ALCATEL-LUCENT BUSINESS IP VPN SOLUTION

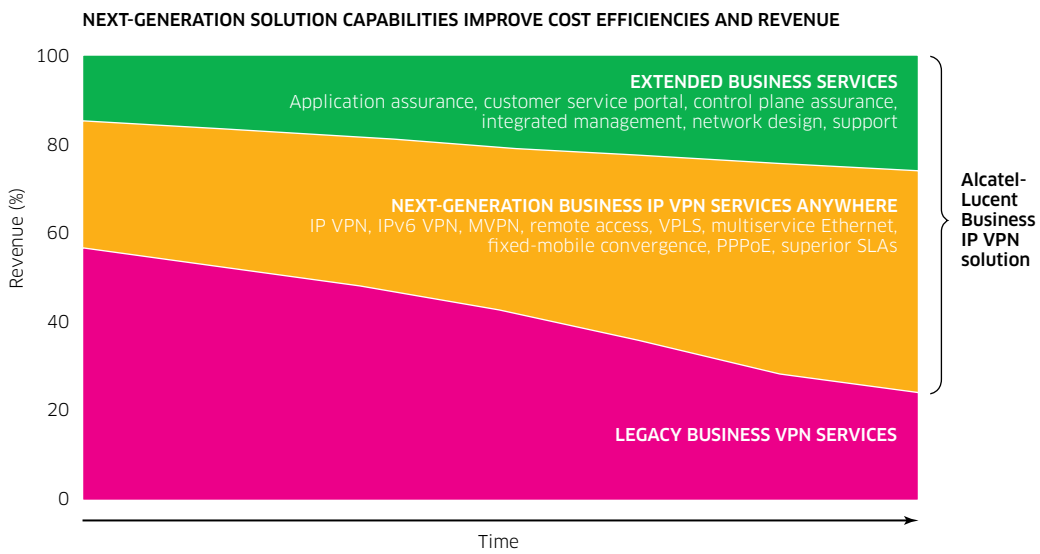
MEETING NEXT GENERATION IP VPN DEMANDS RAPIDLY AND EFFICIENTLY

APPLICATION NOTE

ABSTRACT

Changing business requirements are putting increased pressure on service providers to deliver more services, faster. Existing service provider infrastructures have been stretched to the limit and are not suitable for delivering the sought-after Enterprise 2.0 services, which require significantly more bandwidth, greater scalability, improved reach, application performance, IPv6, customer management and higher quality IP WAN environments. To participate in this growing market, service providers must transition to a next-generation, MPLS-based all-IP infrastructure. The Alcatel-Lucent Business IP VPN Solution, which is comprised of highly innovative and proven technology and service components, addresses service providers' requirements for a converged IP/MPLS services network to deliver emerging business applications, and offers unmatched service velocity, service value and investment protection.

Next-generation solution capabilities to improve Business IP VPN cost efficiencies and revenue



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1. INTRODUCTION

Today, more than ever before, enterprise IT departments are under pressure to deliver more with less. Company executives want their organizations to take full advantage of technology to enhance operations, improve communications and build customer service, but they also want to minimize operating costs.

At the same time, the nature of Enterprise IP WAN services is changing, with the increasing dominance of real-time VoIP, video and data intensive applications like backup, storage, rich media websites, cloud computing, datacenter virtualization, SaaS applications and Wi-Fi/mobility, leading to Enterprise 2.0 applications and services. These new services are now expected to be available to any business customer anywhere on any device, even outside the workplace. The new point-to-point or multipoint services, which often have rich media or time sensitive components, add to the pressure on the service provider's infrastructure, as they require more bandwidth, higher quality levels, improved reach, customer management, and greater scalability.

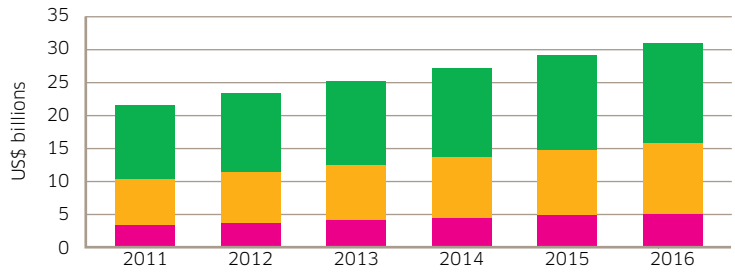
To meet today's dynamic enterprise demands, service providers need to refresh their network infrastructures and adopt a more efficient, flexible, scalable and feature-rich networking solution. They need to transition their infrastructures to support an all-IP architecture, with multi-access multiservice IP VPN that is customer and application aware. This new architecture needs to support a broad mix of services from a single platform to improve cost efficiency and operational simplicity. By reducing the complexity of the network, service providers can deliver services more efficiently and achieve significant capital and operational savings.

This paper looks at the evolving requirements for a next-generation IP network. It then describes the Alcatel-Lucent Business IP VPN Solution, Alcatel-Lucent's industry-leading solution for this market space.

2. BUSINESS IP VPN MARKET OVERVIEW

MPLS-based VPN services are already well understood by service providers worldwide. Now, MPLS IP VPN services are entering a new phase, one that requires a next-generation architecture for the delivery of Enterprise 2.0 services. As a result of enterprise demand, MPLS IP VPN services are forecasted to show solid growth. Figure 1 illustrates the growing demand for Business IP VPN services.

Figure 1. Worldwide MPLS IP VPN service revenue



	2011	2012	2013	2014	2015	2016
Large enterprises and government	$10,894	$11,720	$12,572	$13,431	$14,293	$15,143
Mid-size enterprise	$7,254	$7,934	$13,431	$9,375	$10,101	$10,804
Small to medium	$3,351	$3,706	$4,065	$4,416	$4,750	$5,056

Source: Ovum, Worldwide IP-VPN Forecast, 2011-2016

MPLS IP VPN services are forecasted to grow at a healthy pace from 21.5 billion United States dollars in 2011 to 31.0 billion United States dollars by 2016.

2.1 Enterprise demand for next-generation services

Enterprises today are focused on acquiring new high-bandwidth and mission-critical applications at economical prices. These next-generation applications and services are expectedto help enterprises reduce the cost of business operations and travel budgets, and become more efficient, productive, competitive and global. Some examples of these new applications are:

- Cloud computing
- Data center virtualization
- VoIP and Video Applications
- Media rich websites, digital signage and software distribution
- Business continuity and disaster recovery

Enterprises are looking to access these new services and applications anywhere, anytime, and with identical capabilities and consistent service qualities. These services are used to connect with remote sites, partners and customers, regardless of access differences and geographic distances.

The dynamic enterprise requires agility to respond quickly to changing markets. The dynamic enterprise's demand for services that are "always-on" and available "anywhere" has triggered the need for highly scalable, reliable and traffic-engineered mesh-based IP architectures with remote and mobile access to IP VPN. Unscalable, rigid and uneconomical legacy VPNs and fixed leased lines are no longer tenable. To meet their new business communication goals, enterprises need service providers who are committed to upgrading their infrastructures, or ones that can already meet their next-generation IP service and application requirements. The enterprise therefore needs network services that can adapt quickly. Service providers must be able to respond quickly to requests for changes in site services, applications, bandwidth, QoS and so on. Figure 2 shows how today's business objectives are driving Enterprise 2.0 demands.

Figure 2. Modern dynamic enterprise requirements

NETWORK SERVICES TO FACILITATE BUSINESS

ENTERPRISE 1.0 REQUIREMENTS

- Phone service (PTSN)
- Reliable Internet accress (IP, ATM)
- Leased line connectivity (ATM, SONET/SDH)
- IP VPN connectivity between multiple sites (regional)
- Centralized policy control and resource access (hub-and-spoke)

NEXT-GENERATION SERVICES TO BECOME COMPETITIVE, PRODUCTIVE, RESPONSIVE, EFFICIENT AND GLOBAL

ENTERPRISE 2.0 DEMANDS

- Bandwidth hungry and mission-critical ICT applications anywhere; application assurance; virtualized data centers
- Multiservice Ethernet access, wireline access; support for nomadic users
- Any-to-any service continuity (legacy, Ehternet, fixed-mobile convergence); multicast VPN; dual stack IPv4/IPv6; VPLS
- Expanded business reach (national and international)
- SLAs for next-generation services and applications
- Customer service portal for ordering, monitoring and managing services and applications

In its July 2007 study, In-Stat CE Trends, the research firm determined several key factors that are extremely important with respect to WAN services for enterprises today. These factors include geographic service reach; single converged network for voice, video and data applications; interworking of multiple service locations (for example, Frame Relay to IP/MPLS); superior monitoring/management capabilities; and the capability to add and/or delete sites without impacting network operations.

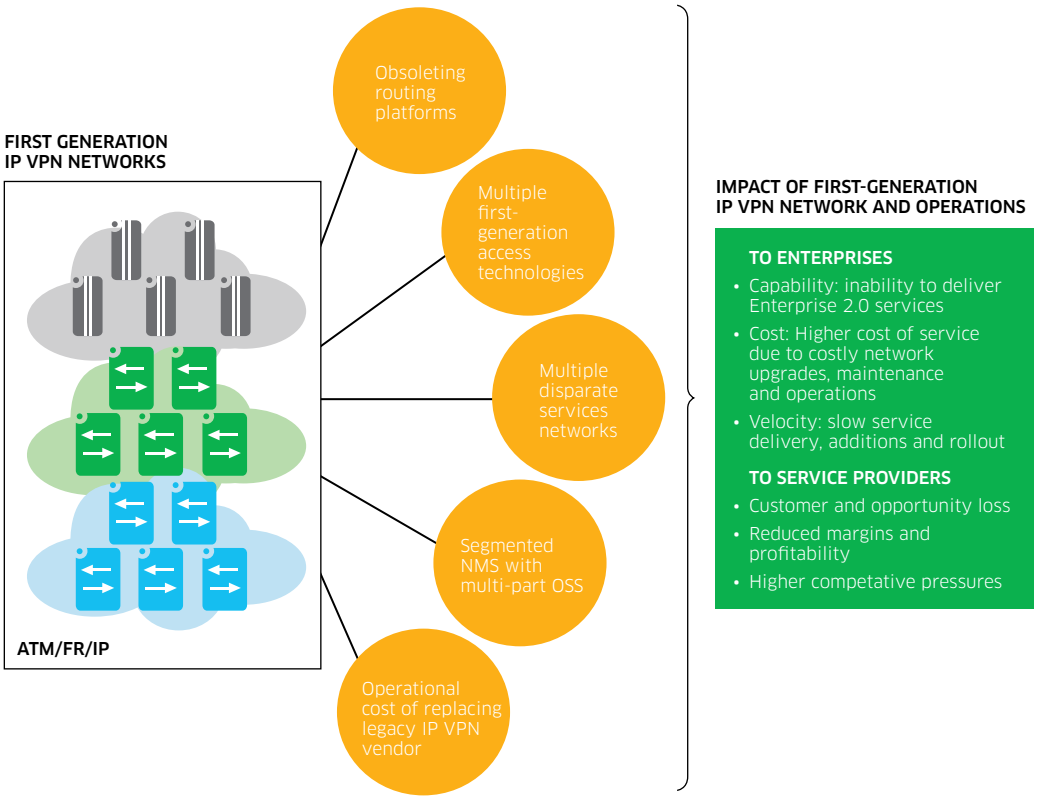
2.2 Addressing the business IP VPN requirement

Enterprise 2.0 requirements provide an excellent opportunity for service providers to introduce profitable new services and applications. However, first-generation VPN networks do not support these services effectively. Networks have already evolved extensively to meet enterprise voice, video, data and management requirements, so they have stretched as far as they can (see Figure 3). To deliver Enterprise 2.0 services quickly and cost effectively, service providers must be prepared to transform their networks to fully converged next-generation IP networks.

"What enterprises want today outstrips what telcos can deliver. Legacy networks are frustratingly obsolete to the modern enterprise."

Julian Payne, Product Manager, Cable & Wireless

Figure 3. Service provider challenges with first-generation IP VPN networks



To overcome the network challenges, service providers must evolve to a single multiservice network that has the capability and flexibility to meet all dynamic enterprise requirements and next-generation converged infrastructure needs. Proven service provider strategies include:

1. Upgrading to next-generation multiservice delivery platforms – to enable extremely efficient, high bandwidth services with superior performance and reliability.
2. Reducing the number of access networks and separate service networks – to reduce service costs, velocity and complexity.
3. Upgrading OSS tools – to maximize operational savings through fully managed integrated services and improve customer loyalty through on-demand customer management capabilities.
4. Proactively fighting price erosion – by offering differentiated services that improve service margins and enable new revenue streams.

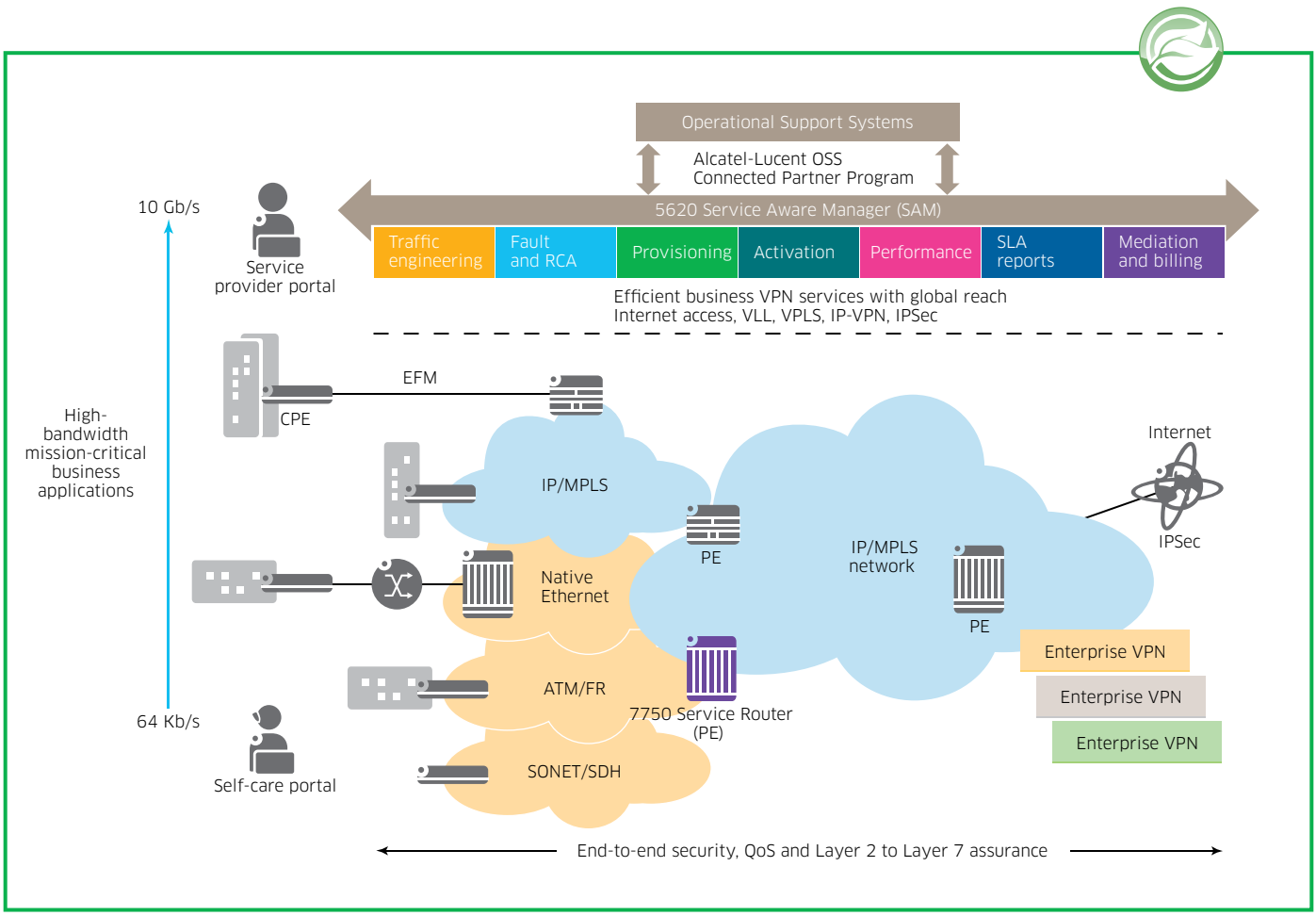
Alcatel-Lucent understands the challenges and opportunities service providers face. Alcatel-Lucent Business IP VPN Solution enables service providers to migrate to a highly customer-focused services network rapidly, through a proven service platform, and management and consulting services foundation.

3. THE ALCATEL-LUCENT BUSINESS IP VPN SOLUTION

Alcatel-Lucent Business IP VPN enables service providers to deliver customer-focused, next-generation IP VPN services efficiently. By improving operations, reducing platforms and providing access to new revenue streams, Business IP VPN enables service providers to increase the return on their investment. Figure 4 provides an overview of Alcatel-Lucent IP VPN solution. Key components of the Alcatel-Lucent solution include:

- Next-generation multiservice edge platform – Alcatel-Lucent 7750 Service Router (SR), which supports terabit business services.
- Next-generation service provider and customer management – fully integrated Alcatel-Lucent 5620 Service Aware Manager (SAM) for service providers, along with unified enterprise service portal.

Figure 4. Alcatel-Lucent Business IP VPN Solution



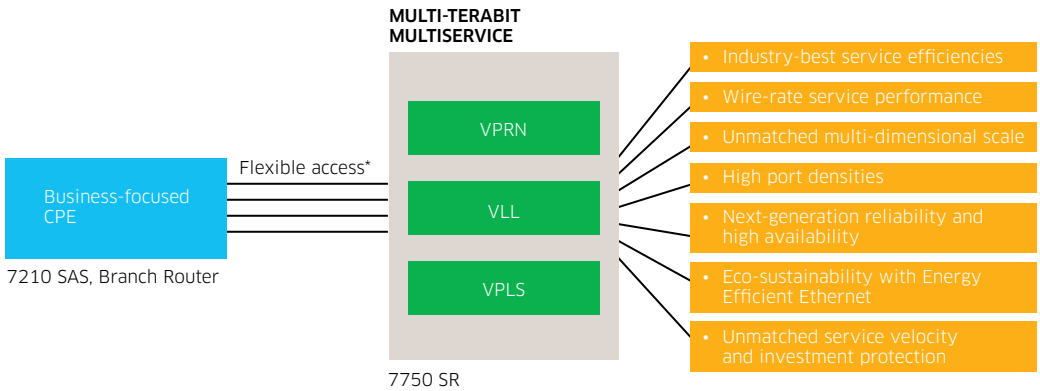
The new service capabilities and extended management support of Alcatel-Lucent Business IP VPN help service providers offset declining legacy revenues and increase profitability. These key service delivery capabilities, combined with operational expertise, enable next-generation services delivery, assurance and velocity:

- Next-generation IP services delivery – multi-access, multiservice (IP VPN, VPLS, VLL) terabit capacity, high availability and performance; application assurance; dual stack IPv4 and IPv6 VPN; next-generation multicast VPN; fixed-mobile convergence (FMC).
- Streamlined operational expertise – Alcatel-Lucent provides industry-leading network design and operational expertise so service providers can mitigate risk and deliver customer-focused services rapidly.

3.1 Alcatel-Lucent next generation terabit business Service Router

The Alcatel-Lucent SR is a widely deployed and proven platform with industry-best multiservice, multi-access service capabilities. The award winning terabit SR portfolio with extensive IP/MPLSand integrated deep packet inspection (DPI) capabilities enables service providers to deliver superior services and applications with mission-critical assurance. The Alcatel-Lucent SR enables service providers to deliver profitable services with investment protection, by continuously driving service value along with next-generation service efficiency, performance, multi-dimensional scaling, service velocity, reliability and energy efficiencies. See Figure 5.

Figure 5. Alcatel-Lucent next-generation terabit Business Service Router



The Alcatel-Lucent SR portfolio supports uniform, end-to-end multiple services (VPRN, VLL, VPLS), due to the consistent use of the Alcatel-Lucent Service Router Operating System (SR OS) across the portfolio. The Alcatel-Lucent SR OS is the only industry-validated operating system for business, residential and wireless services. It has been validated for scale, performance, consistency and high availability through rigorous independent certified lab or industry validation events like Isocore and BT Exact™. The Alcatel-Lucent SR allows any mix of high-density legacy MDAs, Ethernet MDAs and DPI ISAs (IPSec, AA) on the same IOM, without any configuration restrictions. It allows a mix of interface types and services on the same port on the same MDA and same IOM, with wire-rate service performance.

The Alcatel-Lucent SR supports terabit capacity with 200 Gb/s capable line cards today, lowering the cost per bit for services and increasing the architectural simplicities to new record levels. The award-winning FP2 and FP3 packet silicon supports a single 100 Gb/s and 400 Gb/s full duplex respectively packet processing engine that breaks the barriers of Nx10 Gb/s packet processing, enabling multiservice fairness, consistency and performance for all active services through fair and dynamic resource allocation, regardless of interface types. The Alcatel-Lucent SR silicon technology creates sustainable differentiation for service providers through superior service performance.

The Alcatel-Lucent SR supports industry-leading multi-dimensional scale and port densities, which reduce the CAPEX and OPEX required to deliver Enterprise 2.0 services by reducing the number of networks, appliances and ports needed. The Alcatel-Lucent SR scales:

- Customers – by supporting concurrent Layer 2 and Layer 3 customers, and a mix of tens of thousands of VPRN, VLL and VPLS services on the same platform
- Service – Tens of thousands of concurrent Layer 2/Layer 3 services without any platform and port restrictions
- IP routing – by supporting millions of routes and MAC addresses per platform
- Service bandwidth and capacity – through its per-platform terabit capacity with interfaces ranging from 64 kb/s to 100 Gb/s and multilink interfaces with greater than 100 Gb/s aggregated speeds.

The Alcatel-Lucent SR enables next-generation extensibility and investment protection for service providers through its ability to support scalable features that eliminate the need for any new or special-purpose modules. The Alcatel-Lucent SR helps service providers drive continuous service value and profitability through extended product life. For example, recent feature additions to the Alcatel-Lucent SR include multicast VPN with BGP discovery, point-to-multipoint LSP, IPv6 PIM-SSM and IEEE Y.1731. These enhancements can be implemented on an existing Alcatel-Lucent SR platform through software upgrades.

Alcatel-Lucent is committed to eco-sustainability. The energy-efficient Alcatel-Lucent SR is based on innovative technology that helps service providers to reduce their carbon footprint. The Alcatel-Lucent delivers some of the highest levels of energy efficiencies, for all active services.

3.2 Next-generation service capacity and efficiency

Alcatel-Lucent Business IP VPN enables service providers to reduce routed fiber miles, the number of appliances and operations. With the introduction of an industry-first 100 Gb/s line card for the edge router, Alcatel-Lucent further reduces the cost per bit and the complexity of managing or delivering new high-bandwidth services across these networks significantly.

Supporting multiservice legacy and Ethernet access on the same platform enables service providers to deliver both Layer 2 and Layer 3 services over a single legacy or Ethernet port. This enables service providers to deliver any-to-any service continuity and a consistent service experience using fewer ports and reduces the need for separate platforms. Moreover, this approach enables easier changes or upgrades by eliminating the need for a new access circuit.

Integrated PPPoE capabilities enable service providers to eliminate the cost and complexity of a centralized BRAS and leverage IP/MPLS network efficiencies by terminating PPPoE sessions on the IP VPN, including traffic sourced from spoke pseudowires ("PW-ESM"). A PPPoE wholesale model is supported to allow address overlap. Both tunneling and termination options with 1:1 and N:1 models allow service providers to deliver highly efficient and scalable PPPoE services. Additional L2TP support is available to allow increased PPPoE service delivery options.

Alcatel-Lucent SR-integrated IPSec VPN capabilities support scalable network-based secure remote access, as well as site-to-site and network infrastructure services for unsecured or uncontrolled environments. Having MPLS capabilities on the same platform increases IPSec service delivery options and reduces the cost and complexity of standalone IPSec VPN appliances.

Supporting dual-stack IPv4 and IPv6 VPN services on the Alcatel-Lucent SR platform with almost full parity allows service providers to deliver an efficient and meaningful mix of dual-stack unicast, multicast and broadcast services. Service providers can deliver consistent dual-stack VPN or Internet access services in address-constrained IPv4 or IPv6-mandated service environments, with integrated dual-stack service management.

3.3 Always-on (non-stop) IP VPN services with in-line service security

Alcatel-Lucent Business IP VPN enables high-fidelity business IP VPN services with unmatched performance, security and reliability for all concurrent services. End-to-end service reliability ensures business IP VPN services are not interrupted by link failures, equipment failures, DoS attacks and software upgrades.

Link, nodal and path protection capabilities ensure highly available services and protect against IP VPN service interruptions, through the use of:

- Multi-Chassis Link Aggregation Group (MC-LAG)
- Multi-Chassis Automatic Protection Switching
- Multi-Chassis Resilient Ring
- Multi-Chassis Multilink PPP (MC-MLPPP)
- Primary and standby LSPs
- MPLS Fast Reroute
- Bidirectional Forwarding Detection
- Pseudowire dual homing
- Pseudowire stitching
- MAC topology change notification and flush notification
- Non-stop routing (both graceful and stateful) and non-stop forwarding

Redundant hardware capabilities, such as fans, power, switch fabric and control processor modules, ensure service continuity in the event of critical hardware failures. In-service upgrades ensure non-stop service delivery across software upgrades.

The key security capabilities across different layers include DoS attack prevention; line-rate filtering; service mirroring; routing and control authentication; administration authentication and authorization; logging; audits; reporting; network traffic control; network topology analysis; Layer 2/Layer 3 resource control on per-customer, per-service, per-port, per-IOM and per-platform bases; Layers 2 to 7 monitoring; and application control.

3.4 Sophisticated QoS and OAM end-to-end

Sophisticated and granular QoS models enable service providers to deliver deterministic, fair and guaranteed QoS for all concurrent IP and Ethernet services, regardless of access or network interface type. Alcatel-Lucent Business IP VPN supports both hard and soft QoS with the choice of strict and weighted (burstable) packet processing options. The solution allows up to eight service queues per service, per customer, and per site, which can be optionally configured with Diffserv QoS, MPLS traffic engineering or ECMP, depending on the needs of any given service. Extensive QoS interworking capabilities ensure QoS continuity and performance across any access type.

Comprehensive port, interface and service accounting support end-to-end IP VPN service billing and assurance. The multi-tiered accounting support makes it simpler and easier for service providers to perform accounting across any service deployment scenario.

Link, segment and service OAM continuity is supported across any deployment options through standards-based, purpose-built tools, making it significantly easier for service providers to assure end-to-end service. The key OAM capabilities provided by the solution include IP/MPLS OAM, IPv6 OAM, IEEE 802.1ag, IEEE 802.3ah, Y.1731, legacy link OAM, legacy service OAM, OAM interworking and Layer 2/Layer 3 service mirroring.

3.5 Consistent global service reach

It is now as convenient for service providers to expand their footprint into more regional and international markets or acquire more networks for market expansion, as it is to add an Alcatel-Lucent SR in a POP for business IP VPN service delivery. The solution is proven to deliver superior and consistent multiservice SLAs for voice, video and data services with end-to-end integrated management and assurance, regardless of geographic distances. Globally scalable Layer 2 and Layer 3 (IPv4, IPv6) services can be delivered using a single provider edge (PE) node, reducing the number of nodes required and simplying operations. Service providers can support a range of services over a single network peering point. In addition to helping to lower the cost of communications, this approach enables easier changes or upgrades by eliminating the need for a new interconnect circuit.

The efficiency of international service delivery enables service providers to simplify service expansion by reducing the number of platforms and operations. Alcatel-Lucent IP VPNs enable superior inter-service provider SLAs as well as end-customer SLAs. The Service Router has been proven in active deployments to deliver sub-second rerouting of international traffic.

Alcatel-Lucent Business IP VPN allows seamless integration of wireless access for FMC service delivery. It enables service providers to deliver superior mobile VPN services with special tariffs and cost savings for corporate-wide voice, video and data communications, regardless of geographic distances.

Alcatel-Lucent Business IP VPN delivers consistent IP services with identical capabilities, applications and management at each of the enterprise's key international locations. Enterprises can enjoy consistent performance, reliability and convergence benefits at remote offices, partner, customer and contact center locations, which helps improve customer "stickiness". This stickiness translates to long-term persistent profitability for service providers through assured, expandable and differentiated global IP VPN services.

3.6 Application enablement, reporting, assurance and policy control

With the Alcatel-Lucent Application-Assured Networking (AAN) capability service providers can deliver new revenue-generating Layer 3 and Layer 2 Business VPN services to a broad customer base conveniently and cost-effectively. This highly differentiated network-based approach enables service providers to leverage their existing IP/MPLS network and service management infrastructure to offer application-level visibility and policy control with minimal investment.

Service providers can tailor VPN services to each enterprise's unique application performance requirements and deliver highly enhanced ICT services. The ability to recognize applications and application flows through the network enables service providers to report on the applications and/or apply application-level QoS controls. The AAN solution can support multiple small, medium and large enterprise customers and provides significant cost savings over a comparable WAN optimization controller appliance approach.

The ongoing operational savings through deployment simplification (logistics, installation, provisioning, assurance and maintenance) of a network-based solution are very compelling.

The primary functions of the network-based Alcatel-Lucent AAN solution are:

- Application identification – provides visibility of applications and their performance behavior over the WAN VPN.
- Application reporting – provides both application traffic mix statistics, and application problem identification and isolation; generates reports to help enterprise CIOs make informed decisions regarding application performance over the WAN.
- Application assurance – enables per-application fine tuning to optimize the performance over the WAN or to prioritize one application above other applications within the same service class; enables application-level QoS.
- Application consumerization policy control – enables per-application resource allocation and control of consumer applications, ensuring business application performance and assurance before other non-business applications, like public Internet video downloads and video messengers.

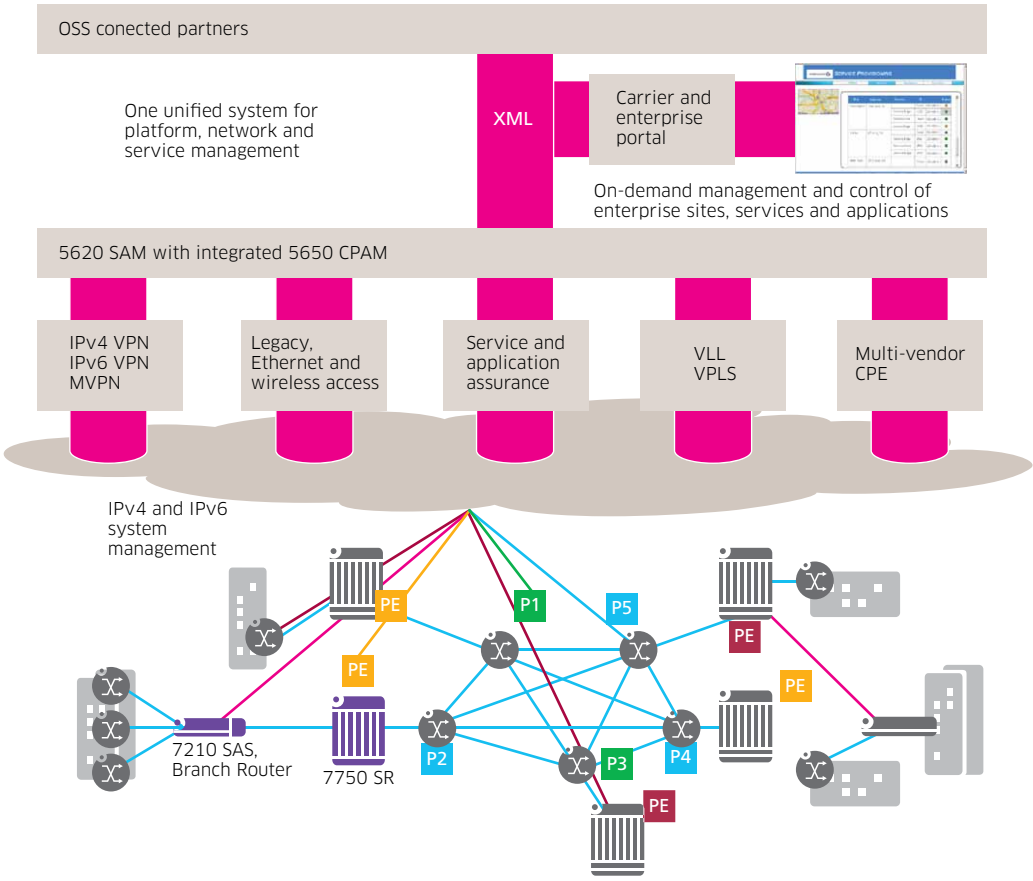
The Alcatel-Lucent AAN services rely on the application assurance feature set of the Alcatel-Lucent SR OS, including the purpose-built Alcatel-Lucent Multi Service Integrated Services Adapter (MS-ISA).

3.7 Next-generation Business IP VPN Management

An integrated network and service management solution is essential for efficient operation of the network, rapid turn-up of services, and easy troubleshooting of customer service issues. It enables service providers to reduce operations costs while improving customer satisfaction and adhering to stringent SLAs.

The Alcatel-Lucent 5620 SAM is the central piece of the Alcatel-Lucent IP/MPLS management solution. It has revolutionized the management paradigm for IP/MPLS networks by providing a solution that allows service providers to move away from a CLI management approach towards a graphical, automated, full-featured management system that does not require scarce IP experts to operate the network. Figure 6 illustrates the Alcatel-Lucent 5620 SAM.

Figure 6. Integrated Alcatel-Lucent 5620 SAM for Business IP VPN Management



The Alcatel-Lucent 5620 SAM allows service providers to simplify and expedite all-IP network evolution and transformation, so they are in a position to deliver fully managed, end-to-end, multi-site and multi-access business IP VPN services with legacy, wireless or Ethernet access. The Alcatel-Lucent 5620 SAM unifies service management and enables faster rollout and system configuration across multiple platforms. To further simplify the integration, Alcatel-Lucent has created an ecosystem of leading OSS partnerships to pre-integrate the Alcatel-Lucent 5620 SAM with best-of-breed fault, performance, provisioning and traffic engineering OSS applications. This helps to reduce back office integration costs and accelerate the launch of services.

"The 5620 SAM's proactive interoperability certification with market-leading OSS provisioning applications reduces the cost and time, not to mention the risk, of deploying new services on Alcatel-Lucent's Service Routing portfolio."

David Eldh, TeliaSonera Sweden, IP Network Development

The management solution also provides a turnkey business IP VPN service portal for enterprise and service provider use, enabling lightweight provisioning and customized reporting. The service portals are used by service providers to simplify internal workflow processes and by enterprises to monitor services and request service changes. These portals enable service providers to offer on-demand management capabilities to its customers, which significantly improves customer satisfaction.

The Alcatel-Lucent 5620 SAM and integrated Alcatel-Lucent 5650 Control Plane Assurance Manager (CPAM) enable service providers to view multi-vendor network topology and VPN dynamics. This in turn enables service providers to improve network assurance and operational efficiency, using convenient contactless technology. The Alcatel-Lucent 5650 CPAM gives the service provider access to multi-vendor real-time

or time-based routing maps for root-cause analysis, without affecting existing routing dynamics. This enables service providers to deliver superior and predictable SLAs through high-fidelity topologies.

The Alcatel-Lucent 5620 SAM provides fully integrated end-to-end management support for the Alcatel-Lucent IP/MPLS portfolio, with lightweight integrated management for third-party CPEs. The Alcatel-Lucent 5620 SAM provides one unified platform with sophisticated tools for integrated element, network and service management, enabling simplified, rapid and on-demand service management and assurance for service providers and enterprises. It enables service providers to reduce provisioning time and improve operational efficiencies as well as secure significant savings.

4. SERVICE PROVIDER SUCCESS STORIES

Alcatel-Lucent Business IP VPN has been helping service providers worldwide to successfully deliver Enterprise 2.0 services regionally, nationally and internationally.

4.1 Cable & Wireless

Cable & Wireless® (C&W) selected the Alcatel-Lucent 7750 SR platform for their Multi-Service Platform (MSP) network to deliver next-generation all-IP services. C&W's requirements were to:

- Meet growing demands for bandwidth, reach and reliability from enterprise customers.
- Expand their footprint into international markets quickly, to meet critical international Layer 3 VPN service demands.
- Implement economical next-generation Ethernet VPN and Ethernet access into IP VPNs, with guaranteed SLAs.

These existing networks have been extended as far as they can go. This combination means it can be difficult to make the business case for supporting new applications.
Cable & Wireless

According to C&W, most business networks are complex and have grown with the business over time. Mergers, acquisitions and overseas expansion have taken this complexity to another level.

Given this situation, C&W felt it was imperative to evolve to their MSP network. MSP has been operational since 2006 in the Caribbean (2008 in the United Kingdom) and has a number of large customers. For example, Tesco™ selected MSP to connect 1800 sites in more than 14 countries. This network will have 40 times the capacity of Tesco's current network.

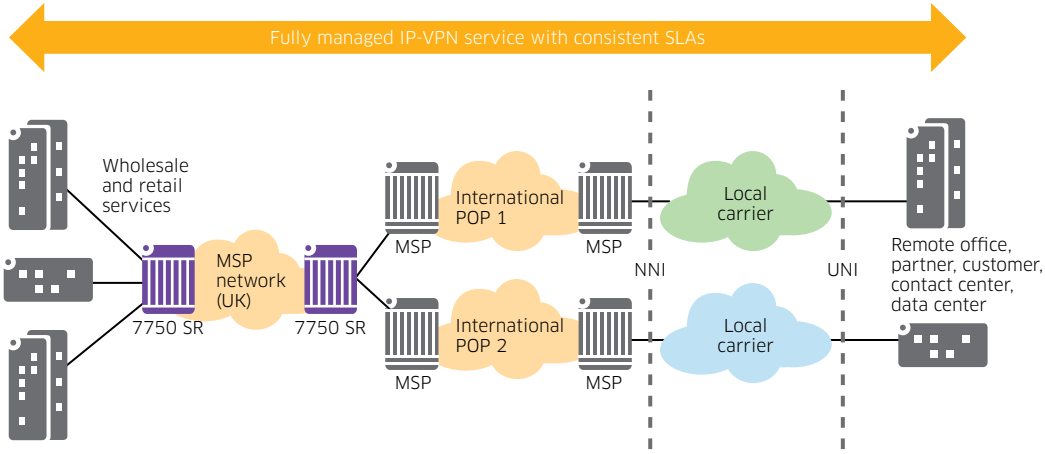
According to C&W, MSP delivers the following key benefits to their enterprise customers:

- Fast and affordable – C&W can provide gigabit Ethernet with throughput up to 1 Gb/s off the shelf. Most existing IP networks only offer 300-500 Mb/s throughput or require non-standard builds to deliver it.
- Scalable and sure – the C&W network supports soft changes — avoiding on-site service calls — as a customer's needs grow.
- Converged and multiservice – Integration of Layer 2 Ethernet and IP VPN over the same core and access architecture means lower costs for the delivery of multiple services.
- Any access – MSP works with all access options: fiber, copper, radio; Ethernet, leased line, ADSL, SDSL or Ethernet first mile.
- Local and global – All MSP services can be used internationally, ready to serve enterprise branches or offices overseas, or in the event of an acquisition or merger. Enterprises can run highly available, multiservice data networks across the same architecture, which reduces operating costs.

A strong range of products – all launched, all proven, all based on forward looking technology
Current Analysis

MSP extends well beyond the United Kingdom and Caribbean, delivering fully managed IP VPN services with higher quality and performance (see Figure 7).

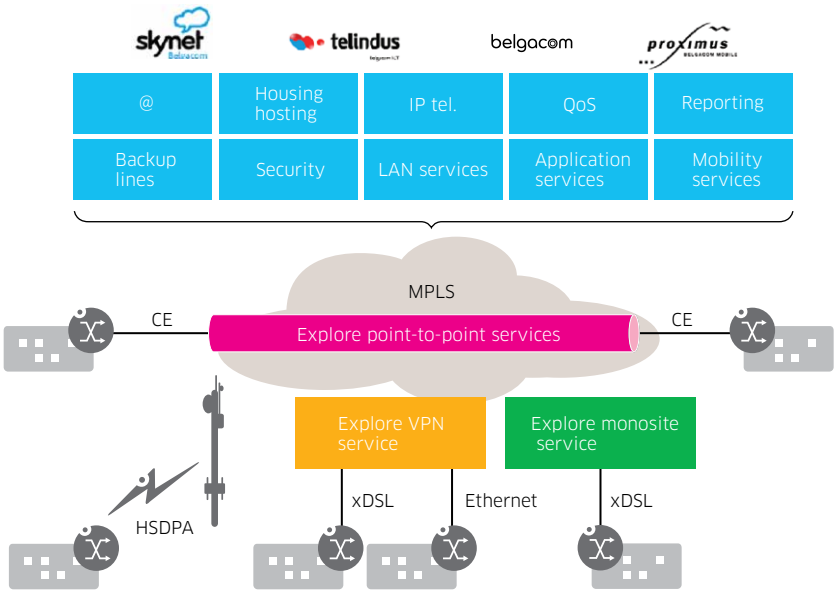
Figure 7. C&W's fully managed international IP VPN service



4.2 Belgacom

Belgacom Explore is another successful real-world deployment that uses the Alcatel-Lucent SR foundation to deliver converged residential, business and mobile services over a single MPLS-based infrastructure. Alcatel-Lucent Business IP VPN enabled Belgacom to phase out its legacy network and go forward with voice, video and data services over a converged fixed-mobile infrastructure. Figure 8 depicts the Belgacom Explore network.

Figure 8. Alcatel-Lucent SR-based Belgacom Explore network



"The Cable & Wireless MSP is a seamless network, offering identical capabilities at your key international locations. Consolidation and cost savings can now cover multiple geographies, while rolling out of new applications can be centrally managed and monitored, providing you with a single, flexible and cost effective global solution. With MSP we can offer internationally exactly the same performance and convergence benefits that we first offered to our customers in the UK. Now it is available on a global scale in the world's key markets for multinational operations."

Cable&Wireless

In a business services context, Belgacom Explore delivers reliable and secure business-critical IP VPN, VLL and VPLS services, enabling a complete and uniform value-added business VPN and ICT services offering. All enterprise customers can have their own IP VPN domain, Ethernet domain or both, for converged business-critical voice, video and data service with consistent SLA guarantees, regardless of their service access types.

5. CONCLUSION

Fast growing enterprise requirements for VoIP, Video, Cloud, IPv6, data intensive applications and mobility, are driving demands for next-generation managed IP VPN services in all geographic regions. These organizations require a dynamic and superior business experience to be available anywhere anytime. Next-generation services and applications with superior quality, bandwidth, reach, management and assurance are critical for modern enterprises to be competitive and profitable. These demands represent a new business and revenue opportunity for service providers that can best be targeted through an all-IP VPN services solution with integrated management. Thus, next-generation IP/MPLS evolution is critical to address obsoleting platforms, multipart operations and disparate service network challenges.

The Alcatel-Lucent Business IP VPN Solution addresses service providers' requirements for a single IP/MPLS services network, capable of supporting next-generation business VPN services. The Alcatel-Lucent Business IP VPN solution is comprised of highly innovative and proven technology and service components, including the terabit Alcatel-Lucent 7750 SR and integrated Alcatel-Lucent 5620 SAM management system. These sophisticated components enable service providers to address business-critical service delivery, platform and management needs in accordance with Enterprise 2.0 requirements, with unmatched investment protection, service value expansion and return on investment. Alcatel-Lucent global professional services and support teams are available to assist service providers with the planning, designing and execution of the transition to a next-generation infrastructure.

There are currently over 90 service provider customers worldwide who are delivering business-focused MPLS-based IP VPN (IPv4 and IPv6), VPLS and VLL services, using the proven, all-IP Alcatel-Lucent IP VPN. Examples include Cable & Wireless and Belgacom. Alcatel-Lucent IP VPN allows service providers to service modern enterprises' global Enterprise 2.0 needs, including IP VPN, Internet and access. At the same time, it increases profitability for service providers through significant operational savings, service efficiencies and support for new revenue-generating services.

6. ABBREVIATIONS

AAN	(Alcatel-Lucent) Application Assured Networking
ADSL	Asynchronous Digital Subscriber Line
ATM	Asynchronous Transfer Mode
BRAS	broadband remote access server
C&W	Cable & Wireless
CAPEX	capital expenditure
CIO	chief information office
CLI	command line interface
CPAM	(Alcatel-Lucent 5650) Control Plane Assurance Manager
CPE	customer premises equipment

DoS	denial of service
DPI	deep packet inspection
ECMP	Equal Cost Multiple Path routing
EFM	Ethernet in the first mile
FMC	fixed-mobile convergence
FR	Frame Relay
HSDPA	High-Speed Downlink Packet Access
HSUPA	High-Speed Uplink Packet Access
ICT	information and communications technology
IEEE	Institute of Electrical Engineers
IOM	input/output module
IPSec	IP Security protocol suite
ISA	integrated service adapter
L2TP	Layer 2 Tunneling Protocol
LSP	label-switched path
MAC	media access control
MC-LAG	Multi-Chassis Link Aggregation Group
MC-MLPPP	Multi-Chassis Multilink Point-to-Point Protocol
MDA	media dependent adapter
MPLS	Multiprotocol Label Switching
MS-ISA	(Alcatel-Lucent) Multi Service Integrated Services Adapter
MSP	Multi-Service Platform
NNI	network to network interface
OAM	operations, administration and maintenance
OPEX	operating expenditure
OSS	operations support system
PE	provider edge
PIM-SSM	Protocol Independent Multicast – Source Specific Multicast
POP	point-of-presence
PPP	Point-to-Point Protocol
PPPoE	Point-to-Point Protocol over Ethernet
PSTN	Public Switched Telephone Network
QoS	quality of service
RCA	root cause analysis
SaaS	Software-as-a-Service
SAM	(Alcatel-Lucent 5620) Service Aware Manager
SDH	Synchronous Digital Hierarchy
SDSL	Symmetric Digital Subscriber Line
SLA	service level agreement
SONET	Synchronous Optical Network
SR	(Alcatel-Lucent) Service Router
SR OS	(Alcatel-Lucent) Service Router Operation System
STP	Spanning Tree Protocol
UNI	user to network interface
VLL	virtual leased line
VoIP	Voice over IP
VPLS	Virtual Private LAN Service
VPN	virtual private network
VPRN	virtual private routed network

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