WHAT IS HTTP ACCELERATION AND HOW TO CONFIGURE AND MANAGE IT ON JUNIPER NETWORKS WX SERIES APPLICATION ACCELERATION PLATFORMS
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Introduction

Juniper Networks® WX Series Application Acceleration Platforms have been providing acceleration, control, and visibility for a wide range of applications—such as email, enterprise applications, Web portals, etc.

In the WX Operating System 5.7, Juniper brings another milestone in HTTP application acceleration.

Scope

The goal of this Implementation Guide is to provide you with an understanding of the following:

- What is HTTP Acceleration and How It Works
- How to Configure HTTP Acceleration
- How to Monitor HTTP Acceleration
- How to Troubleshoot HTTP Acceleration

Design Considerations

HTTP acceleration in WXOS 5.7 is an important improvement of Juniper’s current methodology and is available on all Juniper Networks WX Series, WXC Series Application Acceleration Platforms, WX Stack, and WXC Stack products, and Integrated Services Module (ISM200) devices currently supported.

Note: For better scalability, Juniper recommends platforms with disks (WXC Series, WX Stack, and ISM200).

What is HTTP Acceleration and How It Works

What is HTTP Acceleration

The goal of HTTP acceleration is to provide to remote users the best response time when they access their Web applications such as the intranet, SharePoint, SAP, Oracle, PeopleSoft, etc.

How Does It Work - Basic

From the release WXOS 5.7, the WX Series Application Acceleration Platforms can act as a transparent forward proxy for HTTP clients. Traffic is accelerated by saving static objects in a memory-based or disk-based object cache, and serving those objects from the cache whenever possible.

Note: HTTP acceleration acts as a transparent forward proxy for HTTP traffic. HTTPS applications are optimized by SSL Optimization. For more details on SSL Optimization, refer to the SSL Implementation Guide: https://www.juniper.net/partners/partner_center/common/products/wx_a_kit/collateral/905016.pdf.
How Does It Work - Advanced

How Does the WX Series Detect If the Object Is Static or Not

Web servers always indicate in their responses if an object is static or not (in HTTP headers such as "Cache-Control" and "Pragma"). The WX Series Application Acceleration Platforms use this information to determine if the object received is cacheable or not.

Note: It's also possible to exclude specific objects from caching—see section "HTTP Acceleration Configuration - Advanced."

How Does the WX Series Detect If the Object Saved Is Still Fresh

Web servers can indicate in their responses how long a static object is fresh (in HTTP headers such as "Expire" and "max-age"). The WX Series Application Acceleration Platforms use this information to determine how long they can directly deliver the object to clients.

Web servers always indicate when an object has been last modified (in the HTTP header "Last-Modified"). If there is no information on how long an object can be saved, the WX Series Application Acceleration Platforms will examine this "Last-Modified" header. If the object has been modified recently, the WX Series won't directly deliver the object, but always validate its freshness on the Web server. If the object has not been modified for a very long time (months), the WX Series will directly deliver the object.

Note: In case the server doesn't indicate how long an object is fresh, the following algorithm is used: (Now – "Date-Object-Cached-in-WX") / ("Date-Object-Cached-in-WX" – "Last-Modified-Date") < 1

In all cases, after 24 hours the WX Series Application Acceleration Platforms will confirm that the object saved is still fresh. And this will be done even if the Web server indicated that the object could be cached for more than 24 hours.

How the WX Series Devices Enforce Caching

Web browsers revisiting sites don't always request the static objects. They may simply do conditional requests to confirm that the static objects they have already in their browser cache are still fresh (using the HTTP request header "If-Modified-Since").

In such cases, new WX Series Application Acceleration Platforms deployed in a branch won't have the opportunity to detect the objects in the Web server response and so won't have the opportunity to save them in their HTTP Proxy Cache. To avoid such cases, the WX Series devices modify the conditional requests to non-conditional requests. This is done by default on the following popular static objects:

- Cascading style sheets (.css)
- Static images (.gif and .jpeg)
- Java scripts (.js)
- Data Type Definition and Extensible Stylesheet Language files (.dtd and .xsl)

Note: This behavior can be disabled—see section "HTTP Acceleration Configuration - Advanced."
How Much Static Content Can Be Saved By the HTTP Acceleration

Each WX Series appliance has its own HTTP acceleration scalability, based on its RAM and disk capabilities.

### Table 1: WX Series and WXC Series HTTP scalability

<table>
<thead>
<tr>
<th>WX SERIES AND WXC SERIES PLATFORMS</th>
<th>HTTP OPT CACHE SIZE</th>
<th>MAX NUMBER OF OBJECTS</th>
<th>MAX OBJECT SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>WXc1800</td>
<td>8 GB</td>
<td>25,600</td>
<td>50 MB</td>
</tr>
<tr>
<td>WXc250</td>
<td>4 GB</td>
<td>25,600</td>
<td>50 MB</td>
</tr>
<tr>
<td>WXc2600</td>
<td>25 GB</td>
<td>25,600</td>
<td>50 MB</td>
</tr>
<tr>
<td>WXc500</td>
<td>25 GB</td>
<td>25,600</td>
<td>50 MB</td>
</tr>
<tr>
<td>WXc590</td>
<td>25 GB</td>
<td>25,600</td>
<td>50 MB</td>
</tr>
<tr>
<td>WXc3400</td>
<td>25 GB</td>
<td>25,600</td>
<td>50 MB</td>
</tr>
<tr>
<td>WXc Stack</td>
<td>25 GB x #WXc590</td>
<td>25,600 x #WXc590</td>
<td>50 MB x #WXc590</td>
</tr>
<tr>
<td>ISM200</td>
<td>12 GB</td>
<td>25,600</td>
<td>50 MB</td>
</tr>
<tr>
<td>WX15</td>
<td>2 MB</td>
<td>290</td>
<td>100 KB</td>
</tr>
<tr>
<td>WX20</td>
<td>4 MB</td>
<td>585</td>
<td>100 KB</td>
</tr>
<tr>
<td>WX50</td>
<td>4 MB</td>
<td>585</td>
<td>100 KB</td>
</tr>
<tr>
<td>WX60</td>
<td>4 MB</td>
<td>585</td>
<td>100 KB</td>
</tr>
<tr>
<td>WX100</td>
<td>4 MB</td>
<td>585</td>
<td>100 KB</td>
</tr>
<tr>
<td>WX Stack</td>
<td>4 MB x #WX60</td>
<td>585</td>
<td>100 KB x #WX60</td>
</tr>
</tbody>
</table>

**Note:** WX Series platforms (with no disk) have limited HTTP acceleration storage. Juniper recommends platforms with disks (WXC Series, WXC Stack, and ISM200) for HTTP acceleration.

## How To Configure HTTP Acceleration

### Pre-Validation

HTTP acceleration in WXOS 5.7 is an important improvement of Juniper Networks current methodology.

HTTP acceleration has to be enabled simply on the WX Series platform closest to the clients (WX-Branches). But remote WX Series devices (WX-Data Center) must have WXOS 5.6.4 (or later), WXOS 5.5.6 (or later 5.5.x), or WXOS 5.4.10 (or later 5.4.x).

Applications must be configured with HTTP type to get HTTP acceleration for them.

TCP acceleration must be enabled for applications on both WX Series devices (client and server side) to get HTTP acceleration for them.

Selected applications must also go through the WX tunnel to be accelerated.

So the requirements for HTTP optimization are:

**Requirements:**

- WX Series device closest to the clients (WX-Branches)
  - Minimum release WXOS 5.7
    - **Note:** When you upgrade from 5.x (prior to 5.7) to 5.7, the disks are formatted and the NSC dictionary is cleared.
  - Application type has to be HTTP
  - TCP Acceleration must be enabled for applications
  - Applications have to go in a WX tunnel
- Remote WX Series device (WX-Data Center)
  - Minimum release 5.6.4 (or later), WXOS 5.5.6 (or later 5.5.x), or WXOS 5.4.10 (or later 5.4.x)
  - TCP Acceleration must be enabled for applications
  - Applications have to go in a WX tunnel
HTTP Acceleration Configuration

On the WX Series device closest to the client (WX-Branches), enable HTTP acceleration for one or multiple applications.

**Note:** The applications displayed are the ones defined as HTTP type.

Under "Acceleration - Application Flow Acceleration – HTTP":

![HTTP Acceleration Configuration](image)

HTTP Acceleration Configuration - Advanced

**Disable Specific Objects from Caching**

By default, the WX Series Application Acceleration Platforms will cache all static objects.

For troubleshooting reasons, you can remove specific objects from caching. This is available via CLI:

```
WXC-Branch# config acceleration http excluded-object-types <add|remove> <type/subtype>
```

**Note:** You can find the list of objects types, such as text/html, text/css; application/x-javascript, on [http://www.iana.org/assignments/media-types/](http://www.iana.org/assignments/media-types/)

**Disable Caching Enforcement**

By default for some static objects (.js, .css, .gif, .jpg, .xsl, and .dtd), if the browser sends a conditional request for an object that is not in the object cache (using the HTTP request header "If-Modified-Since"), the condition is removed so that the server is forced to respond with the object, which is then saved in the HTTP cache.

For troubleshooting reasons, this behavior can be changed via CLI (on by default):

```
WXC-Branch# config acceleration http advanced-params forced-cache <on|off>
```

**Enable Web Server Compression**

Web servers may support HTTP compression. In such case, Web servers compress their responses if browser requests show they support Web compression (HTTP header “Accept-Encoding”).

Web server compression is far less effective than WX Series compression. By default the WX Series device sends Web requests with no compression support. This optimizes the compression on the WAN and off-loads the Web servers from compressing the responses.

For troubleshooting reasons, this behavior can be changed via CLI (on by default):

```
WXC-Branch# config acceleration http advanced-params disable-http-compression<on|off>
```

**Flush the HTTP Cache**

For testing or troubleshooting purposes, you can flush the WX Series HTTP Proxy Cache. This is available via CLI:

```
WXC-Branch# shell oyo purgeCache
```

**Flush HTTP Statistics**

For testing or troubleshooting purposes, you can flush the WX HTTP Cache. This is available via CLI:

```
WXC-Branch# shell oyo PnHttpResetStats
```
How To Monitor HTTP Acceleration

Multiple techniques are applied to HTTP traffic to provide the best response time to users, such as compression/caching and TCP Acceleration. This document focuses on HTTP acceleration monitoring. For more details on other techniques, see the User Guide (www.juniper.net/customers/csc/software/appaccel/wxseries/wxc2600/index.jsp). WX Series Application Acceleration Platforms provide different ways to monitor HTTP acceleration.

**Note:** These statistics are available on the WX Series device that is doing the HTTP acceleration—the WX Series device closest to the clients (WX-Branches).

**Global HTTP Acceleration Statistics**

The HTTP acceleration report shows the amount of time saved by HTTP acceleration.

```
<table>
<thead>
<tr>
<th>Transaction Type</th>
<th>Actual</th>
<th>w/o WX</th>
<th>Savings</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>All HTTP Transactions</td>
<td>34.61</td>
<td>56.90</td>
<td>62.29</td>
<td>64.9%</td>
</tr>
</tbody>
</table>
```

The report is available via WebUI under “Monitor – Acceleration – HTTP Acceleration.”
Advanced HTTP Acceleration Statistics

The WX Series Application Acceleration Platforms also provide advanced HTTP statistics, such as the number of requests received and directly replied by the WX Series devices.

These advanced statistics are globally available via CLI:

WXC-Branch# show acceleration application http status

HTTP Acceleration Stats

Method           GET    HEAD    POST    OTHERS

Hit:             615    N/A     N/A     N/A
Missed:          164    N/A     N/A     N/A
Total:           779    0       0       0

.js    .css    .gif    .jpg    .xsl    .dtd    Others    Total

Hit:         0      0      0      600   0     0       15     615
Missed:      0      0      0      160   0     0       4       164
Total:       0      0      0      760   0     0       19     779

Or advanced statistics for a specific flow are also available via WebUI under “Admin – Tools – Flow Diagnostics”: 
How To Troubleshoot HTTP Acceleration

If you don’t see any HTTP acceleration, check the requirement section (“Pre-Validation”).

Here is a list of common mistakes:

**Under the HTTP acceleration configuration page, you don’t see your application,**

On the WX Series device closest to the clients [WX-Branches], in WebUI under “Acceleration - Application Flow Acceleration – HTTP,” you see only the applications defined as HTTP type.

**Under the HTTP acceleration configuration page, your application is grey and can’t be selected,**

On the WX Series device closest to the clients [WX-Branches], in WebUI under “Acceleration - Application Flow Acceleration – HTTP,” applications defined as HTTP but without TCP acceleration enabled are displayed in grey and can’t be selected for HTTP acceleration.

**HTTP acceleration doesn’t run.**

There are multiple possibilities:

- The remote WX Series device [WX-Data Center] doesn’t have the minimum release. On the WX Series device closest to the clients [WX-Branches], in WebUI under “Admin – Tools – Flow Diagnostics” you’ll see the following:

  ![Application Acceleration Table](image)

  And clicking on the red x, you’ll see “Version Incompatible”:

  ![Version Incompatible](image)

- The WX Series device closest to the clients [WX-Branches] doesn’t have HTTP acceleration enabled for that application. On the WX Series device closest to the clients [WX-Branches], in WebUI under “Admin – Tools – Flow Diagnostics” you’ll see the following:

  ![Application Acceleration](image)

  Validate that the WX-Branch has HTTP acceleration enabled for that application.

**Note:** The application name can be found in the flow Diagnostic under “General Flow.”

- The traffic doesn’t go in a WX-tunnel. On the WX Series device closest to the clients [WX-Branches], in WebUI under “Admin – Tools – Flow Diagnostics” you’ll see the following:

  ![General Flow](image)
To have HTTP acceleration, the flow has to go in a WX-tunnel.

- The application is not a Web application. HTTP acceleration can run only on HTTP applications. If you try to accelerate non-Web applications, the WX Series device won’t apply HTTP acceleration. Other acceleration techniques will still apply, such as compression/caching, TCP Acceleration, and QoS. On the WX Series device closest to the clients (WX-Branches), in WebUI under “Admin – Tools – Flow Diagnostics” you’ll see the following:

And clicking on the red x, you’ll see “Soft Quit”:

HTTP acceleration runs, but no transactions are accelerated when I refresh pages on my browser.

Depending on your browser (and sometimes browser version), the refresh button has a different behavior. For some of them the WX Series device will accelerate the “refresh” transactions and for others the WX Series device will not. This has nothing to do with the WX Series Application Acceleration Platforms, but with the browser refresh request type.

- On Internet Explorer 5.5/6.0/7.0, the refresh button sends requests to determine if the page in its browser cache is up-to-date. Servers or HTTP proxies can reply to these requests. So with this browser, the WX Series device may accelerate a refresh request if the object is in its cache and still fresh.

**Note:** Internet Explorer can forbid proxies to reply with “CTRL + F5.”

- On Firefox 3.0, the refresh button sends requests to determine if the page in its browser cache is up-to-date too. But these requests forbid proxies to reply and only Web servers can reply. So with this browser, the WX Series device will not accelerate a refresh.

**Summary**

In WXOS 5.7, Juniper enhanced its HTTP application acceleration. This technical document describes how HTTP Acceleration works, and how to configure, manage and troubleshoot it.

**About Juniper Networks**

Juniper Networks, Inc. is the leader in high-performance networking. Juniper offers a high-performance network infrastructure that creates a responsive and trusted environment for accelerating the deployment of services and applications over a single network. This fuels high-performance businesses. Additional information can be found at www.juniper.net.