

Universal Software for NETSHe network devices

User Manual

Section 7. Bandwidth management and traffic prioritization

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Bandwidth management and traffic prioritization

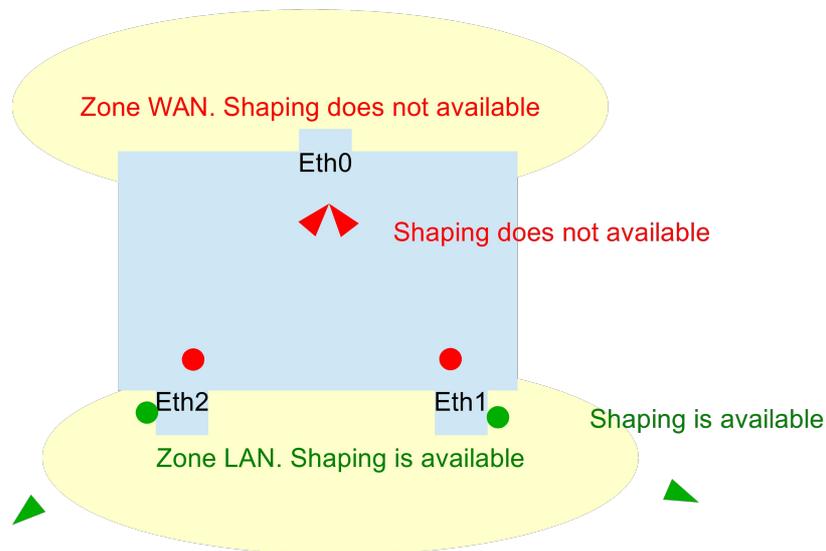
This unit deals with the issues of installation and setting of bandwidth management and traffic prioritization(QoS) in NETSHe.

Basics of QoS system in NETSHe

The following principles are essential for using QoS system:

- These rules can not be applied to the incoming interface traffic (frames/packets).
- The traffic can be shaped for both modes – bridging and routing modes.
- You can not shape traffic for the bridge interfaces. Only for the interfaces which are bridged.
- Firewall must be enabled to shape traffic in the routing mode.
- You can shape traffic, control quality of service (QOS) and manage bandwidth only for outgoing from the interface traffic.
- You can shape traffic only for interfaces which are assigned to the zone LAN.
- We use 4 level of traffic priorotization: Priority, Express, Normal and Low.
- We can assign one from 4 levels of traffic prioritization to each flow (class).
- We can use any combination of source mac-address, source ip-address/network, destination ip-address/network, protocol (include I7 protocol pattern) and destination ports to identify packets or frames, that going through interface, as flow (class).
- The MAC-addresses, SAP, PCP, VLAN ID values can be used for interfaces that are bridged only.
- The L7 protocols sequencies can be used for interfaces in routing mode only.
- We can assign CIR for each flow (class).
- The sum of all CIRs must be less or equal to output bandwidth of network interface.
- The uplink and downlink bandwidth for the interface must be specified. The specified bandwidth must be less or equal to the real interface's (or link) bandwidth. If the specified bandwidth is greater than real bandwidth, the QoS will work uncorrectly. Local noise which drops down the link bandwidth for wireless interfaces, makes QoS incorrect for the noise and recovery time.
- We use HTB to implement shaper.

Figure 1. Shaping schema



To do this, you can enable QoS for each interface, specify interface bandwidth, define traffic classes, priorities for each traffic class and allocate bandwidth for each class of traffic.

NETSHe measures bandwidth in kilobits per second.

Interface speed (both direction - uplink and downlink) must be specified first to enable shaping/QoS management per interface.

It should be noted, that specified speed will be used to do strong bandwidth limitation. E.g. if you will specify speed in 10000 Kilobits per second for the Fast Ethernet interface, you will never overcome this limit. It does not related to the configured (or not configured) traffic classes.

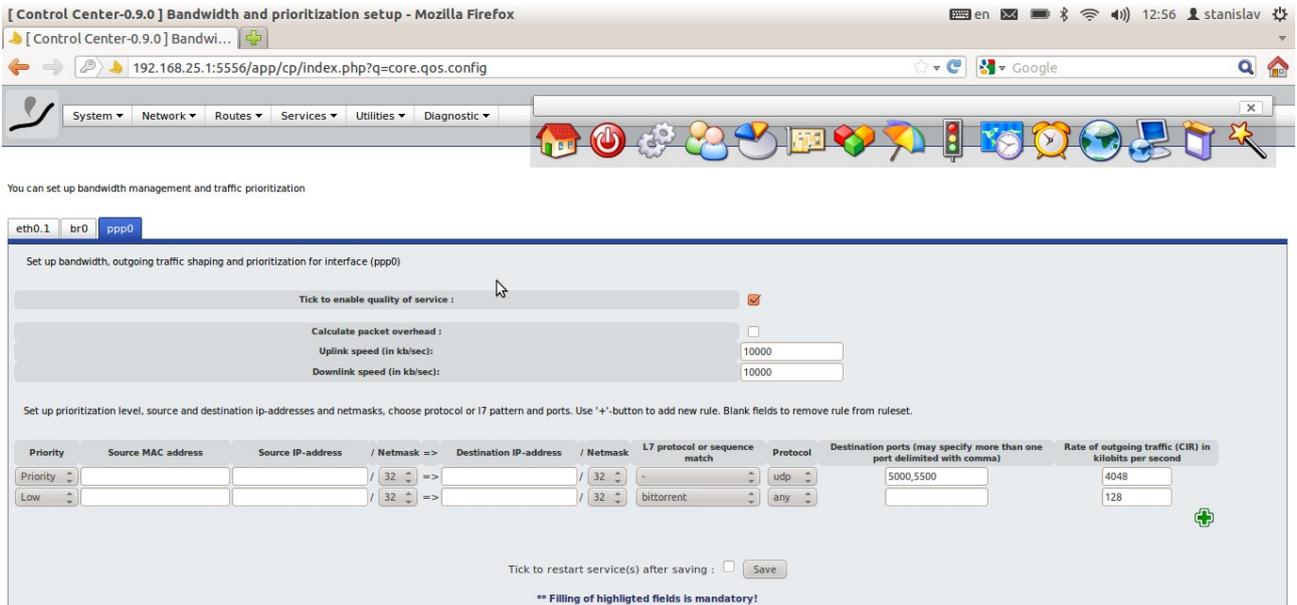
To setup traffic classes or flows, NETSHe uses four levels of traffic priority: Prior, Express, Normal and Low Prior. You can assign one of four priority levels for each flow.

You can use any combination of packet attributes (such as MAC-addresses, Destination and Source addresses, ports and protocol types) to specify managed packet flow. You can assign guaranteed bandwidth (CIR) for each flow.

The sum of all flow CIRs must not exceed the interface bandwidth.

NETSHe uses “HTB” scheduler for the QoS management. More information about HTB you can find at <http://luxik.cdi.cz/~devik/qos/htb/manual/userg.htm>

When you specify uplink speed/downlink speed for the interface, you create “Parent” class in terms of HTB. All flows in the NETSHe act as “Leaf” nodes/classes.
 When interface has unused bandwidth, it (unused bandwidth) can be shared between specified flows on the flow priority basis.



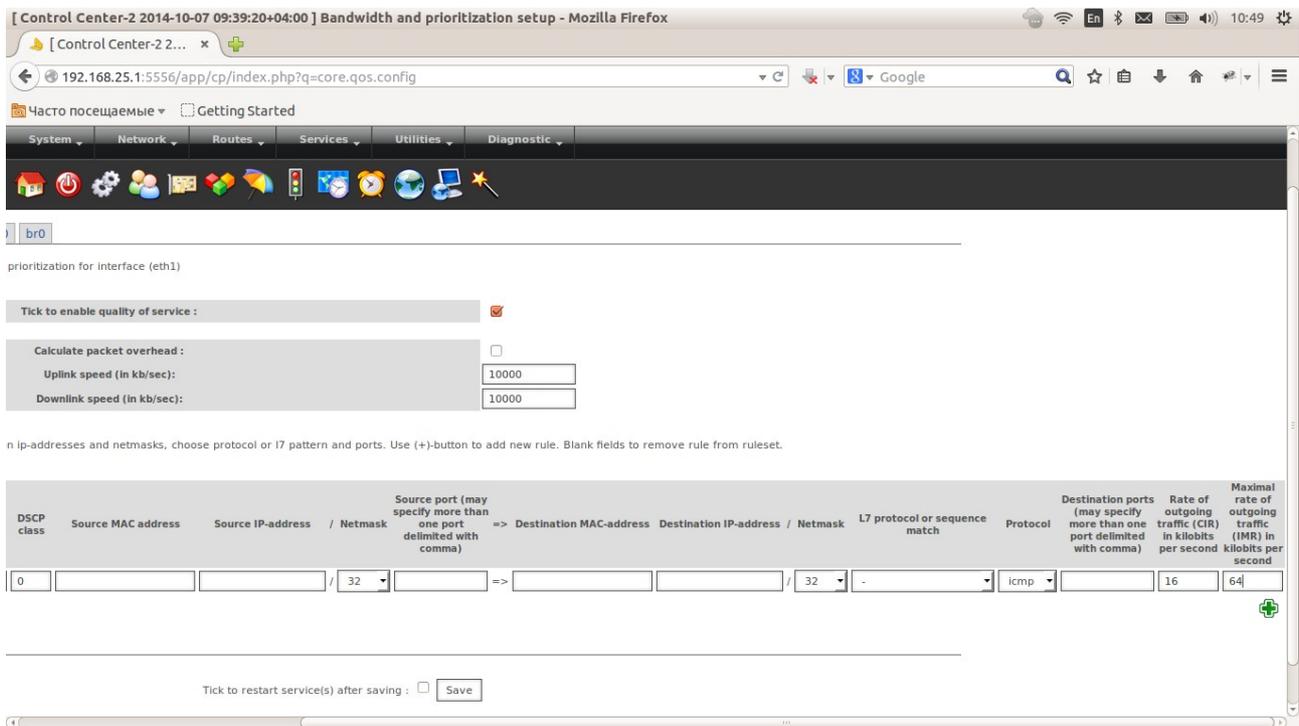
Setup samples.

How to prioritize ICMP traffic (pings) for the bridge ?

First, select the bridged interfaces.

In the sample it will be eth1 and bat0. Choose 'eth1' tab in the QoS configuration page (Menu 'Network->Bandwidth management and traffic prioritization').

Enable QoS for the interface. Specify real uplink/downlink bandwidth for the interface and setup one rule with the 'Express' priority as showed in the figure below.



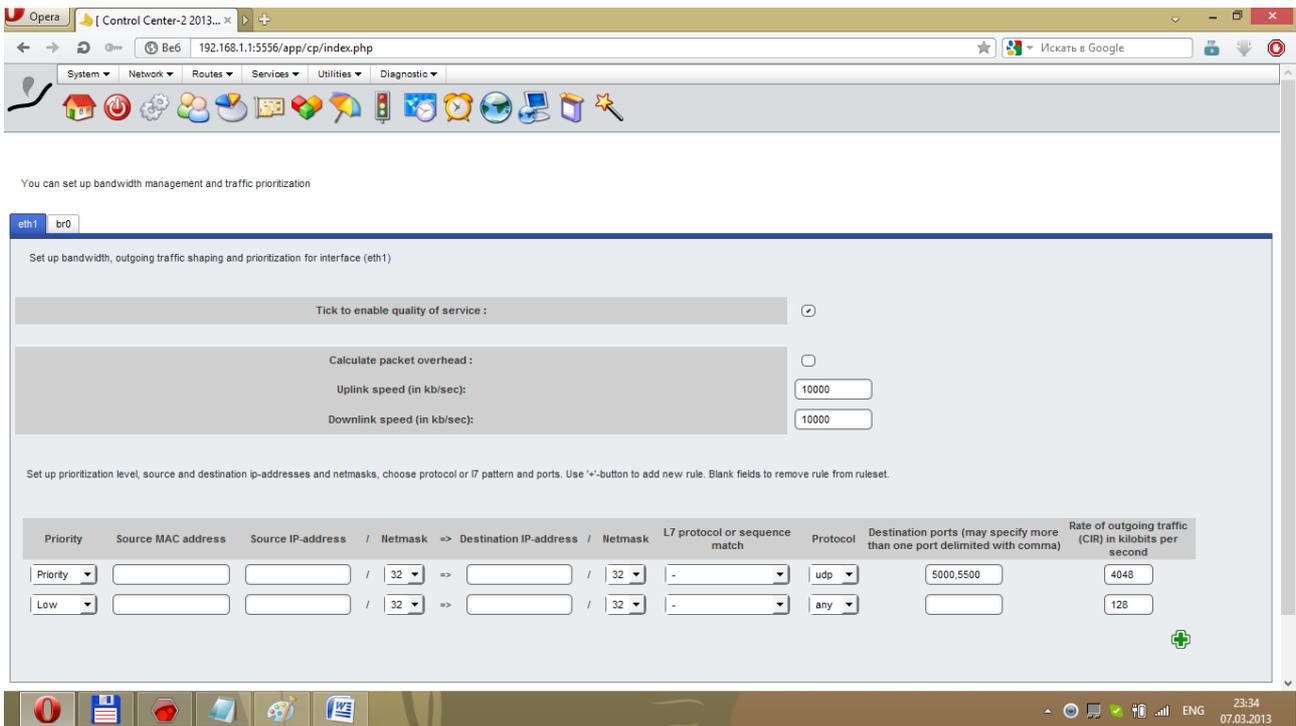
Make the same for the bat0 interface. Tick 'Apply' checkbox and press the 'Save' button.

The simplest example of QoS setting in NETSHe.

Task description.

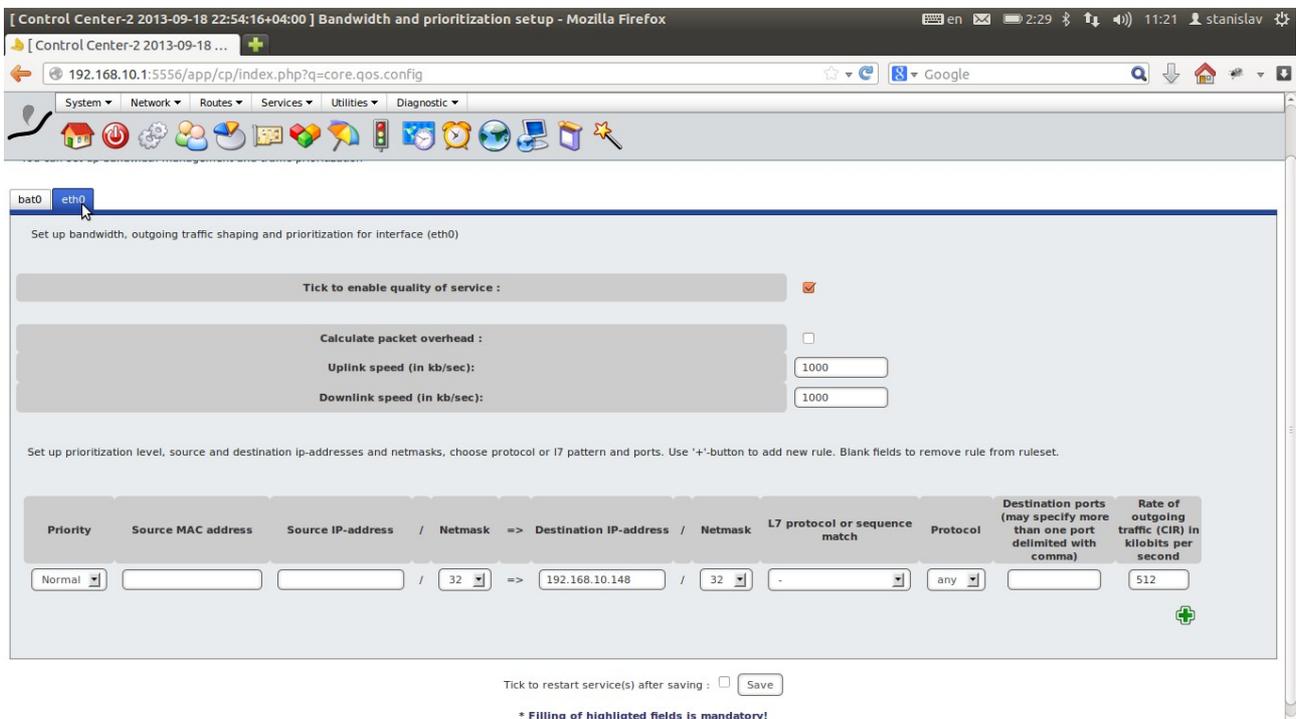
Setup priority transmission of voice packets (rtp-protocol with destination port numbers between 5000 and 6000) and specify the guaranteed bandwidth of 4MBit per second. Select the packets with bittorrent-protocol from the general flow and specify the lowest priority and bandwidth of 128 kilobit per second.

Setup process is illustrated in Fig. 4 and 5.



How to test shaping/QoS in NETSHe?

Please, connect to the eth0 port at least two PC. Setup NETSHe as showed in the Figure 3 (It is possible to use sample configuration files).



Setup one connected PC with ip-address 192.168.10.148/24 and second with ip-address 192.168.10.2/24 with Iperf servers enabled.

Initiate Iperf test connection to the 192.168.10.148. You will see around 1000 kilobits per

second throughput. Cancel Iperf test connection.

Initiate Iperf test connection to the 192.168.10.2. You will see around 1000 kilobits per second throughput. Cancel Iperf test connection.

Initiate Iperf test connection to the both PCs simultaneously. You will see around 512 kilobits per second throughput to each PC.

The screenshot shows the Mikrotik Control Center interface for configuring bandwidth and prioritization on the ppp0 interface. The page includes a navigation menu, a breadcrumb trail (eth0.1 > br0 > ppp0), and a main configuration area. The configuration area has a checkbox for 'Tick to enable quality of service' which is checked. Below this, there are input fields for 'Uplink speed (in kb/sec)' and 'Downlink speed (in kb/sec)', both set to 10000. A table for rule configuration is present, with columns for Priority, Source MAC address, Source IP-address / Netmask, Destination IP-address / Netmask, L7 protocol or sequence match, Protocol, Destination ports, and Rate of outgoing traffic (CIR) in kilobits per second. Two rules are listed: one with Priority 'Low', Source IP '32', Destination IP '32', Protocol 'bittorrent', and Rate '128'; and another with Priority 'Low', Source IP '32', Destination IP '32', Protocol 'udp', Destination ports '5000,5500', and Rate '4048'. A 'Save' button and a 'Tick to restart service(s) after saving' checkbox are at the bottom. A note states '** Filling of highlighted fields is mandatory!'.

You can set up bandwidth management and traffic prioritization

eth0.1 br0 ppp0

Set up bandwidth, outgoing traffic shaping and prioritization for interface (ppp0)

Tick to enable quality of service :

Calculate packet overhead :

Uplink speed (in kb/sec): 10000

Downlink speed (in kb/sec): 10000

Set up prioritization level, source and destination ip-addresses and netmasks, choose protocol or l7 pattern and ports. Use '+'-button to add new rule. Blank fields to remove rule from ruleset.

Priority	Source MAC address	Source IP-address / Netmask =>	Destination IP-address / Netmask	L7 protocol or sequence match	Protocol	Destination ports (may specify more than one port delimited with comma)	Rate of outgoing traffic (CIR) in kilobits per second
Low		/ 32 =>	/ 32 =>	bittorrent	any	5000,5500	128
					udp		4048

Tick to restart service(s) after saving : Save

** Filling of highlighted fields is mandatory!