Aleron—Lower Cost, Faster Deployment, Higher Performance Applications via Optical IP Backbone and MPLS

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>
> *~ Chris Lutts,*
> *Vice President and General Manager*
> *Broadband Services at Aleron*

While many service providers must migrate from legacy infrastructures, phasing in newer internetworking technologies as demand and costs allow, Aleron has built a next-generation Internet Protocol (IP)-based network that uses multiprotocol label switching (MPLS) across its entire core network to enable new applications and value-added services. Aleron addresses the worldwide IP network services market with a scalable, optical network architecture reaching more than 30 countries. Aleron provides high-speed, high-performance Internet connectivity, data transmission and value-added network applications, and by using advanced network technologies provides its customers with the next generation of IP network services with higher reliability and lower costs. Customers range from content providers from Microsoft to large ISPs like United Online (Juno/NetZero) to Fortune 500 corporations like Hughes.

Cisco MPLS is available to the Aleron network via the Cisco core and edge routers running Cisco IOS Software. With Aleron's MPLS backbone, any major node is only a single hop from the next, ensuring fast, dependable communications. With MPLS, constructing highly-configurable IP-based virtual private networks (VPNs) and applications that can be defined and managed based on different quality of service (QoS) characteristics is significantly faster, more cost-effective and flexible. New service can be deployed within 24 hours and customers can sign up for only the amount of bandwidth they need when they need it. Service level agreements (SLAs) from Aleron are comparable to those offered to companies buying private network connections but are based on much lower fees and highly flexible options.

MPLS Across Core Network Backbone

With the intensely competitive climate for service providers, Aleron's founders knew that the company had to offer a compelling portfolio of services and features at attractive prices. Since they were not limited by having to phase in new equipment into a legacy environment, Aleron engineers were able to design a network topology that delivered the fastest, most quality sensitive services. They were also able to take advantage of cost efficiencies from an optical IP backbone and features enabled by MPLS.

With MPLS and LDP, Aleron is marketing a Guaranteed Bandwidth Connections service featuring point-to-point and point-to-multipoint connections to global peering points or content sites. The service allows customers to extend or create a VPN using MPLS with QoS applied to different traffic types.

"Other service providers are adding new equipment to their copper-based networks," says Chris Lutts, Vice President and General Manager, Broadband Services at Aleron, "but our ability to build a completely optical backbone with MPLS over a fully meshed OC-48 topology without dealing with legacy infrastructure lowers our costs and we are able to pass on the cost efficiency to our customers."

Aleron's Cisco Powered Network features Cisco 10-Gigabit 12400 Series Internet Routers in the core and Cisco 12000 Series Internet Routers at the network edge. Advanced MPLS technology and Label Distribution Protocol (LDP) are used across the entire core and traditional IP routing is available at the network edges. MPLS enables IP packets to travel using Layer 2 switching techniques for decreased network latency and fewer router hops. When combined with traffic engineering and LDP, MPLS allows for the construction of highly configurable IP-based VPNs and for applications with defined QoS.

Faster Provisioning, Reduced Latency

In the past, corporations wanting to connect offices around one country or globally have purchased dedicated lines connecting one site to the other or have paid for private virtual circuits over asynchronous transfer mode (ATM) or Frame Relay networks. These solutions take time to provision—usually 30–90 days to connect circuits from end to end—and are expensive to maintain.

By contrast, the Aleron network provides simplified packet switching using MPLS that supports single-hop worldwide connectivity. Traffic traveling on virtual circuits built withtraditional Layer 3 IP routing first goes to acentral network hub and then to its end site. Each router the traffic passes through extracts forwarding information from the Layer 3 header in each packet. This information forms an index for a routing table lookup to determine succeeding hops. But when a TCP/IP packet enters an MPLS-enabled network, the router identifies the packet's final destination. The packet is then encapsulated with an MPLS header that includes a label specifying the path to the next router. The packet is put into a Layer Two tunnel and sent across the network from the first router it encountered to the destination router. No Layer Three lookups are needed while the packets are passing through the intermediate routers and the packets have reduced latency because they have bypassed each transit router's lookup queue. When the packet reaches its destination router, its MPLS header is removed and it passes back into normal IP routing and switching.

"MPLS is on the verge of being standardized and implemented worldwide," says Lutts. "But while the world is moving into MPLS and into fully IP-based and scalable networks, the big telecoms still have large investments n their older ATM and Frame technology. We can move a lot faster to get customers next-generation solutions."

Aleron uses Label Distribution Protocol (LDP) to reserve bandwidth for key applications. LDP can establish a virtual circuit of arbitrary size between any two ingress and egress routers. Reserved bandwidth between those routers can be assigned a priority level for enhanced QoS.

EXECUTIVE SUMMARY

Background
Aleron's Internet backbone dates back to 1994, when it was operated by Apex Global Information Services (AGIS). Today the company is positioning itself to be an industry leader with an architecture to provide high-speed, high-performance Internet connectivity, data communications, and other value-added network applications for Fortune 500 companies, content providers, and large Internet Service Providers. Aleron's network was ranked number one in performance among all backbone networks in 2001 tests by Keynote Systems and Boardwatch Magazine.

Challenge
To compete successfully in the intensely competitive service provider market, Aleron's management realized that it had to offer leading-edge network features and services at competitive prices.

Cisco Solution
Aleron turned to Cisco Systems for network technology that leverages the advanced features of multiprotocol label switching (MPLS) in Cisco IOS Software and Label Distribution Protocol (LDP). With Cisco 12400 Series Internet Routers at the network core and Cisco 12000 Series Internet Routers at the edge, Aleron brought Layer 2 network efficiencies to its network.

Results
With its new generation network based on Cisco core and edge routers, MPLS, and LDP, Aleron has lowered the cost, speeded up the deployment, enhanced scalability, and enabled higher performance applications for its customers. Enterprises, content providers, and Internet Service Providers can look to Aleron for VPNs deployed within 24 hours, bandwidth-as-needed charges, and traffic defined by different quality of service (QoS) characteristics. Service level agreements (SLAs) from Aleron are competitively priced and the network's characteristics allow for much lower fees and more flexible options.

As a result, any of Aleron's backbone nodes, anywhere in the world, is only one router hop away. This provides faster, latency-free traffic and dedicated bandwidth inside of the network.

"A service provider might link to Aleron in London and then connect to an exchange in Tokyo with only two hops in between. Through LDP, this bandwidth can also be guaranteed and dedicated to the customer, and the bandwidth can be increased up to 622 Mbps or decreased within 24 hours," explains Lutts.

Offering Global IP Services

Beta customers, including foreign ISPs, tested the Aleron network's features in early 2002 and full production and service began soon after. Foreign ISPs with peering relationships with providers in the United States have been interested in the Aleron service to connect their points of presence (POPs).

"Instead of buying a private line to connect their U.S. POPs, foreign ISPs connect them through a virtual circuit from us," says Lutts. "So we become their virtual U.S. network, a network that is very scalable, very flexible, easy to deploy, and with service comparable to a private line or ATM or Frame Relay network—but at much lower cost."

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