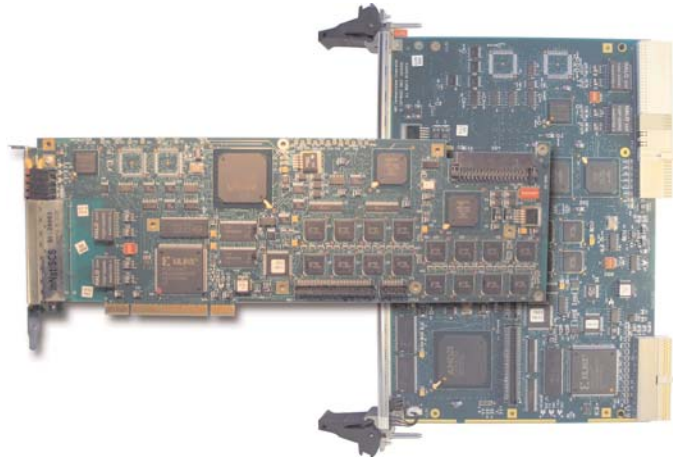


AG 4040 Series

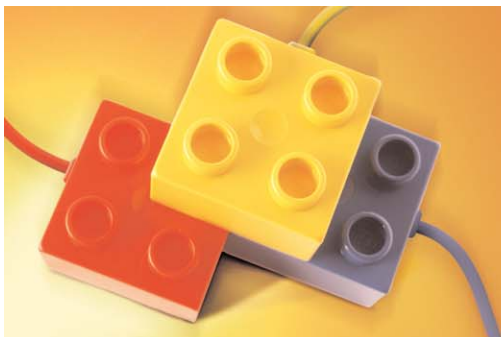
DSP and Digital PSTN Interfaces

The NMS Communications AG 4040 Series, part of the Open Access™ framework, offers developers and OEMs a new level of flexibility while reducing total lifecycle costs. Building on the same digital signal processing (DSP) architecture as the AG 4000 series, the AG 4040 Series delivers increased processing power, more efficient power management, and software-selectable T1/E1 network interfaces. The AG 4040 family is available in either PCI or CompactPCI form factors, and satisfies both rich media processing and digital PSTN interface needs in a wide range of voice and signalling applications.



FEATURES

- 1, 2, or 4 T1/E1 digital interfaces in a single slot for connection to the public telephone network
- Software-configurable T1 or E1 interfaces eliminate the need for multiple hardware platforms
- Efficient management of DSP resources minimizes host overhead and maximizes host processing time for applications
- Full-speed H.100/H.110 bus with 4,096 timeslots supports interoperability with other boards in open-architecture, high-capacity systems
- Up to 16 boards per system
- DSP-based voice, DTMF/MF, and call progress functions ensure application reliability
- Hierarchical switching model improves system and application scalability
- Natural Call Control™ protocol-independent API minimizes system development and deployment efforts
- Feature-rich Natural Access software development kits support Windows®, Intel®, SPARC® Solaris™, and Linux®
- Open Access architecture ensures scalability, compatibility, and high performance to leverage developer time and application investment
- “Drop-in” replacement for AG 4000 Series



Open Access

The Foundation of Innovation

AG 4040 Series

CONFIGURATION

AG 4040 Series boards are available in PCI and CompactPCI families configured to address a variety of applications:

- Telecommunications network connections with up to 120 ports of IVR and digital trunking.
- NaturalConference™ high-density, real-time multi-party conferencing.
- NaturalFax™/AG 4040 fax support with up to 120 ports of IVR, NaturalFax, and digital trunking.
- Special applications with up to 4,000 MIPS of DSP resources and 120 ports of digital trunking.

PCI Board Family

The PCI family offers single, dual, and quad digital trunk interfaces. The standard configurations are implemented with a single board or a combination of motherboard with daughterboard. The motherboard contains the digital T1/E1 interfaces as well as 4, 8, or 16 DSPs. The daughterboard is used to extend the processing power of the board through the addition of 16 or 24 DSPs. All versions are PCI long form-factor boards and require only a single PCI slot.

The AG 4040 PCI boards' on-board switching makes it easy for developers to switch calls between H.100 boards and telecommunications resources in multiple-board applications.

CompactPCI Board Family

AG 4040 CompactPCI boards may be configured as a single board with dual or quad digital trunk interfaces, or as a motherboard-daughterboard combination, depending upon processing requirements. The motherboard contains 16 DSPs; the daughterboard contains an additional 16 or 24 DSPs.

The CompactPCI boards feature on-board switching support for connecting channels to either line interfaces, DSP resources for voice processing and signaling, or the H.110 bus. These boards may also run signaling protocols for line interfaces on other boards by switching these resources across the H.110 bus.

Natural Access Support

The AG 4040 Series is supported by NMS' Natural Access development and runtime environment. Natural Access provides a consistent set of APIs that are operating system-independent, thereby delivering

true application portability. With Natural Access' Natural Call Control API, programmers can easily and quickly develop applications that run on multiple types of telecommunications interfaces by using a single protocol-independent API. Natural Call Control minimizes the processing overhead on the host CPU by executing protocols on the board's control processor.

Part of the Open Access framework, Natural Access unifies application development across NMS PacketMedia™ HMP, AG, and CG products, giving developers and OEMs the flexibility to build high-value media processing applications in a single unified development environment and then run and deploy on their "silicon of choice." This allows deployments to seamlessly scale from four to thousands of ports within the same application.

The AG 4040C CompactPCI boards fully support the PICMG hot swap specification version 3.0, which enables the addition, subtraction, and replacement of boards in a running system. Natural Access features a number of API calls that enable applications to dynamically receive notification of board insertions and extractions.

TECHNICAL DESCRIPTION

On-board Resources Reduce Host Overhead

The AG 4040 Series boards include a powerful embedded control processor, which manages the host interface, DSP resources, and on-board memory cache. The control processor dynamically assigns algorithms to DSPs as needed and executes signaling protocols. As a result, host-processing overhead is reduced dramatically, which reserves more host processing power for the application.

Dynamic, Efficient Task Processing

The NMS AG Series was the first to implement true media streaming on DSP resource boards, through an efficient task processing design, which ensures flexibility and scalability. AG 4040 boards use from 4 to 40 high-performance, 100 MIPS, low-power 'C549 DSPs. All AG 4040 configurations dissipate less than the PCI specification of 25 watts per slot.

In the AG Series, each DSP can be assigned a mix of specific tasks or services, such as voice recording and playback, DTMF reception and generation, call progress analysis, speech compression, echo cancellation, or fax functions. The tasks are dynamically started, stopped, and interconnected as needed. All of the tasks or services are available for use by any of the channels.

Network Interfaces

The AG 4040 PCI boards for one, two, or four T1 (DSX-1) or E1 (75Ω or 120Ω) terminations. AG 4040 CompactPCI boards are field-configurable for two or four T1 (DSX-1) or E1 (75Ω or 120Ω) terminations. Additionally the AG 4040 Series T1 platforms can connect to other DSX-1 level equipment without the need for a CSU.

NMS SERVICES

NMS provides a complete range of services designed to complement your needs at every stage — design, evaluation, development, and deployment. NMS offerings include product support, technical training, logistics, and the best developer support program in the industry. With NMS Services you are able to reduce time-to-market, ensure quality, and focus on your unique competitive advantage.

TECHNICAL SPECIFICATIONS

PCI Board

- Board interface capacity: One, two, or four T1/E1 digital trunk terminations
- TDM bus: H.100 bus interface
- Mechanical: PCI Rev. 2.2 for a long expansion card (physical dimensions 4.2 x 12.283 in (10.7 x 31.2 cm))

CompactPCI Board

- Board interface capacity: Two or four digital trunk terminations
- TDM bus: H.110 bus interface
- Mechanical: PICMG 2.0, R2.1 CompactPCI

Software

- Software development kits: Natural Access for Windows 2000, Windows Server 2003, Intel Solaris 8, SPARC Solaris 8 (32-bit, 64-bit, and mixed-mode), SPARC Solaris 9 (32-bit, 64-bit, and mixed-mode), and Red Hat® Linux 7.2 and Red Hat Linux 9
- Software switching support through Natural Access

PSTN Network Connectivity

- T1 Connector: Up to four RJ-48C connectors
- E1 Connector: Up to four 75Ω RJ-48C with BNC adapter cables or up to four 120Ω RJ-48 connectors
- Dip switch setting of 75Ω or 120Ω line impedance
- Mix of one ISDN and multiple CAS protocols on a single board

Host Interface

- Electrical: PCI Local Bus specification Revision 2.1 (both PCI bus 3.3 V and 5.0 V signalling)
- Bus speed: DC to 33 MHz
- I/O mapped memory: Memory mapped interface for efficient block data transfers
- Address/interrupts: Address and interrupts automatically configured by PCI BIOS (no jumpers or switches)

Audio Signal Processing

- Sampling rates: 8 ksamples/sec (telephone industry standard)
- **Speech compression:**
 - 11 kHz, 8- or 16-bit linear (.WAV); 16-bit may reduce the number of ports per board
 - 8 kHz 16-bit linear (.WAV)
 - 64 kbps μ -law or A-law per ITU-T G.711
 - 16, 24, and 32 kbps ADPCM using NMS algorithm with NMS framing and bit packing with up to 2x speedup on playback
 - OKI-compatible ADPCM 24 kbps @ 6 kHz or 32 kbps @ 8 kHz with up to 2x speedup on playback
 - IMA-compatible ADPCM 32 kbps
 - G.726-compatible ADPCM 32 kbps
 - MS-GSM

On-board Processors and Memory

- DSPs: 4, 8, 16, 32, or 40 Texas Instruments TMS320C549 DSPs at 100 MIPS each
- Microprocessor: One 133 MHz 80586 compatible embedded processor

H.100/H.110 Support

- Flexible connectivity between T1/E1 trunks, DSPs, and H.100/H.110 bus
- 128 full-duplex connections to bus
- 1,024 local connections
- Switchable access to any of 4,096 bi-directional timeslots
- H.100/H.110 bus clock master or clock slave (software selectable)
- H.100 termination capability (switch-enabled)
- Uses Lucent Microelectronics Ambassador™ Family chip

Power Requirements

- AG 4040: 0.5 A max. @ 5.0 V, 3.0 A max @3.3 V
- AG 4040 w/ daughterboard: 2.2 A max @ 5.0 V, 3.0 A max @3.3 V
- AG 4040C: 0.7 A max. @ 5.0 V, 3.0 A max @ 3.3 V
- AG 4040C w/ daughterboard: 1.5 A max @ 5.0 V, 3.5 A max @ 3.3 V

Environment

- Operating temperature: 0 °C to +50 °C
- Storage temperature: -20 °C to +70 °C
- Humidity: 5% to 80%, non-condensing

Regulatory Certification

This product meets EMC, Safety and Telecom requirements for the US, Canada and the EU. Please refer to the [Global Approvals](#) section of our web site for a complete list of countries in which we currently hold Telecom approvals. If you need specific details on EMC, Safety, or Telecom approvals, please contact Technical Services at Tech_support@nmss.com or +1 508 271 1333.

Standards and Compliance

- PCI SIG: PCI Specification Revision 2.1
- CompactPCI: PICMG 2.0, Rev. 2.1
- Hot Swap: PICMG 2.1, Rev. 3.0

Refer to the [PSTN Digital Trunk Support data sheet for specifications, standards, and compliance information on protocols, T1 and E1 interfaces, and tone generation and detection.](#)

For the latest information on supported features and operating systems, refer to our web site at www.nmscommunications.com.

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OPEN ACCESS PRODUCT FAMILIES

Open Access is a comprehensive product framework for next-generation voice, data, and video applications and services. Open Access provides accessibility at any point — from enabling technology, to modular application platforms, to system-level products, satisfying business and technology requirements in one cohesive model.

Enabling Technology		Modular Application Platforms	Systems
SOFTWARE • Universal Speech Access • PacketMedia HMP • Natural Access • Fusion • SS7	HARDWARE • CG Series • AG Series • CX Series • TX Series	• Video Messaging • IP/TDM Media Server • Speech Server	NMS HearSay Mobile Services Delivery System • Data Center • Central Office