Lucent Technologies
Bell Labs Innovations



SOLUTIONS BACKGROUNDER

Access Point™ Family of Next-Generation IP Service Routers

Providing New Sources of Revenue and a Competitive Edge for Service Providers

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Introduction

The Access Point products – AP 450 and AP 1000 – are next-generation, high-performance IP Services routers optimized for service providers wishing to deploy managed IP services on the enterprise customer premises or at the service provider network edge (POP/Point of Presence). Access Point products are purpose-built with the following functionality:

- Robust multi-access IP routing
- Leadership IP Quality of Service (QoS) with Class-Based Queuing (CBQ)
- Advanced Virtual Private Network (VPN) security features
- Rich management services

Some examples of revenue-generating CPE-based (Customer Premises based) or POP-based applications implemented today by service providers include VPN, service-level assured Internet access, bandwidth management, multi-tenant Internet access, web/application hosting, and access aggregation routing.

The Access Point family consists of the AP 450 LS, AP 450 HS, and AP 1000 IP Services routers. Supported WAN interface modules and protocols, routing performance, and applications capabilities differentiate the model's IP services characteristics.

The Access Point family is part of the overall Lucent next-generation family of IP services platforms which range from SuperPipe/PipeLine to Access Point to SpringTide. The award winning, Lucent VPN Firewall family of solutions complements these next-generation IP services platforms by providing a higher grade of security and/or overlays into existing infrastructure. Lucent offers a full portfolio of IP Services solutions that deliver basic access routing, IP services routing, and IP services switching to satisfy a range of managed IP services applications and site configurations.

This backgrounder provides an overview of the Access Point product family and some of the applications that are most commonly implemented in today's service provider networks. All of the applications are generating new sources of revenue for service providers today. And service providers can keep their competitive edge by easily upgrading the Access Point IP services routers with additional applications as their customer base expands its requirements.

Why Implement Access Point Managed IP Services?

Service providers are looking for new ways to generate revenue that are easy to deploy and have a very quick turnaround for ROI. IP services is an excellent vehicle to satisfy this competitive requirement, while also meeting the e-business demands of enterprise customers in supporting Intranet, Extranet, and e-commerce applications.

Some of the reasons for the increasing demand for service provider IP services result from the market conditions driving their customer base – enterprise, SOHO (small office), residential:

- Exponential growth of e-commerce with value of transactions forecasted in the trillions of dollars
- New virtual business models where business processes are integrated and driven by secure access and shared information; this implies demand for “best” effort IP services with SLAs, QoS, and security
- Outsourcing of enterprise network builds and management
- Growth of Internet access worldwide
- Need for cost-effective communication methods to support Intranets, Extranets, and e-commerce/e-business
- Requirement to develop a foundation for other e-business applications

The classes of service providers that may wish to implement IP services include:

- LEC (Local Exchange Carriers) or PTTs
- CLEC (Competitive Local Exchange Carriers)
- BLECs (Building Local Exchange Carriers) for deployment of multi-tenant IP services
- ISPs (Internet Service Providers)
- Long Distance Carriers

What are typical Access Point Managed IP Services Applications ?

The Access Point IP services routers are ideally suited for a range of revenue-generating applications which can be classified as “managed” IP services delivered by service providers to their enterprise and/or SOHO customers. Some of the most commonly implemented Access Point applications include managed IP access and routing, bandwidth management and IP QOS, VPNs, and firewall services.

In addition, the Access Point is designed to enable service providers to deploy services in a flexible way and addresses many different variations of these basic services. Service providers can offer:

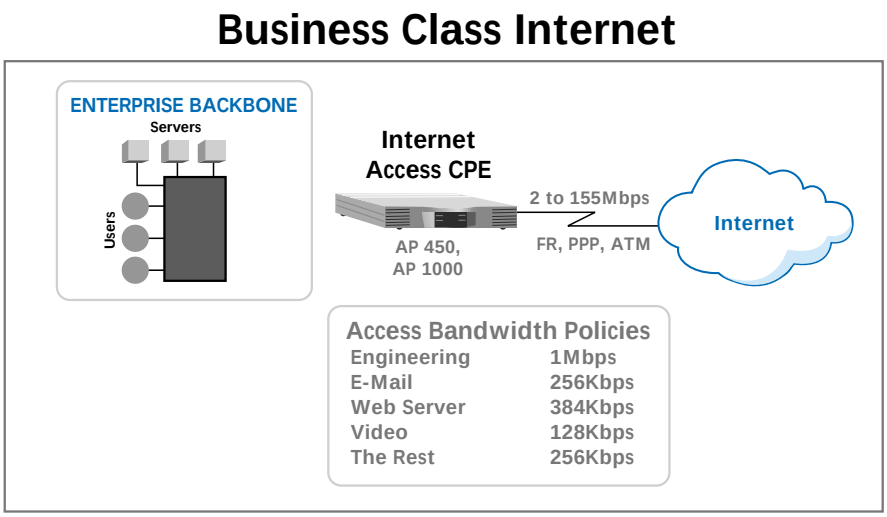
- CPE-based services on business enterprise sites
- CPE-based services in multi-tenant unit or multi-dwelling unit sites (delivered by local exchange carriers (LECs) or building local exchange carriers (BLECs)
- POP-based services on service provider network edge in small POPs or small aggregation sites

All of the following application scenarios are examples of solutions currently installed and generating service provider revenue today or solutions requested from service providers RFPs (request for proposals).

Managed IP Access and Routing or Business Class Internet Access:

In this application, the Access Point’s robust multi-access, IP QoS, and management capabilities are maximized as a revenue-generating service to business enterprises. The Access Point is providing for basic access to the Internet and routing; that is, connecting the enterprise environment into the Internet backbone. And the service provider can offer a suite of differentiated services:

1. **Service assured IP services, with different levels of service**
   For example, bronze, silver, gold services, in which case the class-based queuing is used to provide for the different levels of service, and the metering and management capabilities of the Access Point are used to assure that those services are being upheld.
2. **Application Service Level Agreements (SLAs)**
   With CBQ, the service provider allows the enterprise to control, monitor, and measure distribution of bandwidth across a variety of internal departments, applications, and users. Once these applications are installed, the service provider can generate additional revenue by adding new services, such as secure VPN access.

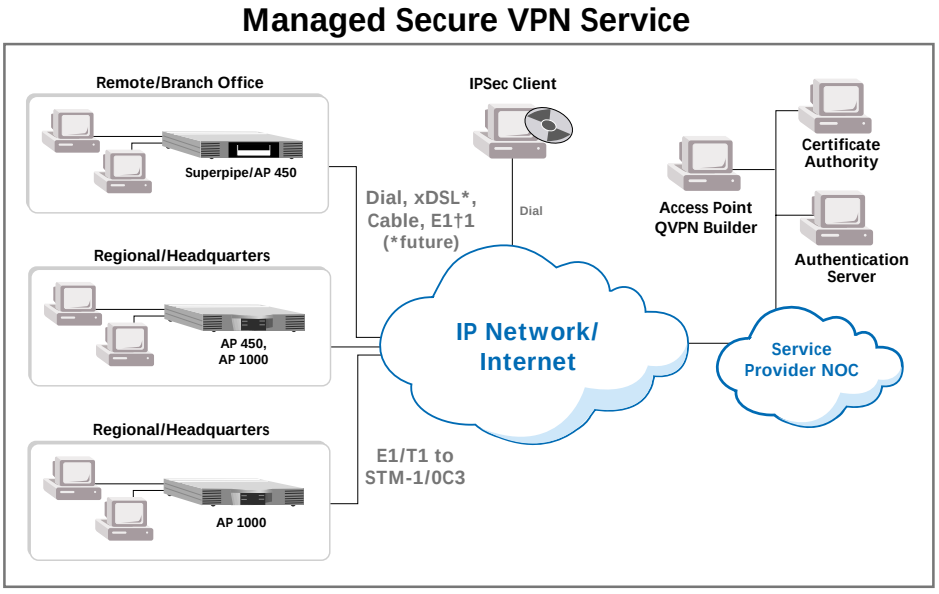


Business Class Internet: The enterprise controls, monitors, and measures the distribution of bandwidth across internal departments, applications, and users.

Managed Virtual Private Networks:

With the Access Point, service providers can offer a full spectrum of VPN solutions that can address their enterprise customers' needs in building Intranet, Extranet, and e-commerce solutions. In this application, the high performance, scalability, secure VPN tunneling, and firewall management capabilities are maximized to deploy a complete set of site-to-site and remote access VPN solutions at large corporate enterprise sites. The remote access VPN is enabled by the use of the IPSec client, which can connect and communicate securely with any Access Point located on the customer premises or at the network edge.

The Access Point products are currently deployed by UUNET ® as the cornerstone of their end-to-end SLA-managed UUsecure[SM] site-to-site VPN service, the world's largest secure VPN service.



Managed Secure VPN Service: Enterprises are offered a spectrum of VPN services covering Intranet, Extranet, e-commerce, and remote access applications with the benefits of QoS, firewalls, and centralized VPN policy management.

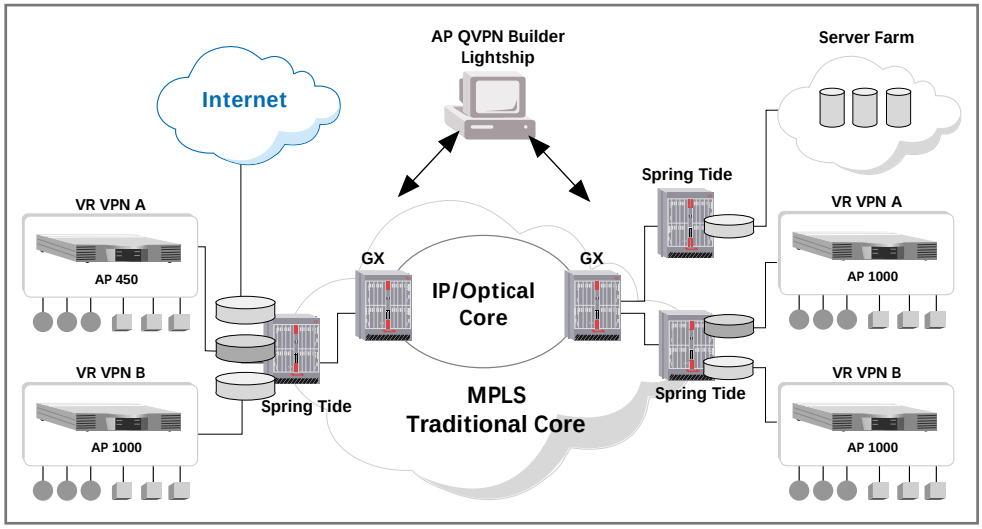
Managed QoS IP Service:

The Access Point is used by service providers to assure end-to-end quality of service and bandwidth guarantees in conjunction with MPLS or traditional core network environments. In this type of application, the Access Point IP services routers and SpringTide IP services switches (both members of Lucent's IP service platform family) are configured together to deliver a robust IP QoS service to enterprises. Access Points are located at the customer premises with SpringTide switches at the POP network edge.

The Access Points provide for bandwidth management of the narrowband link between any given customer premises and the SpringTide switch, and signal the SpringTide using DiffServ to indicate the class of service required for any given application. The SpringTide switch uses its queuing and bandwidth management capabilities to control the bandwidth on the downstream link and uses DiffServ to signal the Access Point the quality of service and instructions as to how to treat traffic as it enters the Access Point. The SpringTide switch uses DiffServ to indicate a hop-to-hop class of service throughout a traditional core, or maps the class of service to an MPLS tag, providing quality of service across the core.

This implementation is exemplified by the next-generation Internet service currently deployed by Sonera in Helsinki, Finland, which was recently publicized in Broadband Publishing's The ATM & IP Report, September/October 2000 issue. The service actually offers four levels of IP QoS guarantees at Gold, Silver, Bronze, and Best Effort levels.

Managed QoS IP Service

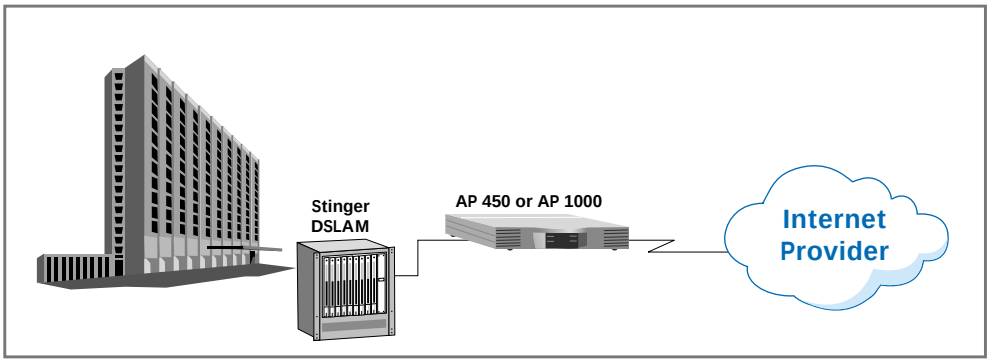


Managed QoS IP Service: The Access Points and SpringTides work together to deliver end-to-end QoS and bandwidth guarantees, a scalable virtual routing architecture, and service supporting traditional core switching or MPLS technology.

Multi-tenant Internet Access:

With its scalable IP QoS and VPN security features, the Access Point allows a service provider to cost-effectively provision high quality, secure IP bandwidth to the individual tenants of a multi-tenant facility, an office/campus environment, or any office or residential tower facility. As a result, service providers can cost effectively deliver highly profitable value-added services such as VPN, IP QoS, DSL, and firewall management. An excellent example of multi-tenant services is the usage of Access Points with the Lucent Stinger DSLAM product, allowing tenants in a large building to utilize a data services package comprised of high speed DSL access and routing, bandwidth management, firewall protection, and quality of service standards.

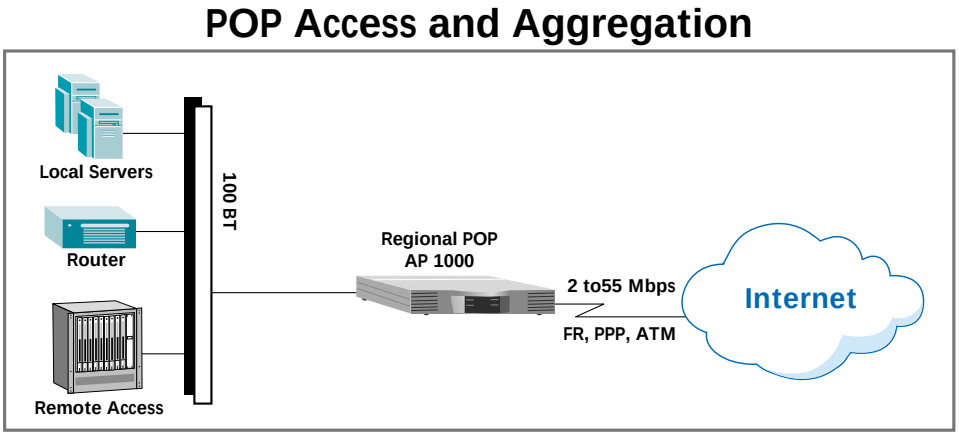
Multi-tenant Internet Access



Multi-tenant Internet Access: Network providers easily and cost effectively provision Internet access across an office building, office park, convention center, or other multi-tenant facilities. A discrete IP "channel" is provisioned for each tenant with value-added services to any tenant of VPN, QoS, and firewall management. And there is the performance and scalability available to match any size multi-tenant facility.

POP Access and Aggregation:

With POP access and aggregation services, the service provider is able to use the Access Point to provide a wide area uplink at reduced costs through the use of CBQ to control bandwidth across local servers and downstream subscriber lines. Access Point is currently deployed as an access or "leaf" POP router based on its high performance, Cisco-interoperable IP routing services. Access Point supports high speed T3 or OC3 rate PPP, Frame Relay, ATM or Packet over SONET (POS) access from a regional POP to the Internet backbone at extremely competitive price and performance.

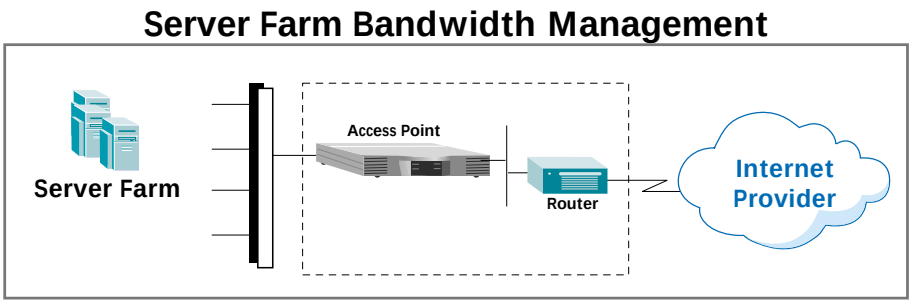


POP Access and Aggregation: With Access Point, the service provider reduces wide area up-link cost and controls bandwidth across local servers and downstream subscriber lines.

Server Farm Bandwidth Management:

A permutation on the POP access and aggregation solution is using the Access Point as an access and bandwidth management device for a server farm, such as in a Web hosting or an application service provider environment. In this case, the network provider offers Web hosting or co-location services that include committed or regulated bandwidth rates and a quality of service standard, as part of a premium service offering. The Access Point supports this application by:

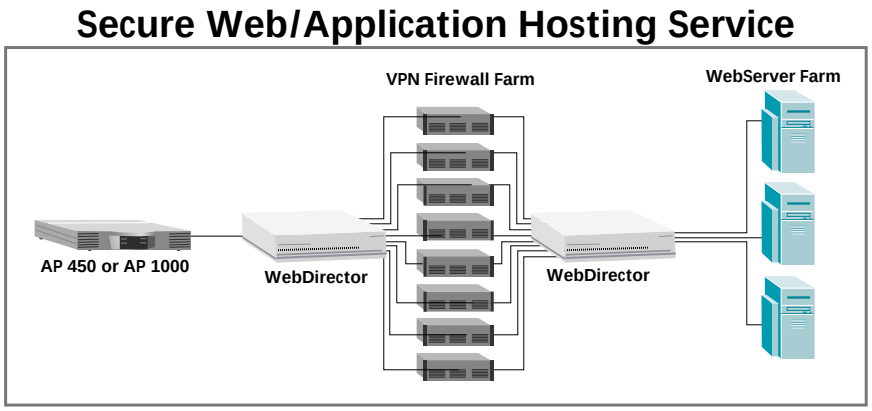
1. Either working with an access router, in which case the Access Point is using class-based queuing to provide for bandwidth management and application-based quality of service; or
2. The Access Point can be used to provide for the router function, as well as the bandwidth management and quality of service monitoring function.



Server Farm Bandwidth Management: The server provider offers Web hosting or co-location services that include committed, or regulated bandwidth rates as part of a premium service offering.

Web/Application Hosting Services

The proven performance and scale of Access Point's bandwidth management/QoS feature make it uniquely suited for delivering high quality, committed rate services in large scale Web or application hosting environments. When paired with Lucent's leadership Secure VPN portfolio (Lucent VPN Firewall Brick™ and LSMS) and *immi*net™ Web Cache and WebDirector solutions, the service provider can deploy sophisticated web or application hosting services, along with firewall balancing. And with the Access Point price/performance support for Gigabit Ethernet and POP interfaces, the service provider can offer performance, value, security, and quality of service in web and application hosting environments.



Secure Web/Application Hosting Services: The service provider delivers web hosting services with high throughput of 1 Gbps and high capacity firewall array of 800K sessions. In addition, there is advanced data center security with built-in high availability and redundancy.

What is the Positioning within the Access Point Product Family?

The Access Point family consists of the AP 450 LS, AP 450 HS and AP 1000 IP Services routers, plus the Access Point QVPN Builder IP management software.. Supported WAN interface modules and protocols, routing performance, and applications capabilities differentiate the Access Point models IP services characteristics.

All the Access Point products are purpose-built with the following functionality:

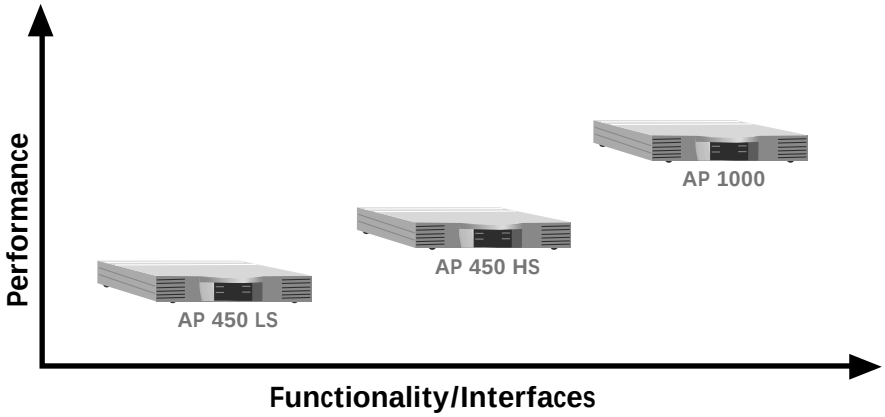
- Robust multi-access IP routing
- Leadership IP Quality of Service (QoS) with Class-Based Queuing (CBQ)
- Advanced Virtual Private Network (VPN) security features
- Rich management services

Users can migrate from basic IP access to more advanced virtual private network and Service Level Agreement (SLA) managed IP services with a single, purpose-built IP services platform. The integrated traffic measurement and monitoring capabilities allow service level monitoring, enhanced network planning, and billing support. And as a fully Simple Network Management Protocol (SNMP) managed system, Access Point is easily integrated into existing network management systems and back-office services.

Both Access Point 450 models can be easily deployed at small to medium-sized enterprise regional and branch locations, with AP 450 LS targeted at the smaller facilities. Access Point 450 has data forwarding rates of up to 200 Mbps and 3DES encrypted traffic forwarding rates of up to 80 Mbps. The AP 450 HS typically provides a 20% performance increase over the AP 450 LS, with added functionality for supporting applications such as access aggregation and enhanced routing.

The Access Point LS and HS models are differentiated by the WAN interface modules and protocols supported, as well as their routing performance and application fit. Both models can be easily deployed at small to medium-sized enterprise regional and branch locations, with AP 450 LS targeted at the smaller facilities. The AP 450 LS supports serial, T1/E1, and ISDN WAN interface modules. The AP 450 HS extends the capabilities of the AP 450 LS interfaces to include HSSI, Frame DS3, and ATM DS3/OC-3 support; plus, DVMRPv3, ISIS, ATM, and SMDS routing, connectivity, and WAN protocols. The AP450 HS typically provides a 20% performance increase over the AP 450 LS, with added applications functionality such as access aggregation and enhanced routing.

Access Point QVPN Builder software is an integral part of the AP family, providing a centralized IP Services policy manager, which allows service providers to cost-effectively deploy and provision secure, high-performance Internet VPN services. The Access Point QVPN Builder includes two major management application components. The first is VPN Tunnel Manager used for defining the profiles of the secure tunnels that form the VPN. The second is the Firewall/QoS Manager used for managing both the firewall and bandwidth management features of the Access Point IP services platforms



The Access Point Product Family is differentiated by supported WAN interface modules and protocols, routing performance, and applications capabilities.

What are the Access Point Product Features?

Before reviewing the key features of the Access Point products, it is important to note some of the key vendor selection criteria that a service provider should utilize when planning an IP services routing solution.The following table outlines some of the key selection criteria service providers should use:

Selection Criteria	Requirements
Multi-Access Routing	• Supports multiple access methods-FR, ATM, ISDN, PPP, DSL, etc. – for a range of customer premises requirements • High performance throughput to support Internet usage in a corporate environment
QoS with CBQ Management	• Support IP services with the same QoS capabilities of private line environment • Support multi-voice/data/video applications with QoS and bandwidth management
VPN Security Features	• Easy to provision and deploy new services cost-effectively
Management Services	• Allows for secure business transactions • Protects corporate data with firewalls.

When comparing with other vendor IP services routers, what is unique about the Access Point products is they are built to purpose to meet all of these selection criteria.

Specifically, the AP product family offers the following key capabilities for deployment of IP services:

Robust multi-access routing

- Full, high performance IP routing with access ranging from low speed ISDN to high speed OC-3
- Supports multi-IP routing protocols: RIP2, OSPF, BGP-4, VRRP, IS-IS, Multicast
- Supports multiple-IP connectivity: FR, ATM, ISDN, DSL, PPP, MLPP, SMDS, POS
- Supports multi-WAN interfaces: X.21, V.35, HSSI, T1/E1, DS3, OC-3
- Multi-LAN interfaces: 10/100T Ethernet, Gigabit Ethernet

Leadership IP QoS with CBQ

- Explicit, granular IP layer rate control
- Flexible, hierarchical traffic classification
- Bandwidth management with CBQ
- Bandwidth borrowing for most efficient access usage
- Robust QoS/CoS signaling with DiffServ and 802.1p

Advanced Virtual Private Network (VPN) security features

- Tunneling services: IPSec, L2TP, IP-IP, GRE
- Dynamic key management – IKE
- Both stateful and stateless packet filtering firewall
- Denial of service protection
- Encryption: IPSec with 3 DES
- ICSA-certified Firewall and IPSec features

Rich Management Services

- Full, secure SNMP management
- CLI, scripting lanaguage
- Web-based GUI
- Policy-based VPN provisioning with Access Point QVPN Builder
- Comprehensive RADIUS support

Technical comparison details of the Access Point product family are outlined in the following matrix:

Access Point Product Comparison Matrix

Processor	RISC 7000	RISC 5000	RISC 5000
Field Upgradeable	Yes	No	No
Memory	128 MB SDRAM, upgradeable to 256 MB SDRAM	128 MB SDRAM, 4 MB SRAM	64 MB DRAM, Upgradeable to 128 MB DRAM, No SRAM
Built-in Interfaces	2 10/100 Ethernet	No	No
Expansion Slots	6 • 4 for PMC interface cards • 2 for encryption modules	4 • 2 for PMC interface cards • 2 for PCI interface cards • Encryption module uses 1 PMC interface slot	4 • 2 for PMC interface cards • 2 for PCI interface cards • Encryption module uses 1 PMC interface slot
Encryption Modules	2 Optional	1 Optional	1 Optional
LAN/WAN Interfaces	• 10/100 Ethernet • MSSI (PPP/FR) • HSSI (PPP/FR) • 4 port T1/E1 • Frame-based DS3 • ATM DS3 • ATM OC3 • Gigabit Ethernet • Packet over SONET OC3	• 10/100 Ethernet • MSSI (PPP/FR) • HSSI (PPP/FR) • 4 port T1/E1 • Frame-based DS3 • ATM DS3 • ATM OC3 • ISDN BRI	• 10/100 Ethernet • MSSI (PPP/FR) • HSSI (PPP/FR) • 4 port T1/E1 • ISDN BRI
Routing Protocols	IP, RIP, RIP2, OSPF, BGP-4, IGMPv2, DVMRPv3, IS-IS	IP, RIP, RIP2, OSPF, BGP-4, IGMPv2, DVMRPv3, IS-IS	IP, RIP, RIP2, OSPF, BGP-4, IGMPv2, DVMRPv3, IS-IS
IP Connectivity Protocols	FR, ISDN, PPP, Multilink PPP, SMDS, ATM	FR, ISDN, PPP, Multilink PPP, SMDS, ATM	FR, ISDN, PPP, Multilink PPP
IP Forwarding Rate	500 Mbps	200 Mbps	170 Mbps
3DES Forwarding Rate	155 Mbps	80 Mbps	65 Mbps
L2TP Throughput	80 Kpps	50 Kpps	40 Kpps
L2TP Tunnels	3000 Tunnels	1000 Tunnels	800 Tunnels
IPSec Tunnels	8000 Dial-in Tunnels	4000 Dial-in Tunnels	3000 Dial-in Tunnels
Future Application Support	Full	Full	Limited

What is the Lucent Family of IP Services Platforms?

The Access Point products are part of an overall Lucent IP services platform family that enables service providers to effectively deploy a wide range of IP services to both business and consumer customers. The family provides for a full range of managed IP services:

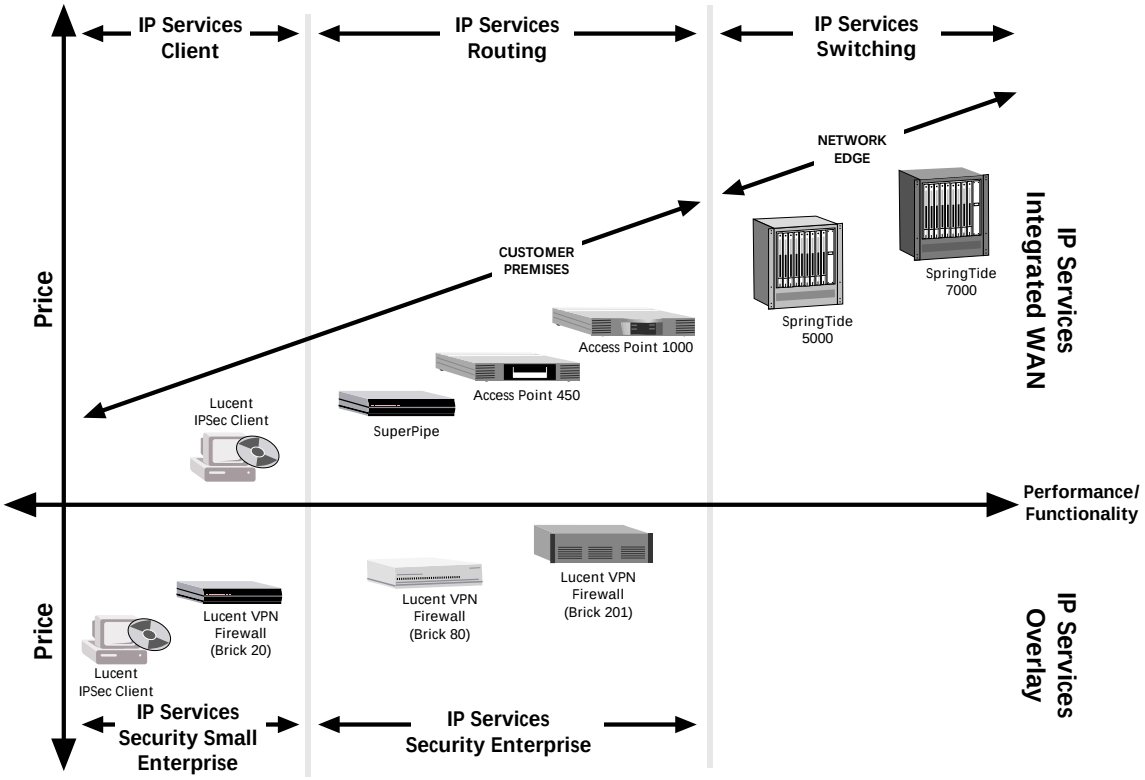
- Basic IP access and premises-based IP services routing capabilities through products, exemplified in our SuperPipe and Access Point products
- Small network edge POP implementations through our Access Point products
- Large-scale IP services switching platforms through our SpringTide family.

Collectively, these platforms enable service providers to offer IP services in a variety of different ways.

When Lucent refers to an IP services platform family, we mean a range of products that offer a comprehensive set of common characteristics: IP access and routing; quality of service support capabilities, including bandwidth management and class of service signaling; secure VPN capabilities; firewall security; and management services. These common characteristics are key elements to effective implementation and deployment of IP services by service providers. In the case of the Access Points, all of these characteristics are built into a cost-effective platform that enables services to be delivered from the customer premises or the network edge (POP-based).

The IP services platforms are complemented by Lucent's award-winning portfolio of the industry's leading high-security VPN firewall family: the VPN firewall Brick Models 80 and 201; a set of capabilities for providing mobile and remote access support via the IP Sec Client; and a set of policy management tools from the Lucent Security Management Server for automating and simplifying security and VPN management.

Lucent's IP Services Family



Lucent's IP Services Family: Lucent offers a full portfolio of IP services solutions that deliver basic access routing, IP services routing, and IP services switching to satisfy a range of managed IP services applications and site configurations. These solutions are complemented by the award-winning Lucent VPN Firewall family of products.

Access Point — A Summary of Key Benefits

When implementing next-generation IP services routing solutions, service providers should consider the following key benefits of Lucent Access Point solutions:

- *Best Price/Performance:* As much as twice the performance at nearly half the price relative to market competition. Traditional IP routers demonstrate significant performance degradation with no ability to scale as new, more demanding IP services are added.
- *Best Choice of Solutions:* Fully integrated IP services solution ranging from CPE-based enterprise to POP-based Service Provider.
- *Best IP QoS capabilities:* State-of-the-art Class Based Queuing (CBQ) and standard DiffServ and 802.1p signaling to enable end-to-end QoS solutions.
- *Best Scalability for Growth:* Service migration path from the largest headquarter sites to the smallest remote office; easy to add-on new capabilities.
- *Best VPN scalability:* IPSec (IP Security) and L2TP (Layer 2 Tunneling Protocol) for remote access and site-to-site VPNs.
- *Highest VPN Performance* Supports up to 155 Mbps 3DES encrypted traffic forwarding with up to 8000 remote access IPSec tunnels and 1000 site-to-site IPSec tunnels (see BCR Best in Test, Nov. 1999).
- *Best, centralized policy and security management:* Enables rapid, cost-effective deployment and provisioning of VPN, firewall, and QoS-based services. The QVPN Builder tool drastically simplifies deployment, configuration and management of IP services for any scale network.
- *Standards-based interfaces:* Interoperability with multi-vendor products and applications; independent lab certification for IPSec and security/firewall applications.
- *Standards-based VPN and security:* VPN tunneling and security using IPSec and L2TP, complemented by a full, stateful and stateless packet-filtering firewall features for ironclad network security
- *Fast time-to-market for new IP services:* Enables new high margin, revenue-generating services with easy to deploy and configure solution.
- *Proven success stories:* Some of the world's largest IP services networks are generating revenue today with Access Point solutions.
- *Comprehensive global professional services & customer support:* Enables full network and application analysis, design, implementation, and support.