Cisco Systems **Routing Innovations**

Innovation in Internet Protocol (IP) routing is one of Cisco Systems' strongest commitments. The IP router—the heart of the Internet—inspects each packet of data and its corresponding IP address and sends it through the network using sophisticated hardware and software technology. The company has more than 15 years of development and innovation experience, and has built the largest IP networks in the world. Cisco continues to be a market share leader in IP Routing, and according to Synergy Research, the IP Routing market is expected to grow from $7 billion today to $10.5 billion by 2007.

Today's core and edge routing announcements reinforce Cisco's commitment to enabling service providers to be successful in a very challenging environment. The Cisco routing platform allows service providers to protect their existing infrastructure investments, while providing the foundation for new, revenue-generating services.

Cisco's most recent routing innovation—the Cisco Carrier Routing System (CRS-1)—demonstrates how the company has built a networking router of unprecedented performance and intelligence to run the infrastructure for the Information Age.

Below is a timeline of Cisco's routing innovations from 1986 through the present. For more information on Cisco's leadership routing technologies, solutions, and services, visit http://newsroom.cisco.com/dlls/innovators/Core_IP/index.html.

1986

- Cisco forever changes networking communications industry and Internet by launching its first innovation, the AGS multi-protocol router.

- Cisco introduces and ships the FGS, its first remote access router.

1993

- Cisco introduces the high-end 7000 router.

1994

- Cisco introduces the Cisco 2500 Series: the first compact, full-featured router for small or branch offices. Customers now utilize routing software that is unbundled from the router hardware.

- IP Multicast technologies enable massively scalable distribution of data, voice, and video streams efficiently to hundreds, thousands, even millions of users. Multicast enables corporate communications, video conferencing, e-learning, Internet broadcast, and streaming media applications.

rev. 040831

1994—1997

- QoS is the set of techniques to manage network resources. Cisco was the first company to support QoS Differentiated Services on an end-to-end basis, thus enabling the deployment of key new world applications such as voice and video over IP, as well as guaranteeing resources for existing business critical applications.

1995

- Cisco introduces the Cisco 7500 Series: the first multi gigabit back-plane router from Cisco. First router to have a Packet-over-SONET interface – a revolution in simplifying how Internet and IP traffic are carried over long distances.

1996

- The Cisco 12000 Series router is the first specifically built router for service providers and carrier customers looking to meet the extraordinary demands of scaling the backbone of the Internet and IP networks. Offers first completely distributed, modular router with ability to seamlessly scale – over 100 times the original capacity to date – without being taken out of the network and replaced.

1997

- Cisco ships one million units of the Cisco 2500 – believed to be the first router ever to reach the one million-unit mark.

- Cisco introduces "Tag Switching" technology—the precursor to Multiprotocol Label Switching (MPLS). MPLS is a routing technology that performs "flow aggregation" where labels are assigned to incoming packets with forwarding information that routes the packets along Label Switch Paths for the best possible path.

- Cisco introduces Gigabit Ethernet and Layer 3 routing in switches.

1999

- The Cisco 1600 becomes the fastest selling router in company history.

2000

- The Cisco 7500 Series named one of the most important products in the decade for revolutionizing the networking industry.

- Cisco introduces the Parallel express Forwarding (PXF) Network Processor—the award winning network processor that revolutionized the way packet processing is done in hardware. PXF is a powerful adaptive network processing technology that enables multiple million packet per second forwarding rates while allowing customers to continuously upgrade their feature sets without swapping hardware.

rev. 040831

- Cisco announces Cisco 10000 Edge Services Router (ESR), a carrier-class product for Internet service providers (ISPs) deploying high-density, dedicated-access IP services.

- Cisco develops a method of integrating hardware encryption technology into the Cisco 1700 family of routers by shrinking the technology to fit into a space the size of a PCMCIA card. The result is a tiny, affordable device that provides a complete security access solution, including high-speed encryption, stateful inspection firewall, intrusion detection system (IDS), and a VPN tunnel server.

2001

- Cisco introduces Very Short Reach Optics (VSR) – enabling cost-effective scaling of IP networks. VSR provides a significantly lower cost solution for 10 Gbps intra-PoP connections. VSR-1 is the first Optical Internetworking Forum (OIF) approved 10 Gbsp interface optimized for interconnection distances of less than 300 meters between routers, switches and Dense Wave Division Multiplexing (DWDM) systems.

- Cisco is the first vendor to announce Phase 1 of IPv6. IPv6 offers expanded IP addresses to accommodate the (1) proliferation of Internet devices such as personal computers, personal digital assistants, wireless devices, and new Internet appliances; (2) expansion of the Internet throughout the world; (3) increasing use of "always on" Internet access; and (4) requirements of emerging Internet applications. IPv6 also provides integrated auto-configuration for plug-and-play capabilities, enhances mobility and end-to-end security.

- Cisco is the first vendor to extend mobile IP to create Mobile Networks. This breakthrough technology allows entire networks to roam. For example, passengers aboard an airplane can stay connected to the Internet. Each passenger's IP device is a node on the mobile network connected to a router on the plane.

- Cisco ships The 12400 Series Internet Routers – first fully distributed routing architecture in the industry. Solution delivers uncompromising 10G routing performance, unparalleled QoS capabilities, comprehensive high availability support, and integrated core and edge feature set.

- The Cisco 12406 Internet Router is the first 1/4-rack system in the industry to support 10 Gigabits per second (Gbps) interfaces.

2002

- Cisco introduces industry's first single port 10 Gigabit Ethernet (GbE) router line card designed to cost-effectively scale service provider Ethernet infrastructure. Cisco also introduces industry's first 10 Gigabit DPT/RPR line cards extending its leadership in RPR technologies. New 10Gbps product introductions allow service providers to deploy the Cisco 12000 Series with the greatest architectural flexibility and versatility as they achieve 10Gbps economies of scale anywhere in their network.

- In the Service Provider segment, Cisco gains significant momentum, announcing such alliances as SBC Communications Inc., who plans to use Cisco IP networking technology in its core network infrastructure. Cisco is also delivering expanded IP backbone scalability to Sprint with combined Cisco 12000 and 10700 Series Internet router solution. http://newsroom.cisco.com/dlls/prod_050802b.html

2003

- Cisco more than doubled the processing power of its Cisco 7200 Series routers, bringing million-packets-per-second (mpps) processing to one of the industry's most widely

rev. 040831

deployed mid-range routers via the new Cisco 7200 Series Network Processing Engine (NPE-G1). Cisco also introduced the compact Cisco® 7301 Series router, designed as the industry's highest-performing single-rack-unit router built for customer-edge applications. (Jun 03)

- The Cisco 12000 Series continues to win key franchises in core networks worldwide, including SBC, Verizon, Japan Telecom, and Vodaphone. AT&T and Cisco Expand Market Alliance for Delivering Global Managed-Networking Services

- Cisco announced that Verizon Communications will utilize the Cisco 12000 Series Router platform in its national IP VPN network. China Netcom Group, one of the leading communications service providers in China, also chose the Cisco 12000, as well as the 7000 Series Routers for its IP/MPLS backbone and service network. (Oct 03)

- New Enhancements to Cisco 12000 Router Double the Capacity of the World's Largest Core Networks; Additions to Cisco 7600 Series Enable New Edge Services for Customers like SBC and Comcast.

  - The additions to the Cisco 12000 Series Router are: the new Cisco 12800 Routers, a 40 Gigabit per second (Gbps) per slot system with complementary higher density OC-192/STM-64 and OC-48/STM-16 line cards that utilize the greater system capacity, and new Cisco 12010 and 12006 Routers, 2.5 Gbps per slot systems offered in 10- and six-slot chassis.

  - The Cisco 7600 Series introduces a new system processor, Supervisor Engine 720-3BXL, support for additional Layer 2 and Layer 3 Multiprotocol Label Switching Virtual Private Network (MPLS VPN) and Internet Protocol version 6 (IPv6) services, greater scalability, and a new Enhanced FlexWAN module which doubles the service performance while using existing Cisco 7200 and Cisco 7500 port adapters. (December 10, 2003)

2004

- Announced on May 25th, the Cisco Carrier Routing System (CRS-1) is the industry's first carrier router offering continuous system operation, unprecedented service flexibility and unparalleled system longevity. Cisco CRS-1 is powered by Cisco IOS XR - a unique self healing and self-defending operating system designed to scale up to 92Tbps and always on operation. The Cisco CRS-1 combines the Cisco Silicon Packet Processor, the industry's first programmable 40Gbps ASIC, and Service Separation Architecture for unprecedented service flexibility and speed to service. The Cisco CRS-1 provides foundation for service and network convergence while providing investment protection for decades to come.

rev. 040831