Meeting Evolving Broadband Requirements with ECI's ST™-series Routers

Application Note

Next-generation B-RAS Needed

Residential customers are hooked on broadband. They are subscribing to both DSL (Digital Subscriber Line) and cable-based broadband in accelerating numbers. For DSL operators who've been able to upgrade dial-up customers to high-speed Internet connect, this is good news. But from a business standpoint, it doesn't go far enough. While first-generation DSL service has allowed service providers to offer residential Internet access at speeds far beyond dial-up, traditional cable operators offer still higher Internet access speeds. At the same time, new VoIP (Voice over Internet Protocol) and wireless phone companies are gnawing at the profit margins DSL operators traditionally rely on from their voice customer base.

Such factors are forcing DSL operators to upgrade their existing infrastructures. To successfully compete, they not only need next generation networks that offer significantly increased throughput to the home, they also need to support enhanced services and content that goes beyond Internet access. Savvy DSL operators are looking for ways to avoid commoditization of their offerings by building networks that give them the flexibility to support delivery to their residential customers of video on demand, IP video, and other advanced service offerings.

The B-RAS (broadband-remote access server) is a key component of today's DSL networks. The traditional B-RAS is an ATM (Asynchronous Transfer Mode) PVC (Private Virtual Circuit) and PPP (Point to Point Protocol) termination device that provides authenticated access to a single service: the Internet. What's needed, however is a fundamentally different B-RAS that can act as a gateway to many network services. The next-generation B-RAS must also facilitate the migration from ATM-based access to the next generation of Ethernet-based DSL access.

Market Forces Drive New Broadband Requirements

Two key factors are driving new B-RAS feature requirements: explosive user growth and the shift from best-effort Internet to a wide range of services with new bandwidth and service delivery requirements.

Growing Number of Subscribers: According to a DSL Forum report issued in December 2005, customers are signing up for DSL service at a rate of 40 million a year – over 100,000 each day. The report indicates that more than 125 million homes and businesses currently depend on broadband DSL. This growth will create the need for much higher scale B-RAS platforms which will be able to support the ever-increasing bandwidth demands of triple play (voice, video and data) services.

The Move to Sophisticated High-Bandwidth Services: Gaming, video-on-demand, IP video, VoIP and other broadband value-added services are driving user broadband implementation while providing new revenue. To guarantee delivery of these delay-sensitive applications, the B-RAS device must contain sophisticated QoS (quality of service) to recognize and assign priority to certain types of applications over others. Additional bandwidth is required to deliver these services with the high quality needed to drive its use. A complete Internet routing implementation is also needed to deliver applications originating from multiple providers to a single customer.

The Stages of Broadband DSL Service Evolution

Broadband DSL service has evolved significantly since it was first introduced and can be characterized by three distinct phases:

Service Definition (Late 1990s): In this first stage of DSL service rollout, competition was limited and service was first offered to early adopters. Uptake was slow and B-RAS vendors delivered an architecture customized for each service provider.

Service Growth (2000-2003): This was a time of rapid growth and expansion as DSL began to enter mainstream awareness and experienced an increasing rate of implementation. Service delivery architectures became more standardized and competition increased. With bandwidth as the only differentiator, service began to commoditize. As a result, vendors began to seek new sources of revenue from value-added services.

Service Breadth (2004+): In this recent phase of growth, DSL has begun to reach critical mass. Heightened competition has driven price erosion for basic service, forcing providers to seriously look for alternative revenue sources by offering differentiated services. Advanced services now being offered include business VPNs, IP Video, interactive gaming, music and voice services.

B-RAS Device Evolution

As broadband service delivery has evolved from high-speed Internet service to a wide variety of services, the fundamental requirements of the B-RAS have also changed.

First Generation B-RAS – Service Definition Phase (Late 1990s): The first generation of B-RAS devices acted as a session managers for broadband connectivity. Their primary role was to terminate many PPP sessions and perform subscriber management (including authentication, authorization and accounting as well as IP address assignment) for each session. They were software-based to support the rapid prototyping required by the customized nature of deployments and suffered from low performance as a result.

Second Generation B-RAS – Service Growth Phase (2000-2003): In this phase, hardware forwarding moderately improved performance and scale but resulted in limited flexibility. B-RAS devices still maintained centralized, processor-based architectures and were optimized for a single-service – Internet access. Attempting to add advanced features such as filtering or QoS led to performance degradation.

ECI ST-Series B-RAS Highlights

High Performance
- 100,000 sessions
- 8,000 VRFs with dynamic routing
- Up to 160 Gbps throughput

Comprehensive Routing
- BGP-4, ISIS-TE, OSPFv2, RIPv1, RIPv2
- LDP, RVP-TE, IPv6, MPLS IP VPNs

Integrated Layer 2 switching
- ATM VP or VC switching
- Ethernet switching
- ATM, Frame relay and Ethernet over MPLS

Policy Management
- Dynamic, per-session QoS

High Availability
- Distributed hardware and software
- Hitless software upgrades
- Non-stop performance

Hierarchical Scheduling
- Per the DSL Forum TR-59 architecture

IP Multicast for Video or Audio Broadcast
- Per the DSL Forum TR-59 architecture
- PIM Sparse Mode, MBGP, IGMP v2/3

Interface Flexibility
- AnyService on AnyPort @ AnySpeed

Third Generation B-RAS – Service Breadth (2004+): These B-RAS devices have undergone a significant shift in functionality to support a complete range of high-bandwidth, multimedia-intensive services. B-RAS functionality is integrated into service edge routers, which provide the capacity, Internet routing, integrated switching, high availability, QoS support, service and access network flexibility required to deliver a complete portfolio of services to a rapidly growing customer base.

The Third Generation ECI Telecom ST™-series B-RAS

Though producers of early B-RAS devices have attempted to add the required functionality to support third-generation B-RAS functionality, the requirements have shifted so profoundly as to require a new type of B-RAS designed specifically to support the next wave of high-bandwidth, multimedia-enabled consumer and business broadband applications.

ECI's ST-series service edge routers (comprised of the 5 Gbps throughput ST50 and the 160 Gbps ST200) were designed specifically to meet third generation B-RAS service delivery requirements. The distributed ST-series B-RAS hardware and software architecture integrates sophisticated QoS, Internet routing, Layer 2 switching, and service management to deliver wire-speed advanced broadband service delivery with all services enabled on every port. See the ECI Telecom ST-series B-RAS chart left, for a summary of key broadband-enabling architectural differentiators.

The increasing adoption of broadband coupled with a dramatic shift from a single service (high speed, always-on Internet connectivity) to a wide range of high-bandwidth, multimedia-intensive services has dramatically changed the architectural requirements of B-RAS devices. Unlike older-generation B-RAS platforms designed to support data services only, the ST-series were designed to support all types of high-bandwidth, delay-sensitive multimedia broadband services at wire speed. The ST-series integrates the scale, QoS, accounting, high-speed interfaces and integrated routing and switching required to deliver and exciting and profitable portfolio of consumer broadband services today, with the unique ability to evolve with changing service delivery requirements and rapid subscriber growth.

ST™-series Broadband Edge Routers

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About ECI Telecom
ECI Telecom offers future-ready telecommunications solutions that leading carriers and service providers rely on for delivering revenue-generating services to their business and residential customers. With its current products, ECI can deliver a full complement of access-to-edge IP transport solutions today. Known for its ability to translate customer needs into scalable, flexible, cost-effective solutions, ECI helps companies increase the value of their network infrastructure and reduce operating expenses. The company's single-shelf networking systems simplify network deployment and enable Build-as-You-Grow™ next generation telecommunication networks.

The Data Networking Division
The Data Networking Division (DND) adds next-generation IP/MPLS edge routing technology to ECI Telecom's product and services portfolio. DND's edge routers offer full-featured, multi-service support and complete Internet routing in a carrier-class, IP-based platform. ECI's ST-series routers provide the automated subscriber management, reliability, and performance that service providers need to implement advanced, revenue-generating broadband applications, like video on demand or voice over IP.