



hp procurve
networking
business

january 2003



business
white paper

the hp procurve adaptive EDGE architecture™

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introduction

The Internet and global economy are placing new demands on the intelligence of enterprise networks. Innovations in digital technology are transforming business infrastructure and will ultimately transform the way companies provision communications and information technology for the enterprise. It's no longer adequate to have an enterprise network that cannot effectively handle the forces of change to evolve in a smart and dynamic manner.

To gain a competitive advantage, business decision makers are looking for new ways to create communication efficiencies and at the same time maximize network investments to achieve real business value. As a result of the advancements in communications, enterprise networks must become adaptive to support business requirements and extend resources worldwide. Networks must have the ability to easily adjust to new ways of communicating. In short, networks must be built to provide a flexible foundation for IT and all forms of business communication creating a single pervasive digital utility.

Today new applications can make users more efficient, but also make networks more complex if not deployed appropriately. Decisions about network access, traffic prioritization, traffic flows and bandwidth optimization can no longer be centralized. As new applications become pervasive, more functionality must move to the edge of the network to effectively support users while making efficient use of the network resources. The edge of the network is not a destination; it's where the user connects. It's where users must be authorized to access applications and resources to accomplish their jobs, but no more. The edge is like a set of intelligent keyed doorways that lead the user to the appropriate zones of information and services that they need to achieve their business goals and objectives. Doors can be opened and closed as the needs of the business change. The keys to the doors can be handed out to the appropriate users only - protecting private information from prying eyes. The edge of the network creates the right doorway to connect each user to the information, services and applications they need. At the edge of the network there are no boundaries to what your business can accomplish. It's all about creating and choosing the right pathways to the business information and services each user needs.

This paper introduces an innovative network architecture — the HP ProCurve Adaptive EDGE Architecture™ — that enables companies to effectively accommodate the evolution of the enterprise network into an anytime, anywhere resource that adapts to changing business needs with control to the edge and command from the center.

Three major and interdependent forces are driving the transformation of the enterprise network: the Internet, communications and an increasingly mobile workforce.

- **The Internet**

The Internet essentially obsoletes the classic enterprise data network created to serve just internal employees, processes, and private physical sites. The Internet makes new business models, distribution channels, creates marketing opportunities, and promotes collaboration and partnerships – all new ways of communicating. Moreover, the Internet shifts the emphasis from exclusion to inclusion. Meaning instead of an “exclusive” model in which organizations try to prevent people from doing things they shouldn't, they have an “inclusive” model that seeks to provide users appropriate network access.¹ The key is that the “inclusion” or access must be appropriate for the organization, the department, and the partner, right down to the edge of the network,

the changing enterprise network

¹ Securing the Cloud.” *The Economist*. October 26, 2002. Article.

to the individual employee, customer, consultant or application. *The bottom line – the enterprise network will become a public network.* Therefore network security will become a key element of the network's future.

- **Dynamic communications**

Communications occur in many ways and forms. Historically, companies have used multiple infrastructures and technologies to implement a variety of communication networks, such as data, video and video conferencing. The shift to digital technologies brings all of them together into a *converged* communications network – a single network that supports a broad range of applications that can use multiple information types. As a result, conventional boundaries will blur and then disappear which can already be seen in examples like call centers, virtual meeting rooms and universal messaging. *The bottom line – the data network will become the only network.* Supporting a broad range of *new applications* will become a key element of the network future.

- **Mobile workforce**

The need for communications can arise at anytime. A company's workforce may be anywhere – at the office, away from the desk in a conference room, at home or on the road. The range of "potentially mobile" and "always mobile" digital appliances continues to diversify and proliferate. The network itself is extending its reach to provide mobile connectivity with local wireless technology, public high-bandwidth wireless hotspots and digital cellular to address the needs of anytime communications. Access management, along with security, will be necessary to provide users with transparent services and communication. *The bottom line – the network will become an anytime, anywhere resource.* Supporting secure *mobility* across a range of transports both wired and wireless, inside and outside of the office will become a key element of the network future.

As the network becomes increasingly more public, more converged and more mobile, companies will need to understand and support new security methods, new applications, and new connection management solutions for a mobile workforce. Traditional solutions are based on one-dimensional architectures that address only one area of network design at a time, such as voice, video or data. Design rules and product features for voice, video and data were sufficient to supply quality of service (QoS) for these applications, but were too rigid and insufficient to address mobility or security at the same time. These new and emerging requirements need solutions that are based on a fundamental, multi-dimensional architecture that addresses the complexity and flexibility required to handle all solution areas at the same time.

An analysis of the issues associated with QoS across a wide-range of network applications in a secure mobile environment, yields an overwhelming conclusion. The requirements of the next-generation network can only be met with more control and functionality at the edge of the network. For example, security must be enforced regardless of when, where or how the user connects at the edge of the network via a wired office connection, a wireless LAN connection or from a remote location via an ISP. New applications will require QoS, traffic conditioning and rate limiting to allow them to all coexist on one network. Such control must be *established at the edge* and maintained across the network. In the case of mobility, as a user moves from one location to another, the edge must preserve the connection as appropriate from wired to wireless, in and out of the office and back again. *Control to the edge* is the only way to offer full support for today and tomorrow's new applications while ensuring security and quickly providing appropriate access and mobile

the evolution of Ethernet networks

connectivity to services and information.

In addition to providing control to the edge, defining the appropriate user access for applications, services, and information is a policy decision driven by organization, mission, business needs, job descriptions, customer profiles and more. *Control to the edge* must be paired with *command from the center* driven by business needs and priorities. HP ProCurve networks have been meeting this challenge with network solutions for two decades and the company will continue to meet them.

This new network will probably not come from a new revolutionary technology but from the evolution of a known technology – Ethernet. For most of its life, Ethernet has existed primarily to move one kind of traffic – files. Until recently, its evolution was driven by the need to move data faster (10Mbps to 100Mbps to Gigabit to 10 Gigabit) and without interference (switching). In the process, Ethernet has become a truly pervasive network technology in business, education and government around the world for building increasingly cost effective and robust local area networks. While this rate of change seems remarkable in retrospect, the future – driven by security, convergence and mobility requirements – holds even more remarkable potential for change.

Ethernet is now moving into both new geographic domains, such as metropolitan area networks and mobile wireless connectivity, as well as new classes of converged applications. These new applications and technologies bring with them new traffic types that include:

- **voice** (VoIP or IP telephony) focused on small packet transport with low packet loss and latency requirements
- **video** distribution and teleconferencing with sustained throughput and multicast requirements for large packets
- **storage** (Network Attached Storage and block-mode iSCSI) requiring high burst data rates and low latency
- **inter-process communication** (emerging Remote Direct Memory Access over Ethernet standard) requiring efficient and reliable low latency message and data transfer
- **trusted traffic** (and its opposite, unwanted traffic) authenticated and encrypted end-to-end

Each traffic type requires different responses and behaviors that the network must deliver so the applications work reliably. Securely delivering the right network behavior for each application type demands a new network approach that provides more control to the edge where the user is identified and the application connects even as the user moves. Next-generation Ethernet/IP networks with *control to the edge* will manage access and traffic flows more effectively. The HP ProCurve networking business recognizes the critical functionality is migrating to the edge of the network and that this capability must be offered in a cost effective and manageable way.

Ethernet/IP networks, both public and private, will ultimately span the planet and transport all types of digital traffic in support of every conceivable digital application. This will

positive solutions for customer needs

transition Ethernet/IP from being a network to Ethernet/IP being the one network. This evolution will mean Ethernet/IP everywhere for everything digital. The HP ProCurve Networking Business is committed to delivering affordable, secure, control to the edge to ensure the future value of the customer's enterprise network investment.

As the transformation of Ethernet/IP networks occurs it becomes a foundation technology, a utility infrastructure that is an integral part of every enterprise. IT professionals that build and run these networks have specific needs that must be addressed. They must build a network that not only meets today's needs but also clearly defines the methods to support future needs, both seen and unseen. Questions IT professionals grapple with include:

- How will my network be configured to support a new voice solution without disrupting existing applications?
- Will I be able to provide specific levels of access to my network based on the identity of the person and not the physical location of the network port?
- When I begin to distribute video will I be able to control the quality and ensure delivery only to those who need it?
- Can I be confident that disruption on one port or segment of the network will be effectively isolated and managed?
- Will I be able to extend the wired network to provide secure access to an increasingly mobile workforce?
- Can I affordably assure the network is available and that it will survive malicious attacks from inside and out?
- If something goes wrong, can I get help when I need it?
- How do I keep my network open, based on industry standards and *under my control*, and not be held hostage to high support costs, expensive add-ons and proprietary complexity?
- Will I be able to easily manage and configure my network to adapt to changing business needs, and monitor and create business revenue generation with improved network traffic accounting?
- Will my vendors be there for me in the future and can I trust them to have my best interests as their highest priority?
- In today's business environment can I meet all my business needs and still lower my capital and people costs?

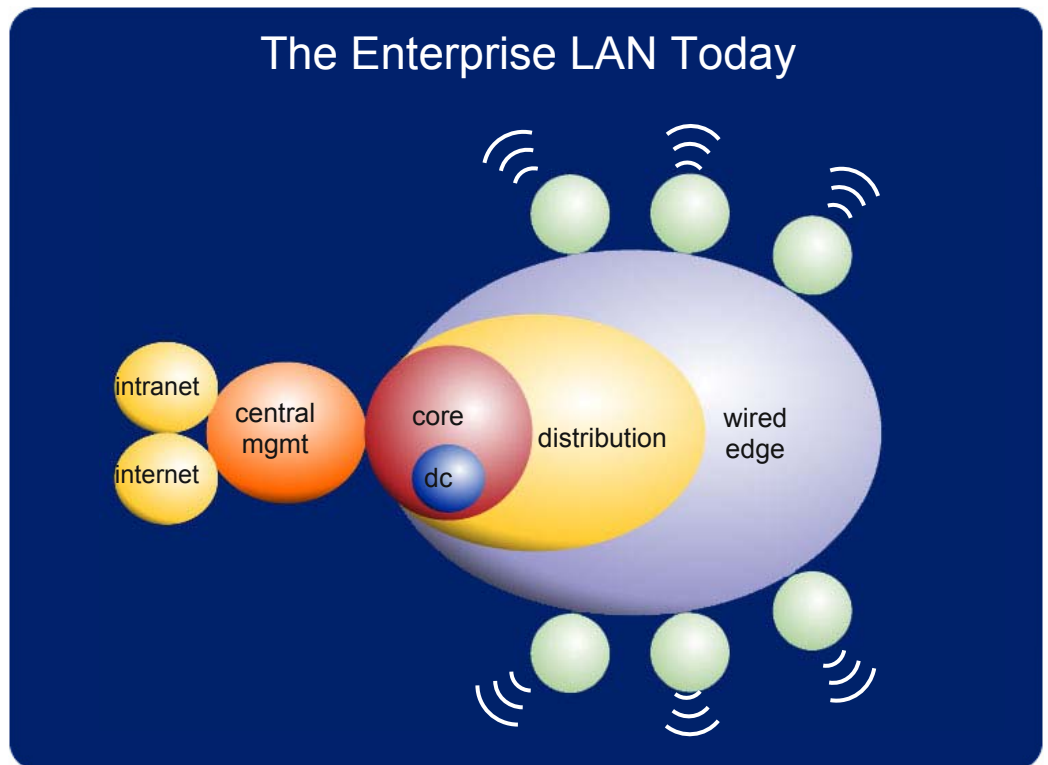
This is a formidable list of questions. The security and peace of mind that comes from knowing the HP ProCurve Networking Business is providing positive answers and proactive solutions to these questions is what the HP ProCurve Adaptive Architecture are all about.

meeting the need – the HP ProCurve Adaptive EDGE Architecture

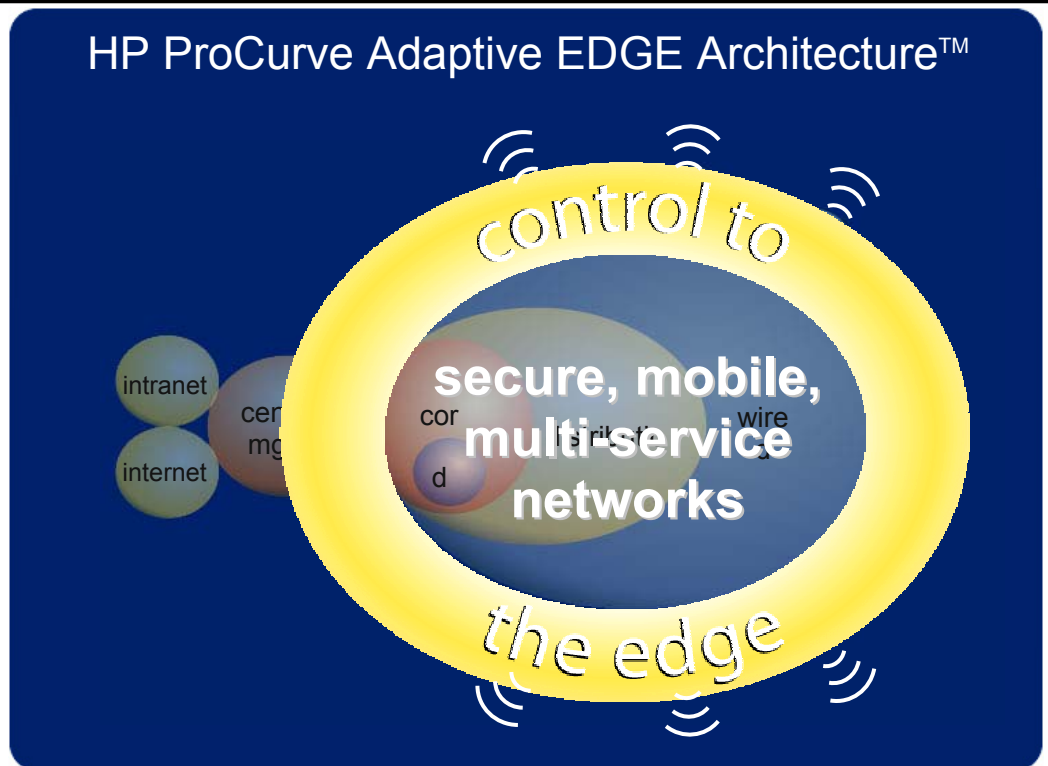
The HP ProCurve Adaptive EDGE Architecture™ was developed to secure the future of HP ProCurve customers by delivering the best central command with control to the edge. Only control to edge securely provides the robust functionality to support all current and future traffic and application types.

By definition, it is the network edge where users and applications connect, where network traffic enters and exits the network, and where the network must determine how that traffic should be handled. The edge is where security policies must be enforced, where the user connects after being authenticated at a central command resource. Without control to the edge, decisions about security and traffic must be deferred to the network core, impacting

core performance and scalability while at the same time requiring more bandwidth in all parts of the network driving up cost and complexity. In addition, this opens the network to security attacks between where access is physically attained and where authorization is granted.



In networking terminology, control to the edge places selected layer 2, 3, 4 and higher functions in edge switches. These switches control access and traffic flows to ensure the increasing set of applications can function correctly and concurrently without interference. HP ProCurve Adaptive EDGE networks support both centralized cores and distributed cores with equal facility because either interior core configuration can enforce the *key decisions made at the edge*. Ultimately, the ProCurve EDGE Architecture will enable highly available meshed networks, a grid of functionally uniform switching devices, to scale out to virtually unlimited dimensions and performance thanks to the distributed decision making of control to the edge.



HP ProCurve networks have been delivering meshing technology since 1998 and the company has been an innovator in delivering breakthroughs in edge switches, including its most recent ProCurve EDGE Architecture-compliant Switch 5300 series, at a price point comparable to other vendor's conventional stacking switches.

The HP ProCurve Adaptive EDGE Architecture focuses on:

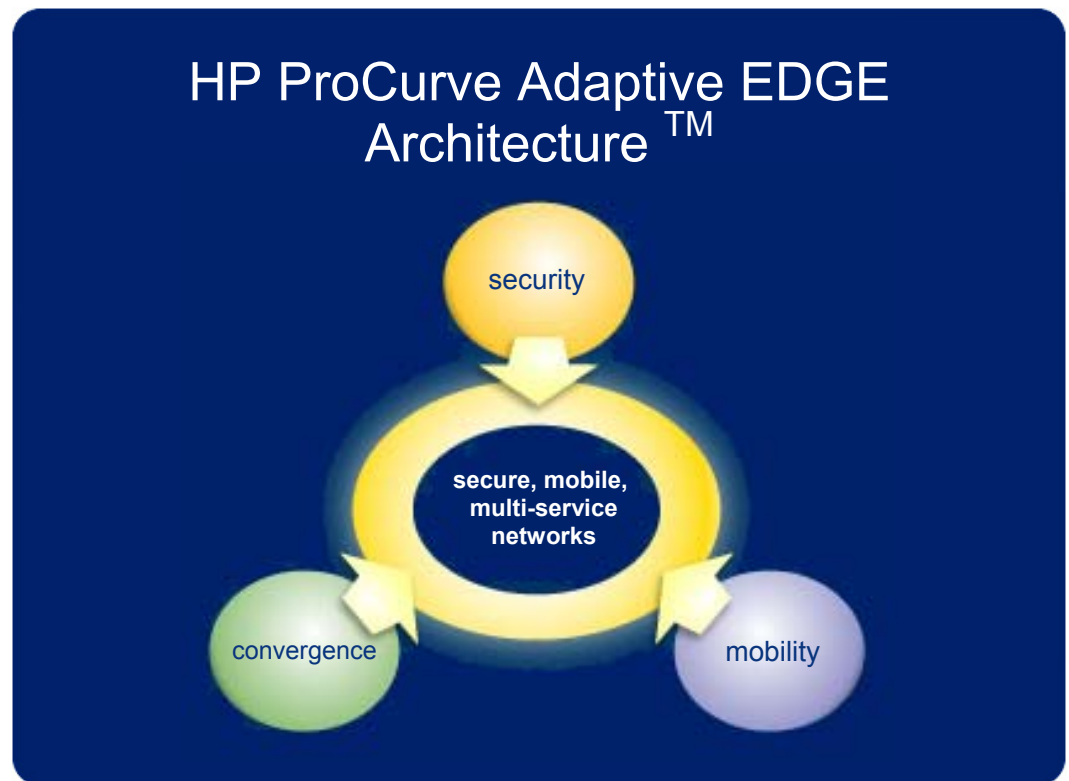
- traffic monitoring to control bandwidth optimization throughout the network grid
- integration of industry standard VLAN and industry standard security constructs to provide "out of the box" access management unavailable on non-EDGE enabled ports
- complementary implementation of industry standard traffic routing and Layer 2 meshing providing path fail over and multi-path load balancing for robust "always on" reliability
- unparalleled range of traffic prioritization features to provide traffic type coexistence and quality of services functions *virtually eliminating the need for custom network design architectures* to ensure support of current and future voice, video and content delivery applications
- centralized command of the edge for easy implementation of user security and application policies

emerging applications and the HP ProCurve Adaptive EDGE Architecture

HP ProCurve Adaptive EDGE Architecture was created to provide unparalleled support of the nearly limitless applications that will be deployed on Ethernet networks in the foreseeable future. Both today's and tomorrow's key business application areas are addressed by the HP ProCurve EDGE Architecture and the HP ProCurve family of products and services.

Businesses can benefit directly from the *control to the edge* technology. Voice over IP (IP Telephony) solutions utilize layer 2, 3 and 4 traffic prioritization to ensure voice packets are not lost and latency is minimized throughout the network edge to edge. HP ProCurve VoIP solutions are open and interoperable with all the major IP telephony players and offer the lowest cost and highest performance of any LAN vendor.

HP ProCurve will also offer a layer set of edge access security options for both wired and wireless access. These solutions will take advantage of edge control features including 802.1X port based access control, MAC lockdown and management and attack protection features. The security solutions will also enable a truly secure mobility solution to create wireless LAN connectivity. These solutions will extend the HP Adaptive EDGE Architecture™ into the wireless domain.



the HP ProCurve Adaptive EDGE Architecture is real today

The Adaptive EDGE Architecture is not just a future vision. Many elements of the architecture are already available in HP ProCurve's current products, including recently introduced HP ProCurve Switch 5300 Series. Based on HP developed ASICs the 5300 series delivers a broad range of Layer 2, 3 and 4 features for control to the edge. The 5300 series is cost effective at the edge and can be coupled with the 9300 series core switches or used to create a distributed core in a network comprised entirely of 5300 series switches in a meshed – at layer 2 or layer 3 – highly available configuration or grid.

In 2003, HP ProCurve is delivering the next generation of HP ProCurve Adaptive EDGE Architecture products with Gigabit to the desktop switches that will deliver “near-zero latency” for even the largest files while simultaneously supporting voice, video and other application classes.

summary

The future of enterprise networking is clear. Companies must *adapt* their infrastructure to deploy and support converged, mobile, highly secure networks. These three forces are all *related*, *interactive* and *interdependent*. As a result, enterprises require a three-dimensional architecture that fully integrates and leverages each solution.

These new capabilities cannot be effectively deployed without having critical functionality at the edge of the network. In short, control to the edge is the only way to offer full support for today and tomorrow’s applications while ensuring secure, appropriate and mobile access.

The HP ProCurve Adaptive EDGE Architecture is the only design that recognizes the necessary migration of functionality to the network edge and gives customers a cost-effective, easy-to-manage solution to achieve command from the center with control to the edge. HP ProCurve Adaptive EDGE Architecture enables companies to preserve networking investments while readying their networks for the future to support business needs and priorities. With HP ProCurve Adaptive EDGE Architecture, a company’s network can truly become an anywhere, anytime resource.

for more information

More information about HP ProCurve Adaptive EDGE Architecture is available at <http://www.hp.com/rnd/architecture>.

More information about HP ProCurve networking solutions and products is available at <http://www.hp.com/go/hpProCurve>.

HP is a leading global provider of products, technologies, solutions and services to consumers and businesses. The company's offerings span IT infrastructure, personal computing and access devices, global services and imaging and printing. HP completed its merger transaction involving Compaq Computer Corp. on May 3, 2002. More information about HP is available at <http://www.hp.com>.