services on the parent. However Call Types are not specific to peripherals, whereas, Services are.

    If you have a child that has two or more Unified CCE System PGs, ensure that you have not configured call types that span these two peripherals. If you configure a Call Type that spans

peripherals on the child, these are configured as two services on the parent system, one for each peripheral. Hence, a single call type on the child maps to two different Services (on two different peripherals) on the parent, resulting in reporting differences.

Related Topics

Interval configuration

Reporting Applications in a Parent/Child Environment

Unified Intelligence Center provides real-time and historical reports for agents, skill groups, services, and call types. These reports can be used to manage agents, measure customer experience, and monitor call center operations.

- To run enterprise-wide reports at the *parent*, always select the ICM Templates check box in each report category. Leave the Unified CCE Templates check box unchecked.
- To run reports at the *parent* to measure customer experience, use “ICM Templates” in the Services category.
- To run reports at the *child* to measure customer experience, use “Unified CCE Templates” in the Call Type category.

Unified IC does not distinguish between ICM Templates and Unified CCE Templates.

Parent/Child Deployment Models

The following table provides a brief outline of reporting on the parent and child systems for two common parent/child deployment models.

Table 21: Reporting Options, Unified CCE Gateway Deployment Model

Deployment Model	Parent Reporting	Child Reporting	Caveats
One parent with one or more children, each with a System PG **Note** The parent treats each child as a separate ACD.	The parent has its own reporting components: an Historical Data Server, an Administrative & Data Server, and a Unified Intelligence Center reporting application Unified Intelligence Center does not distinguish between ICM and Unified CCE templates.	Each child system has its own individual reporting components: an Historical Data Server, an Administrative & Data Server, and a Unified Intelligence Center reporting application. Unified Intelligence Center does not distinguish between ICM and Unified CCE templates.	Reports do not reflect Outbound Dialer Campaign or Dialer statistics that are reported on the child. The Agent and Skill Group reports on the parent do not reflect reporting statistics for the Outbound Option dialer and Multimedia (email, and chat) tasks that are handled by agents in the child.

Deployment Model	Parent Reporting	Child Reporting	Caveats
Multiple parents connected to a single child system through individual System PGs; for example, multiple Outsourcers sending calls from their parent to a single child (Provider).	Each parent has its own reporting components. For example, each Outsourcer has its own individual parent with its own Unified IC reporting application. Each parent can see only reporting information that is associated with its own Unified CCE Enterprise Gateway PG.	The receiving child (Unified CCE) system has an Historical Data Server, an Administrative & Data Server, and a Unified IC reporting application and provides reporting on agent performance and customer experience on calls routed to the Unified CCE child from multiple Unified CCE parents.	In this deployment the child Unified CCE System has two peripherals (System PGs) each talking to different Unified CCE parents. **Note** The child must not set up call types that span the two peripherals.

Autoconfiguration from Child to Parent

The PG supports autoconfiguration of basic configuration data from the child to populate tables on the parent. Autoconfiguration is enabled by default in the Peripheral tab of the PG Explorer and takes effect when the PG is started.

Once initial autoconfiguration is complete and configuration rules are updated, additional changes on the child are sent up to, and are applied dynamically to, the parent. During subsequent connections, configuration keys are checked so that only changes are updated.

When records are deleted on the child, they are marked as "deletable" on the parent but are not actually deleted.

Do not confuse Cisco Contact Center Gateway peripheral autoconfiguration with agent autoconfiguration.

- Peripheral autoconfiguration is a check box on the main Peripheral tab. It is greyed out for all but the gateway PGs.
- Agent autoconfiguration is a check box option available on the Advanced tab in the PG Explorer.

  You must ensure that Agent autoconfiguration is *disabled* so that the Unified CCE Gateway PG can function properly using Peripheral auto-configuration.

Note With autoconfiguration on, you cannot alter any of the active configuration on the parent.

These are the tables on the parent that receive configuration data from the child:

1. **Agent/Person**
2. **Skill Group**

Note Default skill groups on the child, which are non-viewable, are created as real skill groups on the parent. Activity done in the default skill group on the child shows up in these real skill groups on the parent.

3. **Service** (*Call Types* on the child are configured as *Services* on the parent.)

4. **Peripheral Monitor**

If *any* error occurs during autoconfiguration, the keys on the parent are not updated. The Unified CCE PIM continues to upload the entire child configuration to compare it every time it is started until no configuration errors are encountered.

Autoconfiguration does not provide complete configuration for Unified CCE software. You must configure some elements manually at the parent, such as:

- Dialed numbers
- Scripts
- Peripheral targets
- Routes
- Agent desk settings
- Agent teams
- Supervisors
- Service members

  To configure service members for any given service, examine the script for a call type on the child and note to what skill groups the script offers the call. On the Unified CCE parent, make these skill groups service members of that Service.

Naming Conventions for Mapping on the Parent

Mapping is the method that Contact Center Gateway uses to manage data that the child system delivers to a parent system during the autoconfiguration process.

Unified CCE uses naming conventions to assist users in tracking data mapping between parent and child systems.

Limit the number of characters in the names of agents, skill groups, and call types on the child system. When these names are passed to the parent during autoconfiguration, the software configures the name as `(Parent)Peripheral.EnterpriseName +"."+ (Child)Skill_Group.PeripheralName`. If the configured name exceeds 32 characters, it is automatically truncated, and the *name* of the skill group, agent, or call type on the child is replaced with a *number* on the parent. This means that you cannot find the name in reports run on the Unified CCE system.

The following list provides the mapping naming convention syntax descriptions for each data entity and uses the example of a Peripheral.EnterpriseName value of CCE1:

- **Skill Group**

  Default syntax (under 32 characters): (Parent)Peripheral.EnterpriseName+"."
  +(Child)Skill_Group.PeripheralName

  Example: CCE1.Sales

  Fallback syntax (over 32 characters): (Parent)Peripheral.EnterpriseName+"."
  +(Child)Skill_Group.PeripheralNumber

  Example: CCE1.5001

- **Service**

  Default syntax: (Parent)Peripheral.EnterpriseName+"."+ (Child)Call_Type.Name

  Example: CCE1.TECH_SUPPORT_CT

  Fallback syntax: (Parent)Peripheral.EnterpriseName+"."+ (Child)Call_Type.CallTypeID

  Example: CCE1.5009

- **Agent**

  Default syntax: (Parent)Peripheral.EnterpriseName+"."+ (Child)Agent.LastName + "."+ (Child)Agent.FirstName

  Example: CCE1.Smith.Jane

Note Duplicates are avoided by a suffixed numeral. If a child has two agents with identical names, differentiated enterprise names are generated. (Example: CCE1.Jones.John and CCE1.Jones.John.1)

Fallback syntax: (Parent)Peripheral.EnterpriseName+"."+ (Child)Agent.PeripheralNumber

Example: CCE1.5011

Note In Parent/Child deployment type, the agent name is automatically configured for the customer. Spaces are not allowed in agent IDs. In a specific scenario, if a child agent is created with a space or a "-", in either the First Name or Last Name field, the name are not created on the parents.

Call Types on Child Maps to Services on Parent

Most data entities on a child map to corresponding entities on the parent and are mapped by their corresponding peripheral fields. However, there is one important exception: for reporting purposes, *Call Types* on the child map to *Services* on the parent. That is, when autoconfiguration occurs, data from the *Call Type tables* on the child populate the *Service tables* on the parent.

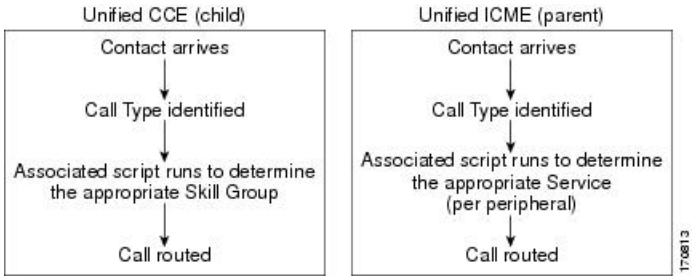
Note The parent continues to process the Call Type data it owns using the “traditional” method, that is, by populating the Call Type tables with Call Types configured on the parent.

Call Type and Service Differences for Parent and Child

On both the parent and the child, Call Type is the first-level category by which data is determined about the contact and a script is associated with the Call Type. On the child, when a contact of a certain Call Type is received, the associated script runs to determine the appropriate Skill Group to route the call to. However, on the parent, when a contact of a certain Call Type is received, the associated script runs to determine the appropriate Service to which to route the call.

Note This diagram does not show translation routing.

Figure 10: Child Skill Group/Parent Service



Similar Data Concepts in Child Call Type and Parent Service Database Tables

This section describes the relationship between customer experience data available at the parent and at the child.

At the child, service level data is collected and presented in Call Type and Skill Group database tables and reports.

At the parent, service level data is collected and reported only in Service database tables and reports.

In addition to these differences, in a Unified CCE *child*, you can also use scripting to change call types in order to capture certain statistics. In such scripts, when a call changes call types, the old call type Service Level timer stops and the Service Level timer associated with the new call type starts. However, the Service Level timer for Services on the Unified CCE *parent* is not stopped and reset.

Note

- Due to this timing issue, do not compare ServiceLevel field values in Call_Type_Interval/Real_Time tables on the child with the ServiceLevel field values in Service_Interval/Real_Time tables at the parent.
- "Similar concept" in this discussion means "closest in meaning"; it does not imply an absolute match.

The data collected and presented in Service database tables and Services reports at the parent is expected to vary from data collected and presented on Call Type database tables and Call Type reports on the child. Although the two data sets are not expected to be an exact match, in some cases, the customer can look at a specific data field in the Services table at the parent and see a corresponding data field in Call Type table in the child that is similar in meaning.

Note

- Data fields that are not listed in these tables either cannot be mapped (that is, although they might be populated on a parent system, they have no corresponding value on the child system) or are not available (that is, they are null or zero on the parent.)
- There are no corresponding fields or tables in the child for the parent Service_Five_Minute table.

Table 22: Service and Call Type Data Mapping

Parent: Service_Interval	Child: Call_Type_Interval	Comments
AnswerWaitTime	AnswerWaitTime	
AvgDelayQ	AvgRouterDelayQ	Network queuing data is not available at the child level.
CallsAnswered	CallsAnswered	
CallsHandled	CallsHandled	
CallsOffered	CallsOffered	
DelayQAbandTime	DelayQAbandTimeHalf	See Note 1.
HandleTime	HandleTimeHalf	
HoldTime	HoldTimeToHalf	
OverflowOut	OverflowOutHalf	
SkillTargetID	No direct map	The PeripheralNumber of this service in the Service table maps to the CallTypeID in the child table.
TalkTime	TalkTimeHalf	
TimeZone	TimeZone	

Note 1: Any condition on the child causing the call to terminate while in queue is documented in this field in the database schema. (The child Call Type reports have more granularity with regard to “error” calls.)

Table 23: Service_Real_Time Data Mapping

Parent: Service_Real_Time	Child: Call_Type_Real_Time	Comments
AnswerWaitTimeHalf	AnswerWaitTimeHalf	
AnswerWaitTimeTo5	AnswerWaitTimeTo5	
AnswerWaitTimeToday	AnswerWaitTimeToday	
AvgDelayQATo5	AvgRouterDelayQTo5	See Note 1.
AvgDelayQNow	AvgRouterDelayQNow	
CallsAbandQHalf	RouterCallsAbandQToHalf	See Note 1.
CallsAbandQTo5	RouterCallsAbandQTo5	See Note 1.
CallsAbandQToday	RouterCallsAbandQToday	See Note 1.
CallsAnsweredHalf	CallsAnsweredHalf	

Parent: Service_Real_Time	Child: Call_Type_Real_Time	Comments
CallsAnsweredTo5	CallsAnsweredTo5	
CallsAnsweredToday	CallsAnsweredToday	
CallsHandledHalf	CallsHandledHalf	
CallsHandledTo5	CallshandledTo5	
CallsHandledToday	CallsHandledToday	
CallsOfferedHalf	CallsOfferedHalf	
CallsOfferedTo5	CallsOfferedTo5	
CallsOfferedToday	CallsOfferedToday	
DelayQAbandTimeTo5	DelayQAbandTimeTo5	See Note 1.
HandleTimeHalf	HandleTimeHalf	
HandleTimeTo5	HandleTimeTo5	
HandleTimeToday	HandleTimeToday	
HoldTimeHalf	HoldTimeHalf	
HoldTimeTo5	HoldTimeTo5	
HoldTimeToday	HoldTimeToday	
RedirectNoAnsCallsHalf	CallsRONAHalf	
RedirectNoAnsCallsTo5	CallsRONATo5	
RedirectNoAnsCallsToday	CallsRONAToday	
TalkTimeHalf	TalkTimeHalf	
TalkTimeTo5	TalkTimeTo5	
TalkTimeToday	TalkTimeToday	

Note 1: Any condition on the child causing the call to terminate while in queue is documented in this field in the database schema. (The child Call Type reports have more granularity with regard to “error” calls.)

Related Topics

Differences between Unified ICM parent and Unified CCE child reporting, on page 119

Mapping Data Between Child and Parent

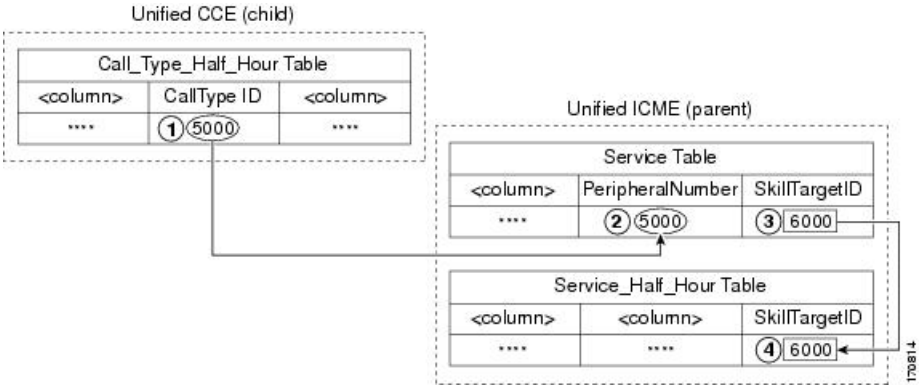
When the child maps a Call Type to a parent Service, the following attributes are passed from the Call_Type table to the Service table:

- The CallTypeID in the Call_Type table on the child system maps to the PeripheralNumber in the Service table on the parent.
- The EnterpriseName in the Call_Type table on the child maps to the PeripheralName in the Service table on the parent.

You can use this mapping process to locate the corresponding Service records on the parent for a call type record on the child.

The figure that follows shows an example of data mapping.

Figure 11: Data Mapping Between Unified CCE Child and Unified ICM Parent



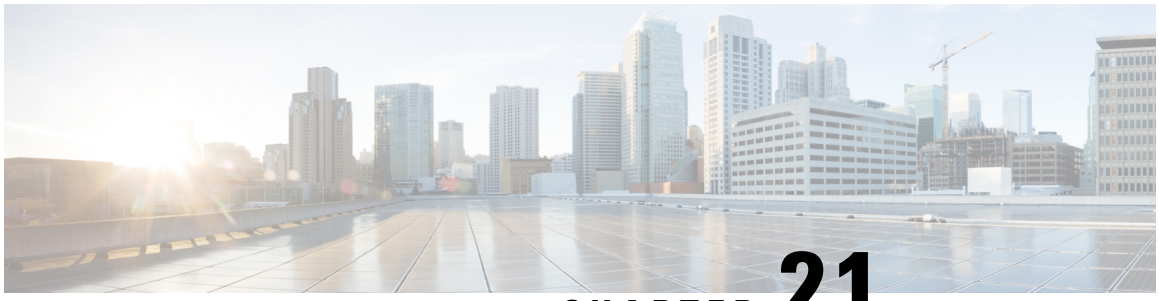
In the figure:

1. On the child, the record in the Call_Type_Interval table you are interested in has a CallTypeID value of 5000.
2. On the parent, you would search the Service table for a Service with a PeripheralNumber field that matches the CallTypeID on the child (5000).
3. The SkillTargetID for that Service is 6000.
4. Using the SkillTargetID value (6000), look up the corresponding record in any of the Service Tables (for example, Service_Interval, Service_Real_Time).

PART IV

Reporting Implications of Data Loss and Component Failover

• Data Loss and Component Failover, on page 131



CHAPTER 21

Data Loss and Component Failover

- Data Flow from Logger to Historical Data Server, on page 131
- Methods to Prevent Data Loss from Logger and HDS Failure, on page 133
- Data Loss from PIM Failure and Reporting, on page 135
- Other Possible Points of Failover, on page 135

Data Flow from Logger to Historical Data Server

Assuming a full-duplex, fault-tolerant implementation, data is sent from CallRouter A to Logger A and from CallRouter B to Logger B.

The Logger Central Database forwards (replicates) historical data to corresponding historical tables on the Historical Database Server in summary intervals. These data populate the historical interval and daily reports.

Two Administration & Data Servers are typically set up as HDS machines. A similar fault-tolerant strategy applies to the HDS—when the primary HDS fails, the Administration Client automatically switches over to use the backup HDS.

Each Historical Data Server (HDS) is connected to a single Logger.

Recovery and Replication

Recovery Keys

The recovery key is the base key for all historical data tables. This key is always incremented by 1 before a new record is inserted into any historical table.

In a duplex configuration, the Logger that finishes initializing first is designated the primary Logger (although both the Loggers are always active and working in parallel). The recovery key is always initialized by the primary Logger. The recovery key is based on the current GMT date and time and always has a value greater than any previous value generated. This helps the recovery process to keep the Loggers in sync.

The replication process may have a latency of about one to five minutes because the Logger replicates data table-by-table on the HDS.

Temporary Tables

Each historical table on the Logger Central Database has two corresponding temporary tables that act as buffers to incoming historical data. As they have minimal indexes, the temporary tables speed up the process of inserting data into the corresponding actual table in the Logger Central Database.

Recovery Process

As the incoming historical data is written to the corresponding temporary tables by the Logger, the Recovery process reads the data from the temporary tables and performs a bulk insert operation of up to 2000 records into the actual historical tables.

In a duplex configuration, the recovery process keeps the historical data on the two Loggers in sync, using the recovery keys. The historical data between the Loggers is synced directly using actual tables; temporary tables are not used by the recovery process.

Replication

The Replication process is responsible for replicating data that has been committed to the Logger Central database to the HDS database.

The Replication mechanism consists of two processes: the Replication Server Process that runs on the Logger and the Replication Client Process that runs on the Distributor on which HDS has also been installed.

The Replication Client sends a request to the Replication Server requesting historical data that have associated Recovery Keys higher than those currently on corresponding historical tables. The Replication server sends the requested data back as a set of 2000 records each time.

The Replication server reads the historical data from the actual tables on the Logger and sends it to the Replication Client, which writes the historical data to the actual corresponding tables in the HDS database. Temporary tables are not used to replicate the data from the Logger to the HDS.

Possible Points of Delay or Inconsistency

If the Logger connected to the HDS goes offline, the HDS does not connect to a different Logger. For example, if the HDS is connected to Logger B and Logger B fails, the HDS does not connect to Logger A. When Logger B comes back up, it recovers data from Logger A and begins to receive current historical information. Once the Logger has recovered all of the data from Logger A, it begins to replicate this data to the HDS.

If reports are run from this HDS for recent intervals while the Logger is offline or while the Logger is in the process of recovering or replicating data, you might not see data for those intervals in reports. This situation is temporary, and you will see the data once the replication process for the tables used by the reports is complete. If you are using a fault-tolerant system with two HDS Administration & Data Servers, you can run reports using the backup HDS while the primary HDS is not receiving data.

If the HDS goes offline and you are using a fault-tolerant system with two HDS Administration & Data Servers, you can run reports using the backup HDS. When the HDS comes back up, it recovers data from the last HDS data backup and also replicates data from the Logger for the most recent data not available in the backup.

The recovery data replication is faster than regular Logger-HDS data replication. Once the HDS has recovered to its typical Logger-HDS latency of one to five minutes, data replication proceeds as usual.

If you are not using a fault-tolerant system, you will not see data in historical reports until the HDS is restored. You might also notice missing data as the replication process is in progress. This situation is temporary and you will see the data once the replication process for the tables utilized by the reports is complete.

Methods to Prevent Data Loss from Logger and HDS Failure

Data loss manifests as *data holes*, which are one or more missing records in an historical database table.

There are two types of data loss: temporary and permanent:

- A temporary data hole can happen during the Logger recovery process. For example, Logger A goes down, then comes back up and contacts Logger B to synchronize and recover historical data that was written while it was down.

  While this recovery process is going on, the reporting database on Logger A may have temporary data holes, which will be filled when the recovery process completes.

- A permanent data hole can happen during an Emergency Purge. For example, there can be permanent data loss if an emergency purge deletes records on one Logger that have not been sent to the other Logger or to the HDS.

It is possible to monitor and tune Unified CCE to minimize the occurrence of data loss.

Fault Tolerance

To protect your system, see the information on duplexed Unified CCE fault tolerance in the *Administration Guide for Cisco Unified Contact Center Enterprise*.

Data Retention and Backups

Another way to safeguard against loss is to configure the amount of time that data is stored on the Logger Central Database and in the HDS in relation to the schedule for HDS backups.

The Central database stores data for less time than the HDS. For example, you might store two weeks of data on the Logger and a year of data on the HDS.

When the HDS recovers after going offline, it retrieves all of the data on the Logger for the interval for which data is missing from the backup. You must manually restore the rest of the data from the last HDS backup.

The amount of data retained on the Logger should cover, at a minimum, the time period between HDS backups. For example, if the Logger stores data for two weeks, then you need to back up at least every other week to ensure that you can recover all historical data.

CPU Utilization

It is possible that the process on one of the Loggers is slow because of space issues or an overload of the SQL Server. In this situation, the data on the Logger with the slower SQL Server will lag in persistence of the historical data with respect to the other Logger. This causes the HDS on the corresponding side to lag as well.

As a consequence, if both sides have an HDS set up and the same reports are run from both HDSs, the reports might differ. This is usually a temporary inconsistency, since the condition that causes the SQL server process to slow might be remedied. Autogrowing of the database and load conditions often remediate. The Loggers and the HDSs eventually catch up and are in sync. Running the reports later will result in consistent reports.

However, it the database server runs of disk space, the situation is quite serious and might cause data to be out of sync for a longer duration until the problem is remedied. A permanent loss of data can occur when data is purged from the peer Logger and never replicated on the slower side.

Scheduled Purge and Retention Settings on Loggers

The goal of the scheduled purge is to free up database space by purging the oldest data.

There are several reasons for data loss during a scheduled purge:

- **Retention settings on Loggers**

  Data inconsistencies and permanent data loss can occur if the number of days to retain the data differs on the Loggers.

  Assume that Logger A is set to retain 7 days' worth of data, while Logger B is set to retain 15 days worth of data.

  If Logger B is down for 6 days, a temporary data discrepancy exists when it is brought back up, until the Recovery process synchronized the data from Logger A. However, if Logger B is down for 10 days, when it comes back up, it can synchronize only the last 7 days worth of data, based on Logger A's retention setting. Three days are lost permanently from Logger B.

Note The data might be lost from the system permanently, if the historical data was copied to the HDS database associated with Logger A. Although this situation appears as a discrepancy in the reports that are run from HDS servers that connect to side B, the system is functioning in a predictable manner. It can be considered as an issue of perception.

  To avoid this situation, make sure that the retention settings are the same on both Loggers are the same.

- **Scheduled purge and Peripheral Gateway failure**

  If multiple Peripheral Gateways (PGs) are configured, and if one of the PGs goes down for a brief period, it is possible to lose historical data permanently.

  Assume that there are three PGs in the system and that one goes down for a day and then comes back online. When that PG comes back online, it sends historical data for activity that occurred prior to it going offline.

  If the scheduled purge mechanism activates and determines that the oldest one hour of data needs to be purged, it is possible that the purge will delete data that was sent by the PG after it came online but before it was replicated to the HDS.

  Permanent data loss can occur is the HDS is down and the scheduled purge on the Logger deletes data that has not yet been replicated to the HDS.

Emergency Purge

The emergency purge mechanism is triggered when the Logger Central Database becomes full or reaches a configured threshold size. Its objective is to free up space by purging data from the historical tables so that the database has more free space than the allowed minimum.

The emergency purge goes through each historical table in a predefined order one at a time and purges one hour's worth of data from the table. As data is purged from each historical table, a check is made to verify if the free space is more than the minimum threshold value. Once adequate space has been recovered, the emergency purge procedure stops. Otherwise, it continues through to the next historical table and keeps looping as necessary.

Permanent loss of historical data can occur if the emergency purge removes historical data that has not yet made it to an HDS and has also not been replicated to the peer Logger that is “down” or in the recovery process.

Database used percentage is displayed as a status message in the replication process every few minutes. You can occasionally monitor this value to make sure that is does not grow too often or too fast. Emergency purge occurs when the percentage used is greater than the configured value (usually 90%).

Data Loss from PIM Failure and Reporting

Here are some reporting considerations when you experience data loss from PIM failure.

The Peripheral Interface Manager (PIM) is the process on the Peripheral Gateway responsible for the actual connection to the peripheral and for normalizing the CTI interface on behalf of Unified CCE .

If a PIM fails, if the link between the PIM and the ACD goes down, or if the ACD goes down, then all of the reporting data that has been gathered for the peripheral associated with the PIM is deleted.

When the PIM failures occur, the peripheral is marked offline to the central controller.

The state of all agents on that peripheral is set to *logged out* and is reported as such to the CallRouter.

The CallRouter has no way of determining what was going on at the ACD while the PIM was out of contact with the ACD. When the PIM reconnects to the ACD, the ACDS does not send the PIM sufficient information to allow the recording of accurate historical reporting data for the interval(s) in which the disconnect took place.

Note When the PIM reconnects to the ACD, most ACDs do pass information to the PIM about each agent's state and duration in that state. While this is not enough to allow accurate historical reporting data to be recorded, it is enough to allow the CallRouter to make accurate call routing decisions.

When the PG is duplexed, either the Side A or Side B PIM is active for each peripheral. If one side loses connection, the other comes up and activates.

Other Possible Points of Failover

Peripheral Gateway / CTI Manager Service Failover

If the agent's PG shuts down or the CTI Manager service shuts down, the agent is momentarily logged out. The agent might be logged in again automatically once the backup PG or CTI Manager comes into service. The agent Media Logout Status reports for the agent, agent skill group, agent team, and agent peripheral show a logout reason code of 50002.

Table 24: Agent State Before and After Peripheral Gateway/CTI Manager Service Failover

Agent State at Fail-Over	Agent State after Fail-over
Available	Available

Agent State at Fail-Over	Agent State after Fail-over
Not Ready	Not Ready
Wrap-up	Available, if in Available state before the call. Otherwise, the agent reverts to Not Ready.

Agent Desktop/Finesse Server Failover

If the agent desktop (Finesse desktop) shuts down or loses communication with Finesse server, or if the Finesse server shuts down, the agent is logged out of all MRDs supported by the peripheral that has lost communication with the contact center software.

The agent is logged in again automatically when one of the following occurs:

- The agent desktop comes back up or resumes communication with the Finesse server
- The agent is connected to the backup Finesse server

The agent Media Logout Status reports for the agent, agent skill group, agent team, and agent peripheral show a logout reason code of 50002.

The state to which the agent reverts after failover depends on the agent's state when the failover occurred, as described in the following table.

Table 25: Agent State Before and After Agent Desktop/Finesse Server Failover

Agent state at failover	Agent state after failover
Available	Available
Not Ready	Not Ready
Reserved	Available
Wrap-up	Available, if in Available state before the call. Otherwise, the agent reverts to Not Ready.

Application Instance / MR PG Failover

If the connection between the Application Instance and MR PG shuts down or either component shuts down, the Central Controller discards all pending NEW_TASK requests received from the application.

The Application Instance waits for the connection to be restored and continues to send messages regarding existing tasks and new tasks assigned by the Application Instance to the Agent PG CTI server. When the connection, MR PIM, or Application Instance is restored, the Application Instance resends any pending NEW_TASK requests for which it has not received a response from the Central Controller. The tasks that are assigned to the agent by the Application Instance while the connection is down and completed before the connection is restored do not appear in reports.

Note If the Application Instance shuts down, this situation also affects Agent PG CTI server connections.

If the connection between the MR PIM and the Central Controller shuts down or the Central Controller shuts down, the MR PIM sends a ROUTING_DISABLED message to the Application Instance that causes the Application Instance to stop sending routing requests to the Central Controller.

Any request sent while the connection is down is rejected with a NEW_TASK_FAILURE message. The Application Instance continues to send messages regarding existing tasks and new tasks assigned by the Application Instance to the Agent PG CTI server.

When the connection or Central Controller is restored, the MR PIM sends the Application Instance a ROUTING_ENABLED message that causes the Application Instance to start sending routing requests to the Central Controller again. The tasks that are assigned to the agent by the Application Instance while the connection is down and completed before the connection is restored do not appear in reports. If the connection between the Central Controller and the MR PG fails, the CallRouter deletes all pending new tasks. When the connection is restored, the application connected to MR PG will resubmit all the tasks.

Note If the Central Controller shuts down, this situation also affects the Application Instance/Agent PG CTI server interface.

Application Instance / Agent PG CTI Server / PIM Failover

If the connection between the Application Instance and Agent PG CTI server shuts down or either component shuts down, agents stay logged in. Tasks remain for a time, based on the task life attribute of the MRD. If the task life expires while the connection is down, tasks are terminated with the disposition code of 42 (DBCD_APPLICATION_PATH_WENT_DOWN).

Note For the email MRD, agents are not logged out automatically when the Agent PG CTI server or connection to CTI server shuts down. Instead the email Manager continues to record agent state and assign tasks to agents. When the connection is restored, the email Manager sends the updated agent state information on the peripherals serviced by the Agent PG CTI server to the CTI server, which sends the information to Unified CCE software. The software attempts to recreate historical data and corrects current agent state. If the connection or Agent PG CTI server is down for more than the time limit configured for the MRD, reporting on tasks might be ended prematurely and restarted with the connection is reestablished

The application instance can assign tasks to agents while the connection or CTI server is down and, if the connection to the MR PG is up, can continue to send routing requests to the central controller and receive routing instructions. However, no reporting data is stored for the tasks while the connection is down. Also, any tasks that are assigned and completed while the connection or CTI server is down do not appear in reports. If the connection between the Agent PG CTI server and the CallRouter shuts down or if the CallRouter shuts down, the application instance continues to send messages to the CTI server and agent activity is tracked. However, this information is not sent to the CallRouter until the connection or the CallRouter is restored, at which time the cached reporting information is sent to the central controller.

Note If the Central Controller shuts down, this situation also affects the Application Instance/MR PG interface.

If the PIM shuts down, voice media routing is unavailable for agents associated with the PIM. However, the Central Controller can continue to assign non-voice tasks to agents associated with the PIM, and the CTI server can continue to process messages and requests about agents associated with the PIM for non-voice MRDs. When the connection is restored, voice media routing is available again.

PART V

Peripheral Gateway Processes

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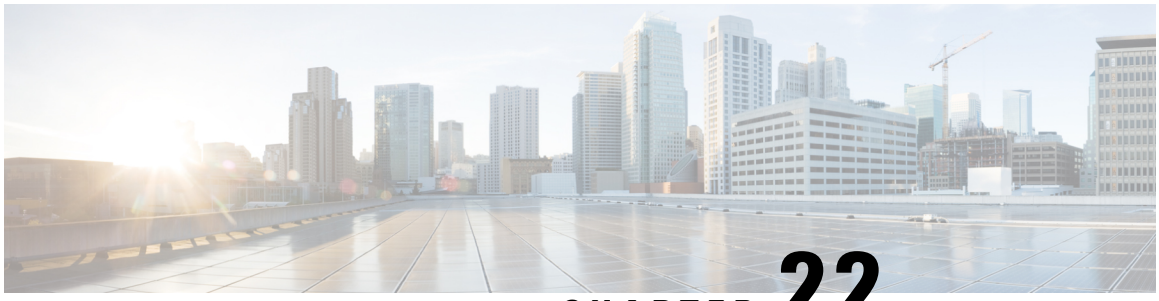

CHAPTER 22

Peripheral Gateway Processes

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- Peripheral Interface Manager, on page 141
- Message Delivery Service, on page 141
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Overview

Four processes on the Peripheral Gateway are critical to reporting: the Peripheral Interface Manager (PIM), the Message Delivery System (MDS), the Open Peripheral Controller (OPC), and the Peripheral Gateway Agent process (PG Agent).

Peripheral Interface Manager

The Peripheral Interface Manager (PIM) manages communication between the PG and the peripherals themselves (ACDs, IVRs). The PIM's main function is to convert peripheral-specific events and requests to a Unified CCE-compatible peripheral data stream.

The PIM supplies the Open Peripheral Controller (OPC) with Computer-Supported Telephony Application (CSTA) call event reporting messages. These messages form the basis of real-time monitoring and historical reporting. The OPC process receives the CSTA messages from the PIM and uses them to construct the actual real-time and historical routing and reporting data.

Message Delivery Service

The Message Delivery Service (MDS) manages all data flow between Unified CCE processes within the PG. The MDS notifies connected processes of errors detected during a data flow request. In addition, it plays a key role in keeping duplexed components (such as Loggers) synchronized.

Open Peripheral Controller

The Open Peripheral Controller (OPC) is the process that takes real-time data and events from the PIM and presents these data to the CallRouter. The OPC process forms the database objects the CallRouter needs to route calls and to monitor real-time activity on the peripheral. These include call objects, agent objects, Service objects, Peripheral device objects, routing objects, and skill groups.

To interface with the PIM, OPC uses the *OPC Interface*. The OPC Interface provides a standard communication interface between OPC and the various types of PIMs.

The OPC process outputs the data it receives from the PIM in the form of OPC Interface (OPCI) messages, which OPC uses to track the state transition of monitored calls and agents. The OPCI messages are based on European Computer Manufacturers Association (ECMA) Standard Protocol for Computer-Supported Telephony Application (CSTA). They also include additional components and interfaces to support real time data feeds or other call control interfaces needed for an ACD.

Open Peripheral Interface Data Elements

To interface with the Central Controller Agent, OPC uses the Open Peripheral Interface (OPI).

The OPI defines the objects that control the flow of OPCI messages from OPC to the CallRouter. Each table in the Central Database has a set of fields that the CallRouter uses to make its routing decisions. OPI defines tags for each of those fields.

As elements change based on events and updates from the ACD, OPC informs the CallRouter of the changed values based on table type, tag, and value. OPC sends to the Router only those data elements that have changed in value. Types of OPI data elements reported to the CallRouter are Now, Half, and Today.

Related Topics

Real-time data, on page 5

PG Agent

The PG Agent process is responsible for controlling the flow of OPI messages from OPC to the CallRouter. It manages all message traffic between the Peripheral Gateway and the Agent Process on the CallRouter, which is called the Central Controller Agent (CC Agent). The protocol used between the two agent processes is the Device Management Protocol (DMP).

Computer Supported Telephony Application Message Example

To illustrate how Computer Supported Telephony Application (CSTA) messages from the PIM are translated into OPI data elements, it helps to examine one CSTA message: `CSTAEstablished`.

Several OPC state transitions occur when OPC receives this message. The CSTAEstablished event indicates that a device (agent, trunk, or voice port) answered a call.

When OPC receives this event, the following OPC state transitions take place:

- **If the call was Queued**, several database elements and call objects are changed:

- The count for CallsQNow is reduced by one (–1).

  CallsQNow is a database element for services and routes that tracks the number of calls currently in queue at the peripheral.

- The call object used to track the CallsQNow and CallQNowTime data elements is removed from the Call Queued object for the service and route associated with the call.

  CallsQNowTime is a database element that records the time in seconds that all calls currently in queue to the service or route have spent in the queue.

- The CallsLeftQTo5 data element for the service or route associated with the call increases by one (+1).

  CallsLeftQ is a database element that provides the total number of calls to the service or route that were removed from queue during the current five-minute interval. CallsLeftQ is also used to calculate expected delay.

- LocalQTime is written in the Termination_Call_Detail table.

  LocalQTime is the time in seconds that the call was in the local queue at the peripheral. The Termination_Call_Detail record contains information about how each call was handled at a peripheral. It is generated for each call that arrives at a peripheral (provided the proper monitoring is enabled for the peripheral).

- **If there is a Call Alert event**, the amount of time the call spent ringing is added to the Call object for RingTime in the Termination_Call_Detail record.

  RingTime is the number of seconds that the call spent ringing at the agent's teleset before being answered.

- **If the answering device is an agent**, the following data elements and call objects are changed:

  - The AgentsTalking data element for the service or route associated with the call is increased by one (+1).

    AgentsTalking is a service and route database element that provides a count of the number of service agents currently in one of several talking states.

  - The call is associated with the agent and the agent is placed in the TalkingIn state on behalf of the call. This increases by one (+1) the count for TalkingIn for the skill group associated with the call the agent is handling.

    TalkingIn is a database element for skill groups that provides a count for the number of agents in the skill group currently talking on inbound calls.

  - The parameters used to calculate the database element AvgSpeedAnswer are modified.

    AvgSpeedAnswer is a service and route data element. It provides the average AnswerWaitTime for all calls to the service or route (that is, the average time that all calls to the service or route had to wait before being answered). The calculation for AvgSpeedAnswer is AnswerWaitTime / CallsAnswered.

  - The CallsAnsweredHalf (in the real-time database tables) and CallAnsweredTo5 (in the five-minute tables), are increased by one (+1).

  - The AnswerWaitTime for the call is added and written to the database.

AnswerWaitTime is the elapsed time from when the call was offered at the peripheral to when it was answered. It includes any RingTime, LocalQTime, and DelayTime (all from the Termination_Call_Detail records) associated with calls.

- RingTime, LocalQTime, and DelayTime are added to AnswerWaitTimeTo5.
- TalkTime for the call begins to be monitored.

  TalkTime is a service completed call time data element. It is populated with TalkTime and HoldTime from the Termination_Call_Detail record for the call. The value is not updated in the database until any after-call work associated with the call is completed.

Two Models of Reporting (Unified CCE)

The PIM is responsible for general monitoring functions that include accessing data on the peripheral regarding agent groups, service, routes, trunk groups, and agents.

The level of data provided by the PIM is determined by the types of CTI links available on the peripheral. The PIM can retrieve ACD statistics by using an event-based CTI feed, an aggregate data CTI feed, or both. In general, an event-based CTI feed provides more data and capabilities than an aggregate data CTI feed.

Event-Based Reporting

An event-based PIM (for example, the Aspect Event Link PIM) connects to a CTI link that provides call events and agent state events.

Event-based PIMs base their data on agent and call state transitions reported from the ACD. These PIMs convert CTI events received from the switch to CSTA-based OPC API messages, which can then be forwarded to OPC. The OPC constructs the routing and monitoring data from these events.

Aggregate-Based Reporting

Some aggregate-data PIMs connect to CTI links that provide aggregate skill group, service, and route statistics. The aggregate-data PIM works by polling the ACD for certain data supported over the switch vendor's CTI link. The aggregate PIM reports to OPC those data components that are required to build the OPI data elements.

When the PIM detects a change, it updates OPC, which informs the CallRouter of the changed values. ACD-specific data is supported by a passed-through API defined in the OPC interface. OPC sends the data to the CallRouter to be stored in the Central Database. Pass-through data requires that the database define the table format of the records.

PART VI

Routing and Queuing

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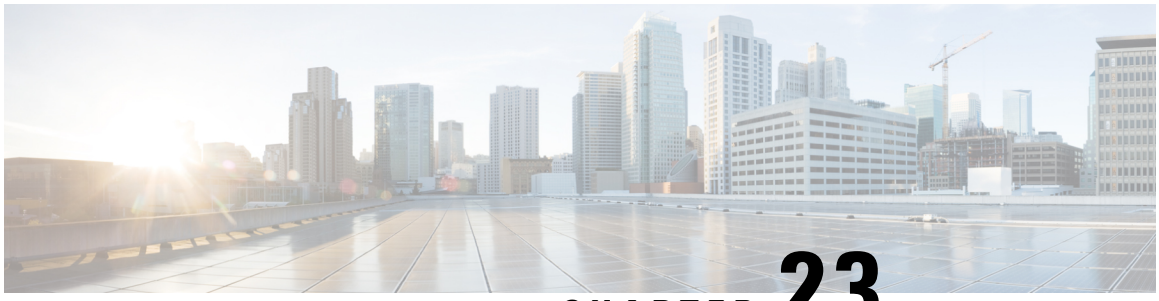
- Network Queuing and Reporting, on page 153
- Routing in Unified CCE Deployments, on page 157



CHAPTER 23

Routing and Queuing

- Routing, on page 147
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- Precision Queues, on page 151

Routing

When Unified CCE software receives a routing request, it determines the appropriate destination for the call by running routing scripts.

These scripts use real-time information about activity at the contact centers to find the destination best able to handle the call. You can monitor how the system is handling calls and can make changes to the scripts when needed, using the Script Editor.

A destination (called a *routing target*) can be a network target such an announcement or a ring, or a skill target such as an agent, a skill group, or a service. Once these targets are defined in the Configuration Manager, they can be specified in the routing script.

Pre-routing

Pre-routing is a routing decision that is run before the call terminates at the call center. With pre-routing, the Network Interface Controller (NIC) receives the route request from the Interexchange Carrier (IXC) and passes the call information along to Unified CCE software.

Unified CCE bases pre-routing decisions on real-time data gathered by the PGs at the call center sites. Unified CCE then runs the appropriate script that defines how the call is to be routed.

A pre-routing request therefore determines the initial destination for a call.

Post-routing

Post-routing is a routing decision made after the call has initially been processed at a VRU or call center. Post-routing enables Unified CCE to process calls when an ACD, VRU, or PBX generates a route request via the PG.

Unified CCE runs scripts to process the route request and return the destination address. This directs the ACD/PBX to send the call to an agent, skill group, service or Call Type in the same call center or at a different

call center. In making a post-routing decision, Unified CCE software can use all the same information and scripts used in pre-routing.

A post-routing is sent by the peripheral to refine the original route or redirect the call.

Note Your *ACD Supplement Guide* describes the features of Unified CCE post-routing available with the ACD, as well as any considerations you should be aware of when using post-routing or Translation Routing on the PG.

Translation Routing

Translation routing is the term used when additional information is sent along with a call.

This type of routing is necessary because the carrier can deliver *voice*, but has no way to deliver *data* to the peripheral.

Unified CCE software works with the PG to deliver the call to the final destination on the peripheral and to ensure that the appropriate information collected for the call is also delivered to the agent's desktop.

After the data is delivered to the peripheral, the PG receives back information about which agent the call is sent to.

You define Translation Routes with the Configuration Manager, using the Translation Route Wizard.

Note Refer to your *ACD Supplement Guide* to see if your ACD supports translation routing and for any considerations when you use translation routing on the PG.

Translation routing is always used when a call moves from one peripheral to another. A call can also be translation routed from the network.

- The term ICM TranslationRoute is used when calls are translation routed to a peripheral that is an ACD.
- The term TranslationRouteToVRU is used when calls are translation routed to a peripheral that is a VRU.

Translation routing plays a significant role in the accuracy of reporting and allows for cradle-to-grave call tracking and reporting. Some reporting metrics gathered for Call Types and skill groups are applicable only if calls are translation routed.

Skills-Based Routing

Skills-based routing is a routing decision whereby a call is routed to the skill group that has agents with the appropriate expertise.

Queuing

Queued calls are calls that are being held until an agent is available.

Unified CCE software calculates a number of call center metrics based on the time spent in queues.

It is important to understand the two models of queuing and how queuing affects reporting metrics.

ACD Queuing

ACD queues are used to queue calls on a targeted ACD and are *controlled by the ACD*.

Unified CCE might route a call to the ACD, based on knowledge gathered by the PGs that a certain skill group or service at that ACD is best suited to answer the call.

Once the call arrives at the ACD, if an agent is not available, the ACD queues the call to the skill group. Optionally a call can be queued to a skill group on the ACD during agent transfers or resulting from a call treatment provided on the ACD.

Enterprise Queuing

Unified CCE controls Enterprise queues using the Service Control Interface (SCI), irrespective of the telephony platform chosen to queue the call.

In this model, calls are held at a "network-level" VRU that has an enterprise view of available agents, based on the skill groups and services configured for the peripheral.

The following telephony platforms are supported for Enterprise queuing:

- Cisco Voice Portal and Cisco IP-IVR, when connected to Unified CCE by a VRU PG
- A third-party VRU that supports service control and is connected to Unified CCE by a VRU PG
- A VRU at the TDM Network that supports service control and is connected to Unified CCE by a NIC
- For deployments where Unified CCE provides integration to an ACD for agent level routing, the ACD itself is used as the telephony platform that queues the call as the Unified CCE directs.

Enterprise queues are an efficient way to route a call in your enterprise network. Enterprise queues are also a cost-effective way to save on toll charges before terminating a call on the ACD.

How Calls Offered and Calls Queued Are Incremented

The Skill_Group_Real_Time database tracks calls offered and calls queued in separate fields.

Therefore, there is no double counting of calls queued and offered at the ACD and calls queued and offered at the network.

Effect of Enterprise Queues on Reporting

The use of enterprise queues affects Call Type, Skill Group, and Service reporting.

The reporting metrics that are affected include queued metrics, answered metrics, service level metrics, and abandoned metrics.

The reporting of these metrics is also affected by whether or not the call was routed when sent to an ACD. For more information, see, translation-routed.

Note

- Some reporting metrics for skill groups and call types are applicable only if calls are translation routed.
- Translation routing plays a significant role in the accuracy of reporting. Some reporting metrics gathered for Call Types and skill groups are applicable only if calls are translation routed. Calls can be translation routed either to a VRU Peripheral or to an ACD.
- Translation routing is primarily applicable when Unified CCE software is used for Enterprise Routing to traditional ACDs. This includes deployments connected to legacy ACDs using any supported TDM PG such as Aspect PG and deployments connected to Cisco Unified System Contact Center using Unified CCE Gateway PG. Translation Routing enables Unified CCE for cradle to grave reporting.
- For deployments where Unified CCE provides integrations to an ACD for Enterprise Routing, the following is true:
  - Unified CCE system reports on ACD queue metrics.
  - When Unified CCE software is used to provide initial call treatment and/or enterprise queuing, Unified CCE software reports on enterprise queue metrics. However, once the call is routed to an ACD the ACD may queue the call. In this case, Unified CCE software reports on both enterprise queue and ACD queue metrics.
  - Unified CCE system uses a Service Control VRU as the telephony platform for enterprise queuing.
- Reporting is the same whether Unified CCE script uses a Send To VRU node or a Translation Route To VRU node.

Call Type Metrics

When a call is translation-routed:

- The *AnswerWaitTime*, *ASA*, and *Service Level* include both the time spent in the Enterprise queue and the time spent in the ACD queue.

  The measurement of AnswerWaitTime for a call begins when the call is queued. The measurement of Service Level begins when the call arrives at the routing script or when its Call Type is changed.

  This method of measurement means that if self-service is performed on a call before the call is queued to an agent, the routing script must be set up to change the Call Type when self-service is completed. Otherwise, the time spent in self-service will negatively impact the Service Level.

- *Abandoned* statistics are classified in three ways:
  - Calls that abandoned while ringing at the agent desktop.
  - Calls that abandoned in an Enterprise queue while waiting for an available agent.
  - Total number of calls that abandoned. This number includes calls that abandoned in a VRU (prompting), calls abandoned in both Enterprise queue and ACD queue, and calls that abandoned at the agent.

Note Although the total abandons includes calls that abandoned at the ACD, there is no separate count for only those calls that abandoned at the ACD.

When a call is not translation-routed:

- The Call Type *Abandoned* metrics allow you to determine the number of calls that abandoned in an enterprise queue while waiting for an available agent and the number of calls that abandoned while in self-service.

  However, they do not allow you to determine the number of calls that were abandoned after they left the VRU and before an agent answered them.

- The Call Type *Answered* metrics will always be zero and are not applicable.
- The Call Type *Service Level* metrics are not applicable.

Skill Group Metrics

When a call is translation-routed:

- The Skill Group *Answered* metrics include only time spent in the ACD queue.

When a call is not translation-routed:

- The Skill Group *Queued* metrics are applicable.
- The Skill Group *Abandoned* metrics allow you to determine the number of calls that abandoned in an enterprise queue while waiting for an available agent, but they do not allow you to determine the number of calls that abandoned after they left the VRU and before an agent answered them. The ACD report shows calls that abandoned after they arrived at the ACD.
- The Skill Group *Answered* metrics do not include any time spent in the enterprise queue and therefore are not applicable.

Note None of the skill group metrics include time spent in self-service, or calls that ended during self-service. A call is not associated with a skill group until it is queued, and a call is queued after self-service is complete.

Service Metrics

If a Service Control VRU is used for VRU application, the Service metrics can be used to provide performance measures for the VRU service. The type of VRU and configuration determines the information and usefulness of the metrics reported for the VRU service.

The metrics reported for Unified CCE Services defined for the ACD peripherals do not include any time spent in the enterprise queue. Hence the service metrics are not useful when using an enterprise queue.

Precision Queues

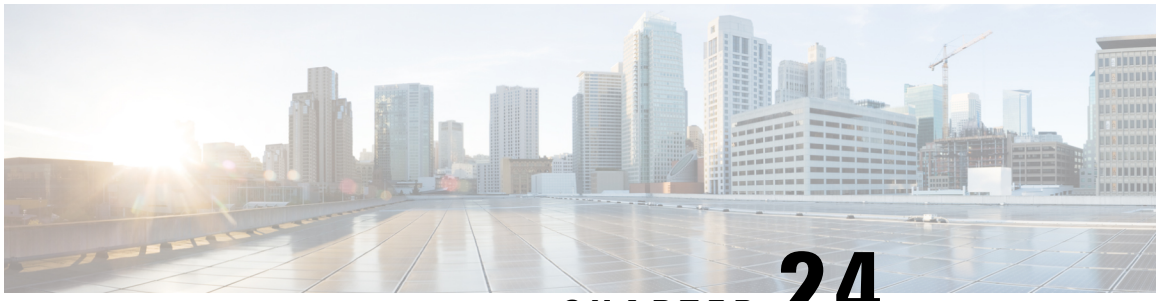
Precision Routing is a feature available with Cisco Unified CCE. Precision Routing enhances and can replace traditional routing. Traditional routing looks at all the skills to which an agent belongs and defines the hierarchy of skills to map business needs. However, traditional routing is restricted by its single dimensional nature. Precision Routing provides multidimensional routing with simple configuration, scripting, and reporting. Agents are represented through multiple attributes with proficiencies so that the capabilities of each agent are accurately exposed, bringing more value to the business.

You can use a combination of attributes to create multidimensional precision queues. Using Unified CCE scripting, you can dynamically map the precision queues to direct a call to the agent that best matches the precise needs of the caller.

For more information on precision routing, see the *Cisco Unified Contact Center Enterprise Features Guide* at https://www.cisco.com/c/en/us/support/customer-collaboration/unified-contact-center-enterprise/products-feature-guides-list.html.

Note Precision Routing is supported only on Unified CCE Communications Manager PG.

Note Precision Routing is only supported for inbound Unified CCE agents.



CHAPTER 24

Network Queuing and Reporting

- Network VRU and Call Type Metrics, on page 153
- Network VRU and Skill Group Metrics, on page 155

Network VRU and Call Type Metrics

All of the Call Type metrics apply to both Unified CCE and Unified ICM. In Unified CCE systems, Answer Wait Time, ASA, and Service Level include both the time spent in the network queue and the time spent in the ACD queue.

The measurement of Answer Wait Time for a call begins when the call is *queued*. The measurement of Service Level begins when the call *arrives* at the routing script, or when its call type is *changed*. This means that if self-service is performed on a call before the call is queued to an agent, the routing script must be set up to change the call type of the call when self-service is completed. Otherwise, the time spent in self-service negatively impacts the Service Level.

With regard to ICM-Not-TR systems, the Call Type abandoned metrics allow you to determine the number of calls that abandoned while queued in the CallRouter, but they do not allow you to determine the number of calls that abandoned while in self service, nor the number of calls that were abandoned after they leave the VRU and before an agent answers them. The Call Type answered metrics are always zero. The Call Type Service Level metrics are meaningless and can be ignored.

The following table shows the fields in the Call_Type_Real_Time table that affect reporting metrics by metric category:

Table 26: Call_Type_Real_Time Table and Reporting Metrics

Queued Metrics	At VRU Metrics/ Answered Metrics	Service Level Metrics	Abandoned Metrics
AvgRouterDelayQHalf	**At VRU :**	ServiceLevelAbandHalf	CallDelayAbandTimeHalf
AvgRouterDelayQNow	CallsAtVRUNow	ServiceLevelAbandTo5	CallDelayAbandTimeTo5
AvgRouterDelayQTo5	**Answered:**	ServiceLevelAbandToday	CallDelayAbandTimeToday
AvgRouterDelayQToday	AnsweredWaitTimeHalf	ServiceLevelCallsHalf	CTDelayAbandTimeHalf
CallsLeftQTo5	AnswerWaitTimeTo5	ServiceLevelCallsTo5	CTDelayAbandTimeTo5
CallsAtVRUNow	AnswerWaitTimeToday	ServiceLevelCallsToday	CTDelayAbandTimeToday
RouterCallsQNow	CallsAnsweredHalf	ServiceLevelCallsOfferedHalf	DelayAgentAbandTimeHalf
RouterCallsQNowTime	CallsAnsweredTo5	ServiceLevelCallsOfferedTo5	DelayAgentAbandTimeTo55
RouterLongestCallQ	CallsAnsweredToday	ServiceLevelCallsOfferedToday	DelayAgentAbandTimeToday
RouterQueueCallsHalf	CallsAtAgentNow	ServiceLevelHalf	DelayQAbandTimeHalf
RouterQueueCallsTo5		ServiceLevelTo5	DelayQAbandTimeTo5
RouterQueueCallsToday		ServiceLevelToday	DelayQAbandTimeToday
RouterQueueWaitTimeHalf			RouterCallsAbandQHalf
RouterQueueWaitTimeTo5			RouterCallsAbandQTo5
RouterQueueWaitTimeToday			RouterCallsAbandQToday
ServiceLevelCallsQHeld			RouterCallsAbandToAgentHalf
			RouterCallsAbandToAgentTo5
			RouterCallsAbandToAgentToday
			TotalCallsAbandHalf
			TotalCallsAbandTo5
			TotalCallsAbandToday

The following table shows the fields (by metric category) in the Call_Type_Interval table that affect reporting metrics:

Table 27: Call_Type_Interval Table and Reporting Metrics

Queued Metrics	At VRU Metrics/ Answered Metrics	Service Level Metrics	Abandoned Metrics
AvgRouterDelayQ CallsQHandled RouterQueueCalls RouterQueueCallType Limit RouterQueueGlobalLimit RouterQueueWaitTime	**At VRU :** CTVRUTime VRUTime **Answered:** AnsInterval1 - AnsInterval10 AnswerWaitTime CallsAnswered	ServiceLevelAband ServiceLevelCalls ServieLevelCallsOffered ServiceLevel	AbandInterval1 - AbandInterval10 CallDelayAbandTime CTDelayAbandTime DelayAgentAbandTime DelayQAbandTime RouterCallsAbandQ RouterCallsAbandToAgent TotalCallsAband

For additional information on the Call_Type_Real_Time and Call_Type_Interval table fields, see the *Database Schema Handbook for Cisco Unified Contact Center Enterprise*.

Network VRU and Skill Group Metrics

For a call that is queued by CVP, the Answer Wait Time and ASA metrics for the skill group do not include the time spent in the network queue. However, service level metrics for the skill group do include the time spent in the network queue.

The skill group abandoned metrics allow you to determine the number of calls that abandoned while queued to the CallRouter, but they do not allow you to determine the number of calls that abandoned after they left the VRU and before an agent answered them. The skill group answered metrics are always zero. The skill group service level metrics are meaningless and can be ignored.

Note None of the skill group metrics include time spent in self-service or calls that ended during self-service, because a call is not associated with a skill group until it is queued, and a call is queued after self-service is complete.

The following table shows the fields (by metric category) in the Skill_Group_Real_Time table that affect reporting metrics:

Table 28: Skill_Group_Real_Time Table and Reporting Metrics

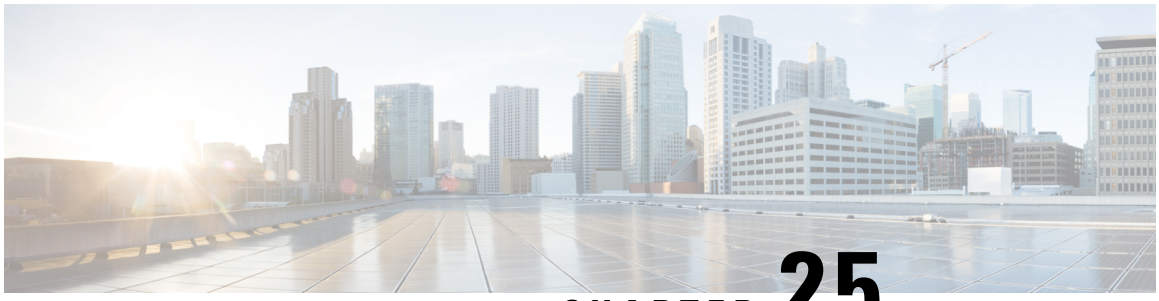
Queued Metrics	At VRU Metrics/ Answered Metrics	Service Level Metrics	Abandoned Metrics
CallsQueuedNow	**At VRU:**	ServiceLevelTo5	RouterCallsAbandQTo5
LongestCallQ	None.	ServiceLevelCallsTo5	RouterCallsAbandToAgentTo5
RouterCallsQNow	**Answered:**	ServiceLevelCallsAbandTo5	
RouterLongestCallInQ	AnswerWaitTimeTo5	ServiceLevelCallsDequeuedTo5	
	CallsAnsweredTo5	ServiceLevelRonaTo5	
		ServiceLevelCallsOfferedTo5	

The following table shows the fields (by metric category) in the Skill_Group_Interval table that affect reporting metrics:

Table 29: Skill_Group_Interval Table and Reporting Metrics

Queued Metrics	At VRU Metrics/ Answered Metrics	Service Level Metrics	Abandoned Metrics
CallsQueued	**At VRU:**	ServiceLevel	AbandonRingCalls
RouterQueueCalls	None.	ServiceLevelCalls	AbandonRingTime
	Answered:	ServiceLevelCallsAband	RouterCallsAbandQ
	AnswerWaitTime	ServiceLevelCallsDequeued	RouterCallsAbandToAgent
	CallsAnswered	ServiceLevelError	

For additional information about the Skill_Group_Real_Time and Skill_Group_Interval table fields, see the Database Schema Handbook for Cisco Unified Contact Center Enterprise at https://www.cisco.com/c/en/us/support/customer-collaboration/unified-contact-center-enterprise/products-technical-reference-list.html.



CHAPTER 25

Routing in Unified CCE Deployments

- Different Cisco Unified CCE Deployments, on page 157
- Deployments with Enterprise Routing, on page 157
- Deployments with Hybrid Routing, on page 163

Different Cisco Unified CCE Deployments

Cisco Unified CCE reports help to monitor operational effectiveness, customer experience and contact center agent performance across your enterprise.

In order to effectively run your call center using the data provided by enterprise reports, it is important to understand the different Cisco Unified CCE deployments.

The Peripheral Gateway component in a Unified CCE system is used to interface with peripherals at the different call centers in your enterprise.

The capabilities provided by the Unified CCE software when connected by a traditional TDM PG to a legacy TDM ACD differ from the capabilities provided by a Gateway PG and a Unified CM PG.

Unified CCE can be deployed with different types of Peripheral Gateways to meet the call center needs in your enterprise.

Deployments with Enterprise Routing

In this deployment, Unified CCE is configured with PGs that can connect to legacy ACDs using any of the supported TDM PGs (Aspect, Avaya, and so forth) as well as the Unified CCE Gateway PGs.

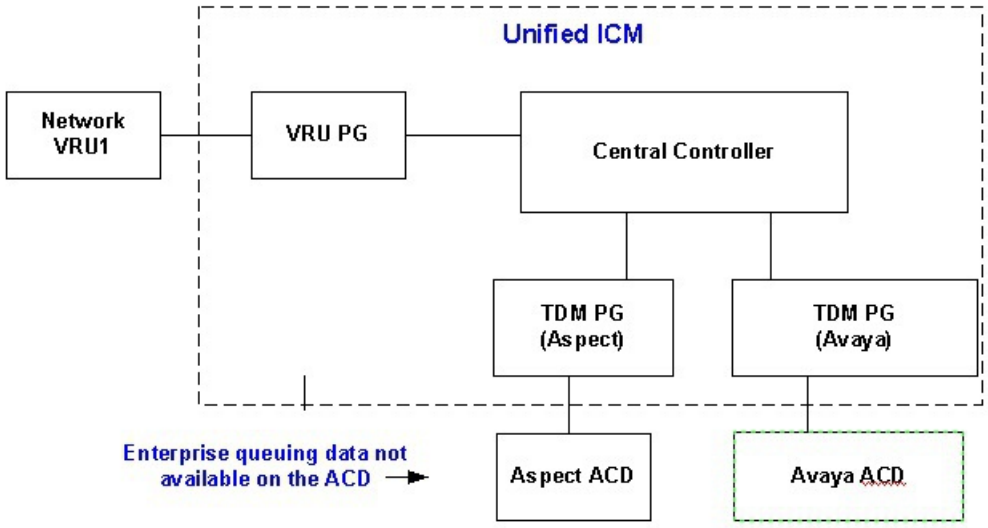
When Unified CCE is configured with these types of PGs, the call treatment and queuing (ACD queuing) is provided *by the ACD*. That is, it is the ACD that controls the queuing and chooses the agent required to handle the call.

Unified CCE software is primarily used for intelligent call routing to sites and consolidated reporting for these ACDs. Optionally Unified CCE software can be used to provide initial call treatment and/or enterprise queuing (Enterprise queue). In this case the call is routed to a site when an agent becomes available.

The ACD offers the call to agents based on skill definitions on the ACD. If an agent is not available, the ACD queues the call (in the ACD queue) and then directs the call when an agent becomes available.

This illustration shows a Unified CCE system connected to two PGs for legacy ACDs and to a network VRU.

Figure 12: Deployments with Enterprise Routing



- When calls are routed to an ACD, call treatment is provided on the ACD and the ACD controls the queuing.
- Network VRU1 can be any Service Control VRU that can be used to provide initial call treatment and serve as the telephony platform for queuing calls across all call center ACDs. VRU1 can also be used for information gathering and self-service.

Routing and Scripting

In this deployment, Cisco Unified CCE software uses real-time reporting statistics gathered from the different peripherals (ACDs) to make routing decisions to route calls to the ACD at a site that is best suited to answer the call.

The following routing capabilities can be provided in this deployment.

- **Site-based Routing:** Cisco Unified CCE software, using ICM routing capabilities, can use real time reporting statistics gathered from the different peripherals (ACDs) to make routing decisions to route calls to the ACD at a site that is best suited to answer the call.

  Site selection can be scripted using real time Service and Skill Group metrics provided by the PG.

  Several metrics can be used to make the selection, such as Agent availability, CallsInProgress, and a Minimum Expected Delay (MED) calculation.

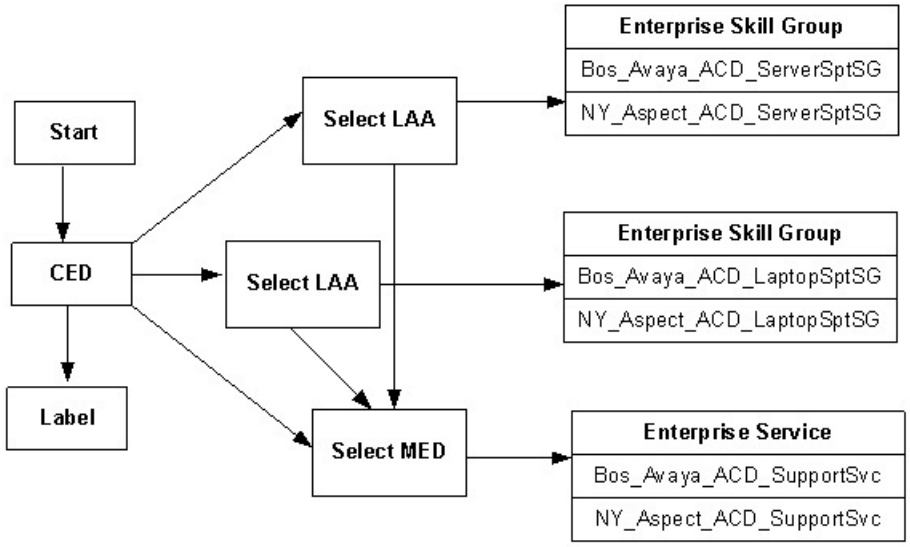
Note Cisco Unified CCE scripts provide a predefined MED (Minimum Expected Delay) calculation that can be used only with ICM Services.

- **Agent Level Routing:** Not Supported.

A typical script used to route calls in this deployment is illustrated and explained below.

- The script is associated with a Call Type. The example is shown for an enterprise that has two sites (Boston and New York), each running a call center.
- The call center at either site can provide call treatment to handle “Support” calls. “Support” is configured as a Service in Unified CCE.
- Both call centers have agents trained to handle calls for either “Laptop Support” or “Server Support”. These categories are configured as Skill Groups in Unified CCE. The relationship of the Service to Skill Groups is configured as Service Members in Cisco Unified CCE.
- The Boston call center has an Avaya ACD (peripheral) connected with an Avaya PG, and the New York call center has an Aspect ACD (peripheral) connected with the Aspect PG. Service and Skill Groups are configured for each peripheral in Unified CCE.

Figure 13: Sample Script for Enterprise Routing



The script illustrated above shows an example of pre-routing and ACD queuing, processed as follows:

1. The script is associated with a Call Type to route Support calls.
2. The script uses caller entered digits (CED) to determine the skill group (Laptop Support or Server Support) required to handle the call and/or the Service treatment (Support) required by the caller.
3. The script uses the LAA (longest available agent) node to look for an available agent across the enterprise who can handle the call.

   Unified CCE software routes the call to the call center site that has an available agent. The ACD at that site picks an agent and assigns the call.
4. If an agent is not available, the script uses the MED (Minimum Expected Delay) node to select a site that can handle the call with minimum delay.

   Once the site with the least expected wait time is selected, the call is routed to the ACD at that site.

After the call arrives on the ACD, call treatment is provided by the ACD. If an agent is available, the ACD assigns the call to that agent.

If an agent is not available, the ACD will queue the call to a skill group to wait for an available agent.

Reporting Considerations

This section is an overview of reporting categories to use to meet the reporting needs for your enterprise in this deployment.

Two key factors that affect reporting are:

- Are you using ACD queuing or Enterprise queuing?
- Are you using Translation Routing to route calls to the ACD?

The information is therefore presented based in the four scenarios described in this section.

Scenario One: Calls Are Queued on the ACD and Are Not Translation Routed

For Enterprise reporting, use the following report categories:

- Use Enterprise Service reports for an enterprise view of reporting statistics for the application.
- Use Enterprise Skill Group reports for enterprise view of reporting statistics routed to a particular skill group.

This table shows other report categories and the statistics they provide.

Table 30: Calls Are Queued on the ACD and Are Not Translation Routed

Report Focus	Reporting Statistics Needed	Report Template	Key Statistics
Application	Before the call is routed to the ACD	Call Type	Number of calls routed Number of calls received Number of calls that encountered an error or received default treatment
	After the call is routed to the ACD, calls queued on the ACD	Peripheral Service Enterprise Service	Queue Statistics (ACD Queue) Abandons Service Level RONA
	After the call is answered by agent	Peripheral Service Enterprise Service	ASA Calls Handled Avg. Handle Time Transfers

Report Focus	Reporting Statistics Needed	Report Template	Key Statistics
Skill Group	For calls routed to skill groups and queued calls	Peripheral Skill Group Enterprise Skill Group	Queue Statistics (ACD Queue) Abandons RONA
	After the call is answered by agent	Peripheral Skill Group Enterprise Skill Group	ASA Calls Handled Avg. Handle Time Avg. Talk Time
	Agent Info	Peripheral Skill Group Enterprise Skill Group	FTEs and Percent Utilization
Agents	Agent Info	Agent	Agent's current state Duration in state Agents logged out Calls Handled Avg. Handle Time Avg. Talk Time

Scenario Two: Calls Are Queued on the ACD and Are Translation Routed

The report categories to use are the same as for Scenario One (Calls Queued on the ACD that are not Translation Routed), with the additional statistics available for Call Type (cradle-to-grave):

Table 31: Calls Are Queued on the ACD and Are Translation Routed

Report Focus	Reporting Statistics Needed	Report Template	Key Statistics
Application	After the call is routed to the ACD, calls queued on the ACD	Call Type	Abandons
	After the call is answered by agent	Call Type	ASA Calls Handled

Note Call Types cannot report on *queued metrics* for calls queued on the ACD (ACD queue), such as the number of calls queued on the ACD.

Scenario Three: Calls Are Enterprise Queued and Are Not Translation Routed

For Enterprise reporting, use the following report categories:

- Use Enterprise Service reports for an enterprise view of some reporting statistics for the application.
- Use Call Type and Enterprise Skill Group reports for an enterprise view of queued and abandon in queue statistics for the application and skill group respectively.
- Use Enterprise Skill Group reports for enterprise view of reporting statistics when routed to a particular skill group.

Skill Group and Agent reporting are the same as for Scenario One (Calls Queued on the ACD that are not Translation Routed).

This table shows other report categories and the statistics they provide.

Table 32: Calls Are Enterprise Queued and Are Not Translation Routed

Report Focus	Reporting Statistics Needed	Report Template	Key Statistics
Application	Before the call is routed to the ACD, queued in the enterprise	Call Type	Number of calls routed Number of calls received Number of calls that encountered an error Enterprise Queue Statistics and Abandon in Enterprise Queue
	After the call is routed to ACD	Peripheral Service Enterprise Service	Abandons RONA
	After the call is answered by the agent	Peripheral Service Enterprise Service	Calls Handled Avg Handled Time Transfers

Note Skill Groups report on Enterprise queue statistics.

Related Topics

Effect of enterprise queues on reporting , on page 149

Scenario Four: Calls Are Enterprise Queued and Are Translation Routed

For Enterprise reporting, use the following report categories:

- Use Call Type reports for enterprise view of reporting statistics for the application.
- Use Call Type and Enterprise Skill Group reports for enterprise view of queued and abandon in queue statistics for the application and skill group respectively.

- Use Enterprise Skill Group reports for enterprise view of reporting statistics when routed to a particular skill group.

Skill Group and Agent reporting are the same as for Scenario One (Calls Queued on the ACD that are not Translation Routed).

This table shows other report categories and the statistics they provide.

Table 33: Calls Are Enterprise Queued and Are Translation Routed

Report Focus	Reporting Statistics Needed	Report Template	Key Statistics
Application	Before the call is routed to the ACD, queued in the enterprise	Call Type	Number of calls routed Number of calls received Number of calls that encountered an error Queue Statistics and Abandon in Queue
	After the call is routed to the ACD	Call Type	Abandons Service Level **Note** RONA calls are reported on services and are not available for Call Types.
	After the call is answered by agent	Call Type	Calls Handled Avg Handled Time ASA

Note Skill Groups report on Enterprise queue statistics.

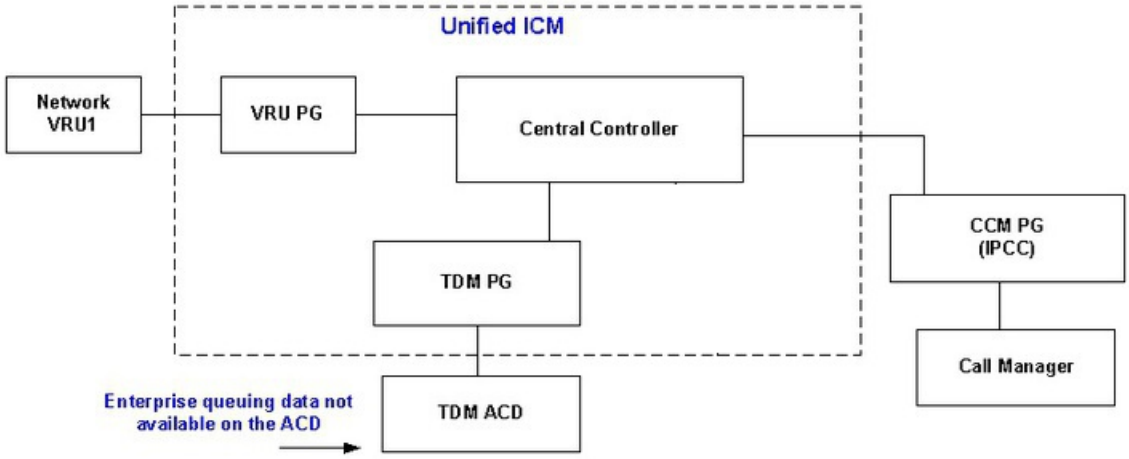
Related Topics

Effect of enterprise queues on reporting , on page 149

Deployments with Hybrid Routing

In this deployment, Unified CCE includes both TDM PGs for Enterprise Routing to legacy ACDs and Cisco Call Manager PGs to provide the Agent Routing Integration (ARI) to an ACD/PBX such as Avaya.

Figure 14: Deployments with Hybrid Routing



Routing and Scripting

The manner in which you configure and script your Unified CCE system in this deployment greatly affects the accuracy and usefulness of your reporting metrics. This section assumes that calls are shared and routed across call centers for the application and are managed the same way.

Follow these guidelines for configuring and scripting Unified CCE to ensure that your reports display correct and relevant metrics for your “hybrid” contact center implementation.

Guidelines:

1. Ensure all calls are routed by Unified CCE software.
2. Deploy a Service Control VRU to provide treatment and to queue calls in the enterprise while waiting for an available agent in a skill group.

   In other words, queue calls to skill groups in Unified CCE (Enterprise queuing) for all call centers. Avoid using ACD queues.
3. For legacy ACDs where Unified CCE software is used for Enterprise Routing, consider the following:
   - Ensure all calls are routed by Unified CCE software.
   - Use Translation Routes for routing calls to the legacy ACD. Always use translation routing when routing calls between ACDs.
   - Once the call is routed by Unified CCE and is terminated on the legacy ACD, make sure no treatment occurs at the ACD.
   - Avoid having agents transfer calls directly to other agent stations or agent IDs. Instead, use post routing capabilities to have Unified CCE provide treatment and queuing for transferred calls.
   - Avoid handling Redirection on No Answer (RONA) situations on the ACD. Instead use post routing capabilities to have the RONA calls routed by Unified CCE.
4. Plan for Call Type Reporting. To run this type of reporting:

- Configure a separate call type for each type of treatment offered. For example: Create a separate call type for treating Support calls and Sales calls across all ACDs in your call centers.
- If you want to separate Information Gathering VRU metrics from queue metrics, configure a separate call type for queuing.
- Configure a separate call type associated with Redirection on No Answer situations. This enables you to direct calls that Ring No Answer to a routing script designed for this situation. This also enables you to use Call Type reports to report on this Redirection on No Answer and to see how calls that redirect on no answer are eventually handled.
- Configure a separate call type associated with call transfers. This enables you to direct the transfer to a different routing script.

5. Create a custom formula using skill group metrics for site selection based on expected delay. This is required as the predefined MED (Minimum Expected Delay) calculation provided by Unified CCE scripts is not applicable for Agent Level Routing configurations.
6. Configure Enterprise Skill Groups for Enterprise Skill Group reporting. Avoid grouping skill groups from the same peripheral into an Enterprise Skill Group.

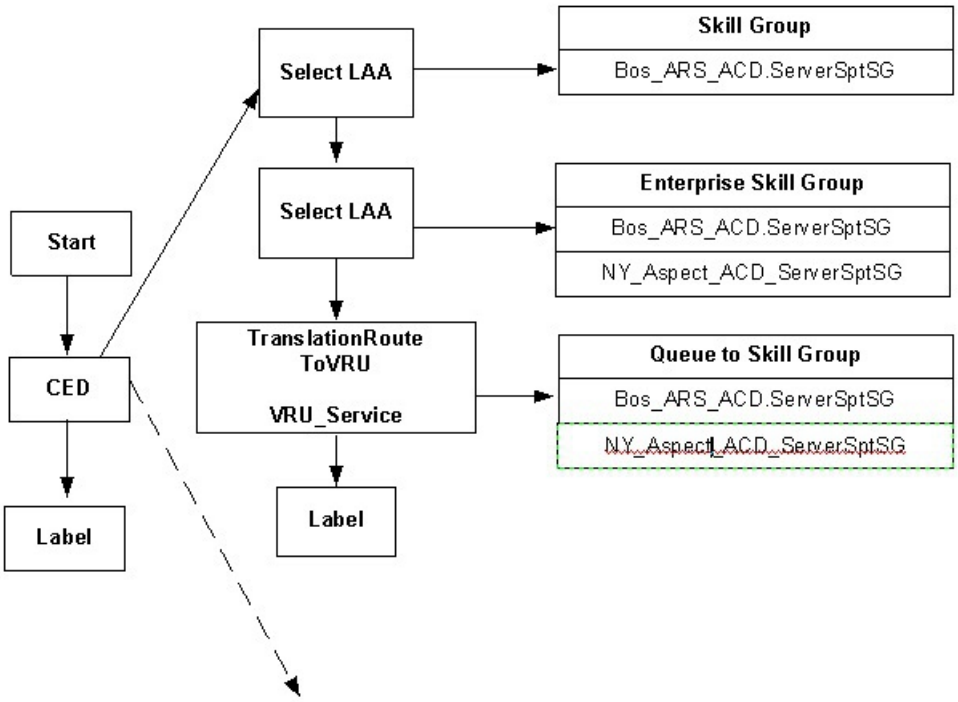
A typical ICM script used to route calls in this deployment is shown below.

In this example:

- The enterprise has two sites (Boston and New York), each running a call center.
- A Call Type is defined that is associated with the routing script. This Call Type is used to define the treatment provided by the call centers.
- The call treatment to handle “Support” calls is provided by Unified CCE software through the call type and script association.
- The call center at each site has agents who are skilled to handle calls for either “Laptop Support” or “Server Support”. These categories are configured as Skill Groups in the ICM.

  The Boston call center has an Avaya ACD (peripheral) connected with an ARS PG. The New York call center has an Aspect ACD (peripheral) connected with an ACD PG.
- Skill Groups are configured for each peripheral in the ICM.

Figure 15: Sample Script for Hybrid Routing



The script above is used for the following:

1. The script is associated with a Call Type to route support calls. The call type is used to define the treatment provided by the call centers.
2. The script uses Caller entered digits (CED) to determine the skill group (Laptop Support or Server Support) required to handle the call.
3. The script uses the LAA (longest available agent) node to look for an available agent at a particular call center. In this case the call may have arrived at the Boston call center, and you prefer to look for an available agent from that call center first.
4. If an agent is not available, the script uses the LAA (longest available agent) node to look for an available agent across the enterprise.
5. If an agent is not available, the script instructs the ICM software to translation route the call to the VRU and queue the call (Enterprise queuing).
6. Depending on the call center where there is an available agent, the ICM software does the following:
   - If an agent is available at the New York call center, the call routes to the Aspect ACD. The ACD at the site then picks an agent and assigns the call.
   - If an agent is available at the Boston (ARS) call center, Unified CCE software selects the agent and provides instructions to the routing client (VRU) to direct the call to the agent.

Reporting Considerations for Hybrid Routing Deployments

In order to get accurate and useful reporting metrics in this type of deployment, it is important to consider several factors that affect reporting. For more information, see Enterprise Routing.

Some of these factors include:

- Two reporting models used to provide reporting statistics for the application: Services are used for Enterprise Routing and Call Types for Agent Level Routing.
- The use of a Service Control VRU in your deployment to provide initial call treatment and enterprise queuing when sharing queues (skill groups) across call centers. This entails queuing calls to skill groups waiting for an available agent across your enterprise.
- The reporting on **queuing** statistics—ACD queues and Enterprise queues.
- The use of the Translation Routing mechanism to route calls to legacy ACDs for enterprise routing. This allows for call types to be used to provide reporting statistics for the application (Cradle to Grave). Translation Routing is implicit with Agent Level Routing.
- Routing scripts set up for your call center operations.

The table below defines the report categories to use to meet the reporting needs for your enterprise.

Enterprise Reporting

- Use Call Type reports for an enterprise view of reporting statistics for the application, including queue statistics.
- Use Enterprise Skill Group reports for an enterprise view of reporting statistics when calls are routed to a particular skill group, including queue statistics.

Report focus	Reporting Statistics Needed	Report Template	Key Statistics
Application	Before call is routed to an agent	Call Type	Number of calls routed. Number of calls received. Number of calls that encountered an error. Queue Statistics and Abandons.
	After call is routed to an agent	Call Type	Abandons Service Level Redirection on No Answer (RONA)
	After call is answered by an agent	Call Type	ASA Calls Handled Transfers

Report focus	Reporting Statistics Needed	Report Template	Key Statistics
Skill Group	Calls routed to a skill group Queued calls	Peripheral Skill Group & Enterprise Skill Group	Queue Statistics Abandons RONA Service Levels
	After call is answered by an agent	Peripheral Skill Group & Enterprise Skill Group	ASA Calls Handled Avg.TalkTime Avg.HandleTime
	Agent Info	Peripheral Skill Group & Enterprise Skill Group	Full Time Equivalent Agents (FTE) Percent Utilization.
Agents	Agent Info	Agent by individual, team, peripheral or skill group	Agent's current state Duration in a state Agents logged out Calls Handled Avg.Talk Time Avg.Handle Time