

## Choosing a Dialogic® Product Option for Creating a PSTN-HMP Interface

Environment Helps Determine  
Product Choice for TDM-IP Hybrid  
Media Server System with Dialogic®  
Host Media Processing Software



## Executive Summary

Dialogic offers three options for creating a PSTN interface solution when building a TDM-IP hybrid media server system with Dialogic® Host Media Processing (HMP) Software. These options are HMP interface boards, a gateway subsystem, and appliance gateways. By supplying high-level and detailed comparisons and a set of scenarios that address a variety of situations, this white paper can serve as a guide to choosing the option appropriate for a particular environment and for a customer's development resources and deployment needs.



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## Introduction

Dialogic offers three options for creating an interface between TDM and IP networks when building a TDM-IP hybrid media server system using Dialogic® Host Media Processing (HMP) Software. These product options, which can be used to connect HMP-IP applications to legacy PSTN and PBX networks, are

- **HMP interface boards** — Dialogic® HMP Interface Boards (DNI Boards)
- **Gateway subsystem** — Dialogic® Diva® Media Boards with Dialogic® Diva® SIPcontrol™ Software
- **Appliance gateways** — Dialogic® 1000 Media Gateway Series (DMG1000 Gateways) and Dialogic® 2000 Media Gateway Series (DMG2000 Gateways)

Which option is suitable for a particular environment? By providing product comparisons and scenarios, this white paper can act as a guide to making an appropriate decision for a given environment and set of development resources and deployment needs.

### A Note on Terminology

For clarity, Dialogic® products will often be referred to in this paper by type: HMP interface boards, gateway subsystem, and appliance gateways. A complete list of Dialogic products for each type is given in Appendix A with links to online product information.

Application Programming Interfaces (APIs) will be referred to frequently, and abbreviations will be used for simplicity:

- **GC API** — Dialogic® Global Call API (call control)
- **R4 API** — Dialogic® R4 API (media)
- **GC/R4 APIs** — Both Dialogic Global Call and Dialogic R4 APIs

## Product Line Overview

An overview of the three Dialogic® product options for creating an interface between TDM and IP networks when building a TDM-IP hybrid media server system using Dialogic HMP Software will be given in this section.

### HMP Interface Boards

HMP interface boards integrate into a host system with Dialogic HMP Software to provide direct API support for PSTN call control and a T1/E1 interface for HMP.

HMP interface boards are T1/E1 PCI boards available in single, dual, quad, and octal density. They provide a native interface to Dialogic HMP Software for building efficient PSTN and digital PBX connectivity into HMP-based telephony applications.

### Gateway Subsystem

The combination of Diva SIPcontrol and Diva Media Boards creates a PSTN-to-SIP gateway subsystem that can be integrated into a server running an HMP application. The boards support a variety of TDM protocols and interfaces, ranging from analog over ISDN and QSIG with BRI and PRI interfaces to E1/T1 digital variants. This paper will discuss Diva boards that support BRI and analog interfaces for Diva SIPcontrol version 1.5 and Dialogic HMP Software 3.0 only.

Diva SIPcontrol translates call control information from a Diva Media Board into SIP messages while voice channels are converted into IP packets and streamed via the RTP protocol. When Diva SIPcontrol and Diva Media Boards are combined in a Windows®-based server, the result is a fully functional PSTN-IP gateway.

### Appliance Gateways

Dialogic offers a series of turnkey appliances designed to reside separately from an HMP media server. The two types of appliance gateways that will be discussed in this paper are the DMG1000 Gateways and DMG2000 Gateways.

The DMG1000 Gateways connect a PBX and a LAN or WAN to convert proprietary digital PBX messages into a format suitable for transmission over standard IP networks. An analog FXO model supplies standard analog connectivity with trunks or PBX FXS ports, while providing a serial signaling interface for supplementary service options.

The DMG2000 Gateways merge traditional PSTN (E1/T1) technology with IP networks.

### Summary Table

This section contains a summary comparison of the three options for creating a TDM-IP interface for an application or media server created with Dialogic HMP Software (referred to in Table 1 as an “HMP server”). The comparison is designed to give you enough information to understand the scenarios later in this paper. A comparison with more technical detail can be found in Table 3 in Appendix B.

	HMP Interface Board	Gateway Subsystem	Appliance Gateway
<b>Architecture</b>	Boards integrated into an HMP server and into HMP software via the Global Call API	Diva SIPcontrol and Diva Media Boards combined to create a PSTN-to-SIP gateway subsystem that can be integrated into an HMP server	Turnkey appliance requiring integration with HMP server for media functionality
<b>PSTN Interface</b>	Supports the same T/E1 protocols supported by Dialogic® boards with Dialogic® DM3 architecture	BRI and/or analog, depending on the Diva Media Boards used	<ul style="list-style-type: none"> <li>DMG1000 Gateways support proprietary digital PBX and analog interfaces</li> <li>DMG2000 Gateways support T1/E1 interfaces</li> </ul>

Table 1. Option Summary

## Analyzing the Options

After examining the comparisons in Tables 1 and 3, the choice of a gateway option may be very straightforward. However, also provided are a high-level architectural diagram (Figure 1), a scenario summary table (Table 2), and a discussion of several deployment scenarios. All of these are designed to provide further help in selecting an option.

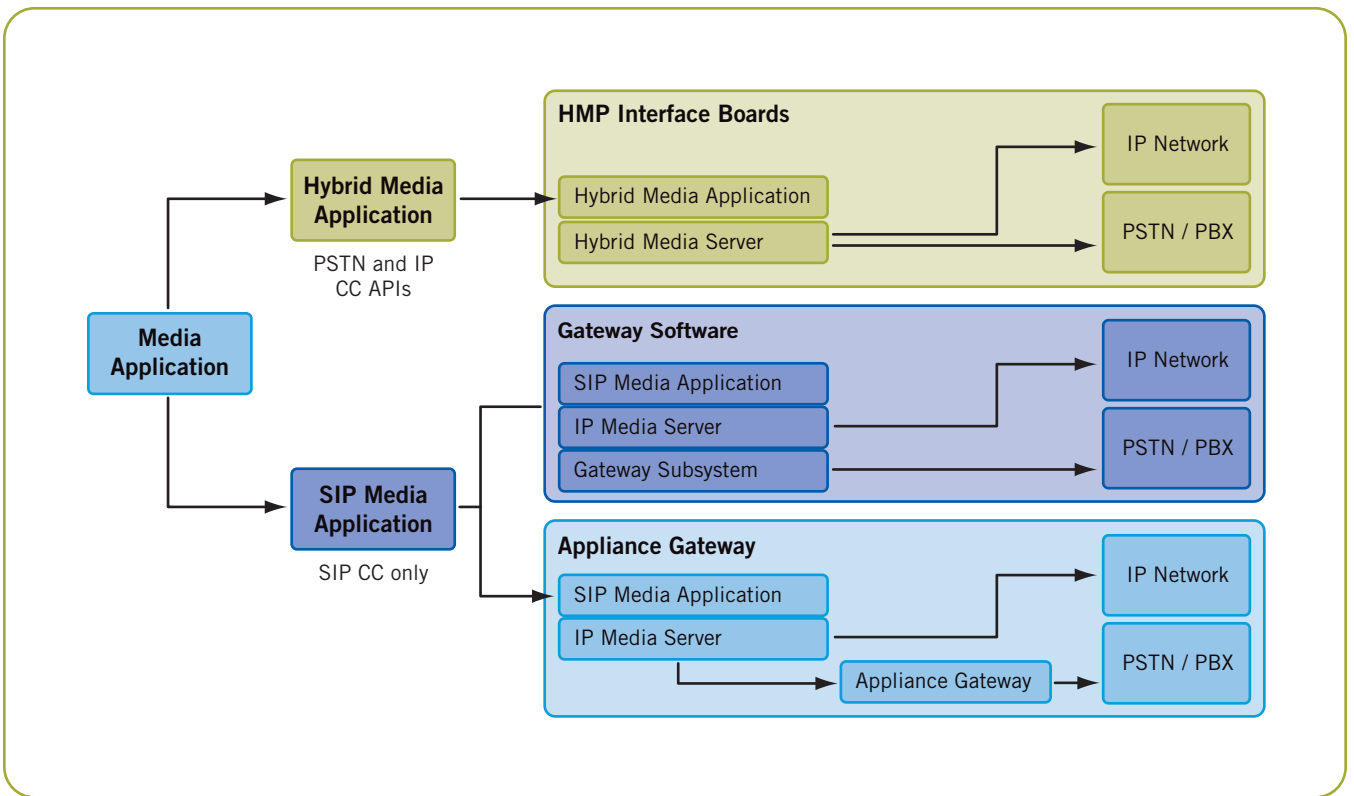


Figure 1. Interface Options for Hybrid Network Deployment

## Scenarios

Table 2 contains a summary of the scenarios, situations, and suggested options discussed in this paper.

Scenarios	Situations	Options
I. Existing HMP media server needs TDM interface	N/A	Appliance gateway
II. Existing TDM system needs IP interface	1. Dialogic boards with DM3 architecture in use	HMP interface board
	2. Diva Media Boards in use	Gateway subsystem
	3. Neither Dialogic boards nor Diva Media Boards in use	See Scenario III
III. Entire TDM-IP interface system must be built	1. Dialogic HMP Software application in use	Appliance gateway
	2. Application with PSTN interface using Dialogic APIs in use	HMP interface board
	3. Gateway software using Dialogic® DM/IP Boards in use	HMP interface board
	4. No reusable software and no programming experience with Dialogic boards or Diva Media Boards	Appliance gateway

Table 2. Summary of Scenarios, Situations, and Options

### Scenario Discussion

**Scenario I:** An existing HMP media server needs a TDM interface.

**Solution:** An appliance gateway would be appropriate. Turnkey appliances are easy to deploy because no API development is required for the PBX/PSTN interface.

The major benefits are time and cost savings on development and installation. However, adding one or more turnkey appliances requires rack space since this option is standalone and cannot be added to another server. Also, PSTN resources cannot be routed between appliance units for high-density applications.

**Scenario II:** An existing TDM system is being extended to include IP capabilities. Several solutions are possible depending on the current situation.

**Situation 1:** Existing TDM system is using Dialogic boards with DM3 architecture, and the applications using GC/R4 APIs are reusable.

**Solution:** HMP interface boards would be appropriate. Since the applications are reusable, most of the TDM call control and media function software can also be reused, and development would only be required to add IP call control capabilities for HMP.

PSTN call control software would not have to be written from scratch, saving considerable resources and time.

Also, no additional rack space would be required since the new hybrid media server can replace the old TDM server. However, this solution does require some programming for switch integration.

**Situation 2:** Existing TDM system is using Dialogic Media Boards.

**Solution:** Gateway subsystem would be the most viable option since Diva SIPcontrol can be integrated easily into the existing TDM system, and time and costs would be saved by reusing Diva BRI and/or Diva Analog boards. The PSTN call control software can be reused, and the Diva-based gateway solution can be integrated into the same server as the HMP application, saving rack space, or it can be deployed separately, creating a modular system.

**Situation 3:** Existing TDM system does not use either Dialogic boards or Diva Media Boards.

**Solution:** The hybrid system would have to be built from scratch. See Scenario 3 in the next section for other options.

**Scenario III:** An entire TDM-IP media server system must be built since no TDM system is in place and neither Dialogic boards nor Diva Media Boards were previously used in the TDM system. Several options are available, depending on the situation.

**Situation 1:** A program using Dialogic HMP Software with the GC API (or a third-party API) for IP call control and the R4 API for media is available and can be reused.

**Solution:** An appliance gateway would be an appropriate option. Turnkey appliances are a fast and easy gateway solution to deploy because no API development is required for the PSTN interface.

The major benefits are time and cost savings on development and installation. However, adding one or more turnkey appliances requires rack space since this interface option is standalone and cannot be added to the HMP server. Also, PSTN resources cannot be routed between appliance units for high-density applications.

**Situation 2:** A program interfacing with the PSTN using the GC/R4 APIs has been written and can be reused.

**Solution:** HMP interface boards would be appropriate since most of the PSTN program can be retained.

The major benefits are development time and cost savings because a PSTN call control application does not have to be created from scratch. Feature and protocol capabilities for T1/E1 interfaces are available through the HMP interface boards, and rack space is saved because a single server can be used for both the interface and the HMP application. However, software programming is needed for switch integration.

**Situation 3:** A program creating a gateway with Dialogic DM/IP boards is available and can be reused.

**Solution:** HMP interface boards are appropriate because most of the code for TDM call control, media functionality, and IP call control can be retained.

Depending on the existing application, very little software development may be needed. Rack space is not required because a single server can be used. However, software programming is needed for switch integration,

**Situation 4:** No reusable software exists and the programming staff has no experience with Dialogic boards or Diva Media Boards.

**Solution:** An appliance gateway should provide the fastest and most cost-effective development and deployment because software development will only be required for the IP media server.

The major benefits are time and cost savings on development and installation. However, adding one or more turnkey appliances requires rack space since this interface option is standalone and cannot be added to the HMP server. Also PSTN resources cannot be routed between appliance units for high-density applications.

## For More Information

This white paper was designed to provide assistance in choosing an appropriate interface option when building a TDM-IP hybrid media server system with Dialogic® Host Media Processing (HMP) Software. A variety of scenarios, situations, and suggested option choices have been provided. If you need further help, contact Dialogic. Worldwide contact information is available at <http://www.dialogic.com/contact>.

## Acronyms

API	Application Programming Interface
BRI	Basic Rate Interface
GC	Global Call
HMP	Host Media Processing
PBX	Private Branch eXchange
PCI	Peripheral Component Interconnect
PCIe	PCI Express
QoS	Quality of Service
PSTN	Public Switched Telephone Network
SIP	Session Initiation Protocol
SMDI	Simple Message Desk Interface

## Appendix A: Dialogic Products by Option Category

This appendix provides the names of the specific products discussed in this white paper by category and links to product information online.

### HMP Interface Boards (DNI Boards)

- Dialogic® DNI300TEPHMP Digital Network Interface Board
- Dialogic® DNI601TEPHMP Digital Network Interface Board
- Dialogic® DNI1200TEPHMP Digital Network Interface Board
- Dialogic® DNI2410TEPEHMP Digital Network Interface Board

For online product information, visit [http://www.dialogic.com/products/ip\\_enabled/hmp\\_enabled\\_boards.htm](http://www.dialogic.com/products/ip_enabled/hmp_enabled_boards.htm).

### Gateway Subsystem (with appropriate Dialogic® Diva® Media Boards)

- Dialogic® Diva® SIPcontrol™ Software
- Dialogic® Diva® BRI-2 Media Board
- Dialogic® Diva® 4BRI-8 Media Board
- Dialogic® Diva® Analog-2P Media Board
- Dialogic® Diva® Analog-4P Media Board
- Dialogic® Diva® Analog-8P Media Board

For Diva SIPcontrol product information, visit [http://www.dialogic.com/products/ip\\_enabled/Diva\\_SIPcontrol.htm](http://www.dialogic.com/products/ip_enabled/Diva_SIPcontrol.htm).

For Diva Media Board information, visit [http://www.dialogic.com/products/tdm\\_boards/media\\_processing/default.htm](http://www.dialogic.com/products/tdm_boards/media_processing/default.htm).

### Gateway Appliances

- Dialogic® 1000 Media Gateway Series (DMG1000 Gateways)
- Dialogic® 2000 Media Gateway Series (DMG2000 Gateways)

The DMG1000 gateways were formerly known as the Dialogic PBX-IP Media Gateway (PIMG). The DMG2000 gateways were formerly known as the Dialogic T1/E1-IP Media Gateway (TIMG).

For online product information, visit <http://www.dialogic.com/products/gateways/default.htm>.



## Appendix B: Detailed Option Comparison

Table 3 in this appendix contains a detailed comparison that builds on the high-level comparison in Table 1.

	Appliance Gateways	HMP Interface Boards	Gateway Subsystem
<b>Architecture</b>			
Design	Turnkey appliance	PCI or PCIe telephony board integrates into a server running the HMP application	PCI or PCIe telephony board integrates into a server running the HMP application
Operating System	Real-time embedded, independent of the HMP application server	Server running Windows, which can be the same as the HMP application server	Server running Windows, which can be the same as or independent of the HMP server
Dialogic® Software	Dialogic® Gateway Software Version 5.1	Dialogic HMP Software 2.0 or above	Dialogic HMP Software 2.0 or above; Dialogic® Diva SDK 8.3; Diva SIPcontrol 1.5
<b>Hosted HMP Application Server Requirements</b>			
Configuration	Separate server for hosted SIP/HMP applications; operating system can be Windows or Linux	Boards designed to be integrated into the same server that will run the HMP application; dual span board has embedded echo and tone offload, so does not require host MIPS	Boards designed to be integrated into the same server that will run the HMP application
Processor, memory, and speed requirements	Dependent on HMP application	Dependent on the HMP application and on echo cancellation required for single and quad span PSTN interfaces	Dependent on the HMP application; Diva Media Boards have embedded DSPs that provide echo offload to the host
<b>Density and Scalability</b>			
Single Unit Density	Single, dual, and quad T1/E1 density, 8-port analog, or 8-port digital PBX emulations	Single, dual, quad, and octal T1/E1 density; up to 3 boards per chassis	4- and 8-port BRI, 2-, 4-, and 8-port analog; up to 4 boards per system
Form Factor	1U 19" Rack Mount Server	Single, dual, and quad PCI; octal PCIe; can use 1U 19" Rack Mount Server with a single board; can use expansion chassis for servers that do not have multiple PCI or PCIe slots	PCI or PCIe; can use 1U 19" Rack Mount Server with a single board; can use expansion chassis for servers that do not have multiple PCI or PCIe slots
CT Bus Support	Not Required	Boards have a CT bus connection that allows multiple board synchronization and routing of PSTN resources between boards	Not Available
<b>Interfaces/Protocols</b>			
T1/E1 ISDN	5ESS DMS100 NI2 EuroISDN	4ESS 5ESS NTT NI2 DMS NET5 DPNSS	Not Available
T1 CAS	Yes	Yes	No
T1/E1 Clear Channel	No	Yes	No
NFAS	No	Yes	No
Mixed Protocols	No	Yes	No
BRI	No	No	Yes
PBX Digital Trunk Protocols	T1/E1 QSIG (DMG2000)	T1/E1 QSIG	Not Available

## Appendix B: Detailed Option Comparison *(continued)*

	Appliance Gateways	HMP Interface Boards	Gateway Subsystem
<b>Interfaces/Protocols <i>(continued)</i></b>			
Proprietary PBX Digital Handset Emulation	Yes (DMG1000)	No	No
Analog	Yes	No	Yes
Fax Support: T.30 to T.38  Transcodes fax from T.30 fax protocol (supporting V.21, V.27, V.29, V.17 and V.34 modulation schemes) to T.38 for transmission over a packet network.	Yes	Yes (V.17 only)	Yes
Coders	G.711 G.723.1 G.729a only	G.711 G.726 G.723 G.729	G.711 G.726 (with HMP) G.723 (with HMP) G.729 (with HMP)
Echo Cancellation	G.168 with up to 128 ms tail length	Host-based G.168 with up to 64 ms tail length (DNI300TEPHMP, DNI1200TEPHMP)  DSP-based G.168 with up to 64 ms tail length (DNI601TEPHMP)  ASIC-based G.168 with up to 128 ms tail length (DNI2410TEPEHMP)	G.168 with up to 128 ms tail length
IP (SIP, H.323, QoS, RFC 2833)	Yes	Yes	Yes
Serial Protocol Support (MWI and Call party information)	SMDI, MCI (NEC Systems only), MD110 (Ericsson Systems only)	Not Available	Not Available
<b>Features</b>			
PSTN Transfers	HookFlash, TBCT, Join with and without path replacement	HookFlash, TBCT, RLT	Tromboning (for analog)
IP Transfers (SIP RFC 3261 REFER method [blind, bridged, supervised]; REINVITE; Register; Redirect)	Yes	Yes	Yes
Message Waiting Support	MWI supported on CAS and QSIG; other protocols may support MWI	Not Available	Not Available
Call Routing	Round Robin via IP load balancing	Application dependent	Application dependent
CPA pre-connect (Busy, no dial tone, no ringback)	Yes	Yes	Yes
CPA post-connect	Voice, answering machine, fax	Voice, answering machine, fax, modem	Voice, answering machine, fax, modem

Table 3. Detailed Option Comparison

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