Datasheet

# Intel® NetStructure™ HDSI Platform

## High-Density Station Interface

Intel in Communications

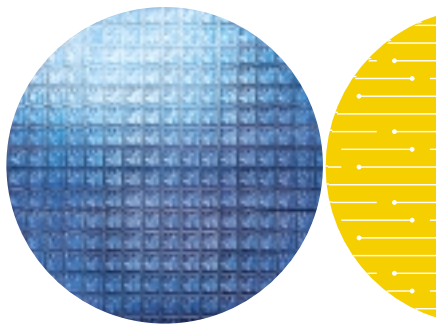
The High Density Station Interface (HDSI) is an open-architecture platform for computer telephony that integrates large-scale switching and voice processing resources under a single hardware and software architecture. The HDSI solution is offered in both PCI and Compact PCI* configurations, which provide the industry's highest density analog station connectivity in a single computer chassis slot.

The HDSI system is provided in four station densities. The HDSI/480 (the base model) supports 48 stations; the HDSI/720 supports 72 stations; the HDSI/960 supports 96 stations; and the HDSI/1200 supports 120 stations.

The HDSI is an Intel assembly consisting of either an HDSI-PCI board with H.100 compliant CT Bus connectivity, or an HDSI-CompactPCI board assembly (including a CompactPCI baseboard and a rear I/O Module) with H.110 compliant CT Bus connectivity, connected to a Station Interface Box (SIB). The CT Bus provides switching between trunks and stations and

## Features and Benefits

- Connect up to 120 analog telephone devices directly to CT or SC systems and create large-scale, PC-based telemarketing systems and call centers
- Build economical systems by sharing resources via CT Bus connectivity to enable customized, integrated applications using a wide range of complementary technologies such as speech recognition, facsimile, and text-to-speech (TTS)
- Programmable ringing with automatic ring trip requires no additional external circuitry for 20 Hz, 25 Hz, 30 Hz, and 50 Hz ring frequencies
- Station status event detection allows collection of call traffic statistics via the application for cost-effective management of call setup and call termination
- Programmable gain provides station volume control from the application and enables matching line levels from different devices
- Supports programmable notification tones for metering time expired
- Provides battery feed to phone (termination) sets
- C language application program interfaces (APIs) for Windows* NT* shortens development cycle and gets applications to market faster
- Programmable ring cadence options
- Onboard FSK generation allows the transmission of Caller ID to CLASS, CLIP, and J-CLIP-type Caller ID phones, as well as the ability to activate and deactivate message waiting indicators
- Onboard DTMF detection recognizes tones generated by phones connected to the stations
- Onboard generation of PBX-like tones (dial tone, ring back, busy, etc.) to stations
- Available voice play and record provides for easy integration of messaging



also allows expansion for additional Intel® Dialogic® network and resource boards. Utilizing just one computer chassis slot, this HDSI solution can support up to 120 stations with tone detection and generation, and FSK Caller ID transmission.

Each HDSI station interface connects an application-selectable time slot on the CT Bus to an analog station device. The RJ-21X telephone interface on the SIB enables easy connections to breakout boxes or punchdown blocks. For standard RJ-11 jack connections, Intel offers an optional SA/240 station adapter and a 50-pin cable.

| Model | Stations | Interface | Form Factor | SIB | Resource Bus | OS Support |
|---|---|---|---|---|---|---|
| HDSI/480 | 48 | RJ-21X, RJ-11** | PCI, CompactPCI | 2U-19 in. | CT Bus, SCbus | Windows NT, Windows 2000, Linux |
| HDSI/720 | 72 | RJ-21X, RJ-11** | PCI, CompactPCI | 2U-19 in. | CT Bus, SCbus | Windows NT, Windows 2000, Linux |
| HDSI/960 | 96 | RJ-21X, RJ-11** | PCI, CompactPCI | 2U-19 in. | CT Bus, SCbus | Windows NT, Windows 2000, Linux |
| HDSI/1200 | 120 | RJ-21X, RJ-11** | PCI, CompactPCI | 2U-19 in. | CT Bus, SCbus | Windows NT, Windows 2000, Linux |

** With optional SA/240 Station Adapter and 50-pin cable

The SIB has an internal power supply that provides loop current (battery) and ring voltage to local telephony devices. The system can handle multiple stations going on- or off-hook and ringing simultaneously.

All HDSI models are capable of providing the AC voltage needed to ring standard 2500-type telephones and some other phones. The ring capability is contained within the SIB. The HDSI board defaults to a 33-percent duty cycle ring cadence and can ring 120 phones simultaneously.

Balanced lines ensure low noise and allow stations to be installed up to 5280 ft (1 mi/1.609 km) from the SIB. Built-in electrostatic discharge (ESD) protection lets agents insert and remove headset jacks without damaging HDSI board circuits.

Application-programmable channel gain controls the volume for each channel and matches line impedances from country-specific telephone sets and devices.

Station status event detection collects call traffic statistics and enables cost-effective management of call setup/call termination.

## Applications

- Inbound and outbound telemarketing
- PBX/key systems
- Customer service, help desks
- Operator services such as billing automation, directory assistance, and intercept treatments
- Automatic call distribution (ACD)
- Local information services

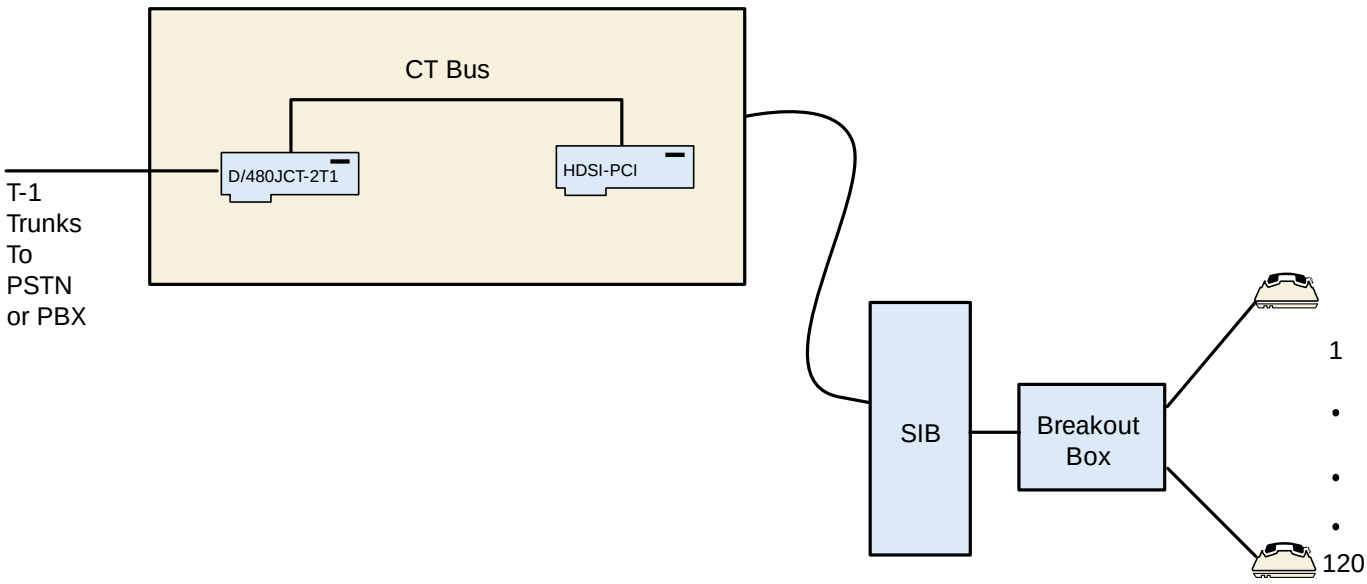



**Figure 1. Intel® NetStructure™ HDSI board in a 48 × 120 Configuration**

## Configurations

Use the HDSI series to expand the capabilities of switching and station interface applications and to design economical cost-effective CT applications of any size. The HDSI boards install in either PCI or CompactPCI chassis and are compatible with computers using Intel® Pentium® processors.

In a typical telemarketing application, a voice board or other resource board dials outbound numbers. When the system detects a called party going off-hook, the call is passed to a local operator through an available channel.

For inbound applications, calls that are not handled by voice automation can be passed directly to a live agent. The agent can be alerted to the incoming calls by a ring or zip tone.

HDSI stations can be independently assigned to any CT Bus time slot, enabling station-connected agents or devices to serve as shared resources. Multiple HDSI boards can be installed in a single system, each sharing the same PC interrupt. For example, an HDSI/1200 station can be cabled to an Intel® Dialogic® D/480JCT-2T1 voice board and a T-1 board, via the CT Bus, creating a 120-station-×-48-trunk switching environment. Applications can use the switching ability of the CT Bus to create economical agent-to-call ratios. The HDSI hardware permits up to eight HDSI boards in a single system. System size limitations depend on the application and host processing power.

Note: The HDSI must not be connected directly to the public telephone network. Use only with local headsets and telephones.

## Software Support

The HDSI series is supported by the System Software and Software Development Kit (SDK) for Windows NT and Windows 2000* and Linux*. This package contains a set of tools for developing complex multichannel applications.

## Functional Description

The signals from each station device (phone, headsets, etc.) enter the line circuitry on the HDSI board through an ESD filter, and are applied to a line interface on an HDSI baseboard or daughterboard. This filter protects the HDSI board against conditions, such as electro-magnetic interference (EMI) and voltage transients on station device lines — including electrostatic discharge and transients generated by plugging in or removing operator headsets.

Each HDSI interface contains a line interface and Quad Subscriber Line Audioprocessing Circuits (QSLACs) for COder/DECoder (CODEC) functions. Each line inter-face provides battery feed and ring to one station device. The line interface performs the two- to four-wire conversion by separating the tip and ring signals into individual transmit and receive paths to the QSLAC.

Four line interface circuits connect to one QSLAC. An on-hook/off-hook signal transmitted by the SIB is sent by the host PC's PCI bus to the application program.

The CODECs convert inbound audio from analog to eight-bit digital audio signals, and outbound audio from eight-bit digital to analog signals. The digital-to-analog-direction gain of the CODEC is controlled separately for each station by the application. The QSLACs transmit and receive digital audio signals to and from the PCI card through the SIB interface cables. The HDSI board control microprocessor interprets and executes commands from the host PC and controls all operations of the SIB via an external local control bus. Communications between the SIB microprocessor and the host PC is established by sending commands and data via reserved TDM slots structured within this external control bus. All HDSI operations are interrupt-driven to meet the demands of real-time systems. All HDSI boards installed in the PC share the same interrupt line. When the system is initialized, firmware to control all board operations is downloaded from the host PC to the onboard RAM. This downloadable firmware gives the board all of its intelligence and enables easy feature enhancement.

The board locator technology circuit operates in conjunction with a rotary switch to determine and set non-conflicting board IDs. This feature eliminates the need to set confusing jumpers or DIP switches.

## Technical Specifications†

### HDSI PCI/CompactPCI

| | |
|---|---|
| Interfaces | Four (connects to one SIB)<br>One CT Bus or SCbus |
| Max. boards/system | Eight (application, call traffic, and CPU dependent) |
| Control processor | Up to 8 MB local to control processor |
| Digital signal processors | Motorola* 5630x, 1 K word program cache; Up to 15 DSPs @ 100 MIPS each |
| DSP memory | 256 K word DRAM local to each DSP<br>128 K word SRAM local to each DSP |
| Baseboard global memory | 32-bit wide DRAM accessible to all signal processors and control processor |
| Form factor | PCI long card, single-slot width, CompactPCI |
| Host interface memory | 512 KB |
| Bus compatibility | Rev 2.1 of PCI Bus Specification |
| Bus mode | Target and DMA master mode operation |
| SIB connectors | Four RJ-48C on rear bracket |
| Computer telephony bus | ECTF H.100-compliant CT Bus, offering onboard switching access to 4096 bi-directional 64 Kb/s DS-0 time slots. SCbus interoperability through provided adapter, 68-pin ribbon cable connector. |

### Power Requirements

| | |
|---|---|
| +5 VDC | 3.85 A (max) |
| +12 VDC | 30 mA (max) |

### Cooling Requirements

| | |
|---|---|
| Operating temperature | 0°C to +50°C. Cooling condition per maximum operating temperature 5 CFM. |
| Storage temperature | –20°C to +70°C |
| Humidity | 8% to 80% noncondensing |

### Safety and EMI Certifications

| | |
|---|---|
| United States | FCC: EBZUSA-31207-XD-T<br>UL: E96804 |
| Canada | IC: 885 7969 A<br>UL: E96804 |
| Warranty | See http://www.intel.com/network/csp/products/3144web.htm |

## Technical Specifications† (cont.)

### Station Interface Box (SIB)

#### Programmable Tone Parameters

| | |
|---|---|
| Frequency | 300 Hz to 3400 Hz, 31.25 Hz increments |
| Level | –10 dBm0 to –40 dBm0, 3 dB increments |
| Duration | 10 ms to 4 s, 10 ms increments |
| Interval between | 2 s to 17 min (Tariff Tone only) |

#### Telephone Interface

| | |
|---|---|
| Connectors | RJ-21X female for connecting to SA/240 Station Adapter |
| Signaling type | Loop start originate |
| Telephone set connection | Two-wire loop start, balanced |
| Loop current | 20 mA +3 mA |
| Default D-to-A signal level gain | –3 dB adjustable; ±6 dB in 1 dB steps (to telephone line, approx.) |
| Default A-to-D signal level gain | –3 dB |
| Impedance | 600 Ohms ±7% |
| 2-wire return lost | 25.0 dB typical |
| Receive signal/noise ratio | 36 dB + 3 dB (–1 dBm, 1004 Hz) |
| Noise-to-ground | 32 dBrnc +3 dB |
| Idle channel noise | 15 dBrnc +3 dB |
| Channel-to-channel crosstalk | –70 dB max. (0 dBm, 1004 Hz) |
| Open loop voltage | –20 VDC +1.5 VDC (with –24 volt supply) |
| Closed loop current | –20 mA ±3 mA |
| Loop length | 5280 ft (1 mi/1.609 km), typical (24 gauge) |
| Clock rate | Expansion: 2.048 Mb/s or 1.544 Mb/s<br>Independent: 1.544 Mb/s |
| PCM algorithm | A-law or µ-law, software selectable |
| Ring voltage | 54 Vrms @ 20 Hz, (balanced) |
| Ringer Equivalency Number (REN) | 2 REN max. per station |
| Telephone ring frequency | 20 Hz, 25 Hz, 30 Hz, 50 Hz |

#### SIB Power Requirements

| | |
|---|---|
| 100 V — 120 V | 3.0 A max |
| 200 V — 250 V<br>50/60 Hz | 1.5 A max |

#### SIB Interface Cable

| | |
|---|---|
| Type | Standard shielded, RJ-48 male |
| Length | 6 ft (1.828 m) provided. Maximum distance the SIB can be from the HDSI/PCI is 660ft (201.168 m). |

#### Safety and EMI Certifications

| | |
|---|---|
| United States | FCC Part 15 Class A<br>FCC Part 68<br>CISPR 22 Class A<br>UL: Listing pending |
| Warranty | See http://www.intel.com/network/csp/products/3144web.htm |

## Technical Specifications† (cont.)

### SA/240 Station Adapter Kit†

HDSI Series boards use the SA/240 Station Adapter Kit, the same model used by the MSI/SC global series boards. The SA/240 Station Adapter Kit ISA version includes a cable assembly and an RJ-11 breakout box. The cable has two RJ-21X connectors: one male, one female. The breakout box converts the RJ-21X connectors into 24 standard RJ-11 connectors for easy connection to standard telephone sets. The same SA/240 breakout box is used for both ISA and PCI products. The SA/240 can be wall-mounted. If RJ-11 connections are desired, five SA/240 kits are needed for one HDSI/1200.

**SA/240 Station Adapter Unit**

| | |
|---|---|
| Telephone set connection | RJ-11 standard connectors |
| Number of RJ-11 connectors | 24 |
| Front panel connector | RJ-21X jack |
| Length | 6.0 in. (15.4 cm) |
| Width | 3.8 in. (9.7 cm) |
| Height | 1.25 in. (3.2 cm) excluding RJ-21X connector<br>1.50 in. (3.8 cm) including RJ-21X connector |
| Weight | 24 oz. (.68 kg) |
| Operating temperature | 0°C to +50°C |
| Storage temperature | –20°C to +70°C |
| Humidity | 8% to 80% noncondensing |

**Cable**

| | |
|---|---|
| Length | Approx. 4.0 ft (1.2 m) |
| Connectors | RJ-21X, 50-pin male to HDSI/SC board<br>RJ-21X, 50-pin female standard USOC to breakout box |

**Safety and EMI Certifications**

| | |
|---|---|
| United States | UL: 94V-O |
| Canada | CSA: Listed |
| Warranty | See http://www.intel.com/network/csp/products/3144web.htm |

## Optional Components

- SA/240 station adapter kit for HDSI
- Kit components can be ordered separately.
  - — RJ-21X cable for SIB
  - — RJ-21X to RJ-11 breakout box

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