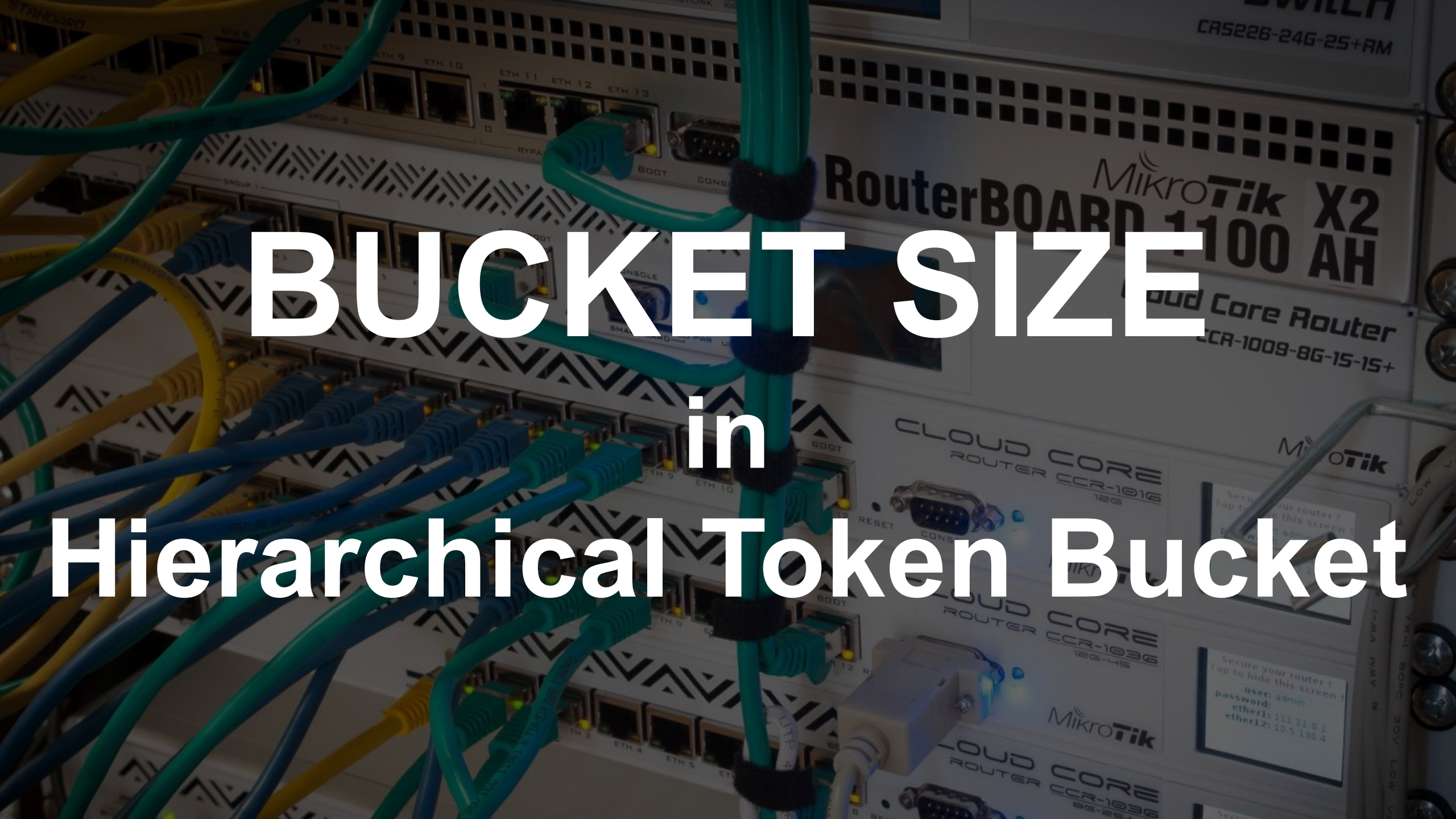

MikroTik
MUM Indonesia 2017
Yogyakarta, 27-28 Oct




# BUCKET SIZE
# in
# Hierarchical Token Bucket

# Ahmad Rosid Komarudin

## Experience

- SMK IDN Madinatul Ilmi
- ID-Networkers

## Certification

- MTCNA, MTCRE, MTCWE, MTCUME, MTCINE
- Mikrotik Certified Trainer
- Others Certificate

# SMK Negeri 1 Nglegok


# Pesantren IDN

# About ID-Networkers


Rofiq Fauzi, Oky Tria Saputra, Ikhwanul Kurnia Rahman, Farras Afif Perdana, Untung Wahyudi, Ahmad Rosid / ID-Networkers

Rating: 4.9/5 (1424 votes)

Average student result: 69%

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# About IDNFoundation.org



# Objective

- Traffic shaping?
- Hierarchical Token Bucket
- Hirarchical in HTB
- Bucket Size in HTB
- Bucket Size in Hotspot Network
- Bucket Size vs Burst

# Traffic Shaping?


Usage without shaping.

# Traffic Shaping?

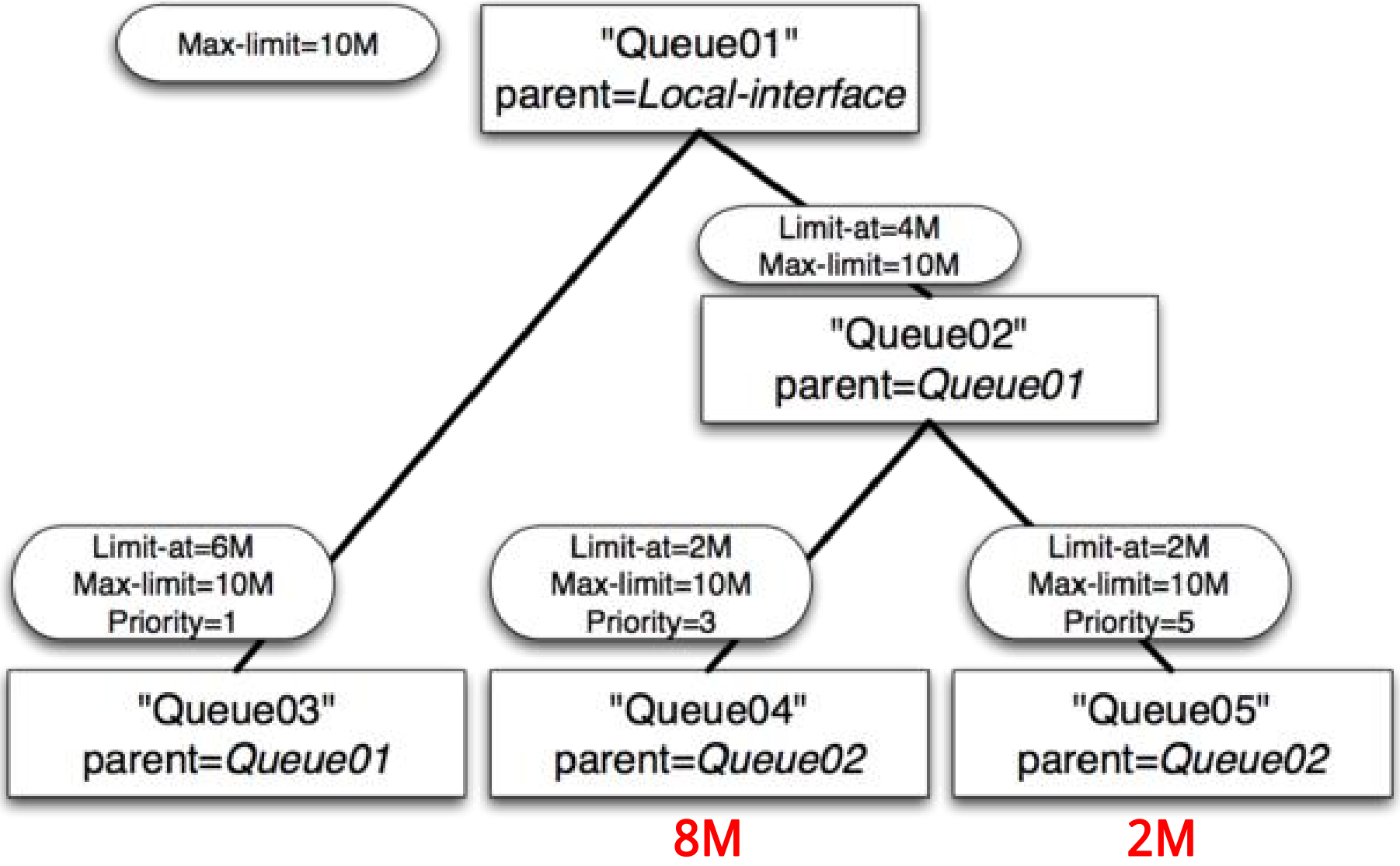

Usage with shaping.

# Hierarchical Token Bucket

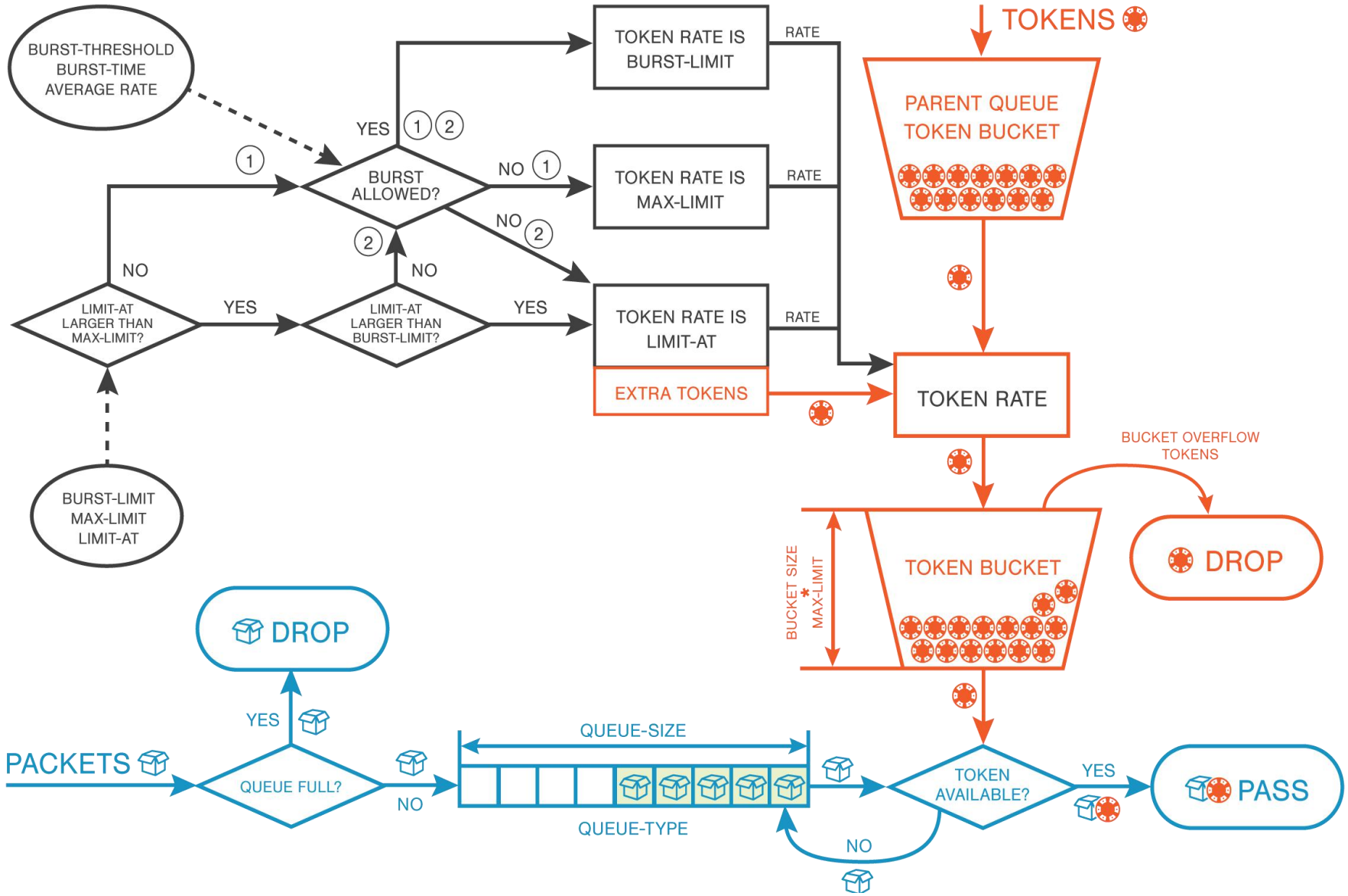
- All quality of service implementation in RouterOS is based on Hierarchical Token Bucket
- HTB allows to create hierarchical queue structure and determine relations between parent and child queues and relation between child queues
- Now, HTB allows us to manipulate bucket size parameter

# Hierarchical

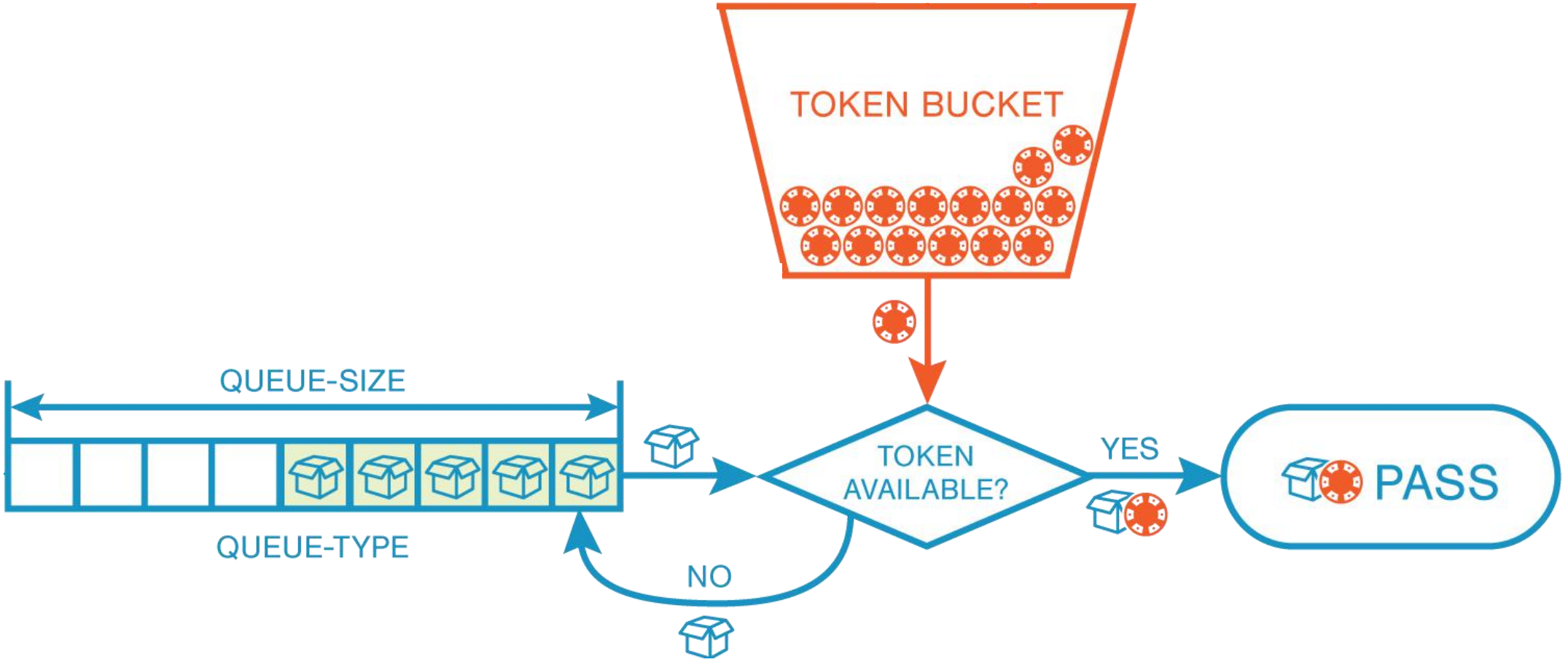
# Hierarchical



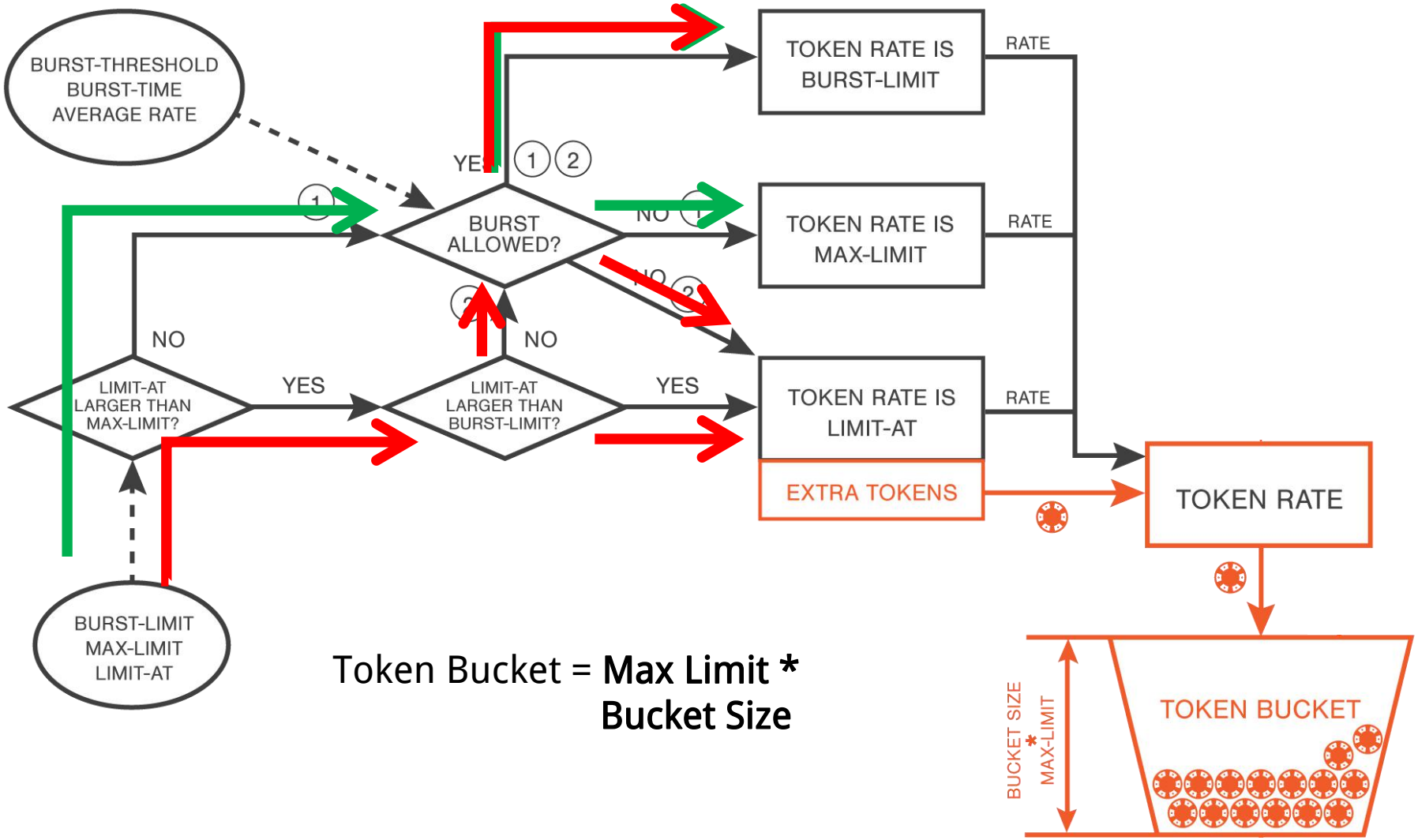
# Token Bucket Algorithm



# Token Bucket Algorithm

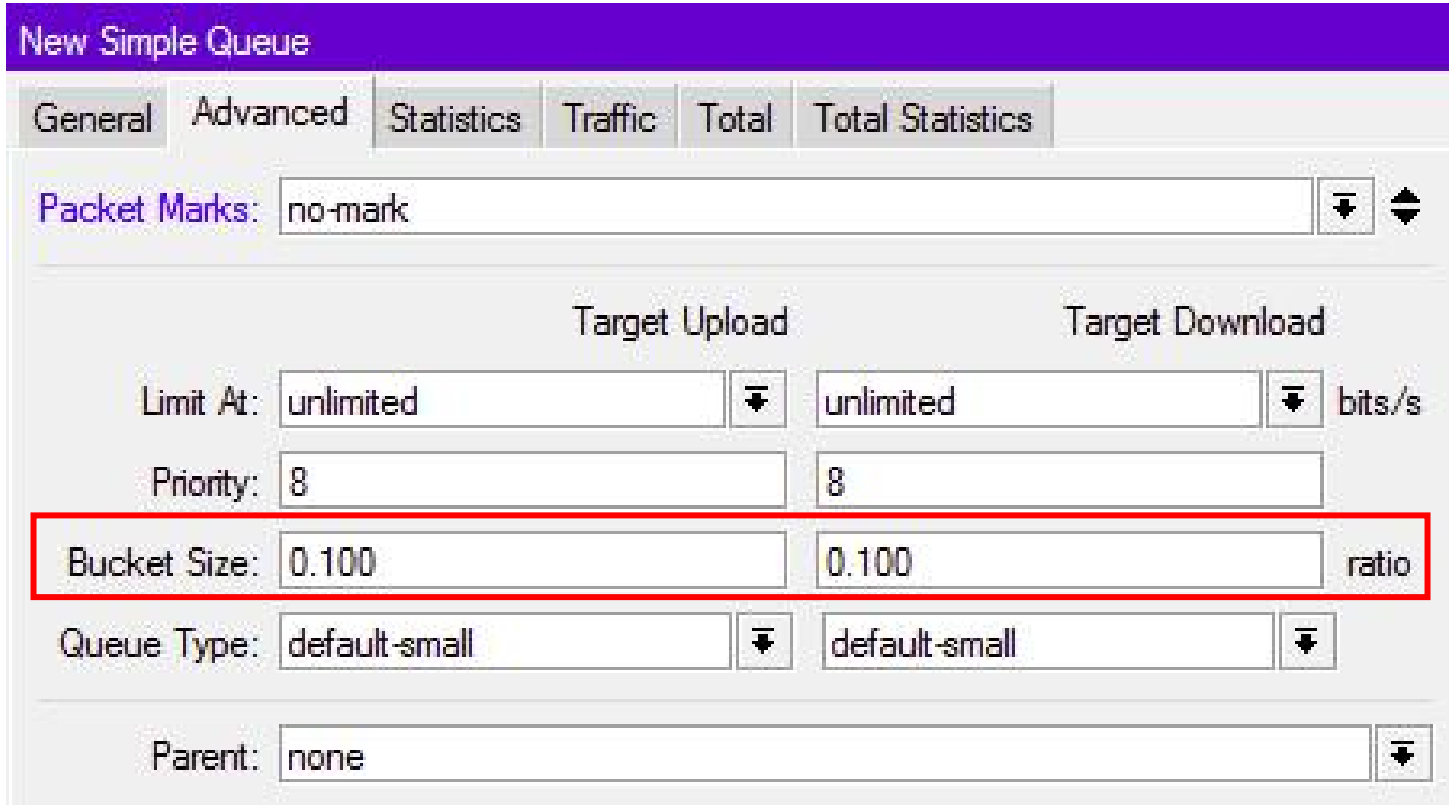


# Token Bucket Capacity



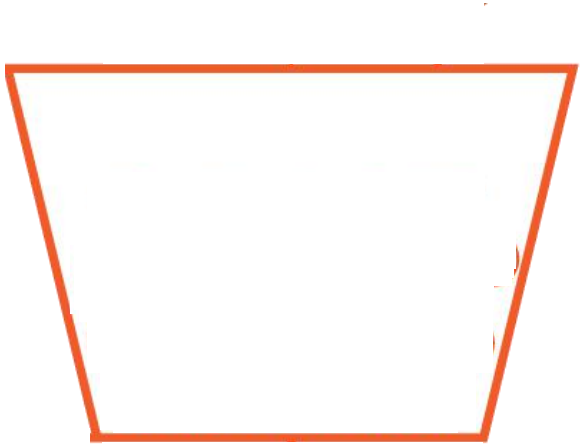

Token Bucket = **Max Limit * Bucket Size**

# Bucket size

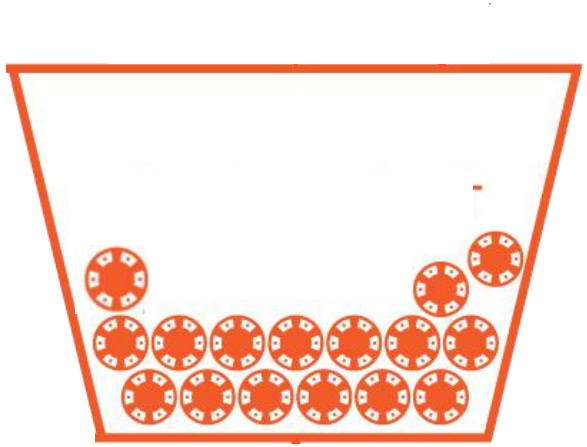



Applies to RouterOS: v6.35+

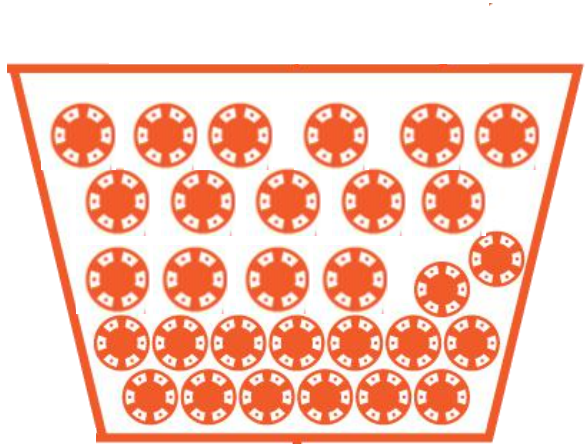
# The Rule



Packet not sent



Normal Trafic



Get additional bandwidth

# Example Case

- **max-limit=512K , bucket-size=10**
- bucket capacity = 5M (512K * 10)
- 5Mb without limitation
- client use 1Mbps -> get 10 second
- client use 2Mbps -> get 4 second

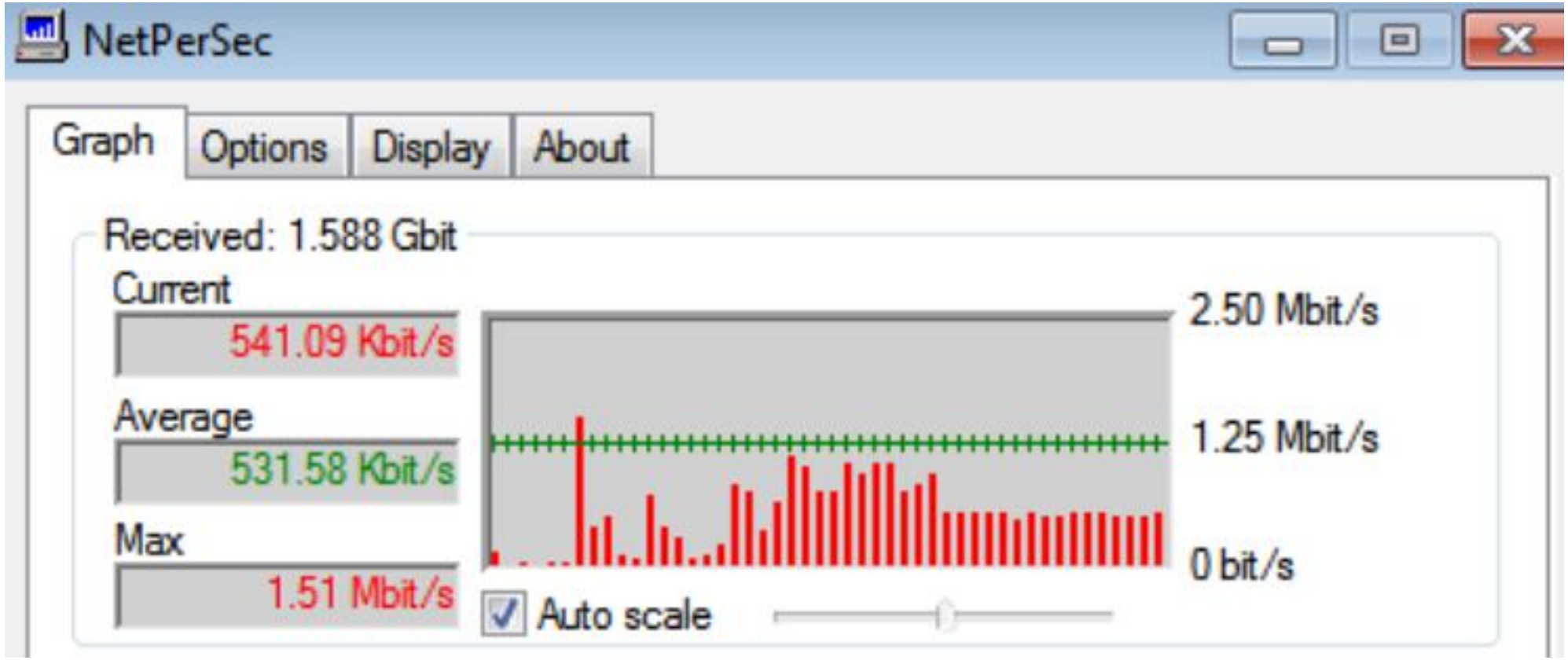
# Kalkulasi bucket capacity

- max-limit = 512K
- bucket capacity = 5M
- Trafic yang digunakan 1Mbps

| Detik ke- | Max-limit | bucket | sisa bucket |
|---|---|---|---|
| 1 | 512K | 512K | 4.5M |
| 2 | 512K | 512K | 4M |
| 3 | 512K | 512K | 3.5M |
| 4 | 512K | 512K | 3M |
| 5 | 512K | 512K | 2.5M |
| 6 | 512K | 512K | 2M |
| 7 | 512K | 512K | 1.5M |
| 8 | 512K | 512K | 1Mb |
| 9 | 512K | 512K | 512K |
| 10 | 512K | 512K | 0 |
| 11 | 512K | | |

# POC

- Client menggunakan 1 Mb



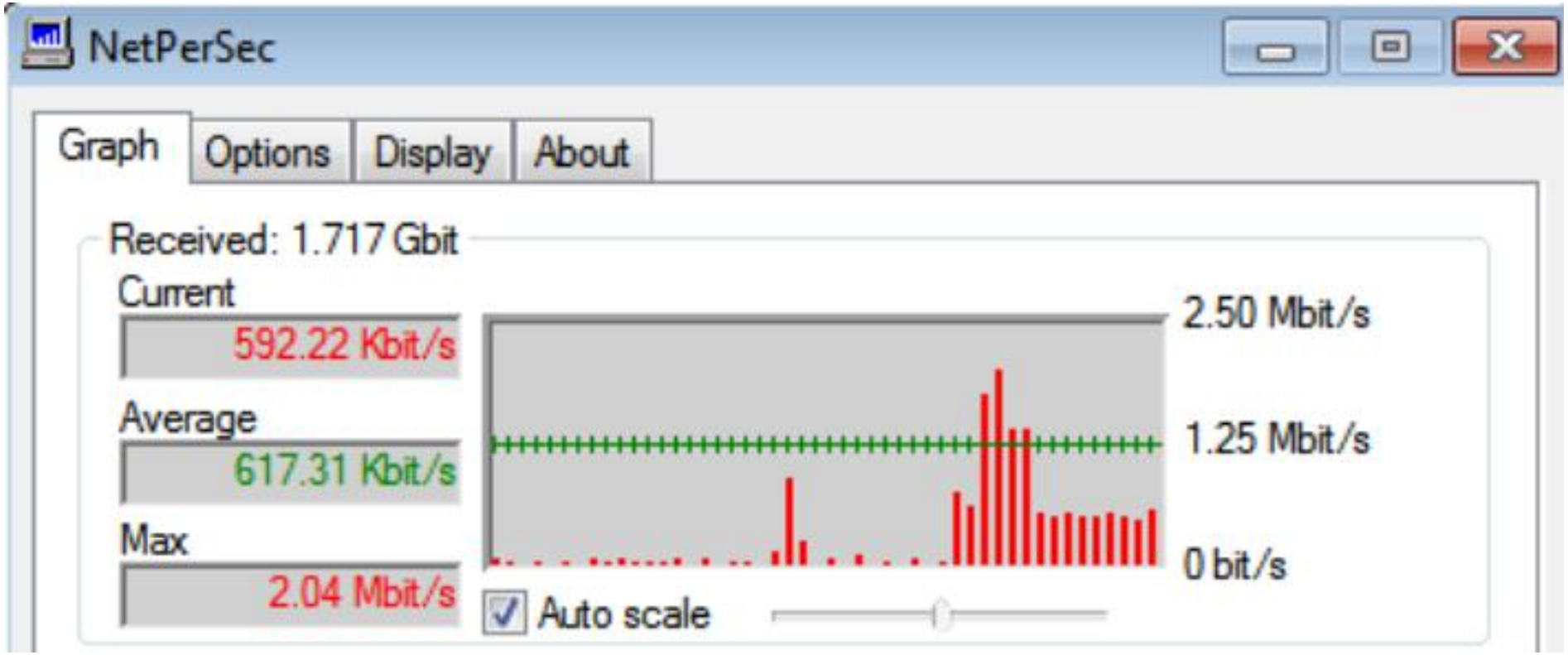
# Kalkulasi bucket capacity

- max-limit = 512K
- bucket capacity = 5M
- Trafic yang digunakan 2Mbps

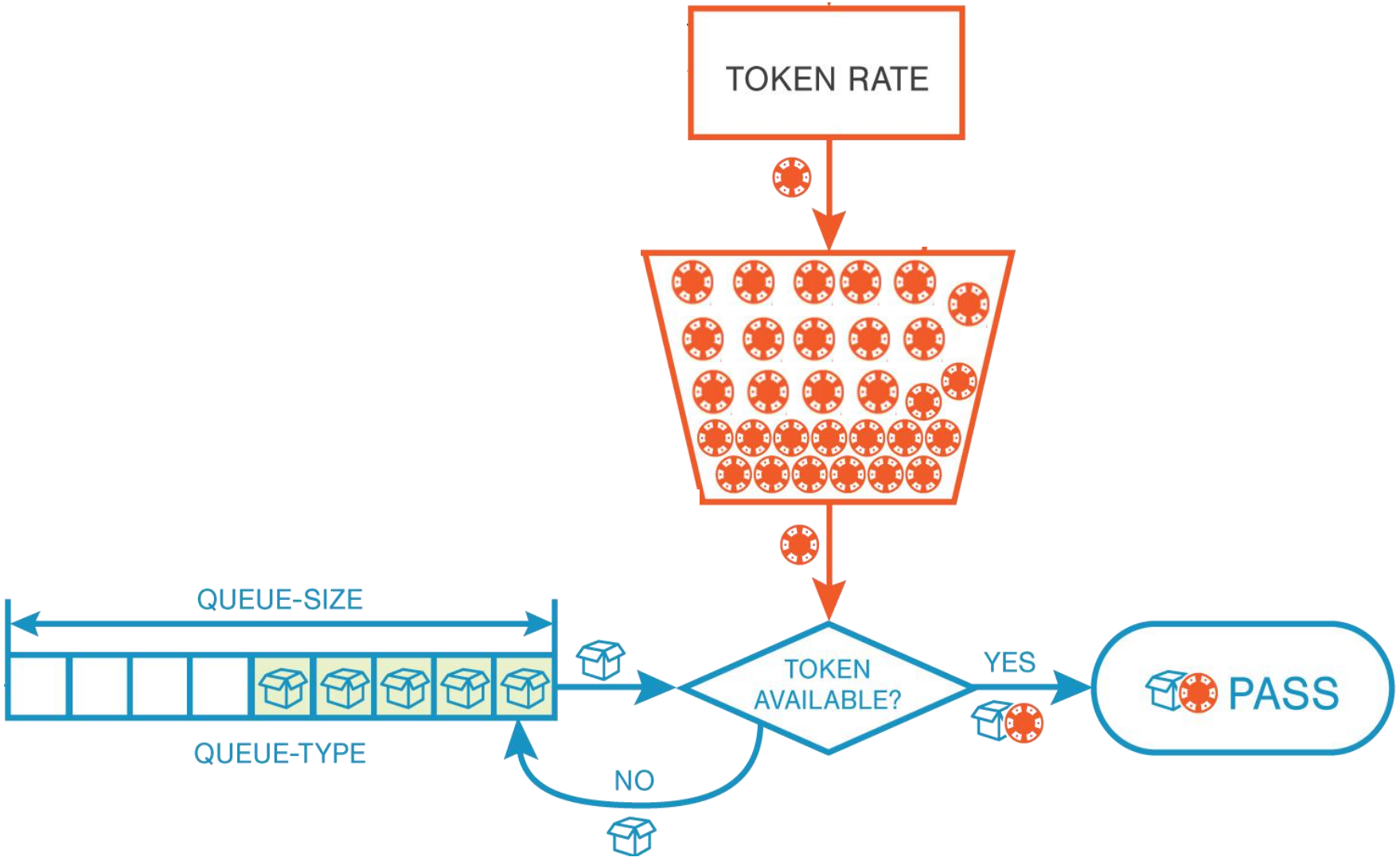
| Detik ke- | Max-limit | bucket | sisa bucket |
|---|---|---|---|
| 1 | 512K | 1.5M | 3.5M |
| 2 | 512K | 1.5M | 2M |
| 3 | 512K | 1.5M | 512K |
| 4 | 512K | 512K | 0 |
| 5 | 512K | | |

# POC

- Client menggunakan 2 Mb



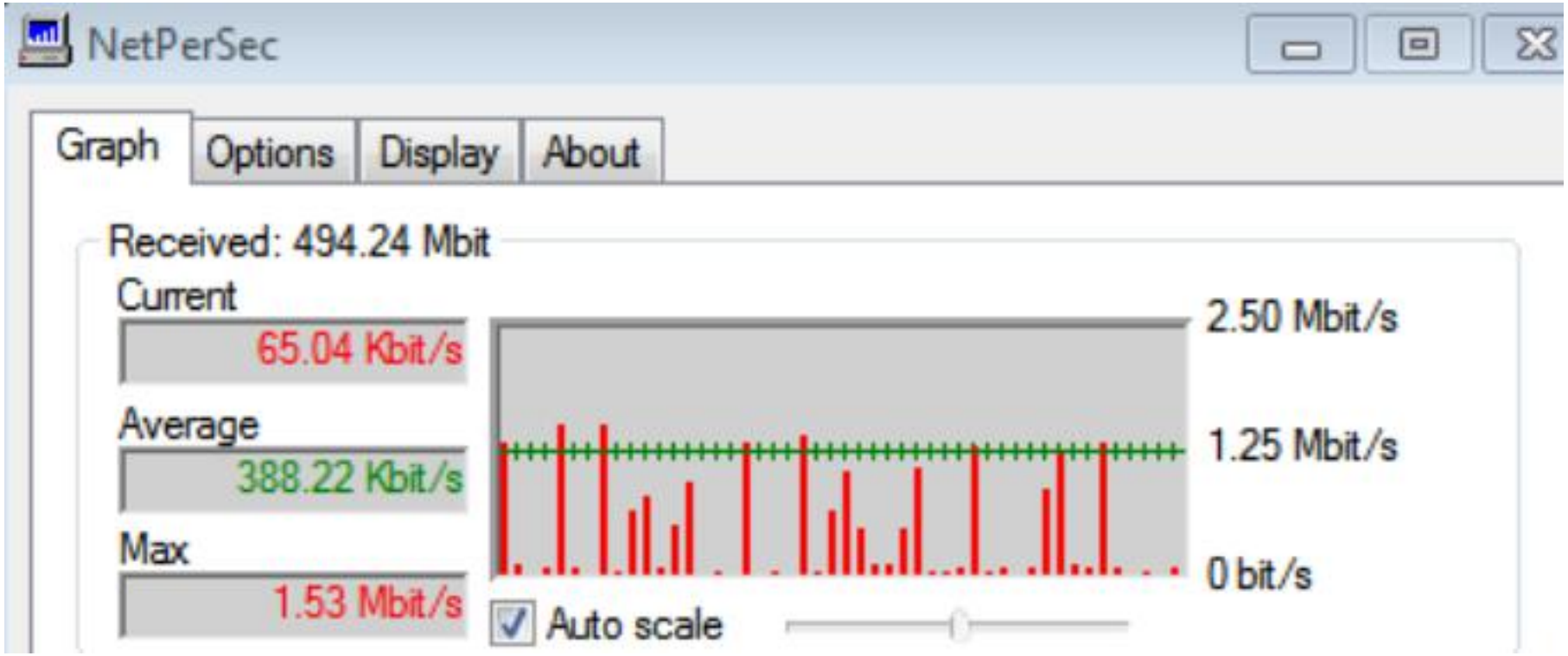
# When the bucket full?



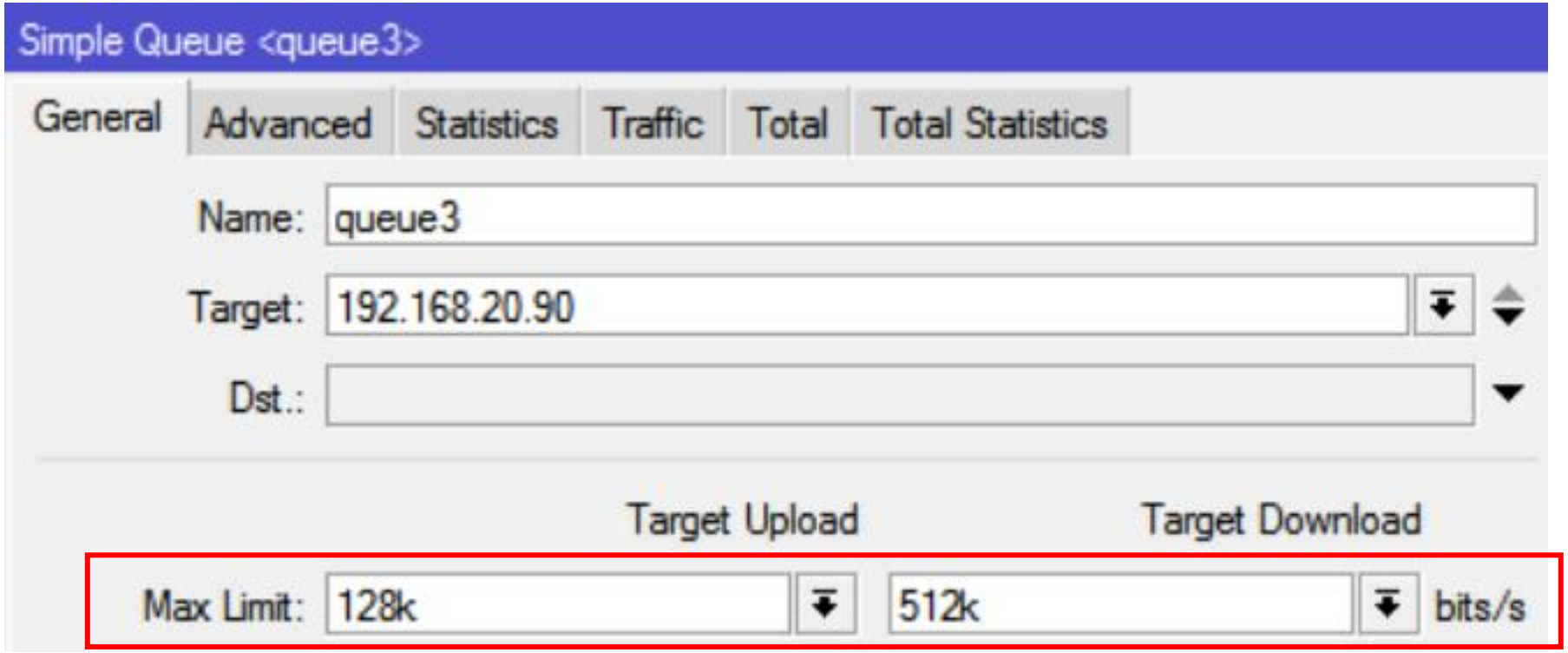
# EXAMPLE CASE

# How data work?

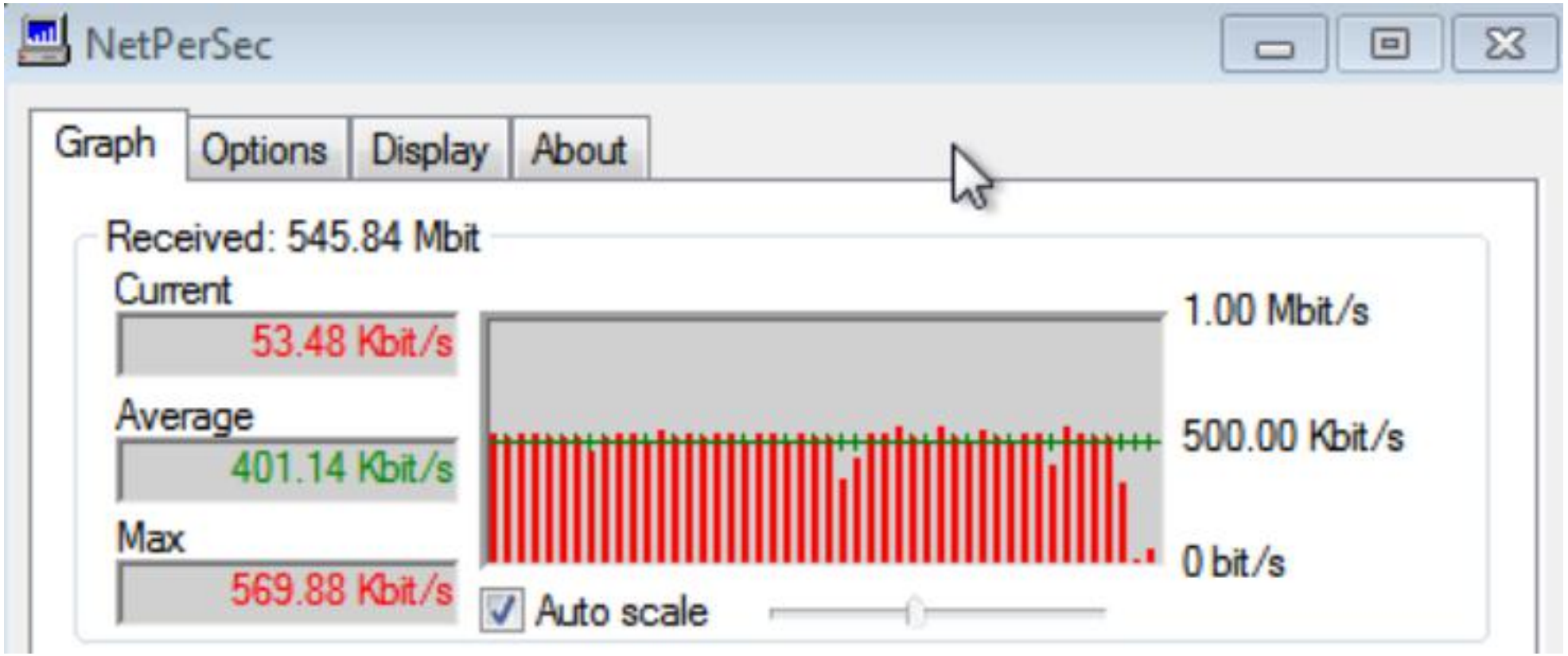
- Without queue



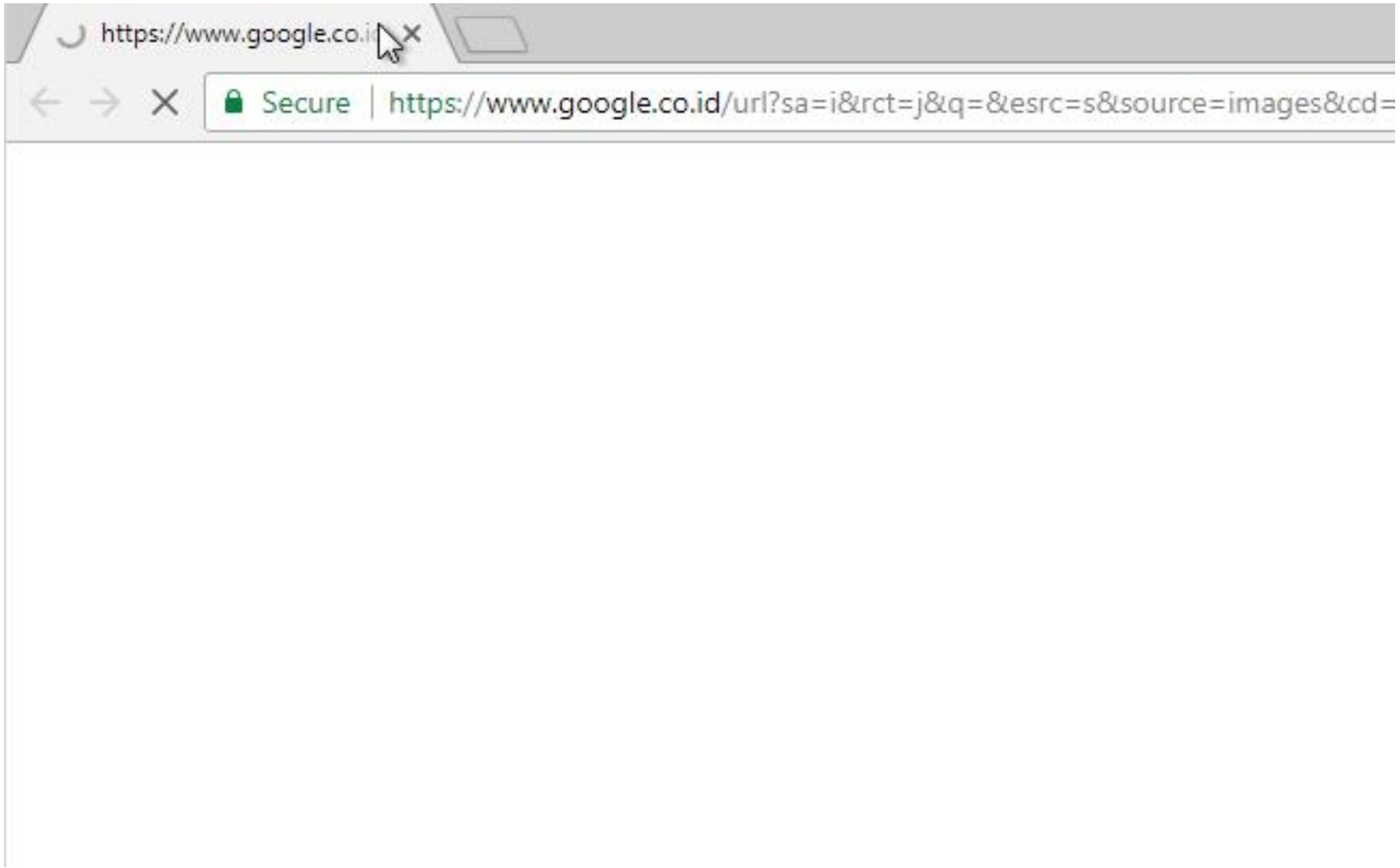
# Try to create queue



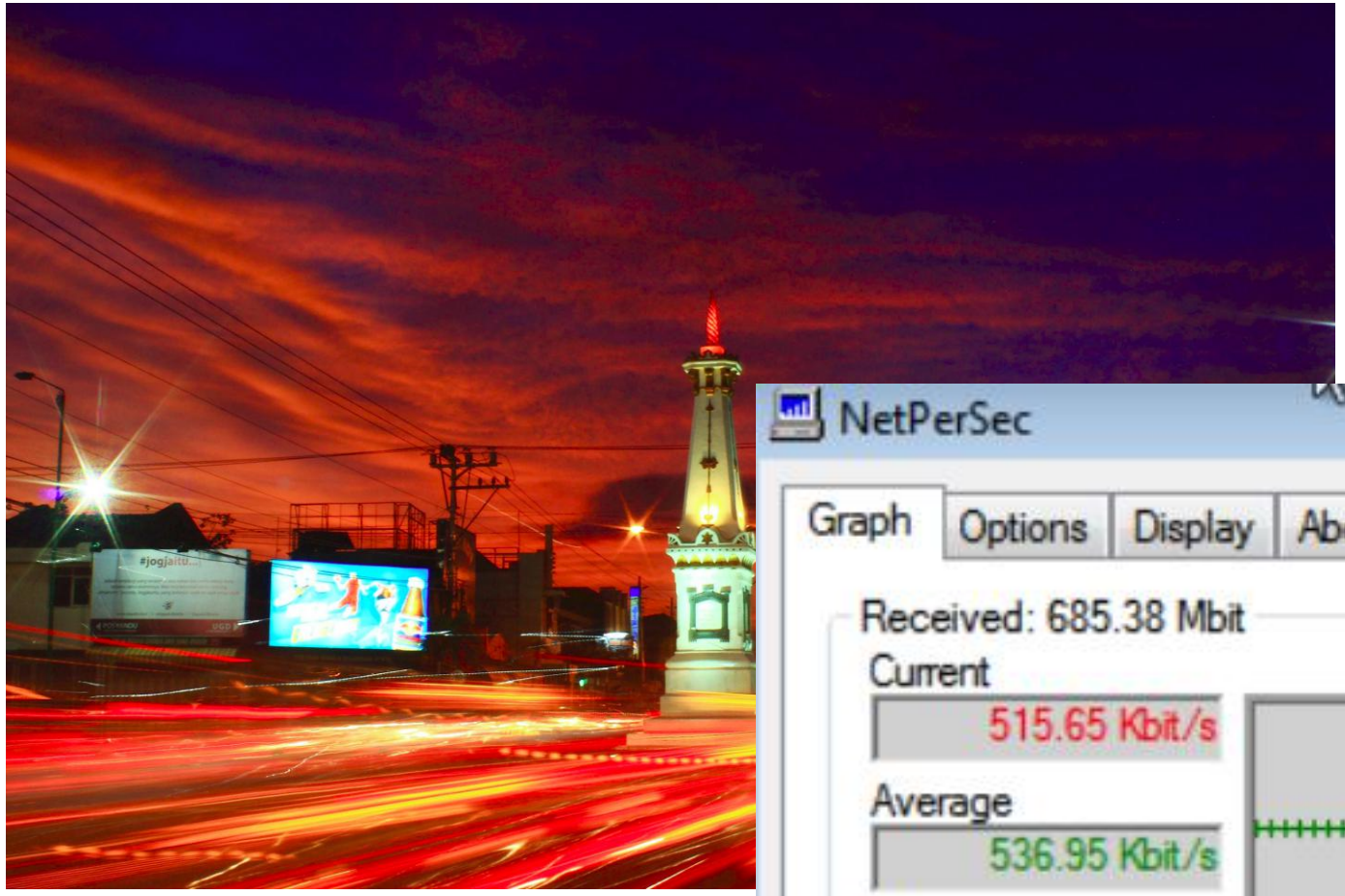
# Trafic with queue



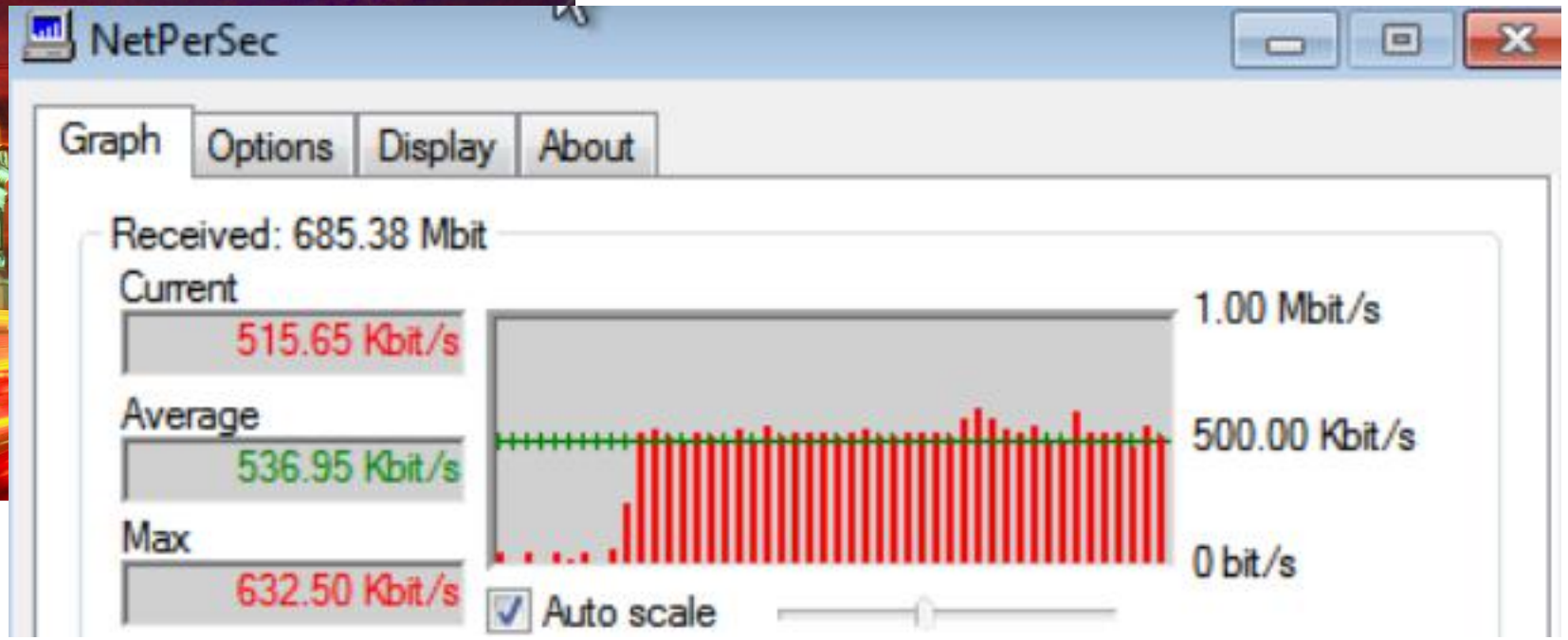
# Try to open google



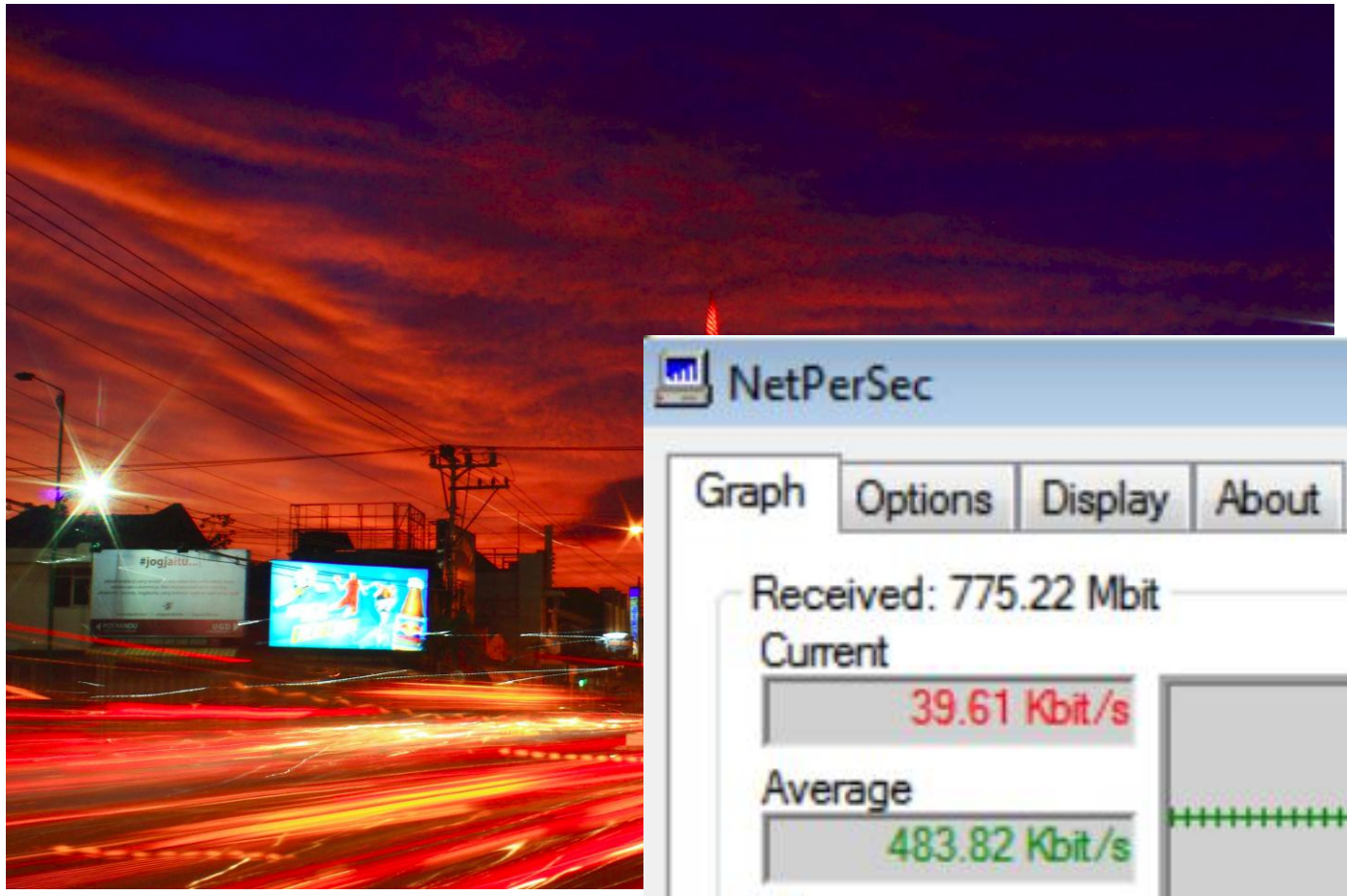
# Open a picture

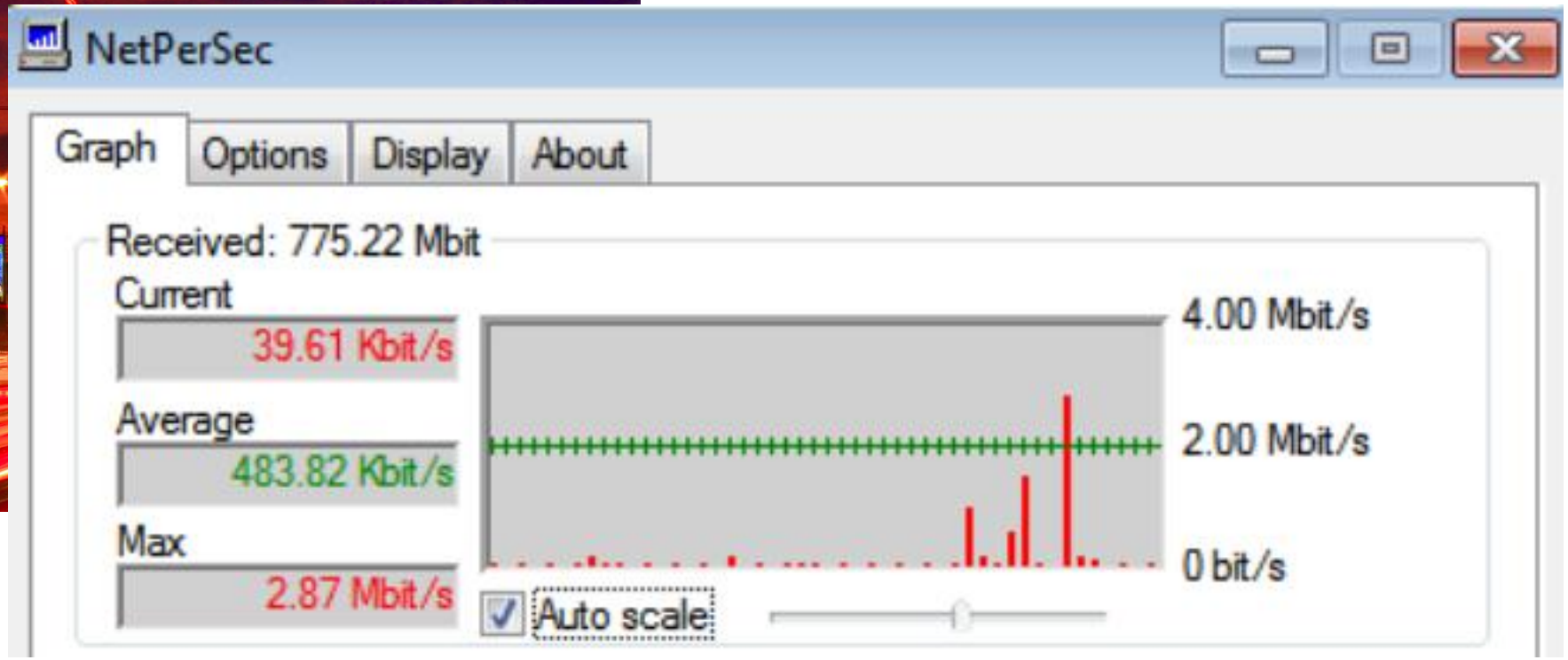


pic size = 1200x674
need 39 seconds to access 1 picture

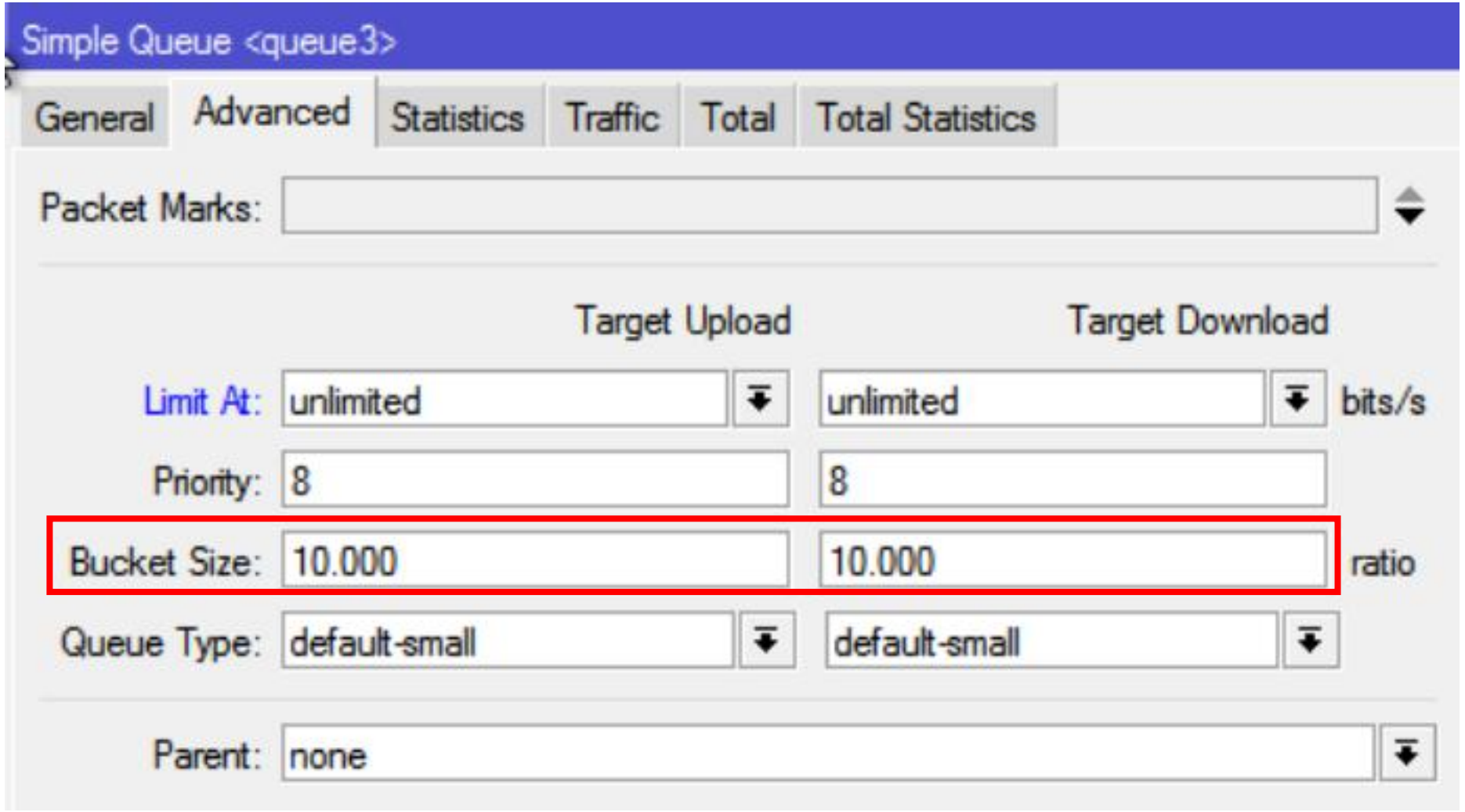


# Open a picture (without queue)

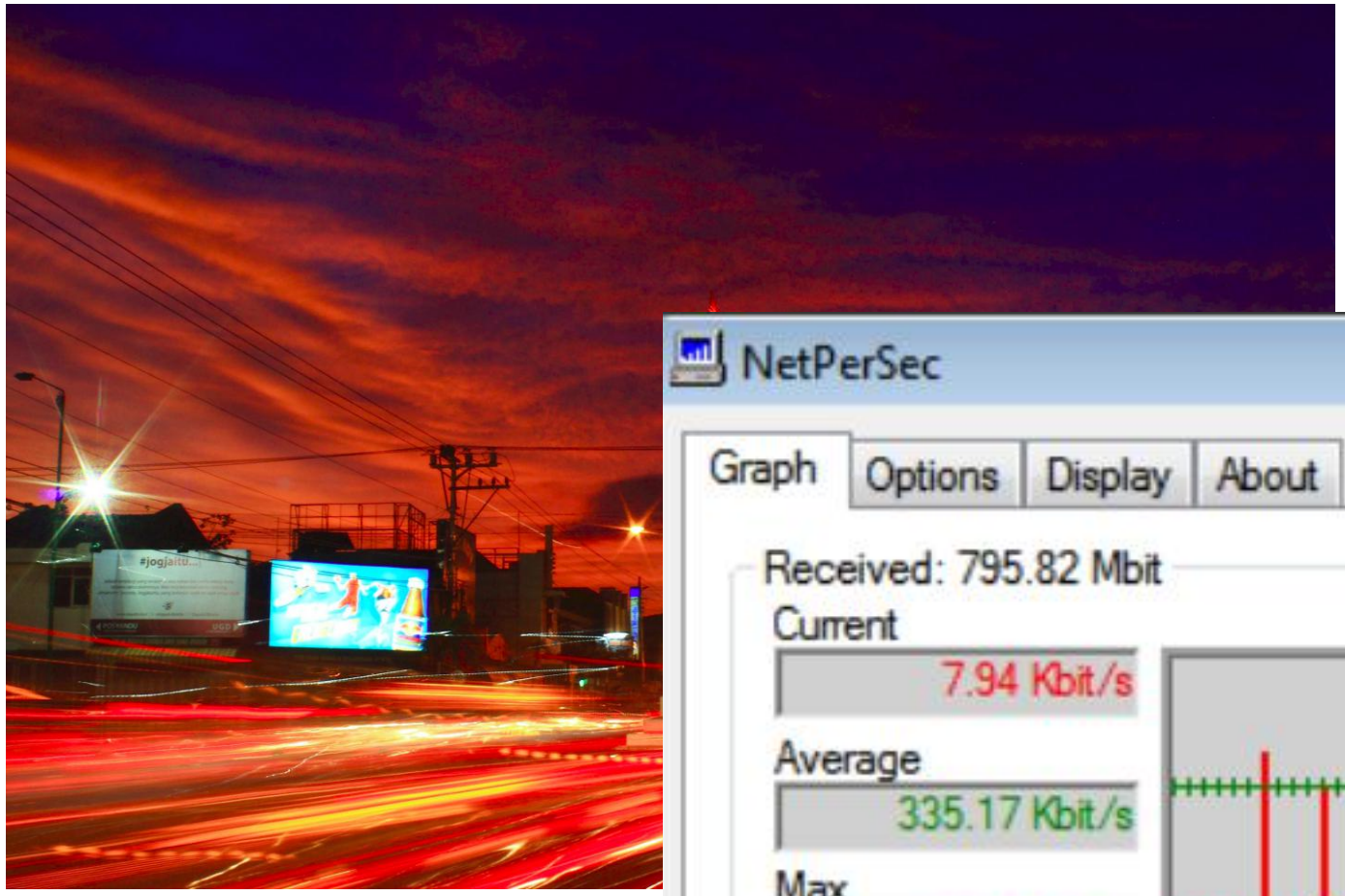


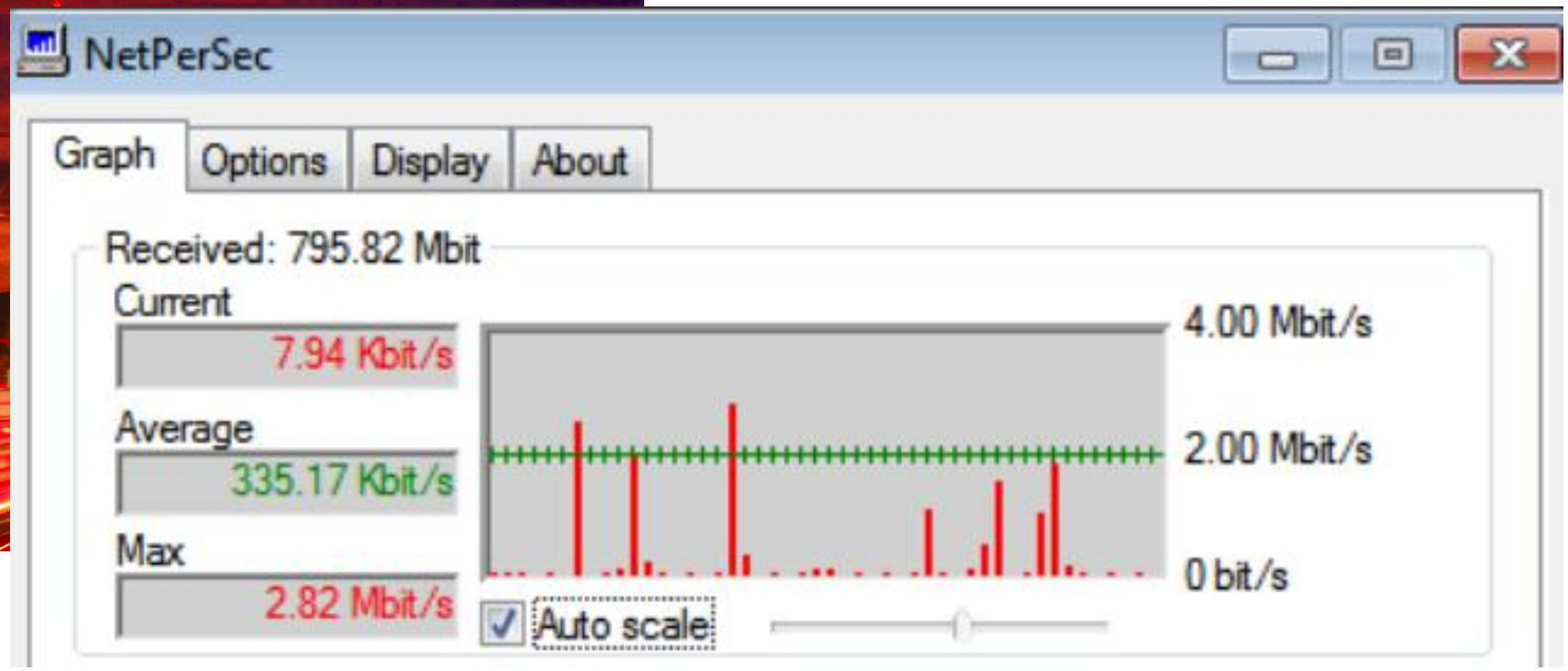


# Modify bucket size

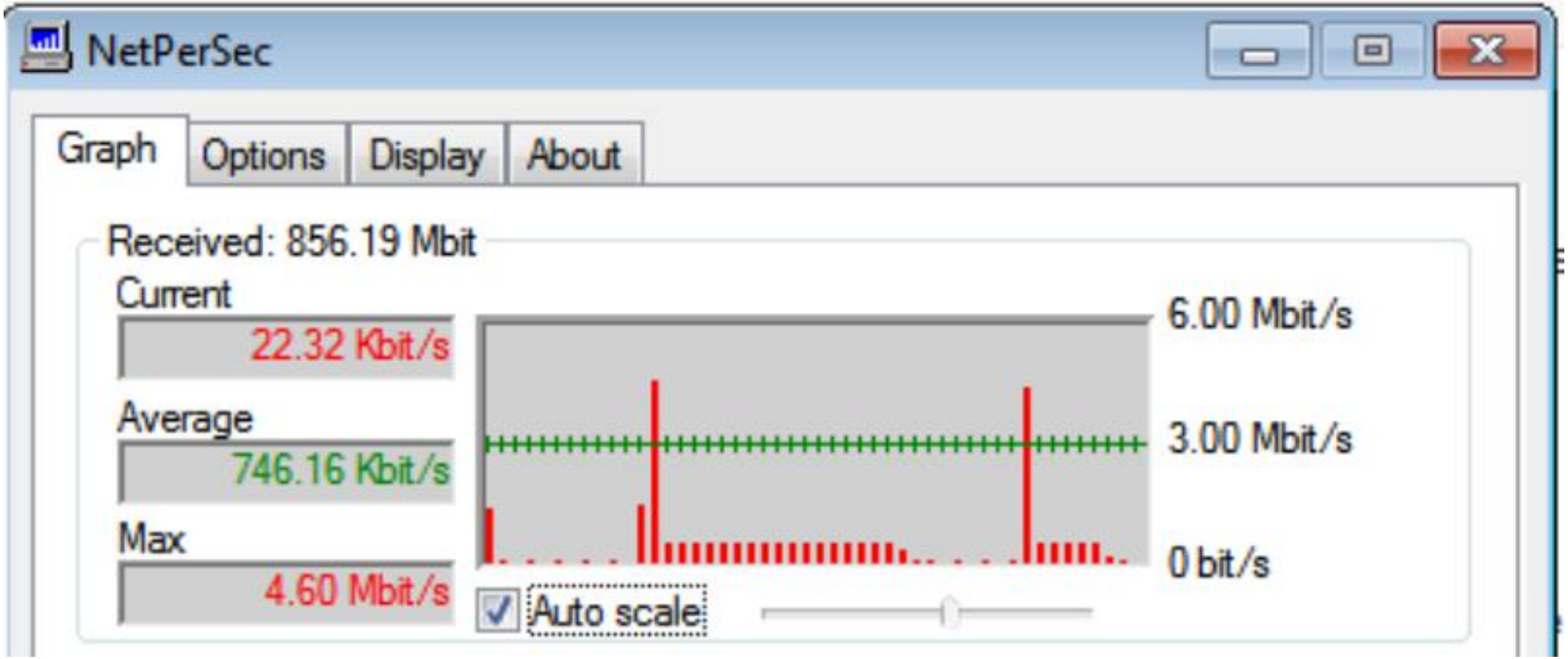


# Open a picture



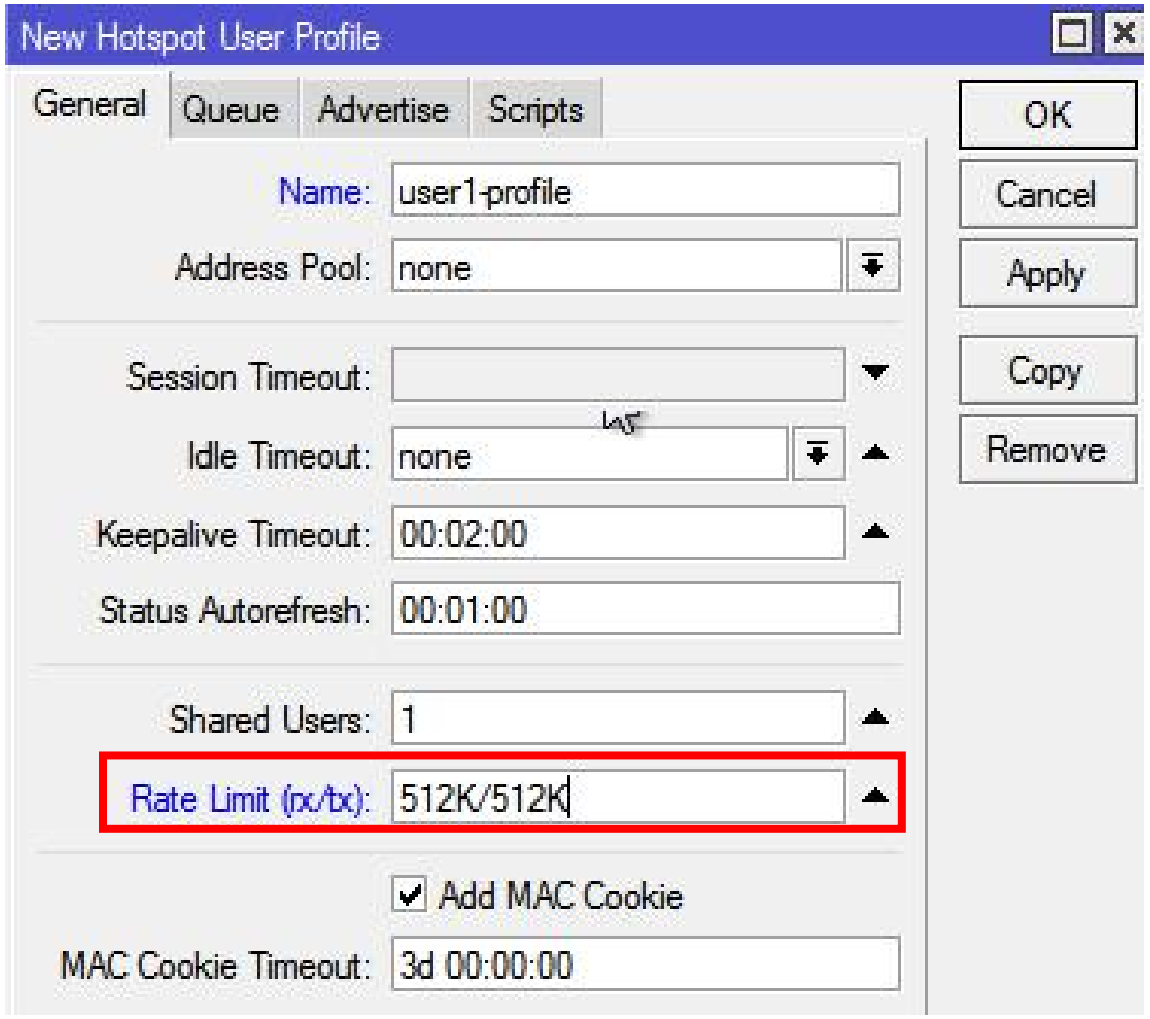


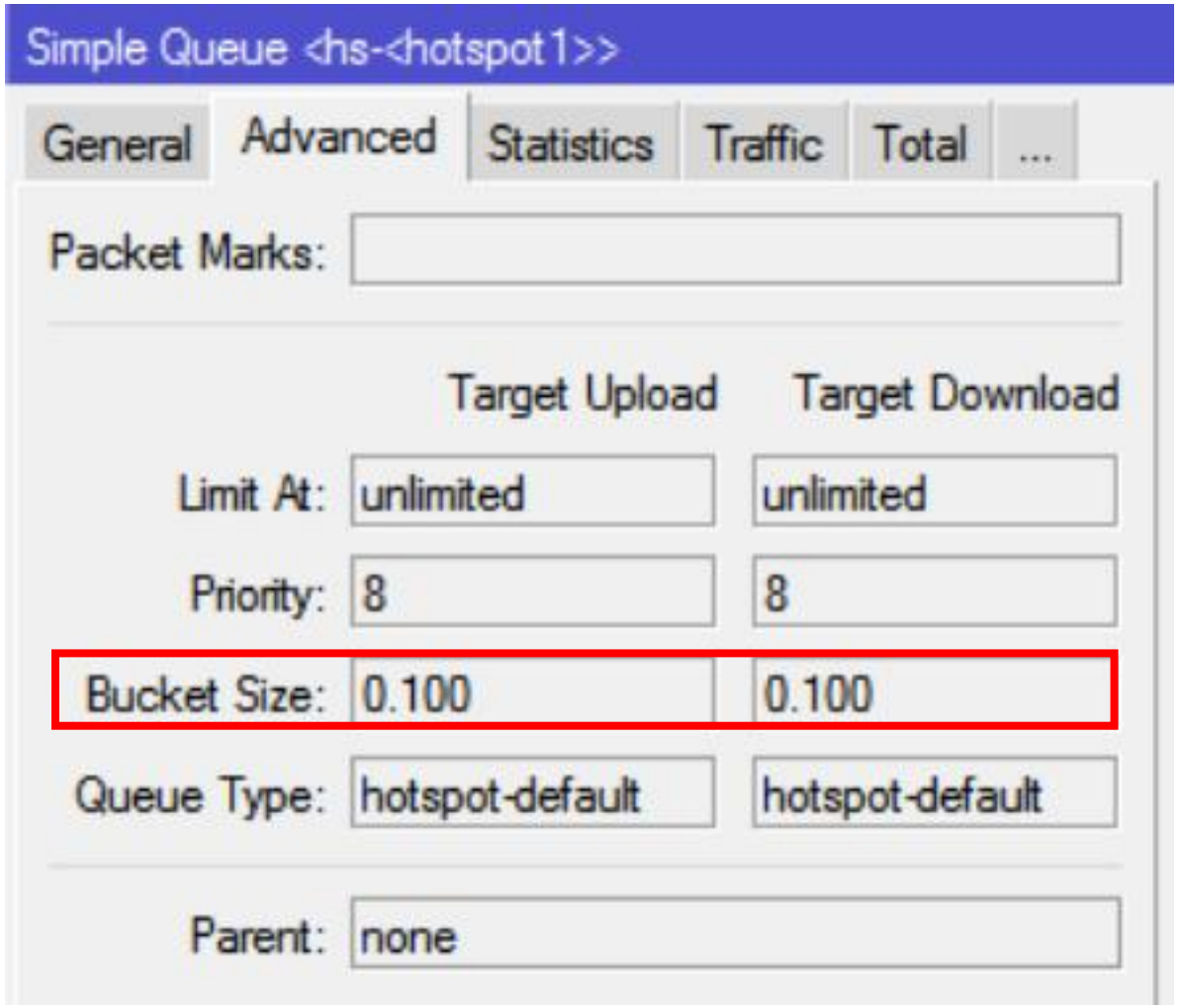
# This is how to bucket size work



# BUCKET SIZE
# in
# HOTSPOT NETWORK

# Dynamic Queue



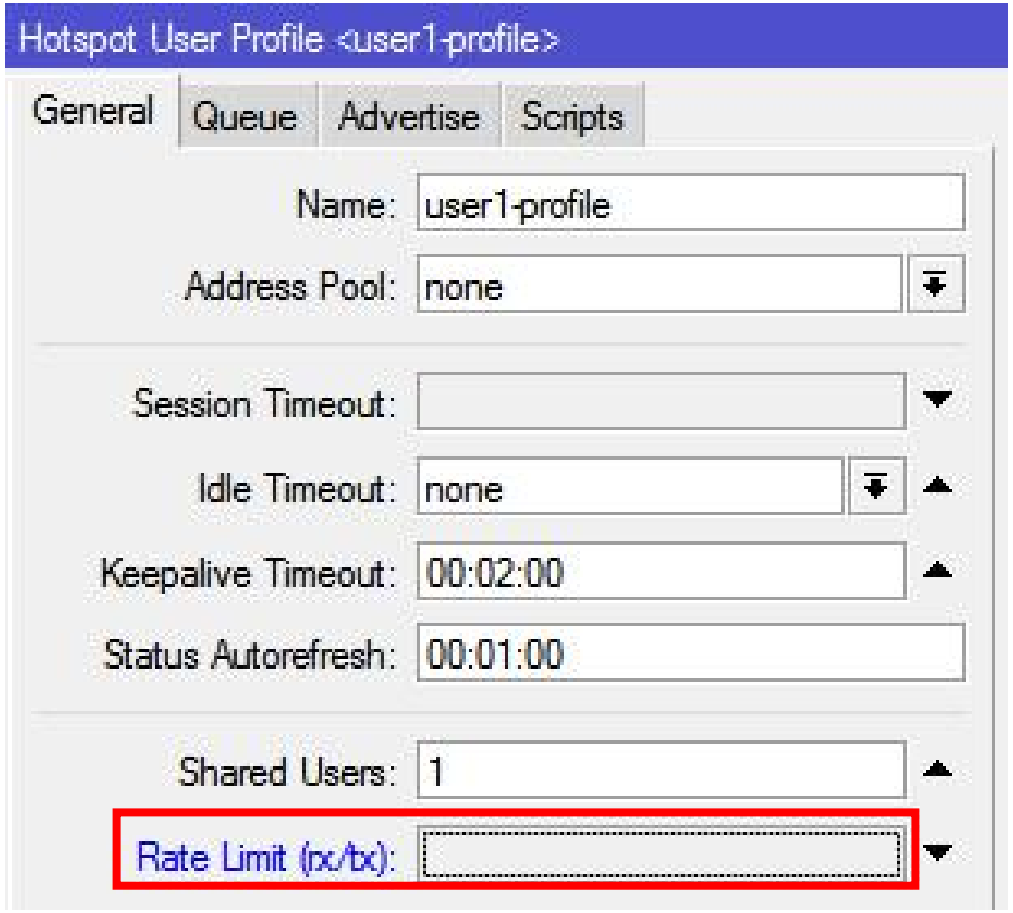
# Burst

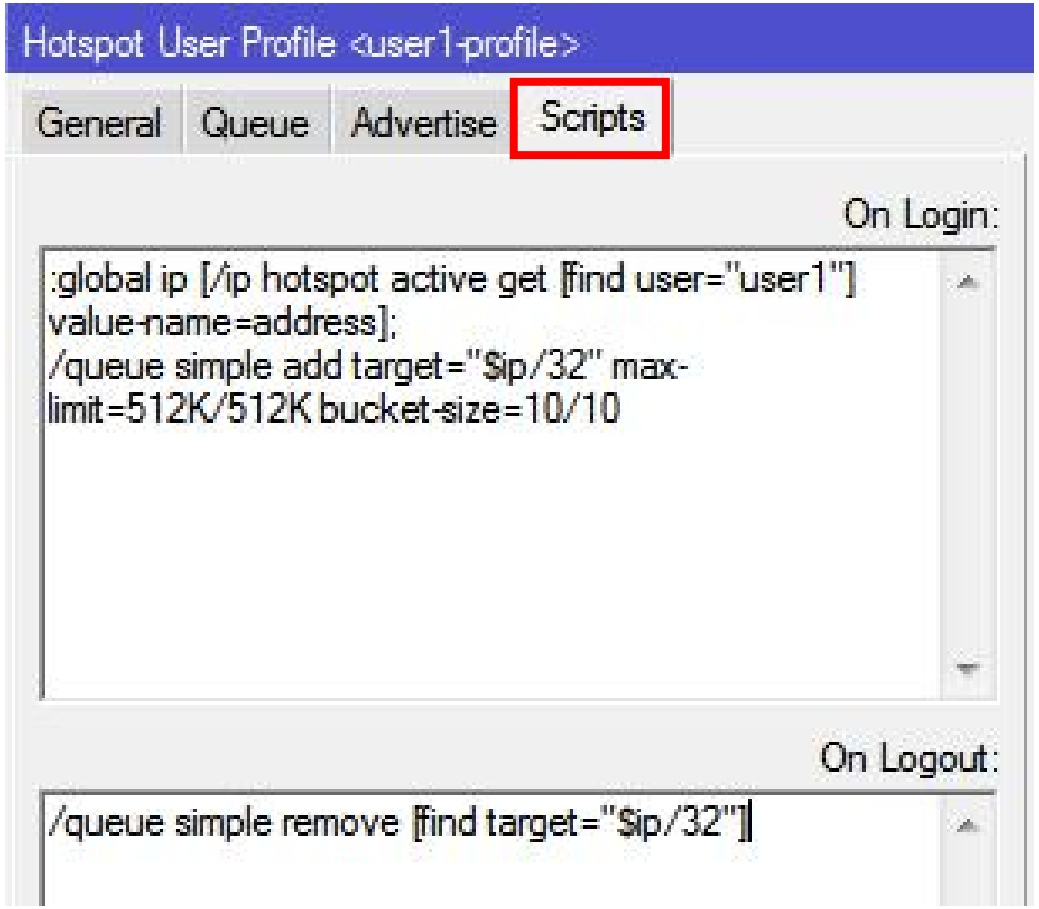
| | |
|---|---|
| `rate-limit` (*string*; Default: "") | Rate limitation in form of **rx-rate[/tx-rate] [rx-burst-rate[/tx-burst-rate] [rx-burst-threshold[/tx-burst-threshold] [rx-burst-time[/tx-burst-time]]]] [priority] [rx-rate-min[/tx-rate-min]]** from the point of view of the router (so "rx" is client upload, and "tx" is client download). All rates should be numbers with optional 'k' (1,000s) or 'M' (1,000,000s). If tx-rate is not specified, rx-rate is as tx-rate too. Same goes for tx-burst-rate and tx-burst-threshold and tx-burst-time. If both rx-burst-threshold and tx-burst-threshold are not specified (but burst-rate is specified), rx-rate and tx-rate is used as burst thresholds. If both rx-burst-time and tx-burst-time are not specified, 1s is used as default. rx-rate-min and tx-rate min are the values of limit-at properties |

Rate limitation in form of **rx-rate[/tx-rate] [rx-burst-rate[/tx-burst-rate] [rx-burst-threshold[/tx-burst-threshold] [rx-burst-time[/tx-burst-time]]]] [priority] [rx-rate-min[/tx-rate-min]]** from the point of view of the router (so "rx" is client upload, and "tx" is client download).


Character
AutoBlackToTitle.cs
ClickToStart.cs
Explosion.cs
Explosive.cs
Fire.cs
FloorSection.cs
GameControl.cs
GameGUI.cs
Hose.cs
MapIcons.cs
MessageGUI.cs
MoveBetweenPoints
Player.cs
Priority Particle Add.
PriorityAlphaParticle
SceneChanger.cs
SmokeParticles.cs
WaterHoseParticles
WaterSplash.cs
vignette.blur = (1-health) * 2 * smokeEffect * 2;
vignette.blurDistance = (1-health) * 2 * smokeEffect * 2;
vignette.chromaticAberration = heatEffect * 10;
}
void OnTriggerStay(Collider c)
{
var fire = c.GetComponent<Fire>();
if (fire && fire.alive)
{
float dist = 1-((transform.position -
NearHeat(dist);
}
var smoke = c.GetComponent<SmokeParticleEmitter>();
if (smoke && smoke.GetComponent<ParticleSystem>().enabled)
{
float dist = 1-((transform.position -
NearSmoke(dist);
}
}
void OnCollisionEnter(Collision c)
{
var healthBox = c.gameObject.GetComponent<HealthBox>();

# Manipulate Bucket Size



# The Script

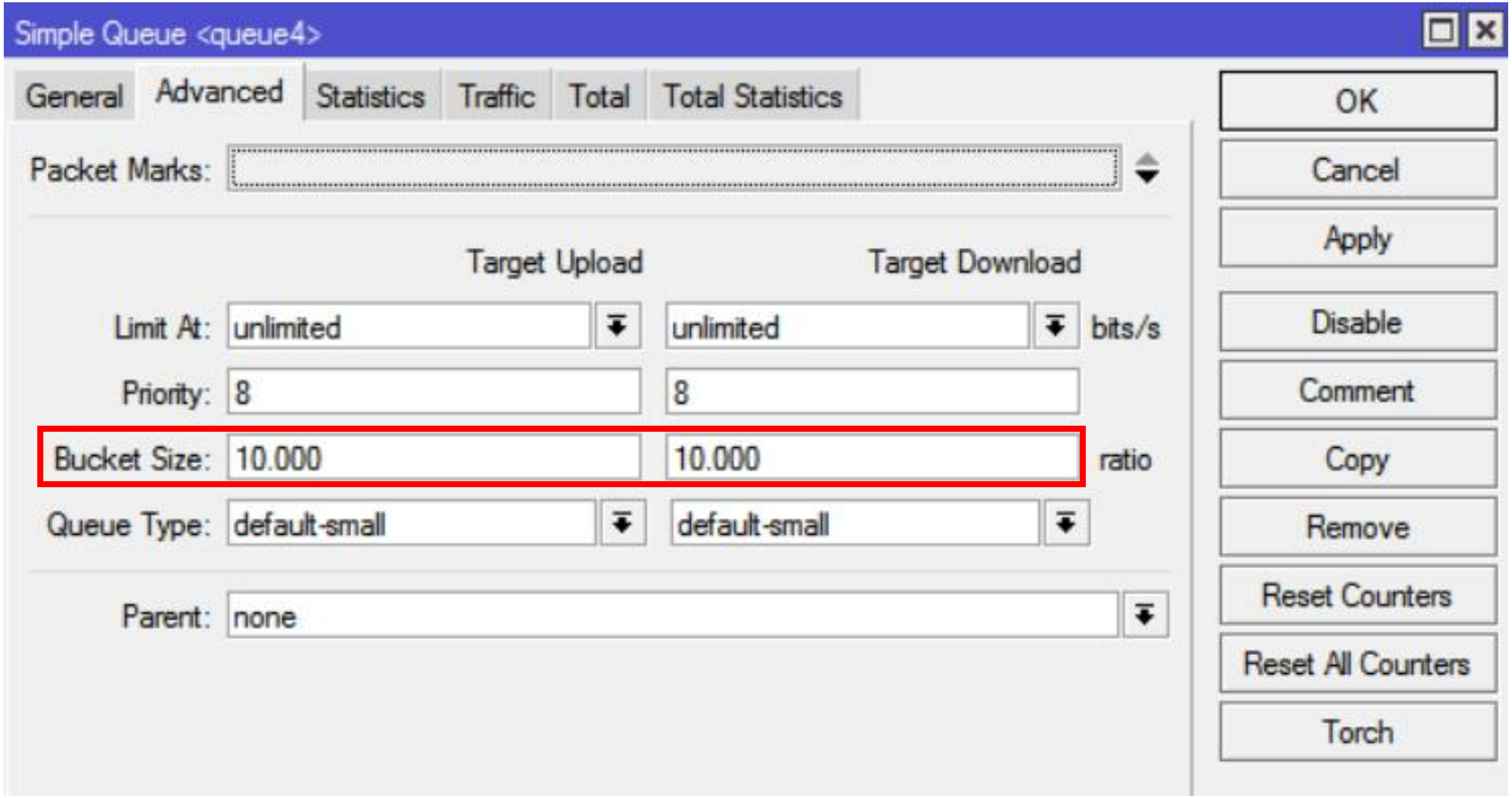
- **On Login**

```
:global ip [/ip hotspot active get [find user="user1"]
value-name=address];
/queue simple add target="$ip/32" max-limit=512K/512K
bucket-size=10/10
```

- **On Logout**

```
/queue simple remove [find target="$ip/32"]
```

# The Result


Simple Queue <queue4>
General
Advanced
Statistics
Traffic
Total
Total Statistics
Packet Marks:
Target Upload
Target Download
Limit At:
unlimited
unlimited
bits/s
Priority:
8
8
Bucket Size:
10.000
10.000
ratio
Queue Type:
default-small
default-small
Parent:
none
OK
Cancel
Apply
Disable
Comment
Copy
Remove
Reset Counters
Reset All Counters
Torch

# Bucket Size vs Burst

VS

# How Burst Work

- max-limit = 512kbps
- burst-threshold = 384kbps
- burst-limit = 1024kbps
- burst-time = 16s

| Detik ke- | Kalkulasi | Data Rate | Actual Rate |
|---|---|---|---|
| 1 | (0+0+0+0+0+0+0+0+0+0+0+0+0+0+0+0)/16 | 0 | 1024 |
| 2 | (0+0+0+0+0+0+0+0+0+0+0+0+0+0+0+1024)/16 | 64 | 1024 |
| 3 | (0+0+0+0+0+0+0+0+0+0+0+0+0+0+1024+1024)/16 | 128 | 1024 |
| 4 | (0+0+0+0+0+0+0+0+0+0+0+0+0+1024+1024+1024)/16 | 192 | 1024 |
| 5 | (0+0+0+0+0+0+0+0+0+0+0+0+1024+1024+1024+1024)/16 | 256 | 1024 |
| 6 | (0+0+0+0+0+0+0+0+0+0+0+1024+1024+1024+1024+1024)/16 | 320 | 512 |
| 7 | (0+0+0+0+0+0+0+0+0+0+512+1024+1024+1024+1024+1024)/16 | 352 | 512 |
| 8 | (0+0+0+0+0+0+0+0+0+512+512+1024+1024+1024+1024+1024)/16 | 384 | 512 |
| 9 | (0+0+0+0+0+0+0+0+512+512+512+1024+1024+1024+1024+1024)/16 | 416 | 512 |
| 10 | (0+0+0+0+0+0+0+512+512+512+512+1024+1024+1024+1024+1024)/16 | 448 | 512 |
| 11 | (0+0+0+0+0+0+512+512+512+512+512+1024+1024+1024+1024+1024)/16 | 480 | 512 |
| 12 | (0+0+0+0+0+512+512+512+512+512+512+1024+1024+1024+1024+1024)/16 | 512 | 512 |
| 13 | (0+0+0+0+512+512+512+512+512+512+512+1024+1024+1024+1024+1024)/16 | 544 | 512 |
| 14 | (0+0+0+512+512+512+512+512+512+512+512+1024+1024+1024+1024+1024)/16 | 576 | 512 |
| 15 | (0+0+512+512+512+512+512+512+512+512+512+1024+1024+1024+1024+1024)/16 | 608 | 512 |
| 16 | (0+512+512+512+512+512+512+512+512+512+512+1024+1024+1024+1024+1024)/16 | 640 | 512 |

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