Dialogic

Dialogic® Blue™ Telephony Boards

Installation Guide

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www.dialogic.com

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Introduction to the Dialogic® Blue™ Telephony Boards

The Dialogic® Blue™ Telephony Boards family consists of telephony boards that can provide host-based call processing for the open source and IVR markets. Each board supports basic telephony features, including call transfer emulation, G.711, Automatic Gain Control (AGC), and echo cancellation. For a complete list of supported features, see Supported Features, below.

The following Dialogic Blue Telephony Boards are available:

Board Name	Notes
Dialogic® Blue™ OneSpan-24/30-S-LP Telephony Board	**S-LP** stands for software echo cancellation and low profile form factor.
Dialogic® Blue™ OneSpan-24/30-H-HL Telephony Board	**H-HL** stands for hardware echo cancellation and half length form factor.
Dialogic® Blue™ TwoSpan-48/60-H-HL Telephony Board	
Dialogic® Blue™ FourSpan-96/120-H-HL Telephony Board	
Dialogic® Blue™ EightSpan-192/240-H-HL Telephony Board	

To view a copy of the Software License Agreement for the Diva software that runs on Dialogic Blue Telephony Boards, see:

http://www.dialogic.com/manuals/divasr9.6lin /diva_SoftwareLicenseAgreement.pdf

Supported Features

- Fax tone detection
- DTMF tone detection and transmission
- Collection of DTMF post-dial digits
- Host-based Switching and Conferencing (Line Interconnect)
- Host-based Cross-board switching (Line Interconnect on multiple boards)
- Automatic Gain Control (AGC) for conferencing
- Up to 128 ms of G.168 Echo Cancellation (EC). On the H-HL versions of the Dialogic Blue Telephony Boards, the EC is implemented in the hardware. On the Dialogic Blue OneSpan-24/30-S-LP Telephony Board, the EC is implemented in the software, so the EC consumes host CPU performance.
- Real-Time Protocol (RTP / RTCP)
- Secure RTP
- Comfort Noise Generation (CNG), when using Asterisk codecs or Dialogic® Diva® SIPcontrol™ codecs
- Voice Activity Detection (VAD), when using Asterisk codecs or Diva SIPcontrol codecs
- Dynamic Anti Jitter Buffer (less buffer available)
- Audio Tap
- Full-duplex voice, 'barge-in'
- G.711 Coding (a-Law and µ-Law)
- Call Transfer Emulation
- Clear Channel Data (transparent), HDLC, X.75/V.42bis, ISO8208, X.25
- SS7 MTP1/MTP2
- Full international protocol code support (ISDN, R2, T.1 RBS, Line Side E.1)

If you need features that are not available with your Dialogic Blue Telephony Board, such as fax or modem functionality, contact your Sales representative, who can offer you a Dialogic® Diva® Media Board to meet your needs.

Supported Operating Systems

Dialogic Blue Telephony Boards support Linux operating systems with most of the known kernels and distributions. For a list of these kernals and distributions, see the *Dialogic® Diva® System Release Reference Guide* for Release 9.6LIN or later.

System Requirements

The system requirements and performance of Dialogic Blue Telephony Boards varies depending on the application, the use of echo cancellation, and the density of the system. In general, the following guidelines apply when reserving enough CPU power for the application and running the system below 50% CPU load:

To operate one Dialogic Blue OneSpan-24/30-S-LP Telephony Board with software echo cancellation, you need a 2GHz XEON Core processor. With this processor type, you need 24% processor performance using software echo cancellation on one core of the 2 GHz XEON processor. Without software echo cancellation, the CPU utilization will be below 10%.

To operate Dialogic Blue H-HL boards, which are equipped with hardware echo cancellation, a low end (dual core) system will support up to 120 channels, a mid end (quad core) system will support up to 240 channels, and a high end system will support up to 480 channels.

General Safety Instructions

Use the following safety instructions to help ensure your own personal safety and to help protect your computer, your Dialogic Blue Telephony Board, and your working environment from potential damage.

WARNING

All computers that have Dialogic Blue Telephony Boards installed must comply with the country specific safety regulations, such as CE or FCC, to avoid serious personal injuries and damage to your computer, your Dialogic Blue Telephony Board, or both.

Before you install your Dialogic Blue Telephony Board or remove the cover from your computer for any reason, disconnect the cable from the ISDN, E1, or T1 line, to avoid personal injuries and damage to your computer, your Dialogic Blue Telephony Board, or both.

Proper installation of the Dialogic Blue Telephony Board requires that it is screwed to the metal backplate of the PC. This ensures proper grounding that is necessary for your safety.

Never install telephone jacks in wet locations.

Never touch non-insulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.

Use caution when installing or modifying telephone lines.

Telephone companies report that electrical surges, typically lightning transients, are very destructive to customer terminal equipment connected to AC power sources. The use of a surge arrestor on the AC line is recommended.

(Applies to OneSpan-24/30-S-LP Telephony Boards only) PRI signals can have telephone network voltages (TNV). Therefore, ISDN PRI, E1, and T1 lines should be installed and maintained by service personnel only. It may be hazardous if your computer is not properly plugged in and grounded. This applies particularly to users in North America and Australia.

IMPORTANT

Dialogic Blue Telephony Boards have been tested and found to comply with the Electromagnetic compatibility, Safety, and Network connection regulations within the European Union, North America, and other major territories. Read the regulatory information before installing and using your Telephony Board.

Cables for PRI interface ports shall be shielded.

Dialogic Blue Telephony Boards should only be operated within the permitted temperature range of 10 degrees C to 50 degrees C. If the temperature is exceeded, a trace file with the temperature information will be created.

Before You Start

Before you start, make sure you have the items you need to install your Dialogic Blue Telephony Board and the corresponding software.

Item	Description
Computer	Your computer must have: • A free PCIe x1 slot, 1.0a compliant. Other slot sizes, e.g., x8, x16 can be used if supported by the BIOS and the operating system. • An installed Linux operating system. • At least 100 MB of free hard-disk space for the software.
Dialogic® Blue™ Telephony Board package	This includes: • Dialogic Blue Telephony Board • Installation Guide
Cables	The RJ45 cables are not part of the package and need to be ordered from an independent distributor.
Primary Rate Interface (PRI), channelized E1 or T1 interface	The lines are installed by your service provider. Make sure that you get the appropriate line(s) for your Dialogic Blue Telephony Board.
Information about your line	Your service provider has to provide the following information: • Switch type: This usually depends on your geographic location. Common switch types include Euro-ISDN DSS1 (used in Europe), QSIG (used in PBXs), NI-1 and 5ESS (both used in North America), and T1 Robbed Bit. • Phone numbers for each E1 or T1

Installation

This chapter will assist you in installing your Dialogic Blue Telephony Board and connecting it to your ISDN PRI, E1, or T1 line.

You need to complete the following three procedures to use your Dialogic Blue Telephony Board properly:

- (A) Insert your Dialogic Blue Telephony Board into your computer as described below.
- (B) Connect your Dialogic Blue Telephony Board as described on page 8.
- (C) Install your Dialogic® Diva® System Release software as described on page 12.

Note: You may need to consult your computer's manual during the installation of your Dialogic Blue Telephony Board.

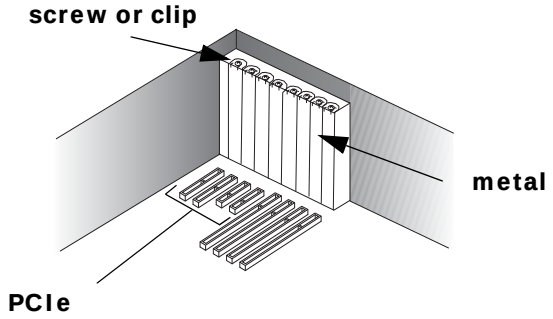
Step 1: Inserting Your Dialogic® Blue™ Telephony Board into Your Computer

1. For your safety, disconnect all technical and peripheral devices and all energy sources from the computer.
2. Drain static electricity from your body by touching the metal chassis (the unpainted metal at the back of your computer).
3. Remove the ISDN cable, if present, and the power cord from your computer.

4. Remove the cover of the computer as described in your computer's manual.
5. Locate a PCIe slot in your computer.
6. If there is a metal plate at the end of the slot, remove the screw or loosen the clip and remove the metal plate. Keep the screw for fastening your Dialogic Blue Telephony Board.
7. Before you insert your Dialogic Blue Telephony Board, read the following safety instruction:

CAUTION: To avoid damaging your hardware, insert the Dialogic Blue Telephony Board only into a PCIe slot, according to your board type. Inserting the Telephony Board into any other type of slot can damage your board, your computer, or both.

Firmly insert the Dialogic Blue Telephony Board into the selected slot. Make sure that the board does not touch the CPU, memory modules, or other parts on the motherboard.



8. Firmly secure the Dialogic Blue Telephony Board with the screw or clip.

WARNING: For your safety, make sure that the Dialogic Blue Telephony Board's bracket is properly secured to the PC's chassis by fastening the Dialogic Blue Telephony Board with the screw or clip. This will ensure proper grounding and avoid personal injuries and damage to your computer, your board, or both.

9. Replace the cover of the computer as described in your computer's manual.

Step 2: Connecting Your Dialogic® Blue™ Telephony Board

The OneSpan-24/30-S-LP Telephony board has a built-in CSU (Channel Service Unit) to protect the board from damage due to power surges. However, you can also use an external CSU, which allows you to test your ISDN, E1, or T1 line.

Dialogic Blue H-HL Telephony boards do not supply the CSU functionality internally. For these boards, you must purchase a CSU unit from an independent distributor.

Connecting All Dialogic® Blue™ Telephony Board Models Except the Dialogic® Blue™ EightSpan-192/240-H-HL Board

The instructions in this section describe how to connect the following boards:

- OneSpan-24/30-S-LP Telephony Board
- OneSpan-24/30-H-HL Telephony Board
- TwoSpan-48/60-H-HL Telephony Board
- FourSpan-96/120-H-HL Telephony Board

The cable you use to connect the Dialogic Blue Telephony Board depends on how you want to apply the board:

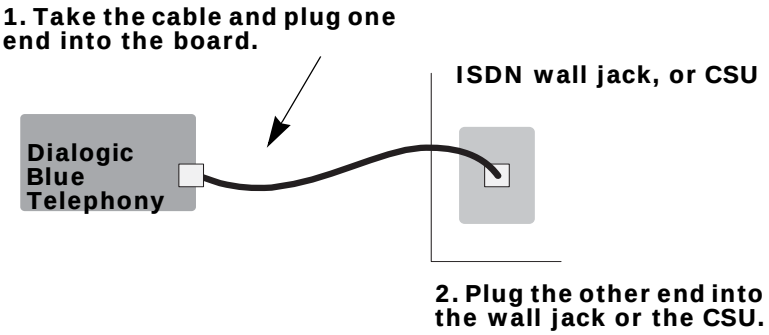
- RJ45 to RJ45 for connection to an ISDN PRI, E1, or T1 line with an RJ45 jack or for connection as network termination to a PBX.
- RJ45 to open-ended cables for connection to your ISDN PRI, E1, or T1 line with open-ended wire connections or for back-to-back connection.

If the ISDN PRI or T1 line is installed with an RJ45 jack, use an RJ45 to RJ45 cable:

Dialogic® Blue™ Telephony Board	Signals	RJ45 Terminal
Pin 1	Receive + (RX +)	Pin 1
Pin 2	Receive - (RX -)	Pin 2
Pin 4	Transmit + (TX +)	Pin 4
Pin 5	Transmit - (TX -)	Pin 5
shielded plug	overall shielded	shielded plug

Note: For E1 Mode with 75 Ohm impedance, use an external 75 Ohm Balun Adapter. You can purchase such an adapter from specialized stores.

Connect your Dialogic Blue Telephony Board as shown below:



If the Dialogic® Blue™ Telephony Board in NT Mode Is Connected to a PBX

The Diva System Release software enables you to configure a Dialogic Blue Telephony Board as a network termination (NT). This means your Dialogic Blue Telephony Board can serve as an NT for PBXs that act as terminal equipment and therefore requires an NT to provide a clocking signal. For example, the Dialogic Blue Telephony Board can act as an NT when coupling PBXs with the Q.SIG protocol.

When connecting the Dialogic Blue Telephony Board to a PBX that acts as TE, configure the Dialogic Blue Telephony Board as an NT. Wire it to the PBX as shown in the diagram on page 10, and apply the appropriate assignment to the PBX connectors.

If the ISDN PRI, E1, or T1 Line Uses Open-Ended Wire Connections

In some cases, you are required to connect to your network termination using the open-ended connectors. The transmission (TX) leads and the receiving (RX) leads are identified by color; transmission leads are blue and white-blue, receiving leads are orange and white-orange.

Use an RJ45 to open ended cable:

Dialogic® Blue™ Telephony Board	Signals	Open Ends
Pin 1	Receive + (RX +)	white-orange
Pin 2	Receive - (RX -)	orange
Pin 4	Transmit + (TX +)	white-blue
Pin 5	Transmit - (TX -)	blue
shielded plug	overall shielded	shield

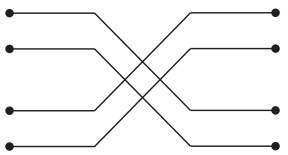
Make sure to connect the transmission leads of your Dialogic Blue Telephony Board to the receiving connectors of the network termination and the receiving leads of your Dialogic Blue Telephony Board to the transmission connectors of the network termination.

Note: If the Dialogic Blue Telephony Board is not properly connected to the ISDN PRI, E1, or T1 line, a layer 1 warning light appears on the NT, the Dialogic Blue Telephony Board, the external CSU, and at the switching center of the network provider. The network provider might then deactivate the line. If this occurs, you must contact your network provider to reactivate your line.

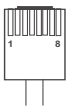
If the Dialogic® Blue™ Telephony Boards Are Run in Back-to-Back Mode

The Diva System Release software enables you to configure a Dialogic Blue Telephony Board as a network termination (NT). This means you can use two Dialogic Blue Telephony Boards in back-to-back operation.

When using Dialogic Blue Telephony Boards back-to-back, configure one Dialogic Blue Telephony Board as an NT and the other one as TE. Connect the Dialogic Blue Telephony Boards with a crossover cable. You can build your own crossover cable using an open-ended ISDN cable. Just crimp the open end according to the NT-side assignment shown in this diagram:

	TE Side		**NT Side**
Pins on RJ45	Signals	Wiring	Signals
1	RX +		RX +
2	RX -		RX -
3not used			
4	TX +		TX +
5	TX -		TX -
6not used			
7not used			
8not used			

Note: Looking at the RJ45 connector with the exposed connector pins facing you, the pins are numbered from 1 to 8 from left to right (as shown below).



Connecting the Dialogic® Blue™ EightSpan-192/240-H-HL Telephony Board

The instructions in this section describe how to connect the EightSpan-192/240-H-HL Telephony Board.

The cable you use to connect the Dialogic Blue Telephony Board depends on how you want to apply the Dialogic Blue Telephony Board:

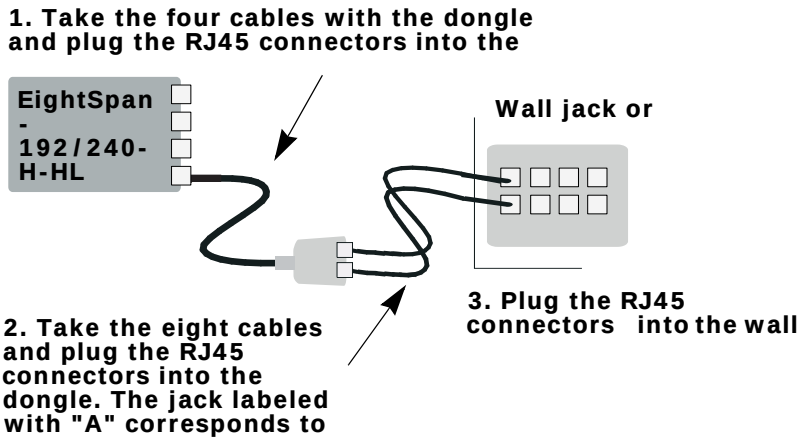
- RJ45 to RJ45 for connection to an ISDN PRI, E1, or T1 line with an RJ45 jack or for connection as network termination to a PBX.
- RJ45 to open-ended cables for connection to your ISDN PRI, E1, or T1 line with open-ended wire connections or for back-to-back connection.

If the ISDN PRI or T1 line is installed with an RJ45 jack, use an RJ45 to RJ45 cable:

RJ45	Signals	Dongle with RJ45 jacks		Signals
Pin 1	Receive + (RX +) (Port A)	Port A	Pin 1	Receive + (RX +)
Pin 2	Receive - (RX -) (Port A)		Pin 2	Receive - (RX -)
Pin 3	Receive + (RX +) (Port B)		Pin 4	Transmit + (TX +)
Pin 4	Transmit + (TX +) (Port A)		Pin 5	Transmit - (TX -)
Pin 5	Transmit - (TX -) (Port A)	Port B	Pin 1	Receive + (RX +)
Pin 6	Receive - (RX -) (Port B)		Pin 2	Receive - (RX -)
Pin 7	Transmit + (TX +) (Port B)		Pin 4	Transmit + (TX +)
Pin 8	Transmit - (TX -) (Port B)		Pin 5	Transmit - (TX -)

Note: EightSpan-192/240-H-HL Telephony Boards do not supply the function of the CSU internally. You need to purchase a CSU unit from an independent distributor.

Connect the EightSpan-192/240-H-HL Telephony Board as shown in this graphic**:**



If the Dialogic® Blue™ Telephony Board in NT Mode Is Connected to a PBX

The Diva System Release software enables you to configure an EightSpan-192/240-H-HL Telephony Board as a network termination (NT). To configure an EightSpan-192/240-H-HL Telephony Board in this way, follow the instructions in If the Dialogic® Blue™ Telephony Board in NT Mode Is Connected to a PBX on page 9.

If the ISDN PRI, E1, or T1 Line Uses Open-Ended Wire Connections

In some cases, you are required to connect to your network termination using the open-ended connectors. To connect to your network termination using the open connectors, follow the instructions in If the ISDN PRI, E1, or T1 Line Uses Open-Ended Wire Connections on page 9.

If the Dialogic® Blue™ Telephony Boards Are Run in Back-to-Back Mode

The Diva System Release software enables you to configure a Dialogic Blue Telephony Board as a network termination (NT). This means you can use two Dialogic Blue Telephony Boards in back-to-back operation. To configure EightSpan-192/240-H-HL Telephony Boards in this way, follow the instructions in If the Dialogic® Blue™ Telephony Boards Are Run in Back-to-Back Mode on page 10.

Step 3: Installing the Dialogic® Diva® System Release Software

The Dialogic Blue Telephony Boards use Dialogic® Diva® System Release software, which can be downloaded from the Dialogic website. To access this software, follow these steps:

1. Access the Dialogic® Blue™ Telephony Boards page at http://www.dialogic.com/products/media/blue/default.htm.
2. Click on the board for which you want to install Diva System Release software.
3. In the RELATED LINKS section on the upper right, click **Download Diva SR software for Linux.**

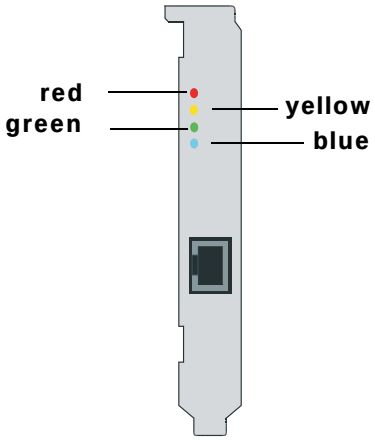
For instructions about installing this software, see the online documentation that came with the drivers. The online documentation is also available on the Dialogic web site at http://www.dialogic.com/manuals/default.htm.

Troubleshooting

If you are having problems with your Dialogic Blue Telephony Board or with the corresponding software, the following suggestions can help you try to diagnose and solve the problems. If these suggestions do not work for you, try the suggestions described in the online reference guides or in the help files for the corresponding software, or access the Dialogic Service Center. For more information, see Customer Service on page 17.

Checking the Status LEDs for the Dialogic® Blue™ OneSpan-24/30-S-LP Telephony Board

The OneSpan-24/30-S-LP Telephony Board has four status LEDs that indicate specific board statuses. The following image shows these LEDs:

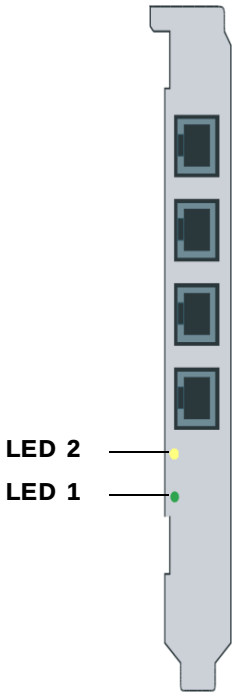


The table below describes the function of each LED:

Color	Status	Description
yellow	off	Normal operation.
	lit	Remote site is experiencing synchronization problems (if a remote alarm/yellow alarm is detected).
red	off	Normal operation.
	lit	The receiver does not detect a signal (loss of signal/red alarm).
blue	off	Normal operation.
	lit	Received frames are not synchronized properly (alarm indication signal/blue alarm).
green	off	Layer 2 is not active. Check your layer 2 configuration, i.e., switch type, switch etc.
	lit	Layer 2 is active. If your Dialogic Blue Telephony Board works properly, layer 2 is always active.

Checking the Status LEDs for the Dialogic® Blue™ H-HL Telephony Boards

The Dialogic Blue H-HL Telephony Boards have two status LEDs that indicate specific board statuses. The following image shows the LEDs for a FourSpan-96/120-H-HL Telephony Board:



LED 1 (Red/Green)

LED 1 indicates whether the board is operational. The following table describes the board statuses signaled by LED 1:

Color/State	Board Status
Red	Board is in reset mode.
Green	Internal power is okay.
Off	Board is not receiving power.

LED 2 (Yellow)

It is recommended to get the port status by viewing the **View report** page of the Diva Web GUI. If the Diva web GUI is not available, you can interpret the blinking cadences of LED 2, as described below.

LED 2 uses blinking cadences to provide the Layer 1 and layer 2 statuses for each port. The start of a sequence is indicated by a long period off, followed by the status sequence for Port 1. A short period off signals the status sequence for the next port. For example, LED 2 will blink as follows for a four-port Dialogic Blue Telephony Board:

1. Long period off
2. Blink sequence for Port 1
3. Short period off
4. Blink sequence for Port 2
5. Short period off
6. Blink sequence for Port 3
7. Short period off

8. Blink sequence for Port 4
9. Long period off
10. Blink sequence for Port 1
11. ...

The following table describes the board statuses signaled by each LED 2 blink sequence:

Blink Sequence	Board Status
Short bright orange period	The receiver does not detect a signal (loss of signal/red alarm).
Long bright orange period	Normal operation. (Layer 1 and Layer 2 are both active.)
Dark orange period followed by a bright orange period	Received frames are not synchronized properly (alarm indication signal/blue alarm).
Bright orange period followed by a dark orange period	Remote site is experiencing synchronization problems (a remote yellow alarm is detected).
Dark orange period followed by a bright orange period and then a dark orange period	Layer 1 is active. Layer 2 is inactive. Check your layer 2 configuration, including the switch type, switch, and so on.

Technical Specifications

Environmental requirements:

- Operating temperature: 10 degrees C to 50 degrees C
- Maximum tolerance in voltage fluctuation: according to the respective PCIe specification

OneSpan Boards

	Dialogic® Blue™ OneSpan-24/30-S-LP Telephony Board	**Dialogic® Blue™ OneSpan-24/30-H-HLTelephony Board**
Bus type	PCIe 1.0a x 1 lane	
CPU	N/A	
Memory	N/A	
IRQ levels	Allocated by PC BIOS	
I/O base addr. (hex)		
Shared memory range	N/A	
DSPs	N/A	1 Echo canceller DSP
Dimensions in mm (length x height)		
PCB	167.65 x 68.901	167.65 x 111.15
Low profile bracket	181.36 x 80.06	N/A
Bracket	180.96 x 120.88	180.96 x 126.31
Data transfer		
D-channels	1 x 64 kbps	
B-channels	1 x 23 or 30 x 64 kbps	1 x 23 x 64 kbps or 1 x 30 x 64 kbps
Channelized T1	24 x 56 kbps	1 x 24 x 56 kbps
Plug&Play	Yes	
Power safe mode		
Ports	1x Female RJ45 (ISDN PRI)	
Physical interfaces	1 x Primary rate interface or 1 x channelized T1 interface	
Power requirements	0.58 A @ +3.3 V Typ. 0.04 A @ +12 V Typ.	0.57 A @ +3.3 V Typ 0.25 A @ +12 V Typ.

TwoSpan, FourSpan, and EightSpan Boards

	Dialogic® Blue™ TwoSpan-48/60-H-HL Telephony Board	**Dialogic® Blue™ FourSpan-96/120-H-HL Telephony Board**	**Dialogic® Blue™ EightSpan-192/240-H-HL Telephony Board**
Bus type	PCIe 1.0a x1 lane		
CPU	N/A		
Memory	N/A		
IRQ levels	Allocated by PC BIOS		
I/O base addr. (hex)			
Shared memory range	N/A		
DSPs	1 Echo canceller DSP		2 Echo canceller DSPs
Dimensions in mm (length x height)			
PCB	167.65 x 111.15		

	Dialogic® Blue™ TwoSpan-48/60-H-HL Telephony Board	**Dialogic® Blue™ FourSpan-96/120-H-HL Telephony Board**	**Dialogic® Blue™ EightSpan-192/240-H-HL Telephony Board**
Low profile bracket	N/A	N/A	N/A
Bracket	180.96 x 126.31		
Data transfer			
D-channels	2 x 64 kbps	4 x 64 kbps	8 x 64 kbps
B-channels	2 x 23 x 64 kbps or 2 x 30 x 64 kbps	4 x 23 x 64 kbps or 4 x 30 x 64 kbps	8 x 23 x 64 kbps or 8 x 30 x 64 kbps
Channelized T1	2 x 24 x 56 kbps	4 x 24 x 56 kbps	8 x 24 x 56 kbps
Plug&Play	Yes		
Power safe mode			
Ports	2 x Female RJ45 (ISDN PRI)	4 x Female RJ45 (ISDN PRI)	8 x Female RJ45 (ISDN PRI)
Physical interfaces	2 x Primary rate interface or 2 x channelized T1 interface	4 x Primary rate interface or 4 x channelized T1 interface	8 x Primary rate interface or 8 x channelized T1 interface
Power requirements	0.57 A @ +3.3 V Typ. 0.25 A @ +12 V Typ.		0.76 A @ +3.3 V Typ. 0.25 A @ +12 V Typ.

Customer Service

Dialogic provides various options and arrangements for obtaining technical support for your Dialogic® product. We recommend that you use the Dialogic® Diva® Support Tools first before contacting your Dialogic supplier. Also, we suggest that you visit the Dialogic® Service Center website, as it includes detailed information about a variety of topics. In the unusual case that neither your supplier nor the information on the Services & Support site is able to adequately address your support issue, you can purchase technical support services as described in Dialogic Customer Support on page 18.

Dialogic Services & Support Website

If your supplier is unable to help you to address your issue, you can visit the Services & Support website. There, you can access:

- A help web section for Dialogic® products at http://www.dialogic.com/support/helpweb
- A download section, to install the current version of your software at http://www.dialogic.com/support/downind.asp
- A training section, with information about webinars as well as online and onsite trainings, at http://www.dialogic.com/training/default.htm
- A manuals section, that includes currently available documentation, at http://www.dialogic.com/manuals/default.htm
- Technical discussion forums about different developer-specific Q&A at http://www.dialogic.com/forums/category-view.asp

Dialogic Customer Support

If the information on the Dialogic Service & Support website is not sufficient for your technical support needs or you have requirements for more extensive services, Dialogic has numerous service offerings to meet those needs.

Technical support service can be purchased on a per unit basis to handle installation, configuration, and integration issues, and service agreements are available that provide technical support for application developers. For more information, see http://www.dialogic.com/products/services/enterprise-developers-and-resellers-services.htm.