Access Link Monitoring

PacketShaper 11.10
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Contents

Access-Link Monitoring Overview ................................................................. 4
Access-Link Monitoring Requirements .......................................................... 5
MIB Variables Polled by the Access-Link Monitoring Feature ......................... 5

Configure a High Availability Topology for Access-Link Monitoring ............... 7
Define High Availability Access Routers ....................................................... 7
Define WAN Link Interfaces ........................................................................... 8
Enable Access-Link Monitoring .................................................................... 10
View the High Availability Configuration ..................................................... 12
Disable Access-Link Monitoring .................................................................... 13
Access-Link Monitoring Overview

Redundant network configurations typically involve some type of load-balancing or load-sharing scheme that determines how traffic is distributed across the available WAN links. In some configurations, the load-balancing scheme may be unable to enforce distribution of traffic so that each available WAN link is utilized 100 percent, nor can it ensure that no links will ever be overloaded. In addition, there is always the potential that any given link or router could go down, reducing the total available capacity to the WAN links remaining.

PacketShaper’s access-link monitoring feature allows PacketShaper to deal with this "imperfect" load-balancing issue and has the ability to respond to the occurrence of WAN link failure. When access-link monitoring is enabled, PacketShaper can adjust partitions appropriately to prevent overloading any given WAN link and to account for lost available capacity due to router or link failure. Access-link monitoring has two modes: basic and advanced.

When access-link monitoring is configured in the **basic mode** (shown above), the PacketShaper polls the configured router(s) every 30 seconds to assess the status (link up or link down) of the WAN link interfaces. If a link goes down, PacketShaper will automatically adjust the total available capacity by subtracting out the capacity of the down link. As part of this process, it will adjust the access link size and resize Inbound and/or Outbound partitions to reflect the available bandwidth. This situation is illustrated in the diagram below.
When advanced mode is enabled, PacketShaper can help prevent the overloading of an interface. The PacketShaper will use SNMP polling to assess the actual throughput of each configured WAN link interface; the configured routers are polled every 30 seconds. When an interface approaches 25% of its configured capacity, PacketShaper will begin pacing the traffic sent to the router to prevent overloading any interface. This pacing will also greatly reduce the number of retransmissions. PacketShaper begins adjusting the partition sizes early in order to ensure gradual, smooth adjustments, as well as to give you time to modify policies if desired. PacketShaper will poll the router frequently, and once there is evidence that the links are out of danger of being overloaded, it will gradually increase the size of the partition(s).

**Access-Link Monitoring Requirements**

The access-link monitoring feature has the following requirements and limitations:

- In order to have the ability to adjust partition sizes (a critical part of the access-link monitoring feature), you must enable traffic shaping on your PacketShaper.
- SNMP must be enabled on each high availability router.
- Although there is no pre-set limit for the number of routers each PacketShaper can monitor, the polling process consumes both CPU and memory resources. For best access-link monitoring performance, make sure that your unit is not already operating at its maximum capacity.

**MIB Variables Polled by the Access-Link Monitoring Feature**

As mentioned previously, the access-link monitoring feature uses SNMP polling to assess the interface status and throughput. The following MIB variables are requested in both basic and advanced mode:

- sysName—name that identifies the router
- ifName—name that identifies the interface
- ifOperStatus—indicates if the given interface is up or down
- ifSpeed—link speed

In advanced mode, the following additional MIB variables are polled:

- ifInOctets—number of Inbound bytes of traffic seen on the interface
- ifOutOctets—number of Outbound bytes of traffic seen on the interface

See Configure a High Availability Topology for details on configuring access-link monitoring.
Configure a High Availability Topology for Access-Link Monitoring

The high availability feature is also known as access-link monitoring. This feature is described fully in the "Access-Link Monitoring Overview" on page 4.

To configure high availability, you need to:

1. Define the access routers.
2. Define the WAN link interfaces.
3. Enable high availability by selecting a mode: basic or advanced.

Define High Availability Access Routers

To define a high availability access router:

1. Click the Setup tab.
2. From the Choose Setup Page list, select High Availability.
3. In the High Availability setup page, click add router. The Add Router page is displayed.

```
   SETUP

Choose Setup Page: high availability

   add router

add router  reset form  cancel  Go to High Availability

Router:

SNMP Community String:

Inbound Override Capacity:

Outbound Override Capacity:
```

4. Define the router:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Router</td>
<td>IP address or DNS name of the access router</td>
</tr>
<tr>
<td>SNMP Community String</td>
<td>SNMP community string (password) for the router</td>
</tr>
</tbody>
</table>

5. (Optional) In the **Inbound Override Capacity** and **Outbound Override Capacity** fields, define the maximum throughput that is expected to pass through the router. Data rates are specified as integer bits per second, followed by a K (thousands), M (millions), or "G" (billions).

**Note:** If you leave the override fields blank, PacketShaper uses the sum of the interface speeds to determine the WAN access line capacity for a router. However, in a configuration with multiple WAN interfaces on a router, you may want the inbound and outbound rates for the router to be less than the sum of the interface speeds, if you don't expect to get perfect load balancing between the interfaces. In this type of situation, you might want to configure override values. If both interfaces are up, PacketShaper would use the override values for the router when calculating the WAN access line capacity available for the router. If one of the interfaces goes down, PacketShaper would use the capacities configured for the active interfaces.

6. Click **add router**.

7. **Add the WAN link interfaces** for this router.

8. Repeat the above steps for additional access routers.

9. To see the routers and interfaces listed in the **High Availability Configuration** table, click **Go to High Availability**.

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**Define WAN Link Interfaces**

To identify the WAN link interfaces on each high availability access router:
1. Make sure you have defined the router. The router’s name and settings should be listed in the [High Availability Configuration] table on the [High Availability setup page].

   ![High Availability Configuration Table]

   Inbound | Outbound
   ---|---
   Current Access Speed: 128k | 128k
   Available Capacity: 128k | 128k

2. In the [High Availability Configuration] table, click the router’s name.

3. Click **add interface**. The [Add Interface] screen is displayed.

   ![Add Interface Screen]

   **Go to High Availability**

   **Router:** main
   **Interface:**
   **Inbound Capacity:**
   **Outbound Capacity:**

4. Define the interface:
### Field Description

**Interface**  Name (ifName) or index number (ifIndex) that identifies the interface. Examples of interface names are *ethernet 3/1* and *serial 0/1*.

It is recommended that you identify the interface by name, not index, because ifnames are unique and persistent while index numbers can change dynamically. If you are using Cisco IOS v12.1 or above and have configured the router to make the ifindex persistent, you can safely identify the interface by index number. Note that ifname was not available in Cisco IOS before v11.1.

[Instructions for finding the ifName and ifIndex values for Cisco router interfaces](#)

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inbound Capacity</td>
<td>Maximum inbound and outbound throughput that is expected to pass through the interface. Data rates are specified as integer bits per second, followed by a K (thousands), M (millions), or G (billions).</td>
</tr>
<tr>
<td>Outbound Capacity</td>
<td></td>
</tr>
</tbody>
</table>

5. Click **add interface**. The interface settings are listed in the Interfaces table.

6. Repeat steps 3-5 above for each interface on the router.

7. When you're finished adding interfaces for the router, click **Go to High Availability**. The settings for each interface are listed in the *High Availability Configuration* table.

8. To define interfaces for other routers, repeat all the steps above.

Adding an interface will increase the router's available bandwidth unless you have set override values for the router. The lowest value (override versus sum of interfaces) takes precedence. For example, suppose a router has two 400K interfaces and you have set an override of 600K. The override takes precedence because it is less than the sum of the interfaces (800K). Be aware that if you add another 200K interface, the override will continue to take precedence (in other words, the router's available bandwidth will still be 600K), even though it may not be appropriate. Make sure that you adjust your override after adding a new interface.

---

**Enable Access-Link Monitoring**

**Note:** Leave the **High Availability Mode** field set to off until you have defined all your routers and interfaces.

After you have defined your access routers and their interfaces and are ready to enable access-link monitoring, follow these steps:

1. Click the **Setup** tab.

2. From the **Choose Setup Page** list, select **High Availability**. The *High Availability* screen is displayed.
3. In the **High Availability Mode** field, select one of the following:

- **basic** When the basic mode is enabled, PacketShaper polls the configured router(s) every 30 seconds to assess the status (link up or link down) of the WAN link interfaces. If a link goes down, PacketShaper will automatically adjust the total available capacity by subtracting out the capacity of the down link. As part of this process, it will adjust the access link size and resize Inbound and/or Outbound partitions to reflect the available bandwidth.

- **advanced** Advanced mode includes all the functionality of basic mode, plus offers link overload protection. PacketShaper will use SNMP polling to access the actual throughput of each configured WAN link interface. If an interface approaches its configured capacity, PacketShaper will pace the traffic sent to the router to prevent overloading any interface. This pacing will also greatly reduce the number of retransmissions.

3. Click **apply changes**.

**Note:** In order for the partition size adjustments to take effect, traffic shaping must be enabled.

After high availability is enabled, you will see additional information in the *High Availability Configuration*.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Access Speed</td>
<td>The Current Access Speed is the total of all interface capacities that are active (up). A router’s capacity is determined by the values set for the override capacity or by summing all the interfaces’ capacities (if no override has been set). When high availability is enabled and a link becomes inactive, the Current Access Speed will reflect this reduction of available bandwidth (that is, the inactive link's capacity will be subtracted out, assuming it is less than the override value).</td>
</tr>
<tr>
<td>Available Capacity</td>
<td>The Available Capacity is the total bps available based on the values configured for the interfaces and routers. It is the sum of the routers' capacities (without regard to whether its interfaces are up or down).</td>
</tr>
</tbody>
</table>
| Statistics          | **Router Status**: Indicates whether the router is up or down  
                        **Interface Status**: Indicates whether the interface is up or down  
                        **Interface Throughput**: The actual throughput (based on SNMP polling) measured in bits per second (bps); this information is shown only in advanced mode |
View the High Availability Configuration

The high availability configuration is displayed in a table on the High Availability setup page.

1. Click the Setup tab.

2. From the Choose Setup Page list, select High Availability.

Alternatively, you can click the Go to High Availability link that is available on the various high availability setup pages (such as Edit Router and Edit Interface).

The table below describes the items in the High Availability Configuration table.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Availability Mode</td>
<td>The current high availability mode (basic, advanced, or off). See &quot;Enable Access-Link Monitoring&quot; on page 10 for more information.</td>
</tr>
</tbody>
</table>
### Access Link Monitoring

<table>
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</tr>
</tbody>
</table>

**Note:** For more information about defining high availability routers, see [Define High Availability Access Routers](#).

**Note:** Click the router’s name to modify the router settings.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Router</td>
<td>The router’s configured name (IP address or DNS name), SNMP community string, the override capacity (if set), and the router status (up vs. down). See Define High Availability Access Routers for more information.</td>
</tr>
</tbody>
</table>

**Note:** Click the router's name to modify the router settings.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td>The interface's configured name and number (ifname and ifindex), the inbound and outbound capacities, and the interface status (up vs. down). If the interface name (ifname) is not found on the router, the Name column displays a zero after the name, for example test(0). If the interface number (ifindex) is not found, the Name column displays Unknown, for example Unknown(1234). If advanced mode is enabled, the actual bps throughput (based on SNMP polling) is listed for each interface. See Define WAN Link Interfaces for more information.</td>
</tr>
</tbody>
</table>

**Note:** Click the interface name to modify the interface settings.

### Disable Access-Link Monitoring

When you turn off high availability, all your configuration settings are retained, but PacketShaper will not monitor the status of the interfaces and routers, nor will it adjust the access link size and resize partitions if a link goes down.

To disable access-link monitoring:

1. Click the **Setup** tab.

2. From the **Choose Setup Page** list, select **High Availability**. The **High Availability** screen is displayed.

3. In the **High Availability Mode** field, choose **off**.

4. Click **apply changes**.

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**Define High Availability Access Routers**

**Define WAN Link Interfaces**