



F5 White Paper

The Need for Speed: F5 Acceleration Portfolio

Today's complex networks transmit massive amounts of data over lines that are not growing as fast as usage is. Any improvement an organization makes to the performance of their transport mechanism in terms of latency and loss also improves the overall system. Whether an organization is moving large amounts of data over a WAN link or communicating with customers through a web application, F5 has solutions to help improve throughput and mitigate the effects of latency.

by Don MacVittie
Technical Marketing Manager



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Introduction

Applications don't always perform as expected, especially when they're running across large or complex networks. Bandwidth is often underutilized, and sluggish response times frustrate users. Poor performance leads to lost productivity, inefficient manual workarounds, abandoned applications, and reduced business agility.

F5 Networks®, the leader in Application Delivery Networking, enables IT agility that drives business forward. This paper focuses on accelerating your software portfolio over the WAN and LAN. While nearly all F5 products increase application performance, this is an overview of specific F5 acceleration features across F5 product lines.

F5 Product Portfolio

This paper focuses on the following products:

BIG-IP Local Traffic Manager

F5® BIG-IP® Local Traffic Manager™ (LTM) is an advanced Application Delivery Controller (ADC) that secures, optimizes, and delivers applications, and increases organizational effectiveness. BIG-IP LTM directs transactions to and from servers, routers, and other devices; compresses and caches data; performs SSL offload; and manipulates packet headers and data as required.

BIG-IP WebAccelerator

BIG-IP® WebAccelerator™ is an advanced web application delivery solution that provides a series of intelligent technologies that help overcome performance issues such as browser and web application platform inefficiencies and WAN latency. BIG-IP WebAccelerator offloads servers and decreases bandwidth usage, thus decreasing page download times and increasing user productivity. BIG-IP WebAccelerator is deployable in either asymmetric or symmetric configurations, and it is available as a product module on BIG-IP LTM or as a stand-alone device in a variety of configurations.



BIG-IP WAN Optimization Module

BIG-IP® WAN Optimization Module™ (WOM) is an add-on software module for BIG-IP LTM that overcomes the effects of latency, packet loss, and low bandwidth across the WAN to deliver fast and reliable performance for all users. By installing a BIG-IP WOM appliance at each end of a WAN link, file transfers and data replication can take place at nearly the speed of a wired LAN. BIG-IP WOM is appropriate for storage replication between data centers and disaster recovery sites.

BIG-IP Edge Gateway

BIG-IP Edge Gateway™ is a remote access solution that secures and accelerates applications for validated users around the globe. With BIG-IP Edge Gateway, users get access to an organization's internal resources at accelerated speeds, while IT maintains control over access rights and privileges. With the optional BIG-IP Edge Client™, users can automatically log in to the VPN upon startup if their VPN and device logins are the same.

Features of BIG-IP LTM

BIG-IP LTM accelerates static web content and file transfers through TCP optimization, caching, and compression. BIG-IP LTM acceleration features include:

TCP optimization

TCP optimization is a state-of-the-art, highly optimized TCP stack that has been integrated into the F5 TMOS® architecture. It implements, and in some cases, improves many of the performance-enhancing RFCs related to TCP.

Because BIG-IP LTM is a full-proxy ADC, it terminates and processes communications originating from both the client and server. The processing performed by BIG-IP LTM can dramatically improve both client and server TCP performance, delivering up to a four-fold improvement in bandwidth efficiency with no modifications to clients, servers, applications, or network infrastructure.

HTTP compression

HTTP compression uses the standard GZIP algorithm to reduce the size of HTML text in HTTP websites. The standard BIG-IP LTM product includes support for 5 Mbps of compression, with higher compression throughput optionally available based upon



model and options chosen. Compression is performed in dedicated hardware or in software, depending on the BIG-IP LTM model.

HTTP caching

HTTP caching stores commonly requested static objects in memory, which reduces requests to servers and therefore reduces server loads. BIG-IP LTM can dedicate up to 50 percent of memory to caching, yielding a maximum of 2 GB for the cache, which is more than enough for most static websites.

OneConnect

F5 OneConnect™ aggregates server-side HTTP connections. It is also known as TCP multiplexing or connection pooling. BIG-IP LTM does not affect client connections; rather it uses OneConnect to aggregate multiple client-side connections to as few as one TCP server connection.

Hardware-assisted SSL offloading

SSL acceleration offloads server-side SSL processing to increase both server and application performance. Computationally intensive SSL setup, re-keying, encryption, and decryption are offloaded to reduce server processor utilization by up to 50 percent. SSL acceleration consolidates private key creation and storage, SSL certificate management, and FIPS SSL support on key sizes up to 2048 bits.

Features of BIG-IP WebAccelerator

BIG-IP WebAccelerator accelerates web application delivery traffic, specifically and exclusively HTTP and HTTPS. BIG-IP WebAccelerator extends BIG-IP LTM capabilities by improving web application behavior transparently, through a deep understanding of the HTTP protocol and subsequent manipulation of the data that is sent between the client and server. BIG-IP WebAccelerator can be deployed asymmetrically for use by a geographically disparate group of users or symmetrically for a point solution at a remote office or data center.

Asymmetric acceleration is a cost-effective solution for providing the benefits of acceleration to the majority of web-application users. This unique feature is



important because web acceleration typically involves a high number of short transactions that gain little or no benefit from generic WAN acceleration.

Deploying a single BIG-IP WebAccelerator device asymmetrically from a central office is often the best first step toward achieving immediate and significant performance improvements at a modest cost. A side benefit to asymmetric deployment is that other, non-web-based applications that share the WAN link from a branch office to a central site will experience more available bandwidth.

BIG-IP WebAccelerator features are grouped into two main categories: Dynamic Data Offload and Dynamic Content Control.

Dynamic Data Offload

Dynamic Data Offload acts on communication between the BIG-IP WebAccelerator and a server. It provides caching and compression, and optimizes issues with the HTTP protocol to reduce server processing and offload some server communications. Features include:

Dynamic caching

Dynamic caching caches data that may seem dynamic but is actually static data or data that changes in an identifiable pattern (including query parameters, cookies, or session IDs). By fully inspecting every aspect of HTTP requests, controlling caching behavior, and invalidating cached data, BIG-IP WebAccelerator caches a high percentage of data from dynamic web applications while maintaining proper application behavior. Dynamic caching works with any browser. It requires no browser modification or special client software.

Dynamic caching is valuable in situations where user authentication is required, for example, when access is controlled by NTLM authentication, or with applications like Microsoft Office SharePoint Server or Outlook Web Access. In this case, BIG-IP WebAccelerator uses Unique Content Identifiers (UCIs) to ensure that sensitive data is delivered only to the appropriate user.

In addition to memory-based caching, BIG-IP WebAccelerator offers a disk cache of 60 GB on the add-on module for BIG-IP LTM and 120 GB on the BIG-IP WebAccelerator 4500 appliance.



Dynamic compression

Dynamic compression applies to dynamic data from web applications and ensures that compression is used only when it will improve performance. Dynamic compression is different from standard compression implementations because of its high efficiency and its ability to avoid widespread browser compression bugs. Even dynamic content requiring unique session IDs within every link on the page can be delivered and compressed, often with zero compression overhead.

HTTP optimizations maintain high user performance levels by optimally tuning each HTTP session. For example, because BIG-IP WebAccelerator proxies connections and caches content, it can note when there is no change to an object and return a 304 status code in response to a client request, even in conditions where the web application is hard-coded to re-send the object. In addition, when BIG-IP WebAccelerator caches objects, it can respond directly to a client rather than requesting the object from a server. Further, optimizations for the Microsoft NTLM authentication protocol can enhance access to protected resources.

Dynamic Content Control

Dynamic Content Control performs browser-side optimizations that eliminate unnecessary object downloads, enable extra client-side connections to a server, and speed viewing of PDF files being downloaded. Features include:

Intelligent Browser Referencing

Intelligent Browser Referencing (IBR) ensures that the browser only downloads truly dynamic and unique content by eliminating the download of repetitive data or browser-conditional requests for static data that is incorrectly considered dynamic.

Web applications require a browser to check whether a particular object has changed since it was last downloaded, even though the content might be static or it might already reside in the browser's cache. Dynamic Content Control is an extremely powerful tool that can remedy this problem by eliminating the need for costly web application re-programming. IBR requires no changes to browsers—it works with default browser settings.

MultiConnect

With MultiConnect, browsers can open more simultaneous connections between the browser and BIG-IP WebAccelerator to increase parallel data transfers for



browsers that limit concurrent server connections. For example, Microsoft Internet Explorer versions prior to IE7 limit concurrent server connections to two. MultiConnect enables the client to surpass this limit with more simultaneous browser connections, making it especially effective with low latency or low bandwidth network connections.

Dynamic Linearization

Dynamic Linearization eliminates the long delay that users often experience when waiting for a PDF file to display. This feature enables users to display the initial page of a PDF file or jump to and view other pages as the file is downloading.

No other web acceleration device offers customers the option to deploy the product asymmetrically or symmetrically, or both in combination. An asymmetric BIG-IP WebAccelerator deployment enables all users to benefit from web content acceleration. A symmetric deployment enables web content to be served locally within a regional or branch office and to remote users who connect through the regional office. Both individuals and users in smaller branch offices can benefit from increased performance when they access applications through the regional office.

No client software or modification is required for either asymmetric or symmetric BIG-IP WebAccelerator deployments.

Features of BIG-IP WAN Optimization Module (WOM)

BIG-IP WOM accelerates TCP traffic between two sites, including protocols such as CIFS, FTP, and SRDF. Like BIG-IP WebAccelerator, BIG-IP WOM also builds on BIG-IP LTM capabilities to deliver protocol optimization over WAN links. BIG-IP WOM is deployed in a symmetric configuration. Product features include:

- **BIG-IP WOM TCP offload:** By proxying connections at the remote office, BIG-IP WOM mitigates the effects of TCP connection latency and aggregates connections between BIG-IP WOM devices.
- **Third-party replication support:** With a large and growing pool of replication vendors supported, F5 solutions can fit almost any need, from moving live virtual machines between data centers to replicating your file system over the WAN.



- **SSL-encrypted WAN communication:** BIG-IP WOM encrypts WAN-side communication to ensure that traffic is secured while passing over public networks.
- **Symmetric Data Deduplication:** BIG-IP WOM reduces the volume of data transmitted over a WAN connection by sending tokens in place of repeat data, reconstituting the exact original data at the destination.
- **Symmetric Adaptive Compression:** BIG-IP WOM uses advanced compression algorithms to reduce the volume of data transferred over your WAN connection.

Symmetric Adaptive Compression (SAC) performs payload-level compression. SAC chooses among multiple scenario-optimized compression algorithms to compress data. It can be used alone to compress data when transactions are short and the added overhead from examining the data stream and sending data dictionary entries negates the benefits of using Symmetric Data Deduplication. It can also be completely overridden for objects or protocols that do not benefit from compression, such as graphics files or streaming media. Secondly, SAC can be used to compress dictionary entries between BIG-IP WOM devices.

Symmetric Data Deduplication (SDD) enables BIG-IP WOM to avoid sending previously transmitted data. Each BIG-IP WOM device maintains a session-level data dictionary that performs highly efficient byte-level caching. When a local BIG-IP WOM observes duplicate data in the packet stream, it sends a dictionary pointer that references data in the remote dictionary rather than sending the original data stream. For example, if the phrase “F5 Networks” is sent repeatedly, a dictionary entry can be sent instead of the text for all instances after the first instance. Because BIG-IP WOM is byte-based, it can compress to the exact length of compressible data, even across packet boundaries. SDD is most useful when transmitting files with repetitive data or when files are accessed repeatedly.

Features of BIG-IP Edge Gateway

Edge Gateway is groundbreaking in its approach to authenticated user access and performance across the WAN. It incorporates security, web acceleration, and WAN optimization into a single device and then adds advanced functionality. By allowing users to connect to the VPN from any of a variety of client devices and integrate with Microsoft ActiveSync, BIG-IP Edge Gateway gets the data and applications into the data center and therefore into the hands of field employees quickly and securely.

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Features of BIG-IP LTM, BIG-IP WebAccelerator, and BIG-IP WOM are bundled into BIG-IP Edge Gateway to make a unique acceleration solution to support a mobile workforce. From speeding CIFS access to files to caching commonly downloaded objects on web pages, Edge Gateway will improve the user experience for any remote employee.

Adding security functionality like integration with Oracle Access Manager, AAA server integration for all of the major products, a Visual Policy Editor to make rights administration easier, and caching of credentials creates a complete remote office solution.

Conclusion

F5's unique and compelling acceleration offerings can help overcome challenges to delivering superior application performance, whether they are accessed over a LAN or WAN. F5's acceleration offerings increase overall bandwidth utilization while reducing unnecessary data transmission, shortening response times, and increasing user productivity and business agility. F5's leadership in Application Delivery Networking ensures your applications are secure, fast, and available.

F5 Networks, Inc. 401 Elliott Avenue West, Seattle, WA 98119 888-882-4447 www.f5.com

F5 Networks, Inc.
Corporate Headquarters
info@f5.com

F5 Networks
Asia-Pacific
apacinfo@f5.com

F5 Networks Ltd.
Europe/Middle-East/Africa
emeainfo@f5.com

F5 Networks
Japan K.K.
f5j-info@f5.com

