

Altera's Stars of Innovation are chosen for their groundbreaking use of programmable logic in leading-edge applications. The Stars of Innovation exemplify the excellence in engineering made possible by the power and flexibility of Altera's programmable solutions. For more information about the Stars of Innovation, go to www.altera.com/stars.



Cisco Systems

Cisco Systems, Inc. is the worldwide leader in networking for the Internet. Cisco's Internet protocol (IP)-based networking solutions are the foundation of the Internet and most corporate, education, and government networks around the world. Virtually all messages or transactions passing over the Internet are carried quickly and securely through Cisco equipment. In addition, Cisco solutions are the basis for most large, complex networks used by corporations, public institutions, and telecommunication companies, and are found in a growing number of medium-sized commercial enterprises.

Altera has been supplying Cisco with advanced programmable logic solutions since 1993, when Cisco acquired Crescendo Communications, an Altera customer that developed the technology underlying the ground-breaking Cisco Catalyst 5000 series of Gigabit Ethernet and ATM-ready switches. The Cisco Catalyst 5000 series redefined enterprise-level networking, and enjoyed widespread success. The high density of Altera's products in the Cisco Catalyst 5000 series—up to 24 Altera devices on a single board—led Cisco to use Altera products in other switch families, including their premier intelligent multilayer modular switch, the Cisco 6500 Series.

Equipped with Altera's FPGAs and MAX[®] CPLDs, the Cisco 6500 Series switch sets a new standard for IP communications and application delivery in enterprise campus, service provider, and metro edge networks. The Cisco 6500 Series' ability to maximize user productivity and enhance operational control while providing unprecedented investment protection earned it Network+Interop's Well-Connected award and Datamation's Network Infrastructure Product of the Year awards. While the Cisco Catalyst Series of switches enables the creation of leading-edge Ethernet-

based networks, Cisco also offers a complete range of switching solutions that combine support for legacy circuit-switched functions, such as time-division multiplexed (TDM) voice streams, with support for the latest packet-based functions like voice-over-IP and video-over-IP. These multiservice switches enable customers to maintain and grow their existing data services, while integrating them into a lower-cost network infrastructure capable of supporting a broader range of more advanced functions and services.

Many of Cisco's multiservice switches contain Altera's products, including the Cisco MGX 8230 Advanced ATM Multiservice Edge Concentrator, which provides the most cost-effective gateway for narrowband services in space and power-limited situations; the MGX 8250 Edge Concentrator, which supports aggregation of a complete range of IP, voice, and narrowband services in an IP+ATM network; and the Cisco IGX 8400 series wide-area switches, which provide the backbone required to deliver today's enterprise data, voice, fax, and video applications by offering an end-to-end



Altera's corporate network is almost entirely composed of Cisco routers, firewalls, and other products, like this Cisco Catalyst 5500 switch, which is used to support Altera's local area networks (LANs).



This Cisco 7200 Series router acts as the core gateway to Altera's corporate wide area network (WAN) and the Internet.



Switches from the Cisco Catalyst 6500 family, like this one, are at the heart of Altera's LANs.

networking solution. These multiservice ATM solutions from Cisco Systems connect enterprise locations while integrating with existing routers and access devices to safely and cost-effectively support business-critical applications.

While ATM and LAN switching both have important roles to play, routing continues to be essential in building highly available and scalable networks. Routers provide the security, stability, and control needed for mission-critical enterprise networks. Moreover, an emerging set of applications and environments are expanding the boundaries of high-end routing. Likewise, Altera usage in Cisco products extends beyond their switches into their routers, a clear leadership area for Cisco.

Cisco's extensive line of routing hardware, which provides everything from high-end routing platforms for building IP-optimized backbones to Ethernet LANs to WANs for small businesses and small branch offices, relies on both Altera's FPGAs and MAX® CPLDs. For example, in the Cisco 12000 Series routers, part of Cisco's family of multimillion packets-per-second (pps) IP and MPLS routing platforms, Altera APEX™ 20KE FPGAs provide high-speed digital processing, reinforcing the Cisco 12000 Series' position as the premier high-end routing solution for service provider backbone and edge applications.

Altera programmable solutions serve in Cisco's other high-performance router families as well, including several members of the Cisco 7000 Series, which is the undisputed leader in their market space with over 76 percent market share. Within the Cisco 7000 Series, Altera devices are most prominent in the Cisco 7600 Series, which delivers high-performance WAN and MAN networking with line-rate IP services; the Cisco 7500 Series, which is designed for environments requiring high performance, high availability routing; the Cisco 7300 Series, which can be used for enterprise campus or Internet gateway applications or be deployed by service providers as a high-end CPE router for managed service offerings; and the Cisco 7200 Series, Cisco's fastest single-processor router, which can serve in applications such as enterprise

WAN aggregation, point-of-presence leased line aggregation, and as customer premise equipment for outsourced WAN infrastructures.

Cisco's range of router solutions also extends to cover the needs of small to mid-sized businesses and branch offices. The Cisco 1600 Series router has become the proven choice for data access for small branch offices and small businesses because it provides flexible and secure data access, connecting Ethernet LANs to WANs via ISDN, asynchronous serial, and synchronous serial connections, as well as supporting frame relay, leased lines, switched 56, switched multimegabit data service (SMDS), and X.25. The Cisco 1700 modular access router series builds upon the success of the Cisco 1600 Series routers, delivering greater flexibility and investment protection. Cisco uses Altera devices in both the Cisco 1600 and Cisco 1700 Series routers.

For larger offices and small ISPs, Cisco offers the Cisco 2600 and Cisco 3600 Series routers. Both the Cisco 2600 Series and Cisco 3600 Series are multiservice router

families that share modular interfaces, providing network managers and service providers a scalable, cost-effective solution to meet such needs as Internet/intranet access with firewall security, voice/data integration, analog and digital dial access services, and virtual private network (VPN) access. At the upper end of the Cisco 3600 Series is the Cisco 3660 multiservice access platform, which enables applications such as packetized voice aggregation and branch office ATM access ranging from T1/E1 IMA to OC-3. Altera MAX CPLDs are heavily used in both the Cisco 2600 and Cisco 3600 Series, and WAN interface cards for both families feature APEX 20KE devices and the Nios® soft embedded processor.

In addition to supplying the foundations of the Internet infrastructure, Cisco also offers products that enhance and improve the Internet experience. The Cisco 6400 carrier-class broadband aggregator is a high-performance gateway



The Cisco product-based network at Altera is composed of over 400 individual devices or products, like this Cisco 2600 Series router (above) and Cisco 3600 Series router (below), and is the foundation for Altera's global computing infrastructure.



Continued on page 20

...Continued from page 15

that enables service providers to deliver personalized broadband network services, and voice- and entertainment-driven traffic over the full suite of broadband access media. The service selection gateway (SSG) capability of the Cisco 6400 allows subscribers to dynamically select on-demand services such as video-conferencing, streaming video, personalized Internet, business-grade Internet, shopping, and gaming to create new revenue streams and help attract and retain subscribers. The SSG allows each family member to access multiple services simultaneously for the ultimate in service utility and flexibility. With the capability to reach more than 14,000 homes simultaneously with a cost-effective high-speed service delivery infrastructure, the 6400, equipped with Altera FPGAs, enables service providers to meet the needs of a rapidly growing subscriber base with a scalable solution.

The information age rapidly brought to fruition by the advent of the Internet has led to great advances in information storage and management. Cisco products equipped with Altera devices play an important role here, as well. For example, the Cisco MDS 9000 family of multilayer storage networking products allows customers to deploy high-performance storage-area networks (SANs), delivering intelligent network services such as multiprotocol/multitransport integration, virtual storage area networks (VSANs), comprehensive

security, advanced traffic management, sophisticated diagnostics, and unified SAN management. In addition, the Cisco MDS 9000 family provides an open platform for embedding intelligent storage services such as network-based virtualization. With its multi-layer approach to network and storage intelligence, the Cisco MDS 9000 family ushers in a new era in storage networking.

With over ten years of cooperation in developing the world's most advanced Internet networking products, Cisco and Altera have formed a close relationship highlighted by frequent technology sharing and individualized support at all levels. While gathering feedback from its customers on future product development, Altera received valuable input from Cisco and incorporated it into all of its recent products, including the Stratix™, Stratix GX, and Cyclone™ families. Accordingly, the first devices that Altera shipped from each of these families were delivered to Cisco to fulfill immediate needs in next-generation products. Altera maintains the highest level of commitment to its relationship with Cisco, which has led both of them to produce standards-setting solutions through technology leadership and enabled them to become the defining companies in their industries.

This material is not sponsored by, endorsed by, or affiliated with Cisco Systems, Inc. Cisco, Cisco Systems, and the Cisco Systems logo are registered trademarks or trademarks of Cisco Systems, Inc. and/or its affiliates in the U.S. and certain other countries.