

Stacking the Odds in Your Favor

Understanding Array SpeedStack™ Technology

White Paper

Overview

Point network solutions spend up to 80% of their processing time managing TCP/IP and parsing HTTP requests; as processing is repeated for each solution added to a network, performance suffers. Array SpeedStack™ technology performs TCP/IP and HTTP processing once in a manner that eliminates the need for repeat work. Learn about:

- The Built-in Inefficiencies of Free-Standing Networking Solutions
- The Technology Behind Array SpeedStack™
- Practical Applications of SpeedStack™ Technology

Understanding Array SpeedStack™ Technology

The Array Networks SpeedStack™ architecture dramatically improves network and Web-enabled application performance by never repeating work.

Imagine that you have hired a contractor to build a house. The blueprints are approved, so all you need now are the final signoffs from the city planning department. This takes time, however, because the project manager must walk the plans from one official to another until everyone has given his or her blessing.

As a result, the construction crew is forced to sit around the site doing nothing for most of the day. Finally, the project manager arrives with the properly signed documents and work can begin. An hour or two later, with daylight fading, the crew stops for the evening.

The next day, the construction crew once again arrives at dawn, but surprisingly does not begin work. This is because the project manager has to obtain the same approvals he got on the first day before work can begin. This continues day after day, forcing the construction crew to spend most of its time sitting and waiting, and only a fraction of its time actually building the new home.

Clearly, this is not a reflection of reality. Yet until now, this is how the vast majority of “point” or single-task solutions for external and internal Web-based networks have operated.

For example, if a network manager wanted to add server load balancing (SLB) to a Web-based network to manage growing volumes, the SLB application would have to repeat many of the same processing steps that had already been performed on the packet stream by other networking components. This repetition robs each component of a significant amount of processing power, which could otherwise be devoted to the task at-hand.

Array Networks developed its revolutionary SpeedStack technology to greatly improve the performance of networks and Web-enabled applications. SpeedStack is at the heart of Array’s highly integrated Application Front End appliances that direct, accelerate, and secure internal and external Web traffic.

This white paper will discuss the limitations of traditional Web-based network topology that led to the development of SpeedStack. In addition, it will examine how SpeedStack technology provides unsurpassed synergy to deliver an array of benefits to networks and Web-enabled applications.

Understanding Array SpeedStack™ Technology

→ Built-in Inefficiencies

Businesses large and small today look to their IT infrastructure to put information at the disposal of an increasingly mobile workforce, enhance internal communications, improve strategic relationships with vendors and business associates, and provide customers with secure, trouble-free access to products and services. A plethora of Web-enabled applications has toppled traditional corporate walls, creating a ubiquitous, information-driven, global society.

But Web-based network infrastructures are not without their limitations. Lawrence T. Lu, Chief Technology Officer and one of the founders of Array Networks, first identified a problem with repetitive tasks within Web-based network topology several years before Array's launch. While working to improve network performance through free-standing solutions such as server load balancing or caching, Lu discovered that the vast majority of system processing power was spent on just two tasks: TCP/IP requests and HTTP parsing.

→ **TCP/IP** – *In a network supporting a large number of servers, TCP/IP stacks must track a multitude of concurrent connections. State information for these connections can grow to very large sizes as the network examines each packet and correlates it to a particular data point in the table. Obviously, this requires a great deal of processing power as network demands increase.*

→ **HTTP** – *Whenever a client PC or workstation makes a request via the Web, it uses a series of HTTP commands. These commands can vary in length from 10 bytes to five kilobytes (5000 bytes) of information. Processor-intensive HTTP parsing is needed for a server to “digest” these commands and act on them.*

As Lu studied the process, he calculated that a Web-based network uses approximately 40 percent of its power on TCP/IP processing, and another 40 percent of its processing on HTTP parsing. Because each stand-alone solution was forced to repeat this process, the component could deliver only about 20 percent of its processing power to the tasks it was expected to perform.

To remedy this, Lu began to work on a unified platform in which TCP/IP and HTTP parsing could be so tightly coupled that information could be processed and held for use by any component of the system. By eliminating the task of doing this over and over, vertical networking applications such as server load balancing, caching, SSL acceleration, or firewalls gained access to substantially more processing power. The result was greatly enhanced network performance.

Understanding Array SpeedStack™ Technology

→ The Solution: SpeedStack™

Array Networks was founded on the introduction of products built around SpeedStack technology. Array's SpeedStack consists of a TCP/IP stack, HTTP parser and a proxy engine. This unique architecture allows Array and third-party developers to attach vertical applications onto SpeedStack at various places in the data flow. For instance, an SLB solution can be attached at the TCP/IP level, or Layer 4. It can also be attached at the proxy engine, resulting in Layer 7 SLB.

In each case, the work of digesting the connection and handling HTTP parsing is *never repeated*. Using a traditional Layer 7 SLB component, the application must use much of its processing power to digest the information and send it up to Layer 7 before the component can perform its functions.

But in Array Networks' SpeedStack, TCP/IP and HTTP work is only performed once, regardless of how many vertical solutions are attached.

"With SpeedStack, the user's intent is understood by each of the various vertical functions," explains Lu. "We have a mantra at Array Networks that says: 'It's not about bigger, it's about smarter', and that means never repeating work."

SpeedStack technology makes it possible to attach many vertical functions—Layer 4 or Layer 7 SLB, reverse proxy caching, global server load balancing, SSL acceleration, compression and so on—while sustaining the highest performance—due to virtually no repetition."

In Array Networks solutions, the TCP/IP stack processes packets when they first enter the system. The stack achieves higher performance through the efficient handling of packets, which detects any dangerous or damaged packets and discards them early in the process. Once the TCP/IP stack is finished, the packets are fed into the HTTP parser, which dissects the HTTP header in a way that eliminates the need for other components to repeat this task. The parsing engine itself is tuned for precise HTTP processing, thus delivering outstanding performance.

All these networking functions take place in the kernel of the operating system. "By implementing our solution in the core operating system, performance is dramatically increased," Lu notes.

Finally, the SpeedStack's proxy engine manages the connections between clients and servers, efficiently passing information back and forth—while enabling other subsystems to tap into the packet flow to do their work.

Understanding Array SpeedStack™ Technology

A key feature of SpeedStack is its proxy API (application programming interface). The proxy API is a “hook” located between the HTTP parser and the proxy engine that allows third-party partners to easily integrate networking components into the data flow. What makes Array’s proxy API so useful is that it contains all the digested information from the TCP/IP stack and HTTP parser. It can efficiently pass this digested information on to a third-party application. The application can then manipulate the request and inject it via the API back into the data flow—transparent to the network—for forwarding to the server by the proxy engine.

“This is a powerful capability because it means that third-party applications don’t need to have their own proxy engines,” remarks Lu. “Our partners enjoy the flexibility of being right in the middle of the data stream. They can more easily create applications for needs such as dynamic advertising insertion, and even achieve higher performance than they would by building in their own proxy engine.”

Array Networks continues to expand the horizons using its SpeedStack technology. In the newest hardware and software implementation of SpeedStack, Array has embedded SSL acceleration directly into the stack. By moving this capability inside, the company has greatly improved the performance of its solutions. Following are some of the impressive performance measures achieved by the latest version of SpeedStack:

- Up to 50,000 HTTP requests per second (per Array unit)
- More than 5,000 SSL transactions per second (open, data transfer, close)
- Up to 80% peak performance sustained by the proxy API (when using a null module)

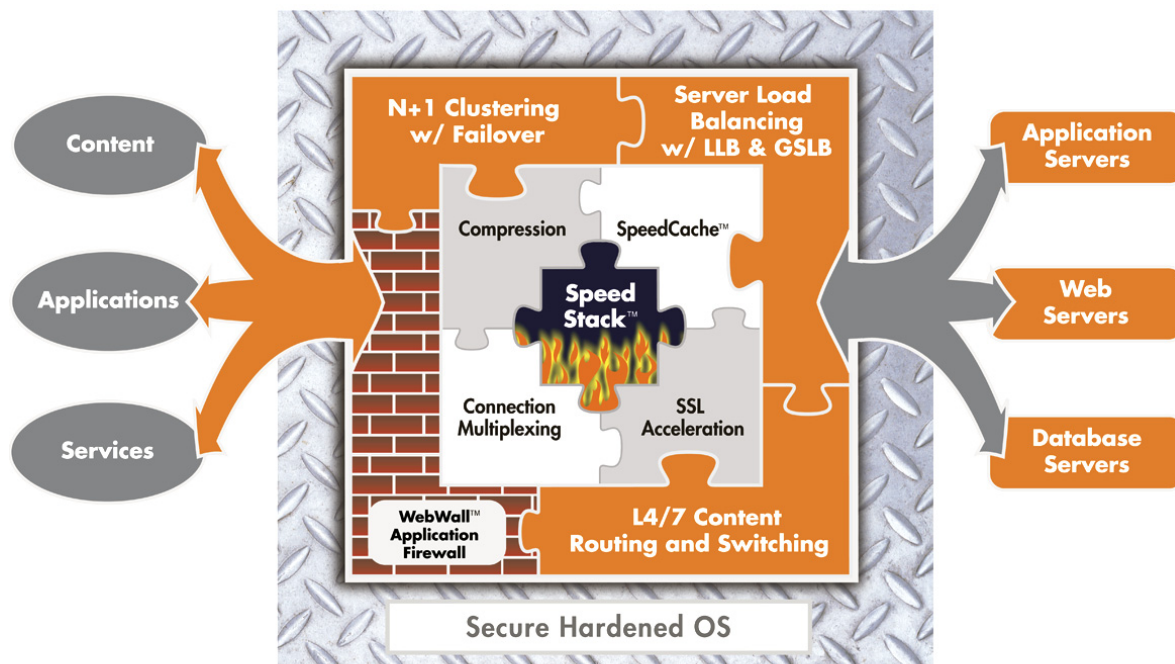
Those who are familiar with Web-based networking systems will recognize that these figures are significantly superior to other point solutions on the market today.

Understanding Array SpeedStack™ Technology

→ Practical Applications of SpeedStack™ Technology

When the Web exploded in popularity in the 1990s, organizations put many different solutions in front of their Web servers. These solutions were intended to help accelerate traffic, balance higher volumes of requests, or provide for secure transactions.

In the beginning, the various solutions would be physically aggregated at a particular website. Array Networks' solutions are *integrated*, not aggregated, for higher performance—even if an organization starts with one or two functions, then adds more over time. Because other vendors' stand-alone solutions increase a system's overhead and latency, the expected gains in Web traffic coordination and website optimization may be measurably degraded. Array appliances achieve remarkable synergy as the SpeedStack architecture allows multiple vertical functions to be consolidated into a single box:



Application Front End

Array Networks®

Because of Array's integrated design, customers not only need fewer point solutions (load balancers, Web caches, etc.) but also fewer servers; resulting in reduced capital expenditures, less complex operation and management, lower-cost software licenses, and decreased rack space consumption. Further, SpeedStack supports a built-in, invest-as-you-grow upgrade path that lets network managers quickly and economically enable integrated functions with just a phone call—avoiding the expense of service calls to install additional hardware or software.

Understanding Array SpeedStack™ Technology

Summary

The Internet and the World Wide Web have revolutionized how individuals access information and conduct business. While offering unsurpassed ease of access, Web-based networks also have built-in inefficiencies that have presented obstacles to achieving the highest possible performance.

Array Networks' SpeedStack technology provides a unique platform that tightly couples the TCP/IP stack, HTTP parser and proxy engine to dramatically improve the performance of internal and external Web-based networks and Web-enabled applications.

About Array Networks

Array Networks is a world leader in secure application acceleration and deployment appliances for global enterprises. Built upon the Array SpeedStack(TM) technology, Array's unified secure content access solutions enable industry-leading performance, integration, scalability and ease of implementation and management. Headquartered in Campbell, California with sales offices in the U.S., Europe, Asia Pacific and Latin America, Array engineers and manufactures its products in the Silicon Valley and sells them through direct and indirect channels across the globe.

Array Networks, Inc.

254 East Hacienda Avenue

Campbell, CA 95008

Phone: (408) 378-6800

Toll Free: 1-866-MY-ARRAY

Fax: (408) 874-2753

Email: info@arraynetworks.net

www.arraynetworks.net