



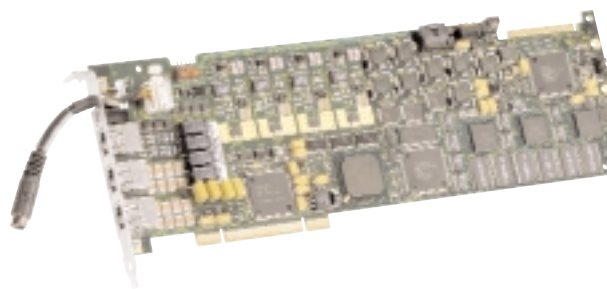
Intel® Dialogic® Integrated DI0408LSAR2 PCI Board

All-in-One Solutions: Four Loop Start Trunks + Eight Analog
Stations + Resources

Features and Benefits

Highly integrated

- Single-slot PCI solution with enough DSP horsepower to provide a full range of voice, fax, conferencing, tone, and switching resources to deliver a standalone solution
- Four loop start trunk interfaces, dedicated call control and tone detection, Caller ID detection, and power fail transfer **plus** access to sharable voice, conference, and fax resources
- Eight analog station interfaces, dedicated call control and tone detection, and frequency shift keying (FSK) signaling for delivery of CLASS services **plus** access to sharable voice, conference, and fax resources



Expandable

- Up to eight boards can be supported in a single PC chassis, allowing easy and cost-effective system expansion from four trunks and eight stations to 32 trunks and 64 stations

Flexible

- All Intel® Dialogic® integrated boards are compatible, allowing a range of configurations to meet the needs of virtually any application

Resources and advanced features

- Voice play and record — provides up to 12 play and record resources, either dedicated to each trunk and station, or independent with transaction record for voice messaging, interactive voice response (IVR), and other applications
- Continuous speech processing — supports up to four channels of routable CSP resources
- Conference — supports up to three conferences with up to nine simultaneous conferees maximum, in single or multiple conferences
- Fax — soft fax send-and-receive resource right on board
- Caller ID — receives and delivers Caller ID name and number on all trunks, extendable to all stations via FSK signaling
- Off-hook FSK — allows delivery of FSK data to the station ports in an off-hook condition, supporting features such as Caller ID on Call Waiting
- Message waiting — controls station message waiting indicators via FSK signaling
- Music-on hold — audio input jack can be used to record music-on-hold or voice prompts

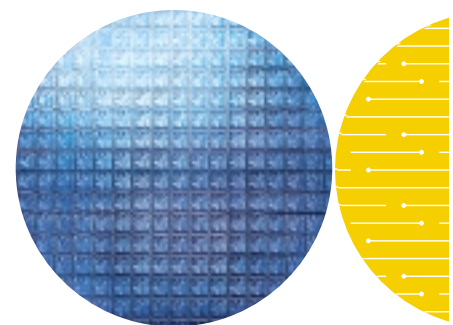
Open standards

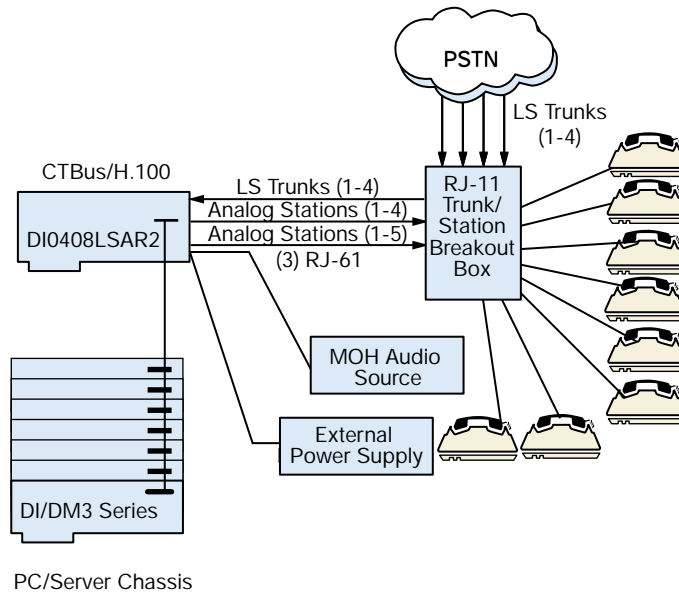
- CT Bus interface (H.100) — scale system size and capabilities with other interface and resource boards. Supports SCbus mode for backward compatibility with older Intel products.
- Station equipment — use affordable 2500-type phones, analog speakerphones, and off-the-shelf CLASS feature phones with message waiting lights and Caller ID support
- Global Call — unified call control access through Global Call interfaces provides worldwide application portability and shortens development time

Reliable

- Non-blocking — one-to-one ratio of basic dial tone, dual-tone multifrequency (DTMF), and switching resources for all trunks and stations
- Failover — direct trunk-to-station connections on four analog stations is provided on board if the server loses power or becomes unavailable, ensuring basic service availability
- Loop ring and power — delivered by a separate dedicated power supply for reliable long loop support and ringer equivalency number (REN) compliance
- Service and support — backed by Intel; the leader in converged communications building-block solutions

Intel in
Communications





Configuration Diagram

Intel® Dialogic® integrated products are next-generation building blocks for converged communications systems. The DI0408LSAR2 board is a single-slot, richly configured trunk and station interface board designed for use in small- to mid-sized server-based private branch exchanges (PBXs) and contact center systems. Intel Dialogic integrated products are highly reliable and cost effective, offering an optimized and selectable combination of interfaces and resources for switching applications.

The full-size, single PCI slot assembly can function as a standalone solution or can be combined with other hardware via a CT Bus interface (H.100). The DI0408LSAR2 board is a second-generation board that reduces the overall hardware to a single baseboard from the previous digital baseboard and daughter-

board design, while increasing the resource availability and options. It is designed to comply with a range of international approvals.

The converged resources Intel® Dialogic® DM3 architecture provides access to independent, high-performance, firmware-based network protocol and media processing resources that can be operated and integrated on compatible hardware platforms.

Configurations

Build a 4-trunk x 8-station converged communications system in a single PCI slot with one Intel Dialogic DI0408LSAR2 board. Add up to eight Intel integrated boards or other Intel boards to build virtually any small- to medium-size enterprise switching application.

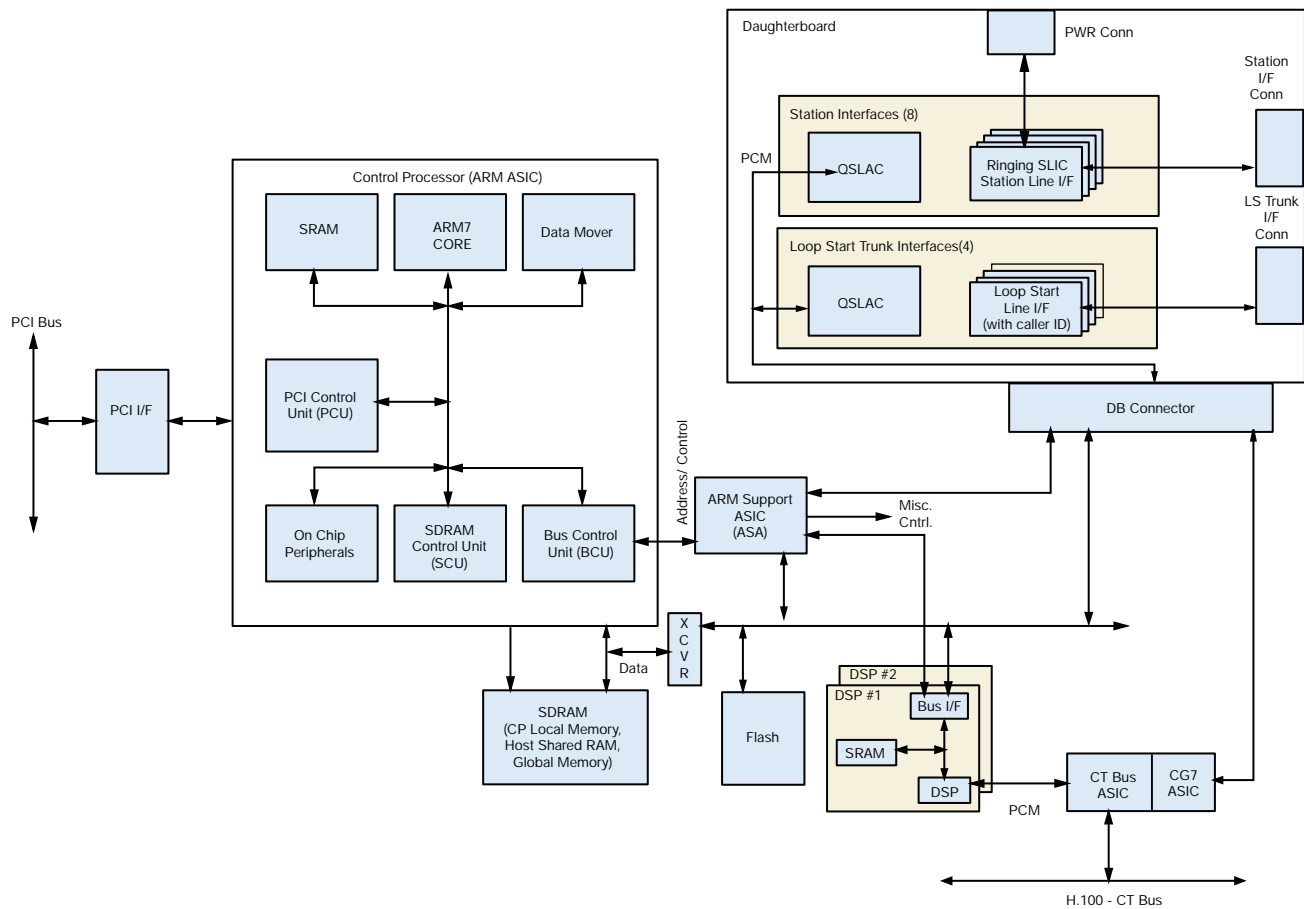
Applications

Server-based PBX

- Enables integration of converged communications switching applications with voice, conferencing, Voice over Internet Protocol (VoIP), speech, and fax capabilities on standard Windows NT* and Windows* 2000 platforms

Customer contact center

- Inbound and outbound call centers
- Automatic call distributors (ACDs)



Functional Block Diagram

Functional Description

DI0408LSAR2 boards are based on the DM3 mediastream architecture, which provides a consistent set of system services and interfaces allowing DM3 compatible resources, such as players, recorders, tone generators, signal detectors, conferencing, fax, and call control to execute in this environment.

The control processor is an ARM core-based ASIC. In addition to the core, the control processor includes various on-chip peripherals (such as timers, interrupt controllers, etc.), an on-chip 0 wait state SRAM, an SDRAM controller, an onboard bus controller, a PCI control unit that provides a glueless interface to a PCI I/F device, and a data mover that assists in moving data between the SDRAM, SRAM, digital signal processor (DSP) memories, and the PCI I/F.

Software executes on the control processor. Functionality includes initialization, configuration, inter-processor communication, and switching. The primary or controlling component of DM3 resources

typically execute on the control processor, interacting with DSP sub-components to realize the full resource functionality.

Each board includes three Motorola* 563xx DSPs. The DSP subsystems include SRAM. The DSPs provide direct pulse code modulation (PCM) connections to the CT Bus ASIC that provides PCM switching between the SCbus/CT Bus (H.100) and the PCM connections to the loop start and analog station interfaces.

The CT Bus ASIC (CT812) provides full master/slave H.100 capabilities as well as full SCbus master/slave capabilities. The CT Bus ASIC is connected to the loop start and analog trunk interfaces via the CG7 ASIC, which provides gain control, as well as A-law to μ -law conversion capabilities.

Each board provides four loop start interfaces and eight analog station interfaces.

One quad subscriber line audio circuit (QSLAC) provides an interface to the four loop start front ends.

The QSLAC provides the required analog-to-digital and digital-to-analog conversion. The front ends include off-hook and on-hook audio paths that provide the QSLAC with an interface to the tip and ring pairs. The off-hook path handles the audio and the interface includes a hook switch, loop current detector, and isolation for the tip and ring lines. The on-hook audio path provides Caller ID support. Ring detection and battery reversal detection are also provided, as well as EMI and high voltage protection.

Two QSLACs connected to eight ringing subscriber line interface circuits (SLICs) are used to interface to the eight analog station interface tip and ring pairs. The QSLACs provides the required analog-to-digital and digital-to-analog conversion for the loop start interfaces. The SLIC provides support for many battery, overvoltage, ringing, supervision, coder/decoder, hybrid, and test (BORSCHT) functions. It includes current limiting, on-hook audio path, tip and ring

reversal/generation, and loop-current detection. It also provides thermal shutdown protection. Power for the analog station loop current (-24 VDC) and power for ringing (-70 VDC) is provided via a cable exiting from the card bracket.

The ARM Support ASIC (ASA) contains miscellaneous control and glue logic that lets the various subsystems perform in a controlled and integrated manner.

Software Support

The Intel Dialogic DI0408LSAR2 boards are currently supported by System Software and Development Kit Version 5.1.1 FP1 or greater. The station interfaces and conference resources are controlled via MSI APIs. Voice and fax resources are controlled by R4 on DM3 APIs. The loop start trunks are controlled via Global Call high-level call control utility, which simplifies the development and use of PSTN signaling protocols.

Technical Specifications**

Number of ports	12
Max. boards/system	8
Analog network interface	4 loop start
Station interfaces	8 analog
Voice play/record resources	12 dedicated or 8 sharable w/ transaction record
Conference resources	9
Fax ports	2 (V.17 Soft Fax)
CLASS signaling	Frequency shift keying (FSK)
Resource sharing bus	CT Bus (H.100 compliant)
Control microprocessor	ARM7 TDMI
Digital signal processors	Three Motorola* 56311 DSPs @ 150 MHz, each with 150 MIPS minimum
Form factor	PCI long card

Host Interface

Bus compatibility	Universal PCI. Complies with PCI Local Bus Specification 2.2.
Bus speed	33 MHz max.
Bus mode	32-bit to 16-bit conversion in target mode
Shared memory	128 KB page
Operating system	Windows NT / Windows 2000 / Windows XT

Power Requirements (from host PCI slot)

+5 VDC	1.2 A max.
+12 VDC	10 mA max.
-12 VDC	10 mA max.

Trunk Interface

Trunk type	Analog loop start (EIA/TIA 464B)
Loop current range	20 mA to 120 mA
Ring detection	40 Vrms to 130 Vrms; 15.3 Hz to 68 Hz
Ringer equivalence number (REN)	0.6B
Battery reversal detection	Yes
Echo return loss	-24 dB min.
Connector	RJ-61 (four trunk interfaces)

Station Interface

Signaling type	Loop start originate
Open loop voltage	20.5 VDC \pm 1 VDC
Closed loop current	-25 mA \pm 5 mA
External power supply option	One required per board
Ring frequency	20 Hz
Ring amplitude	40 Vrms @ 20 Hz minimum into 4 REN
2-wire return loss	25 dB
Maximum loop length	3500 ft. (1050 m) using 24 AWG
Connector	Two RJ-61 (four station interfaces each)

Audio Input Interface

Input impedance	1000 Ohms, AC coupled
Maximum input level	600 mVpp
Connector	1/8 in. (.31 cm) mini-phone jack

Technical Specifications** (cont.)

Facsimile Specifications

Fax resources	2
Fax compatibility	V.17
Transmission speed	14.4 kb/s
Automatic step-down	12 kb/s, 9.6 kb/s, 7.2 kb/s, 4.8 kb/s
Transmit/receive data modes	MH, MR, MMR, all with or without ECM
Binary file transfer	Yes
Image width	A3, A4, B4
Image resolution	Normal (203 lines/in. x 98 lines/in., 203 lines/2.5 cm x 98 lines/2.5 cm) Fine (203 lines/in. x 196 lines/in., 203 lines/2.5 cm x 196 lines/2.5 cm)

Conferencing

Conference resources	9
Conference size	2 to 9 conferees
Number of conferences	Up to 3
Features	Automatic gain control Dynamic create/destroy Dynamic add/delete Echo cancellation Coach/pupil mode DTMF volume control Tone clamping Active talker notification

Environmental

Operating temperature	0° C to +50° C
Storage temperature	-20° C to +70° C
Humidity	8% to 80% non-condensing

Cooling Conditions for Maximum Operating Temperature

50° C	0.6 CFM per board
40° C	0.4 CFM per board
30° C	0.3 CFM per board

Safety and EMI Certifications

United States	Safety: UL 1950 EMI: CFR 47 (FCC) Part 15, Subpart B, Class A Telecom: FCC Part 68
Canada	Safety: CSA Std. C22.2 No.950 1995 EMI: CSA Std. C108.8 Telecom: CS-03 issue 8
Japan	EMI: VCCI Class A Telecom: PTT Approval: A02-0022JPA
Europe†	Safety: EN60950 (2000) EMI: EN 55022, CISPR 22 - Class B Limits, EN 55024 (immunity) Telecom: TBR21
Australia**	Safety: Austel TS-001, AS 3260 with amendments 1, 2, 3, 4 EMI: AS 3548 Telecom: TS-002,TS-004
International**	Safety: IEC60950 (1999) 3rd edition EMI: CISPR 22 - Class A limits, CISPR 24 (immunity)
Warranty	Intel® Telecom Products Warranty Information at http://www.intel.com/network/csp/products/3144web.htm

MSI-Global Power Module**

The MSI-Global Power Module generates –24 V and –70 V to power the DI station interface loop. One power module is required per DI board when station modules are used. The power module connects to a prewired power cable attached to the DI0408LSAR2 board (Item Market Name: MSISCGBLPWRMOD).

Connectors

Input connector	Standard North American AC input
Output connector	6-pin female mini-DIN
Internal fusing	Not user replaceable

Power Requirements

Input voltage	90 VAC to 265 VAC, 47 Hz to 63 Hz
Output voltage	–24 VDC: 1.0 A –70 VDC: 300 mA
Output ripple	Less than 100 mV (peak-to-peak main)
Percent regulation	± 2.5% for –24 V ± 7.5% for –70 V
Operating temperature	0° C to +50° C
Size	6.5 in. (16.25 cm) long, 3.75 in. (9.375 cm) wide, 2.17 in. (2.425 cm) high
Warranty	Intel® Telecom Products Warranty Information at http://www.intel.com/network/csp/products/3144web.htm

Safety Certifications

UL	1950 3rd edition File No: E148586
TUV	EN60950 File No: B970624072005
CE	CUL (CSA 950) File No: E160908 DENAN: PS-E MEL 080801-NC 4339

Telephone Interface Adapters and Cable Options

The DI0408 Breakout Kit includes three RJ-61 cables and an RJ-11 breakout box. The RJ-61 cables connect trunk and stations loops from the DI0408LSAR2 boards to the RJ-11 breakout box. The RJ-11 breakout box splits the RJ-61 leads into modular RJ-11 jacks for four (4) individual loop start trunk interface inputs and eight (8) individual analog station interface outputs.

The RJ-61 Tri-Dongle Kit includes three (3) RJ-61 cables equipped with a four-way RJ-11 splitter at one end. This kit can be used to breakout trunks and stations from the DI0408LSAR2 boards to RJ-11 jacks.

DI Accessories	Item Market Name	Description
DI0408 Breakout Kit	DI0408BOBKI	Breakout panel to 12 RJ-11 jacks, 3 RJ-61 cables included
RJ-61 Tri-Dongle Kit	DI0408BOBKIT	RJ-61 cable with integrated RJ-11 (4 jack) splitter, 3 per kit

System Hardware Requirements

- PC with processor compatible to an Intel® Pentium® processor with full-size PCI card slots that are 32-bit, 33 MHz, and 3.3 V or 5 V signaling compatible
- Additional system hardware requirements based on Windows NT or Windows 2000 operating system requirements
- Additional system hardware requirements based on application requirements

Hardware Compatibility Guide

- Intel Dialogic Integrated Series
- MSI Series
- JCT Series
- DM3 Series
- Spring Ware Series

To learn more, visit our site on the World Wide Web at <http://www.intel.com>.

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