Host Media Processing on AdvancedTCA*-Compliant Intel® Platforms

Building Cost-Effective Network Elements for Voice and Data with Intel® Host Media Processing Software and the Intel® NetStructure™ MPCBL0001 High-Performance Single Board Computer

Intel in Communications

This application brief describes the new generation of media processing technology designed to enable lower total cost of ownership and time-to-market development of media processing solutions. Intel® Host Media Processing (HMP) software, applied on Intel's AdvancedTCA-compliant building blocks for next-generation telecommunication platforms, provides basic media services that developers can use to build flexible, scalable, and cost-effective modular network elements for voice and data services. The implementation of the newest and most powerful Intel® processors on an AdvancedTCA-compliant high-performance single board computer enables a standard computing platform to cost-effectively perform the media processing functions that previously required integrated Digital Signal Processing (DSP) silicon.

AdvancedTCA Specification

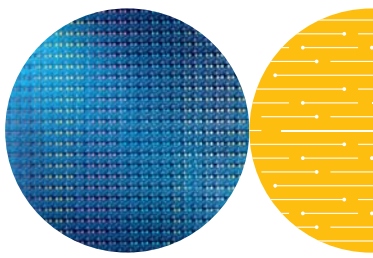
The PICMG* 3.x specification, or AdvancedTCA (ATCA) standard, is an industry initiative to create a new board (blade) and chassis (shelf) form factor optimized for carrier-grade tele-communications solutions. ATCA is designed to meet the requirements of next-generation communication applications by providing support for a multiple standard switch fabrics including Ethernet and PCI Express* architecture, with features that will enable manufacturers to meet a variety of demanding customer requirements. ATCA provides the headroom to enable a new generation of modular high-performance, yet cost-effective telecommunications solutions. In addition to enhanced fabric scalability up to 2.4 Terabit/sec, ATCA supports scalable multi-protocol interfaces, a 200W per board power budget and a large 8U x 280mm x 1.2" board form factor.

Moving to Standards

Existing proprietary solutions are now migrating to ATCA to benefit from the standardization and growing availability of off-the-shelf modular building-block solutions. The ATCA standard is designed to enable customers to transition their telecommunications applications quickly, seamlessly, and inexpensively. The general platform adaptability of Intel HMP and the modular and standard flexibility of the ATCA platform enable a powerful solution set for telecommunications providers.

This move to standard ATCA-based building blocks offers significant advantages:

- **Lower cost of inventory and startup –** smaller initial capital investment
- **Lower development costs –** development systems do not require specialized hardware



- **Lower deployment costs –** software is less expensive to install and configure than hardware
- **Lower sparing costs –** hardware can be used for multiple functions
- **Lower maintenance costs –** maintenance is easier and less training is needed when system configurations are standardized

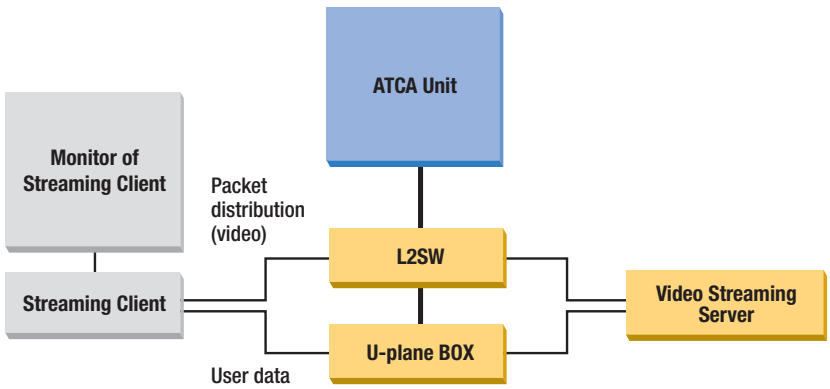
Intel® Media Processing Building Blocks

The Intel® NetStructure™ MPCBL0001 Single Board Computer (SBC), compliant with ATCA specifications, can achieve greater performance levels than have been previously supported on standards-based blade products. This standard compute blade provides single or dual Low Voltage Intel® Xeon™ processors (1.6 GHz or 2.0 GHz) via the Intel® E7501 chipset. ATCA standard building-block components deliver dynamic system management (IPMI 1.5), high blade density, and NEBS-3-compliant design to ensures the reliability and carrier-grade quality of the ATCA platform for use in High Availability Telecommunication Network environments.

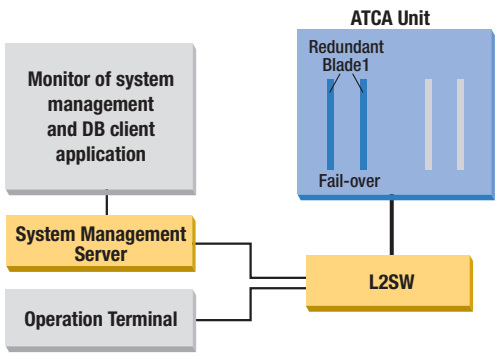
With 4+ GBytes of DDR-266 memory, dual Gigabit Ethernet, and optional Fibre Channel, the MPCBL001 SBC provides an extremely powerful platform for Intel HMP software. The use of HMP software enables developers to migrate their media processing algorithms and control software from the domain of custom software and relatively expensive proprietary boards to a standards-based and open software model and standard computing platforms.

Currently, application developers need to buy boards and a computing platform to begin developing new telecom applications. With Intel HMP software, developers can start work on new telecom applications after a simple software installation. Such a reduced startup cost, along with emerging Internet-telecom integration, is designed to enable a new generation of innovative, cost-effective telecom applications.

AdvancedTCA*-based SGSN, GGSN System Demo



Fail-over and System Management Demo-based AdvancedTCA*



Demo contents

- Fail-over for redundant blades
  - In-memory DB application is working as redundant blades
- System management for ATCA
  - Element status (SBC, SW, CMM)
  - Resource usage of SBC (CPU, memory, etc.)

Intel HMP software running on an Intel ATCA-compliant single board computer is a cost-effective solution for low-end deployments that utilize a single computing platform for both application and media processing. This combination of building blocks is also designed for high-density solutions that require disk storage and support for advanced media processing such as speech recognition and Text-To-Speech (TTS).

Cost-Effective Media Processing

The introduction of DSP capabilities on the Intel Xeon processor is extremely cost-effective technology for deploying host media processing functions. Intel HMP software running on the Intel Xeon processor is designed to enable a single processor to replace multiple DSPs in a platform designed to scale to densities of DS-3 and even OC-3. Intel HMP software supports two major functions: voice media processing algorithms and software voice switching. Specific applications include:

- **Announcements –** streaming µ-law or A-law audio data from a file on a hard disk and converting into a telecom audio stream through a linear player resource
- **Interactive Voice Response (IVR) –** combining announcements with Dual Tone MultiFrequency (DTMF) or touch-tone signal detector algorithm. This function includes barge-in, a feature that stops the announcement when a DTMF digit is detected or when speech is detected.
- **Conferencing –** bridging voice streams in a three-way conference
- **Transcoding –** compressing voice, based on the G.729a and G.723.1 compression algorithms
- **Fax –** translating from a T.30/T.17 modem stream to fax Tag Image File Format (TIFF) files
- **Speech –** performing a range of speech technology functions, including TTS, speech menus, and large vocabularies

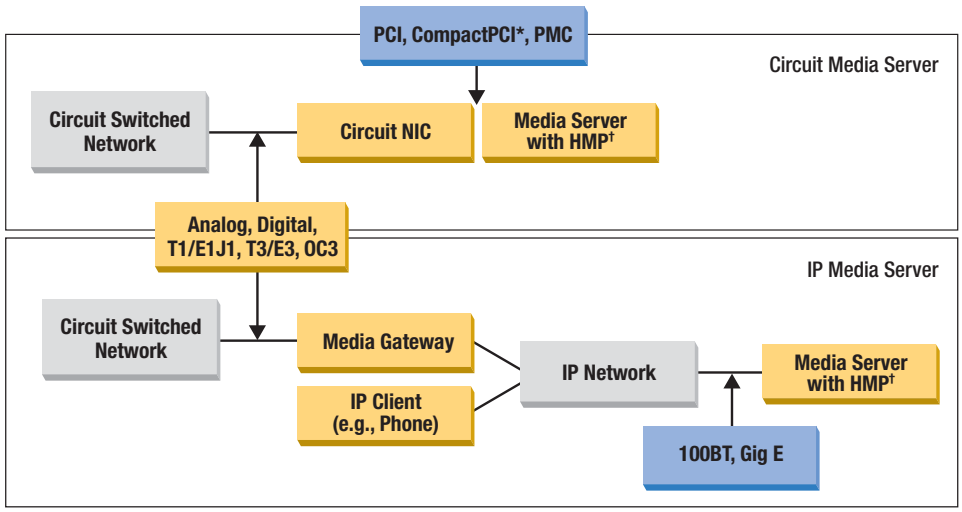
Deployment Architectures

The modular next-generation network combines voice and data in a single packet infrastructure. This makes two main architectures currently feasible for deploying media services: a direct circuit-based network interface and a packet-based IP network interface. These two architectures are illustrated in Figure 1 below. Intel HMP software can provide media processing in both architectures.

IP Networks

Packet-based IP network deployments require only Ethernet network interfaces. Service providers are moving to standard 100BASE-T and Gigabit Ethernet as the primary interface for both Internet backbone services and telecom voice connections. Service providers are deploying media gateways to convert the circuit network voice stream to an Ethernet-based infrastructure using Voice Over IP (VoIP). The ubiquity of Ethernet has necessitated equipping standard Web

Figure 1 – Media server deployment architectures



†Host Media Processing software

computing platforms and desktop and laptop PCs with Ethernet interfaces. As a result, an Ethernet telecom media server can be deployed on a standard Web computing platform with HMP software alone and without any additional voice-processing hardware. These Ethernet networks allow Ethernet-based telecom media servers to provide voice media processing for both legacy circuit clients and IP-based clients.

Softswitch Applications

The same type of Web server platform is currently being used for call-processing functions in soft-switch applications. Telecom media processing services can easily be added to these networks with HMP software running on the same server platform as the soft-switch. This new type of deployment would replace the specialized media processing platforms currently in use.

The economics of using homogeneous hardware architecture are very compelling. Total cost of ownership is significantly reduced for both network and enterprise service providers because the costs of sparing, training, and the integration of management systems are lower. This type of deployment also speeds time-to-market and accelerates the innovation cycle by allowing new features to be deployed through software upgrades.

Conclusion

Moving telecom media processing functions into computing silicon and industry-standard computing platforms based on the PICMG ATCA specification promises to allow telecom equipment suppliers and enterprises to significantly improve performance.

The combination of Intel HMP software and Intel ATCA-compliant platforms enable developers to migrate their telecommunications media processing solutions from the domain of custom software and relatively expensive proprietary boards to a standards-based open software model for high-volume computing platforms. The adoption of modular standards-based building blocks can enable startup costs and total cost of ownership of new telecom services to shrink dramatically.

Intel Advantage

Intel is a leading supplier of communications building blocks, adding value at many levels of integration. Through continuous innovations and advancements in connectivity and processing in the network, Intel is delivering, along with its customers and developer community, a wide choice of solutions that enable faster time-to-market, longer time-in-market, and increased revenue opportunity.

Intel Access

Intel® Networking and Communications Design Components:	www.intel.com/design/network/index.htm
Boards and Platforms Design for AdvancedTCA* Specifications:	developer.intel.com/design/network/products/cbp/atca/index.htm
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