DEPLOYMENT GUIDE

Brocade Virtual Traffic Manager and Microsoft Exchange 2016 Deployment Guide

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Preface

About This Guide

The *Brocade Virtual Traffic Manager and Microsoft Exchange 2016 Deployment Guide* describes how to configure Brocade Virtual Traffic Manager (Brocade vTM) to load-balance and optimize Microsoft Exchange 2016 Client Access Servers (CASs). This deployment guide is designed to be used together with the Brocade vTM documentation.

For more details on the Brocade vADC product family, see http://www.brocade.com/vADC.

Audience

This guide is written for network administrators, Microsoft Exchange administrators, and developer operations (DevOps) professionals who are familiar with administering and managing both application delivery controllers (ADCs) and Microsoft Exchange network protocols including HTTP, SMTP, POP, and IMAP. You should also be familiar with installing and configuring a virtual appliance in a virtual VMware, Hyper-V, or dedicated Linux environment.

About Brocade

Brocade® (NASDAQ: BRCD) networking solutions help the world's leading organizations transition smoothly to a world where applications and information reside anywhere. This vision is designed to deliver key business benefits such as unmatched simplicity, non-stop networking, application optimization, and investment protection.

Innovative Ethernet and storage networking solutions for data center, campus, and service provider networks help reduce complexity and cost while enabling virtualization and cloud computing to increase business agility.

To help ensure a complete solution, Brocade partners with world-class IT companies and provides comprehensive education, support, and professional services offerings (www.brocade.com).

Contacting Brocade

This section describes how to contact departments within Brocade.

Internet

You can learn about Brocade products through the company website: http://www.brocade.com.

Technical Support

If you have problems installing, using, or replacing Brocade products, contact Brocade Support or your channel partner who provides support. To contact Brocade Support, see http://www.brocade.com/en/support.html.

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Brocade Global Services has the expertise to help organizations build scalable and efficient cloud infrastructures. Leveraging 15 years of expertise in storage, networking, and virtualization, Brocade Global Services delivers world-class professional services, technical support, and education services, enabling organizations to maximize their Brocade investments, accelerate new technology deployments, and optimize the performance of networking infrastructures.

Document History

Date	Part Number	Description
December 2016	53-1004941-01	Initial release.
February 2017	53-1004941-02	Added Brocade vWAF and Web Accelerator content.

Solution Overview

This chapter describes how Brocade Virtual Traffic Manager provides advanced load balancing and application delivery controller features for Microsoft Exchange 2016; the factors that you need to consider when designing your Virtual Traffic Manager deployment; and how and when to implement the most commonly used features.

Brocade Virtual Traffic Manager Overview

Brocade Virtual Traffic Manager (Brocade vTM) is a software-based application delivery controller (ADC) designed to deliver faster and more reliable access to public websites and private applications. Brocade vTM frees applications from the constraints of legacy, proprietary, hardware-based load balancers, which enables them to run in any physical, virtual, or cloud environment. With vADC products from Brocade, organizations can:

- Make applications more reliable with local and global load balancing.
- Scale application servers by up to 3x by offloading TCP and SSL connection overhead.
- Accelerate applications by up to 4x by using web content optimization (WCO).
- Secure applications from the latest application attacks, including SQL injection, XSS, CSRF, and more.
- Control applications effectively with built-in application intelligence and a full-featured scripting engine.

Virtual Traffic Manager offers much more than basic load balancing. It controls and optimizes end-user services by inspecting, transforming, prioritizing, and routing application traffic. The powerful TrafficScript® engine facilitates the implementation of traffic management policies that are unique to an application by allowing organizations to build custom functionality or to leverage existing features in Virtual Traffic Manager in a specialized way. With vTM, organizations can deliver the following:

- **Performance**—Improve application performance for users by offloading encryption and compression from the web server by dynamic caching and reducing the number of TCP sessions on the application.
- **Reliability and Scalability**—Increase application reliability by load-balancing traffic across web and application servers, balancing load across multiple data centers (private or public clouds), monitoring the response time of servers in real-time to decide the fastest way to deliver a service, protecting against traffic surges, and managing the bandwidth and rate of requests used by different classes of traffic.
- **Advanced Scripting and Application Intelligence**—Manage application delivery more easily with fine-grained control of users and services using TrafficScript, an easy-to-use scripting language that can parse any user transaction and take specific, real-time action based on the user, application, request, or more. Development teams use TrafficScript to enable a point of control in distributed applications, whereas operations teams use it to quickly respond to changing business requirements or problems within an application before developers can fix it.
- **Application Acceleration**—Dramatically accelerate web-based applications and websites in real-time with optional web content optimization (WCO) functionality. It dynamically groups activities for fewer long-distance round trips, resamples and sprites images to reduce bandwidth, and minifies and compresses JavaScript and combines style sheets to give the best possible response time for loading a web page on any browser or device.
- **Application-Layer Security**—Enhance application security by filtering out errors in web requests and protecting against external threats, with the option of a comprehensive Layer 7 firewall to defend against deliberate attacks.

What's New in Microsoft Exchange 2016

Today, CPU horsepower is significantly less expensive and is no longer a constraining factor. With that constraint lifted, the primary design goal for Exchange 2016 is for simplicity of scale, hardware utilization, and failure isolation. With Exchange 2016, we reduced the number of server roles to two: the Mailbox and Edge Transport server roles.

The Mailbox server in Exchange 2016 includes all of the server components from the Exchange 2013 Mailbox and Client Access server roles:

- Client Access services provide authentication, limited redirection, and proxy services. Client Access services do not do any data rendering and offer all the usual client access protocols: HTTP, POP and IMAP, and SMTP.
- Mailbox services include all the traditional server components found in the Exchange 2013 Mailbox server role: the backend client access protocols, Transport service, Mailbox databases, and Unified Messaging. The Mailbox server handles all activity for the active mailboxes on that server.

The Edge Transport role is typically deployed in your perimeter network, outside your internal Active Directory forest, and is designed to minimize the attack surface of your Exchange deployment. By handling all Internet-facing mail flow, it also adds additional layers of message protection and security against viruses and spam, and can apply mail flow rules (also known as transport rules) to control message flow.

For a complete list of new features and changes in Exchange 2016, refer to the Microsoft TechNet links below:

- What's discontinued in Exchange 2016: https://technet.microsoft.com/en-us/library/jj619283.
- Architectural changes in load balancing for Exchange Server 2016: https://blogs.technet.microsoft.com/exchange/2015/10/08/load-balancing-in-exchange-2016/.

Why Brocade vTM to Load-Balance and Optimize Microsoft Exchange 2016

Brocade Virtual Traffic Manager has significant advantages over other ADCs for load-balancing and optimizing Microsoft Exchange 2016.

Application-Centric View

- Ability to deploy a separate ADC per application or tenant
- Ability to dynamically right-size the Brocade virtual deployment to fit the application needs
- Dynamic provisioning and scaling of ADC resources

Designed with Service Providers in Mind

- 64-bit software that can be deployed in a VMware or Hyper-V environment or as a dedicated software installation, instead of a physical appliance
- Multicore packet processing for scalability
- Robust APIs for simple automated provisioning and management

Designed for Services

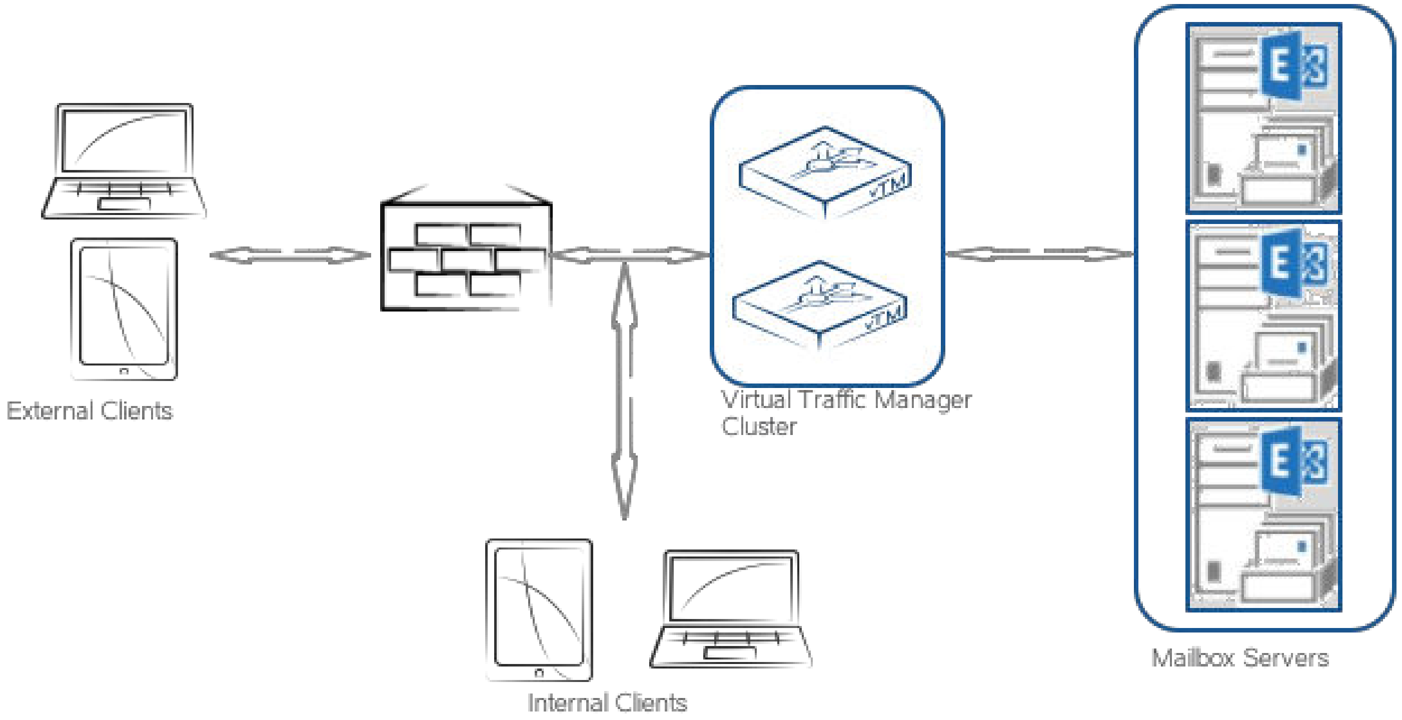
- Global load balancing, SSL offload, caching, and service-level management

- Application firewalling and web content optimization
- Robust and open APIs

Microsoft Exchange 2016 Architecture

Brocade Virtual Traffic Manager is a straightforward deployment to an existing network infrastructure with little to no changes required on the network. The Brocade Virtual Traffic Manager can be deployed to provide support for both internal and external clients. DNS configuration is used to redirect traffic for internal and external clients to Brocade Virtual Traffic Manager. Clustering of Brocade vTMs can be used to provide high availability and load balancing to support a large amount of traffic and fault tolerance.

FIGURE 1 Microsoft Exchange Server



Like Exchange 2013, Exchange 2016 does not require session affinity. For a given protocol session, the Client Access services located on the Mailbox server maintain a 1:1 relationship with the Mailbox server hosting the user's data. In the event that the active database copy is moved to a different Mailbox server, sessions always end up at the Mailbox server hosting the active database copy.

If the client leverages the HTTP(s) protocol, then the protocol used between Mailbox servers is HTTP(s). If the protocol leveraged by the client is IMAP or POP, then the protocol used between the Mailbox servers is IMAP or POP.

However, there is a concern with this architectural change. Since session affinity is not used by the load balancer, this means that the load balancer has no knowledge of the target URL or request content. All the load balancer uses is layer 4 information, the IP address and the protocol/port. For this reason, if a specific service on the Mailbox server is down, traffic is still sent to the server due to the lack of health check on a particular service.

Exchange 2016 includes a built-in monitoring solution, known as Managed Availability. Managed Availability includes an offline responder. When the offline responder is invoked, the affected protocol (or server) is removed from service. To ensure that load balancers do not route traffic to a Mailbox server that Managed Availability has marked as offline, load balancer health probes must be configured to check <virtual-directory>/healthcheck.htm. If the load balancer health probe receives a 200 status response, then the protocol is up; if the load balancer receives a different status code, then Managed Availability has marked that protocol instance down on the Mailbox server.

As a result, the load balancer should also consider that end point down and remove the Mailbox server from the applicable load balancing pool.

Based on the possibility of doing a health check specific to a service, Exchange 2016 HTTPS services can be load balanced using any one of the following deployment scenarios:

Deployment Type	Pros	Cons
Single Virtual Server - L4 (Optional and not covered in this guide)	Quick setup Consumes less resources on vTM	No health monitoring per Exchange HTTP service
Single Virtual Server - L7	Health monitoring per Exchange HTTP service Single external IP address and URL	Consumes more resources on vTM
Multiple Virtual Servers - L7	Isolated services with health monitoring	Uses more IP address space Complex configuration

Deploying Brocade Virtual Traffic Manager

This chapter describes the procedures for deploying Brocade Virtual Traffic Manager for load-balancing and optimizing Microsoft Exchange 2016 Mailbox Servers.

Requirements

- Brocade Virtual Traffic Manager (10.1 or later)
- Microsoft Exchange 2016

The following are the prerequisites for deploying Exchange 2016 with Brocade Virtual Traffic Manager.

Exchange 2016 Port Requirements

The following table describes the ports used by Exchange 2016.

MailBox Service Name	Protocol	TCP Port	Description
• Autodiscover service • Exchange ActiveSync • Exchange Web Services (EWS) • Offline address book (OAdistribution) • Outlook Anywhere (RPC over HTTP) • Outlook MAPI over HTTP • Outlook on the web	HTTPS	443	Encrypted web connections are used by clients and web services for the mentioned services.
• Internet calendar publishing • Outlook on the web (redirect to 443/TCP) • Autodiscover (fallback when 443/TCP isn't available)	HTTP	80	Wherever possible encrypted web connections on 443 must be used for protection but some services must be configured to use unencrypted web connections on port 80 to the client access services on Mailbox servers.
POP3 clients	POP3 / POP3s	110, 995	Post Office Protocol 3 is an email protocol that supports offline mail processing.
IMAP4	IMAP4 / IMAP4s	143, 993	Interactive Mail Access Protocol is an email protocol that supports offline and online mail processing.

Certificate Requirement

In Exchange 2016 Mailbox server, all communications are done through HTTPS. Data is encrypted using certificates. A client can be redirected to a different Mailbox server in a pool of servers that is different to the server that authenticated it originally. To avoid client to authenticate again against a different server and to ensure that data is decrypted correctly, use a certificate that is shared among the Mailbox servers and Brocade Virtual Traffic Manager (vTM).

A single certificate using Subject Alternative Name (SAN) extension can be used to support all services on a Mailbox server. If separate certificates are used for different services, ensure that those certificates are imported into all other Mailbox servers and vTMs as appropriate.

Brocade Virtual Traffic Manager Platform Support

Brocade Virtual Traffic Manager is available on different platforms such as Linux, Solaris, Hyper-V, and VMware; it can be installed as pure software or as a virtual appliance. The Brocade Virtual Traffic Manager is available for download at http://my.brocade.com.

Configuring a Single Virtual Server in L7 Mode

This approach uses a single IP address that is mapped to the FQDN of all Exchange HTTP services and uses multiple pools. The following are the detailed configuration steps on Traffic Manager to configure a single virtual server for all services.

This approach uses a single IP address that is mapped to the FQDN of all the Exchange HTTP services and uses multiple Pools for each service. Using a TrafficScript, Traffic Manager directs the traffic to its appropriate Pool, and each pool can be monitored separately.

This section contains step-by-step instructions on configuring Traffic Manager for Single Virtual Server for all Exchange HTTP services with Multiple Pools:

Component	Procedure	Description
Virtual Traffic Manager (once)	Creating a Traffic IP Group for each Exchange HTTP Service	A single traffic IP group must be created for all Exchange services. For details, see Creating Traffic IP Groups on page 13.
Virtual Traffic Manager (repeat for each service)	Creating a Pool for each Exchange HTTP Service	Enter the hostname or IP address of the node along with the TCP/UDP port. For details, see Creating Pools on page 14.
	Selecting a Monitor for the Pool	Select a health monitor for the pool. For details, see Creating Monitors on page 14.
Virtual Traffic Manager (once)	Creating a Virtual Server for each Exchange HTTP Service	Create and associate the virtual server to the server pool of choice and the traffic IP group to listen on. For details, see Creating Virtual Servers on page 15.
Virtual Traffic Manager (once)	Configuring SSL Decryption	Configure SSL decryption to enable SSL offloads. For details, see Configuring SSL Decryption on page 15.
Virtual Traffic Manager (once)	Creating and associating a Traffic Script that forwards the requests to appropriate pool with the virtual server	Configure a traffic script to forward requests to relevant pools. For details, see Creating and Associating a TrafficScript on page 16.

Creating Traffic IP Groups

Create a traffic IP group (also known as a virtual IP) for all services on which the virtual server will be listening.

1. Navigate to **Services** > **Traffic IP Groups** and scroll down to **Create a new Traffic IP Group**.
2. Fill in the fields as follows:
   - **Name**—A descriptive name for the Exchange HTTP Services (e.g. mail-lb.company.com)
   - **IP Addresses**—An IP address that is mapped to FQDN of all the Exchange HTTP services
3. Click the **Create Traffic Group** button.

Creating Pools

For each of the identified Exchange HTTP Services, create a pool using the following steps.

1. Navigate to **Services** > **Pools** and scroll down to **Create a new Pool**.
2. Fill in the fields as follows:
   - **Pool Name**—A descriptive name for the pool. (e.g., OWA Service)
   - **Nodes**—hostname:443 or ipaddress:443
   - **Monitor**—No Monitor (This will be covered in detail in a later section.)
3. Click **SSL Settings**.
4. Click the **Yes** button next to **ssl_encrypt**.
5. Click the **Update** button to apply changes.

   Repeat Steps 1 to 5 to create a pool for each Exchange HTTP Service.

Creating Monitors

This sections details the steps to create health monitors.

NOTE
Advanced external monitors can be written in any language of choice and be associated with the pool.

Create a health monitor to monitor the health of a pool.

1. Navigate to **Catalogs** > **Monitors**.
2. Scroll down to **Create new monitor**.
3. Give the new monitor a descriptive name.
4. Set the type to **HTTP monitor** and the scope to **Node**.
5. Click **Create Monitor** to create the monitor.
6. In the subsequent configuration page, scroll down and set **use_ssl** to **Yes**.
7. Change **host_header**: to the service URL path (e.g., owa.company.com).
8. Change **Path:** to **/<Path>/healthcheck.htm** (e.g., /OWA/healthcheck.htm).
9. Change **status_regex** to **^200$** .
10. Change **body_regex** to **.*200 OK**.
11. Scroll down to **Apply Changes** and click the **Update** button.
12. Navigate to **Services** > **Pools** and select the pool that the monitor will be attached to.
13. Scroll down and click **Health Monitoring**.

14. Add the appropriate health monitor.

    Repeat Steps 1 to 14 to create a health monitor for each Exchange HTTP Service Pool. Refer to the table below for the path that should be used for each service.

Service Name	Path
Outlook Anywhere (OA)	/rpc/healthcheck.htm
Autodiscover	/Autodiscover/healthcheck.htm
Exchange Web Service (EWS)	/EWS/healthcheck.htm
Exchange Admin Center (EAC)	/ECP/healthcheck.htm
Outlook on the Web (OWA)	/OWA/healthcheck.htm
Exchange ActiveSync (EAS)	/Microsoft-Server-ActiveSync/healthcheck.htm
Offline Address Book (OAB)	/OAB/healthcheck.htm
MAPI	/mapi/healthcheck.htm

Creating Virtual Servers

To handle all the Exchange traffic, create a virtual server using the following steps.

1. Navigate to **Services** > **Virtual Servers** and scroll down to **Create a new Virtual Server**.
2. Enter the following:
   - **Virtual Server Name**—A descriptive name for the virtual server
   - **Protocol**—HTTP
   - **Port**—443
   - **Default Traffic Pool**—The pool created for this service in the previous section
3. Click **Create Virtual Server**.
4. In the next screen, under **Listening on**, select **Traffic IP Groups** and check the appropriate traffic IP group that was created for Exchange traffic.
5. Set **Enabled** to **Yes**.
6. Click the **Update** button to apply the changes.

Configuring SSL Decryption

To perform SSL decryption, import the SAN certificate and the private key used for all services.

1. Navigate to **Catalogs** > **SSL** > **SSL Certificates catalog**.
2. Click **Import Certificate** to import the appropriate certificate.

   After importing the certificate, enable SSL decryption on the virtual server created.
3. Navigate to **Services** > **Virtual Servers** and select the virtual server created for Exchange HTTP Services that will be performing SSL decryption.
4. Scroll down and click **SSL Decryption**.
5. Set **ssl_decrypt** to **Yes**.
6. Select the certificate imported in Step 2.
7. Scroll down to the bottom of the page and click **Update**.

Creating and Associating a TrafficScript

Because a single virtual server is used for all Exchange 2016 HTTP services, incoming traffic must be forwarded to an appropriate pool. This can be done through TrafficScript in Brocade Virtual Traffic Manager.

To create a traffic script that can accept variables, perform the following steps.

1. Navigate to **System** > **Global Settings** > **Other Settings**.
2. Set **trafficscript!variable_pool_use** to **Yes**.
3. Scroll down to the bottom of the page and click the **Apply** button.
4. Navigate to **Catalogs** > **Rules**.
5. Create a new rule:
   - **Name**—A descriptive name for the rule (e.g. Exchange 2016 Single Traffic IP)
   - User Traffic Script Language
6. Click **Create Rule**.
7. Use the TrafficScript in Appendix on page 30 for syntax.
8. Click the **Update** button.
9. Navigate to **Services** > **Virtual Servers** and select the virtual server created for Exchange HTTP Services that will be performing the TrafficScript created.
10. Scroll down and click **Rules**.
11. Assign the TrafficScript to the request rules by clicking **Add Rule**.

Configuration Summary

By accessing the **Services** > **Config Summary** on the web GUI, a complete snapshot of all the configured services is provided. This is a very useful table to glance through to get a good understanding of how the services are configured.

Configuring Multiple Virtual Servers in L7 Mode

Deploying the Traffic Manager with multiple Virtual Servers requires provisioning an IP address for each virtual server created for every Exchange HTTP service. This approach provides health monitoring per HTTP service, and each virtual server can be managed independently from one another.

Component	Procedure	Description
Virtual Traffic Manager (repeat for each service)	Creating a Traffic IP Group for each Exchange HTTP Service	A traffic IP group must be created for each Exchange service. For details, see Creating Traffic IP Groups on page 17.
	Creating a Pool for each Exchange HTTP Service	Enter the hostname or IP address of the node along with the TCP/UDP port. For details, see Creating Pools on page 17.
	Selecting a Monitor for the Pool	Select a health monitor for the pool. For details, see Creating Monitors on page 17.
	Creating a Virtual Server for each Exchange HTTP Service	Create and associate the virtual server to the server pool of choice and the traffic IP Group to listen on. For details, see Creating Virtual Servers on page 18.

Component	Procedure	Description
	Configuring SSL Decryption	Configure SSL decryption to enable SSL offloads. For details, see Configuring SSL Decryption on page 19.

Creating Traffic IP Groups

Identify Exchange HTTP Services (as captured in the Exchange 2016 Port Requirements on page 12) offered by the Mailbox servers, and create a traffic IP group for each service.

Create a traffic IP group (also known as a virtual IP) on which the virtual server will be listening.

1. Navigate to **Services** > **Traffic IP Groups** and scroll down to **Create a new Traffic IP Group**.
2. Fill in the fields as follows:
   - **Name**—A descriptive name for the traffic IP group (e.g. owa.company.com)
   - **IP Addresses**—An IP address that will be associated to FQDN of this service
3. Click the **Create Traffic Group** button.

   Repeat Steps 1 to 3 for each Exchange Service that will be load balanced through Brocade Virtual Traffic Manager.

Creating Pools

For each of the identified Exchange HTTP Services, create a pool using the following steps.

1. Navigate to **Services** > **Pools** and scroll down to **Create a new Pool**.
2. Fill in the fields as follows:
   - **Pool Name**—A descriptive name for the pool. (e.g., OWA Service)
   - **Nodes**—hostname:443 or ipaddress:443
   - **Monitor**—No Monitor (This will be covered in detail in a later section.)
3. Click **SSL Settings**.
4. Click the **Yes** button next to **ssl_encrypt**.
5. Click the **Update** button to apply changes.

   Repeat Steps 1 to 5 to create a pool for each Exchange HTTP Service.

Creating Monitors

This sections details the steps to create health monitors.

> NOTE
> Advanced external monitors can be written in any language of choice and be associated with the pool.

Create a health monitor to monitor the health of a pool.

1. Navigate to **Catalogs** > **Monitors**.
2. Scroll down to **Create new monitor**.
3. Give the new monitor a descriptive name.
4. Set the type to **HTTP monitor** and the scope to **Node**.
5. Click **Create Monitor** to create the monitor.

6. In the subsequent configuration page, scroll down and set **use_ssl** to **Yes**.
7. Change **host_header**: to the service URL path (e.g., owa.company.com).
8. Change **Path:** to **/<Path>/healthcheck.htm** (e.g., /OWA/healthcheck.htm).
9. Change **status_regex** to **^200$** .
10. Change **body_regex** to **.*200 OK**.
11. Scroll down to **Apply Changes** and click the **Update** button.
12. Navigate to **Services** > **Pools** and select the pool that the monitor will be attached to.
13. Scroll down and click **Health Monitoring**.
14. Add the appropriate health monitor.

    Repeat Steps 1 to 14 to create a health monitor for each Exchange HTTP Service Pool. Refer to the table below for the path that should be used for each service.

Service Name	Path
Outlook Anywhere (OA)	/rpc/healthcheck.htm
Autodiscover	/Autodiscover/healthcheck.htm
Exchange Web Service (EWS)	/EWS/healthcheck.htm
Exchange Admin Center (EAC)	/ECP/healthcheck.htm
Outlook on the Web (OWA)	/OWA/healthcheck.htm
Exchange ActiveSync (EAS)	/Microsoft-Server-ActiveSync/healthcheck.htm
Offline Address Book (OAB)	/OAB/healthcheck.htm
MAPI	/mapi/healthcheck.htm

Creating Virtual Servers

For each of the identified Exchange HTTP Services, create a virtual server using the following steps.

1. Navigate to **Services** > **Virtual Servers** and scroll down to **Create a new Virtual Server**.
2. Enter the following:
   - **Virtual Server Name**—A descriptive name for the virtual server (e.g. owa.company.com)
   - **Protocol**—HTTP
   - **Port**—443
   - **Default Traffic Pool**—The pool created for this service in the previous section
3. Click **Create Virtual Server**.
4. In the next screen, under **Listening on**, select **Traffic IP Groups** and check the appropriate traffic IP group that was created for the service.
5. Set **Enabled** to **Yes**.
6. Click the **Update** button to apply the changes.

   Repeat Steps 1 to 6 to create a Virtual Server for each Exchange Service.

Configuring SSL Decryption

To perform SSL decryption, import the SAN certificate and the private key used for each service created.

1. Navigate to **Catalogs** > **SSL** > **SSL Certificates catalog**.
2. Click **Import Certificate** to import the appropriate certificate.

   After importing the certificate, enable SSL decryption on the virtual server created.
3. Navigate to **Services** > **Virtual Servers** and select the virtual server created for Exchange HTTP Services that will be performing SSL decryption.
4. Scroll down and click **SSL Decryption**.
5. Set **ssl_decrypt** to **Yes**.
6. Select the certificate imported in Step 2.
7. Scroll down to the bottom of the page and click **Update**.

   Repeat Steps 1 to 7 for each Exchange Service.

Configuration Summary

By accessing the **Services** > **Config Summary** on the web GUI, a complete snapshot of all the configured services is provided. This is a very useful table to glance through to get a good understanding of how the services are configured.

Configuring IMAP4 and POP3

The IMAP4 and POP3 services on Exchange 2016 enable mail clients that support the IMAP4 and POP3 protocols to access Exchange 2016 Mailbox servers running the IMAP4 and POP3 services. By default, these services are disabled in Exchange 2016. To support these protocols, IMAP4 and POP3 services must be enabled.

For more information about how to manage and configure POP3 and IMAP4 in Exchange 2016, see https://technet.microsoft.com/en-us/library/jj657728.

Component	Procedure	Description
Virtual Traffic Manager (once each for the POP3 and IMAP4 services)	Creating Traffic IP Group for Both POP3 and IMAP4 Services	A traffic IP group must be created on which a virtual server listens. For details, see Creating Traffic IP Groups on page 19.
	Creating a Pool for Both POP3 and IMAP4 Services	A pool needs to have a set of servers to load-balance. Enter the hostname or IP address of the node along with the TCP/UDP port. For details, see Creating Pools on page 20.
	Creating a Virtual Server for Both POP3 and IMAP4 Services	Create and associate the virtual server to the server pool. For details, see Creating Virtual Servers on page 20.
	Configuring SSL Decryption for Both POP3 and IMAP4 Services	Configure SSL decryption to enable SSL offloads. For details, see Configuring SSL Decryption on page 21.

Creating Traffic IP Groups

Create a traffic IP group (also known as a virtual IP) on which the virtual server will be listening.

1. Navigate to **Services** > **Traffic IP Groups** and scroll down to **Create a new Traffic IP Group**.

2. Enter the following:
    - **Name**—A descriptive name for the POP3 and IMAP4 pool, assuming that POP3 and IMAP4 FQDN resolves to the same traffic IP group (e.g., pop.company.com)
    - **IP Addresses**—An IP address that will be associated to the FQDN of the POP3 and IMAP4 service
3. Click the **Create Traffic Group** button.

Creating Pools

For each service managed by the Traffic Manager, create a pool using the following steps.

1. Navigate to **Services** > **Pools** and scroll down to **Create a new Pool**.
2. Fill in the fields as follows:
    - **Pool Name**—A descriptive name for the pool
    - **Nodes**—hostname:110 or ipaddress:110
    - **Monitor**—POP
3. Click the **Update** button to apply changes.

    Repeat Steps 1 to 3 to create a new pool for IMAP4 using **port 143** for the **Nodes**.

    For IMAP4, the health monitor should be a TCP transaction monitor. Follow the steps to create a new health monitor:
4. Navigate to **Catalogs** > **Monitors** and scroll down to **Create New Monitor**. Type a name and select **TCP Transaction Monitor**.
5. Use the following values for parameters:
    - close_string: **logout\r\n**
    - delay: **10**
    - response_regex: *** OK.***
    - timeout: **10**
6. Navigate to **Services** > **Pools** and under **Health Monitoring**, select the created monitor.

Creating Virtual Servers

To handle all the traffic, create a virtual server using the following steps.

1. Navigate to **Services** > **Virtual Servers** and scroll down to **Create a new Virtual Server**.
2. Enter the following:
    - **Virtual Server Name**—A descriptive name for the virtual server
    - **Protocol**—POP3
    - **Port**—995
    - **Default Traffic Pool**—The pool created for this service in the previous section
3. Click **Create Virtual Server**.
4. In the next screen, under **Listening on**, select **Traffic IP Groups** and check the appropriate traffic IP group that was created earlier.
5. Set **Enabled** to **Yes**.
6. Click the **Update** button to apply changes.

    Repeat Steps 1 to 6 to create a virtual server for IMAP4 using **Protocol**: IMAP4 and **Port**: 993.

Configuring SSL Decryption

To perform SSL decryption, import the certificate with the appropriate SAN.

1. Navigate to **Catalogs** > **SSL** > **SSL Certificates catalog**.
2. Click **Import Certificate** to import the appropriate certificate.

   After importing the certificate, enable SSL decryption on the virtual server created.
3. Navigate to **Services** > **Virtual Servers** and select the virtual server created for POP3 that will be performing SSL decryption.
4. Scroll down and click **SL Decryption**.
5. Set **ssl_decrypt** to **Yes**.
6. Select the certificate imported in Step 2.
7. Scroll down to the bottom of the page and click **Update**.

   Repeat Steps 1 to 7 to enable SSL decryption on the virtual server for IMAP4.

Configuration Summary

By accessing **Services** > **Config Summary** on the web GUI, a complete snapshot of all configured services is provided. This is a very useful table to glance through to get a good understanding of how the services are configured.

Additional Optional Functionality on Brocade Virtual Traffic Manager

Brocade Virtual Traffic Manager has additional capabilities beyond a legacy load balancer to enhance the performance and manageability of your Microsoft Exchange 2016 environment. Here are some common capabilities and best practices for deploying Brocade Virtual Traffic Manager to enhance your Microsoft Exchange 2016 deployment.

Service Level Monitoring

Service Level Monitoring continually checks the responses of your Mailbox servers and sends alerts should these fall below an expected threshold of performance. In addition to sending alerts, TrafficScript can be used to remove the service or server from the pool until the performance issue has been fixed. TrafficScript can also be used to reprioritize traffic and even reallocate bandwidth. This capability increases the availability and service level of Microsoft Exchange.

Configuring Traffic Manager for Service Level Monitoring of Exchange 2016 is outside the scope of this document. For more information, please contact Brocade.

Global Load Balancing

Global Load Balancing enables Client Access Servers to be distributed across multiple locations, for either business continuity/disaster recovery or for locating the servers geographically closer to end users. This enables seamless failover if a datacenter has an outage and greater performance for users distributed geographically.

Configuring Traffic Manager for Global Load Balancing is outside the scope of this document. For more information, please contact Brocade.

Digital Certificates and SSL

All communication between client and server is done through SSL. Brocade Virtual Traffic Manager can use certificates to decrypt incoming services such as POP3 and IMAP4. In addition, it provides SSL offloading for earlier versions of Exchange like Exchange 2010. To provide SSL decryption and offloading, the certificates should be imported into Brocade Virtual Traffic Manager.

Microsoft best practices recommend the use of trusted third-party SAN certificates that can represent multiple domain names, and Brocade recommends you follow these suggestions and best practices provided by Microsoft on TechNet:

https://technet.microsoft.com/en-us/library/dd351044(v=exchg.160).aspx

Redirecting OWA HTTP Requests to SSL

Brocade Virtual Traffic Manager can easily be configured to help clients accessing OWA through non-encrypted port 80 to be redirected automatically to connect on SSL.

This section contains step-by-step instructions for configuring Traffic Manager for Redirecting all HTTP requests to SSL:

- Create a virtual server with traffic pool set to discard
- Create a traffic script to redirect to proper SSL URL
- Associate the redirect TrafficScript to the virtual server

Creating a Virtual Server with Traffic Pool Set to Discard

Create a virtual server to handle all the OWA traffic using the following steps.

1. Enter the following:
   - **Virtual Server Name**—A descriptive name for the virtual server
   - **Protocol**—HTTP
   - **Port**—80
   - **Default Traffic Pool**—discard
2. Click **Create Virtual Server**.
3. In the next screen, set **Enabled** to **Yes**.
4. Click the **Update** button to apply changes.

Creating a Traffic Script to Redirect to Proper SSL URL

1. Navigate to **Catalogs** > **Rules**.
2. Create new rule:
   - **Name**—A descriptive name for the rule (e.g., OWA_Redirect_SSL)
   - User Traffic Script Language
3. Click **Create Rule**.
4. Use the TrafficScript in Appendix on page 30 for syntax.
5. Click the **Update** button.
6. Navigate to **Services** > **Virtual Servers** and select the virtual server that will be performing the TrafficScript created.
7. Scroll down and click **Rules**.
8. Assign the TrafficScript to the request rules by clicking **Add Rule**.

Configuring Clustering for Brocade Virtual Traffic Manager

To provide high availability and fault tolerance for Brocade Virtual Traffic Manager, they can be joined into a cluster and configured to load balance or act as active-passive mode for fault tolerance.

Use the following steps to join a Brocade Virtual Traffic Manager to an existing cluster.

1. Navigate to **System** > **Traffic Managers**.
2. Scroll down to **Add or Remove Traffic Managers** and click **Join a Cluster**.
3. Click **Next** on **Getting Started**.
4. Select the cluster to join and click **Next**.
5. Check the certificate used for the cluster, and provide Username and Password for the cluster, click **Next** to continue.
6. Select **Yes, and allow it to host Traffic IPs immediately** and click **Next**.
7. In the **Summary** page, click **Finish** to join the vTM to the cluster.

Web Accelerator and vWAF Functions

ATTENTION
Reach out to the Brocade support team for help on more advanced and customized configuration of the Web Accelerator and Web Application Firewall.

Web Accelerator

Web Accelerator is a Traffic Manager feature that is available in the Enterprise edition of the Brocade vTM. Web Accelerator enables vTM to perform a full range of optimization techniques on HTML pages including inspecting and modifying them. It also performs the following optimizations on the page resources as the client fetches them:

- Minification and compression of JavaScript files
- Minification and compression of style sheets
- Background images inlined or versioned
- Web fonts versioned
- Resampling of image content
- Compression of all resources

Full control over the above-mentioned individual optimization parameters is also possible with Web Accelerator. There are built-in Web Accelerator profiles available in the product with the Express profile being the most common one designed to match a wide range of applications. Other profiles for Microsoft SharePoint Applications are also available in the product.

For Microsoft Exchange, enable the Web Accelerator for the OWA service using the following procedure.

1. Click the virtual server on which Web Accelerator is to be enabled. Within that, click **Web Accelerator**.
2. In the **Basic Settings** section, enable the Web Accelerator functionality by selecting **yes** in the options for **aptimizer!enabled**.
3. Under **Catalogs > Web Accelerator > Application Scopes**, create a new application scope.
4. Enter any name for the application scope. This name will show up in the list of scopes to choose under the Virtual Server Web Accelerator Settings.
5. Under **hostnames**, enter the hostname for the HTTP service.
6. Keep the rest of the settings as defaults, and click **Create Application Scope**.
7. Under the virtual server settings for Web Accelerator, expand the **Web Accelerator Profiles** section, and select the newly created application scope.
8. To the right of the selected application scope, select **Web Accelerator Profile**. In this case, select **Express**.
9. Click **Update**.

Web Application Firewall

Brocade Virtual Web Application Firewall (Brocade vWAF) is a scalable security platform for off-the-shelf solutions and custom applications. It lets you apply business rules to online traffic, screening for attacks such as SQL injection and cross-site scripting (XSS), while securing outgoing traffic to help compliance with PCI-DSS and HIPAA. Brocade vWAF can be run as an add-on to the vTM to enable both load-balancing and application firewall services on a single instance.

Apart from custom rule configurations that are possible on the vWAF, there is a ruleset called baseline protection that protects applications from the most common application-layer attacks that exist today, such as the following:

- Path Traversal
- Shell Command Injection
- SQL Injection
- Code Injection
- Cross-Site Scripting (XSS)
- Common Attacks
- LDAP Injection
- Scanner
- XPATH Injection

The following procedure documents the configuration of the Brocade Virtual Web Application Firewall for baseline protection of the Microsoft Exchange application, specifically for the HTTP services.

1. On the vTM, navigate to **System > Application Firewall,** and click the **afm_enabled** radio button, followed by **Update** (ensure that the **Confirm** checkbox is checked).
2. Click the **Application Firewall** tab on the vTM.
3. Click **Administration**, and then select **Baseline Management**.
4. From this screen, either download the latest Virtual Web Application Firewall baseline signatures from Brocade Communities and click **Upload** or click the **Download from Server** option if your vTM+vWAF has Internet connectivity.
5. In the **Application Firewall** UI, click **Application Control** and select **Application Creation Wizard**.
6. Enter a name for the application, and click **Continue**.
7. Choose the detection mode that will enable the firewall rules to be applied to production traffic. Choose the protection mode for not affecting production traffic and whether you want to test the rules and check the logs for their accuracy. Click **Continue**.
8. In the **customer key** screen, leave the default, and click **Continue**.
9. In the **hostname** screen, enter the exact FQDN/IP address (typically, this is the TIP group address) by which users/clients will access the application. You can enter multiple values for one application simply by clicking **Add hostname** after adding one. Click **Continue**.
10. In the next screen, leave the default logging level to reduced logging unless there is a need to monitor the complete logs. Click **Continue**.
11. In the next screen, choose the option to enable full request logging and selecting the number of days for data retention. If indefinite, leave it to the default **0**. Click **Continue**.
12. In the next screen, choose to run the Baseline Protection wizard. Click **Continue** and then click **Finish**.
13. In the **Baseline Protection** wizard, click **Next** on the **Overview** screen.
14. Choose the baseline version to use. Click **Next**.
15. Leave the rest of the screens to their defaults, and, finally, click **Finish**.

16. Click the **Virtual Traffic Manager** tab to go back to the vTM UI.
17. Select the virtual server on which the vWAF service is to be enabled, and select **enabled** for the **Application Firewall** option, and click **Update**.

RPC over HTTP

By design, RPC over HTTP is not compatible with Brocade vWAF. However, we can prevent RPC traffic from going to the vWAF by using TrafficScript and checking for the URL path.

The following example TrafficScript checks for "rpc" in the URL path, whitelists the traffic, and bypasses the vWAF for such traffic.

```
if ( string.startswith($path, "/rpc/") ) {
   connection.data.set("enforcer.whitelist", 1);
}
```

Select the virtual server of interest, and add this TrafficScript rule to the Request rules. Make sure to place this TrafficScript rule ahead of the Enforcer rule such that it is executed before the Enforcer TrafficScript.

Common Troubleshooting Tips

This chapter describes tips for troubleshooting common deployment issues.

Uploading Certificates to Traffic Manager

When uploading certificates to Traffic Manager, these must be in PEM format. For your certificates that are not in PEM format, tools are available to convert CER (without a key) and PFX (with a key) formats to PEM format, such as OpenSSL. To upload a certificate used by an Exchange server, export the certificate once with a private key and once without a private key. Use the following commands to convert the certificate to PEM format.

Convert a DER File (.crt .cer .der) to PEM

```
openssl x509 -inform der -in <certificate filename>.cer -out certificate.pem
```

Convert a PKCS#12 File (.pfx .p12) Containing a Private Key and Certificates to PEM

```
openssl pkcs12 -in <certificate key filename>.pfx -out certificatekey.pem -nodes
```

Conclusion

This document discusses how to configure Brocade Virtual Traffic Manager to optimize the deployment of the Microsoft Exchange 2016 application. Traffic Manager is able to make intelligent load-balancing decisions and improve the performance, security, reliability, and integrity of the traffic in this environment. Refer to the product documentation on the Brocade Community Forums (http://community.brocade.com) for examples of how Brocade Virtual Traffic Manager can be deployed to meet a range of service hosting problems.

Appendix

Traffic Script Code to Configure Brocade Virtual Traffic Manager for a Single Virtual Server with Multiple Pools

The following Traffic Script code is used to direct incoming traffic to its corresponding pool.

```
#// TS Rule for Exchange 2016 for a Single VS with Multiple Pools
# Please declare the names of the pools you have configured, and ensure
# that the trafficscript!variable_pool_use Global setting is set to 'yes'

$owa_pool = "Exchange 2016 OWA";
$autodiscover_pool = "Exchange 2016 Autodiscover";
$ecp_pool = "Exchange 2016 ECP";
$ews_pool = "Exchange 2016 EWS";
$eas_pool = "Exchange 2016 EAS";
$oab_pool = "Exchange 2016 OAB";
$oa_pool = "Exchange 2016 OA";
$debug = 0; // Change value to 1 if debug needed

$path = http.getPath();
$pool = "";

#Exchange Autodiscover Pool
if( string.startsWithI( $path, "/autodiscover" ) ) {
    $pool = $autodiscover_pool;
    if ($debug > 0) { log.info("Auto Discover Pool Selected");}
}
#Exchange Control Panel Pool
else if( string.startsWithI( $path, "/ecp" ) ) {
    $pool = $ecp_pool;
    if ($debug > 0) { log.info(" Exchange Control Panel Pool Selected");}
}
# Exchange Web Services Pool
else if( string.startsWithI( $path, "/ews" ) ) {
    $pool = $ews_pool;
    if ($debug > 0) { log.info("Exchange Web Services Pool Selected");}
}
# Exchange Active Sync Pool
else if( $path == "/Microsoft-Server-ActiveSync" ) {
    $pool = $eas_pool;
    if ($debug > 0) { log.info("Exchange Active Sync Pool Selected");}
}
#Exchange Offline Address Book Pool
else if( string.startsWithI( $path, "/oab" ) ) {
    $pool = $oab_pool;
    if ($debug > 0) { log.info("Offline Address Book Pool Selected");}
}
#Exchange Outlook Anywhere Pool
else if( $path == "/rpc/rpcproxy.dll" ) {
    $pool = $oa_pool;
    if ($debug > 0) { log.info("Outlook Anywhere Pool Selected");}
}
#Exchange Outlook Web Access Pool
else {
    $pool = $owa_pool;
    if ($debug > 0) { log.info("Outlook Web Access Pool Selected");}
}
```

```
pool.select ( $pool );
```

Traffic Script Code to Redirect All HTTP Requests to HTTPS

The Traffic Script code below is used to redirect OWA HTTP requests to HTTPS. Similar script can be written for other services.

```
#// TS Rule for redirecting HTTP requests to HTTPS
# Exchange 2016 OWA Redirect SSL
# Redirect to OWA URL if user tried default website
$debug = 0; // Change value to 1 if debug needed

$hostheader = http.getHostHeader();
If (http.getPath() == “/”)
{
    http.redirect(https://.$hostheader.”/owa”);
         if ($debug > 0) { log.info("Redirected to OWA URL");}
}
```