

Configuration Guide

MGCP in AOS

This configuration guide provides instructions on how to configure and implement Media Gateway Control Protocol (MGCP) in ADTRAN Operating System (AOS) voice products. The guide features an overview of MGCP functionality, its place in the network, MGCP configuration for AOS products, and troubleshooting through **debug** and **show** commands.

This guide consists of the following sections:

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Introduction to MGCP Technology

MGCP is a protocol that works hand-in-hand with H.323 and Session Initiation Protocol (SIP) in Voice over Internet Protocol (VoIP) services. MGCP works between a call agent or media gateway controller, usually a software switch, and a media gateway with internal endpoints. The call agents create and manage media sessions with endpoints of physical or virtual data sources through the media gateway. The media gateway is the network device that converts voice signals carried by telephone lines into data packets carried over the Internet or other packet networks. In this network structure, the AOS product functions as a media gateway.

Media gateways communicate with analog endpoints (telephones and fax through foreign exchange station (FXS) interfaces) in a manner configured by the call agent. MGCP is the protocol used for communication between the call agent and the media gateway. In network structures that include multiple call agents and media gateways, call agents communicate with other call agents using SIP or other protocols and media gateways communicate with other media gateways using Realtime Transport Protocol (RTP) or Realtime Control Protocol (RTCP). See [Figure 1](#) for an illustration of how MGCP functions in the network.

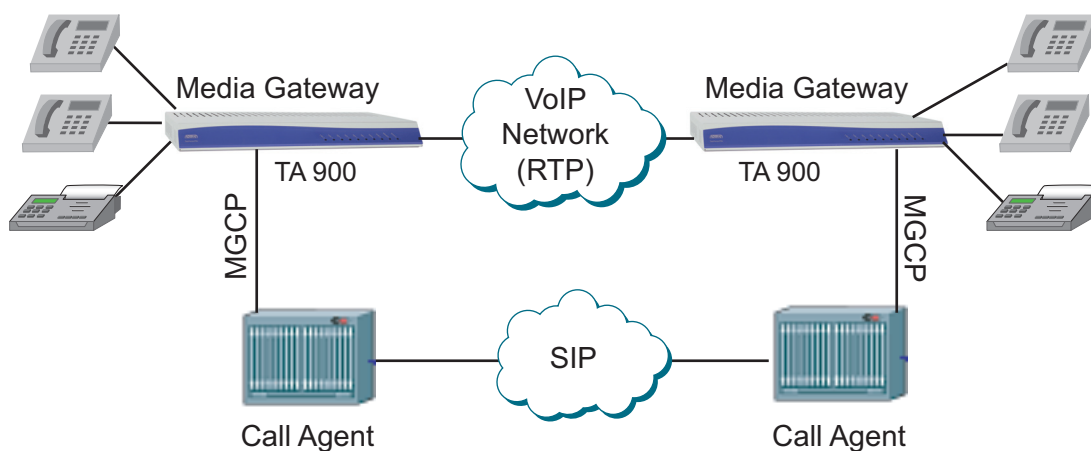


Figure 1. MGCP Function in the Network

MGCP and SIP Communication

Media gateways use MGCP to communicate with call agents, which use SIP or other protocols to communicate with other call agents. Media gateways communicate with other media gateways via RTP over the VoIP network, thus creating a VoIP call from analog sources. Signals from the media gateway are transmitted to the call agent directly from a specified FXS port. Each port is named in order to synchronize the signals. Every MGCP command includes a transaction ID and receives a response. See [Figure 2 on page 3](#) for a description of how media gateways communicate with call agents (via MGCP) and [Figure 3 on page 4](#) for a description of how call agents communicate with other call agents (via SIP) and with media gateways (via MGCP).

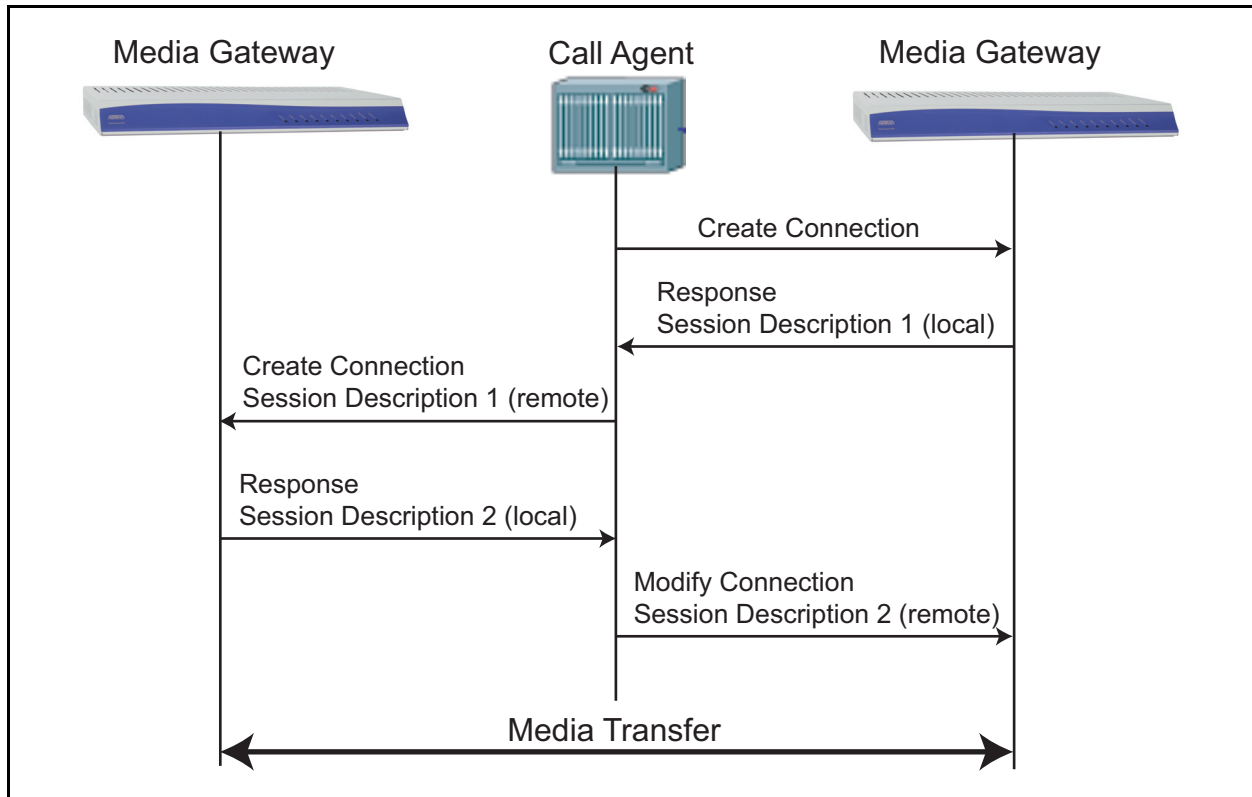


Figure 2. Media Gateway Call Construction via MGCP

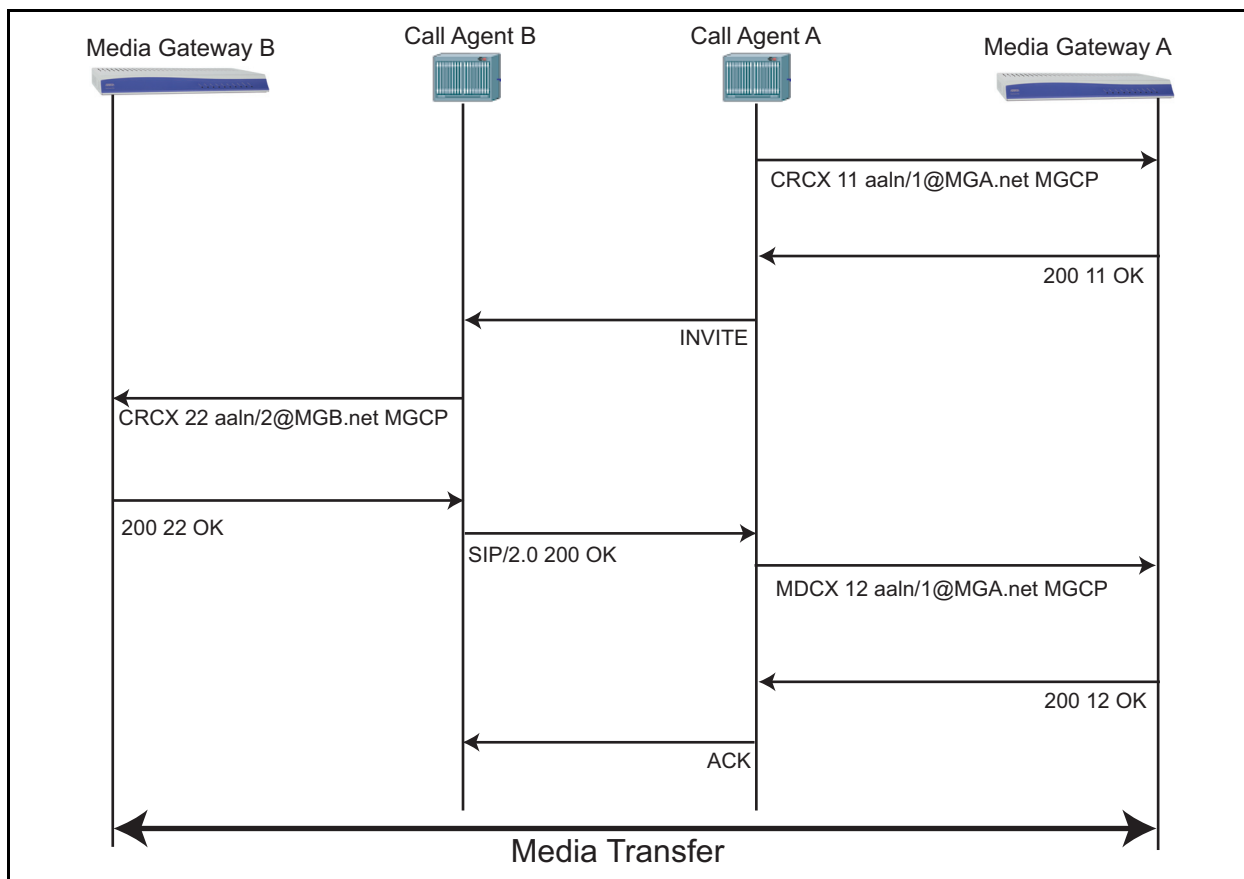


Figure 3. Call Agent and Media Gateway Call Construction via MGCP and SIP

MGCP Standards

There are two MGCP standards. The latest version, MGCP 1.0bis, is derived from RFC 3435. The older version, MGCP 0.1/NCS 1.0, is based on a PacketCable™ derivative. Different call agents can use different MGCP standards, so it is important to configure media gateways and call agents to use the same standard.

Hardware and Software Requirements and Limitations

The MGCP feature is available on AOS products as outlined in the ADTRAN knowledge base article, 2272, *Product Feature Matrix*. This matrix is available online at <http://kb.adtran.com>.

MGCP can be configured only through the AOS command line interface (CLI).

Media is not sent over MGCP, but instead is sent over RTP.

SIP and MGCP can co-exist on the same unit at the same time.

MGCP can only be used for FXS delivery. MGCP TO PRI conversion and MGCP to call switching are not supported in AOS.

Endpoints

All endpoints and other resources allocated to MGCP, with the exception of digital signal processing (DSP) resources, will not be shared. MGCP configuration requires the allocation of FXS endpoints dedicated to MGCP, so the FXS ports are not available for switched call processing. If the FXS ports are already connected to a voice user, attempting to connect those ports to an MGCP endpoint will fail.

Time-division multiplexing (TDM) trunks, including PRI and T1 CAS, are not available as potential MGCP signaling endpoints.

MGCP and DSP

DSP channelized resources will be requested on a per-call basis from a call agent-initialized call setup or from an endpoint going off hook. If a call agent requests a call setup and there are no resources available, the call fails and an error message is sent back to the call agent.

MGCP requires the use of DSP resources to maintain calls. The DSP is used for call progress tone generation, dual tone multi-frequency (DTMF) signaling, and call features, such as caller ID, as well as the voice path. If call conferencing is used, available resources could be additionally limited.

AOS MGCP Interoperability

ADTRAN voice products adhere to and are interoperable with call agents that follow NCS and the MGCP 1.0 standard. Call agents that fall within this criteria include:

- Broadsoft Broadworks
- General Bandwidth G6
- Metaswitch VP3500
- Nortel CS2K

Configuring AOS Voice Products as MGCP Media Gateways

To configure supported AOS voice products as media gateways for MGCP functionality, the following items must be configured:

- MGCP functionality within the AOS product
- MGCP endpoints

Configuring MGCP in AOS Voice Products

MGCP has some parameters that are required for proper operation, and some optional parameters that can also be configured. The following sections describe both the required and optional MGCP configuration parameters.

Accessing the CLI

To access the CLI on your AOS unit, follow these steps:

1. Boot up the unit.
2. Telnet to the unit (**telnet** <ipv4 address>). For example:

telnet 10.10.10.1.



If during the unit's setup process you have changed the default IP version 4 (IPv4) address (10.10.10.1), use the configured IPv4 address.

3. Enter your user name and password at the prompt.



*The AOS default user name is **admin** and the default password is **password**. If your product no longer has the default user name and password, contact your system administrator for the appropriate user name and password.*

4. Enable your unit by entering **enable** at the prompt as follows:

>enable

5. Enter your Enable mode password at the prompt.
6. Enter the unit's Global Configuration mode as follows:

#configure terminal
(config)#

MGCP Required Configuration

To configure the required parts of MGCP in AOS, follow these steps:

1. Enable the MGCP stack using the **ip mgcp** command from the Global Configuration mode. Enter the command as follows:

(config)#**ip mgcp**
(config)#

By default, the MGCP stack is disabled. Using the **no** form of this command disables MGCP.

2. Specify the primary MGCP call agent host name using the **ip mgcp call-agent primary** <hostname | ipv4 address> command.

Both primary and secondary call agents can be established, but at minimum a primary call agent is required. If a connection with the primary call agent fails, call agents will be tried in the order they are entered in the configuration. For more information on configuring secondary call agents, refer to [Optional MGCP Configurations on page 7](#).

To configure a primary MGCP call agent host name, enter the command as follows:

(config)#**ip mgcp call-agent primary ca1.company.com**
(config)#

Host names can be entered as either a fully qualified domain name (FQDN) as in the previous example, or by IPv4 address in the dotted decimal notation form **XX.XX.XX.XX**. The **no** form of this command removes the specified call agent as the primary call agent.



*The **no** form of this command will only take effect if there are no secondary call agents configured. If secondary call agents are configured, the primary call agent can be modified by issuing this command with the new host name information.*



The primary call agent host name cannot be removed while any secondary call agents are configured.

3. Specify the AOS voice product's host name using the **ip mgcp local-domain-name [media-gateway | <hostname | ipv4 address>]** command. Enter the command as follows:

```
(config)#ip mgcp local-domain-name media-gateway
(config)#
```

Specifying the AOS product's host name allows the call agent to recognize the gateway. Using the **media-gateway** parameter rather than a host name specifies that the local domain name will be based on the media gateway setting on the physical interface used for outbound traffic (for example, the Point-to-Point Protocol (PPP) or Ethernet interfaces). The *<hostname | ipv4 address>* parameter can be entered as an FQDN value (as in the previous example) or as an IPv4 address in the dotted decimal notation form **XX.XX.XX.XX**.

The **no** version of this command removes the associated host name from the AOS product.

Optional MGCP Configurations

The following commands specify the optional MGCP configuration parameters.

- **ip mgcp max1 <value>**

The **ip mgcp max1 <value>** command specifies the number of MGCP message retransmissions between the gateway and the call agent. This *<value>*, the suspicion threshold, is the number of message retransmissions that will occur between the gateway and the call agent while the gateway waits for a response from the call agent. If no response is received, the gateway retransmits MGCP messages **max1** times before the gateway either queries the domain name server (DNS) to detect a possible change in call agent interfaces or directs transmissions to alternate call agent IP addresses. The value range for this command is **1** to **255**, with a default value of **5**. Enter the command as follows:

```
(config)#ip mgcp max1 20
(config)#
```

Using the **no** form of this command resets the **max1** value to the default value of **5**.

- **ip mgcp max2 <value>**

The **ip mgcp max2 <value>** command specifies the number of MGCP message retransmission between the gateway and the call agent before the gateway disconnects. The *<value>* parameter, the disconnection threshold, is the number of message retransmissions that will occur before the gateway

disconnects from the call agent. When the gateway has retransmitted messages **max2** times, it means that the gateway has already exceeded the **max1** value and it will contact the DNS once more to search for alternate call agent interfaces to connect to. If the gateway does not find any available call agent interfaces for connection at this last DNS query, the gateway disconnects. The value range for this command is **1** to **255**, with a default value of **7**. Enter the command as follows:

```
(config)#ip mgcp max2 30
(config)#
```

Using the **no** form of this command resets the **max2** value to the default value of **7**.



The **max2** value must always be greater than the **max1** value. If the **max1** value is specified to be greater than the **max2** value, the **max2** value is automatically defined as **max1 + 1**.

- **ip mgcp standard [rfc3435 | ncs]**

The **ip mgcp standard [rfc3435 | ncs]** command specifies the MGP standard to use. You can select either the standard set in RFC 3435 or the Network-based Call Signaling (NCS) protocol. Some call agents require different standards, and the standard used by the call agent and media gateway must match. Enter the command as follows:

```
(config)#ip mgcp standard ncs
(config)#
```

Using the **no** form of this command returns the standard to the default standard, **rfc3435**.

- **ip mgcp bracketed-ip**

The **ip mgcp bracketed-ip** command controls whether bracketed IPv4 addresses are used when specifying an endpoint (refer to [Endpoint MGCP Parameters on page 11](#) for more information). Some call agents require that brackets be used when an MGCP gateway uses an IPv4 address as its local domain name, and some call agents do not support the bracketed format. Bracketed endpoint IPv4 addresses are displayed as **endpointname@[xx.xx.xx.xx]**, whereas non-bracketed endpoint IPv4 addresses are displayed as **endpointname@xx.xx.xx.xx**. This command allows the choice of format, with the bracketed form being used by default. The **no** version of this command prevents the bracketed format from being used. Enter the command as follows to enable bracketed IPv4 address control:

```
(config)#ip mgcp bracketed-ip
(config)#
```

- **ip mgcp call-agent secondary <hostname | ipv4 address>**

The **ip mgcp call-agent secondary** command configures secondary MGCP call agent host names. Multiple secondary call agent host names can be configured. If a connection with the primary call agent fails, call agents will be tried in the order they are entered in the configuration. New secondary call agents are added at the end of the list. Enter the command as follows:

```
(config)#ip mgcp call-agent secondary ca2.company.com
(config)#
```

Host names can be entered as either an FQDN as in the previous example, or by IPv4 address in the dotted decimal notation form **XX.XX.XX.XX**. The **no** form of this command removes the specified call

agent as a secondary call agent.



If secondary call agents are configured, the primary call agent cannot be removed.

- **ip mgcp qos dscp <value>**

The **ip mgcp qos dscp** command is used to set the differentiated services code point (DSCP) value in the MGCP packets transmitted by the media gateway. This value can be used by quality of service (QoS) mechanisms to give priority to this type of traffic in the unit. Value ranges from **0** to **63**, with a default of **46**. Enter the command as follows:

```
(config)#ip mgcp qos dscp 10
(config)#
```

Using the **no** form of this command returns the value to the default of **46**.

- **ip mgcp persistent-notify [hd | hu | hf]**

The **ip mgcp persistent-notify** command controls event notification. By default, persistent notification is disabled, which means that the media gateway will not send event notifications of endpoint hang down (**hd**), hang up (**hu**), or hook flash (**hf**) unless requested to do so by the call agent. When the feature is enabled, the media gateway will send notification of endpoint events even if it has not received a notification request from the call agent. To enable this feature, enter the command as follows:

```
(config)#ip mgcp persistent-notify hd
(config)#
```



Multiple combinations of the parameters of this command can be entered.

Using the **no** form of this command disables persistent notification. Some call agents require the use of persistent notification. For example, sometimes **hd** notification is required for initial dial tone once the link has become active. Refer to the configuration materials provided with your call agent for specific call agent information.



Enabling persistent notification when it is not required can cause unexpected and undesired operation.

- **ip mgcp retransmit-delay [100ms | 250ms | 500ms | 1sec | 2sec | 4sec]**

The **ip mgcp retransmit-delay** command specifies the time between the retransmission of MGCP messages and makes the time constant. Based on RFC 3435, MGCP is configured by default to use a UDP back-off algorithm that creates a longer and longer delay between retransmissions when an endpoint is receiving no response from the gateway. To specify a constant interval between retransmissions, enter the command as follows:

```
(config)#ip mgcp retransmit-delay 1sec
(config)#
```

The **no** form of this command returns to using the UDP back-off algorithm for delays between retransmissions.

- **ip mgcp rfc2833-signaling**

The **ip mgcp rfc2833-signaling** command enables the transmission and reception of ABCD signal bits via RFC 2833 packets. The ABCD bit values can be used to signal incoming calls, disconnect, seize, and other call information. By default, this option is disabled. To enable ABCD signaling via RFC 2833 packets, enter the command as follows:

```
(config)#ip mgcp rfc2833-signaling
(config)#
```

The **no** form of this command disables ABCD signaling.



This command should only be used with gateways configured to send ABCD signaling bits out-of-band for TDM passthrough. Configuring this command when it is not needed will likely cause undesired operation.

- **ip mgcp udp <port>**

The **ip mgcp udp** command configures the local listening port for the MGCP stack for User Datagram Protocol (UDP). Port numbers range from **1** to **65535**. By default, MGCP listens on port **2427** as defined by RFC 3435. To change the MGCP listening port, enter the command as follows:

```
(config)#ip mgcp udp 2727
(config)#
```

The **no** form of this command returns the listening port to the default port (**2427**).

Configuring MGCP Endpoints

MGCP endpoints are dedicated FXS ports configured to use MGCP to communicate with a call agent. The endpoints are configured with a few specialized MGCP commands and a large number of commands that are similar to those used for voice user configuration. The following sections include descriptions of both the specialized MGCP commands and the optional configuration commands.

Endpoint MGCP Parameters

To configure the MGCP endpoints, follow these steps:

1. Create an endpoint and enter the endpoint configuration mode using the **voice mgcp-endpoint** *<index>* command. The *<index>* parameter is a numerical value ranging from **1** to **255** that is used to identify the endpoint in the default naming structure. The most common method of defining the index is to use the FXS port number, because the index is automatically appended to **aaln/** for the endpoint name. To create an endpoint and enter the endpoint's configuration mode, enter the command as follows:

```
(config)#voice mgcp-endpoint 1
(config-mgcp-1)#
```

Using the **no** form of this command destroys the specified endpoint, and if necessary, disconnects it from the specified interface (refer to the **connect fxs** command in Step 3).

2. You must connect the endpoint to a physical FXS port on the AOS voice product by using the **connect fxs** *<slot/port>* command. To connect to a physical port, enter the command as follows, specifying the port the endpoint should connect to:

```
(config-mgcp-1)#connect fxs 0/1
(config-mgcp-1)#
```

The **no** form of this command disconnects the endpoint from the physical FXS port.



This command fails if the specified FXS port is already in use on another MGCP endpoint or a configured voice user.

Endpoint MGCP Parameters (Optional)

1. Once the endpoint is created and you have entered its configuration mode, you can create a textual description of the endpoint. To create a textual description, enter the **description** *<text>* command as follows:

```
(config-mgcp-1)#description farendpoint1
(config-mgcp-1)#
```

Use the **no** form of this command to remove the endpoint's description.

2. The endpoint can be given a specific name to be referenced by the call agent using the **name** *<text>* command. By default, when endpoints are created and given an index number, they are named in the following format: **aaln/x**, where **x** is the index number. For example, an endpoint with an index of **4** will by default have the name **aaln/4**. To rename an endpoint, enter the command as follows:

```
(config-mgcp-1)#name endpoint243
(config-mgcp-1)#
```

Using the **no** form of this command removes the name of the endpoint and reverts back to the default naming convention.

3. Caller ID information can also be blocked on an endpoint by using the **block-caller-id** command. This command blocks caller ID delivery to the connected FXS port, if the caller ID information is presented in the MGCP signaling messages. To block caller ID information on an endpoint, enter the command as follows:

```
(config-mgcp-1)#block-caller-id
(config-mgcp-1)#
```

The **no** form of this command allows caller ID information to appear if it is included in the MGCP message.



This command does not affect caller ID delivered inband in the RTP stream to the FXS port, which often occurs in a TDM passthrough application.

4. The MGCP endpoint battery behavior during a forward disconnect can be specified using the **fwd-disconnect delay [250 | 500 | 750 | 900 | 1000 | 2000 | follow-switch]** command. The **fwd-disconnect delay** command specifies how long (in milliseconds) the endpoint's battery is removed during a forward disconnect situation. In a forward disconnect, the call agent sends a network disconnect (L/osi), and the specified forward disconnect time matches the battery removal duration. For example, if the forward disconnect is set to **750** ms, the battery is removed for 750 ms. To specify the battery is removed for **750** ms, enter the command as follows:

```
(config-mgcp-1)#fwd-disconnect delay 750
(config-mgcp-1)#
```

The battery behavior can also be set to follow the Class 5 switch by using the **follow-switch** parameter (default setting). This parameter depends upon the endpoint's RFC 2833 signaling setting (refer to **ip mgcp frc2833-signaling** on page 10). If the RFC 2833 signaling is enabled, then using the **follow-switch** parameter means that the Class 5 switch determines the length of time the battery is removed. If

RFC 2833 signaling is disabled, then **follow-switch** indicates that the battery is removed for the default time of **900** ms. To set the battery behavior during a forward disconnect to follow the switch, enter the command as follows:

```
(config-mgcp-1)#fwd-disconnect delay follow-switch
(config-mgcp-1)#
```

The **no** form of the **fwd-disconnect delay** command returns the battery behavior to the default value (**follow-switch**).

Configuring Additional MGCP Endpoint Optional Parameters

The following commands are available options for individual endpoint configurations, depending on your network needs.

- **alc**
- **codec-group** *<name>*
- **echo-cancellation**
- **modem-passthrough**
- **nls**

- **plc**
- **rtp delay-mode** [adaptive | fixed]
- **rtp-dtmf-relay** [inband | nte <value>]
- **rtp frame-packetization** [10 | 20 | 30]
- **rtp packet-delay** [fax | maximum | nominal] <value>
- **rtp qos dscp** <value>
- **t38**
- **t38 error-correction** [fec | redundancy]
- **t38 fallback-mode** g711
- **t38 max-buffer** <buffer size>
- **t38 max-datagram** <value>
- **t38 max-rate** [2400 | 4800 | 7200 | 9600 | 12000 | 14400]
- **t38 redundancy** [high-speed | low-speed] <value>
- **vad**

These commands are summarized in the *MGCP Endpoint Optional Configuration Command Summary on page 16* of this guide and also in the *AOS Command Reference Guide* (ADTRAN's Knowledge Base article 2219), available online at <http://kb.adtran.com>. Specific information about T.38 capabilities is also available in the *T.38 Protocol in AOS Configuration Guide* (article number 2186) available online at <http://kb.adtran.com>.

Example MGCP Configuration

The following example configures the basic MGCP gateway and endpoint parameters in an AOS voice product, beginning in the Global Configuration mode. This example includes both required and optional configuration parameters.

```
ip mgcp
ip mgcp call-agent primary ca1.company.com
ip mgcp call-agent secondary ca2.company.com
ip mgcp local-domain-name media-gateway
voice mgcp-endpoint 1
  connect fxs 0/1
end
exit
```

In the previous example, the gateway is enabled and configured to communicate with the call agent at **ca1.company.com**. In the event the gateway cannot communicate with that call agent, a secondary call agent, **ca2.company.com** is specified. The gateway's local domain name is based on the media gateway setting on the physical interface used for outbound traffic.

The endpoint in the previous example has a physical connection to **fxs 0/1**.

MGCP Command Summary

The following tables describe each command for configuring MGCP operation on an AOS product.

Table 1. MGCP Configuration Command Summary

Access Prompt	Command	Command Description
(config)#	[no] ip mgcp	Enables the MGCP stack. By default, the MGCP stack is disabled.
(config)#	[no] ip mgcp call-agent primary <hostname ipv4 address>	Specifies the primary MGCP call agent host name or IPv4 address.
(config)#	[no] ip mgcp local-domain-name [media-gateway <hostname ipv4 address>]	Specifies the local MGCP domain name.

Table 2. Optional MGCP Configuration Command Summary

Access Prompt	Command	Command Description
(config)#	[no] ip mgcp max1 <value>	Specifies the number of retransmissions before attempting to connect to alternate call agent interfaces. Range is 1 to 255 with a default value of 5 .
(config)#	[no] ip mgcp max2 <value>	Specifies the number of retransmissions before a gateway disconnects from the call agent. Range is 1 to 255 with a default value of 7 .
(config)#	[no] ip mgcp standard [rfc3435 ncs]	Specifies the MGCP standard used. Default standard is rfc3435 .
(config)#	[no] ip mgcp bracketed-ip	Controls the use of brackets in specifying endpoint names. By default, brackets are used and endpoint names are sent in the following format: endpointname@[xx.xx.xx.xx] .
(config)#	[no] ip mgcp call-agent secondary <hostname ipv4 address>	Specifies a secondary MGCP call agent host name or IPv4 address.

Table 2. Optional MGCP Configuration Command Summary (Continued)

Access Prompt	Command	Command Description
(config)#	[no] ip mgcp qos dscp <value>	Specifies the DSCP value with which to mark MGCP packets. Range is 0 to 63 with a default value of 46 .
(config)#	[no] ip mgcp persistent-notify [hd hu hf]	Enables notification of the specified event(s) without a notification request. Disabled by default.
(config)#	[no] ip mgcp retransmit-delay [100ms 250ms 500ms 1sec 2sec 4sec]	Specifies the a constant time between retransmissions of MGCP messages. By default, there is a longer and longer delay between retransmissions based on a UDP back-off algorithm.
(config)#	[no] ip mgcp rfc2833-signaling	Enables transmission and reception of ABCD signal bits via RFC 2833 packets for TDM passthrough applications. Disabled by default.
(config)#	[no] ip mgcp udp <port>	Specifies the port on which MGCP listens for UDP messages. Range is 1 to 65535 . By default, the listening port is 2427 .

MGCP Endpoint Configuration Command Summary

The following tables summarize the commands available for MGCP endpoint configuration.

Table 3. MGCP Endpoint Configuration Command Summary

Access Prompt	Command	Command Description
(config)#	[no] voice mgcp-endpoint <index>	Creates an endpoint, assigns it an index number, and enters the endpoint's configuration mode.
(config-mgcp-<endpoint>)#	[no] connect fxs <slot/port>	Specifies the endpoint is connected to a physical FXS port rather than a virtual one.

Table 4. MGCP Endpoint Optional Configuration Command Summary

Access Prompt	Command	Command Description
(config-mgcp- <i><endpoint></i>)#	[no] description <i><text></i>	Specifies a textual description of the endpoint.
(config-mgcp- <i><endpoint></i>)#	[no] name <i><text></i>	Specifies a textual name the call agent will use to refer to this endpoint. Default format is aaln/x , where x is the endpoint index number.
(config-mgcp- <i><endpoint></i>)#	[no] block-caller-id	Specifies the endpoint will block caller ID information received in MGCP signaling.
(config-mgcp- <i><endpoint></i>)#	[no] fwd-disconnect delay [250 500 750 900 1000 2000 follow-switch]	Specifies the length of time (in milliseconds) that the endpoint's battery is removed during a forward disconnect situation. By default, the endpoint forward disconnect delay is set to follow-switch , which is 900 ms in non-TDM passthrough applications.
(config-mgcp- <i><endpoint></i>)#	[no] alc	Enables or disables auto level control (ALC) on the endpoint. ALC is disabled by default.
(config-mgcp- <i><endpoint></i> -)#	[no] codec-group <i><name></i>	Applies a CODEC list for the endpoint to use.
(config-mgcp- <i><endpoint></i>)#	[no] echo-cancellation	Enables or disables echo cancellation. Enabled by default.
(config-mgcp- <i><endpoint></i>)#	[no] modem-passthrough	Specifies fax and modem tone detection is enabled or disabled. Disabled by default.
(config-mgcp- <i><endpoint></i>)#	[no] nls	Enables or disables the endpoint's nonlinear suppression (NLS), which is a component of echo cancellation. NLS is enabled by default.
(config-mgcp- <i><endpoint></i>)#	[no] plc	Enables packet loss concealment (PLC) to attempt to mask lost or delayed packets. Disabled by default.
(config-mgcp- <i><endpoint></i>)#	[no] rtp delay-mode [adaptive fixed]	Specifies the endpoint's jitter buffer mode. By default, the delay mode is set to adaptive .

Table 4. MGCP Endpoint Optional Configuration Command Summary (Continued)

Access Prompt	Command	Command Description
(config-mgcp- <i><endpoint></i>)#	[no] rtp-dtmf-relay [inband nte <value>]	Specifies whether endpoint RTP DTMF events are relayed inband or out-of-band using named telephone events (NTE). NTE range is 96 to 127 . Default setting is nte 101 .
(config-mgcp- <i><endpoint></i>)#	[no] rtp frame-packetization [10 20 30]	Specifies the endpoint's RTP packetization time (in milliseconds). Default value is 20 ms.
(config-mgcp- <i><endpoint></i>)#	[no] rtp packet-delay [fax maximum nominal] <value>	Specifies the endpoint's maximum RTP packet delays (in milliseconds). Fax delay range is 0 to 500 ms, maximum delay range is 40 to 320 ms, and nominal delay range is 10 to 240 ms. Fax delay default value is 50 ms, maximum delay default value is 100 ms, and nominal delay default value is 50 ms.
(config-mgcp- <i><endpoint></i>)#	[no] rtp qos dscp <value>	Specifies the DSCP value with which the endpoint marks RTP packets. Range is 10 to 63 . Default value is 46 .
(config-mgcp- <i><endpoint></i>)#	[no] t38	Enables T.38 fax operation on the endpoint. Disabled by default.
(config-mgcp- <i><endpoint></i>)#	[no] t38 error-correction [fec redundancy]	Specifies the endpoint's T.38 fax error correction method. By default, T.38 error correction for MGCP endpoints is set to forward error correction (fec) for Total Access 900(e), and NetVanta 6310/6330 Series products, and redundancy for NetVanta 6200 Series and NetVanta 640 Series products.
(config-mgcp- <i><endpoint></i>)#	[no] t38 fallback-mode g711	Specifies the fax transmission mode the endpoint will use when T.38 fax relay cannot be successfully negotiated at the time of the fax transfer. Default is g711 .

Table 4. MGCP Endpoint Optional Configuration Command Summary (Continued)

Access Prompt	Command	Command Description
(config-mgcp- <i><endpoint></i>)#	[no] t38 max-buffer <i><buffer size></i>	Specifies the endpoint's maximum buffer size for T.38 fax operation. Range is 0 to 800 bytes. Default size is 200 bytes.
(config-mgcp- <i><endpoint></i>)#	[no] t38 max-datagram <i><value></i>	Specifies the maximum User Datagram Protocol Transport Layer (UDPTL) packet size (in bytes) that the endpoint can receive. Range is 0 to 300 bytes, default is 72 bytes.
(config-mgcp- <i><endpoint></i>)#	[no] t38 max-rate [2400 4800 7200 9600 12000 14400]	Specifies the endpoint's maximum T.38 fax rate in bits per second (bps). By default, the maximum fax rate is set to 14400 bps.
(config-mgcp- <i><endpoint></i>)#	[no] t38 redundancy [high-speed low-speed] <i><value></i>	Specifies the number of redundant packets sent by the endpoint via T.38 fax when redundancy is the T.38 error correction mode. Default value for both high and low speed is 0 .
(config-mgcp- <i><endpoint></i>)#	[no] vad	Enables voice activity detection (VAD) on the endpoint. On MGCP endpoints, VAD is disabled by default.

Troubleshooting MGCP

Debug and statistics for the media gateway and endpoint are available through the **debug** and **show** commands. These commands aid in verifying correct MGCP gateway and endpoint configurations. The following table describes each MGCP troubleshooting command.

Table 5. MGCP Troubleshooting Command Summary

Access Prompt	Command	Command Description
#	show mgcp-endpoint	Displays configuration statistics for all configured MGCP endpoints.
#	debug mgcp verbose	Displays realtime output of MGCP messaging and actions.
#	debug mgcp stack [verbose messages messages summary]	Displays all MGCP messaging and actions, displays all MGCP messages, or displays an MGCP message summary.

show mgcp-endpoint

To use the **show mgcp-endpoint** command, enter the command at the Enable mode prompt. The command displays the endpoint index, name, port, and connection state. The following is sample output from this command.

```
#show mgcp-endpoint
Endpoint   : 10
Name       : aaln/10
FXS        : 0/10
State      : Connected
```

debug mgcp verbose

To use the **debug mgcp verbose** command, enter the command at the Enable mode prompt. The command displays detailed information about MGCP transmissions, receptions, as well as actions taken and stimuli. The following is sample output from this command.

```
#debug mgcp verbose
15:02:04.902 MGCP.STACK DEBUG adEndpointEvent(int=0:10, pkg=, evt=hd)
15:02:04.903 MGCP.STACK MSG TX: -> 10.100.13.243:2727
15:02:04.904 MGCP.STACK MSG TX: ntfy 12 aaln/10@[10.19.247.245] MGCP 1.0
15:02:04.904 MGCP.STACK MSG   X: 107ff06a
15:02:04.905 MGCP.STACK MSG   O: l/hd

15:02:04.908 MGCP.STACK MSG RX: <- 10.100.13.243:2727
15:02:04.908 MGCP.STACK MSG RX: 200 12 OK
15:02:04.910 MGCP.STACK MSG RX: <- 10.100.13.243:2727
```

```
15:02:04.910 MGCP.STACK MSG RX: CRCX 301 aaln/10@[10.19.247.245] MGCP 1.0
15:02:04.911 MGCP.STACK MSG C: 46357f8d44fdeb47
15:02:04.911 MGCP.STACK MSG L: p:20, a:PCMU
15:02:04.911 MGCP.STACK MSG M: sendrecv
15:02:04.912 MGCP.STACK MSG X: 44fdeb47
15:02:04.912 MGCP.STACK MSG
15:02:04.913 MGCP.STACK MSG v=0
15:02:04.913 MGCP.STACK MSG o=root 8705 8705 IN IP4 10.100.13.243
15:02:04.914 MGCP.STACK MSG s=session
15:02:04.915 MGCP.STACK MSG c=IN IP4 10.100.13.243
15:02:04.915 MGCP.STACK MSG t=0 0
15:02:04.916 MGCP.STACK MSG m=audio 16082 RTP/AVP 0
15:02:04.916 MGCP.STACK MSG a=rtpmap:0 PCMU/8000

15:02:04.918 MGCP.STACK DEBUG adMgcpConnectionNegotiate: localConnOpts codecStr="0"
15:02:04.919 MGCP.STACK DEBUG adGatewayCreateConnection() - remote SDP: addr
10.100.13.243, port 16082
15:02:04.919 MGCP.SERVER stopDigitCollection(port=10)
15:02:04.920 MGCP.STACK DEBUG Current(40800)/Available(1495200) Bandwidth
15:02:04.920 MGCP.SERVER Restart RTP channel[0/10]; ecan state=-1

15:02:04.921 MGCP.SERVER sending MgcpToCallControl_SYNC_acquireRtpChannel
15:02:04.921 MGCP.SERVER Using received SDP Offer
15:02:04.922 MGCP.SERVER Creating SDP Answer
15:02:04.930 MGCP.SERVER mgcpFxsFaxModemDetectProxy - startResource Passed
15:02:04.931 MGCP.SERVER Undo of previous operation not required (RTP NAT Entry for
127.0.0.2:10000 not found)
15:02:04.931 MGCP.SERVER Checking for internal Media Gateway IP Address
15:02:04.932 MGCP.SERVER Using RTP Channel 0/1.1
15:02:04.932 MGCP.SERVER Inserting 10.19.247.245 into SDP for Media Gateway on interface ppp 1
15:02:04.933 MGCP.SERVER Adding RTP Media Gateway Entry: 127.0.0.2:10000 ->
10.19.247.245:10000
15:02:04.934 MGCP.SERVER No action taken, firewall traversal is not enabled
15:02:04.936 MGCP.STACK MSG TX: -> 10.100.13.243:2727
15:02:04.937 MGCP.STACK MSG TX: 200 301 OK
15:02:04.937 MGCP.STACK MSG l: 00000003
15:02:04.938 MGCP.STACK MSG
15:02:04.938 MGCP.STACK MSG v=0
15:02:04.939 MGCP.STACK MSG o=aaln/10 3 0 IN IP4 10.19.247.245
15:02:04.939 MGCP.STACK MSG s=phonecall
15:02:04.939 MGCP.STACK MSG c=IN IP4 10.19.247.245
15:02:04.940 MGCP.STACK MSG t=0 0
15:02:04.940 MGCP.STACK MSG m=audio 10000 RTP/AVP 0
15:02:04.941 MGCP.STACK MSG a=silenceSupp:off - - - -
15:02:04.941 MGCP.STACK MSG a=ptime:20
15:02:04.942 MGCP.STACK MSG a=rtpmap:0 PCMU/8000

15:02:04.942 MGCP.STACK MSG RX: <- 10.100.13.243:2727
15:02:04.943 MGCP.STACK MSG RX: RQNT 302 aaln/10@[10.19.247.245] MGCP 1.0
15:02:04.943 MGCP.STACK MSG X: 107ff06a
15:02:04.944 MGCP.STACK MSG R: L/hu(N),L/hf(N),D/[0-9#*](N)
15:02:04.944 MGCP.STACK MSG S: L/dl
```

```
15:02:04.946 MGCP.STACK DEBUG adMgcpStartSignal(int=0:10, pkg_id=L, event_id=dl)
15:02:04.948 MGCP.SERVER startDigitCollection(port=10)
15:02:04.949 MGCP.STACK MSG TX: -> 10.100.13.243:2727
15:02:04.950 MGCP.STACK MSG TX: 200 302 OK
```

debug mgcp stack

To use the **debug mgcp stack** command, enter the command at the Enable mode prompt. The command displays information about the MGCP stack and MGCP messages. The **verbose** keyword specifies showing both the MGCP messaging and other information, the **messages** keyword specifies displaying the MGCP messaging, and the **messages summary** keyword specifies showing a MGCP message summary. The following is sample output from the **debug mgcp stack messages summary** command:

```
#debug mgcp stack messages summary
19:20:22 MGCP.STACK MSGSUM TX: -> 47.234.101.60:2727
19:20:22 MGCP.STACK MSGSUM TX: ntfy 88 aaln/1@65.162.109.238 MGCP 1.0
19:20:22 MGCP.STACK MSGSUM RX: <- 47.234.101.60:2727
19:20:22 MGCP.STACK MSGSUM RX: 200 88 OK

19:20:22 MGCP.STACK MSGSUM RX: <- 47.234.101.60:2727
19:20:22 MGCP.STACK MSGSUM RX: RQNT 30425 aaln/1@65.162.109.238 MGCP 1.0
19:20:22 MGCP.STACK MSGSUM TX: ->42.234.101.60:2727
19:20:22 MGCP.STACK MSGSUM TX: 200 30425 OK
```