AXYOM PLATFORM TAKES PERFORMANCE TO THE EDGE

Casa Systems, Intel, and Dell collaborate on a high-performance ultra-broadband solution

The mobile network edge—where services are accessed and performance, is ultimately judged— is getting denser, more complex, and more intelligent each year as service providers strive to meet burgeoning demand and deliver differentiated, profitable ultra-broadband services. Incorporating cellular as well as trusted and untrusted Wi-Fi into universally accessible services that provide a seamless user experience and which can scale in multiple dimensions is one of today's top mobile network challenges. New applications, including autonomous vehicles, virtual reality, and high-definition everything put further burdens on already stressed networks.

Further densification of access networks, combined with mobile edge computing solutions, will enable service providers to generate revenues from these new applications. However, the right solution has to achieve many objectives that are at odds with each other from an engineering perspective. For example: securing Wi-Fi traffic before it enters the core network, while simultaneously delivering throughput at ultra-broadband speeds; extracting and processing real-time intelligence about subscribers, sessions, and applications while simultaneously scaling to millions of IPSec tunnels; and deploying highly dense fabrics of small cells and Wi-Fi access points while achieving profitable growth. It’s an engineering challenge well suited for the unique strengths of Intel, Dell, and Casa Systems.

In this paper, we will explore how a new approach to virtualization of mobile network functions and mobile edge computing is opening doors for service providers who want to profitably deliver a range of differentiated services to their customers. Casa Systems’ Axyom™ ultra-broadband edge leverages Intel and Dell solutions to deliver the next generation of services.
MULTI-ACCESS EDGE COMPUTING

Edge computing solutions enable placement of network functions in closer proximity to the end point, which allows lower latency and improved ability to collect contextual information, both about the end point and about the network. These advantages create new revenue-generating use cases for service providers, including location-based services, edge content delivery, content optimization, and local breakout for private networks.

The next generation of services will require networks that can scale simultaneously in multiple dimensions. NFV 1.0, in which monolithic blocks of code are “lifted and shifted” from purpose-built hardware, to COTs hardware will not achieve that kind of multi-dimension performance. Casa’s Axyom™ architecture is a modular one, developed by decomposing legacy network functions and reinstantiating them in NFV 2.0 fashion, so they can deliver multi-dimensional performance. This powerful architecture already supports Casa’s wireless and Wi-Fi portfolios. It’s the architecture for Casa’s virtualized fixed access and core solution development as well.

The diversity of 5G applications will require the ability to tailor network attributes across the entire network. SDN and NFV will enable dynamic service orchestration and network slicing to meet emerging 5G and current 4G requirements. Once network functions are virtualized and under SDN control, they can be orchestrated in network slices or service chains to make the network itself a platform for dynamic delivery of uniquely tailored services. Rising demands for these kinds of services cannot be met by legacy mobile solutions. Applications like streaming video involve large numbers of small packets and high throughput for the optimum user experience. At the same time, network densification can open the mobile network to more security threats. Executing strong security processes on each packet can be effectively accomplished with Casa Systems’ Axyom™ at a higher throughput rate than incumbent solutions.

CASAv SYSTEMS DRIVES ADVANCEMENT

Casa Systems is uniquely well suited to meet both current and emerging market demands, in addition to resolving the associated engineering challenges. As a trusted source of innovative cable network access solutions, the company provides fixed, mobile, optical, and Wi-Fi network solutions for ultra-broadband services.

Casa Systems’ Axyom™ incorporates the strong security, RF engineering, high-density access aggregation, and extreme performance and subscriber management capabilities required by the next wave of mobile applications.

The company also understands the requirements on networks that must serve millions of subscribers, and do so without fail. To respond to these industry needs, Casa drew on more than a decade of industry leadership and relationships, fundamentally rethinking the way mobile services are delivered. The result is the Axyom™ ultra-broadband edge.
THE AXYOM™ ULTRA-BROADBAND EDGE

Casa Systems’ Axyom™ software architecture powers virtualized fixed and wireless core and edge solutions. In contrast to NFV 1.0, where monolithic blocks of code are lifted from purpose-built hardware and shifted to COTS servers, Axyom™’s design enables NFV 2.0, where network functions are decomposed and then reconstituted for dramatic performance gains and multidimensional scaling.

Based on the latest NFV technologies, Axyom™ takes advantage of the modular software approach Casa developed to deliver the cable industry’s first and highest density converged access platform. The VNFs supported by the platform integrate with each other to deliver the right combination of attributes for a given application, as opposed to working individually.

Virtualized core and multi-access gateway functions, like those shown to the right, can be placed where they make the most sense in the network. And, NFV 2.0 enables multidimensional scaling of CPU, memory and throughput to eliminate the performance trade-offs present in many of today’s solutions. This allows dramatic improvements in performance, protects the network core, and enables higher QoE.

HARNESSING THE POWER OF PARTNERSHIP

Casa designed and developed Axyom through a collaboration with a pair of industry-leading innovators: Intel and Dell. Fellow members of Intel® Network Builders, the Dell NFV Platform and Intel® Technology Provider program, Intel and Dell contributed to the platform through tools and technology, technical acumen, and broad ecosystem support.

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Intel was called upon to help enable customer and partner VNF solutions based on the company’s CPU leadership for network solutions and the Intel® Xeon® processor E5-2600 v3 product family. Intel® processors make it possible to transition from using discrete architectures for major workloads (e.g., applications, controls, packets, and signal processing) to a single architecture that consolidates the workloads into a more scalable and simplified solution.

Such flexibility means that developers may be able to eliminate special-purpose hardware such as network processors (NPUs), coprocessors, application-specific integrated circuits (ASICs), and field-programmable gate arrays (FPGAs).

In addition to processing power, the Axyom™ platform also takes advantage of the Data Plane Development Kit (DPDK). This powerful set of software libraries removes the most common performance bottlenecks for packet processing software on the Intel® x86 platform. It allows Casa Systems to improve the packet processing performance of the solution by more than 10x, resulting in performance gains that outpace legacy solutions many times over.

The advantages of packet processing while executing other workloads on an Intel processor are numerous and include simplifying the application development environment, accelerating time to market, and reducing CapEx investment. In combination with the Dell/Intel hardware, the Axyom™ platform provides greater abilities to scale in/out or up/down based on the needs of the service provider or their customers. DPDK also plays a critical role in ensuring peak packet-processing performance in SDN and NFV solutions.

The Axyom™ platform benefits as well from utilizing Intel® Quick Assist Technology, which provides security and compression acceleration capabilities to improve performance and efficiency across the service provider network. Developers can use the technology to meet the demands of today's escalating data volumes, especially data-bound for encryption and compression. And this can be done while still ensuring applications are fast, secure, and available.
Dell embraces open standards and open architectures and is a leading supplier of interoperable solutions designed to accelerate the adoption of NFV globally. The partnership with Dell allows Casa Systems to leverage this foundation, along with a comprehensive ecosystem of technology partners, to meet its exacting needs for service delivery.

The Axyom™ platform relies on the Dell PowerEdge R630 server, which is especially well equipped to meet the needs of the Casa solution. The highly versatile, three-socket 1U rack server boasts impressive processor performance, a large memory footprint, extensive I/O options, and a choice of dense, high-performance storage or a low-cost, high-capacity option. It offers a symmetrical architecture design as well and allows better densification with enhanced performance. Finally, the server is built on 100 percent open standards and offers great versatility and operational efficiency.

Dell is committed to its partnerships, contributing not just its technology and expertise, but also its experience as a seasoned collaborator and resource with an expansive global footprint and an understanding of the need to accelerate business during today's digital transformation. Dell understands that the best relationships create an environment of optimism, and a clear path to success. Bringing that mind-set to its role on the development of the Axyom™ platform, Dell was able to help unlock the promise of the product and accelerate its development.
THE FUTURE OF ULTRA-BROADBAND

In today’s telecommunications world, it seems the only constant is change. The mobile edge computing market has become ever more crowded and service providers bring deep existing relationships with legacy “big iron” suppliers. A company’s ability to adapt to this complex environment will increasingly determine whether it stays competitive or falls behind.

Moving from concept to beta in less than nine months, the Axyom™ ultra-broadband edge platform delivers multiple virtual mobile network functions with a new approach to NFV. This important step takes the simple, versatile, performance-driven solution to the edge, where a service provider’s services are delivered and judged—and differentiated.

Sharing a common vision, Intel and Dell continue to create the foundational platforms for the future of the telecommunications industry, consistently extending and redefining what is possible. Playing an essential role are innovative companies such as Casa Systems, which endeavor to find new ways to harness those platforms to create the next generation of virtualized solutions. Powered by joint collaborations like these, the NFV ecosystem will continue to pave the way for new solutions that would have been deemed impossible just a few years ago.

Learn more about the Axyom™ platform at casa-systems.com/assets/Casa-Solution-Brief-Axyom.pdf.