



# BANDWIDTH

MANAGER WITH MIKROTIK 2.0





**I AM #ROOT**

**HELPING US TO FIND RIGHT PICTURES**

# ALEX VISHNYAKOV

- MIKROTIK TRAINER
- SPLYNX BILLING SOFTWARE
- BGP, OSPF, MPLS, OTHER MAGIC
- CISCO-JUNIPER-UBNT-HUAWEI
- RUSSIAN-CZECH-ENGLISH-SPANISH

Raccoon

# USED TOOLS



HARRIS

MARVEL

GUARDIAN  
OF THE GALAXY

# USED TOOLS

- MIKROTIK CHR
- VIRTUAL BOX
- EVE-NG LABS
- UBUNTU WITH SPLYNX
- MIKROTIK API



# Emulated Virtual Environment Next Generation

## Routers :

Mikrotik CHR - 6.39, 6.40, RC versior

Cisco XRv - IOS XR

Cisco CSR1000v - IOS XE

Juniper MX

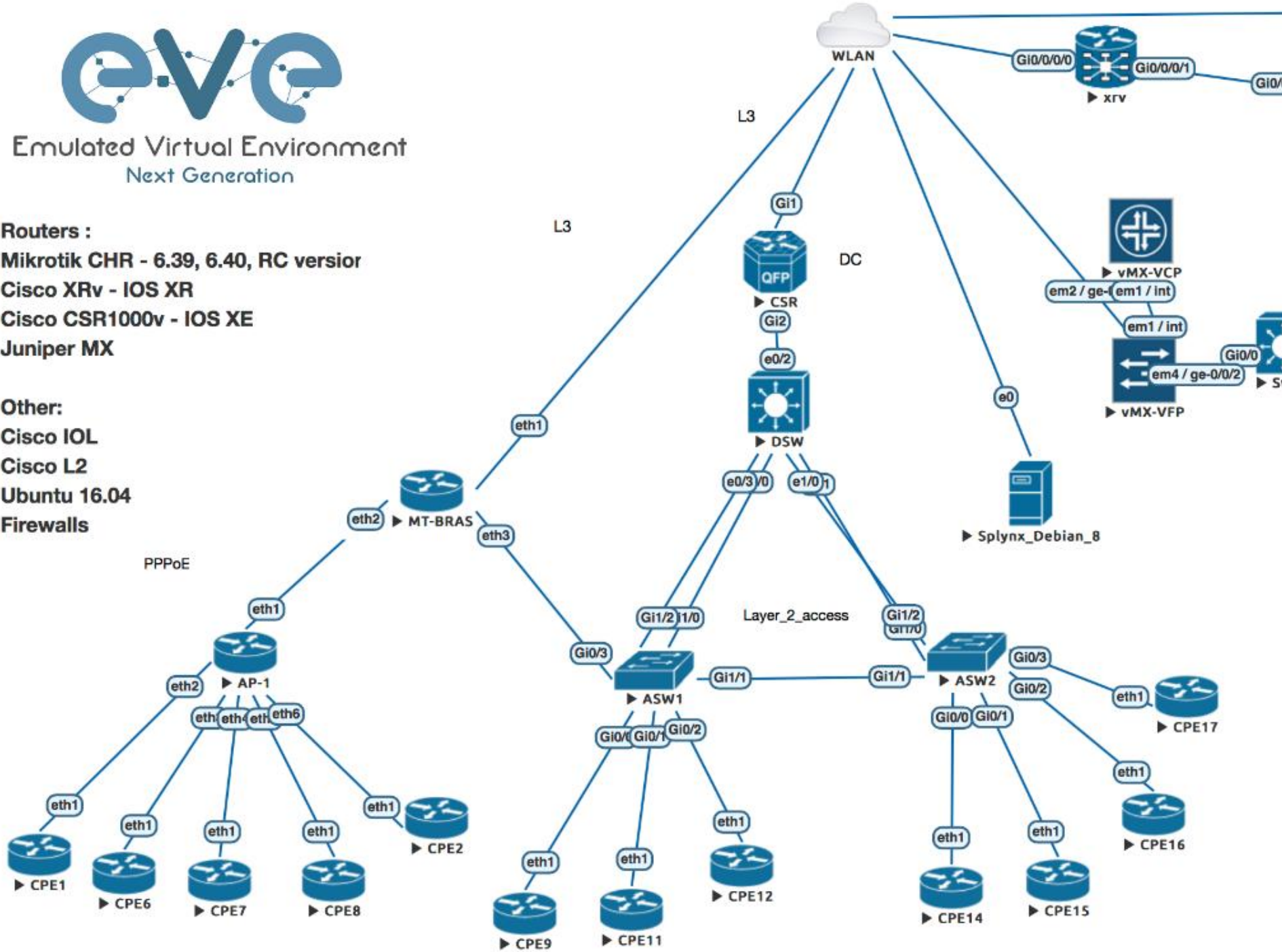
## Other:

Cisco IOL

Cisco L2

Ubuntu 16.04

Firewalls



**READY ?  
LET'S START !**



# **POLICING AND SHAPING**

**CHAINS, QUEUES**





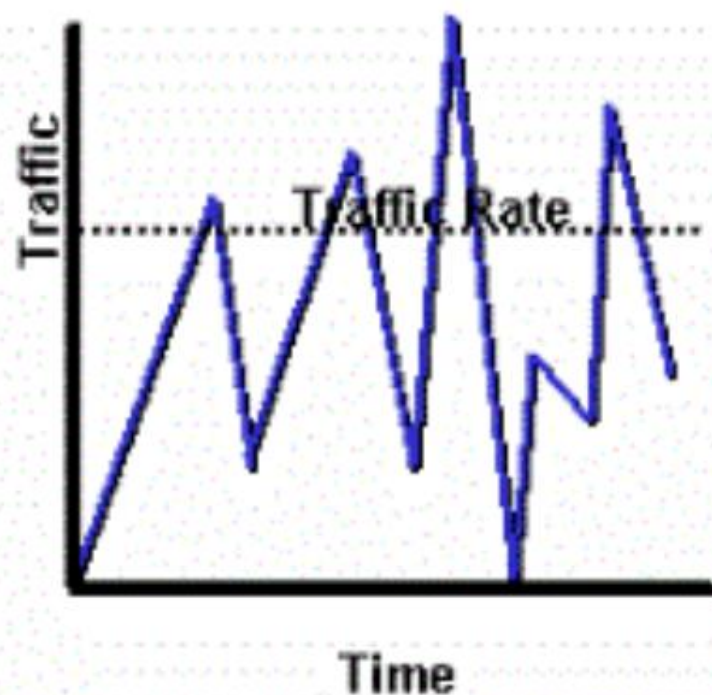
# POLITICS AND SHAKING

CeBIT

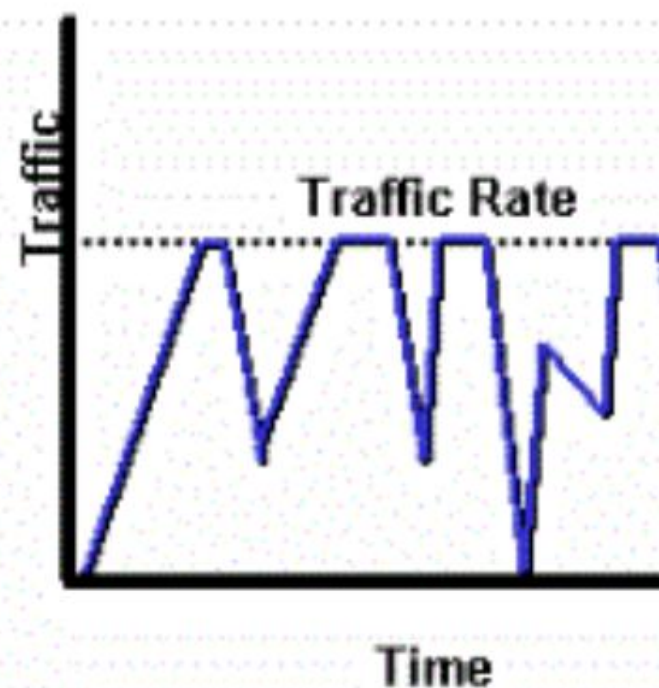


**POLITICIANS SHAKING CHAIN**

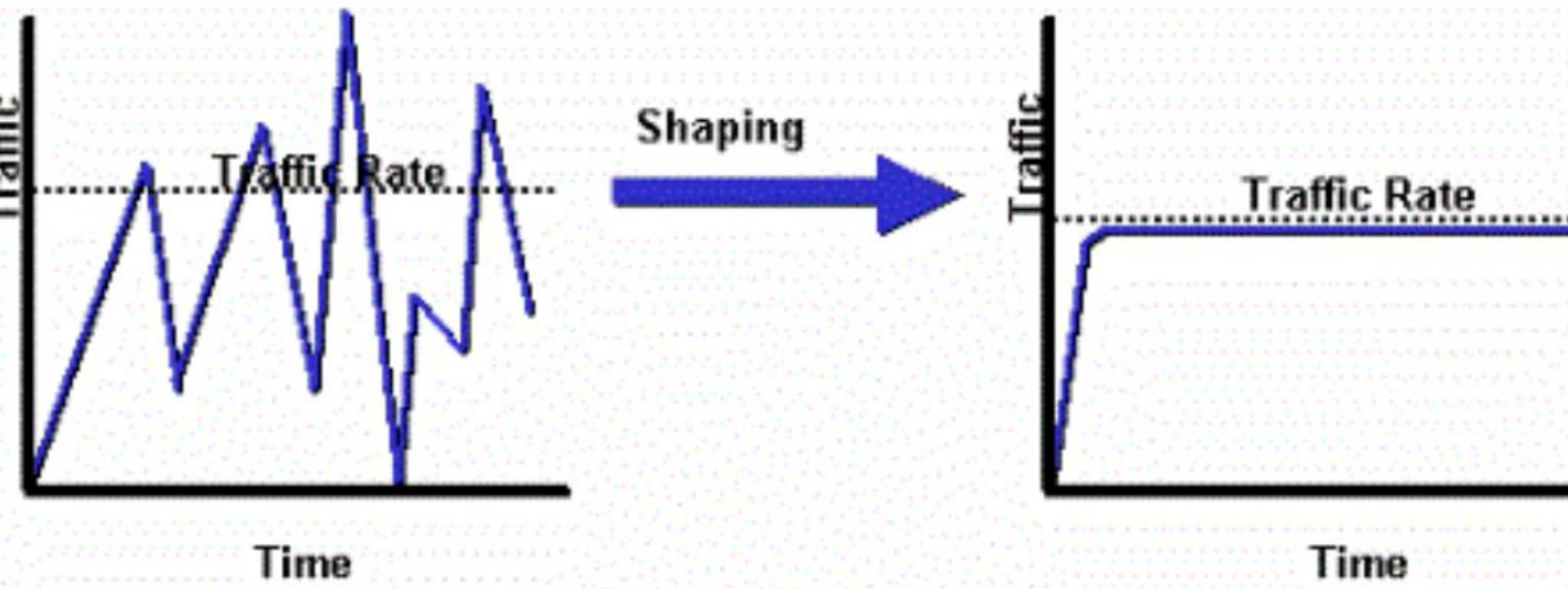
# POLICING



Policing →



# SHAPING



# POLICING

- **DROP PACKETS ABOVE ALLOWED LIMIT**
- **QUEUE SIZE = 1**
- **TCP RE-ESTABLISH**
- **UDP PACKETS ARE LOST**

PING

4

ms

DOWNLOAD

4.72

Mbps

UPLOAD

0.91

Mbps

SHARE



Result ID 7162649405

1. alexcherry@Alexs-MacBook-Pro: ~ (zsh)

```
bytes from 109.205.245.1: icmp_seq=29 ttl=55 time=16.850 ms
bytes from 109.205.245.1: icmp_seq=30 ttl=55 time=15.495 ms
bytes from 109.205.245.1: icmp_seq=31 ttl=55 time=16.115 ms
bytes from 109.205.245.1: icmp_seq=32 ttl=55 time=15.540 ms
bytes from 109.205.245.1: icmp_seq=33 ttl=55 time=15.151 ms
bytes from 109.205.245.1: icmp_seq=34 ttl=55 time=17.172 ms
request timeout for icmp_seq 35
bytes from 109.205.245.1: icmp_seq=36 ttl=55 time=15.916 ms
request timeout for icmp_seq 37
bytes from 109.205.245.1: icmp_seq=38 ttl=55 time=15.350 ms
bytes from 109.205.245.1: icmp_seq=39 ttl=55 time=15.482 ms
request timeout for icmp_seq 40
bytes from 109.205.245.1: icmp_seq=41 ttl=55 time=15.618 ms
bytes from 109.205.245.1: icmp_seq=42 ttl=55 time=15.123 ms
bytes from 109.205.245.1: icmp_seq=43 ttl=55 time=15.438 ms
```

```
109.205.245.1 ping statistics ---
35 packets transmitted, 35 packets received, 0% packet loss
round-trip min/avg/max/stddev = 15.123/15.892/20.629/1.008 ms
```

# POLICING 5 MBPS

⇌ PING

9

ms

↓ DOWNLOAD

11.62

Mbps

↑ UPLOAD

7.48

Mbps

SHARE



Result ID 7163338685



1. alexcherry@Alexs-MacBook-Pro: ~ (zsh)

```
4 bytes from 109.205.245.1: icmp_seq=19 ttl=56 time=14.097 ms
```

```
4 bytes from 109.205.245.1: icmp_seq=20 ttl=56 time=14.112 ms
```

```
4 bytes from 109.205.245.1: icmp_seq=21 ttl=56 time=14.074 ms
```

```
4 bytes from 109.205.245.1: icmp_seq=22 ttl=56 time=14.011 ms
```

```
4 bytes from 109.205.245.1: icmp_seq=23 ttl=56 time=14.011 ms
```

```
4 bytes from 109.205.245.1: icmp_seq=24 ttl=56 time=14.114 ms
```

```
4 bytes from 109.205.245.1: icmp_seq=25 ttl=56 time=14.162 ms
```

```
4 bytes from 109.205.245.1: icmp_seq=26 ttl=56 time=13.767 ms
```

```
4 bytes from 109.205.245.1: icmp_seq=27 ttl=56 time=13.398 ms
```

```
4 bytes from 109.205.245.1: icmp_seq=28 ttl=56 time=14.421 ms
```

```
4 bytes from 109.205.245.1: icmp_seq=29 ttl=56 time=13.403 ms
```

```
4 bytes from 109.205.245.1: icmp_seq=30 ttl=56 time=14.356 ms
```

```
4 bytes from 109.205.245.1: icmp_seq=31 ttl=56 time=14.145 ms
```

```
4 bytes from 109.205.245.1: icmp_seq=32 ttl=56 time=15.886 ms
```

```
4 bytes from 109.205.245.1: icmp_seq=33 ttl=56 time=14.926 ms
```

```
4 bytes from 109.205.245.1: icmp_seq=34 ttl=56 time=17.935 ms
```

```
4 bytes from 109.205.245.1: icmp_seq=35 ttl=56 time=14.191 ms
```

```
4 bytes from 109.205.245.1: icmp_seq=36 ttl=56 time=14.993 ms
```

# POLICING 20 MBPS

# SHAPING

- **PACKETS PUT TO QUEUE**
- **TAKEN OUT BY CPU\***
- **PACKET ORDER IS IMPORTANT**  
**= QUEUE TYPE (FIFO, PCQ...)**
- **SET CORRECT QUEUE SIZE**



PING

3

ms

DOWNLOAD

4.81

Mbps

UPLOAD

0.85

Mbps

SHARE



Result ID [7162667707](#)

1. alexcherry@Alexs-MacBook-Pro: ~ (zsh)

```
bytes from 109.205.245.1: icmp_seq=30 ttl=55 time=17.126 ms
bytes from 109.205.245.1: icmp_seq=31 ttl=55 time=323.043 ms
bytes from 109.205.245.1: icmp_seq=32 ttl=55 time=239.366 ms
bytes from 109.205.245.1: icmp_seq=33 ttl=55 time=126.419 ms
bytes from 109.205.245.1: icmp_seq=34 ttl=55 time=164.011 ms
bytes from 109.205.245.1: icmp_seq=35 ttl=55 time=365.411 ms
bytes from 109.205.245.1: icmp_seq=36 ttl=55 time=183.146 ms
bytes from 109.205.245.1: icmp_seq=37 ttl=55 time=371.995 ms
bytes from 109.205.245.1: icmp_seq=38 ttl=55 time=504.812 ms
bytes from 109.205.245.1: icmp_seq=39 ttl=55 time=509.404 ms
bytes from 109.205.245.1: icmp_seq=40 ttl=55 time=150.161 ms
quest timeout for icmp_seq 41
bytes from 109.205.245.1: icmp_seq=42 ttl=55 time=15.339 ms
bytes from 109.205.245.1: icmp_seq=43 ttl=55 time=16.207 ms
bytes from 109.205.245.1: icmp_seq=44 ttl=55 time=15.113 ms
```

# SHAPING 5 MBPS

```
- 109.205.245.1 ping statistics ---
```

```
packets transmitted, 43 packets received, 4.4% packet loss
```

```
round-trip min/avg/max/stddev = 15.113/127.486/572.786/143.050 ms
```

**PING** **DOWNLOAD** **UPLOAD** **SHARE**

9 14.32 9.28

ms Mbps Mbps





Result ID 7163331010

```
1. alexcherry@Alexs-MacBook-Pro: ~ (zsh)
```

```
bytes from 109.205.245.1: icmp_seq=31 ttl=56 time=18.144 ms
bytes from 109.205.245.1: icmp_seq=32 ttl=56 time=16.118 ms
bytes from 109.205.245.1: icmp_seq=33 ttl=56 time=20.938 ms
bytes from 109.205.245.1: icmp_seq=34 ttl=56 time=11.411 ms
bytes from 109.205.245.1: icmp_seq=35 ttl=56 time=31.170 ms
bytes from 109.205.245.1: icmp_seq=36 ttl=56 time=16.491 ms
bytes from 109.205.245.1: icmp_seq=37 ttl=56 time=22.359 ms
bytes from 109.205.245.1: icmp_seq=38 ttl=56 time=17.177 ms
bytes from 109.205.245.1: icmp_seq=39 ttl=56 time=14.292 ms
bytes from 109.205.245.1: icmp_seq=40 ttl=56 time=16.420 ms
bytes from 109.205.245.1: icmp_seq=41 ttl=56 time=25.011 ms
bytes from 109.205.245.1: icmp_seq=42 ttl=56 time=23.635 ms
bytes from 109.205.245.1: icmp_seq=43 ttl=56 time=31.156 ms
bytes from 109.205.245.1: icmp_seq=44 ttl=56 time=14.826 ms
bytes from 109.205.245.1: icmp_seq=45 ttl=56 time=16.882 ms
bytes from 109.205.245.1: icmp_seq=46 ttl=56 time=14.143 ms
bytes from 109.205.245.1: icmp_seq=47 ttl=56 time=14.191 ms
```

# SHAPING 20 MBPS

## DEFAULT SMALL (PPPOE)

⇌ PING 8 ms  
↓ DOWNLOAD 19.15 Mbps  
↑ UPLOAD 9.76 Mbps  
SHARE      
Result ID 7163336308

```
1. alexcherry@Alexs-MacBook-Pro: ~ (zsh)
4 bytes from 109.205.245.1: icmp_seq=23 ttl=56 time=68.823 ms
4 bytes from 109.205.245.1: icmp_seq=24 ttl=56 time=16.443 ms
4 bytes from 109.205.245.1: icmp_seq=25 ttl=56 time=55.966 ms
4 bytes from 109.205.245.1: icmp_seq=26 ttl=56 time=41.151 ms
4 bytes from 109.205.245.1: icmp_seq=27 ttl=56 time=37.449 ms
4 bytes from 109.205.245.1: icmp_seq=28 ttl=56 time=58.169 ms
4 bytes from 109.205.245.1: icmp_seq=29 ttl=56 time=71.563 ms
4 bytes from 109.205.245.1: icmp_seq=30 ttl=56 time=41.212 ms
4 bytes from 109.205.245.1: icmp_seq=31 ttl=56 time=43.749 ms
4 bytes from 109.205.245.1: icmp_seq=32 ttl=56 time=45.261 ms
4 bytes from 109.205.245.1: icmp_seq=33 ttl=56 time=72.241 ms
4 bytes from 109.205.245.1: icmp_seq=34 ttl=56 time=68.991 ms
4 bytes from 109.205.245.1: icmp_seq=35 ttl=56 time=72.967 ms
4 bytes from 109.205.245.1: icmp_seq=36 ttl=56 time=63.182 ms
4 bytes from 109.205.245.1: icmp_seq=37 ttl=56 time=46.526 ms
4 bytes from 109.205.245.1: icmp_seq=38 ttl=56 time=14.470 ms
4 bytes from 109.205.245.1: icmp_seq=39 ttl=56 time=14.332 ms
4 bytes from 109.205.245.1: icmp_seq=40 ttl=56 time=18.208 ms
```

**SHAPING 20 MBPS FIXED**  
**SET QUEUE SIZE = 50 PACKETS**

# SHAPING

QUEUES, HTB, PCQ



# WHAT TO MANAGE

- **LIMIT CUSTOMER'S SPEED**
- **ALLOCATE BANDWIDTH TO APPLICATIONS**
- **PRIORITY FOR TYPE OF TRAFFIC**



**IT'S ALL ABOUT QUEUES**

# MIKROTIK SHAPING



**1. QUEUE TREE**

**2. Q.TREE : PCQ + ADD.LIST**

**3. SIMPLE QUEUE**

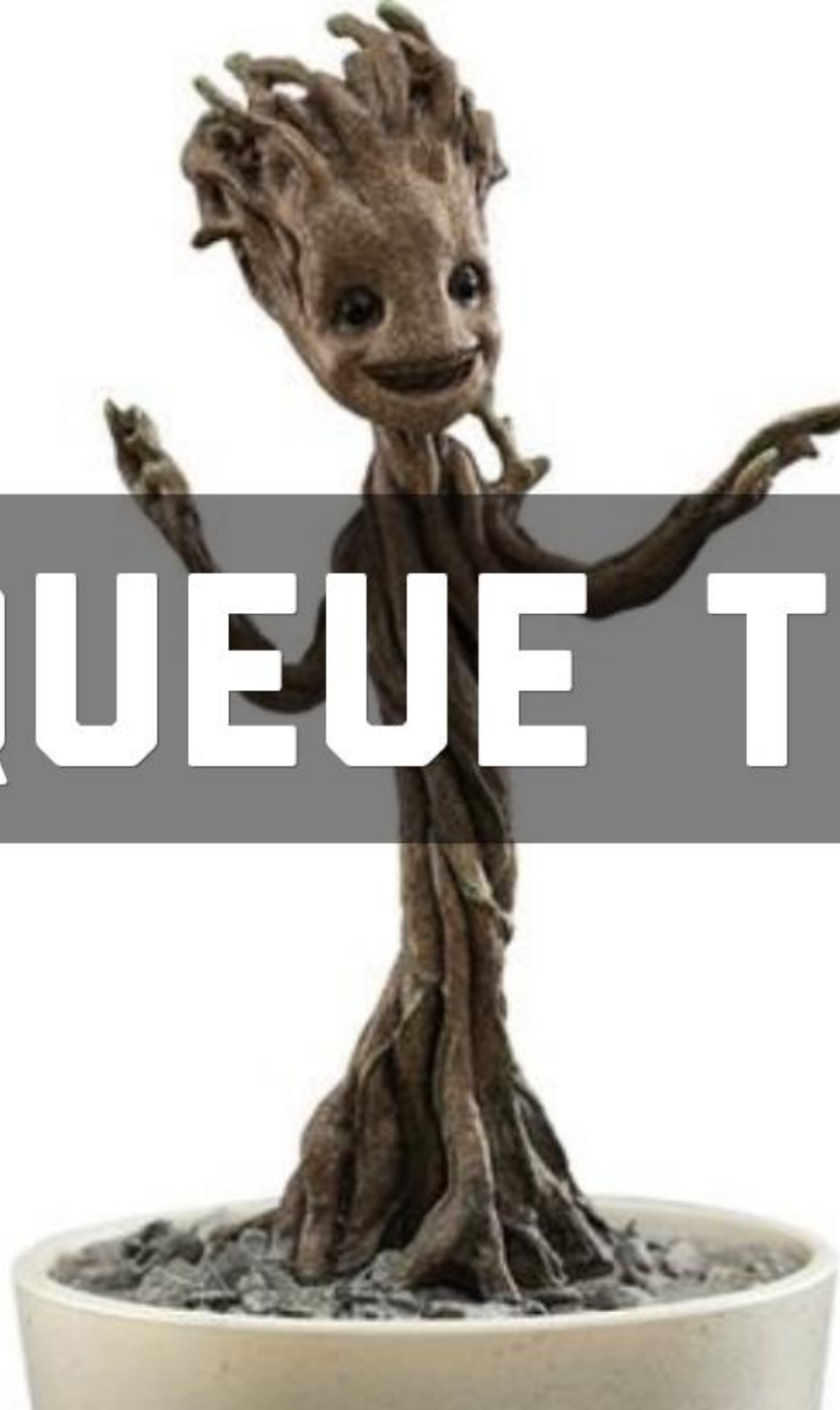
**4. SIMPLE QUEUE +  
PARENTS**

A small, brown, tree-like creature with a smiling face and large eyes, standing in a white pot. The creature has a thick, gnarled trunk and a head that looks like a cluster of roots or branches. It is positioned in the center of the image, with its arms slightly outstretched. A dark grey horizontal band is overlaid across the middle of the image, containing the text "1. CUTE TREE" in white, bold, sans-serif font.

# 1. CUTE TREE



# 1. QUEUE TREE

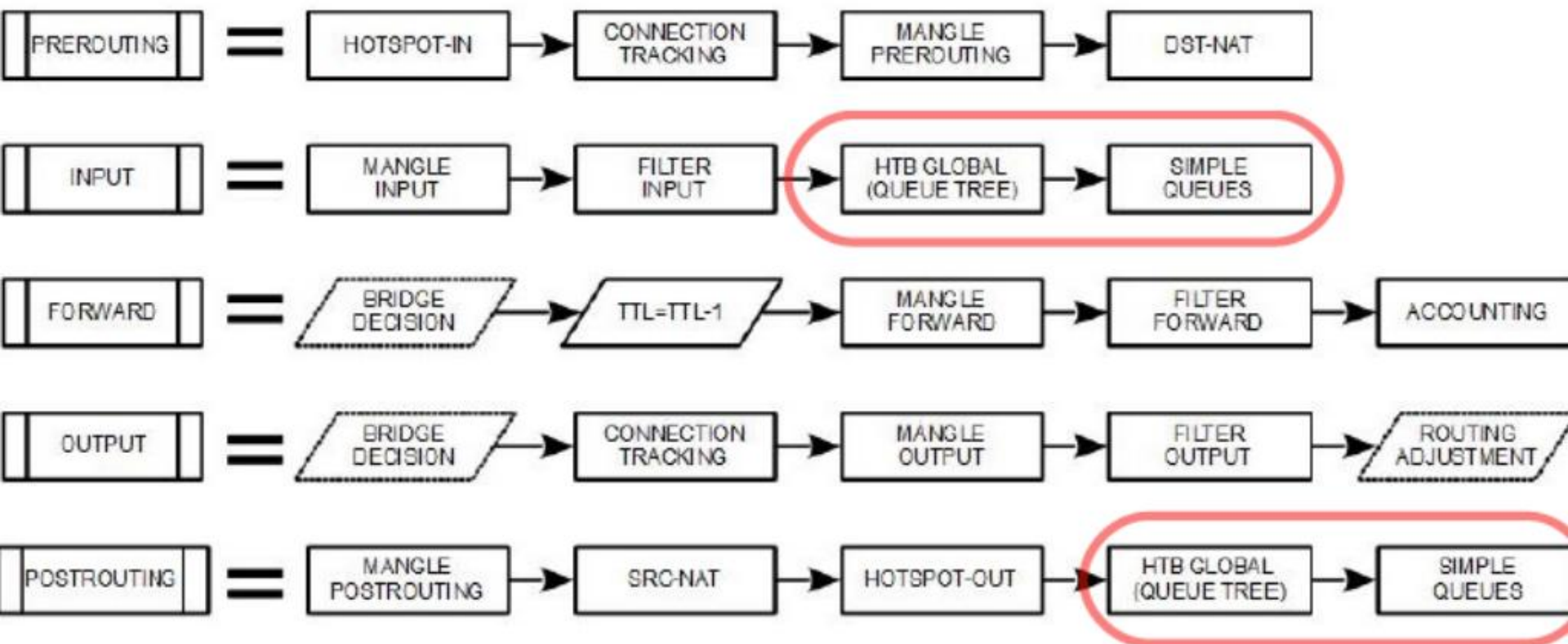


# 1. QUEUE TREE

- NEED TO MANGLE ALL (SLOW)
- TREE WITH MULTIPLE LEVELS
- USE IT FOR TRAFFIC TYPE PRIORITISATION
- HTB GLOBAL IS USED FOR QUEUES

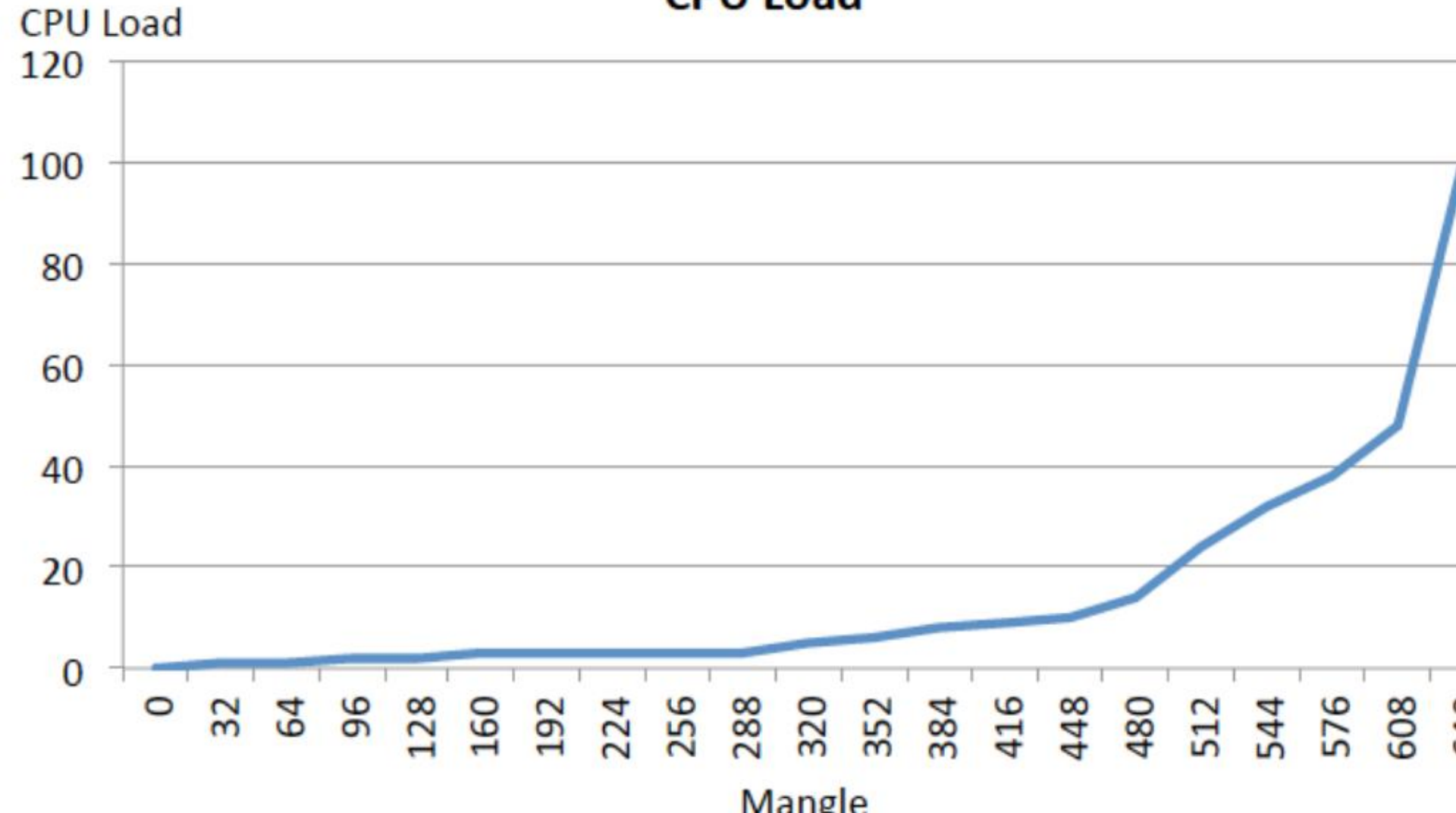


# HTB in RouterOS v6



# Graphs

## CPU Load



# 640 mangles → 100% CPU load

Memory: 3561.8 MB Uptime: 19:34:5 CPU: 100% Hide Passwords

Name	Tx	Rx	Tx Pac...	Rx Pac...	Tx Dro...
ether6	178.0 Mbps	176.2 Mbps	40 451	40 022	
ether1	176.2 Mbps	178.1 Mbps	40 023	40 453	
bridge-re...	713.3 kbps	36.6 kbps	68	76	
ether12	666.0 kbps	55.4 kbps	65	90	
ether11	15.5 kbps	31.3 kbps	27	3	
ether10	15.0 kbps	22.3 kbps	26	2	
ether2	0 bps	0 bps	0	0	
ether3	0 bps	0 bps	0	0	
ether4	0 bps	0 bps	0	0	
ether5	0 bps	0 bps	0	0	
ether7	0 bps	0 bps	0	0	
ether8	0 bps	0 bps	0	0	
ether9	0 bps	0 bps	0	0	
sfpl	0 bps	0 bps	0	0	
sfp2	0 bps	0 bps	0	0	
sfpc	0 bps	0 bps	0	0	

Name	Parent	Packet...	Limit At (...)	Max Limit...	Avg. R...	Queued Bytes
queue-ds...	global	packet...		20M	0 bps	0
queue-ds...	global	packet...		20M	0 bps	0
queue-ds...	global	packet...		20M	0 bps	0
queue-ds...	global	packet...		20M	0 bps	0
queue-ds...	global	packet...		20M	0 bps	0
queue-ds...	global	packet...		20M	0 bps	0
queue-ds...	global	packet...		20M	0 bps	0
queue-ds...	global	packet...		20M	0 bps	0
queue-ds...	global	packet...		20M	0 bps	0
queue-ds...	global	packet...		20M	0 bps	0
queue-ds...	global	packet...		20M	0 bps	0
queue-ds...	global	packet...		20M	0 bps	0
queue-ds...	global	packet...		20M	0 bps	0
queue-ds...	global	packet...		20M	0 bps	0
queue-ds...	global	packet...		20M	0 bps	0
queue-ds...	global	packet...		20M	0 bps	0

CPU	Load ...	IRQ (%)
cpu0	100	99
cpu1	100	99
cpu2	100	100
cpu3	100	96
cpu4	100	100
cpu5	100	100
cpu6	100	100
cpu7	100	100
cpu8	100	100
cpu9	100	100
cpu10	100	100
cpu11	100	100
cpu12	100	99
cpu13	100	100
cpu14	100	100
cpu15	100	100
cpu16	100	100
cpu17	100	100
cpu18	100	100
cpu19	100	100
cpu20	100	99
cpu21	100	100
cpu22	100	100
cpu23	100	99
cpu24	100	100
cpu25	100	100
cpu26	100	100
cpu27	100	100
cpu28	100	100
cpu29	100	100
cpu30	100	95
cpu31	100	99
cpu32	100	100
cpu33	100	100
cpu34	100	97
cpu35	100	100

Action	Chain	Src. Address	Dst. Address	Prot...	Src. Port	Dst. Port	In. Int...	Out...
ma...	pre-routing		172.16.0.68					
ma...	pre-routing	172.16.0.67						
ma...	pre-routing		172.16.0.67					
ma...	pre-routing	172.16.0.66						
ma...	pre-routing		172.16.0.66					
ma...	pre-routing	172.16.0.65						
ma...	pre-routing		172.16.0.65					
ma...	pre-routing	172.16.0.64						
ma...	pre-routing		172.16.0.64					
ma...	pre-routing	172.16.0.63						
ma...	pre-routing		172.16.0.63					
ma...	pre-routing	172.16.0.62						
ma...	pre-routing		172.16.0.62					
ma...	pre-routing	172.16.0.61						
ma...	pre-routing		172.16.0.61					
ma...	pre-routing	172.16.0.60						
ma...	pre-routing		172.16.0.60					

Name	Usage
bridging	0.0
firewall	95.4
flash	0.0
idle	0.0
management	0.1
networking	3.8
profiling	0.3
routing	0.0
undclassified	0.0
winbox	0.0

A close-up shot of Groot, the tree-like character from Guardians of the Galaxy. He is looking down at a control panel with several buttons and levers. The background is a dark, blue, out-of-focus space environment.

**SHOWTIME**

A promotional image for a technical presentation. It features Rocket Raccoon and Groot from the movie Guardians of the Galaxy. Rocket is on the left, holding a large, futuristic blaster. Groot is on the right, with his mouth wide open in a shout or roar. The background is a blurred, blue-toned industrial or space environment. A dark horizontal band across the middle contains white text.

## 2. PCQ + ADDRESS LIST

IMPROVED QUEUE TREE

## **2. PCQ + ADDRESS LIST**

- **REALLY LESS MANGLES**
- **INTERNAL PCQ SUB QUEUES**
- **FAST ON X86 WITH POWERFUL CORES**
- **USED A LOT IN ROUTER OS 5.X**
- **FOR CCR NOT A GOOD OPTION**



## **2. CCR LIMITATION :**

- **ONLY ONE CPU CORE CAN TAKE PACKETS OUT FROM HTB TREE**
- **MIKROTIK IS WORKING ON POSSIBLE UPDATE OF HTB ALGORITHM, OR INTRODUCING COMPLETELY NEW METHOD (V 7.0 ?)**
- **USE INTERFACE HTB AS MUCH AS POSSIBLE TO OFFLOAD TRAFFIC FROM HTB "GLOBAL" OR ... -> USE SIMPLE QUEUES**

A close-up shot of Groot, the tree-like character from Guardians of the Galaxy. He is looking directly at the camera with a wide-eyed, curious expression. His hands are raised, holding onto the top of a dark, curved structure. The background is a bright, glowing orange and yellow, suggesting a fiery or high-energy environment. The overall scene is dynamic and visually striking.

**SHOWTIME**

A full-body image of Drax the Destroyer from the movie Guardians of the Galaxy. He is a muscular, bald man with extensive orange and red tribal-style tattoos covering his face and torso. He is wearing blue tactical pants with a black belt. He stands with his arms crossed against a plain white background.

# 3. SIMPLE QUEUE

# 3. SIMPLE QUEUE

- **STILL SEQUENTIAL IN 6.X**
- **MATCHING ALGORITHM UPDATED**
- **VERY FAST IN CCR AND 6.X**
- **MULTIPLE CORE SUPPORT**
- **CAN BE USED WITH RADIUS**

# 3. SIMPLE QUEUE RADIUS

- **AUTOMATIC CREATION**
- **RADIUS ATTRIBUTES USED**
- **ALLOWS TO CHANGE SPEEDS ON FLY (COA SUPPORT)**
- **ALLOWS CAP AND FUP IMPLEMENTATION**



Queue List

Simple Queues | Interface Queues | Queue Tree | Queue Types

+ - ✓ ✗ 📁 🗑️

00 Reset Counters 00 Reset All Counters

Find

#	Name	Target	Upload Max Limit	Download Max Limit	Packet Marks	Total Max Limit (b...
;;; 221092						
1...	SpL5Q_3949-5068	10.25.5.86	720k	920k		
;;; 221091						
1...	SpL5Q_3945-4972	10.25.5.85	720k	920k		
;;; 245634						
1...	SpL5Q_3944-4930	10.26.0.10	720k	920k		
;;; 003937						
996	SpL5Q_3938-4906	10.25.6.144	720k	920k		
;;; 251631						
1...	SpL5Q_3926-5401	10.25.1.159	920k	1520k		
;;; 003924						
984	SpL5Q_3924-4828	10.25.5.84	720k	920k		
;;; 251630						
983	SpL5Q_3923-4827	10.25.1.97	720k	920k		
;;; 251629						
981	SpL5Q_3922-4824	10.25.1.90	720k	920k		
;;; 265858						
973	SpL5Q_3920-4815	10.25.6.14	720k	920k		
;;; 003919						
1...	SpL5Q_3919-4983	10.25.5.50	720k	920k		
;;; 003917						
1...	SpL5Q_3917-5043	10.26.0.212	2048k	2048k		
;;; 002302						
1...	SpL5Q_3913-5501	10.25.1.206	1024k	1024k		
;;; 003911						
1...	SpL5Q_3911-4962	10.26.0.211	920k	1520k		
;;; 003908						
958	SpL5Q_3908-4753	10.25.7.177	360k	460k		
;;; 003907						
956	SpL5Q_3907-4750	10.25.7.176	360k	460k		
;;; 003903						
948	SpL5Q_3904-4733	10.26.0.207	360k	460k		
;;; 003901						
939	SpL5Q_3901-4570	10.26.0.210	360k	460k		
;;; 251628						
934	SpL5Q_3898-4561	10.25.1.103	720k	920k		

2251 items (1 selected)

0 B queued

0 packets queued

Profile (Running)

Name	Usage
idle	64.9
firewall	17.0
queuing	10.5
networking	3.2
traffic-accounting	0.9
management	0.8
ethernet	0.5
bridging	0.4
ppp	0.3
profiling	0.2
radius	0.2
routing	0.2
unclassified	0.2
firewall-mgmt	0.0
logging	0.0
winbox	0.0

# 300 MBPS, 2K QUEUES

Resources

Free Memory:	15.0 GiB
Total Memory:	15.9 GiB
CPU:	tilegx
CPU Count:	36
CPU Frequency:	1200 MHz
CPU Load:	12 %
Free HDD Space:	876.4 MiB
Total HDD Size:	1024.0 MiB

# 3. SIMPLE QUEUE

- CCR 1036 IN PRODUCTION :
- 1400 PPPOE SESSIONS/QUEUES
- 1.2 DOWN/0,8 UP GBPS
- 80-90% CPU USAGE
- RADIUS CREATED QUEUES



# 3. SIMPLE QUEUE

- CCR 1072 IN PRODUCTION :
- UP TO 3000 PPPOE AND QUEUES
- 2,5 DOWN / 1,5 UP GBPS
- 80-90% CPU USAGE
- RADIUS CREATED QUEUES

Location:

All

Partn

# 3. SIMPLE QUEUE - DEPLOYMENT

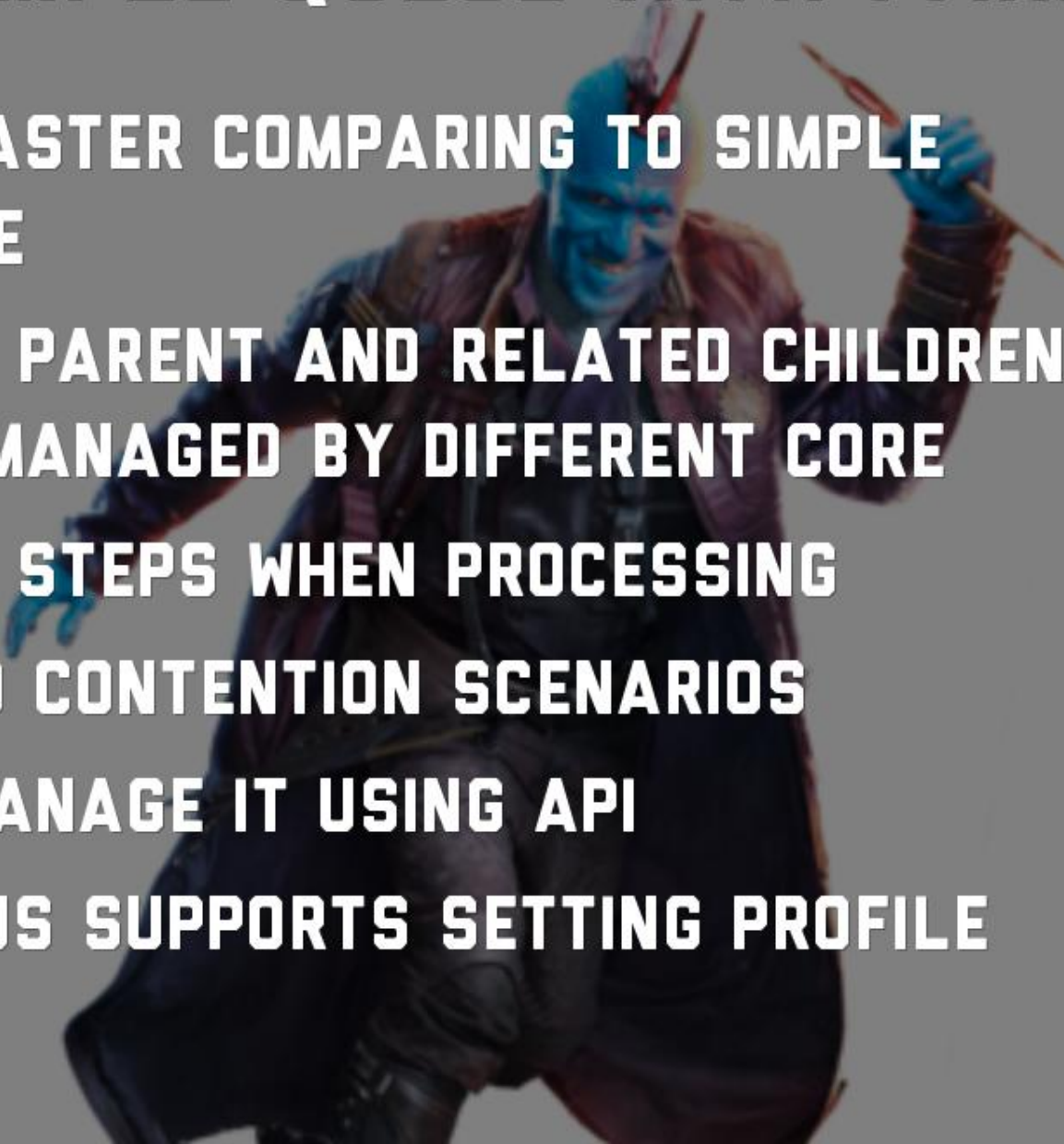
## Routers

	Producer/Model		Status		Customers online
	1036-8G-2S+-EM		Radius		1101
	1036-8G-2S+-EM		Radius		1066
	1036-8G-2S+-EM		Radius		1065
	1036-8G-2S+-EM		Radius		1059
	1036-8G-2S+-EM		Radius		986
	CCR1072-1G-8S+		Radius		0

A full-page background image of the character Star-Lord from the movie Guardians of the Galaxy. He is shown from the waist up, wearing his signature red leather jacket and blue pants. He has a confident, slightly mischievous expression, with a small red and white feather sticking out of his forehead. He is holding a golden arrow in his right hand, pointing it upwards. The background is a plain, light color.

# **4. SIMPLE QUEUE WITH PARENT FASTEST SHAPING ON CCR**

# 4. SIMPLE QUEUE WITH PARENT

- 9X FASTER COMPARING TO SIMPLE QUEUE
  - EACH PARENT AND RELATED CHILDREN ARE MANAGED BY DIFFERENT CORE
  - LESS STEPS WHEN PROCESSING
  - BUILD CONTENTION SCENARIOS
  - WE MANAGE IT USING API
  - RADIUS SUPPORTS SETTING PROFILE
- 
- A blue-skinned character, likely a warrior or mage, is shown in a dynamic, forward-leaning pose. He wears a dark, textured coat and has a staff or wand held in his right hand. The background is a solid, dark grey color.

# CONTENTION PER PLAN

- 5 MBPS PLAN 1:5 CONTENTION
- DEFINE LIMIT-AT (1024 KBPS)
- CENTRAL SHAPING
- MAX. 128 IPS UNDER ONE PARENT

# **CONTENTION PER SECTOR**

- **DEFINE SECTOR MAX SPEEDS**
- **PUT CUSTOMERS UNDER SECTORS**
- **10 MBPS SECTOR WITH 5 CUSTOMERS**
- **EACH CUSTOMER CAN HAVE DIFFERENT SPEED**

A close-up shot of Baby Groot from the movie Guardians of the Galaxy. He is standing on a reflective surface, looking slightly to the right with a happy expression. His arms are raised, and he has a small tuft of hair on his head. The background is a blurred mix of warm orange and yellow lights on the left and cooler green and blue lights on the right.

**SHOWTIME**

# QOS AND ROUTEROS



**OVERLOADED ?**



**WHERE TO SET QOS (L7, TCP/UDP) ?**

**1. ON CENTRAL NAS**

**2. ON ACCESS POINT**

**3. ON CPE**

# **WHERE TO SET QOS ?**

- 1. CENTRAL NAS NEEDS MAIN PARENT WITH MAX LIMIT**
- 2. ACCESS POINTS WE USE IN BRIDGE MODE, PERFORMANCE**
- 3. WE CHOOSE QOS ON CPE**

# WHERE TO SET USER SHAPING ?

- WE RECOMMEND AUTOMATIC AND CENTRAL APPROACH
- PPPOE SERVERS
- IPOE, DHCP DEFAULT GW
- CAN BE ON ACCESS POINTS

**THAT'S ALL !**



# THANK YOU

- FOR YOUR TIME
- MIKROTIK FOR ROUTEROS
- VALENS RIYADI FOR FEW SLIDES
- #ROOT FOR PICTURES :-)

# CONTACTS

- **ALEX@SPLYNX.COM**
- **SPLYNX.COM**
- **ISP-SERVIS.COM**
- **FACEBOOK AND TWITTER :**  
**ISPFRAFRAMEWORK**

**QUESTIONS ?**

