Accelerating Web Application Delivery

Breaking Free from WAN Performance Entanglements

Web applications have become richer over time, including more interactive data with larger embedded images and file attachments. In addition, many client/server applications have a substantial amount of code that must be downloaded to the client browser before operation. All of these attributes make it increasingly difficult to deliver web applications across a WAN.

Silver Peak addresses the unique challenges associated with delivering web applications across a distributed enterprise. Through a combination of data reduction, latency mitigation, packet coalescing, and other innovative application acceleration techniques, Silver Peak ensures fast and efficient web application delivery to all remote and branch offices.

THE PROBLEM WITH HTTP/WEB CONTENT

The performance of web applications is debilitating by programming inefficiencies. Up to 80% of web content generated by enterprise applications is treated by web servers as dynamic content, although the actual underlying content is often static. Dynamic content is not cacheable by the browser or intermediate cache proxies; it is regenerated by the application server and repeatedly sent across the WAN to client browsers every time it is requested. This hinders application performance.

Most enterprise applications, such as Oracle, PeopleSoft and Siebel, create dynamic web content. As a result, less than 20% of enterprise web application content can be cached or accelerated by conventional web cache and HTTP acceleration devices.

Web/application servers control caching of objects by including cache directives within the HTTP reply headers when communicating with client browsers. Here is an example server response header for an html page:

```
HTTP/1.1 200 OK
Date: Sat, 06 May 2000 18:06:07 GMT
Content-Type: text/html
Cache-control: private
```

The last line indicates that the content can be cached by the browser. However, the Expires header is the basic way to set expiration of an object. For example, the following additional header line indicates when the object expires. Until this time, the object can be cached, but after the date noted below, the html object must be re-requested from the server:

```
```

If no Expires header exists, web caches may use a Last-Modified header to infer an expiration time.
However, the problem with dynamic content is that many web caches will not cache an object at all if it doesn’t have a Last-Modified or an Expires header, and dynamically generated content rarely has either tag set. As a result, dynamic and secure objects cannot be cached. Finally, some content, such as cgi scripts, .jsp, .asp GET and POST methods simply are not cached because they may have side effects upon execution.

As a result, typically less than 20% of HTTP traffic is ever cacheable, severely limiting the performance benefits that can be obtained with traditional web caches. Cache administrators can over ride HTTP caching headers, but this must be done cautiously as it can directly impact application operation.

THE SILVER PEAK SOLUTION
Silver Peak NX series appliances address the major challenges associated with delivering web applications across a WAN. This is achieved via the following unique capabilities:

Data Reduction
Silver Peak uses Network Memory™ to capture all “information streams” that traverse the link and recognizes when the information is identical. The first time that an HTTP object (static or dynamic) is requested, the information is compressed and sent over the WAN. When a browser later requests the same object from a server that dynamically creates the content, a Silver Peak NX appliance recognizes the “information stream” and delivers the information locally. Even redundant traffic from dynamic content is always eliminated from the WAN. In addition, if a file is sent via e-mail and later downloaded using HTTP, the Silver Peak NX Series appliance will detect the identical content and deliver the content locally. Network Memory remembers and recalls byte stream patterns, not “layer 7 objects”, which is an important distinction from web caches. In addition, by operating at the network layer and remaining application-transparent, Network Memory benefits all applications, not just TCP applications and protocols like HTTP. With Silver Peak, every client request is passed through to the server and the data received by the client is always fresh, not a cached copy that can be out-of-date. As a result, Silver Peak always ensures 100% data coherency.

Latency Mitigation
HTTP 1.0 required a TCP session to be opened, acknowledged, and closed for every object being requested by a browser. A page with 50 embedded GIF images, for example, required 50 separate TCP sessions to be opened and closed, sequentially. HTTP 1.1 overcomes this chattiness by implementing “keep-alives” and pipelining (parallelization), which together dramatically reduce TCP protocol traffic. Silver Peak uses additional TCP optimization tools and latency mitigation techniques to improve HTTP performance, including window scaling, selective ACK, and fast retransmit. This speeds up web portals and business-critical web applications, particularly when they are accessed over higher latency links.

Packet Coalescing
Silver Peak uses packet coalescing to repack multiple smaller packets into a single larger packet. This is particularly beneficial for web applications, like Oracle, which use J-Initiator – an Oracle java runtime that runs in the browser to provide a more robust client. J-initiator creates a stream of small packets on the WAN, each of which requires a TCP acknowledgement. This magnifies the effects of latency and slows overall performance. By coalescing a series of short packets into a single, larger packet, and then compressing both the header and payload, Silver Peak reduces the impact of latency in these types of environments.

Header Compression and Cross-flow Payload Compression
Silver Peak uses crossflow payload and header compression to reduce the amount of HTTP traffic traversing the WAN, improving performance – even on the first transmission.

Not Your Father’s Cache
On the surface, the Silver Peak solution sounds similar to a web cache. However, there are significant differences between the two, which include:

• Application Transparency. Silver Peak works at the network-layer of the ISO stack. In contrast, caches operate at the application level, intercepting client requests and server
responses and storing application-specific objects. As a result, Silver Peak is able to provide performance improvements across all enterprise applications, regardless of the transport mechanism (TCP, UDP, etc.).

- **Matching traffic patterns vs. application-level objects.** Network Memory recognizes traffic byte streams, observing pattern matches as opposed to object references. In this way, Network Memory can detect when the same information is sent using different applications, and detect when modifications are made to existing data. This enables Silver Peak to better utilize WAN bandwidth and provide better application performance than caches.

- **Support for dynamic content.** As discussed above, web caches are dependent on having cache tags set properly on web objects. Silver Peak, on the other hand, does not require any predefined tags to detect repetitive data.

- **Seamless Integration.** Network Memory does not alter the communication mechanism between clients and servers. All requests for information from a server are delivered to the application server itself. Furthermore, the server’s exact response, not an old cached version, is delivered to the user. This means that Silver Peak appliances can be seamlessly inserted between existing clients and servers with no special application-layer configuration.

- **Data coherency.** Network Memory preserves communication mechanisms between clients and servers. By examining all traffic in real time, NX Series appliances are always dealing with up-to-date information, eliminating the possibility of stale content delivery. All application locking semantics and file/record locking capabilities are still performed by the native server, not a proxy device, ensuring 100% data coherency.

- **Security, compliance, and management.** In a Silver Peak environment, access control policy mechanisms are centrally maintained within the servers themselves, eliminating potential security risks and avoiding unnecessary management headaches that come with replicating and maintaining access privileges across multiple devices. Hardware-based AES encryption ensures that any information stored on NX Series appliances (or passed between them via IPsec) is completely secure from unauthorized access.

**BREAKING FREE FROM WEB ENTANGLEMENTS**

Silver Peak is an indispensable solution for enterprises delivering web applications to remote and branch offices. Through a combination of data reduction and advanced acceleration techniques, Silver Peak NX Series appliances dramatically improve web application performance across the WAN. Silver Peak ensures accurate content delivery in a scalable and secure manner, enabling IT managers to break free from the entanglements that often accompany Web service delivery.