



ANALOG DEVICES CONTINUES TO STRIKE OUT BOLDLY WITH PRODUCTS AND TECHNOLOGY FOR THE BROADBAND ERA

Emerging Broadband Landscape

As the demand for voice, data and video convergence escalates in the residential and office markets, broadband is becoming a pervasive force driving bandwidth explosion. Simple connectivity through high-speed pipes will not be enough to attract and retain discerning subscribers - particularly telecommuters and SOHO subscribers. The ability to understand key market and industry trends such as the emergence of service-level agreements (SLAs) will determine the success of service providers as they strive to bring converged communications to consumer premises.

Next-Generation Network Requirements

In order to address these evolving market requirements, equipment manufacturers need highly integrated cost-effective silicon coupled with a powerful software suite. This solution needs to be flexible and scaleable, provide IP services and Quality of Service (QoS) Bandwidth management, Wire Speed Security/VPN with bundled voice and data services.

Convergence Communications Processors

The answer to accomplishing all of this rests with communications processing chipsets. An integrated blend of ICs and software, these processors leverage a single convergence platform with high throughput routing and bridging functionality to link any physical layer device with higher-layer network processing that is required to address voice, data and video.

As part of its leadership initiative to make inroads in both the wired and wireless segments of the broadband market, ADI made two strategic acquisitions during 2000.

In 2000, ADI purchased Thomas Neuroth AG, an Austrian-based engineering design firm specializing in symmetric DSL (SDSL), with experience in developing products for HDSL and G.SHDSL applications.



Communications Processor Group

Last November, ADI also acquired Chiplogic Inc., a developer of processors and software focused in the convergence communications processing space. While ADI has concentrated efforts on the physical layer, Chiplogic's development activities emphasize Layer 2+ technologies with domain expertise in Systems, VLSI and DSP. This complementary melding of technological expertise will enable ADI to achieve new levels of integration with broadband access and voice network processing.

The initial result of the Chiplogic acquisition (now known as the Communications Processor Group) is ADI's development of the AD6489 and AD6689 communications processors, a system-on-a-chip hardware and software solution, which expands the company's broadband solutions portfolio. This processor family consists of two product versions: one, which is data-only and known as AD6489, and is targeted at SME (Small and Medium Enterprise) security/VPN gateways and routers, while the second device known as AD6689 provides voice and data and is designed for a number of applications, including routers, integrated access devices, SOHO (Small Office/Home Office) and other application-specific gateways, line cards and multiservice concentrators.

AD6x89 Communications Processors

The AD6x89 family offers a flexible architecture, security features and powerful, modular software that ensure high performance. The WAN-independent architecture provides equipment manufacturers the flexibility to interface with DSL, cable, WLL (wireless local loop) and Ethernet in the First Mile (EFM), allowing them to address multiple market segments. In addition, system developers can take advantage of the modular software and a powerful API to customize the architecture to application-specific requirements and increase their ROI. A Convergence Exchange Platform (CEP), which is a system-level implementation of the AD6489, enables developers to work on and integrate their custom software applications for the AD6489 and AD6689 prior to its availability in silicon.



Technology Value Proposition

AD6489 family of products offers a significant value proposition to system vendors both in terms of the architecture and functionality for next generation CPE Equipment.

Security

AD6x89 has a combination of hardware accelerators for Encryption and Authentication coupled with software like Crypto libraries and IKE running on a RISC engine. The portfolio of security hardware engines include DES/3DES algorithms as well as SHA-1 and MD-5 Authentication algorithms.

QoS Engines

AD6x89 solution provides Fast Path Forwarding Engines to accomplish QoS for Bandwidth Management / Differentiated Services – this is needed to put real-time sensitive data like voice and video (residential and business) and to prioritize mission-critical data traffic (business). The AD6489 solution for QoS provides functionality needed to achieve Fast Path Data Flow for:

- Parsing
- Packet Classification
- Traffic Conditioning
- Route Lookup
- Scheduling

Service Level Agreements (SLAs)

AD6x89 provides features for IP Services and Policy Management that would enable SLAs - amongst other things service providers can provide leased-line type of service to customers while having the ability to dynamically use additional available bandwidth.

Powerful Processing Platforms

The AD6x89 devices are a single platform with distributed and specialized RISC engines to handle all of the Voice Processing, Layer 2 to Layer 7 tasks and System Applications. The benefits of this include:

- Reduced BOM
- Smaller Footprints
- Reduce Power Requirements
- Increased Performance
- Low Latency



Comprehensive Software

A comprehensive, pre-packaged software suite includes:

- Device Drivers
- Base Level Integrated Software
- Optional Add-on Features
- System Applications
- Real-time Kernel (long-term)

This significantly reduces the burden on the system vendors by avoiding dealing with multiple sources for various stacks and the associated integration issues. This also reduces the overall development cost while providing time-to-market advantages.

Reference Platforms

ADI provides complete reference platforms for the popular system applications. The reference platforms have the complete software integrated and tested for interoperability. The idea is to allow the system vendor's to adopt the reference platform, as it is if they choose to and reduce their time-to-market by allowing them to focus on system level differentiating features.

Hardware Interfaces

Hardware interfaces have been provided to gluelessly connect to other chips and provide system level applications like 802.11b, HomePNA, DOCSIS Modem, chassis- based, Ethernet uplink etc. This significantly reduces the overall BOM of the systems.



WAN/PHY Independence

The AD6x89 processing solutions can work in conjunction with any Layer 1 (WAN) technology. The architecture also makes them adaptable to ATM, IP and Frame Relay.

Complete Vertical Solutions

ADI offers complete vertical solutions for system applications through integration where possible. Also in some areas like ADSL, ADI can offer complete vertical solution for CPE & CO applications including AFE, Digital Engine and Layer 2+ Processors. This reduces the burden on the system vendor by having a single source for all of the main components of the system.

Leading the Process Curve

ADI strong relationships with leading foundries like TSMC coupled with the strong back-end expertise of the CPG group enables CPG group to stay ahead of the competition in the process technology curve. This gives significant advantages over competition:

- Higher Performance
- Lower Power
- Smaller Area
- Lower Device Cost

As a new generation of information appliances takes advantage of the power of broadband networks and residential gateways, ADI will continue to shape its product development strategy to address these needs. The AD6489/AD6689 products are just the tip of the iceberg, as the company continues to leverage its DSP and analog expertise, and solid understanding of the entire signal processing chain in the broadband communications sector.

About Analog Devices

With revenues of \$772 million for the first quarter of fiscal 2001, Analog Devices is a leading manufacturer of precision high-performance integrated circuits used in analog and digital signal processing applications. The company is headquartered in Norwood, Massachusetts, and employs approximately 9,800 people worldwide. It has manufacturing facilities in Massachusetts, California, North Carolina, Ireland, the Philippines, Taiwan and the United Kingdom. Analog Devices' stock is listed on the New York Stock Exchange, and the company is included in the S&P 500 Index.

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