Application Note

Limitation of Riverbed’s Quality of Service (QoS)

Riverbed’s Quality of Service (QoS) configuration and limitations
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Introduction

The goal of this document is to explain the limitations of the Riverbed QoS and how only Juniper Networks WAN application acceleration platforms (WX application acceleration platforms) reply to end-customer quality of service (QoS) needs.

Scope

This AppNote is targeted for Juniper and partner SEs, especially in competitive deals against Riverbed.

Riverbed QoS Limitation

Riverbed implements QoS, as routers do. You define the local office WAN bandwidth and configure how much outgoing WAN guaranteed bandwidth you want for different applications. This design works well for routers, but is not suited for WAN optimization appliances. With such a technical approach, you can hardly provide per-remote office guaranteed bandwidth. Enterprises don’t want to guarantee X percent of their headquarters’ outgoing bandwidth for critical applications. What enterprises need is X percent of their remote offices’ incoming bandwidth for critical applications.

The following example will demonstrate the complexity of the Riverbed QoS implementation and how it applies to real customer needs.

Customer Example

This example is a classic enterprise QoS requirement.

You have two centralized critical applications’ FTP servers and file servers (they could be Siebel, SAP, Oracle and so on) and you want to guarantee 25 percent of your remote locations’ bandwidth for ftp and 10 percent for CIFS:

- Headquarters link: 10,000 Kbps (10 Mbps)
- 15 Remote sites: 1500 Kbps
- Goal: Allocate to each remote site
  - 25 percent of remote office bandwidth for FTP traffic
  - 10 percent of remote office bandwidth for CIFS traffic

Juniper WX Platform Configuration

You can configure the QoS via the Setup Wizard or manually.

The Setup Wizard does reply to a large number of requests. But this example requires a manual setup. Anyway, our manual setup is simple and easy.

The configuration steps for this QoS requirement are as follows:

1. Set up the Outbound QoS Endpoints for the WX platform in the Headquarters.
   Select: QoS – Templates.
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Technical Note: You don’t manually define the 15 locations (endpoints). They are automatically listed once the WX platform is registered to the registration server.

What you define is simply:

- The local max WAN link (Outbound Speed)
- The max WAN link to remote locations with no WX platform (Other traffic Circuit Speed)
- Each remote max WAN link (remote endpoint Circuit Speed)

2. Define the “ftp” class for the application FTP and CIFS.

3. Associate the application FTP to the class “ftp” and CIFS to the class “CIFS.”
   Select: QoS – Traffic Classes.

   **Technical Note:** The WX platform proposes 53 predefined applications (such as FTP and CIFS). There is obviously the ability to create your own applications if they are not prelisted. The applications can be defined with Layer 3 information (IP addresses) and/or Layer 4 information (TCP/UDP ports) and even Layer 7 information (HTTP URL or Citrix application name).

4. Define the Class Template “CompanyX-QoS” with 25 percent guaranteed for the class “ftp” and 10 percent for the class “CIFS.”

   **Technical Note:** Priority definition is optional. The excess bandwidth not guaranteed (in that case bandwidth above 35 percent) will be used in high-priority for ftp Traffic Class, then CIFS and at last for the default traffic class.

5. Select the Class Template to the different endpoints.
   Select: QoS – Overview.
Via the “Edit” button, select the template “CompanyX-QoS” for each remote location. In this example, the “Other traffic” (traffic with destination where there is no WX platform) remains without template, as we don’t want to guarantee bandwidth for it.

**Technical Note:** You can’t allocate in guaranteed bandwidth more than 80 percent of the WAN bandwidth.

In that example the WAN bandwidth is 10 Mbps => 8 Mbps as the max for the total guaranteed bandwidth. You can see via the WX WebUI how much you have already allocated by selecting the “Show bandwidth as: Kbps.”
**Technical Note:** And in case you try to overallocate, a warning message will prevent the configuration change.
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Riverbed-Steelhead Configuration

Riverbed has no concept of remote locations. So you can’t allocate a guaranteed bandwidth for a remote location.

Riverbed proposes a real complex workaround with limited scalability.

You have to create one QoS class with WAN guaranteed bandwidth per remote location/per application. And you have to apply the correct QoS class to each destination subnet.

This means with Riverbed, you have to manually do the following:

- Calculate how much local WAN bandwidth percentage is each remote location’s guaranteed bandwidth.
  
  **Note:** The Juniper WX platform detects each remote location WAN bandwidth. So you simply specify the percentage of remote location WAN bandwidth you want to guarantee.

- Gather each remote location’s subnets.
  
  **Note:** Each Juniper WX platform automatically detects other Juniper WX platforms’ local subnets. So there is no need to manually define the remote locations subnets

Create one QoS class per remote location and per application.

  **Note:** You simply create a single QoS template with the Juniper WX platform, whatever the number of remote locations and applications.

- Create a specific QoS rule per remote subnet and per application for each remote location.
  
  **Note:** You simply associate the QoS template to each remote location with the Juniper WX platform.

And in that specific basic example you have to create manually:

- 30 QoS classes!!!
  
  There are 15 remote locations and 2 applications (ftp and CIFS): 15 x 2 = 30 QoS classes
  
  **Note:** The Riverbed high-end platforms support only up to 200 QoS classes. So Riverbed can’t support more than 200 sites with 1 single application classified or 50 sites with 4 applications classified.

For information, that was one single QoS template created on the Juniper WX platform.

- 90 QoS rules!!!
  
  There are 15 remote locations, 3 local subnets per location and 2 applications (FTP and CIFS): 15 x 3 x 2 = 90 QoS classes
  
  **Note:** The Riverbed high-end platforms support only up to 600 QoS rules. So Riverbed can’t support more than 200 sites with 3 subnets and 1 single application classified or 50 sites with 3 subnets and 4 applications classified.

For information, the 15 remote locations were simply associated with the QoS template on the Juniper WX platform.
The configuration steps for Steelhead are as follows:

**Technical Note:** The screenshots are based on the Riverbed RiOS 4.1.

1. **Enable QoS and specify WAN bandwidth.**
   * Select: Setup – Advanced Networking - QoS Classification
   * The QoS classification feature allows you to prioritize both optimized and passthrough traffic going through this appliance.

   ![QoS Classification screenshot](image)

   - **General**
     - Enable QoS Classification
     - WAN Bandwidth for Interface wan0/0 = 10000 Kbps

   - **Technical Note:** Riverbed cannot determine the remote location bandwidth. So you have to manually calculate how much local bandwidth is 25 percent of the remote location bandwidth. In that case, 25 percent of 1.5 Mbps is 375 Kbps. And 375 Kbps is 3.75 percent of 10 Mbps.

2. **Create manually the 30 QoS classes: One for each remote location/application.**
   * Manually repeat this 15 times for each 15 remote locations.
   * Select: Setup – Advanced Networking - QoS Classification

   ![QoS Class table](image)

<table>
<thead>
<tr>
<th>QoS Class</th>
<th>Priority</th>
<th>Guaranteed BW%</th>
<th>Link Share Weight</th>
<th>Upper BW %</th>
<th>Connection Limit</th>
<th>Queue</th>
</tr>
</thead>
<tbody>
<tr>
<td>default</td>
<td>Normal</td>
<td>0.01</td>
<td>100.00</td>
<td>100.00</td>
<td>--</td>
<td>sfq</td>
</tr>
</tbody>
</table>

   - **Technical Note:** Riverbed cannot determine the remote location bandwidth. So you have to manually calculate how much local bandwidth is 25 percent of the remote location bandwidth. In that case, 25 percent of 1.5 Mbps is 375 Kbps. And 375 Kbps is 3.75 percent of 10 Mbps.
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Technical Note: Riverbed cannot determine the remote location bandwidth. So you have to manually calculate how much local bandwidth is 10 percent of the remote location bandwidth. In that case, 10 percent of 1.5 Mbps is 150 Kbps. And 150 Kbps is 1.5 percent of 10 Mbps.

So at the end of the 30 QoS classes that were manually configured, you have the following:

<table>
<thead>
<tr>
<th>QoS Class</th>
<th>Priority</th>
<th>Guaranteed BW %</th>
<th>Link Share Weight</th>
<th>Upper BW %</th>
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<tbody>
<tr>
<td>BrandOffice1-CIFS</td>
<td>Business Critical</td>
<td>1.50</td>
<td>100.00</td>
<td>150.00</td>
<td>--</td>
<td>sqq</td>
</tr>
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<td>Real-Time</td>
<td>3.75</td>
<td>100.00</td>
<td>150.00</td>
<td>--</td>
<td>sqq</td>
</tr>
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3. Create the port label for CIFS (TCP 139 + 445).

Riverbed doesn’t have predefined applications. QoS rules (see next point) are based on source and destination IP and ports. In the case of CIFS application, two TCP ports are used: 139 and 445. To avoid the creation of two QoS rules for each CIFS rule, you can create a port label for CIFS.

Select: Setup – Port Labels

4. Create manually the 90 QoS rules: One for each remote subnet/application

Manually repeat this 15 times for all 15 remote locations.

Select: Setup – Advanced Networking - QoS Classification
Those three QoS rules are for the application FTP.

**Note:** The three subnets in the branch office 1 are “1.1.1.0/24”, “1.1.2.0/24”, and “1.1.3.0/24.”
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Those three QoS rules are for the application CIFS.

**Note:** The three subnets in the branch office 1 are “1.1.0/24”, “1.1.2.0/24”, and “1.1.3.0/24.”
Summary

Even if both Juniper and Riverbed support QoS, this document explained how only Juniper can reply to QoS enterprise needs.

For more information about the Riverbed solution and the Juniper advantages, you can look at the latest Riverbed competitive information available on the partner site: https://www.juniper.net/partners/partner_center/content/reseller/products/wan_kit.jsp#comp.

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.