



Configuration examples for the D-Link NetDefend Firewall series

DFL-210/260/800/860/1600/2500

**Scenario: How to configure traffic management for
Quality of Service assurance**

Last update: 2007-08-02

Overview

In this document, the notation *Objects->Address book* means that in the tree on the left side of the screen **Objects** first should be clicked (expanded) and then **Address Book**.

Most of the examples in this document are adapted for the DFL-800. The same settings can easily be used for all other models in the series. The only difference is the names of the interfaces. Since the DFL-1600 and DFL-2500 has more than one lan interface, the lan interfaces are named lan1, lan2 and lan3 not just lan.

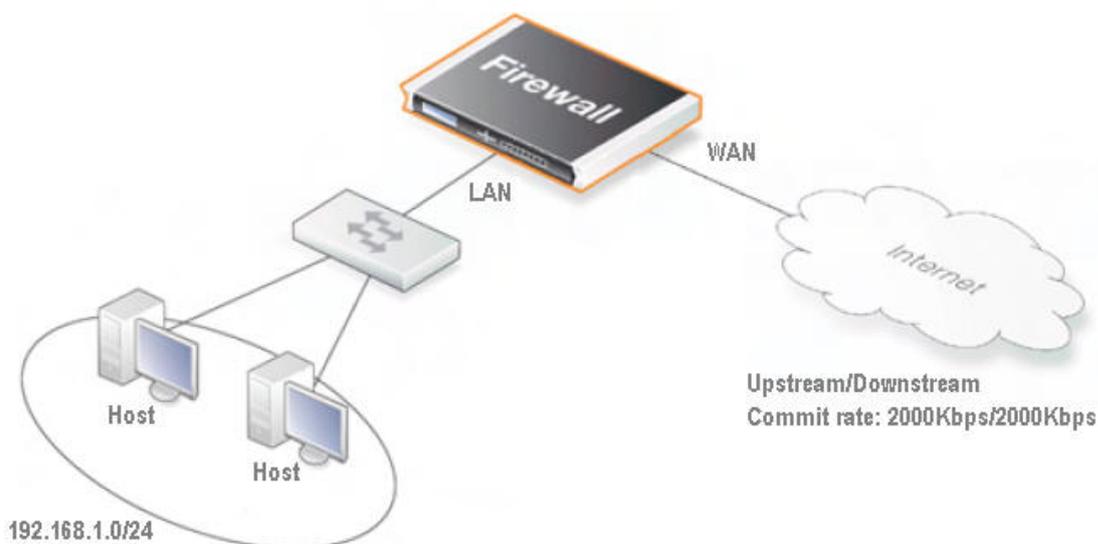
The screenshots in this document is from firmware version 2.12.00. If you are using an earlier version of the firmware, the screenshots may not be identical to what you see on your browser.

How to configure traffic management for Quality of Service assurance

This scenario is about customers intended to ensure important applications with Email, Web and file transfer that can obtain guarantee bandwidth for business requirement in LAN environment. And also, Email communication is their first priority; Web application is second priority and file transfer is third priority depends on company policy.

Detail for this scenario:

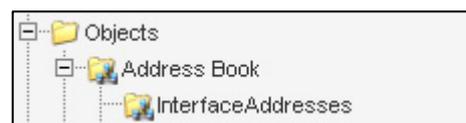
- Internet **upstream/downstream** commit rate is **2000Kbps/2000Kbps**.
- **SMTP** protocol with Bi-direction: The bandwidth is guaranteed to **800Kbps** and the maximum bandwidth limit is **1600Kbps**.
- **HTTP/HTTPS** protocol with Bi-direction: The bandwidth is guaranteed to **600Kbps** and the maximum bandwidth limit is **1200Kbps**.
- **FTP** protocol with Bi-direction: The bandwidth is guaranteed to **400Kbps** and the maximum bandwidth limit is **800Kbps**.
- **Other** protocols with Bi-direction: The bandwidth will **NOT** be guaranteed and limited. It can burst its traffic to use all available bandwidth if SMTP/HTTP/HTTPS/FTP is not full traffic load.
- **SMTP** is first priority; precedence will be assigned to **7**.
- **HTTP/HTTPS** is second priority; the precedence will be assigned to **5**.
- **FTP** is third priority; the precedence will be assigned to **3**.



The following procedure will go through how firewall prioritizes traffic for specific protocols. Except for providing general bandwidth control functionality, it's able to burst additional bandwidth to efficiently utilize the rest of bandwidth if it's available at that time.

1. Interface address and default gateway.

Go to *Objects* -> *Address book* -> *InterfaceAddresses*:



Edit the following items:

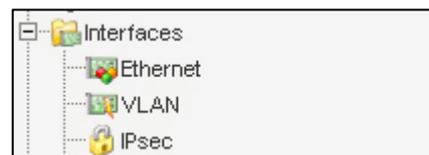
Change **lan_ip** to 192.168.1.1

Change **lannet** to 192.168.1.0/24

Change **wan1_ip** to 192.168.110.1

Change **wan1net** to 192.168.110.0/24

Change **wan1_gw** to 192.168.110.254 (If this object does not exist, create a new one)



Go to *Objects* -> *Interfaces* -> *Ethernet*:

Select **wan1** interface

Select the **wan1_gw** on Default Gateway drop-down menu for wan1 interface

Ethernet

Configure the settings for the Ethernet adapters in the system.

Name	IP	Network	DefaultGateway	DHCPEnabled
dmz	dmz_ip	dmznet		No
lan	lan_ip	lannet		No
wan1	wan1_ip	wan1net	wan1_gw	No
wan2	wan2_ip	wan2net		No

wan1

General | Hardware Settings | Advanced

General

An Ethernet interface represents a logical endpoint for Ethernet traffic.

Name:

IP Address:

Network:

Default Gateway:

Receive Multicast Traffic:

Click **OK**.

Create one IP rule for HTTP protocol:

In the General tab:

General:

The screenshot shows the configuration page for an IP rule titled "HTTP_BW_Control". The "General" tab is selected, and the "General" section is active. The rule name is "HTTP_BW_Control", the action is "NAT", the service is "http-all", and the schedule is "(None)". The "Address Filter" section is also visible, with the source interface set to "lan", source network to "lannet", destination interface to "wan1", and destination network to "all-nets".

General	
Name:	HTTP_BW_Control
Action:	NAT
Service:	http-all
Schedule:	(None)

Address Filter	
Interface:	lan
Network:	lannet
Destination Interface:	wan1
Destination Network:	all-nets

Name: **HTTP_BW_Control**

Action: **NAT**

Service: **http-all**

Source Interface: **lan**

Source Network: **lannet**

Destination Interface: **wan1**

Destination Network: **all-nets**

Click Ok.

Create one IP rule for **others** protocol:

In the **General** tab:

General:

Others_BW_Control

General | Log Settings | NAT | SAT | SAT Server Load Balancing

General

An IP rule specifies what action to perform on network traffic that matches

Name: Others_BW_Control

Action: NAT

Service: all_services

Schedule: (None)

Address Filter

Specify source interface and source network, together with destination interface and destination network, to match the rule to match.

	Source	Destination
Interface:	lan	wan1
Network:	lannet	all-nets

Name: **Others_BW_Control**

Action: **NAT**

Service: **all_services**

Source Interface: **lan**

Source Network: **lannet**

Destination Interface: **wan1**

Destination Network: **all-nets**

Click Ok.

3. Create pipe for each protocol

Go to *Traffic Management* -> *Traffic Shaping* -> *Pipes*.

Add a new Pipe for SMTP Downstream

In the General tab:

General:

Pipe

General | Pipe Limits | Group Limits

General

A pipe defines basic traffic shaping parameters. The pipe

Name:

Precedences:	Minimum	Default	Maximum
	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="7"/>

Name: **SMTP_Downstream**

Precedences: Keep it as default value with 0, 0, 7

In the Pipe Limits tab:

Pipe Limits:

General | Pipe Limits | Group Limits

Pipe Limits

Use pipe limits to specify bandwidth limits per precedence in the pipe. If traffic in down to the lowest available precedence.

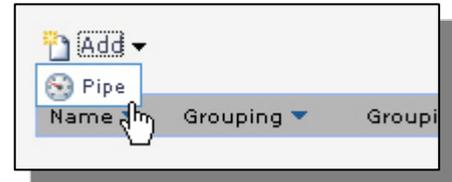
Note that, for bandwidth, 'kilo' and 'mega' are multiples of 1000, not 1024

Precedences:	kilobits per second	Packets per sec.
7:	<input type="text"/>	<input type="text"/>
6:	<input type="text"/>	<input type="text"/>
5:	<input type="text"/>	<input type="text"/>
4:	<input type="text"/>	<input type="text"/>
3:	<input type="text"/>	<input type="text"/>
2:	<input type="text"/>	<input type="text"/>
1:	<input type="text"/>	<input type="text"/>
0:	<input type="text"/>	<input type="text"/>
Total	<input type="text" value="1600"/>	<input type="text"/>

Precedence 0-7: Keep it as "blank" by default

Total kilobits per second: 1600

Click Ok.



Add a new Pipe for SMTP Upstream

In the General tab:

General:

Pipe

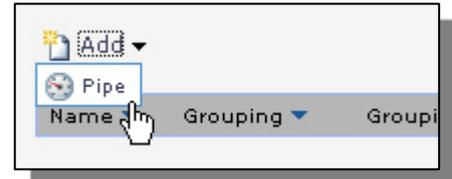
General | Pipe Limits | Group Limits

General

A pipe defines basic traffic shaping parameters. The pipe

Name:

Precedences: Minimum Default Maximum



Name: **SMTP_Upstream**

Precedences: Keep it as default value with 0, 0, 7

In the Pipe Limits tab:

Pipe Limits:

General | Pipe Limits | Group Limits

Pipe Limits

Use pipe limits to specify bandwidth limits per precedence in the pipe. If traffic in down to the lowest available precedence.

Note that, for bandwidth, 'kilo' and 'mega' are multiples of 1000, not 1024

Precedences:	kilobits per second	Packets per sec.
7:	<input type="text"/>	<input type="text"/>
6:	<input type="text"/>	<input type="text"/>
5:	<input type="text"/>	<input type="text"/>
4:	<input type="text"/>	<input type="text"/>
3:	<input type="text"/>	<input type="text"/>
2:	<input type="text"/>	<input type="text"/>
1:	<input type="text"/>	<input type="text"/>
0:	<input type="text"/>	<input type="text"/>

Total

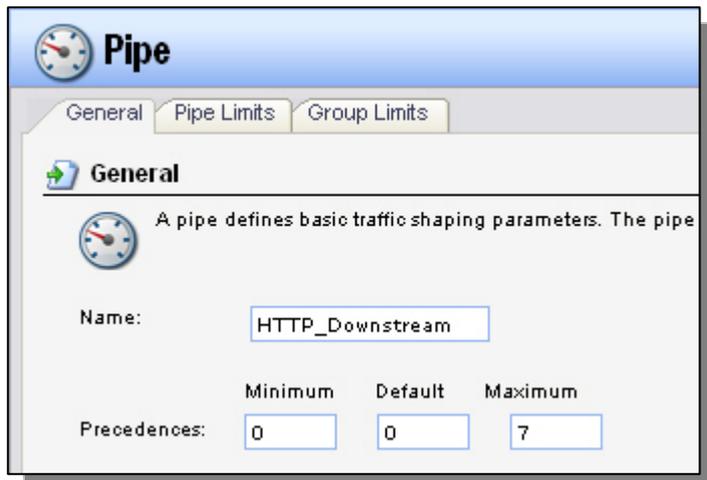
Precedence 0-7: **Keep it as "blank" by default**
Total Kilobits per second: **1600**

Click Ok.

Add a new Pipe for HTTP Downstream

In the General tab:

General:



Pipe

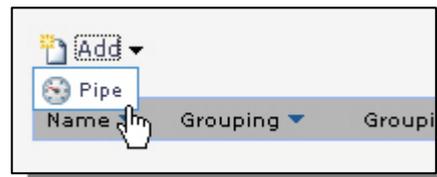
General | Pipe Limits | Group Limits

General

A pipe defines basic traffic shaping parameters. The pipe

Name:

Precedences:	Minimum	Default	Maximum
	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="7"/>

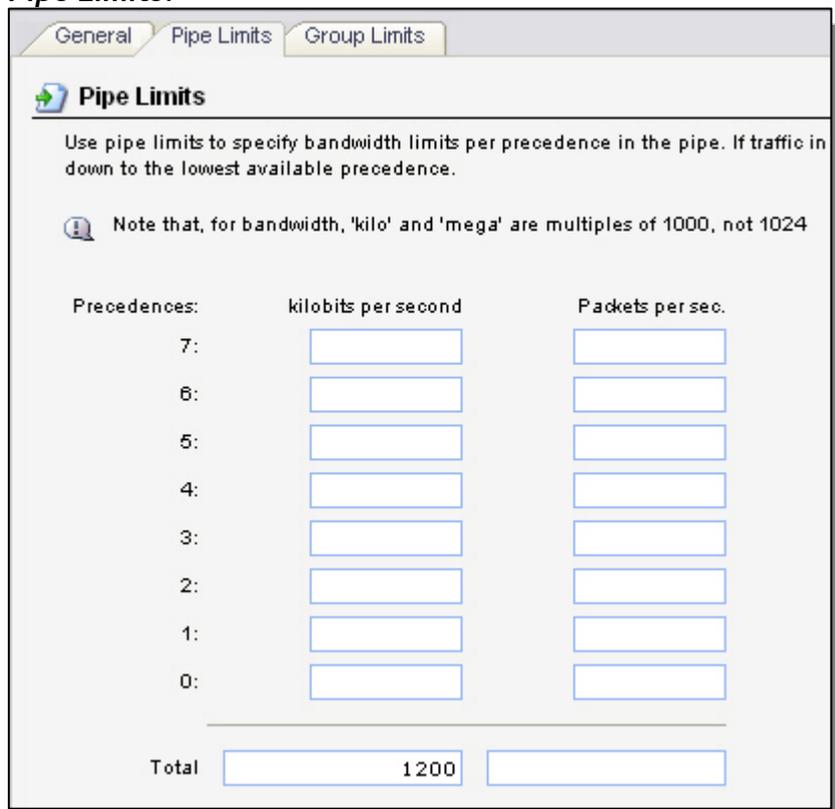


Name: HTTP_Downstream

Precedences: Keep it as default value with 0, 0, 7

In the Pipe Limits tab:

Pipe Limits:



General | Pipe Limits | Group Limits

Pipe Limits

Use pipe limits to specify bandwidth limits per precedence in the pipe. If traffic in down to the lowest available precedence.

Note that, for bandwidth, 'kilo' and 'mega' are multiples of 1000, not 1024

Precedences:	kilobits per second	Packets per sec.
7:	<input type="text"/>	<input type="text"/>
6:	<input type="text"/>	<input type="text"/>
5:	<input type="text"/>	<input type="text"/>
4:	<input type="text"/>	<input type="text"/>
3:	<input type="text"/>	<input type="text"/>
2:	<input type="text"/>	<input type="text"/>
1:	<input type="text"/>	<input type="text"/>
0:	<input type="text"/>	<input type="text"/>
Total	<input type="text" value="1200"/>	<input type="text"/>

Precedence 0-7: Keep it as "blank" by default

Total kilobits per second: 1200

Click Ok.

Add a new Pipe for HTTP Upstream

In the General tab:

General:

Pipe

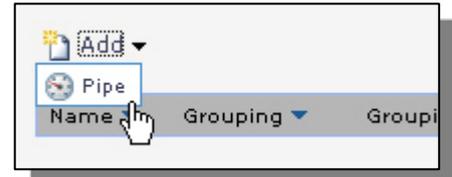
General | Pipe Limits | Group Limits

General

A pipe defines basic traffic shaping parameters. The pipe

Name:

Precedences:	Minimum	Default	Maximum
	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="7"/>



Name: **HTTP_Upstream**

Precedences: Keep it as default value with 0, 0, 7

In the Pipe Limits tab:

Pipe Limits:

General | Pipe Limits | Group Limits

Pipe Limits

Use pipe limits to specify bandwidth limits per precedence in the pipe. If traffic in down to the lowest available precedence.

Note that, for bandwidth, 'kilo' and 'mega' are multiples of 1000, not 1024

Precedences:	kilobits per second	Packets per sec.
7:	<input type="text"/>	<input type="text"/>
6:	<input type="text"/>	<input type="text"/>
5:	<input type="text"/>	<input type="text"/>
4:	<input type="text"/>	<input type="text"/>
3:	<input type="text"/>	<input type="text"/>
2:	<input type="text"/>	<input type="text"/>
1:	<input type="text"/>	<input type="text"/>
0:	<input type="text"/>	<input type="text"/>
Total	<input type="text" value="1200"/>	<input type="text"/>

Precedence 0-7: **Keep it as "blank" by default**

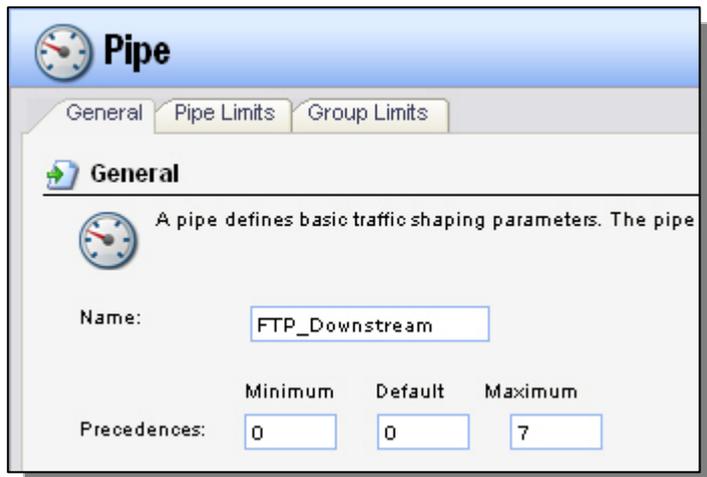
Total kilobits per second: **1200**

Click Ok.

Add a new Pipe for FTP Downstream

In the General tab:

General:



Pipe

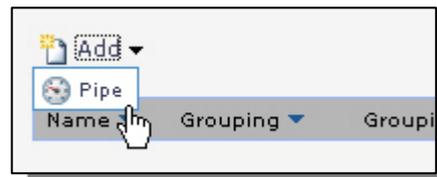
General | Pipe Limits | Group Limits

General

A pipe defines basic traffic shaping parameters. The pipe

Name:

Precedences:	Minimum	Default	Maximum
	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="7"/>

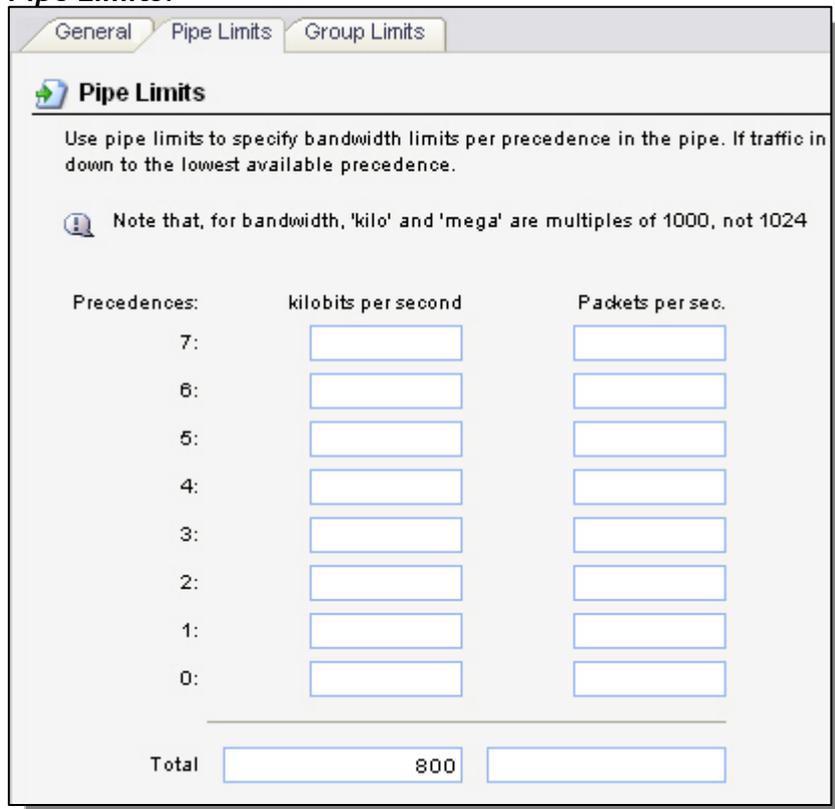


Name: FTP_Downstream

Precedences: Keep it as default value with 0, 0, 7

In the Pipe Limits tab:

Pipe Limits:



General | Pipe Limits | Group Limits

Pipe Limits

Use pipe limits to specify bandwidth limits per precedence in the pipe. If traffic in down to the lowest available precedence.

Note that, for bandwidth, 'kilo' and 'mega' are multiples of 1000, not 1024

Precedences:	kilobits per second	Packets per sec.
7:	<input type="text"/>	<input type="text"/>
6:	<input type="text"/>	<input type="text"/>
5:	<input type="text"/>	<input type="text"/>
4:	<input type="text"/>	<input type="text"/>
3:	<input type="text"/>	<input type="text"/>
2:	<input type="text"/>	<input type="text"/>
1:	<input type="text"/>	<input type="text"/>
0:	<input type="text"/>	<input type="text"/>

Total

Precedence 0-7: Keep it as "blank" by default

Total kilobits per second: 800

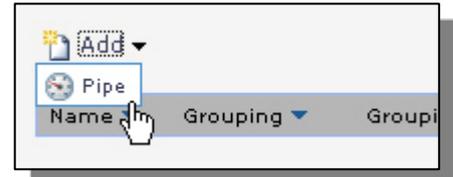
Click Ok.

Add a new Pipe for FTP Upstream

In the General tab:

General:

The screenshot shows the 'General' tab of a configuration window for a pipe named 'FTP'. The 'Name' field contains 'FTP_Upstream'. Below it, there are three input fields for 'Precedences' labeled 'Minimum', 'Default', and 'Maximum'. The values are 0, 0, and 7 respectively.



Name: FTP_Upstream

Precedences: Keep it as default value with 0, 0, 7

In the Pipe Limits tab:

Pipe Limits:

The screenshot shows the 'Pipe Limits' tab. It contains a table for setting bandwidth limits per precedence. The table has three columns: 'Precedences', 'kilobits per second', and 'Packets per sec.'. The rows are numbered 7 down to 0. At the bottom, there is a 'Total' row with a value of 800 in the 'kilobits per second' column.

Precedences:	kilobits per second	Packets per sec.
7:	<input type="text"/>	<input type="text"/>
6:	<input type="text"/>	<input type="text"/>
5:	<input type="text"/>	<input type="text"/>
4:	<input type="text"/>	<input type="text"/>
3:	<input type="text"/>	<input type="text"/>
2:	<input type="text"/>	<input type="text"/>
1:	<input type="text"/>	<input type="text"/>
0:	<input type="text"/>	<input type="text"/>
Total	<input type="text" value="800"/>	<input type="text"/>

Precedence 0-7: Keep it as "blank" by default

Total kilobits per second: 800

Click Ok.

Add a new Pipe for Total Downstream commit rate

In the General tab:

General:

Pipe

General | Pipe Limits | Group Limits

General

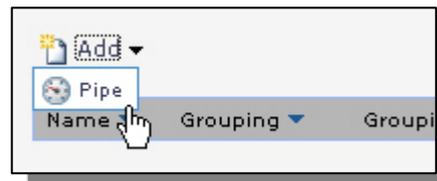
A pipe defines basic traffic shaping parameters. The pipe

Name:

Precedences: Minimum Default Maximum

Name: **Total_Downstream**

Precedences: Keep it as default value with 0, 0, 7



In the Pipe Limits tab:

Pipe Limits:

General | Pipe Limits | Group Limits

Pipe Limits

Use pipe limits to specify bandwidth limits per precedence in the pipe. If traffic in down to the lowest available precedence.

Note that, for bandwidth, 'kilo' and 'mega' are multiples of 1000, not 1024

Precedences:	kilobits per second	Packets per sec.
7:	<input type="text" value="800"/>	<input type="text"/>
6:	<input type="text"/>	<input type="text"/>
5:	<input type="text" value="600"/>	<input type="text"/>
4:	<input type="text"/>	<input type="text"/>
3:	<input type="text" value="400"/>	<input type="text"/>
2:	<input type="text"/>	<input type="text"/>
1:	<input type="text"/>	<input type="text"/>
0:	<input type="text"/>	<input type="text"/>
Total	<input type="text" value="2000"/>	<input type="text"/>

Precedence 7: 800

Precedence 5: 600

Precedence 3: 400

Total kilobits per second: 2000

Click Ok.

Add a new Pipe for Total Upstream commit rate

In the General tab:

General:

Pipe

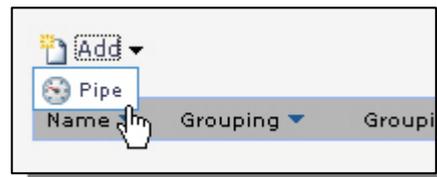
General | Pipe Limits | Group Limits

General

A pipe defines basic traffic shaping parameters. The pipe

Name:

Precedences: Minimum: Default: Maximum:



Name: **Total_Upstream**

Precedences: Keep it as default value with 0, 0, 7

In the Pipe Limits tab:

Pipe Limits:

General | Pipe Limits | Group Limits

Pipe Limits

Use pipe limits to specify bandwidth limits per precedence in the pipe. If traffic in down to the lowest available precedence.

Note that, for bandwidth, 'kilo' and 'mega' are multiples of 1000, not 1024

Precedences:	kilobits per second	Packets per sec.
7:	<input type="text" value="800"/>	<input type="text"/>
6:	<input type="text"/>	<input type="text"/>
5:	<input type="text" value="600"/>	<input type="text"/>
4:	<input type="text"/>	<input type="text"/>
3:	<input type="text" value="400"/>	<input type="text"/>
2:	<input type="text"/>	<input type="text"/>
1:	<input type="text"/>	<input type="text"/>
0:	<input type="text"/>	<input type="text"/>
Total	<input type="text" value="2000"/>	<input type="text"/>

Precedence 7: 800

Precedence 5: 600

Precedence 3: 400

Total kilobits per second: 2000

Click Ok.

Check all Pipes setting is shown as following screenshot then go to next step.

Pipes

Pipes are used as regulators for network traffic flowing through the system.

 Pipes are used as regulators for network traffic flowing through the system.

 Add ▼

Name ▼	Grouping ▼	GroupingNetworkSize ▼	LimitKbpsTotal ▼
 FTP_Downstream	None		800
 FTP_Upstream	None		800
 HTTP_Downstream	None		1200
 HTTP_Upstream	None		1200
 SMTP_Downstream	None		1600
 SMTP_Upstream	None		1600
 Total_Downstream	None		2000
 Total_Upstream	None		2000

4. Create pipe rule for each protocol

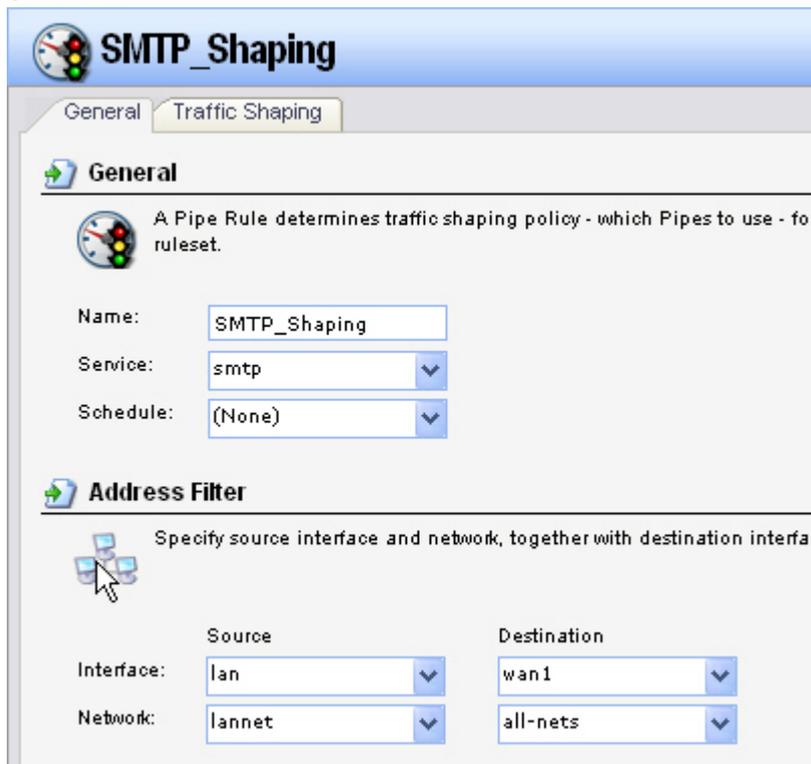
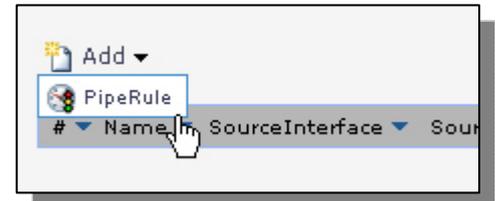
Go to *Traffic Management* -> *Traffic Shaping* -> *PipeRules*.



4-1. Add a new PipeRule for SMTP protocol

In the *General* tab:

General:

A screenshot of the 'SMTP_Shaping' configuration page in the 'General' tab. The page has a blue header with the title 'SMTP_Shaping' and a traffic light icon. Below the header are two tabs: 'General' (selected) and 'Traffic Shaping'. Under the 'General' tab, there is a section titled 'General' with a traffic light icon and a description: 'A Pipe Rule determines traffic shaping policy - which Pipes to use - for ruleset.' Below this are three input fields: 'Name' (SMTP_Shaping), 'Service' (smtp), and 'Schedule' ((None)). Below the 'General' section is an 'Address Filter' section with a computer icon and a description: 'Specify source interface and network, together with destination interface'. It contains four input fields: 'Interface' (lan) under 'Source', 'Interface' (wan1) under 'Destination', 'Network' (lannet) under 'Source', and 'Network' (all-nets) under 'Destination'.

Name: SMTP_Shaping

Service: smtp

Source Interface: lan

Source Network: lannet

Destination Interface: wan1

Destination Network: all-nets

In the Traffic Shaping tab:

Traffic Shaping:

Forward Chain

Available	Selected
FTP_Downstream	SMTP_Upstream
FTP_Upstream	Total_Upstream
HTTP_Downstream	
HTTP_Upstream	
SMTP_Downstream	
Total_Downstream	

Return Chain

Available	Selected
FTP_Downstream	SMTP_Downstream
FTP_Upstream	Total_Downstream
HTTP_Downstream	
HTTP_Upstream	
SMTP_Upstream	
Total_Upstream	

Selected Forward Chain: **SMTP_Upstream, Total_Upstream**

Selected Return Chain: **SMTP_Downstream, Total_Downstream**

Note:

The SMTP Pipes (**SMTP_Upstream** or **SMTP_Downstream**) must be put upper on Total bandwidth commit rate (**Total_Upstream** or **Total_Downstream**).

Precedence:

Precedence

Map IP DSCP (ToS)
 Use Fixed Precedence

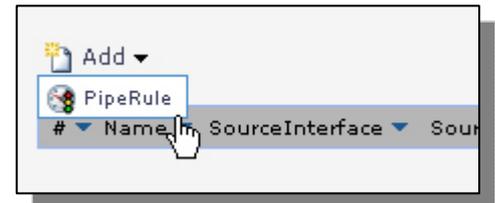
7

Use Fixed Precedence: 7

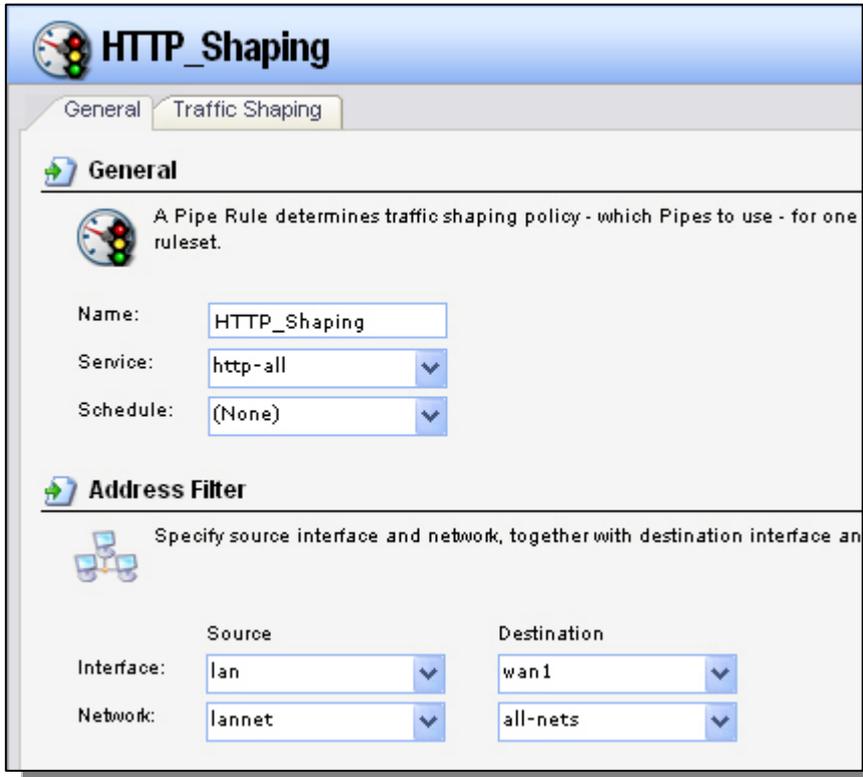
Click Ok.

4-2. Add a new PipeRule for HTTP protocol

In the General tab:



General:

A screenshot of the 'HTTP Shaping' configuration page. The page has a blue header with a traffic light icon and the text 'HTTP Shaping'. Below the header, there are two tabs: 'General' and 'Traffic Shaping'. The 'General' tab is active. Under the 'General' section, there is a description: 'A Pipe Rule determines traffic shaping policy - which Pipes to use - for one ruleset.' Below this, there are three input fields: 'Name' with the value 'HTTP_Shaping', 'Service' with the value 'http-all', and 'Schedule' with the value '(None)'. Below the 'General' section, there is an 'Address Filter' section with the description: 'Specify source interface and network, together with destination interface and network.' Below this, there are four input fields: 'Interface' (Source) with the value 'lan', 'Interface' (Destination) with the value 'wan1', 'Network' (Source) with the value 'lannet', and 'Network' (Destination) with the value 'all-nets'.

Name: **HTTP_Shaping**

Service: **http-all**

Source Interface: **lan**

Source Network: **lannet**

Destination Interface: **wan1**

Destination Network: **all-nets**

In the Traffic Shaping tab:

Traffic Shaping:

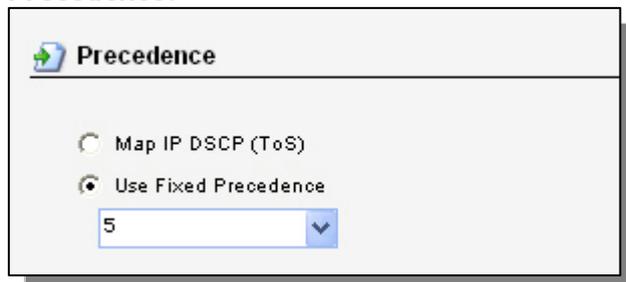


Selected Forward Chain: **HTTP_Upstream, Total_Upstream**
 Selected Return Chain: **HTTP_Downstream, Total_Downstream**

Note:

The HTTP Pipes (**HTTP_Upstream** or **HTTP_Downstream**) must be put upper on Total bandwidth commit rate (**Total_Upstream** or **Total_Downstream**).

Precedence:

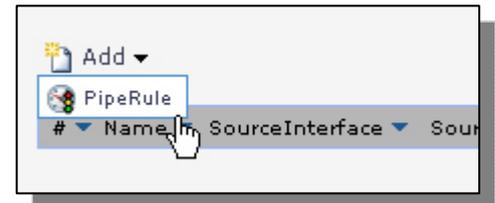


Use Fixed Precedence: 5

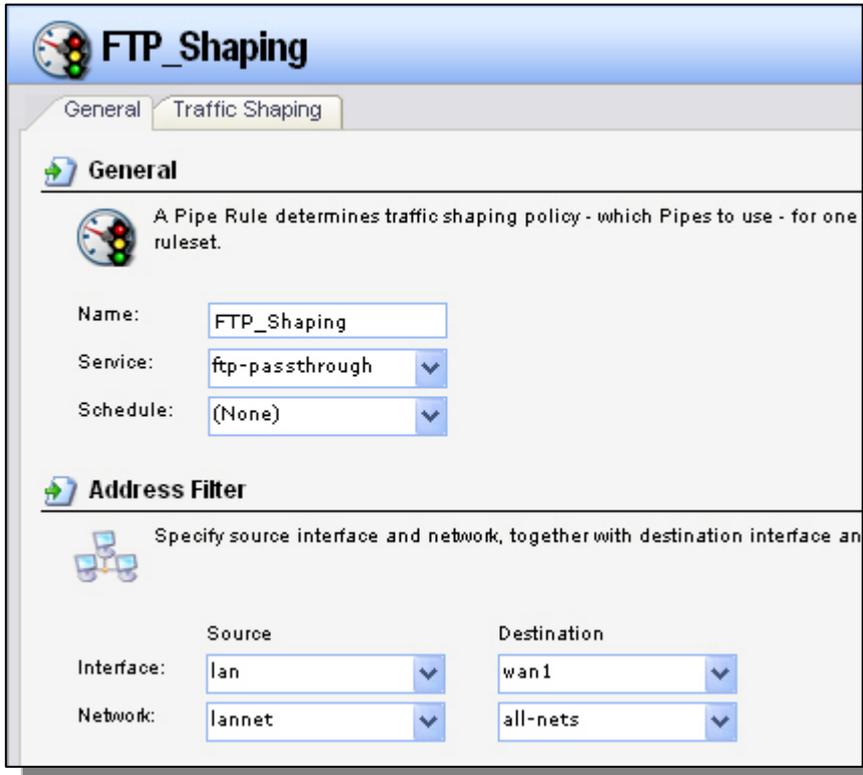
Click Ok.

4-3. Add a new PipeRule for FTP protocol

In the General tab:



General:

A screenshot of the 'FTP_Shaping' configuration page. The page has a blue header with a traffic light icon and the title 'FTP_Shaping'. Below the header, there are two tabs: 'General' (selected) and 'Traffic Shaping'. Under the 'General' tab, there is a section titled 'General' with a traffic light icon and a description: 'A Pipe Rule determines traffic shaping policy - which Pipes to use - for one ruleset.' Below this, there are three fields: 'Name' with the value 'FTP_Shaping', 'Service' with a dropdown menu showing 'ftp-passthrough', and 'Schedule' with a dropdown menu showing '(None)'. Below the 'General' section, there is a section titled 'Address Filter' with a description: 'Specify source interface and network, together with destination interface and network.' Below this, there are four fields: 'Interface' (Source) with 'lan', 'Interface' (Destination) with 'wan1', 'Network' (Source) with 'lannet', and 'Network' (Destination) with 'all-nets'. All fields are dropdown menus.

Name: FTP_Shaping

Service: ftp-passthrough

Source Interface: lan

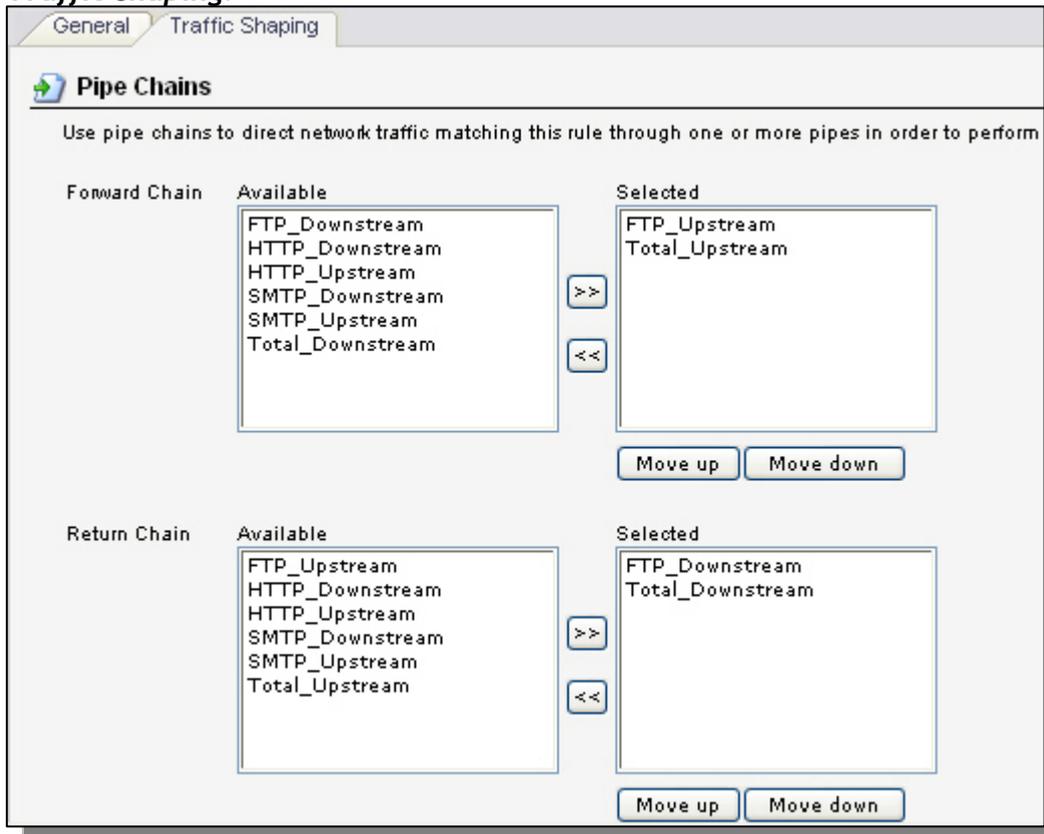
Source Network: lannet

Destination Interface: wan1

Destination Network: all-nets

In the Traffic Shaping tab:

Traffic Shaping:



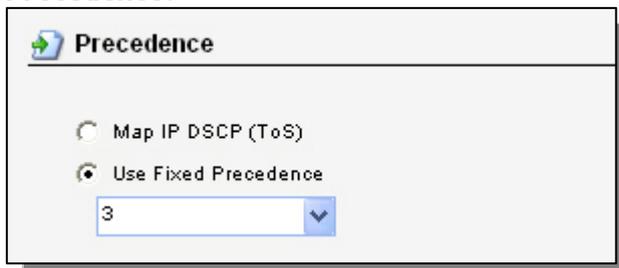
Selected Forward Chain: FTP_Upstream, Total_Upstream

Selected Return Chain: FTP_Downstream, Total_Downstream

Note:

The FTP Pipes (FTP_Upstream or FTP_Downstream) must be put upper on Total bandwidth commit rate (Total_Upstream or Total_Downstream).

Precedence:

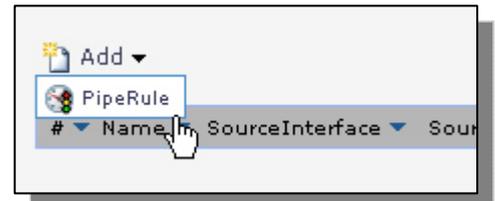


Use Fixed Precedence: 3

Click Ok.

4-4. Add a new PipeRule for Other protocols

In the General tab:



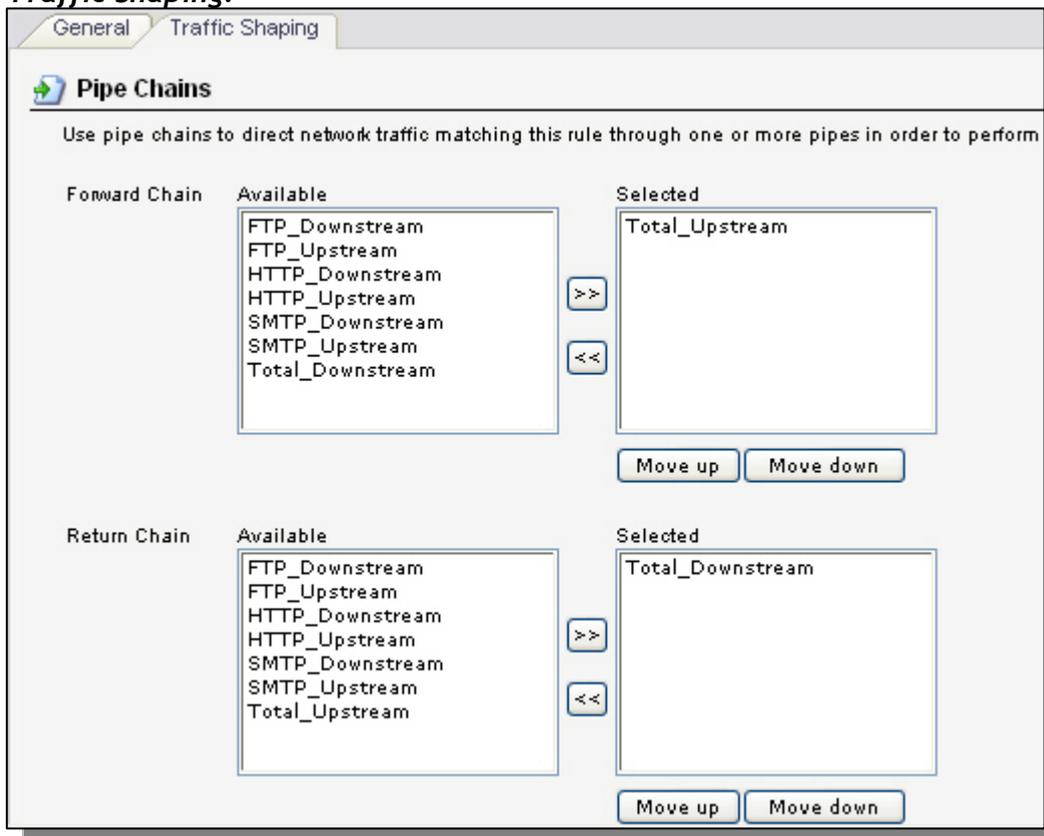
General:

A screenshot of the 'Other_Protocols' configuration page. The page has a blue header with a traffic light icon and the title 'Other_Protocols'. Below the header, there are two tabs: 'General' (selected) and 'Traffic Shaping'. Under the 'General' tab, there is a section titled 'General' with a traffic light icon and a description: 'A Pipe Rule determines traffic shaping policy - which Pipes to use - for one ruleset.' Below this, there are three fields: 'Name' (text input with 'Other_Protocols'), 'Service' (dropdown menu with 'all_services'), and 'Schedule' (dropdown menu with '(None)'). Below the 'General' section is another section titled 'Address Filter' with a description: 'Specify source interface and network, together with destination interface and network.' Below this, there are four fields: 'Interface' (Source: 'lan', Destination: 'wan1') and 'Network' (Source: 'lannet', Destination: 'all-nets').

Name: Other_Protocols
Service: all-services
Source Interface: lan
Source Network: lannet
Destination Interface: wan1
Destination Network: all-nets

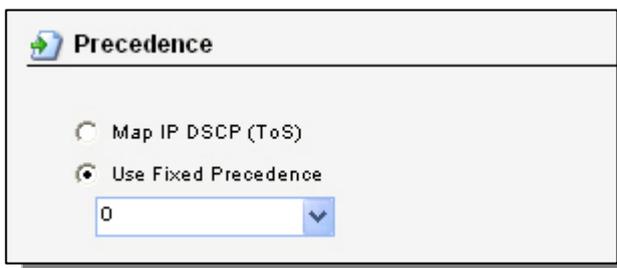
In the Traffic Shaping tab:

Traffic Shaping:



Selected Forward Chain: **Total_Upstream**
Selected Return Chain: **Total_Downstream**

Precedence:



Use Fixed Precedence: 0

Click Ok.

Make sure the PipeRule setting is shown as following screenshot then Save and activate the configuration

#	Name	SourceInterface	SourceNetwork	DestinationInterface	DestinationNetwork	Service
1	SMTP_Shaping	lan	lannet	wan1	all-nets	smtp
2	HTTP_Shaping	lan	lannet	wan1	all-nets	http-all
3	FTP_Shaping	lan	lannet	wan1	all-nets	ftp-passthrough
4	Other_Protocols	lan	lannet	wan1	all-nets	all_services