Optimize Application Delivery Across Your Globally Distributed Data Centers

Deploying multiple data centers helps protect your business from site outages and improves application performance. But to fully achieve these goals, organizations need an efficient way to monitor infrastructure and application health; to manage application and DNS volume spikes; and to control distributed infrastructures according to business needs.

F5® BIG-IP® Global Traffic Manager™ (GTM) provides a smarter way to respond to DNS queries than simple load balancing among data centers. BIG-IP GTM distributes user application requests based on business policies, data center and network conditions, user location, and application performance. BIG-IP GTM scales DNS responses geographically among devices to survive DDoS attacks or volume spikes, and ensures global application high availability. This gives you holistic control of your global traffic to ensure better application performance, less downtime, and simplified management.

**Key benefits**

**Ensure application availability and scale DNS performance 10x**
By ensuring that users are connected to the best site, BIG-IP GTM delivers strong multicenter application availability and dramatically scales DNS.

**Gain control and secure global application delivery**
Route users based on business, geolocation, application, and network requirements to gain flexibility and control, and ensure application availability during DDoS attacks or volume spikes.

**Improve application performance**
Send users to the site with the best application performance based on application and network conditions.

**Deploy flexibly and manage your network simply and efficiently**
BIG-IP GTM Virtual Edition (VE) delivers flexible global application management in virtual deployments. Multiple management tools give you complete visibility and control.
Globally Available Applications

Organizations rely on applications to stay competitive, so ensuring global availability is critical. BIG-IP GTM offers sophisticated health monitoring that supports a wide variety of application types, giving organizations the flexibility to adapt quickly and stay competitive.

Global load balancing

User experience suffers when organizations with distributed data centers are unable to allocate global traffic by routing the user to the best and closest data center based on specific business policies. Changing network and user conditions can overwhelm a data center during peak traffic times. BIG-IP GTM provides comprehensive, high-performance application management services that support evolving application requirements.

Dynamic ratio load balancing

BIG-IP GTM routes users to the best global resource based on comprehensive site and network metrics. For example, the quality of service (QoS) load balancing mode includes a hops coefficient, based on the number of hops between the client and the local DNS. Managers can use hop rate to send the user to the data center that requires the fewest hops, ensuring more rapid access. Dynamic Ratio load balancing mode solves the problem of “winner takes all” common to other global traffic management systems. Dynamic Ratio sends a portion of traffic to the best performing site, second best performing site, and so on—in proportion to the health and performance of network and server resources.

Wide area persistence

User connections can persist across applications and data centers and be automatically routed to the appropriate data center or server, based on application state. BIG-IP GTM synchronizes persistence information across all devices, ensuring that users are directed back to the same site regardless of their entry point. Finally, it propagates the desired persistence information to local DNS servers, reducing the required frequency of synchronizing back-end databases. Session integrity is always maintained, with no more broken sessions or lost or corrupted data. The result is improved application performance and more efficient use of your infrastructure.

Geographic load balancing

Determining the location of users is critical to ensuring they are connected to the best data center and served the right content. BIG-IP GTM includes an IP geolocation database from industry leader Quova to accurately identify exactly where a user is located. Each IP can be located at the continent, country, and state/province level to enable very granular traffic policies and improve application performance.

Custom topology mapping

BIG-IP GTM offers organizations deploying intranet applications the ability to set up custom topology mappings. By defining and saving custom region groupings, you can configure topology based on traffic distribution policies that match your internal infrastructure.

Infrastructure monitoring

BIG-IP GTM checks the health of the entire infrastructure, eliminating single points of failure and routing traffic away from poorly performing sites. By collecting performance and availability metrics from data centers, ISP connections, servers, caches, and user content, BIG-IP GTM ensures high availability and adequate capacity prior to directing traffic to a site.
Application health monitoring

Today’s sophisticated applications require intelligent health checks to determine availability. Instead of relying on a single health check, BIG-IP GTM aggregates multiple monitors so you can check the application state at multiple levels. This results in highest availability, improved reliability, and the elimination of false positives to reduce management overhead. BIG-IP GTM provides pre-defined, out-of-the-box health monitoring support for more than 18 different applications, including SAP, Oracle, LDAP, and mySQL. BIG-IP GTM performs targeted monitoring of these applications to accurately determine their health, reduce downtime, and improve user experience. It also allows you to group related objects so that if one application fails, other apps that depend on it will be marked out of service. This enables you to align and monitor application objects according to business logic and profitability, build scalable traffic distribution policies, and better manage application dependencies.

Disaster recovery/business continuity planning

In addition to performing comprehensive site availability checks, you can define the conditions for shifting all traffic to a backup data center, failing over an entire site, or controlling only the affected applications.

BIG-IP GTM ensures users are always connected to the best site (see illustration).

1. User queries local DNS to resolve domain, and local DNS queries BIG-IP GTM.
2. BIG-IP GTM uses metrics collected for each site and identifies the best server.
3. BIG-IP GTM responds to local DNS with IP address.
4. User is connected to site.
Unmatched DNS Performance

BIG-IP GTM delivers DNS performance that can handle even the busiest sites. This helps your organization provide the best quality of service for your users while eliminating poor application performance.

When sites have a volume spike in DNS query volumes due to legitimate requests or distributed denial of service (DDoS) attacks, BIG-IP GTM manages requests with DNS Express, dramatically increasing DNS performance 10× to quickly respond to all queries. DNS Express improves standard DNS server functions by offloading DNS functions as a secondary DNS server. BIG-IP GTM zone transfers DNS records from the authoritative DNS server and answers DNS queries—delivering exponential performance improvements that optimize DNS infrastructures, and scaling to protect against DDoS attacks.

Benefits and features of DNS Express include:
- High-speed response and DDoS attack protection with in-memory DNS
- Authoritative DNS serving out of RAM
- Configuration size for tens of millions of records
- Scalable DNS performance
- Consolidate DNS servers

Secure Applications

DNS denial-of-service attacks, cache poisoning, and DNS hijacking threaten the availability and security of your applications. BIG-IP GTM protects against DNS attacks and enables you to create policies that provide an added layer of protection for your applications and data.

Hardened device

BIG-IP GTM is designed to resist common attacks by thwarting teardrop attacks, by protecting itself and servers from ICMP attacks, and by not running SMTPd, FTPd, Telnetd, or any other attackable daemons.

Handles DNS attacks

The unmatched performance of DNS Express in BIG-IP GTM can tolerate high levels of DNS attacks—up to 10× standard queries responses—protecting your organization while still maintaining maximum and continuous availability for applications and services.

DNS load balancing

BIG-IP GTM can be used to front-end a pool of static DNS servers. If the DNS request is for a name controlled by BIG-IP GTM, BIG-IP GTM will answer the request. If not, BIG-IP GTM can load balance the request to a pool of DNS servers, providing very high DNS query performance for static DNS.

Security control

Administrators can strengthen site security and diffuse attacks before they start with BIG-IP GTM. iRules can help you create policies that block DNS requests from rogue sites or known sources of attacks before they can do damage.
Packet filtering
BIG-IP GTM uses packet filtering to limit or deny access to and from websites based on monitoring the traffic source, destination, or port.

DNSSEC (option)
With the BIG-IP GTM DNSSEC option, you can digitally sign your DNS query responses. This enables the resolver to determine the authenticity of the response, preventing DNS hijacking and cache poisoning. These signed DNS responses can be used in conjunction with the BIG-IP GTM dynamic DNS system so you can get all the benefits of global server load balancing while also securing your infrastructure. Alternatively, you can use BIG-IP GTM in front of traditional DNS servers to easily deploy and load balance DNSSEC within your existing infrastructure.

Simple Management
Managing a distributed, multiple-site network from a single point is an enormous challenge. BIG-IP GTM provides tools that give you a global view of your infrastructure with the means to manage the network and add policies to ensure the highest availability for your business-critical applications.

Web-based user interface
BIG-IP GTM provides a simple way for your organization to manage its global infrastructure from a centralized location:
- Efficient list and object management for complete visibility of global resources
- Unique naming of global objects to reduce administration and build the infrastructure around business policies
- Sorting and searching for fast access to global objects
- Streamlined setup and object creation to reduce configuration times
- Enhanced management of distributed applications as part of one collective group
- Context-sensitive help for information on objects, commands, and configuration examples

Powerful command line interface
TMSH, a tree-based command line interface for BIG-IP GTM, has integrated search, context-sensitive help, and batch-mode transactions. By providing a shell that is simple to navigate and enabling you to script complex commands, TMSH can significantly reduce management time.

Automated setup and synchronization
Autosync automates setup and secure synchronization of multiple BIG-IP GTM devices. With Autosync, you can make configuration changes from any BIG-IP GTM device in the network, eliminating difficult hierarchical management common to DNS.

Configuration retrieval
AutoDiscovery enables BIG-IP GTM retrieve configurations from any number of distributed BIG-IP systems, removing the need to repeat configurations across devices.
Data center and sync groups

BIG-IP GTM enables you to create logical groups of network equipment to ensure the efficient use of monitoring and metrics collection. The result is a highly optimized solution that can support the Internet’s busiest sites by intelligently sharing the information with members in the logical group.

Distributed application management

Organizations often struggle to align their applications and infrastructure with their business goals and policies. BIG-IP GTM gives you the ability to define dependencies between application services and manage them as a group. With distributed application management, you can build scalable traffic distribution policies and improve efficiency with granular control of data center objects.

iRules

Using F5’s event-driven iRules®, you can customize the dynamic distribution of global traffic. BIG-IP GTM looks deep inside DNS messages to distribute application traffic to the desired data center, pool, or virtual server. This capability reduces latency, increases protection against malicious attacks, and improves application performance. Because iRules is based on an easy-to-use, TCL-based scripting language, administrative costs are nominal.

ZoneRunner

ZoneRunner™ is an integrated zone file management tool that simplifies DNS zone file management and reduces the risk of misconfiguration. It provides a secure environment in which to manage your DNS infrastructure while validating and error-checking zone files. Built on the latest version of BIND, ZoneRunner provides:

• Auto population of commonly used protocols
• Validation/error checking for zone file entries
• Rollback for the last transaction
• Command line versions of zone management
• Zone importation from an external server or a file
• Automatic reverse lookups
• Easy creation, editing, and searching of all records

F5 Enterprise Manager

Enterprise Manager™ can help you significantly reduce the cost and complexity of managing multiple F5 devices. You gain a single-pane view of your entire application delivery infrastructure and the tools you need to reduce deployment times, eliminate redundant tasks, and efficiently scale your infrastructure to meet your business needs.
Network Integration

BIG-IP GTM is designed to fit into your current network and into your plans for the future.

SNMP management application support

BIG-IP GTM integrates its MIBs and an SNMP agent with DNS. This enables SNMP management applications to read statistical data about the current performance of BIG-IP GTM. SNMP management packages have an exact view of what BIG-IP GTM is doing, while keeping an eye on standard DNS information.

Third-party integration

BIG-IP GTM communicates and integrates with a broad array of network devices. This includes support for various types of remote hosts, including SNMP agents: UCD, snmpd, Solstice Enterprise, and the NT/4.0 SNMP agent. BIG-IP GTM also talks to third-party caches, servers, routers, and load balancers to accurately diagnose the health of your network endpoints and provide a heterogeneous solution for global traffic management.

IPv4/IPv6 support

BIG-IP GTM supports next-generation IPv6 networks, resolving AAAA queries without requiring wholesale network and application upgrades.

As IPv6 adoption grows, BIG-IP GTM eases the transition to IPv6 by bridging the gap between IPv6/IPv4 DNS. The DNS translation between IPv6 and IPv4 networks is seamless as BIG-IP GTM provides DNS gateway and translation services for hybrid IPv6 and IPv4 solutions, and manages IPv6 and IPv4 DNS servers in DNS64 environments. For AAAA queries from clients, BIG-IP LTM configured with NAT64 transforms IPv6 to IPv4 for those IPv4-only environments. The response data is sent to the client from NAT64 using IPv6. BIG-IP GTM enables the customer to run pure internal IPv6 and maintain connectivity to IPv6/IPv4 Internet.

IP Anycast integration

BIG-IP GTM and IP Anycast integration increases DNS performance as more devices are added to support millions of DNS queries. DNS query volumes directed to one IP address, whether legitimate or during a denial of service (DoS) attack, are easily managed by distributing the load among multiple geographic BIG-IP GTM devices with an IP Anycast integration. Administrators scale DNS infrastructure up and out to manage DNS request load to one IP, increasing revenue by servicing more users and protecting brand with trustworthy query response.

Network managers realize these benefits:

- Improved user performance and reliability
- Reduced network latency for DNS transactions
- Fewer queries routed to distant servers
- Lower rates of dropped query packets, reducing DNS timeouts/retries
- Fewer congested routers
Global server load balancing in virtual and cloud environments

Easily spin up new deployments of global server load balancing with BIG-IP GTM Virtual Edition (VE) standalone or BIG-IP GTM running on BIG-IP LTM VE. Provide flexible global application availability by routing users to applications in data centers, managing Internet SaaS and outsourced applications, or directing users to the most available cloud applications.

Architecture

The advanced architecture of BIG-IP gives you total flexibility to control application delivery without creating traffic bottlenecks.

TMOS

At the heart of BIG-IP GTM is the F5 operating system, TMOS®, that provides a unified system for optimal application delivery, giving you total visibility, flexibility, and control across all services. TMOS empowers BIG-IP GTM to integrate with other F5 products and intelligently adapt to the diverse and evolving requirements of applications and networks.

Query Performance and Scalability

BIG-IP GTM query performance scales linearly on larger platforms and increases performance by integrating functions in TMOS.

BIG-IP GTM is provisionable for platforms that support Virtual Clustered Multiprocessing (vCMP).
BIG-IP GTM Platforms

BIG-IP Global Traffic Manager is available as a standalone appliance on the BIG-IP 1600, 3600, 3900, 6900 FIPS, and 11050 platforms, and for BIG-IP GTM Virtual Edition. It is available as an add-on module for BIG-IP® Local Traffic Manager™ (LTM) on any BIG-IP platform, and for BIG-IP LTM Virtual Edition. For detailed specifications, refer to the BIG-IP System Hardware Datasheet.

System Requirements

BIG-IP LTM VE with GTM and GTM VE Standalone is compatible with these hypervisor products:

- VMware vSphere Hypervisor 4.0 and 4.1
- Microsoft Hyper-V for Windows Server 2008 R2
- Citrix XenServer 5.6

The virtual machine guest environment for BIG-IP VE must include these characteristics:

- 2 virtual CPUs
- 2 GB RAM
- 3 virtual network adapters
- One 40 GB LSI logic disk
**F5 Services**

F5 Services offers world-class support, training, and consulting to help you get the most from your F5 investment. Whether it’s providing fast answers to questions, training internal teams, or handling entire implementations from design to deployment, F5 Services can help you achieve IT agility. For more information about F5 Services, contact consulting@f5.com or visit f5.com/services.

**More Information**

To learn more about BIG-IP GTM, use the search function on f5.com to find these and other resources.

**Datasheet**

BIG-IP System Hardware Datasheet

**White papers**

Distributing Applications for Disaster Planning and Availability

DNSSEC: The Antidote to DNS Cache Poisoning and Other DNS Attacks

F5 and Infoblox DNS Integrated Architecture: Offering a Complete Scalable, Secure DNS Solution

**Case study**

SaaS Provider RelayHealth Delivers Innovative Healthcare Applications with F5 Solutions