

Digital Subscriber Lines and Managed Network-based Services: A Perfect—and Profitable—Marriage

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Executive Summary

It seemed unimaginable only a few years ago, but by 2005 data traffic in public networks will exceed voice traffic by a ratio of over 20:1. This relentless growth continues on two fronts: more users and increased application sophistication. The insatiable appetite for bandwidth is creating a huge, worldwide demand for broadband access, such as Digital Subscriber Line (DSL) technology, representing an enormous opportunity for Service Providers (SPs).

The dramatic growth in data traffic is largely due to the Internet, whose remarkable success has brought about a new virtual model for networking. Evidence is the advent of Virtual Private Networks (VPNs), business to consumer e-commerce and business-to-business e-business applications. As a result, users are now demanding much more from the end-to-end public network infrastructure. This too, is great news for SPs who want to transition from selling commodity bandwidth to offering highly-differentiated—and profitable—value-added services.

Two implications are clear from these trends: SPs need to offer DSL-based broadband access, and the network infrastructure must now support a rich and diverse set of value-added services. DSL and managed services have potent synergy, and when implemented properly, form a strong—and highly profitable—marriage. A Secure DSL service for example, which combines DSL access with a managed proxy firewall, is a particularly alluring and lucrative offering.

The aggregation of high-speed, high-value services—both wholesale for other SPs and retail to enterprise organizations—affords three major advantages: more profitable revenue streams, an ability to attract new customers and a way to provide existing customers a solid, churn-reducing growth path.

CoSine's IP Service Delivery Platform has been designed to meet the industry's next-generation market needs by providing a powerful, reliable and extensible solution. The platform has three elements: The *IPSX 9000 Service Processing Switch* with its open and industry-leading *IP Services Suite* of value-added capabilities; the *InVision Service Management System*; and the *InGage Customer Network Management system*—a value-added service offering in and of itself.

This white paper explores the synergy in the marketplace between DSL and managed services, describes the ideal architecture for marrying the two, and highlights how a next-generation solution like the IP Service Delivery Platform allows SPs to take full advantage of the opportunity.

The Market for Managed Services with DSL Access

The astonishing success of the Internet and the now dominant Internet Protocol (IP) are creating a new model for business communications—a virtual one via managed network-based services. This trend spells *opportunity* for all SPs. Indeed, Information Technology (IT) departments at a growing percentage of enterprise organizations are beginning to view managed services as their salvation from the onslaught of new technologies and applications. By empowering business customers with managed security, dial-up and site-to-site VPNs, intranets and extranets, bandwidth management, packet/frame/cell interworking, and other value-added services, SPs can grow revenues—and profits—while taking market share away from competitors who offer only commodity bandwidth and connectivity.

In a way that parallels the migration from PBXes to Centrex services for voice communications, today's sophisticated data applications are demanding substantially more from the end-to-end network infrastructure. Users now expect “the network” to provide an assortment of value-added services, deliver mission-critical performance—backed by Quality of Service (QoS) and Service Level Agreement (SLA) assurances—and afford a level of end-to-end manageability that was sorely lacking in private networks. In other words, users want an Intelligent Data Network. For those who may still doubt the validity of this claim, consider what Tom Nolle of CIMI Corporation discovered: SPs had to turn away over \$3 Billion in revenue last year because they “simply could not provide the infrastructure to meet their customers' needs” for IP services.

Thomas Weisel Partners expresses this need even more succinctly: “simply offering higher speed will not differentiate SPs... offering new services will.” Infonetics Research and the International Data Corporation (IDC) report that over half of enterprise organizations use or are planning to use managed services for some or all of their data communications needs. Why? Because managed services constitute the best way for companies to get a more versatile, capable and affordable solution than they could ever hope to achieve with the “go it alone” approach. And, they will turn increasingly to those SPs with highly differentiated, value-added offerings. Which is why many savvy SPs have already begun to capitalize on this enormous market opportunity, allowing them at long last to say “good bye” to the days of unprofitable and undifferentiated “vanilla” services offered with “best effort” performance.

The CoSine Advantage for SPs

Aggregation and consolidation of multiple services onto the purpose-built, next-generation IP Service Delivery Platform fully leverages economies of scale and other efficiencies for maximum profit and return on investment:

- *Establishes an extensible platform that integrates routing, switching, computing and management capabilities to provide flexible processing power for delivering value-added services that scale to tens of thousands of subscriber networks.*
 - *The standard-based platform interoperates with transport services and equipment from the edge through the core, complies with legacy carrier Telecommunications Management Network (TMN) architectures, and has an open CORBA interface for seamless integration with existing network elements.*
 - *The open design facilitates adding subscribers and services as business needs evolve.*
 - *On-going integration of third-party name brand services affords SPs with a continual stream of new revenue opportunities.*
 - *Network-based virtual provisioning accelerates time-to-market and affords rapid deployment, which translate into immediate revenue from satisfied customers.*
 - *The single-point integration of value-added services, such as firewalls, tunneling, encryption and bandwidth management, minimizes operating and maintenance costs.*
 - *Software-activated services can be delivered instantly, since adding new customers and new services requires no new equipment or no truck rolls.*
 - *The flexible architecture allows services to be tailored to specific and evolving subscriber needs, which helps attract new customers and retain existing ones.*
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In today's networked global economy, everybody everywhere feels the pressure to get on-line. Putting it another way: the millions of unconnected businesses and branch offices now need network access. And there's more. The steady advance in application sophistication is causing the currently-connected to also feel the pressure—to upgrade. Rich content, streaming media and other bandwidth-intensive services are saturating today's so-called “high speed” lines. What this means for SPs is that virtually every place of business in the industrialized world will need a new form of network access—either for the first time or as an upgrade to replace an existing service. And an increasing percentage will need the broadband access speeds available with DSL.

DSL technology is emerging as the on-ramp of choice to network-based IP services, especially for site-to-site enterprise networking and telecommuting applications. Owing to the extraordinary 200% annual growth rate forecasted by TeleChoice and similar predictions by other analysts, Infonetics Research reports that over 80% of SPs already have or are planning DSL-based service offerings. Why is DSL expected to dominate the broadband access market? The answer is simple: unbeatable price/performance. The technology is hands-down more capable, reliable and cost-effective than any of the alternatives, including ISDN, cable modems and wireless.

There are three important reasons for DSL's emerging popularity. The first is DSL's ability to fully leverage the ubiquitous local loop wiring that reaches virtually every home and place of business in the industrialized world. Second is the full spectrum of DSL service options—ranging from integrated voice/data communications to pure high-speed and symmetrical data connectivity—which affords a number of opportunities for competitive differentiation. The third and final reason is DSL's straightforward interface with PSTN-based voice communications through passive splitters, special gateways and/or integrated access devices. For these reasons and more, DSL is expected to dominate cable, fiber and wireless technologies as the on-ramp of choice for businesses around the globe.

The Synergy of Secure DSL—and Beyond

DSL and managed services have a potent synergy that promises to bring about a change in “business class” data networking. Each technology affords its own set of advantages, and when combined, the advantages compound. VPNs offer a cost savings of 30-80% with improved reliability over equivalent private networks, extend reach globally, and simplify networking with a single, dependable and flexible connection for a private intranet, semi-private extranets and public Internet access.

DSL's own set of advantages include an increase in the reliability and throughput of the local loop, an always-on continuous availability that eliminates connection set-up and latency, and a flexible assortment of feeds and speeds to meet the full spectrum of needs. In effect, DSL transforms existing telephony wiring into a modern broadband digital communications conduit, bringing additional price/performance advantages to VPNs.

These two technologies also fully complement each other's limitations. For example, as an always-on connection, DSL needs around-the-clock security. By adding a managed, network-based firewall service over the DSL connection, corporate enterprises have the advantages of cost-effective DSL access with the iron-clad security of an application proxy firewall. The combination of high-speed DSL with firewall protection becomes a particularly powerful managed “Secure DSL” service offering.

As subscribers' requirements evolve, the enterprise can choose to add other managed services to their Secure DSL solution. VPN services such as site-to-site IPsec tunneling (virtual leased line) and IPsec dial tunnel termination provide enterprise subscribers with secure any-to-any connectivity. Additionally, the enterprise subscriber could choose to have additional services added including a Public Key Infrastructure (PKI) service integrating with either an Entrust or VeriSign certificate authority, Intrusion Detection and Anti-virus services.

DSL and VPNs are indeed made for one another. Both deliver more affordable bandwidth to sites in an enterprise network with DSL lowering the local connection costs (compared to ISDN and leased lines), and VPNs eliminating the long-distance charges. Both enhance network-wide flexibility and scalability compared to private lines and permanent virtual circuits. Both integrate easily with existing private networks, based on dial/leased lines or Frame Relay virtual circuits. Both are ideal for site-to-site and telecommuter internetworking. And both substantially simplify network implementation and operation, creating fewer headaches for enterprise organizations—and their network SPs.

The combination of DSL broadband access and managed services is indeed quite powerful. But to get the most from this marriage, SPs will need a next-generation architecture.

Marrying DSL and Managed Services the Right Way

The need for high-speed, high-value services will forever change the way SPs design, deploy and deliver their offerings. In a way that parallels the paradigm shift in the voice marketplace, where network-based Centrex services are replacing Private Branch Exchanges (PBXes), IP-based services are now available as a similar set of utilitarian capabilities from the network itself. (There is a more detailed discussion of this important topic in a white paper titled "Moving Into the Cloud: The Case for Network-based VPNs" available on CoSine's Web site at www.cosinecom.com.) The only element missing is the next-generation architecture that marries DSL access and value-added network-based services.

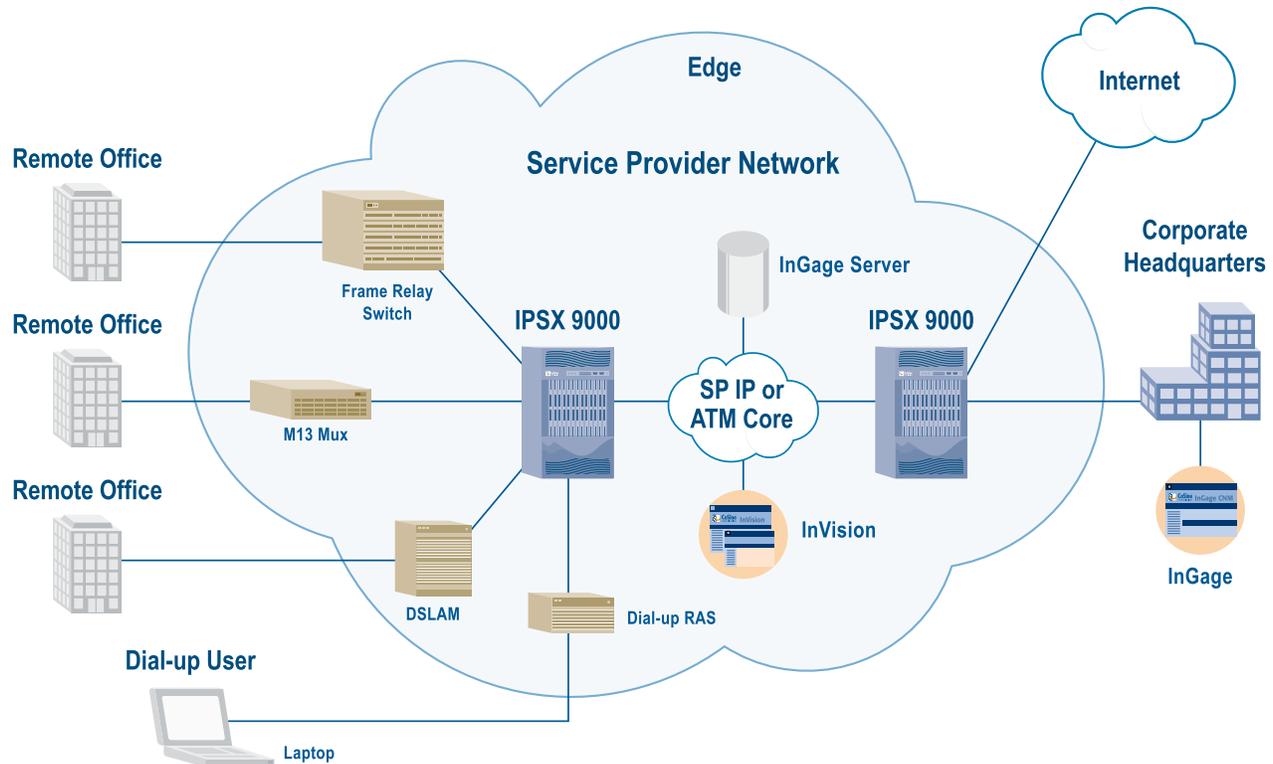


Figure 1. The next-generation services infrastructure is just what enterprise organizations have always wanted: dumb on the premises and smart in the cloud.

Moving IP services from the premises into the cloud will need to involve an evolutionary transition. In other words, the next-generation architecture must satisfy the evolving and expanding enterprise customer demands, and make the offering a successful and profitable business endeavor for SPs. Such a win/win design can be achieved only if it meets these six fundamental objectives:

- Affords investment protection that eliminates forklift upgrades—for both the SP and the enterprise subscriber
- Maintains compatibility with private networks, Internet-based VPNs and management systems, while embracing new broadband access and value-added service technologies
- Delivers a cost-effective, reliable and scalable solution that leverages existing infrastructure, while facilitating high value-add for competitive differentiation
- Enhances the end-to-end manageability of the access aggregation, provisioning and utilization of value-added networked-based services
- Supports both retail and wholesale services with a choice of flexible and mutually profitable business arrangements among SPs
- Provides an extensible and enduring solution that combines an open platform with expandable performance

The shift from premises-based to network-based services essentially relocates specific functions now performed in Customer Premises Equipment (CPE) to systems at the edge of the SP's network. The resulting configuration affords numerous benefits. By minimizing the role of CPE, services are easier to provision, change and manage, and the need for truck-rolls or any other high-cost installation exercise is eliminated. The enterprise can utilize ordinary (i.e. "dumb" and inexpensive) routers with the DSL interface either built in or added on as a separate DSL modem. Because everything else is provided by and managed from the network—firewall, VPN, tunneling, and more—the enterprise achieves substantial protection from technological obsolescence. Similarly, SPs can insulate themselves from changes in technology by utilizing carrier-class systems that implement an open architecture. And there are no trade-offs because the resulting solution is still far more scalable, flexible and reliable than a CPE-based solution.

In addition, SPs can achieve access technology independence by employing service processing switches that aggregate connections from DSL access multiplexers (DSLAMs), dial-up concentrators and other access systems.

The service processing switch allows SPs to migrate away from the commodity "all you can eat" bandwidth-oriented business model to a more profitable "à la carte" approach based on value-added services. Such managed services are more profitable and afford two other advantages: the ability to attract new customers and give existing ones a solid, churn-reducing growth path.

Control is a major reason enterprise organizations implemented private networks. Interestingly enough, control will also be the main reason they will migrate to managed network-based services. The typical private enterprise network is managed edge-to-edge. There is little or no visibility into the leased lines, dial-up connections or virtual circuits between the edges, but these perform dependably enough to be taken for granted. A mesh topology or dial backup capability adds enhanced reliability for mission-critical needs. By contrast, a well-designed, managed network-based VPN service can provide a more affordable, versatile, reliable and capable solution with the added advantage of genuine, end-to-end customer network management.

The CoSine Advantage for Subscribers

The next-generation capabilities of the IP Service Delivery Platform make selling managed network-based services easy:

- *Managed services give IT departments the ability to focus their limited resources on strategic business endeavors and other competitive pursuits.*
 - *Subscribers maintain visibility and control of their private portion of the SP's network, thereby eliminating the single biggest obstacle to outsourcing.*
 - *The comprehensive set of DSL VPN services integrates seamlessly with existing private networks—whether based on leased/dial lines or Frame Relay—to protect the subscriber's investment and provide a ready-made growth path to state-of-the-art capabilities.*
 - *Subscribers can avoid costly capital expenditures and the risk of technological obsolescence by paying for network-based services on an as-needed, incremental basis.*
 - *The carrier-class platform ensures dependable network operation—with full performance assurances—to handle any mission-critical application.*
 - *The availability of popular third-party branded services, which can be tailored to meet specific needs, is particularly appealing—and comforting—to IT managers.*
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The DSL Sales Opportunity: Wholesale and Retail Applications

As with most industry trends, the underlying motivation for the utilization of managed value-added services is financial. Network-based services satisfy this all-important financial need by fully leveraging the economies of scale afforded by next-generation service processing switches capable of supporting a wide range of value-added services for tens of thousands of subscriber networks.

With services in the cloud, both parties benefit: SPs can increase profitability while lowering costs for their enterprise subscribers. An investment in this win/win arrangement pays for itself—quickly—by enabling two distinct types of service offerings: retail and wholesale.

Retail services are made available directly to enterprise accounts. Just as businesses replaced their modem banks with remote access VPNs, for example, they will gladly abandon their obsolescence-prone hodge-podge collection of VPN CPE for a managed VPN service. Secure DSL access, derived from the simple combination of DSL and a managed firewall, is a particularly attractive retail service offering.

The second sales opportunity is wholesale arrangements with other SPs who, in turn, sell retail to enterprise accounts. The virtual nature of a next-generation system makes wholesale offerings easy to provision—and quite profitable. The ability to aggregate multiple subscribers using a variety of different DSL access and value-added managed services on a single wholesale connection to a retail ISP, for example, is a lucrative business opportunity in and of itself.

With both retail and wholesale market opportunities, a service processing switch empowers SPs to rapidly recoup the initial investment and be left with a profitable revenue stream for many more years to come.

Naturally, the systems installed to aggregate and provision advanced network-based services need to possess the usual carrier-class features: reliability, scalability, performance, manageability, etc. In addition, they must deliver an extensible set of highly differentiated value-added services, such as managed security, intranet and extranet VPNs, and more. Service processing switches are the only viable alternative because they eliminate the need to implement piecemeal configurations that are difficult to integrate, operate and manage. Indeed, the right solution changes the end-to-end scenario from “plug-and-pray” to “plug-and-play”—which is just what both SPs and their enterprise subscribers have always wanted.

The CoSine IP Service Delivery Platform

CoSine's next-generation IP services solution consists of three distributed elements that work in concert to create a complete, feature-rich platform for value-added IP services:

- The **IPSX 9000 Service Processing Switch** is designed as a flexible and extensible open system for delivering high-performance processing for IP services with carrier-class reliability and manageability. The IP Services Suite for the IPSX 9000 adds a full spectrum of value-added capabilities developed by both CoSine and a growing list of third-party partners.
- The **InVision Service Management System (SMS)** enables SPs to provision, manage and account for the full suite of value-added IP services.
- The **InGage Customer Network Management (CNM)** system gives subscribers the visibility and control they seek when using managed services.

The three platform elements unite to form a total managed services solution that enjoys substantial advantages over basic broadband access aggregation products. By delivering both access aggregation and a full assortment of managed value-added services, the CoSine IP Service Delivery Platform possesses all the necessary design elements for uniting profitability with longevity.

Presented here are highlights of CoSine's IP Service Delivery Platform that are particularly relevant to managed DSL service aggregation. Details on the platform and related offerings are available on CoSine's Web site at www.cosinecom.com.

IPSX 9000 Service Processing Switch

CoSine's IPSX 9000 Service Processing Switch satisfies the next-generation market and architectural objectives identified above making it the industry's premier platform for managed network-based services. Because the IPSX is agnostic with respect to last mile access technologies, a single switch can aggregate value-added services concurrently for a wide range of access concentration systems, including remote access servers (analog or ISDN), digital cross-connects, Frame Relay switches, ATM switches, DSLAMs, and cable or wireless switches.

Located strategically between access concentrators and the backbone, the is IPSX is ideally situated to deliver a suite of retail and wholesale value-added services, including managed security, tunneling and encapsulation, authentication, encryption, private addressing and network address translation, virtual routing, VPN intranets, B2B e-commerce extranets and bandwidth management.

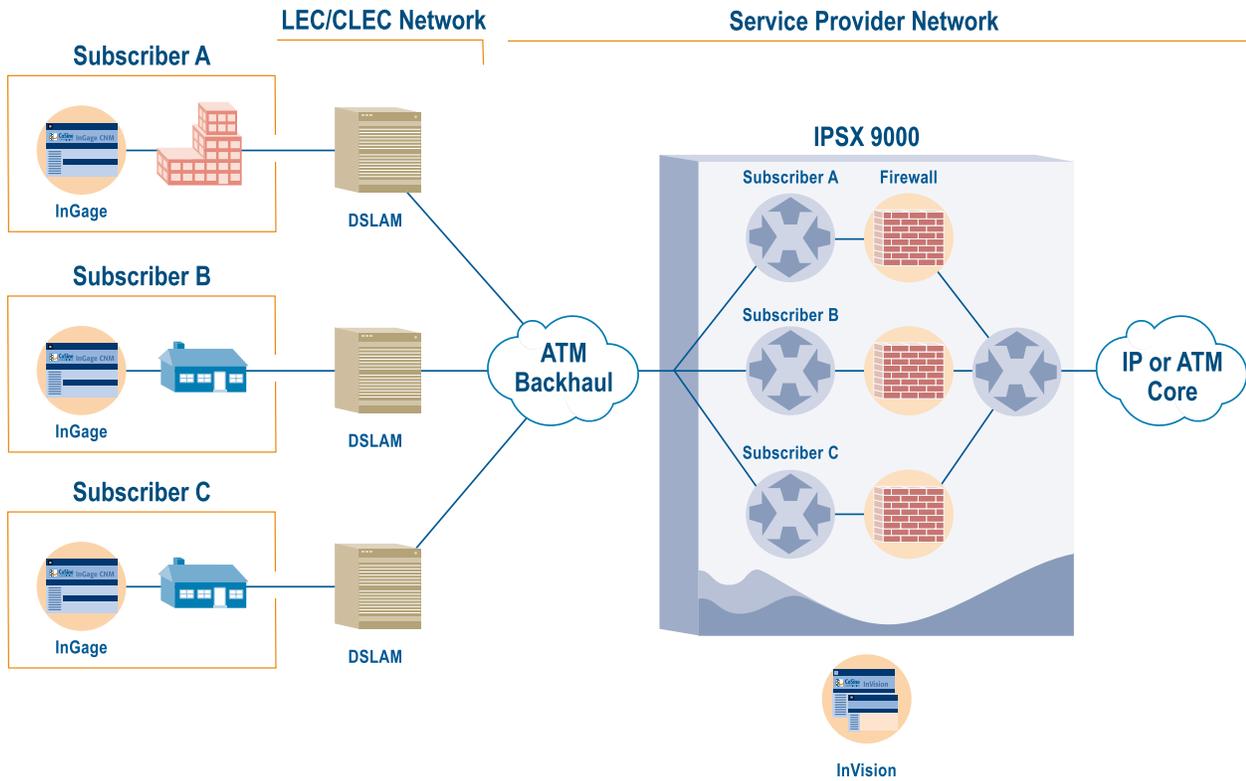


Figure 2. The IPSX 9000 aggregates DSL and other forms of access to provide a common platform for provisioning and delivering manage, network-based services like secure DSL.

The IPSX 9000 implements a sophisticated object-oriented architecture that creates Virtual Routers (VRs) and Virtual Interfaces (VIs) for each retail enterprise customer and each wholesale SP partner—potentially on a site-by-site or application-specific basis. VRs afford the same capabilities as physical routers with each possessing its own set of addresses, routing tables, and packet classification and forwarding schemes. Just as their physical counterpart, the VR supports popular routing protocols, such as OSPF, BGP, RIPv2, IS-IS and static routing.

With their inherent versatility and robust feature sets, VRs are ideal for creating wholesale arrangements with other SPs. Each wholesale Provider gets one or more dedicated and customizable VR for its set of retail customers, who all have access to any VR-based set of services. Different VRs can be used—concurrently and on the same chassis—to implement inherently secure VPNs for retail enterprise customers. With the IPSX 9000, SPs can configure up to 10,000 VRs per switch, which affords the ability to create virtually unlimited combinations and permutations of VRs per wholesale or retail customer.

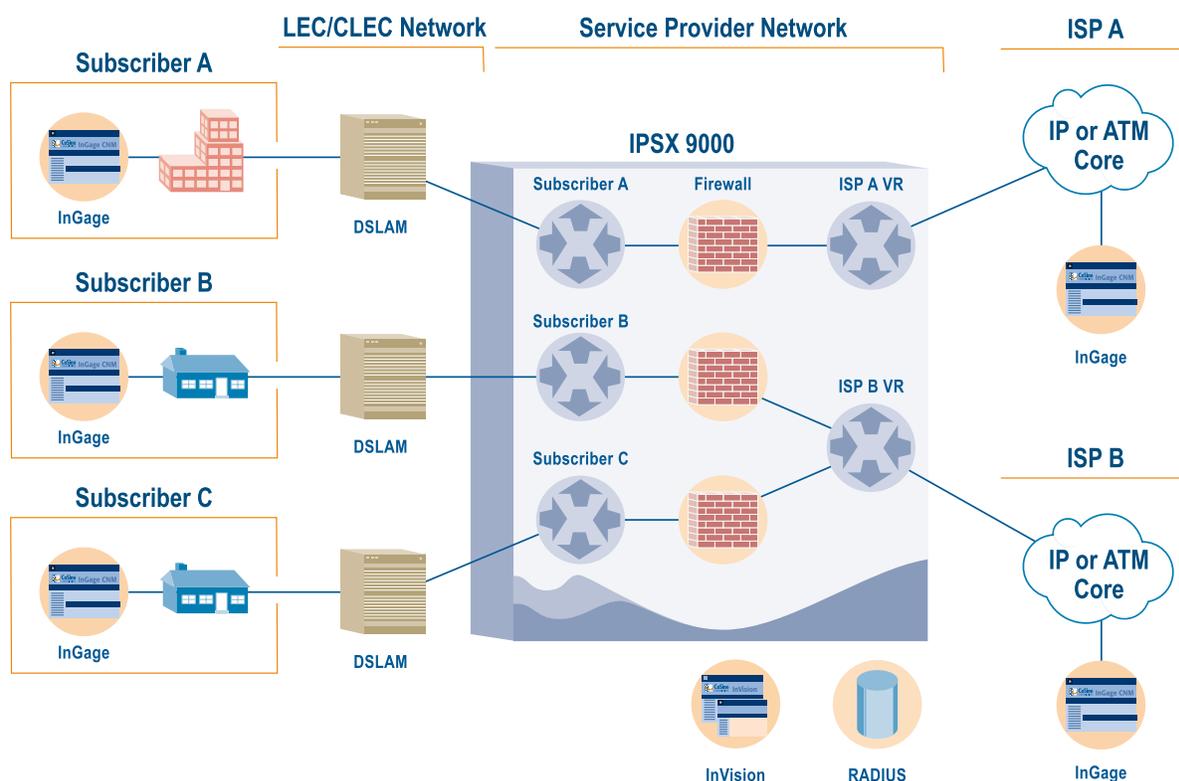


Figure 3. Its robust and virtual architecture—with separate VRs and VIs for each customer—makes the IPSX 9000 ideal for wholesale service aggregation.

VIs enable the IPSX to support all popular Layer 2 services: Frame Relay, PPP, HDLC and ATM. Most customer traffic will be IP, of course, and this dominant Layer 3 protocol operates atop various Layer 2 protocols in DSL connections. The IPSX 9000 aggregates Point-to-Point (PPP) Layer 2 traffic, optionally terminating PPP as IP traffic, then routes or tunnels the PPP/IP traffic to retail or wholesale customers. As a result, the IPSX has the flexibility to handle the full range of popular protocol combinations:

- PPP over Ethernet (RFC 2516) that emulates the existing dial access model, and is especially useful for multi-user offices connecting via DSL
- PPP over Frame Relay (RFC 1973) with Frame Relay-IPSec interworking and Frame Relay over IPSec—a popular option for frame-based enterprise networks
- PPP over ATM (RFC 2364), Ethernet over ATM (RFC 1483), ATM over IPSec and Packet over SONET, giving both retail and wholesale customers a clear growth path

All of these various services are aggregated by the IPSX 9000 using the versatile virtual router. Multiple PPP sessions and PVCs, are terminated on the subscriber access side of the IPSX 9000. All users associated with a retail subscriber's VPN or a wholesale Provider's subscribers are then combined via a VR, onto a L2TP tunnel, PVC or other connection on the trunk side of the IPSX 9000. IPSec encryption and authentication can be added for additional security, and the arrangement is fully compatible with RADIUS and Proxy RADIUS. And CoSine's InVision SMS makes these powerful capabilities remarkably easy to provision and maintain.

Performance is one of many areas where the IPSX 9000 leads the industry. The “best effort” nature of CPE-based VPNs is adequate for most connections that employ dial-up modems, ISDN BRI or Fractional T1 in the 28-128 Kbps throughput range. But the megabit-per-second broadband data rates of DSL demand more in the form of QoS and SLA performance guarantees. The IPSX facilitates Provider-controlled and user-directed traffic engineering through two popular standards. The first is Differentiated Services, or DiffServ, for prioritizing traffic across the WAN. The IPSX supports DiffServ by marking and filtering traffic using Access Control Lists (ACL) parameters for each VI. This allows the SP to offer class-based performance commitments to subscribers. DiffServ may also be set per VR to apply the same class of service treatment to all of a given subscriber’s traffic. The second standard is MultiProtocol Label Switching (MPLS), which facilitates traffic engineering for end-to-end QoS and SLA performance assurances. The IPSX supports this important standard by functioning as an MPLS label edge router to groom traffic.

Its modular design makes the IPSX 9000 flexible and scalable to afford maximum investment protection. A single chassis can handle up to 100,000 DSL sessions simultaneously—all with encrypted tunneling. The 22 Gbps midplane has ample capacity to grow, while the 26 universal slots support an almost unlimited mixture of potential configurations. Over 100 MIPS of incremental processing power allows for “pay as you grow” expansion to accommodate more subscribers and value-added services.

In addition, the IPSX 9000 is purpose-built for carrier-class needs and environments. The design offers full redundancy with support for redundant midplane ring, automatic failover, and hot-swap for redundant blades, AC/DC power supplies and cooling fans. A single chassis can be reconfigured “hot” (while operational), and software upgrades can be installed without system downtime. And, of course, the IPSX 9000 is designed for demanding carrier environments with NEBS Level 3 compliance.

IP Services Suite

CoSine’s comprehensive IP Services Suite adds a rich assortment of managed value-added capabilities—configurable on a per-subscriber basis—atop the quality-assured flexible, scalable and extensible IPSX 9000 foundation. The many services execute on IPSX Processor Blades, which offer multiple RISC CPUs and ample RAM to power numerous, computationally-intensive applications concurrently. The broad—and growing—range of capabilities available with the IP Services Suite includes:

- Managed application-level proxy firewall services based on the feature-rich Gauntlet from Network Associates
- Managed virus scanning services based on the popular McAfee VirusScan, also from Network Associates
- Managed intrusion detection services based on the comprehensive CyberCop Scanner from Network Associates
- IP-enabled Frame Relay, Frame Relay to IPSec Interworking and Frame Relay over IPSec services to create seamless enterprise-wide VPNs
- Business-to-Business and Business-to-Consumer e-commerce extranet services
- IP Security (IPSec) services for packet encryption, authentication and tunneling on site to site dial connections, Public Key Infrastructure (PKI) from the leading certificate authorities VeriSign and Entrust
- Layer 2 Tunneling Protocol (L2TP) services with both LAC and LNS functions that support both ends of the tunnel initiation/termination process
- NAT and DHCP services to accommodate private IP address schemes
- Bandwidth management services via DiffServ and MPLS

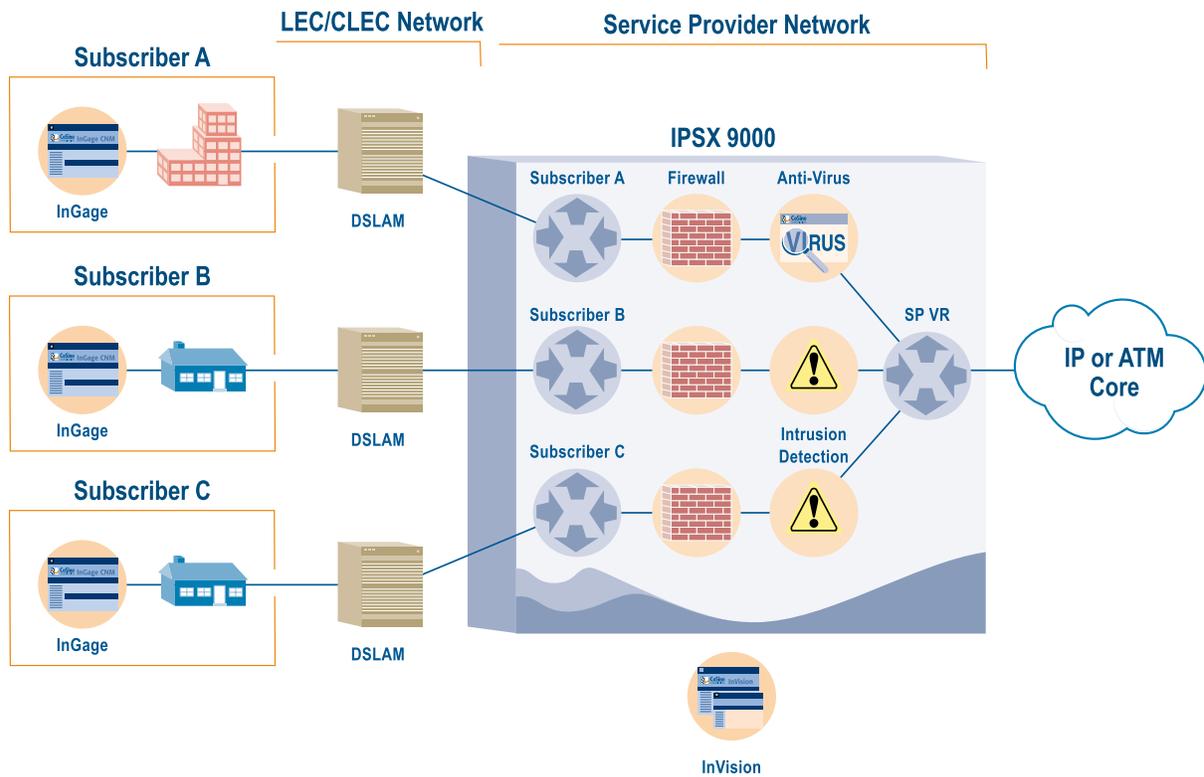


Figure 4. Its capable and extensible design—complete today with a rich assortment of value-added services—makes the IPSX 9000 ideal for a retail managed DSL VPN offering.

CoSine InVision and InGage Management

The full power and potential of the IPSX 9000 is managed by CoSine's InVision SMS and InGage CNM system that together simplify provisioning, accounting and other daily operational tasks. For example, service templates are easily created and quickly applied to similar applications, and then fine-tuned to accommodate specific user requirements.

InVision is a Unix-based element and services management system that lets SPs manage network-based services for hundreds of thousands of subscriber networks. The various standards-based applications handle fault, configuration, performance, accounting and security management. Service provisioning is substantially simplified with the use of templates. Administrators and managers access the InVision applications from any Unix-based client, such as an HP OpenView console. And unlike traditional element management systems, the InVision SMS has the ability to drill down from the virtual (VPNs, VRs and VIs) level to the physical (cards and ports) level.

InGage is a CNM system that lets retail enterprise and wholesale ISP network managers monitor SLA performance, submit service requests and control certain aspects of their own VPNs—all from an intuitive browser interface. One particularly powerful feature is the Service Creation Request (SCR), which lets a customer submit a change order for any managed service. The SCR is passed to the InVision SMS to ensure that the change will have no adverse impact on the network or another customer's service level. Once approved, the SMS automatically translates the SCR into the appropriate commands to provision the new service. Naturally, all InGage CNM capabilities granted are strictly controlled by the SP. Customers have been demanding such capabilities for quite a while, which makes InGage in itself a genuine value-added offering that any SP can use for market differentiation and penetration.

Both InVision and InGage are fully compatible with existing systems for authentication, authorization and accounting, such as the Remote Authentication Dial-In User Service (RADIUS), for both DSL and dial access customers. As a result, customers can gain revolutionary capabilities with a simple, evolutionary transition.

Conclusion

The marketplace for data communications is evolving in ways that will forever change how network services are purchased—and provisioned. Gone will be the days of poor performance from narrowband access and “best effort” services. Gone will be the days of customers building their own “home grown” private and virtual private networks. Similarly, gone will be the days of SPs struggling to deploy, provision and manage piecemeal equipment configurations. Finally—and perhaps best of all—gone will be the days of trying to compete at the commodity level by selling increasingly unprofitable and undifferentiated “vanilla” services.

The aggregation of DSL and other access technologies on a platform that also integrates a full suite of high-value managed services affords an unprecedented market opportunity. The flexibility for Provider and subscriber alike—in any mix of wholesale and retail arrangements—makes the architecture both powerful and profitable.

And this promising future is here today for savvy SPs deploying next-generation infrastructures. Find out how CoSine's IP Service Delivery Platform can give your organization a clear competitive advantage by visiting our Web site at www.cosinecom.com or by calling us toll-free at 1-877-426-7463.



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About CoSine Communications

CoSine Communications, founded in 1998, develops and delivers a new class of managed, network-based IP Service Delivery Platforms "purpose-built" for the deployment of high-value IP services such as Virtual Private Networks (VPNs).

CoSine's platform provides Business IP Service Providers with the service processing, service management and customer capabilities required for offering highly differentiated IP services to subscribers with a high return on investment. For more information, please find CoSine at www.cosinecom.com or call us at 1-877-4COSINE.

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