MRCP

Technical Reference

Interactive Intelligence Customer Interaction Center® (CIC)

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(See Change Log for summary of changes.)

Abstract

This document discusses Interactive Intelligence’s implementation of Media Resource Control Protocol (MRCP), including protocol flow architecture and CIC integration.
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About this information

This technical reference is for CIC System administrators, Interactive Intelligence business partners, and those who want to understand the purpose, concepts, and architecture of the Interactive Intelligence MRCP implementation for Customer Interaction Center.

Referenced information

Because MRCP is integrated with CIC, there are additional technical references and guides that might be of interest to you. This information is available in the CIC Documentation Library on your CIC server or http://help.inin.com/cic. The following documents, Help systems, and links are referred to in this document and provide additional MRCP information:

- *IC Installation and Configuration Guide*
- *VoiceXML Technical Reference*
- *IC Security Features Technical Reference*
- *ASR Technical Reference*
- *Interaction Media Server Technical Reference*
- *Interaction Speech Recognition Technical Reference*
- *Text to Speech Engines for IC Technical Reference*
- *Interaction Administrator Help*
- *Interaction Designer Help*
- Interactive Intelligence License Management Website (http://license.inin.com)

You can also find information on the Internet Engineering Task Force website at the following address:

**Introduction**

Speech-related clients, such as a VoiceXML browser, use Media Resource Control Protocol (MRCP) to control media service resources, including Text-to-Speech (TTS) synthesizers and Automatic Speech Recognizers (ASR). Interactive Intelligence Customer Interaction Center (CIC) supports MRCP version 2 (MRCPv2), which is the current standard.

To connect clients with speech processing servers and manage the sessions between them, MRCP relies on other protocols, such as Session Initiation Protocol (SIP). MRCP uses SIP to set up and tear down media and control sessions with the speech server. Furthermore, MRCP defines the messages to control the media service resources and it also defines the messages that provide the status of the media service resources.

**Overview**

Media Resource Control Protocol (MRCP) is a standard proposed by the Internet Engineering Task Force (IETF) for controlling media services for resources such as speech synthesizers, recognizers, recorders, and verifiers residing on servers on the network. The current standard is now in version 2, which is the only version supported by Interactive Intelligence Customer Interaction Center.

MRCP is an application layer protocol and relies on another session management protocol, typically Session Initiation Protocol (SIP), to establish a control session between the client and the server. SIP is used to establish not only the control channel to use for MRCP, but also to establish the media sessions and associated parameters between the media source—or sink—and the media server.

Once established, the MRCP protocol exchange operates over the control session, allowing the client to control the media processing resources on the speech resource server.
CIC support for MRCP

CIC supports MRCP for Text-to-Speech (TTS) and Automatic Speech Recognition (ASR) functionality.

MRCP for TTS

MRCP in CIC supports synthesizer resources, and it is intended as an alternative to using SAPI for TTS. The following list lists some advantages of using MRCP for TTS.

- TTS processing is off-loaded to other servers rather than competing for resources on the CIC server.
- The MRCP subsystem provides load-balancing capabilities between servers.
- The MRCPv2 standard is much more transparent than SAPI, and it is not based on Component Object Model (COM).
- Most speech vendors have implemented MRCP and deprecated their SAPI integration.
- Audio is streamed from MRCP Servers using Real-time Transport Protocol (RTP) rather than a proprietary method.
- Support for multiple languages, voices, and vendors are more efficient with MRCP.
- Interaction Text to Speech is a native TTS engine in Interaction Media Server and can use MRCP. For more information on Interaction Text to Speech, see Text to Speech Engines for IC Technical Reference in the CIC Documentation Library.

CIC can use MRCP TTS in the following instances:

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name prompt generation</td>
<td>System handlers will use TTS if there are user name prompts that have not been recorded.</td>
</tr>
<tr>
<td>Telephone User Interface (TUI) and Mobile Office</td>
<td>The TUI and Mobile Office will use TTS for dynamic prompts and for email playback.</td>
</tr>
<tr>
<td>Handlers</td>
<td>Whenever TTS prompt tools such as Play String, Play Text File, Record String, Record Text File, and Play Prompt Phrase tools—and anytime their extended versions are used.</td>
</tr>
<tr>
<td>VoiceXML</td>
<td>TTS prompts in VoiceXML scripts can use MRCP.</td>
</tr>
<tr>
<td>Interaction Desktop Personal Rules</td>
<td>Personal Rules, configured in Interaction Desktop, can take advantage of TTS.</td>
</tr>
</tbody>
</table>

MRCP for ASR

The following list provides some of the advantages of using MRCP for ASR.

- Some speech vendors allow only MRCP integrations.
- The MRCP standard allows CIC to integrate with new ASR vendors.
- The MRCP standard is much more transparent than proprietary Application Programming Interfaces (APIs) that are used with other Interactive Intelligence ASR server implementations.
CIC can use MRCP ASR in the following instances:

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TUI and Mobile Office</td>
<td>The TUI and Mobile Office will use ASR for recognizing callers’ utterances.</td>
</tr>
<tr>
<td>Handlers</td>
<td>Whenever ASR recognition tools are used, such as Reco Input.</td>
</tr>
<tr>
<td>VoiceXML</td>
<td>ASR inputs in VoiceXML scripts can use MRCP.</td>
</tr>
</tbody>
</table>

**Note:**
For more information on MRCP for ASR, see *ASR Technical Reference* in the **CIC Documentation Library**.

**Architecture**

The following diagram depicts the protocol flow between servers using MRCP and illustrates how a third-party TTS MRCP play occurs. In this flow, all audio is streamed from the MRCP Server directly to Interaction Media Server using RTP. The audio is then streamed directly to the endpoint using RTP.
The following diagram depicts the protocol flow between servers using MRCP with Interaction Text to Speech, which is a part of Interaction Media Server. In this flow, all audio is streamed from Interaction Media Server to the endpoint using RTP.
Installation and configuration

An MRCP installation includes the following tasks:

- Set up a third-party MRCP server
- Configure the Customer Interaction Center server to use the MRCP server

Hardware considerations

Because MRCP servers are media intensive, you must use a dedicated server to run third-party MRCP server software in your CIC environment. Interactive Intelligence recommends that the MRCP server have ample processing speed and physical memory. Because audio streams between the MRCP server and Interaction Media Servers using RTP, Interactive Intelligence also recommends that the MRCP server be in the same subnet and have a high bandwidth connection to Interaction Media Servers in the same region.

Using Interaction Text to Speech, which is a part of Interaction Media Server, requires significant resources and could impact the performance of Interaction Media Servers that already used a significant amount of resources for previous levels of media operations.

Install the MRCP server

Note:

Interaction Text to Speech is a native TTS engine within Interaction Media Server and does not require a separate installation. You still must apply Interaction Text to Speech licenses through Interaction Administrator. For more information on Interaction Text to Speech, see TTS Engines for IC Technical Reference in the CIC Documentation Library.

Follow the installation instructions from the vendor of your third-party MRCP server. Ensure that the MRCP server media includes the MRCP server installer and installers for the MRCP resources being used. For example, if MRCP is being used for TTS, both an MRCP server installer and a TTS engine installer are required.

CIC supports the following third-party MRCP servers:

- Nuance Speech Server
- Loquendo Speech Suite Server

For the most current versions of the supported third-party MRCP servers with CIC, see the following website:

http://testlab.inin.com
Server selection

When fulfilling a request for MRCP services, CIC analyzes the following items to choose an MRCP server.

<table>
<thead>
<tr>
<th>Order of Consideration</th>
<th>Selection Process</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MRCP Capabilities</td>
<td>CIC searches for MRCP servers that provide the requested MRCP capabilities.</td>
</tr>
<tr>
<td>2</td>
<td>Probation</td>
<td>CIC searches for MRCP servers that are not on probation. CIC will use any server that is not on probation and has the requested MRCP capabilities before a server on probation—even if the server on probation has a better Location, lower Priority, or fewer active sessions.</td>
</tr>
<tr>
<td>3</td>
<td>Location/Selection Rules</td>
<td>Using the Location and Selection Rules, CIC searches for MRCP servers that are in the best location to use the WAN most efficiently. Any MRCP server in a better Location that has the requested MRCP capabilities and is not on probation will be selected before a server with a lower Priority, or fewer sessions.</td>
</tr>
<tr>
<td>4</td>
<td>Priority</td>
<td>CIC searches for servers with a low priority number. Any MRCP server with a lower priority that has the requested MRCP capabilities, is not on probation, and in a better Location, will be selected before a server with fewer sessions.</td>
</tr>
<tr>
<td>5</td>
<td>Load Balancing</td>
<td>Once the other criteria are met, CIC searches for an MRCP server with the fewest sessions. In the case where more than one MRCP server meets the above criteria, CIC selects the MRCP server with the fewest sessions.</td>
</tr>
</tbody>
</table>

**MRCP capabilities**

The MRCP subsystem of the CIC server supports selecting a specific MRCP server to fulfill a Text-to-Speech (TTS) request based on the MRCP capabilities of the server. A request can contain the following criteria:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Server Name</td>
<td>Matches the name of a specific server—as its name is configured in Interaction Administrator.</td>
</tr>
</tbody>
</table>
**MRCP Version**  
Matches servers that support a specific MRCP version—MRCPv2 by default.

**Vendor**  
Matches the vendor field of a specific server.

**Voice Name**  
Matches servers that support a specific voice name.

**Voice Gender**  
Matches servers that support a specific voice gender.

**Voice Language**  
Matches servers that support a specific language.

---

### Locations and Selection Rules

The goal behind MRCP regionalization, through Locations and Selection Rules, is to ensure that the functions provided by the MRCP server occur in the most efficient manner possible. This system allows geographically-dispersed networks to provide the best performance as well as ensure the most efficient use of the available WAN bandwidth for MRCP resources.

Locations enables the correct application of Selection Rules. More specifically, when you assign an MRCP server to a Location, you are specifying where the server resides. When you set up Selection Rules, you are specifying the order of the Locations in which the system is to look for available servers when an Interaction Media Server is used for MRCP in a location. So, using information gleaned from the Location and Selection Rules, CIC finds the best place to use an MRCP server.

### MRCP Selection Rules

When you assign an MRCP server to a location, Selection Rules can then consider that MRCP server. In many cases, the default MRCP Selection Rules provide sufficient functionality. However, you can assign custom MRCP Selection Rules to a location.

---

**Note:**

It is important to understand that the Interaction Media Server Selection Rules are always applied first and that they are performed independently, regardless of MRCP server availability.

For more information on Interaction Media Server Selection Rules, see *Interaction Media Server Technical Reference* in the CIC Documentation Library.

---

**Important!**

For Interaction Text to Speech, the CIC server does not use MRCP Selection Rules. Instead, the CIC server uses the instances of Interaction Text to Speech on the Interaction Media Server that it selected through Media Server Selection Rules.

---

### Default MRCP Selection Rules

When you create a Location in Interaction Administrator, CIC automatically assigns the Default MRCP Selection Rules to that Location. This default configuration specifies a logical order of Locations that will provide the best possible connection to an available MRCP server. The default Selection Rules specify that the CIC server searches for and selects an available MRCP server using the following order:
<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;ThisLocation&gt;</td>
<td>The Location where the media server for the call exists.</td>
</tr>
<tr>
<td>&lt;ICServerLocation&gt;</td>
<td>The location that has the CIC server that controls the interaction.</td>
</tr>
<tr>
<td>&lt;Any&gt;</td>
<td>This option directs the CIC server to search any defined Location in the network if it cannot find an available MRCP server at the above locations.</td>
</tr>
</tbody>
</table>

**Default scenarios**

**Note:**
These scenarios represent only some of the possibilities for MRCP Selection Rules and are intended to only highlight how Default MRCP Selection Rule functions.

Default MRCP Selection Rules work without requiring modification in many cases. Assume the following configuration where Interaction Media Servers use Default Media Server Selection Rules:

<table>
<thead>
<tr>
<th>Location</th>
<th>Media gateway</th>
<th>Media server</th>
<th>MRCP server</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seattle</td>
<td>Media gateway</td>
<td>Media server</td>
<td>MRCP server</td>
</tr>
<tr>
<td>Indianapolis</td>
<td>Media gateway</td>
<td>CIC server</td>
<td>Media server</td>
</tr>
<tr>
<td>Orlando</td>
<td>Media server</td>
<td>MRCP server</td>
<td>MRCP server</td>
</tr>
</tbody>
</table>

A call enters the Orlando Location, which would start the events in one of the following scenarios:

**Scenario 1**
- The CIC server checks the first entry in Default Media Server Selection Rule assigned to the Orlando Location: <This Location>.
- If an Interaction Media Server is available in Orlando, the CIC server uses it for the call.
- The CIC server checks the first entry in Default MRCP Selection Rule assigned to the Orlando Location: <This Location>.
- If an MRCP server is available in the Orlando Location and not on probation, the CIC server uses it for media operations in the call.

**Analysis:**
This scenario represents the best case scenario as all audio remains in the Orlando Location where it will likely have the best quality. The Default MRCP Selection Rule always uses this scenario, if possible.

**Scenario 2**
- The CIC server checks the first entry in Default Media Server Selection Rule assigned to the Orlando Location: <This Location>.
- If an Interaction Media Server is not available in Orlando, then the CIC server checks the second entry in Default Media Server Selection Rule: <ICServerLocation>.
- If an Interaction Media Server is available in the Indianapolis Location, the CIC server uses it for the call.
- Since the Interaction Media Server handling the call is in the Indianapolis Location, the CIC server checks the first entry in Default MRCP Selection Rule assigned to the Indianapolis Location: <This Location>.
- If an MRCP server is available in the Indianapolis Location and not on probation, the CIC server uses it for media operations in the call.

**Analysis:**
This scenario demonstrates how the <ThisLocation> entry in the Default MRCP Selection Rules provides the best possible result. Using both an Interaction Media Server and an MRCP server in the Indianapolis Location ensures that no audio is set over another WAN connection.

**Scenario 3**
- The CIC server checks the first entry in Default Media Server Selection Rule assigned to the Orlando Location: <This Location>.
- If an Interaction Media Server is available in the Orlando Location, the CIC server uses it for the call.
- The CIC server checks the first entry in Default MRCP Selection Rule assigned to the Orlando Location: <This Location>.
- If an MRCP server is not available in the Orlando Location, the CIC server checks the second entry in Default MRCP Selection Rule: <ICServerLocation>.
- If an MRCP server is available in the Indianapolis Location and not on probation, the CIC server uses it for media operations in the call.

**Analysis:**
This scenario demonstrates how the <ICServerLocation> entry in the Default MRCP Selection Rules provides the best possible result. Because the MRCP server in the Orlando Location is unavailable, the Interaction Media Server sends audio from the Orlando Location to an MRCP server in the Indianapolis Location. The WAN connection of the Location with the CIC server is likely better than other WAN connections. Additionally, the CIC server applies the Default Media Server Selection Rule first and independently from the Default MRCP Selection Rule.

While selecting an Interaction Media Server in the Indianapolis Location might seem better for this scenario, understand that the audio must traverse the WAN anyway, and using an Interaction Media Server in the Indianapolis Location requires that audio be sent to the Indianapolis Location even after the MRCP session completes.

**Scenario 4**
- The CIC server checks the first entry in Default Media Server Selection Rule assigned to the Orlando Location: <This Location>.
- If an Interaction Media Server is not available in the Orlando Location, the CIC server checks the second entry in Default Media Server Selection Rule: <ICServerLocation>.
- If an Interaction Media Server is available in the Indianapolis Location, the CIC server uses it for the call.
- Since the Interaction Media Server handling the call is in the Indianapolis Location, the CIC server checks the first entry in Default MRCP Selection Rule assigned to the Indianapolis Location: <This Location>.
- If an MRCP server is not available in the Indianapolis Location, the CIC server checks the second entry in Default MRCP Selection Rule: <ICServerLocation>.
• Since <This Location> and <ICServerLocation> are the same, the CIC server checks the third entry in Default MRCP Selection Rule: <Any>.
• At this point, the CIC server could, based on availability, select any of the MRCP servers in any Location.

**Analysis:**
This scenario is the least ideal as audio traverses two WAN connections. Usage of the <Any> entry in selection rules should be a rare occurrence as it depends on both Interaction Media Server, where the call arrived, and the MRCP server, at the CIC server Location, being unavailable.

### Custom MRCP Selection Rules

If you decide to use custom selection rules, you can create and assign those rules to Locations instead of using the default selection rule.

**Note:**
For information on creating selection rules, see "Selection Rules" in Interaction Administrator Help.

### Custom scenarios

**Note:**
These scenarios represent only some of the possibilities for MRCP Selection Rules and are intended to only highlight how Custom MRCP Selection Rules function.

This section provides scenarios for customer MRCP Selection Rules.

For these scenarios, there are three Locations defined in CIC:
• Indianapolis – Location of the CIC server
• Miami – Contact center location with a fast WAN connection with Orlando
• Orlando – Contact center location with a fast WAN connection with Miami

In this environment, the Miami and Orlando locations should use selection rules that fall back to each other to take advantage of the shorter geographical distance and the fast WAN connection. Also, the WAN connection from Orlando to Indianapolis has more bandwidth than the connection from Miami to Indianapolis.

The following table lists the entities of the CIC network in each Location and the order of MRCP selection rule preferences for each Location:

<table>
<thead>
<tr>
<th>Indianapolis</th>
<th>Miami</th>
<th>Orlando</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gateway</td>
<td>Gateway</td>
<td>Gateway</td>
</tr>
<tr>
<td>CIC server</td>
<td>Media server</td>
<td>Media server</td>
</tr>
<tr>
<td>Media server</td>
<td>MRCP server</td>
<td>MRCP server</td>
</tr>
<tr>
<td>MRCP server</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IRule</th>
<th>MRule</th>
<th>ORule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indianapolis</td>
<td>Miami</td>
<td>Orlando</td>
</tr>
<tr>
<td>Orlando</td>
<td>Orlando</td>
<td>Miami</td>
</tr>
<tr>
<td>Miami</td>
<td>Indianapolis</td>
<td>Indianapolis</td>
</tr>
</tbody>
</table>

Each of the following scenarios starts when a call comes into the Orlando Location.
**Scenario 1**

- The CIC server checks the first entry in Default Media Server Selection Rule assigned to the Orlando Location: <This Location>.
- If an Interaction Media Server is available in the Orlando Location, the CIC server uses it for the call.
- The CIC server checks the first entry in Custom MRCP Selection Rule assigned to the Orlando Location: Orlando.
- If an MRCP server is available in the Orlando Location and is not on probation, the CIC servers uses it for media operations in the call.

**Analysis:**
The scenario represents the optimal functionality as the audio remains in the Orlando Location as is identical to Scenario 1 in the Default scenarios section.

**Scenario 2**

- The CIC server checks the first entry in Default Media Server Selection Rule assigned to the Orlando Location: <This Location>.
- If an Interaction Media Server is available in the Orlando Location, the CIC server uses it for the call.
- The CIC server checks the first entry in Custom MRCP Selection Rule assigned to the Orlando Location: Orlando.
- If an MRCP server is not available in the Orlando Location, the CIC server checks the second entry in Custom MRCP Selection Rule: Miami.
- If an MRCP server is available in the Miami Location and is not on probation, the CIC server uses it for media operations in the call.

**Analysis:**
This scenario demonstrates how Custom MRCP Selection Rule enables you to specify preferences for Locations that different from those in Default MRCP Selection Rule, which would have first tried the Orlando Location and then the Indianapolis Location.

**Scenario 3**

- The CIC server checks the first entry in Default Media Server Selection Rule assigned to the Orlando Location: <This Location>.
- If an Interaction Media Server is not available in the Orlando Location, the CIC server checks the second entry in Default Media Server Selection Rule: <ICServerLocation>.
- If an Interaction Media Server is available in the Indianapolis Location, the CIC server uses it for the call.
- Since the Interaction Media Server handling the call is in the Indianapolis Location, the CIC server checks the first entry in Custom MRCP Selection Rule assigned to the Indianapolis Location: Indianapolis.
- If an MRCP server is available in the Indianapolis Location and is not on probation, the CIC server uses it for media operations in the call.

**Analysis:**
In this scenario, Custom MRCP Selection Rule has the same behavior as Default MRCP Selection Rule because the CIC server used Default Media Server Selection Rule.
If Custom Media Server Selection Rule was used, it could specify the Miami Location instead of the Indianapolis Location for the Interaction Media Server selection. However, since the selected Interaction Media Server is in the Indianapolis Location, it is better to avoid transmission of the audio over another WAN connection.

Scenario 4

- The CIC server checks the first entry in Default Media Server Selection Rule assigned to the Orlando Location: <This Location>.
- If an Interaction Media Server is not available in the Orlando Location, the CIC server checks the second entry in Default Media Server Selection Rule: <ICServerLocation>.
- If an Interaction Media Server is available in the Indianapolis Location, the CIC server uses it for the call.
- Since the Interaction Media Server handling the call is in the Indianapolis Location, the CIC server checks the first entry in Custom MRCP Selection Rule assigned to the Indianapolis Location: Indianapolis.
- If an MRCP server is not available in the Indianapolis Location, the CIC server checks the second entry in Custom MRCP Selection Rule: Orlando.
- If an MRCP server is available in the Orlando Location and is not on probation, the CIC server uses it for media operations in the call.

Analysis:

This scenario is the least ideal as audio traverses two WAN connections. Using Custom MRCP Selection Rule enables you to enforce a preference to use the WAN between the Indianapolis and Orlando Locations instead of allowing the CIC server to select an MRCP server in the Miami Location.

Priority

The Priority setting in Interaction Administrator determines the priority of an MRCP server. The CIC server first considers MRCP servers with lower priority numbers.

Note:

The Priority setting does not apply to Interaction Text to Speech. The Priority setting applies to only Interaction Media Streaming Server.
Probation

To improve the efficiency of the server selection process, the CIC server places an MRCP server on probation if it does not respond or if it fails to create the necessary resources for a call. When an MRCP server is on probation, the CIC server stops sending requests to that server for a set time period to minimize the impact of failures.

A CIC server puts an MRCP server on probation for the following reasons:

- An MRCP server does not respond within the configurable **Connection Timeout** period (Default value: 5 seconds) to a resource creation request from a CIC server.

  The following list provides possible reasons:
  - A networking issue between the CIC server and the MRCP server
  - The MRCP server or service is not running
  - The MRCP server has insufficient resources to respond in time

- An MRCP server responds with an error.

  To diagnose the issues, check the MRCP server logs or contacting Interactive Intelligence Support. Common causes include the following items:
  - Configuration issues on the MRCP server.
    - This issue is particularly common if the MRCP server has never worked successfully or its configuration has recently changed. If this is the case, please review the installation procedure or contact Interactive Intelligence Support.
  - Running out of licenses on the MRCP server.
    - Purchase additional licenses for the MRCP server.

The duration of the first probation period is, by default, 5 seconds, which enables MRCP servers with minor problems to recover and rejoin the pool of available MRCP servers. However, each probation period doubles with each consecutive failure, up to a maximum probation period of 10 minutes.

<table>
<thead>
<tr>
<th>Failure sequence</th>
<th>Probation period</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>5 seconds</td>
</tr>
<tr>
<td>Second</td>
<td>10 seconds</td>
</tr>
<tr>
<td>Third</td>
<td>20 seconds</td>
</tr>
<tr>
<td>Fourth</td>
<td>40 seconds</td>
</tr>
<tr>
<td>Fifth</td>
<td>1 minute 20 seconds</td>
</tr>
<tr>
<td>Sixth</td>
<td>2 minutes 40 seconds</td>
</tr>
<tr>
<td>Seventh</td>
<td>5 minutes 20 seconds</td>
</tr>
<tr>
<td>Eighth and up</td>
<td>10 minutes</td>
</tr>
</tbody>
</table>

Probation status does not remove an MRCP server from selection but it does move that MRCP server to the bottom of the list of available MRCP servers. If there are multiple MRCP servers on probation, the CIC server arranges those MRCP servers at the bottom of the selection list according to items 3 to 5 in the **Server selection** process. For example, MRCP servers on probation in a favorable location appear before servers on probation in an unfavorable location.
If all available MRCP servers are on probation or if you have only one MRCP server, the CIC server disregards the probation state and requests an MRCP server to handle the interaction.

**Note:**
Multiple CIC servers do not share probation state information. Each CIC server tracks MRCP server states separately. To change the Connection Timeout period, see Change MRCP connection timeout.

### Load balancing

The MRCP subsystem of CIC supports a simple load-balancing scheme. The MRCP subsystem tracks the number of open sessions it has for each MRCP server and selects the one with the least amount of sessions to service the next MRCP request.

**Note:**
This strategy does not take into account the following items:
- The current CPU load of an MRCP server
- The architecture of an MRCP server
- The number of sessions in use by other CIC servers
- The session limit of any particular MRCP server
Add an MRCP server

Once you have installed an MRCP server, add it to you CIC Server configuration in Interaction Administrator.

1. On the CIC server, open Interaction Administrator.
2. In the left pane of the Interaction Administrator window, expand the System Configuration container.
3. Locate and expand the MRCP Servers container.
4. Select the Servers container.
5. In the right pane, right-click and select New from the resulting context menu.

The New MRCP Server dialog box appears.

6. In the Name box, enter an identifier for this MRCP server.

Tip:
Since the key to identifying your MRCP server is its SIP address, you can assign any name to it.
7. In the **Vendor** group, select the provider of the MRCP server:
   - **ININ** – Select this option if you are using Interaction Media Streaming Server.
   - **Third Party** – Select this option if you are using an MRCP server from another vendor, such as Nuance or Loquendo.

8. Select **OK**.

   The **Servers Configuration** dialog box for the selected option appears:

   ![Servers Configuration dialog box](image)

   **Note:**
   The **Servers Configuration** dialog box for **ININ** is slightly different from the **Third Party** instance.

9. In the SIP Address box, enter the SIP address of the MRCP server using the following format:

   `sip:user@domain:port`

   *user*, *domain*, and *port* are variables that represent the IP address or server name, network domain, and network port number for the MRCP server.

   **Note:**
   To avoid conflict with the default ports used by other SIP endpoints, Interactive Intelligence recommends that you use port 6060 for SIP communications to MRCP servers. If you use a different port, ensure that the port setting in the MRCP server definition in Interaction Administrator and the network port used by the MRCP server are the same value.

10. Optionally, you can assign this MRCP server to an existing Location defined in your CIC environment.

    For more information, see [Assign an MRCP server to a Location](#).

11. Ensure the **Priority** box is set to **1**.

    For more information on the **MRCP Server Configuration** dialog box, see [Interaction Administrator Help](#).
Assign an MRCP server to a Location

If you have MRCP servers in multiple regions, you can ensure the best performance efficient use of available WAN bandwidth by assigning your MRCP servers to Locations.

**Note:**
To do this procedure, you must have previous defined Locations through Interaction Administrator. For more information, see "IC Server" > "Regionalization" > "Create Location" in Interaction Administrator Help.

1. On the CIC server, open Interaction Administrator.
2. In the left pane of the Interaction Administrator window, expand the **System Configuration** container.
3. Locate and expand the **MRCP Servers** container.
4. Select the **Servers** container.
   The right pane displays your defined MRCP servers.
5. Double-click an MRCP server entry that you want to assign to a defined Location.
   The **Servers Configuration** dialog box for the select MRCP server appears.
6. In the **Location** box, select a defined Location to which you want to assign this MRCP server.
**Tip:**
You can quickly assign MRCP servers to a location by right-clicking the MRCP server entry in the right pane and selecting the Location from the resulting context menu.

![MRCP Technical Reference](image-url)
Assign MRCP Selection Rules to a Location

If the default MRCP Selection Rule does not provide sufficient functionality for your CIC environment, you can create custom Selection Rules and assign them to Locations.

1. On the CIC server, open Interaction Administrator.
2. In the left pane of the Interaction Administrator window, locate and expand the object that represents your CIC server.
3. Expand the Regionalization container.
4. Select the Locations object to display your Location Names in the right pane.
5. In the right pane, double-click a Location Name.
   The Locations Configuration dialog box appears.
7. Use the MRCP Server list box to assign a Selection Rule to this Location.

For more information on creating Selection Rules, see "Selection Rules" in Interaction Administrator Help.

Note:
If you want to return to using Default MRCP Selection Rule for MRCP servers in this Location, repeat this procedure and select <Default MRCP Selection Rule> in the MRCP Server list box.
Alternative method for assigning an MRCP server to a Location

1. On the CIC server, open Interaction Administrator.
2. In the left pane of the Interaction Administrator window, locate and expand the object that represents your CIC server.
3. Expand the Regionalization container.
4. Select the Locations object to display your Location Names in the right pane.
5. In the right pane, double-click a Location Name.
   The Locations Configuration dialog box appears.
6. Select the Endpoints tab.
7. In the Endpoint type box, select MRCP Servers.
8. In the Available endpoints box, select the MRCP server you want to assign to this Location.
9. Click the arrow button to move the selected MRCP server to the Selected endpoints panel.
10. Select the OK button.
Configure an MRCP server for Text to Speech

1. On the CIC server, open Interaction Administrator.
2. In the left pane of the Interaction Administrator window, expand the System Configuration container.
3. Locate and expand the MRCP Servers container.
4. Select the Servers container.
5. In the right pane, under the Servers column, double click your server.

The Servers Configuration dialog box appears for the selected server.
6. Depending on the vendor of the selected MRCP server, do the appropriate action:
   - **Third-Party** – Enable the Text to speech check box.
   - **ININ** – The Retrieve from server option is selected by default. This option configures the MRCP server to make its services available to the CIC server. Select the adjacent button to immediately request services.
Note:
If you want the CIC server to continuously request services from this MRCP server, enable the **Use refresh interval (sec)** check box and set a value in the adjacent box to define the period of time to elapse between requests.

Select the **Use custom** option if you want to specify the capabilities of the MRCP server manually, even if those feature are not yet enabled or configured on the MRCP server.

Enable the **Text to speech** check box to allow the MRCP server to convert text to synthesized speech in calls.

Enable the **External audio sources** check box to allow the MRCP server to provide streaming audio that is injected into calls, such as Music on Hold.

Enable the **Voicemail** check box to allow the MRCP server to insert voice mail messages into calls.

7. Select the **Voices** tab.

8. On the **Voices** tab, select the **Add** button to display the **Enter Synthesizer Voice Name** dialog box.
9. In the **Synthesizer Voice Name** box, enter the name of the TTS synthesizer.

   **Important!**
   TTS synthesizer names are specific to language models that are provided by your TTS vendor. Ensure that you enter the correct name of the appropriate TTS synthesizer.

10. Select the **OK** button.

    The **Enter Synthesizer Voice Name** dialog box closes.

11. Set the following controls on the **Voices** tab:

    - **Gender**
    - **Supported Languages**
12. Select the **OK** button.

The **Servers Configuration** dialog box for the selected MRCP server closes.

**Note:**

For more information about the tabs and controls of the **Servers Configuration** dialog box, see *Interaction Administrator Help.*
Test a TTS MRCP server installation

After you install and configure a third-party MRCP server, and configure the CIC server to use it, Interactive Intelligence recommends that you test the MRCP configure to ensure that everything works correctly.

1. Use a custom handler that has a Play String Extended tool step.
2. To configure the tool step to use MRCP in this play operation, access the Play String Extended properties dialog box and select the Inputs tab.
3. In the Optional Parameters box, enter "MRCP" as the first parameter.

   Important!
   You must include the quotation marks.

4. Select the OK button to save your changes.
5. Test the handler and verify that the modified tool step works correctly.

   ![Properties of Play String Extended dialog box]

If the tool step works as desired, the MRCP configuration has been installed and configured correctly.
Configure CIC to use MRCP server for all Text to Speech

You can configure CIC to automatically use MRCP for all Text-to-Speech (TTS) plays.

1. On the CIC server, open Interaction Administrator.
2. In the left pane of the Interaction Administrator window, select the **System Configuration** container.
3. In the right pane, double-click **Configuration**.
   The **System Configuration** dialog box appears.
4. Select the **Text To Speech** tab.
5. In the **Default TTS Provider** list box on the **Text To Speech** tab, select **MRCP**.

   ![System Configuration Dialog Box](image)

   **Note:**
   If you want to use Interaction Text to Speech for all Text to Speech and have applied the appropriate Interaction Text to Speech licenses, the **Default TTS Provider** list box will also list **Media Server**. Select **Media Server** in the **Default TTS Provider** list box to use Interaction Text to Speech.

6. Select the **OK** button to save your changes.

**Change MRCP connection timeout**

By default, the CIC server waits 5 seconds for configured MRCP servers to respond to an MRCP request. If an MRCP server does not respond within that period of time, the CIC server places that MRCP server on probation. If necessary, you can change this value.

1. On the CIC server, open Interaction Administrator.
2. In the left pane of the Interaction Administrator window, expand the System Configuration container and select the MRCP Servers container.

3. In the right pane, under the MRCP Servers column, double-click Configuration.

   The MRCP Servers Configuration dialog box appears.

4. In the Connection Timeout box, enter the number of seconds that you want the CIC server to wait for responses from MRCP servers.

For more information on the tabs and settings in the MRCP Servers Configuration dialog box, see Interaction Administrator Help.
Check Windows Event Viewer for probation warnings

When the CIC server puts an MRCP server on Probation, it also writes an entry to the Windows Event Log as a Warning notification with Event ID 39613 in the Application log. These entries indicate that there was at least one failed attempt to use an MRCP server.

If the problem that caused the probation was temporary and the MRCP server was able to begin creating resources, the CIC server removes the probation status for the MRCP server and writes a different notification to the Windows Event Log on the CIC server. In this case, an Information level notification with Event ID 39614 is written to the Application log.
Deactivate an MRCP server

If you need to deactivate an MRCP server due to continuous errors resulting in probation or for maintenance, you can remove it from the active operations by deactivating it through Interaction Administrator. You can then perform the necessary tasks on the MRCP server while ensuring that its deactivation does not impact calls.

1. On the CIC server, open Interaction Administrator.
2. In the left pane of the Interaction Administrator window, expand the System Configuration container.
3. Locate and expand the MRCP Servers container.
4. Select the Servers container.
5. In the right pane, under the Servers column, double click the MRCP server to deactivate.
   The Servers Configuration dialog box for the selected server appears.
6. On the Configuration tab, disable the Active check box.
7. Select the OK button to close the Servers Configuration dialog box.

Note:
If there are any active sessions on the MRCP server when you deactivate it, those sessions continue until complete. Before you shut down or perform maintenance on the MRCP server, Interactive Intelligence recommends waiting a period of time after deactivation to ensure that you do not disrupt any remaining calls.
Reactivate an MRCP server

Note:
If an MRCP server was on probation when deactivated, the MRCP server is taken off probation and the probation period is reset. If the problem causing the failure to respond reoccurs, the CIC server will begin the probation process again, regardless of how many times the MRCP server had been previously placed on probation.

1. On the CIC server, open Interaction Administrator.
2. In the left pane of the Interaction Administrator window, expand the System Configuration container.
3. Locate and expand the MRCP Servers container.
4. Select the Servers container.
5. In the right pane, under the Servers column, double click the MRCP server to deactivate.

The Servers Configuration dialog box for the selected server appears.
6. On the Configuration tab, enable the Active check box.

7. Select the OK button to close the Servers Configuration dialog box.
Interaction Designer for TTS

When a CIC system uses MRCP as its default Text-to-Speech (TTS) provider, the Interaction Designer Tools, in the telephony palette, automatically use the MRCP server for speech synthesis. The **Play** operations in the following handler would all use the MRCP server.
MRCP with SAPI

You can configure your CIC server to use Microsoft Speech API (SAPI) for voice synthesis in conjunction with an MRCP server. This configuration requires you to not use MRCP for Text-to-Speech (TTS) by default. You must then configure TTS operations through handler development using parameters.

1. On the CIC server, open Interaction Administrator.
2. In the left pane of the Interaction Administrator window, expand the System Configuration container.
3. In the right pane of the Interaction Administrator window, double-click Configuration.
   The System Configuration dialog box appears.
4. In the System Configuration dialog box, select the Text To Speech tab.
5. In the Default TTS Provider list box, select SAPI.
6. Select the OK button.
   The System Configuration dialog box closes.
7. To use MRCP when SAPI is the default TTS provider, use the Extended version of the prompt tools:

   ![Prompt Tools]

8. Open the Properties dialog box of a Play tool step.
9. In the **Optional Parameters** box, enter "**MRCP**" as the first parameter.

   **Important!**
   You must include the quotation marks.

10. Select the **OK** button to save your changes.

11. Test the handler and verify that the modified tool step works correctly.

### MRCP optional parameters

Use additional MRCP parameters to control speech synthesis in a tool step. Multiple entries in the **Optional Parameters** box must be space-delimited as displayed in the following example:

"**MRCP** mrcp.audio.voice.name:Sally"

If a parameter requires a value, separate the name/value pair with a colon (:) as displayed in the following example:

"mrcp.audio.contentType:application/ssml+xml"
The following table describes valid MRCP parameters.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRCP</td>
<td>Controls whether MRCP should be used for TTS</td>
<td></td>
</tr>
<tr>
<td>mrcp.audio.server.name</td>
<td>Uses the specified MRCP server to synthesize the text to speech</td>
<td>MRCP server name as specified in Interaction Administrator</td>
</tr>
<tr>
<td>mrcp.audio.voice.name</td>
<td>Uses the specified MRCP voice to synthesize the text to speech</td>
<td>MRCP voice name as specified in Interaction Administrator</td>
</tr>
<tr>
<td>*mrcp.audio.voice.rate</td>
<td>SSML prosody rate of a voice</td>
<td>Enter one of the following types of values:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Float multiplier: A value of 2.0 equals twice the rate. A value of 0.5 equals half of the rate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Predefined values:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• x-slow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• slow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• fast</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• x-fast</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• default</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
<td>Values</td>
</tr>
<tr>
<td>----------------------------</td>
<td>------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>*mrcp.audio.voice.volume</td>
<td>SSML prosody volume</td>
<td>Enter one of the following types of values:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• An absolute number in the range of 0 to 100 with 0 representing silence and higher values increasing the volume.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• One of the following predefined values:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- silent</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- x-soft</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- soft</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- loud</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- x-loud</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- default</td>
</tr>
<tr>
<td>*mrcp.audio.language</td>
<td>Uses a voice that supports</td>
<td>Identifiers as specified in <strong>RFC 3066</strong>: language-country</td>
</tr>
<tr>
<td></td>
<td>the specified language</td>
<td></td>
</tr>
<tr>
<td>mrcp.audio.vendor</td>
<td>The MRCP server vendor to use</td>
<td>MRCP vendor as specified in Interaction Administrator</td>
</tr>
<tr>
<td>*mrcp.audio.contentType</td>
<td>The content type of the</td>
<td>• text/plain (default)</td>
</tr>
<tr>
<td></td>
<td>text being synthesized</td>
<td>• application/ssml+xml</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• text/uri-list</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• multipart/mixed</td>
</tr>
</tbody>
</table>

*These parameters are vendor dependent and vary between TTS engines*
Frequently asked questions

1. *Are MRCP servers required for some functionality or are they always optional?*

   MRCP servers are not required. An alternative solution for Text-to-Speech (TTS) is to use Microsoft Speech API (SAPI), which is the default TTS provider of a CIC system. You can configure SAPI voices by accessing the Speech applet in Windows Control Panel. By default, SAPI TTS processing is done on the CIC server, but some vendors, such as Nuance RealSpeak, have SAPI implementations that support off-server installations. With some vendors, such as Loquendo, MRCP is the only solution available to be able to offload TTS processing.

2. *How many MRCP servers do we need for each site?*

   The number of servers for each site is dependent on the TTS usage of each one, including TTS IVR prompts, email playback, custom rules, and so forth.

3. *How do you configure MRCP ASR servers in Interaction Administrator?*

   Only the MRCP synthesizer (TTS) resources are configured in Interaction Administrator. MRCP ASR servers are configured using the ASR Server MRCP controller. See ASR Technical Reference for more details on configuring MRCP server settings for ASR.
## Change log

<table>
<thead>
<tr>
<th>Date</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 23, 2012</td>
<td>Updated Copyright and Trademarks for 2012</td>
</tr>
<tr>
<td>July 26, 2012</td>
<td>Updated document for selecting an MRCP server based on location</td>
</tr>
<tr>
<td>January 9, 2013</td>
<td>Updated document for 4.0 SU3 release for ASR MRCP support.</td>
</tr>
<tr>
<td>January 15, 2013</td>
<td>Updated document for configuring MRCP servers to use Media Streaming Server for voice mail playback.</td>
</tr>
<tr>
<td>February 25, 2013</td>
<td>Updated Copyright and Trademarks for 2013.</td>
</tr>
<tr>
<td>June 10, 2014</td>
<td>• Updated Copyright and Trademarks for 2014.</td>
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<tr>
<td></td>
<td>• Reorganized document contents.</td>
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<tr>
<td></td>
<td>• Added information on Location and Selection Rules.</td>
</tr>
<tr>
<td></td>
<td>• Added information about Probation.</td>
</tr>
<tr>
<td>August 5, 2014</td>
<td>Updated documentation to reflect changes required in the transition from version 4.0 SU# to CIC 2015 R1, such as updates to product version numbers, system requirements, installation procedures, references to Interactive Intelligence Product Information site URLs, and copyright and trademark information.</td>
</tr>
<tr>
<td>July 1, 2015</td>
<td>• Updated cover page to reflect new color scheme and logo.</td>
</tr>
<tr>
<td></td>
<td>• Updated copyright and trademark information.</td>
</tr>
<tr>
<td>October 9, 2015</td>
<td>• Updated references to Interaction Desktop</td>
</tr>
<tr>
<td></td>
<td>• Updated the document to reflect the CIC 2016 R1 version.</td>
</tr>
<tr>
<td>February 4, 2016</td>
<td>• Updated Copyright and Trademarks for 2016.</td>
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<tr>
<td></td>
<td>• Added link to the new CIC Documentation Library at help.inin.com</td>
</tr>
<tr>
<td>June 30, 2016</td>
<td>• IC-136830 - Added content for Interaction Text to Speech</td>
</tr>
<tr>
<td></td>
<td>• Made general edits throughout the document</td>
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</tbody>
</table>