

Rate Limiting Feature

AN-300-RT-4L2W Network Router

Introduction

This document details functionality and setup of the Rate Limiting feature introduced in firmware version 1.0.4.7.



Caution - Rate Limiting should only be used by networking professionals. Configuring this feature incorrectly will cause network performance and reliability issues.

What is Rate Limiting?

This feature allows you to manage WAN interface bandwidth for network clients based on IP address. Rate Limiting does not control intra-network traffic, only traffic to and from the WAN connection(s) for clients on the LAN. Use this feature to:

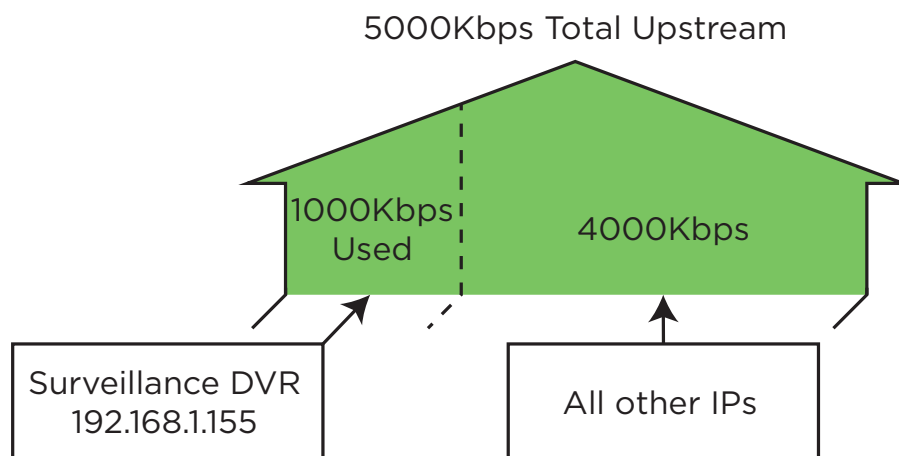
- Prioritize required bandwidth for critical services
- Limit total bandwidth use for specified clients.

Rate Limiting is implemented by creating rules for upstream or downstream traffic priority to one or more IP addresses. Rules can be set to prioritize all traffic or only on certain forwarded ports. Rules may also be “stacked” in order to further segment bandwidth use based on the needs of each client’s applications.

Basic Example

A small business with a 5000Kbps upstream WAN connection has a surveillance DVR requiring 1000Kbps upstream for sending footage to a server. This operation is critical to the business, so a rate limiting rule is created to prioritize 1000Kbps upstream for the IP address of the surveillance system.

If the DVR is not using the full bandwidth, other traffic on the network can use it. When the DVR does use the full amount, other clients must share any remaining bandwidth for their traffic.



Note - See the last page for an additional setup example including menu configuration.

Rate Limiting Menu Overview

Path - Advanced, QOS, Rate Limiting

Service Management

Entries in the table are used when creating new rules in the Rate Control Settings menu at the bottom of the page. The Service Management menu is populated with commonly used port ranges for popular services. Entries may be deleted or modified and new rules can be added.

The screenshot shows the Araknis Networks web interface. At the top, there's a status bar with 'Cloud Service: Connected', 'System Time: 2016-01-14 09:53:47', and 'System Uptime: 1d 13:30:48'. On the left is a navigation menu with sections: STATUS (SYSTEM, CLIENTS AND SERVICES, PORTS), SETTINGS (SYSTEM, WAN, LAN, FIREWALL, DDNS, PORT FORWARDING, SECURITY), and MAINTENANCE (PING, DNS LOOKUP, FILE MANAGEMENT). The main content area is titled 'QOS' and contains a 'Service Management' table. The table has four columns: Service Name, Protocol, Port, and Delete. It lists several services with their respective protocols and port ranges. An 'Add' button is located at the bottom right of the table.

Service Name	Protocol	Port	Delete
All Traffic	TCP+UDP	1 ~ 65535	
DNS	UDP	53 ~ 53	
FTP	TCP	21 ~ 21	
HTTP	TCP	80 ~ 80	
HTTP Secondary	TCP	8080 ~ 8080	
HTTPS	TCP	443 ~ 443	
HTTPS Secondary	TCP	8443 ~ 8443	

Parameters -

- **Service Name** - Description for the ports in the rule.
- **Protocol** - Select the protocol(s) for the ports. Options: TCP, UDP, TCP+UDP
- **Port** - Enter the port or port range for the rule. Enter the same port number in both fields to specify a single port.
- **Delete** - Click to delete a rule.
- **Add** - Click to add a new rule entry.

You must click **Apply** at the bottom right of the page to save changes.

Note - Changing entries in the table will only affect Rate Limiting functionality if the edited entry has been used in a Rate Limiting rule.

The same rules are present in the ACL menu and edits to one list will affect the list in both menus.



Interface Bandwidth Setting and Rate Control Settings

These menus are used to configure the total bandwidth being prioritized between specified clients. Base the values in the Interface Bandwidth Setting table on the needs of the rules configured in the Rate Control Settings table.

Interface Bandwidth Setting

Interface	Upstream Bandwidth (kbit/s)	Downstream Bandwidth (kbit/s)
WAN1	<input type="text" value="512"/>	<input type="text" value="512"/>
WAN2	<input type="text" value="512"/>	<input type="text" value="512"/>

Rate Control Settings

Interface	Service	IP Range	Direction	Bandwidth (kbit/s)	Bandwidth Sharing	Enable	Delete
WAN1	All Traffic	<input type="text"/> - <input type="text"/>	Downstream	<input type="text"/> - <input type="text"/>	<input checked="" type="radio"/> Sharing total bandwidth for all IP <input type="radio"/> Assign for each IP	<input type="checkbox"/>	

Parameters -

- **Interface Bandwidth Setting**
 - **Upstream Bandwidth (kbit/s)** - Set maximum upstream bandwidth for any client in the rules.
 - **Downstream Bandwidth (kbit/s)** - Set maximum downstream bandwidth for any client in the rules.

Note - The sum of minimum values for all rules cannot exceed the maximum WAN interface value. Conversely, the maximum value of any one rule cannot exceed the maximum WAN interface value, but the total maximum value of all rules can exceed it.

- **Rate Control Settings**
 - **Interface** - Select the WAN interface the rule will affect.
 - **Service** - Select a service from the drop down. Use the All Traffic setting unless you want to regulate bandwidth for a specific program or service using a forwarded port.
 - **IP Range** - Set the range of IP addresses that will be affected by the rule. Enter the same address in both fields to create a rule for a single IP address.
 - **Direction** - Select whether the rule affects upstream or downstream traffic.
 - **Bandwidth (kbits/s)** - Enter the minimum and maximum bandwidth allowance for the rule. The minimum setting is prioritized for the specified IP range at all times. The maximum rate is not guaranteed within the rule set but does take priority over non rule bound traffic.
 - **Bandwidth Sharing** - Select *Sharing total bandwidth for all IP* to split the specified bandwidth among the clients, or *Assign for each IP* to allow the full specified bandwidth for each IP.
 - **Enable** - Select whether the rule is in effect or not.
 - **Delete** - Delete a rule.
 - **Add** - Click to add a new rule entry.

You must click **Apply** at the bottom right of the page to save changes.

Rate Limiting Setup Instructions

Before You Begin

- Determine the maximum amount of available upstream and downstream bandwidth required for rules on each WAN interface.
- Calculate the minimum and maximum bandwidth requirements for all rate limiting rules and make sure that remaining bandwidth is sufficient for unregulated clients.
- We recommend reserving no more than 80% of the available bandwidth from the ISP in the rules you create. This guarantees that bandwidth will remain available for unspecified IPs.

Configuration Instructions

The screenshot displays the router's configuration page for QoS. The left sidebar shows navigation options: STATUS, SETTINGS, MAINTENANCE, and ADVANCED. The main content area is titled 'QOS' and contains three sections: Service Management, Interface Bandwidth Setting, and Rate Control Settings.

Service Management

Service Name	Protocol	Port	Delete
All Traffic	TCP+UDP	1 ~ 65535	[Delete]
DNS	UDP	53 ~ 53	[Delete]
FTP	TCP	21 ~ 21	[Delete]
HTTP	TCP	80 ~ 80	[Delete]
HTTP Secondary	TCP	8080 ~ 8080	[Delete]
HTTPS	TCP	443 ~ 443	[Delete]
HTTPS Secondary	TCP	8443 ~ 8443	[Delete]

Interface Bandwidth Setting

Interface	Upstream Bandwidth (kbit/s)	Downstream Bandwidth (kbit/s)
WAN1	512	512
WAN2	512	512

Rate Control Settings

Interface	Service	IP Range	Direction	Bandwidth (kbit/s)	Bandwidth Sharing	Enable	Delete
							[Delete]

Buttons: Add, Apply, Cancel

1. Log into the router interface and navigate to the Rate Limiting menu: Advanced>QOS>Rate Limiting.
2. Insert the maximum bandwidth values into the appropriate Interface Bandwidth Setting fields (second menu on the page). In this example, only the WAN1 interface is being used.
3. Click the **Add** button under the Rate Control Settings menu. A new entry line will appear for adding bandwidth management rules.
4. Create rules to regulate the bandwidth as needed.
5. After all of the rules have been created, click the **Apply** button to save the new configuration.
6. See the next page for additional information about the example shown above.

Menu Configuration Example

Interface		Upstream Bandwidth (kbit/s)	Downstream Bandwidth (kbit/s)
WAN1	10000	100000	
WAN2	100000	100000	

Interface	Service	IP Range	Direction	Bandwidth (kbit/s)	Bandwidth Sharing	Enable	Delete
WAN1	All Traffic	192.168.1.40 ~65	Downstream	35000 ~50000	<input checked="" type="radio"/> Sharing total bandwidth for all IP <input type="radio"/> Assign for each IP	<input checked="" type="checkbox"/>	
WAN1	All Traffic	192.168.1.55 ~192.168.1.55	Upstream	1000 ~1000	<input checked="" type="radio"/> Sharing total bandwidth for all IP <input type="radio"/> Assign for each IP	<input checked="" type="checkbox"/>	
WAN1	All Traffic	192.168.20.170 ~192.168.20.175	Downstream	15000 ~20000	<input checked="" type="radio"/> Sharing total bandwidth for all IP <input type="radio"/> Assign for each IP	<input checked="" type="checkbox"/>	
WAN1	FTP	192.168.1.180 ~192.168.1.182	Upstream	2500 ~2500	<input type="radio"/> Sharing total bandwidth for all IP <input checked="" type="radio"/> Assign for each IP	<input checked="" type="checkbox"/>	

Upstream Bandwidth	Downstream Bandwidth
Total rules = 8500Kbps ~ 8500Kbps*	Total rules = 50000Kbps ~ 70000Kbps
Total Upstream = 10000Kbps	Total Downstream = 100000Kbps

- The example above includes four rate limiting rules: two for downstream bandwidth and two for upstream bandwidth.
- The downstream bandwidth calculation is straight forward. The sum of the minimums and none of the maximum values entered is greater than the maximum specified downstream bandwidth.
- *The upstream calculation is also correct, but the second upstream entry assigns the rule for each IP in the range. To calculate the total amount of possible use, multiply the bandwidth values for that rule by the number of IP addresses (there are three in this example).
- Notice that even though one upstream rule only affects FTP traffic. The same method of calculation still applies.

Contacting Technical Support

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