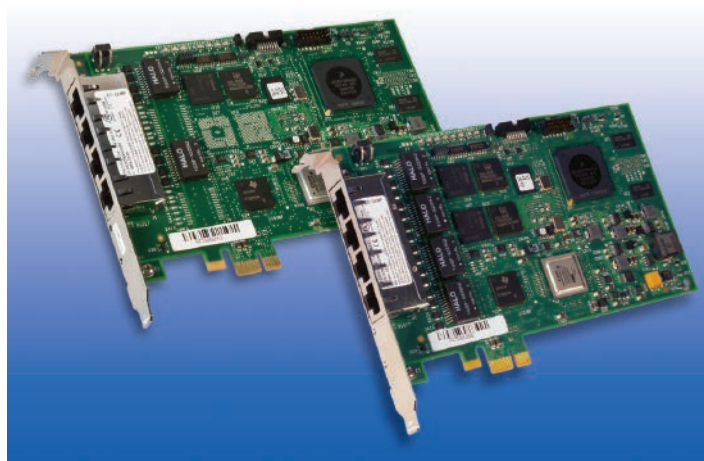# Dialogic® HMP Interface Boards

Half-Length, Standard-Height PCI Express Format

The Dialogic® HMP Interface Boards (DNI Boards) that are available in half-length, standard-height PCI Express format provide a native PSTN interface to Dialogic® PowerMedia™ Host Media Processing (HMP) Software. These half-size DNI Boards can be used in place of full-size PCI Express format DNI Boards of equivalent density in applications using PowerMedia HMP without programming changes. DNI boards are compatible with the Dialogic® DSI SS7 Protocol Stacks allowing combining HMP media on the host, with SS7 signaling on board.

DNI Boards enable efficient VoIP gateway functionality to be built into PowerMedia HMP telephony applications. They also break the traditional DSP-based media span paradigm by providing a digital network interface ready for use with virtually any configuration of host-based media resources, which complement the base gateway capability.

Products Discussed in This Datasheet

PCI Express Half Length, Standard Height Boards

- Dialogic® DNI2410TEPE2HMP Digital Network Interface Board
- Dialogic® DNI1210TEPE2HMP Digital Network Interface Board
- Dialogic® DNI610TEPE2HMP Digital Network Interface Board
- Dialogic® DNI310TEPE2HMP Digital Network Interface Board

PowerMedia HMP

- Dialogic® PowerMedia™ Host Media Processing Software

Features	Benefits
Interface to PowerMedia HMP	Allows host-based video, voice, speech, conference, fax, and IP transcoding to be accessible from the PSTN interface; can be configured in a wide range of densities, scalable in individual port increments
Eight, four, two or one digital network interfaces	Provides four different densities to support a cost-effective range of solutions
Software-selectable trunks configure DNI Boards for either T1 or E1	Reduces the total cost of ownership by increasing flexibility, reducing inventory, and simplifying the purchasing process and test effort
Half length, standard height PCI Express form factor	Permits the use of lower-cost rack-mount servers designed for small footprint peripherals
Support for a wide range of PSTN protocols including SS7, ISDN and CAS signaling	Allows a choice of PSTN protocols. Allows combined HMP media and signaling, including SS7 in conjunction with the Dialogic® DSI SS7 Protocol Stack
Dialogic® Global Call Software	Provides a consistent programming interface for call control utilized by boards with Dialogic® DM3 architecture and by PowerMedia HMP
Host streaming interface	Enables a low-latency, 256-duplex channel interface to host-based media and IP networks

Applications

- 3G-324M video gateway
- Enhanced media gateway
- Converged contact center
- Converged IP-PBX
- IVR and voice portal
- Audio conferencing server
- Messaging
- Enhanced services
- Switching and call completion
- Prepaid/debit card
- IP media gateway

Traditional media span products require onboard DSPs to provide media and audio transcoding resources, creating fixed costs and often fixed or limited configurations of media to complement the network interface density. DNI Boards enable the flexibility of host-based media resources (scalable and licensed in single-unit increments) and allow those resources to be used with a network interface, providing developers and system integrators with a high level of configuration flexibility and cost efficiency.

Architectural Flexibility

With PowerMedia HMP, DNI Boards give application providers the ability to support a range of architectural designs. Traditional TDM, converged TDM and IP, or pure IP solutions can be deployed with the flexibility to connect to virtually any network type deployed in an enterprise or service provider environment.

This flexibility can translate into a solution that is ready for IP connectivity initially or a cost-efficient migration later. It is expected that the voice network will remain a hybrid of TDM and VoIP infrastructure for many years to come, both in enterprise and service provider environments. Solutions developed on PowerMedia HMP and DNI Boards supply a cost-effective way to deliver an architecture that connects to the legacy TDM infrastructure immediately, with a path that provides a software upgrade to VoIP networks as needed. Since media and voice transcoders are delivered via software, field upgrades to VoIP and media expansions can be added to the platform remotely.

Based on the widely deployed DM3 architecture, tailored for host media processing, and controlled via the Dialogic® Global Call API, DNI Boards provide a smooth migration path for existing applications written to Dialogic® System Release Software. Applications utilizing PowerMedia HMP and the Global Call API can easily migrate to the current PowerMedia HMP releases, and add native support for the T1/E1 interfaces via the same API.

Application-Specific Boards

DNI Boards are suited for applications requiring IP media gateway functionality since they provide a cost-effective digital network interface to the PSTN, and a streaming interface to host-based resources and IP media streams via a host-based Ethernet NIC. DNI Boards also provide a suitable platform for developing pure IP media gateway white-box solutions, with the competitive benefit of adding HMP media resources and media applications on top of gateway functionality for an enhanced media gateway solution.

Converged contact centers and IP PBXs can take advantage of the core gateway enablement of DNI Boards to connect legacy PSTN endpoints with IP-based agents and IP hard and soft stations. Switching, messaging, IVR, ACD, conferencing, fax services, and speech applications can all be supported along with the core gateway functionality available with PowerMedia HMP and related DNI Boards. The cost-efficient combination of DNI Boards and PowerMedia HMP creates a compelling and competitive platform for these applications.

Media servers required to support IVR and messaging applications can be deployed on DNI Boards with the benefit of host-based IP connectivity as part of a converged solution, or as a software upgrade for a system that is initially deployed in a pure TDM environment. Large centralized systems can be deployed and connected to a legacy PBX or the PSTN network via T1/E1 connections, while tying in remote facilities with VoIP access to the media server over a data WAN.

Configuration Examples

Media Gateway Architecture

DNI Boards and PowerMedia HMP support the development of cost-effective VoIP media gateway applications residing in a white box server. The ability to scale IP transcoding resources, and to add media resources such as voice, speech, and conferencing, creates a flexible environment for developing enhanced gateway applications between TDM and IP networks.
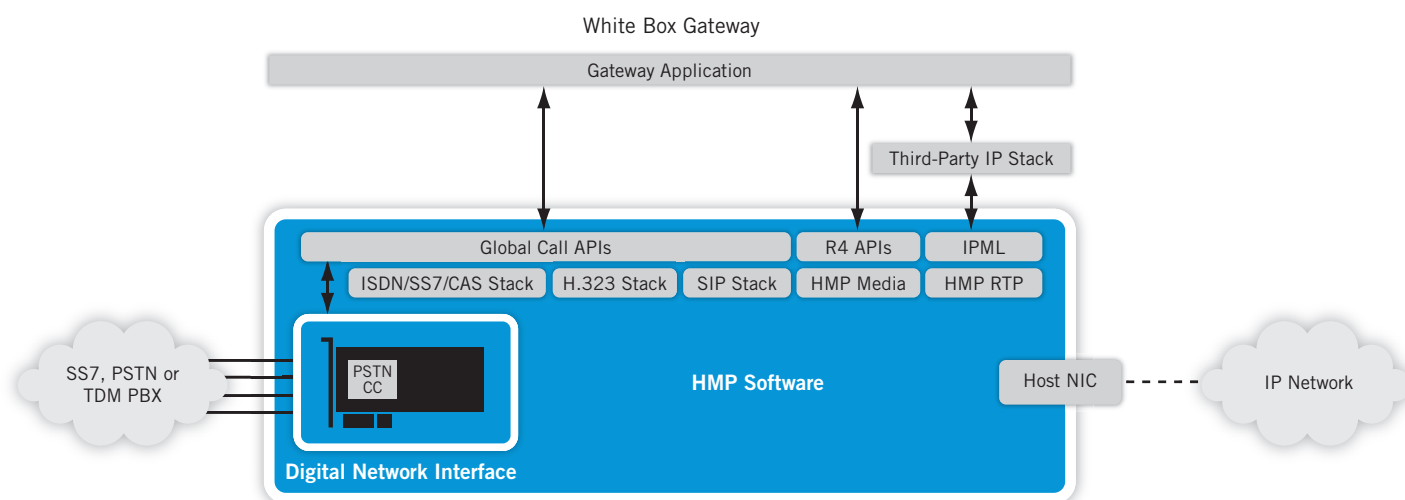

Figure 1. Media Gateway Architecture

Converged IP Contact Center Architecture

DNI Boards and PowerMedia HMP can also combine to provide a platform for converged IP contact center applications. Connected to the PSTN network or PBX via T1/E1 network interfaces and supporting IP agent positions with soft or hard IP station positions, the platform delivers the media components for building IVR, ACD, predictive dialing, messaging, speech, and conferencing on top of a base switching application.
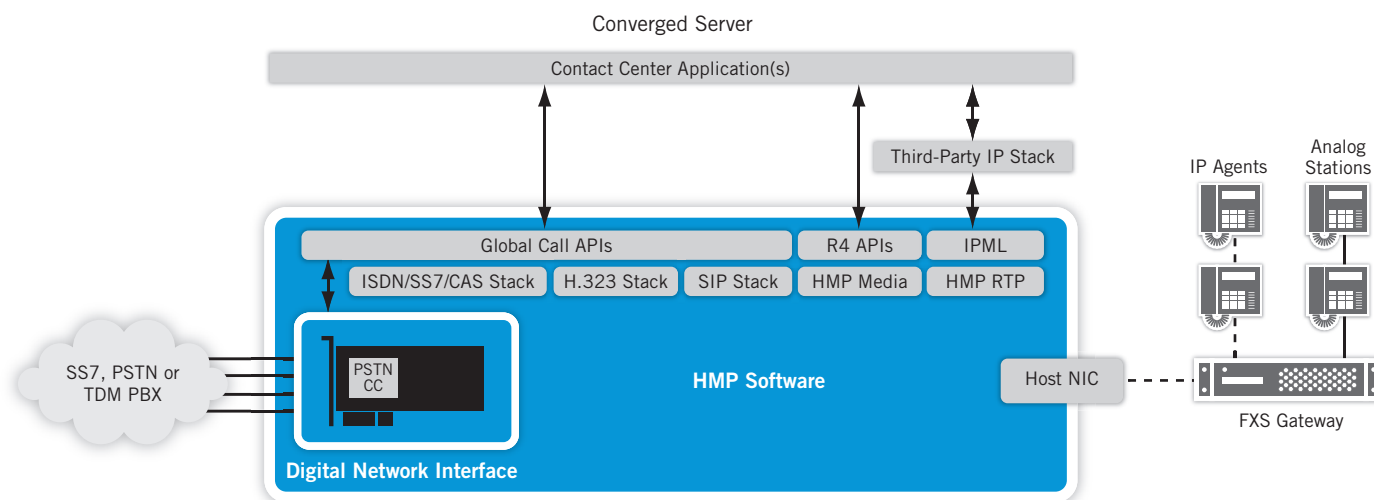

Figure 2. Converged IP Contact Center Architecture

Dialogic® HMP Interface Boards

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Converged Media Server Architecture

DNI Boards and PowerMedia HMP combine to provide a converged media server platform for deploying applications, such as messaging, with both PSTN and IP access. Converged media servers can provide a central and efficient messaging server in existing TDM voice infrastructures by servicing remote locations via an IP network and Dialogic® Media Gateways.
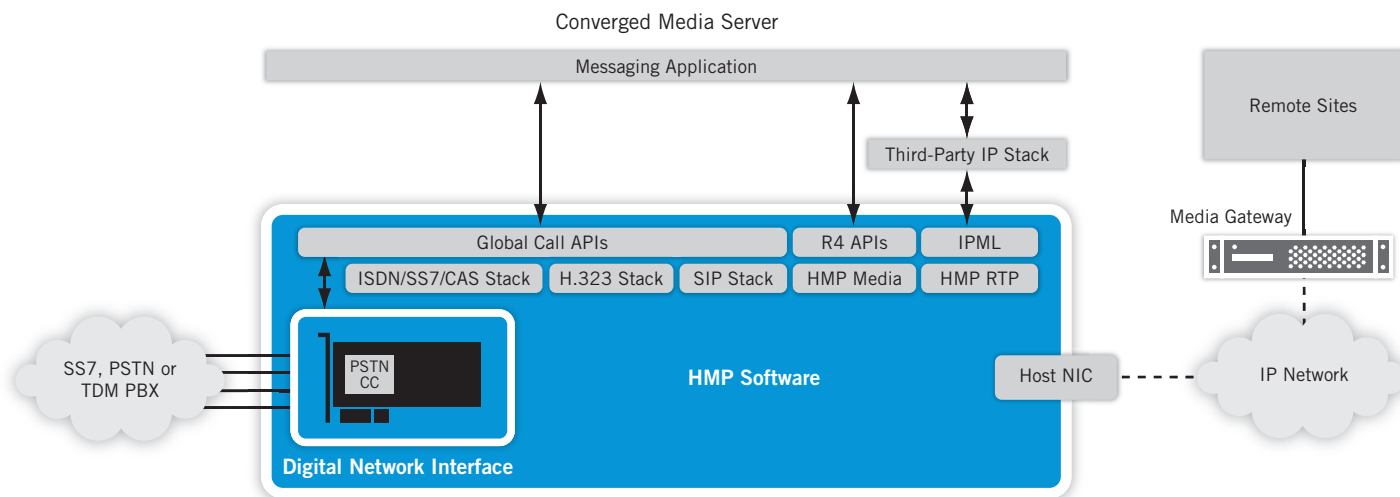

Figure 3. Converged Media Server Architecture

3G-324M Video

Figure 4 provides a view of a 3G-324M implementation using DNI Boards and PowerMedia HMP 4.1. This configuration supports media as well as SIP call control and can be implemented with Dialogic® DSI Protocol Stacks and Dialogic® DSI SS7 Boards. PowerMedia HMP 4.1 runs on a video telephony server, providing play, record, playback, and synchronization used to display video on 3G wireless, IP soft clients, and IP video phones.
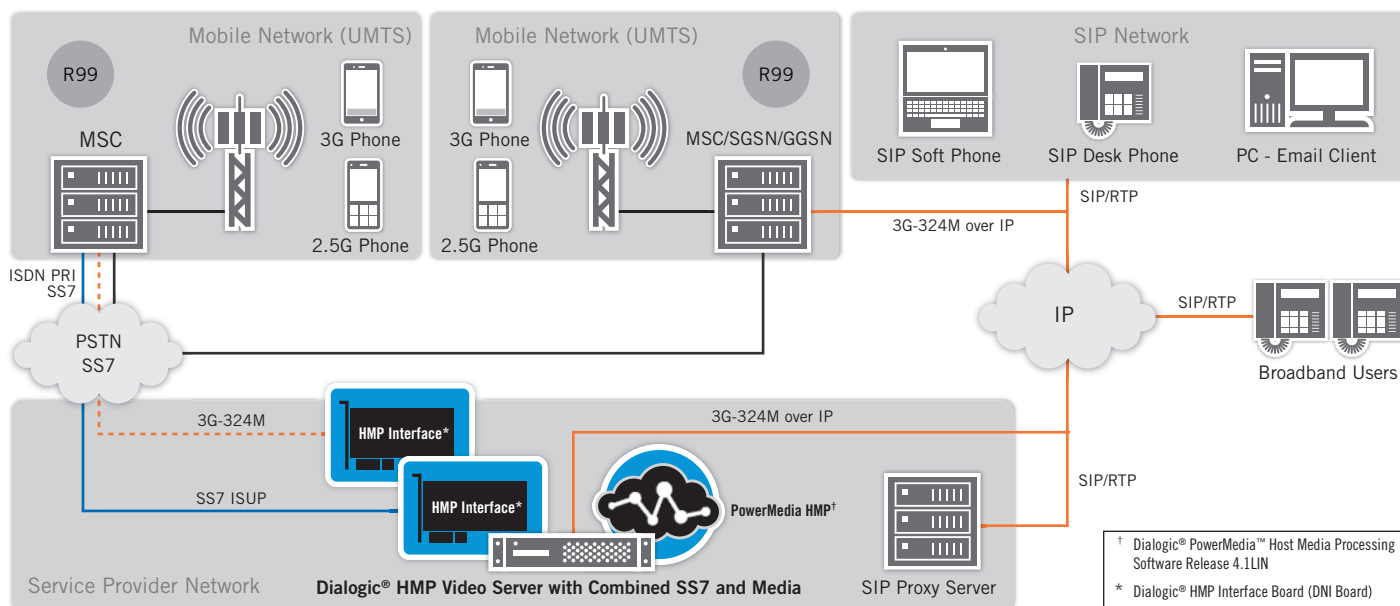

Figure 4. 3G-324M Video with Dialogic® PowerMedia™ Host Media Processing Software Release 4.1LIN

Software Support

DNI/2410PE2, DNI/1210PE2, DNI/610PE2, and DNI/310PE2 currently support PowerMedia HMP 4.1 for Linux and HMP 3.0 for Windows.

PowerMedia HMP performs media processing tasks on general-purpose servers without using specialized hardware, and provides media services for building flexible, scalable, and cost-effective IP media servers. DNI Boards and PowerMedia HMP can be combined to provide a cost-effective platform for converged TDM-IP applications.

PowerMedia HMP is a communications building-block technology. When installed on a system, the customer's application "sees" a Dialogic® board with DM3 architecture, but all media processing occurs on the host processor. To help customers accelerate their time-to-market and migrate existing applications to IP, PowerMedia HMP also supports two direct APIs: Dialogic® R4 API for media processing and Global Call API for call control.

PowerMedia HMP includes digital network PSTN protocols such as ISDN and CAS, equivalent to those found in Dialogic® System Release Software. The protocols are available for download to the DNI Boards during installation and configuration.

DNI Boards can also be used in conjunction with Dialogic® DSI SS7 Protocol Stacks to support SS7 signaling, either in conjunction with Dialogic® Global Call Software or using the direct DSI message-based interface. Combined media and signaling operation on the same board is currently supported by HMP 3.0 for Windows and by HMP 4.1 for Linux.

Dialogic® Global Call Software

DNI Boards support Global Call Software, which is a unified call control programming interface and protocol engine that makes it easier to provide worldwide application portability and which can shorten development time by allowing the same API to be used for almost any network protocol.

Global Call Software provides a common signaling interface for network-enabled applications, regardless of the signaling protocol needed to connect to the local telephone network. Global Call Software is the API for unified call control for boards with DM3 architecture and Dialogic® JCT architecture (also called Dialogic® Springware architecture). The signaling interface provided by Global Call Software facilitates the exchange of call control messages between the telephone network and virtually any network-enabled application. Global Call Software lets developers create an application that can work with signaling systems worldwide, regardless of the network to which they are connected.

Global Call Software is field-proven for high-density, network-enabled solutions for voice and data where the supported hardware and signaling technology can vary widely. Rather than requiring the application to handle the low-level details, Global Call Software offers a consistent, high-level interface to the user, handling each country's unique protocol requirements in a way that is transparent to the application, thereby simplifying and expanding global opportunities.

Functional Description

DNI Boards are based on DM3 architecture (mediastream). The architecture consists of a set of core specifications and firmware modules that are implemented on boards with various processors and interfaces, including:

- TDM bus interface (Dialogic® SyncRoute Bus) for clock synchronization with other DNI boards
- One, two, four, or eight software-selectable digital telephony network interfaces
- Four mixed T1/E1 interfaces (DNI/2410PE2 only)
- PCI Express bus interface

Downloadable Firmware

The hardware for DNI Boards consists of a baseboard with a microprocessor and four or eight DS-1 digital network interfaces.

Telephony signaling protocols are downloaded as firmware to the boards on startup. This downloadable firmware approach enables easy feature upgrade and expansion. Individual firmware components, such as a network interface protocol, are referred to as resources.

Echo Cancellation for Boards

DNI/2410PE2, DNI/1210PE2, DNI/610PE2, and DNI/310PE2 include an ASIC on the baseboard that supports onboard G.168 echo cancellation up to 128 ms tail length. This feature can be enabled or disabled via an API.

Network Interface

DNI Boards have software-selectable trunks that can enable them to be configured as T1 or E1 to increase flexibility, simplify the purchasing process and test effort, and help reduce inventory and the total cost of ownership. DNI/2410PE2 can have four mixed T1 and E1 interfaces. DNI/2410PE2, DNI/1210PE2, DNI/610PE2, and DNI/310PE2 support CEPT Channel Associated Signaling (CAS), Signaling System Number 7 (SS7), and ISDN PRI access for both T1 and E1 networks.

- **Configured as a T1** — DNI/2410PE2, DNI/1210PE2, DNI/610PE2, and DNI/310PE2 support T1 robbed-bit signaling protocols and are compatible with interface devices that use, or can be set to use, 1.544 MHz clocking and μ-law pulse code modulation (PCM). In addition, configured as a T1, the boards also support the clear channel feature, thus providing up to 192 bearer channels when used in this mode; clear channel is normally used in conjunction with the SS7 DSI protocol stack. T1 protocol implementations comply with the North American standard ISDN PRI and the INS-1500 standard used in Japan. In North America and Japan, the ISDN Primary Rate includes 23 voice/data channels (B channels) and one signaling channel (D channel).

- **Configured as an E1** — DNI/2410PE2, DNI/1210PE2, DNI/610PE2, and DNI/310PE2 support CEPT Channel Associated Signaling (CAS) protocols and are compatible with interface devices that use, or can be set to use, 2.048 MHz clocking and A-law PCM. In addition, configured as an E1, these boards also support the clear channel feature, thus providing up to 248 bearer channels when used in this mode; clear channel is normally used in conjunction with the SS7 DSI protocol stack. E1 protocol implementations comply with the E1 ISDN PRI protocols. The E1 ISDN Primary Rate includes 30 voice/data channels (B channels) and two additional channels: one signaling channel (D channel) and one framing channel to handle synchronization.

ISDN PRI features include:

- **Non-Facility Associated Signaling (NFAS)** — Allows a single D channel to control up to 10 PRI trunks, providing significant savings in ISDN service subscription costs available on NI-2, 4ESS, 5ESS, DMS100, and DMS250
- **D channel backup (on NI-2 only)** — Allows another D channel to take over should the main D channel fail
- **Facility, notify, and optional Information Elements (IEs)** — Allows applications to work with network-specific supplementary services
- **Direct Dialing In (DDI)** — Allows an application to route incoming calls by automatically identifying the number the caller dialed. Also known as Dialed Number Identification Service (DNIS)
- **Call-by-call service selection** — Allows an application to select the most efficient bearer channel service, such as a toll-free line or a WATS line, on a call-by-call basis
- **User-to-user information** — Allows an application to send proprietary messages to remote systems during call establishment
- **LAP-D Layer 2 access** — Allows developers to build a customized Layer 3 protocol
- **Dynamic setting of protocol timers** — Allows setting through a configuration file
- **Maskable Layer 2 Control** — Allows an application to toggle between bringing Layer 2 up and down as desired

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SS7 features include:

- **Support for up to 16 SS7 Links** — Flexible run-time licensing allows the user to provision the appropriate density for the application

- **Multiple protocol variants** — Supports ITU-T, ANSI, China and Japan protocol variants

- **Integrated media and signaling on a single board** — Removes the need for external cross connects or inter-board PCM highways

- **Common GlobalCall API for Call Control** — Allows applications to work in a common manner irrespective of the underlying signaling protocol

- **Fully compatible with Dialogic® DSI SS7 Protocol Stack** — Allows support of call control (ISUP, TUP), in addition to transaction based protocols including SCCP, TCAP, MAP, IS41 and INAP

Current information on the protocols supported by each DNI Board can be found in the Configuration Guides and Release Updates for PowerMedia HMP accessible from http://www.dialogic.com/manuals.

Dialogic maintains an extensive number of product approvals in international markets. See the list of globally approved products at http://dialogic.com/declarations.

Technical Specifications

Digital interfaces	8, 4, 2, 1 T1/E1
Form factor	PCI Express half length, standard height, single-slot width
Dimensions	Height: 4.376 in (11.12 cm)
	Length (excluding edge connector): 6.6 in (16.76 cm)

Host Interface

Bus Type	PCI Express
Link Width	1-lane
Bus Compatibility	PCI Express Specification Version 1.1 Compliant
Interrupts	Message Signaled Interrupt (MSI)
Host interface memory	24MB
Bus mode	Target and DMA master mode operation
Network connectors	Four RJ-48C on front bracket

Platforms

Control processor	Freescale MPC8314 PowerQUICC II Pro @ 400 MHz
Control processor memory	104 MB DRAM
Echo Cancellation	Dialogic® e256 EC Chip
Computer telephony bus	Dialogic® SyncRoute cable connector with ability to connect to H.100 bus boards only for clock synchronization

Power Requirements

Configuration	+12 VDC	+3.3 VDC
DNI2410TEPE2HMP	0.33A	1.9A
DNI1210TEPE2HMP	0.25A	1.9A
DNI610TEPE2HMP	0.25A	1.9A
DNI310TEPE2HMP	0.25A	1.9A

Dialogic® HMP Interface Boards
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Cooling Requirements

Operating temperature	0° C to +50° C
Storage temperature	−20° C to +70° C
Humidity	8% to 80% noncondensing

Safety and Telecom Certifications

DNI2410TEPE2HMP can be approved as GEMP or GEMP8.

DNI1210TEPE2HMP, DNI610TEPE2HMP and DNI310TEPE2HMP can be approved as GEMP or GEMP4.

United States	US: EBZXDNANGEMP
	UL: E96804
Canada	IC: 885A- GEMP
	ULc: E96804
Europe	EN 60950-1:2006 +A11:2009
	ETSI TBR 4/A1 :1997
	ETSI TBR 012/A1:1996
	ETSI TBR 013:1996
Estimated MTBF	Per Telcordia Method I:
	DNI2410TEPE2HMP: 336,000 hours
	DNI1210TEPE2HMP: 343,000 hours
	DNI610TEPE2HMP: 343,000 hours
	DNI310TEPE2HMP: 343,000 hours

Telephone Interface — DSX-1 T1

Clock rate	1.544 Mb/s ±32 ppm
Level	3.0 V (nominal)
Pulse width	323.85 ns (nominal)
Line impedance	100 Ohm ±10%
Other electrical characteristics	Complies with AT&T TR62411 and ANSI T1.403-1989
Framing	SF (D3/D4)
	ESF for ISDN
Line coding	AMI
	AMI with B7 stuffing
	B8ZS
Clock and data recovery	Complies with AT&T TR62411 and Telcordia TA-TSY-000170
Jitter tolerance	Complies with AT&T TR62411 and ANSI T1.403-1989
Zero code suppression	Bell ZCS (Jam bit 7)
	GTE ZCS (Jam bit 8)
	Digital Data Service ZCS
	No zero code suppression

Dialogic® HMP Interface Boards
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Telephone Interface	**CEPT E1**
Network clock rate	2.048 Mb/s ±50 ppm
Internal clock rate	2.048 Mb/s ±32 ppm
Level	3.0 V (nominal) for 120 Ohm lines
Pulse width	244 ns (nominal)
Line impedance	120 Ohm, balanced
Other electrical characteristics	Complies with ITU-T Rec. G.703
Framing	ITU-T G.704-1988 with CRC4
Line coding	HDB3
Clock and data recovery	Complies with ITU-T Rec. G.823-1988
Jitter tolerance	Complies with ITU-T Rec. G.823, G.737, G.739, G.742-1988
Loopback	Supports software-selectable local digital loopback
SS7 Interface	
Signaling Links	Up to 16 links (using a single board or spread across multiple boards)
Signaling Data Link	48, 56 or 64kb/s
Throughput	Up to 1,500 MSU/s per board or 3,000 MSU/s per server
Audio Processing	Dialogic® PowerMedia™ Host Media Processing Software provides application or program control for audio levels, automatic gain control, audio digitizing and playback features

Approvals, Compliance, and Warranty

Hazardous substances	RoHS compliance information at http://www.dialogic.com/rohs
Country-specific approvals	See the global product approvals database at http://www.dialogic.com/declarations
Warranty	See warranty information at http://www.dialogic.com/warranties

Ordering Information

Product Code	Order Code	Description
DNI2410TEPE2HMP	306-427	Octal T1/E1 with G.168 echo cancellation, PCIe Half Length, Standard Height
DNI1210TEPE2HMP	306-428	Quad T1/E1 with G.168 echo cancellation, PCIe Half Length, Standard Height
DNI610TEPE2HMP	306-484	Dual T1/E1 with G.168 echo cancellation, PCIe Half Length, Standard Height
DNI310TEPE2HMP	306-483	Single T1/E1 with G.168 echo cancellation, PCIe Half Length, Standard Height
SS7SBLDISUP1K	G01-051	SS7 License, 2 LSL (MTP2, MTP3), 1,024 CICs (ISUP)
SS7SBLDISUP2K	G02-051	SS7 License, 4 LSL (MTP2, MTP3), 2,048 CICs (ISUP)
SS7SBLDISUP4K	G03-051	SS7 License, 4 LSL (MTP2, MTP3), 4,096 CICs (ISUP)
SS7SBLDISUP4K8L	G04-051	SS7 License 8 LSL (MTP2, MTP3), 4,096 CICs (ISUP)
SS7SBLDISUP4K16L	G05-051	SS7 License 16 LSL (MTP2, MTP3), 4,096 CICs (ISUP)

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