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Application Note

Any-to-Any Routing with the Dialogic® 2000 Media Gateway Series

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Application Note

Executive Summary

As service providers and enterprises continue to adopt SIP-based telecommunications solutions, the need to route calls between different SIP devices has become more evident. And, with competing SIP standards developed by groups such as the Internet Engineering Task Force (IETF), Third Generation Partnership Project (3GPP), European Telecommunications Standards Institute (ETSI), and others, there is often an additional need to mediate between different versions of SIP during the call routing process.

The Dialogic® 2000 Media Gateway Series (DMG2000 Gateways) Service Update 4 has any-to-any routing capabilities that can help address these call routing needs. This application note examines the existing routing capabilities of DMG2000 Gateways as well as the enhanced routing capabilities planned for future DMG2000 Gateway releases.

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Table of Contents

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Introduction

Past versions of the Dialogic® 2000 Media Gateway Series (DMG2000 Gateways) supported TDM-to-SIP, SIP-to-TDM, and TDM-to-TDM call routing, but they did not support SIP-to-SIP bridged routing through the Gateway. With those past versions, if an inbound SIP call was sent to a DMG2000 Gateway, the Gateway could only redirect the call back to the source SIP device via a 302 Redirect SIP Message. It could not route the call to a second SIP device.

With Service Update 4, DMG2000 Gateways now support bridged SIP-to-SIP routing for basic call transfers, messaging, and fax. They also support independent SIP signaling configurations, in which a DMG2000 Gateway is used as a bridge to allow communication between endpoints that use different SIP signaling. Planned versions of DMG2000 Gateways will support use cases with independent IP media (through IP media transcoding) and IP media bypass configurations.

Figure 1 shows the any-to-any routing configurations that DMG2000 Gateways (denoted as "Gateway" in this and other figures) support. In this diagram, the yellow lines represent the call paths between users.

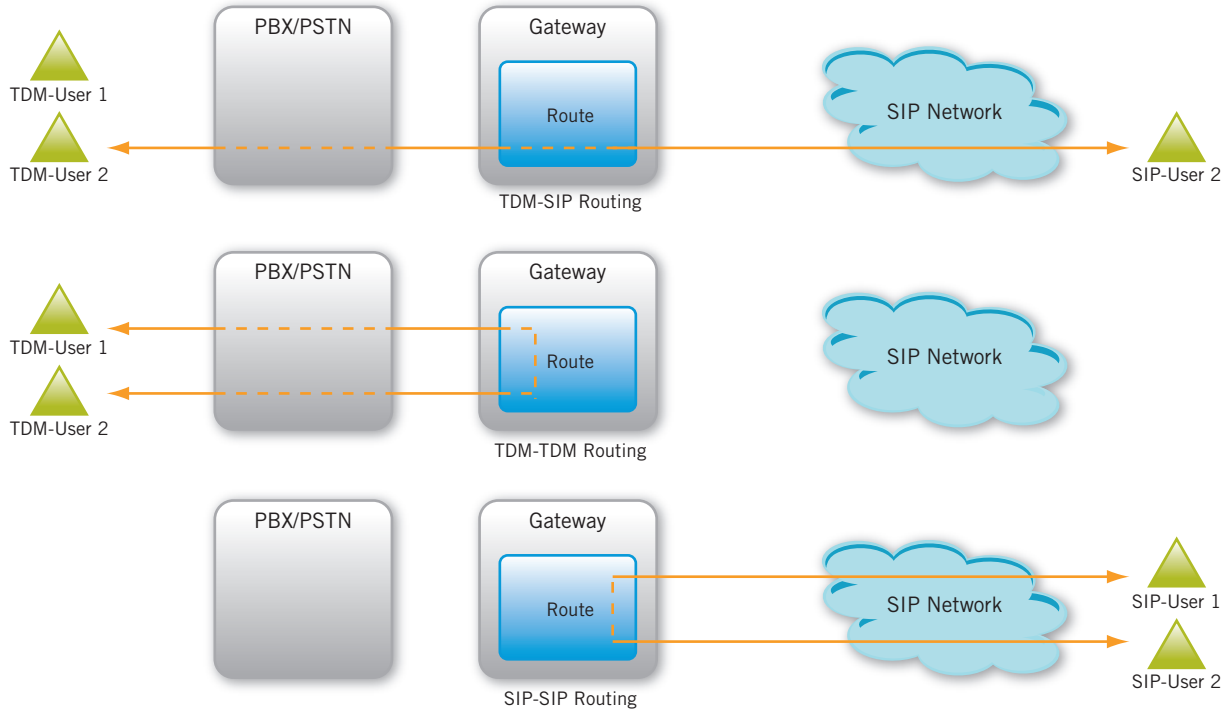

Figure 1: Any-to-Any Routing Configurations

Call Routing Use Cases

The following call routing use cases are applicable to the any-to-any routing capabilities of DMG2000 Gateways:

- IP-to-IP media passthrough
- IP-to-IP media passthrough with SIP signaling mediation
- IP-to-IP media passthrough with IP media transcoding
- IP-to-IP media passthrough with SIP signaling mediation and IP media transcoding
- IP-to-IP media bypass
- IP-to-IP media bypass with SIP signaling mediation

Table 1 lists the endpoint signaling and media characteristics that apply to each use case. All of these use cases support any-to-any routing.

Use Case	IP Signaling	IP Media	IP-IP Media Mode
1	Common	Common	Passthrough
2	Independent	Common	Passthrough
3	Common	Independent	Transcoding
4	Independent	Independent	Transcoding
5	Common	Common	Bypass
6	Independent	Common	Bypass

Table 1: SIP Signaling and IP Media Characteristics for Call Routing Use Cases

Note: Support for the IP media transcoding capability is planned for Service Update 5 (SU5), and support for the IP media bypass capability is planned for a later Service Update (post SU5).

Use Case 1: IP-to-IP Media Passthrough

In the IP-to-IP media passthrough use case, the IP users have the same SIP signaling configurations and media configurations. A DMG2000 Gateway processes the SIP signaling and routes the media directly to the other user without inspecting it. Because the media is not processed by the Gateway, this use case introduces minimal delay.

Figure 2 shows how the IP-to-IP media passthrough use case works. In this diagram, the black lines represent TDM call paths and the yellow lines represent SIP call paths.

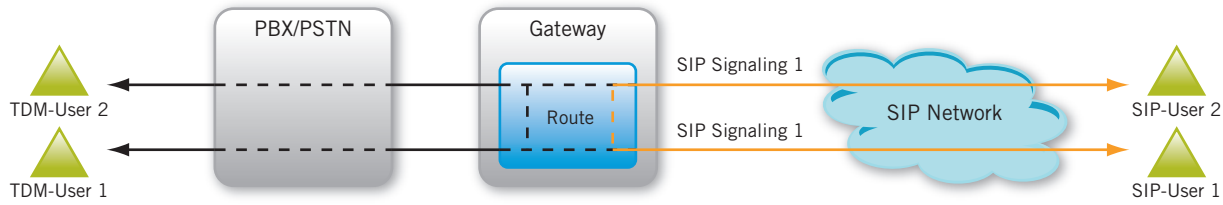

Figure 2: IP-to-IP Media Passthrough

The inbound SIP and TDM call scenarios for the IP-to-IP media passthrough use case are described below.

Inbound SIP Call Scenario

1. SIP-User 1 makes an inbound SIP call.
2. Depending on the gateway routing table configuration and the availability of TDM and/or SIP users, the outbound call can be routed to:
   - SIP-User 1 through a redirected SIP-to-SIP connection.
   - TDM-User 1 or TDM-User 2 through a SIP-to-TDM connection.
   - SIP-User 2 through a redirected SIP-to-SIP connection.
   - SIP-User 2 through a bridged SIP-to-SIP connection.

Inbound TDM Call Scenario

1. TDM-User 1 makes an inbound TDM call.
2. Depending on the Gateway routing table configuration and the availability of TDM and/or SIP users, the outbound call can be routed to:
   - TDM-User 1 through a redirected TDM connection.
   - TDM-User 2 through a bridged TDM connection.
   - SIP-User 1 or SIP-User 2 through a bridged SIP-to-SIP connection.

Use Case 2: IP-to-IP Media Passthrough with SIP Signaling Mediation

In the IP-to-IP media passthrough with SIP signaling mediation use case, a DMG2000 Gateway adds support for SIP-to-SIP routing for endpoints that have different SIP signaling configurations (such as TCP and UDP), but the same media configuration.

Figure 3 shows how the IP-to-IP media passthrough with signaling mediation use case works. In this diagram, the black lines represent TDM call paths and the yellow lines represent SIP call paths.

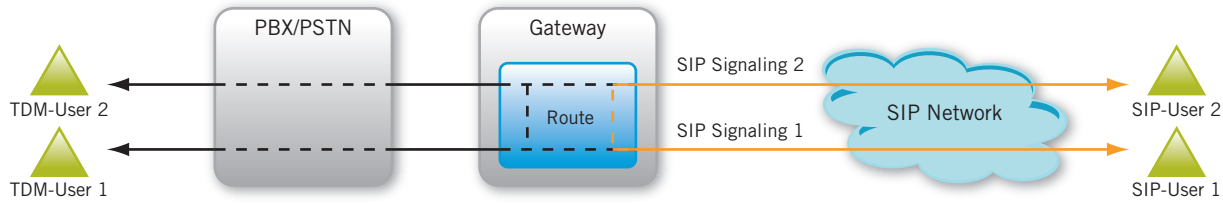

Figure 3: IP-to-IP Media Passthrough with SIP Signaling Mediation

The inbound SIP and TDM call scenarios for the IP-to-IP media passthrough with SIP signaling mediation use case are described below.

Inbound SIP Call Scenario

1. SIP-User 1 makes an inbound SIP call using SIP Signaling 1.
2. Depending on the Gateway routing table configuration and the availability of TDM and/or SIP users, the outbound call can be routed to:
   - SIP-User 1 through a redirected SIP-to-SIP connection using SIP Signaling 1.
   - TDM-User 1 or TDM-User 2 through a SIP-to-TDM connection.
   - SIP-User 2 through a redirected SIP-to-SIP connection using SIP Signaling 2.
   - SIP-User 2 through a bridged SIP-to-SIP connection using SIP Signaling 2.

Inbound TDM Call Scenario

1. TDM-User 1 makes an inbound TDM call.
2. Depending on the Gateway routing table configuration and the availability of TDM and/or SIP users, the outbound call can be routed to:
   - TDM-User 1 through a redirected TDM connection.
   - TDM-User 2 through a bridged TDM connection.
   - SIP-User 1 through a bridged SIP-to-SIP connection using SIP Signaling 1.
   - SIP-User 2 through a bridged SIP-to-SIP connection using SIP Signaling 2.

Use Case 3: IP-to-IP Media Passthrough with IP Media Transcoding

Support for IP media transcoding is planned for Service Update 5.

In the IP-to-IP media passthrough with IP media transcoding use case, a DMG2000 Gateway adds support for SIP-to-SIP routing for endpoints that have the same SIP signaling configuration, but different media configurations (such as G.711 and G.729 audio compression).

Figure 4 shows how the IP-to-IP media passthrough with media transcoding use case works. In this diagram, the black lines represent TDM call paths and the yellow lines represent SIP call paths.

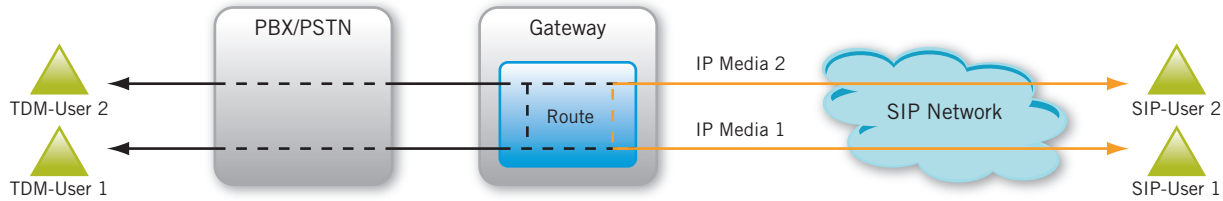

Figure 4: IP-to-IP Media Passthrough with IP Media Transcoding

The inbound SIP and TDM call scenarios for the IP-to-IP media passthrough with IP media transcoding use case are described below.

Inbound SIP Call Scenario

1. SIP-User 1 makes an inbound SIP call using IP Media 1.
2. Depending on the Gateway routing table configuration and the availability of TDM and/or SIP users, the outbound call can be routed to:
   - SIP-User 1 through a redirected SIP-to-SIP connection using IP Media 1.
   - SIP-User 2 through a bridged SIP-to-SIP connection using IP Media 2.
   - TDM-User 1 or TDM-User 2 using a SIP-to-TDM connection.

Inbound TDM Call Scenario

1. TDM-User 1 makes an inbound TDM call.
2. Depending on the Gateway routing table configuration and the availability of TDM and/or SIP users, the outbound call can be routed to:
   - TDM-User 1 through a redirected TDM connection.
   - TDM-User 2 through a bridged TDM connection.
   - SIP-User 1 through a bridged SIP-to-SIP connection using IP Media 1.
   - SIP-User 2 through a bridged SIP-to-SIP connection using IP Media 2.

Use Case 4: IP-to-IP Media Passthrough with SIP Signaling Mediation and IP Media Transcoding

Support for IP media transcoding is planned for Service Update 5.

In the IP-to-IP media passthrough with SIP signaling and IP media transcoding use case, a DMG2000 Gateway adds support for SIP-to-SIP routing for users that have different SIP signaling configurations (such as TCP and UDP) and different IP media configurations (such as G.711 and G.729 audio compression).

Figure 5 shows how the IP-to-IP media passthrough with SIP signaling and IP media transcoding use case works. In this diagram, the black lines represent TDM call paths and the yellow lines represent SIP call paths.

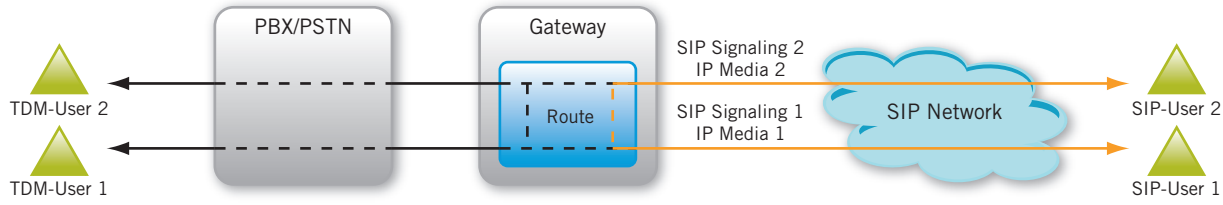

Figure 5: IP-to-IP Media Passthrough with SIP Signaling Mediation and IP Media Transcoding

The inbound SIP and TDM call scenarios for the IP-to-IP media passthrough with SIP signaling and IP media transcoding use case are described below.

Inbound SIP Call Scenario

1. SIP-User 1 makes an inbound SIP call using SIP Signaling 1 and IP Media 1.
2. Depending on the Gateway routing table configuration and the availability of TDM and/or SIP users, the outbound call can be routed to:
   - SIP-User 1 through a redirected SIP-to-SIP connection using SIP Signaling 1 and IP Media 1.
   - SIP-User 2 through a bridged SIP-to-SIP connection using SIP Signaling 2 and IP Media 2.
   - TDM-User 1 or TDM-User 2 through a SIP-to-TDM connection.

Inbound TDM Call Scenario

1. TDM-User 1 makes an inbound TDM call.
2. Depending on the Gateway routing table configuration and the availability of TDM and/or SIP users, the outbound call can be routed to:
   - TDM-User 1 through a redirected TDM-to-TDM connection.
   - TDM-User 2 through a bridged TDM-to-TDM connection.
   - SIP-User 1 through a bridged SIP-to-SIP connection using SIP Signaling 1 and IP Media 1.
   - SIP-User 2 through a bridged SIP-to-SIP connection using SIP Signaling 2 and IP Media 2.

Use Case 5: IP-to-IP Media Bypass

Support for IP-to-IP media bypass is planned for a future Service Update.

In the IP-to-IP media bypass use case, a DMG2000 Gateway adds support for SIP-to-SIP routing for users that have the same SIP signaling configurations and IP media configurations that are not supported by the DMG2000 Gateway. In this use case, the Gateway processes the SIP signaling, but the IP media is sent directly to the other SIP user, without going through the Gateway. This method introduces no delay in the media path.

Note: This use case can apply to situations where the capability of connecting TDM to IP users is required, even though the Gateway does not support the media configuration of the SIP endpoint.

Figure 6 shows how the IP-to-IP media bypass use case works. In this diagram, the black lines represent TDM call paths, the yellow lines represent SIP call paths, and the red lines represent IP Media paths.

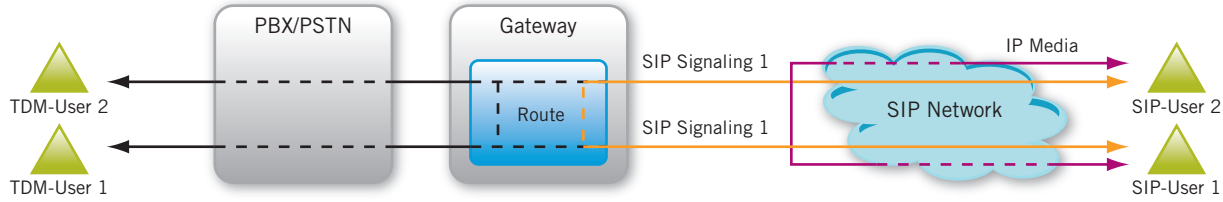

Figure 6: IP Media Bypass

The inbound SIP and TDM call scenarios for the IP-to-IP media bypass use case are described below.

Inbound SIP Call Scenario

1. SIP-User 1 makes an inbound SIP call using IP media.
2. Depending on the gateway routing table configuration and the availability of TDM and/or SIP users, the outbound call can be routed to:
   - SIP-User 1 through a redirected SIP-to-SIP connection.
   - TDM-User 1 or TDM-User 2 through a SIP-to-TDM connection.
   - SIP-User 2 through a redirected SIP-to-SIP connection.
   - SIP-User 2 through a bridged SIP-to-SIP connection.

Inbound TDM Call Scenario

The following call use case can be performed using an IP-to-IP media bypass configuration:

1. TDM-User 1 makes an inbound TDM call.
2. Depending on the gateway routing table configuration and the availability of TDM and/or SIP users, the outbound call can be routed to:
   - TDM-User 1 through a redirected TDM-to-TDM connection.
   - TDM-User 2 through a bridged TDM-to-TDM connection.
   - SIP-User 1 or SIP-User 2 through a bridged TDM-to-SIP connection.

Use Case 6: IP-to-IP Media Bypass with SIP Signaling Mediation

Support for IP-to-IP media bypass is planned for a future Service Update.

In the IP-to-IP media bypass with signaling mediation use case, a DMG2000 Gateway adds support for SIP-to-SIP routing for users that have different SIP signaling configurations (such as TCP and UDP), and IP media configurations that are not supported by the DMG2000 Gateway. In this use case, the Gateway processes the SIP signaling, but the IP media is sent directly to the other SIP user, without going through the gateway. This method introduces no delay in the IP media path.

Note: This use case can apply to situations where the capability of connecting TDM to IP users is required, even though the Gateway does not support the media configuration of the SIP endpoint.

Figure 7 shows how the IP-to-IP media bypass with signaling mediation use case works. In this diagram, the black lines represent TDM call paths, the yellow lines represent SIP call paths, and the red lines represent IP Media paths.

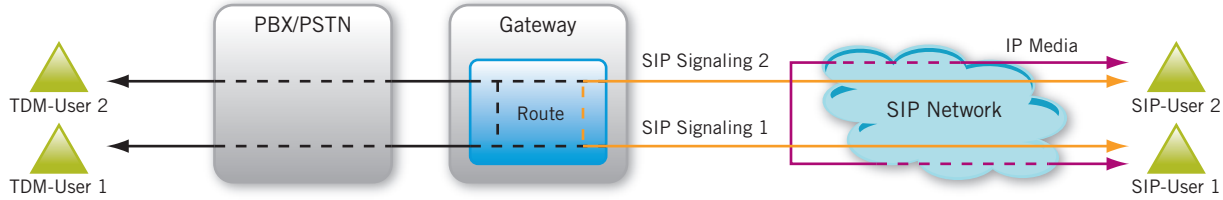

Figure 7: IP-to-IP Media Bypass with SIP Signaling Mediation

The inbound SIP and TDM call scenarios for the IP-to-IP media bypass with SIP signaling mediation use case are described below:

Inbound SIP Call Scenario

1. SIP-User 1 makes an inbound SIP call using SIP Signaling 1 and IP media.
2. Depending on the gateway routing table configuration and the availability of TDM and/or SIP users, the outbound call can be routed to:
   - SIP-User 1 through a redirected SIP-to-SIP connection using SIP Signaling 1.
   - SIP-User 2 through a redirected SIP-to-SIP connection using SIP Signaling 2.
   - SIP-User 2 through a bridged SIP-to-SIP connecting using SIP Signaling 2.
   - TDM-User 1 or TDM-User 2 through a SIP-to-TDM connection.

Inbound TDM Call Scenario

1. TDM-User 1 makes an inbound TDM call.
2. Depending on the gateway routing table configuration and the availability of TDM and/or SIP users, the outbound call can be routed to:
   - TDM-User 1 through a redirected TDM-to-TDM connection.
   - TDM-User 2 through a bridged TDM-to-TDM connection.
   - SIP-User 1 through a bridged TDM-to-SIP connection using SIP Signaling 1.
   - SIP-User 2 through a bridged TDM-to-SIP connection using SIP Signaling 2.

Planned Enhancements

Service Update 4 of the DMG2000 Gateway contains new functionality for bridged SIP-to-SIP routing and SIP signaling mediation. Future enhancements to DMG2000 Gateway functionality are planned to include support for independent IP media configurations (through IP media transcoding) and IP media bypass configurations.

For More Information

For more information about DMG2000 Gateways, see Dialogic® 2000 Media Gateway Series on the Dialogic website.

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