HOW TO MANAGE A NETWORK INFRASTRUCTURE USING LOAD BALANCE AND BANDWITH MANAGEMENT ON SCHOOL

MikroTik User Meeting 2021

INTRODUCE MYSELF

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Linux User

Using MikroTik since 2015 and fully make MikroTik in daily activity or teaching activities.

Experiences :

1. Handle some Virtual Private Server (VPS) as e-Learning activity on several school.
2. Installing some client using Mikrotik Router as a network management, like RT/RW Net, office, or school.

How to make internet reliable?

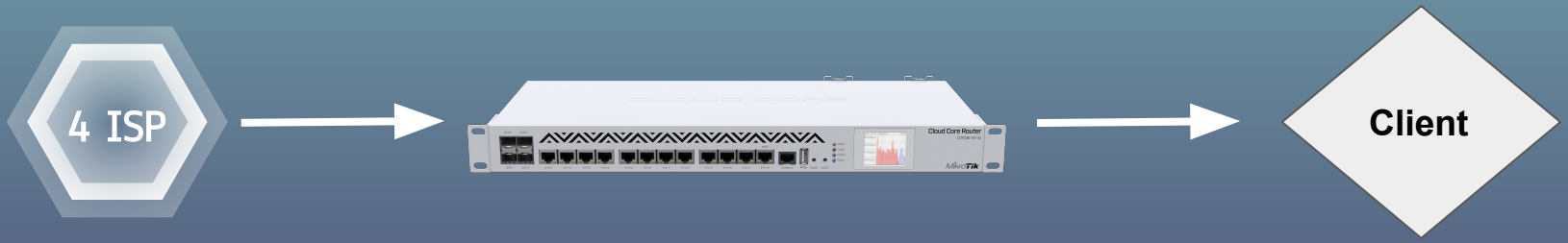
In study case 4 ISP have various amount bandwith? And how to IT Admin make proper distribution to avoid stacking in one ISP line.

Metode Load Balance di MikroTik

1. Static Route with Address List : Mengelompokkan range IP Address agar melewati salah satu gateway dengan menggunakan static routing.
2. Equal Cost Multi Path (ECMP) : Pemilihan jalur bergantian traffict koneksi yang melewati gateway.
3. NTH : Parameter utama dari NTH ini yaitu “Every” and “Packet”. NTH menggunakan algoritma round robin untuk menentukan pembagian pemecahan connection yang akan di-mangle ke rute yang dibuat untuk load balancing.
4. Per Connection Classifier : Pengelompokkan traffict yang keluar masuk berdasarkan src-address, dst-address, src-port, & dst-port.

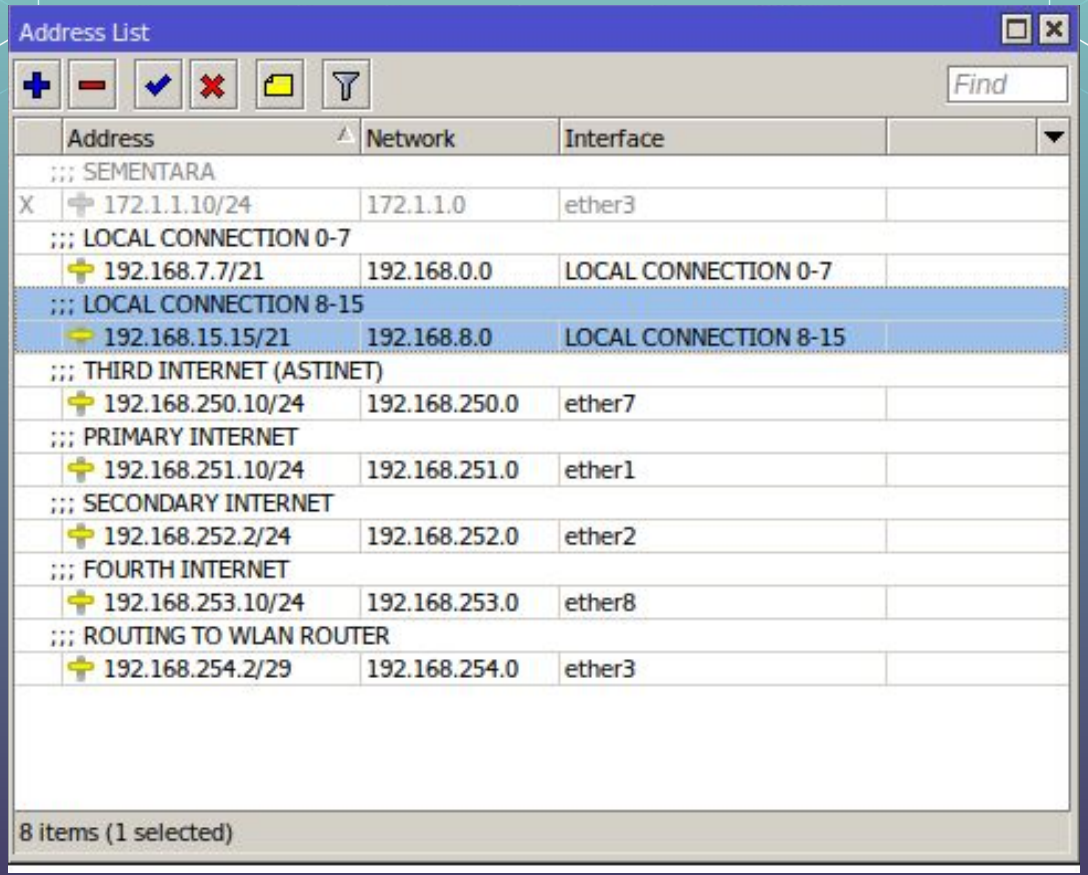
Load Balance With ECMP

Improvement from Round Robin

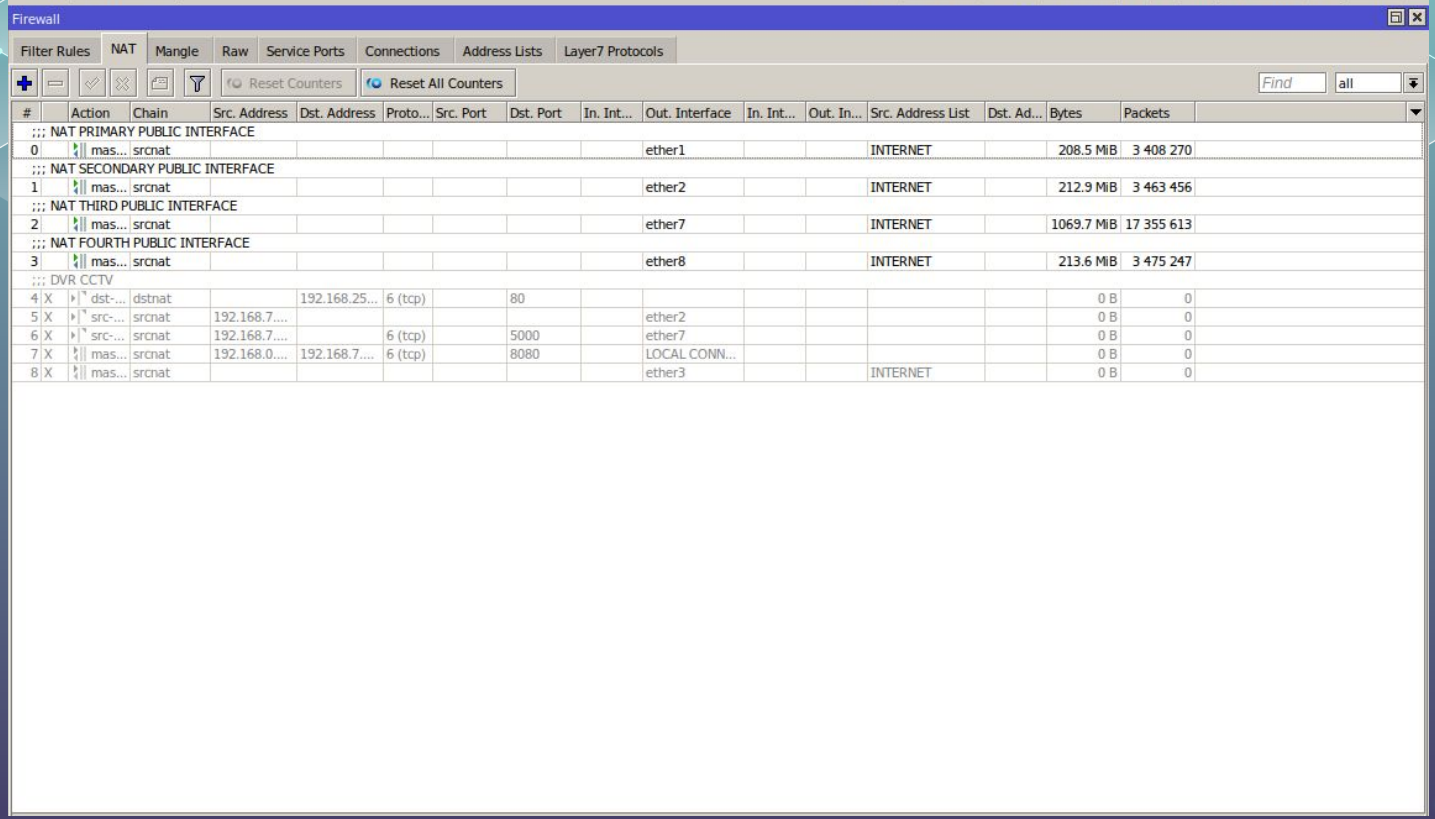


ECMP is "persistent per-connection load balancing" atau "per-src-dst-address combination load balancing"

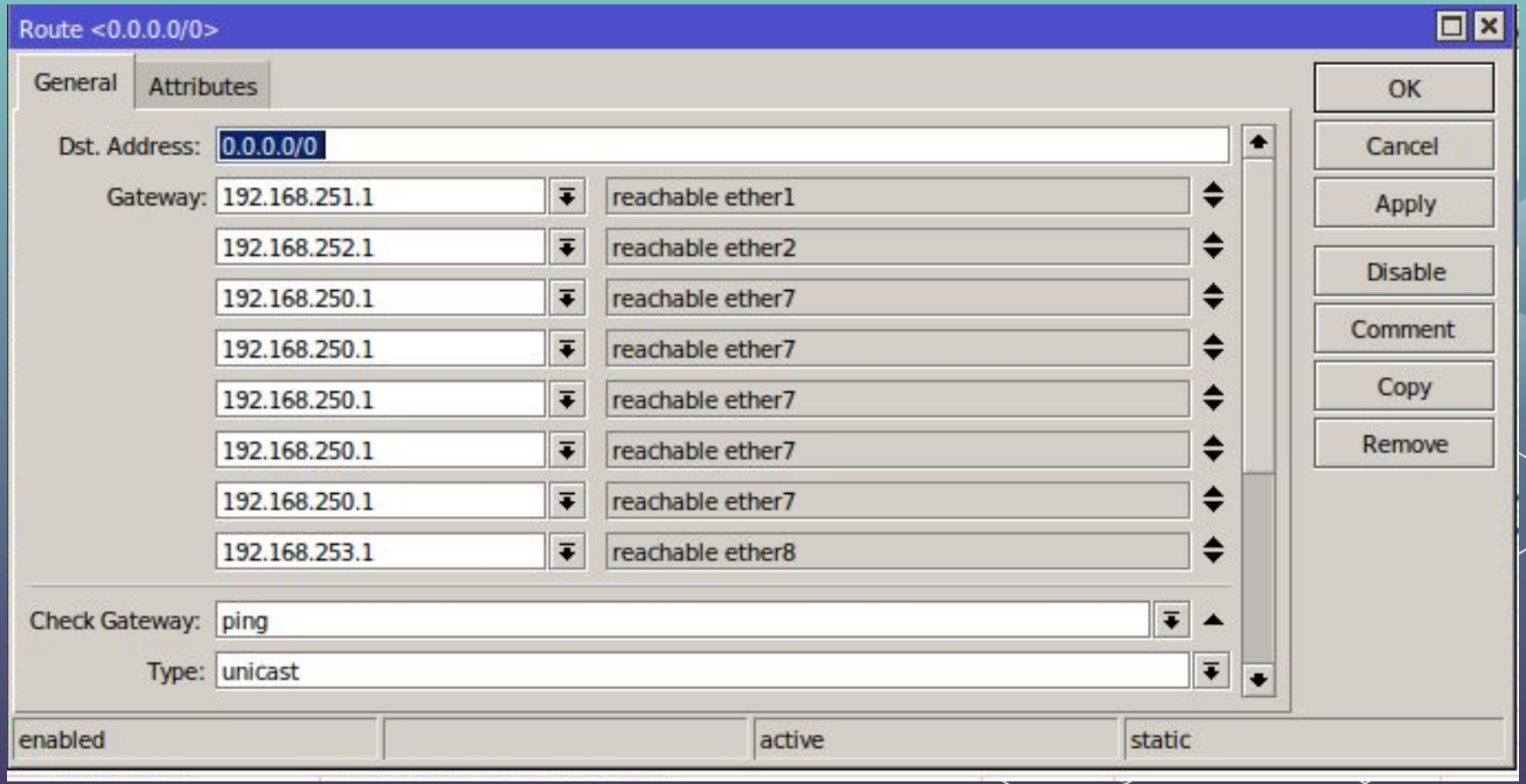
Add IP Interfaces



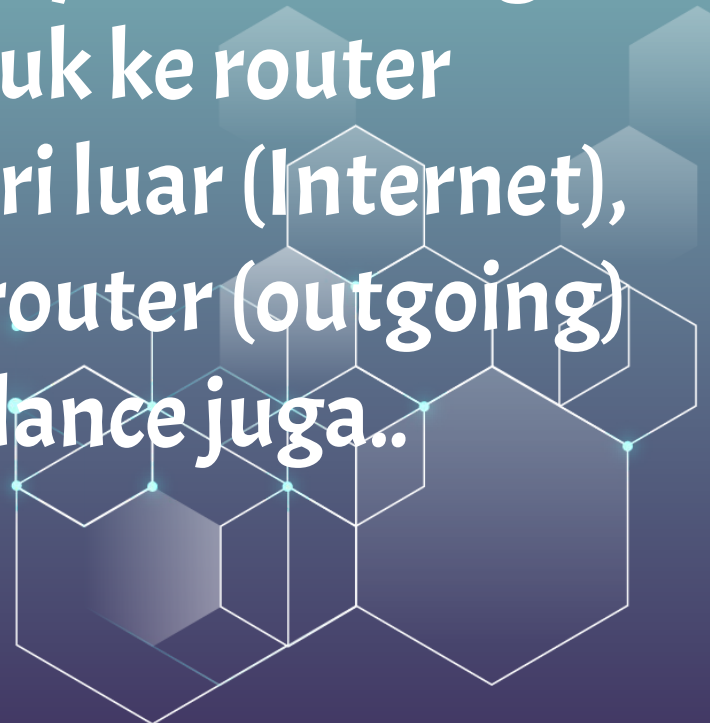
Don’t forget NAT Public interface



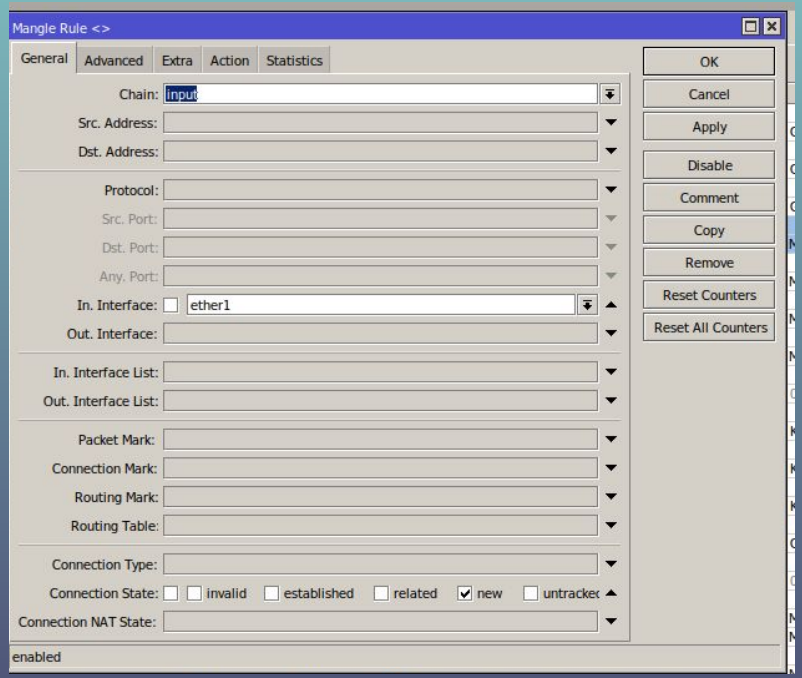
Notice! Perhatikan rasio bandwith antar ISP yang digunakan

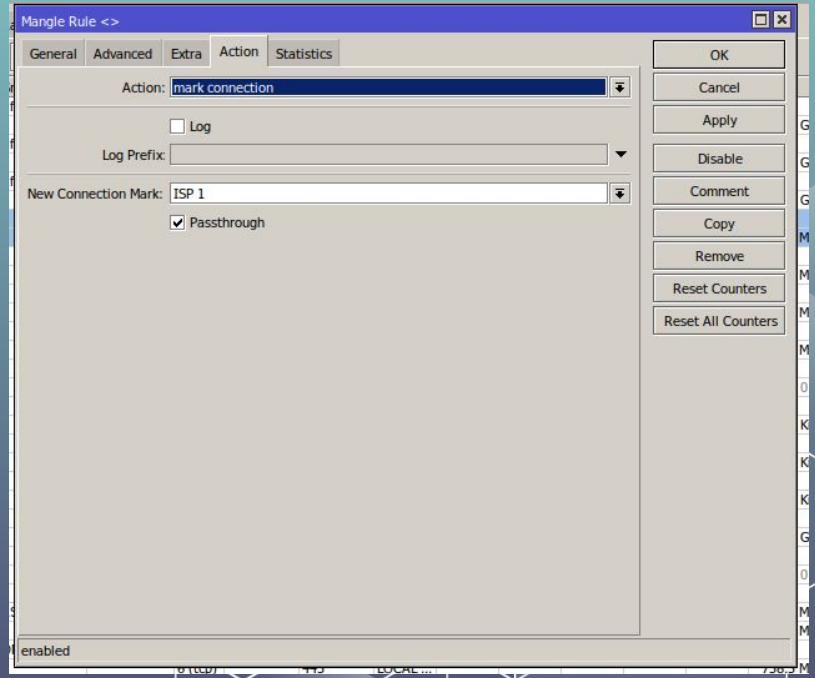


Dengan load balance, maka gateway akan lebih dari satu dan kasusnya terkadang ketika ada packet masuk ke router (incoming) yang berasal dari luar (Internet), maka traffict respons dari router (outgoing) akan terkena load balance juga..

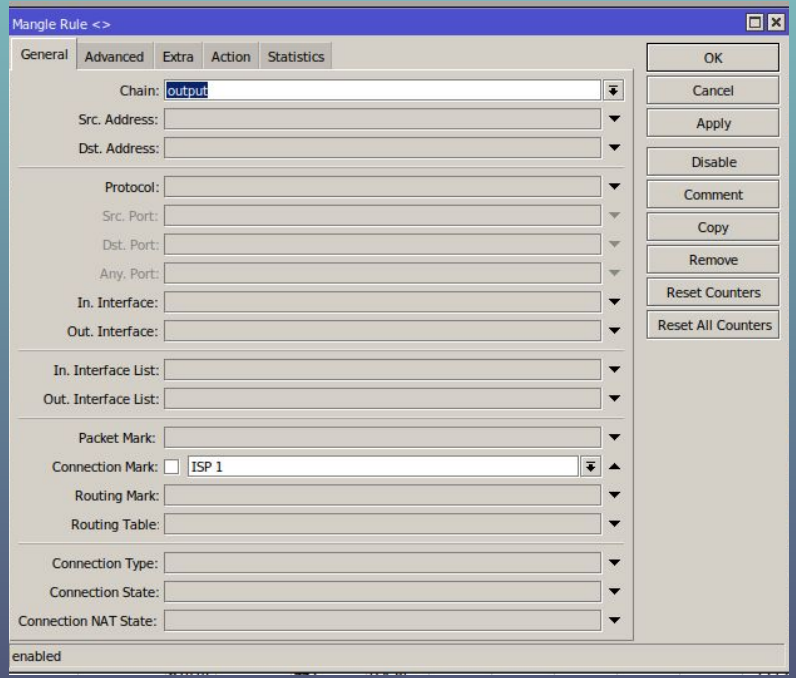


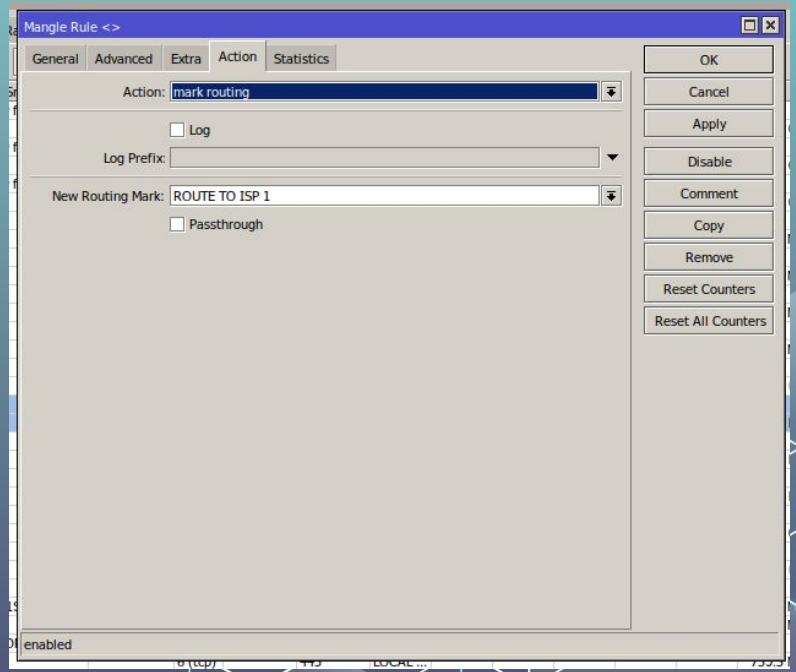
Konfigurasi Firewall mangle



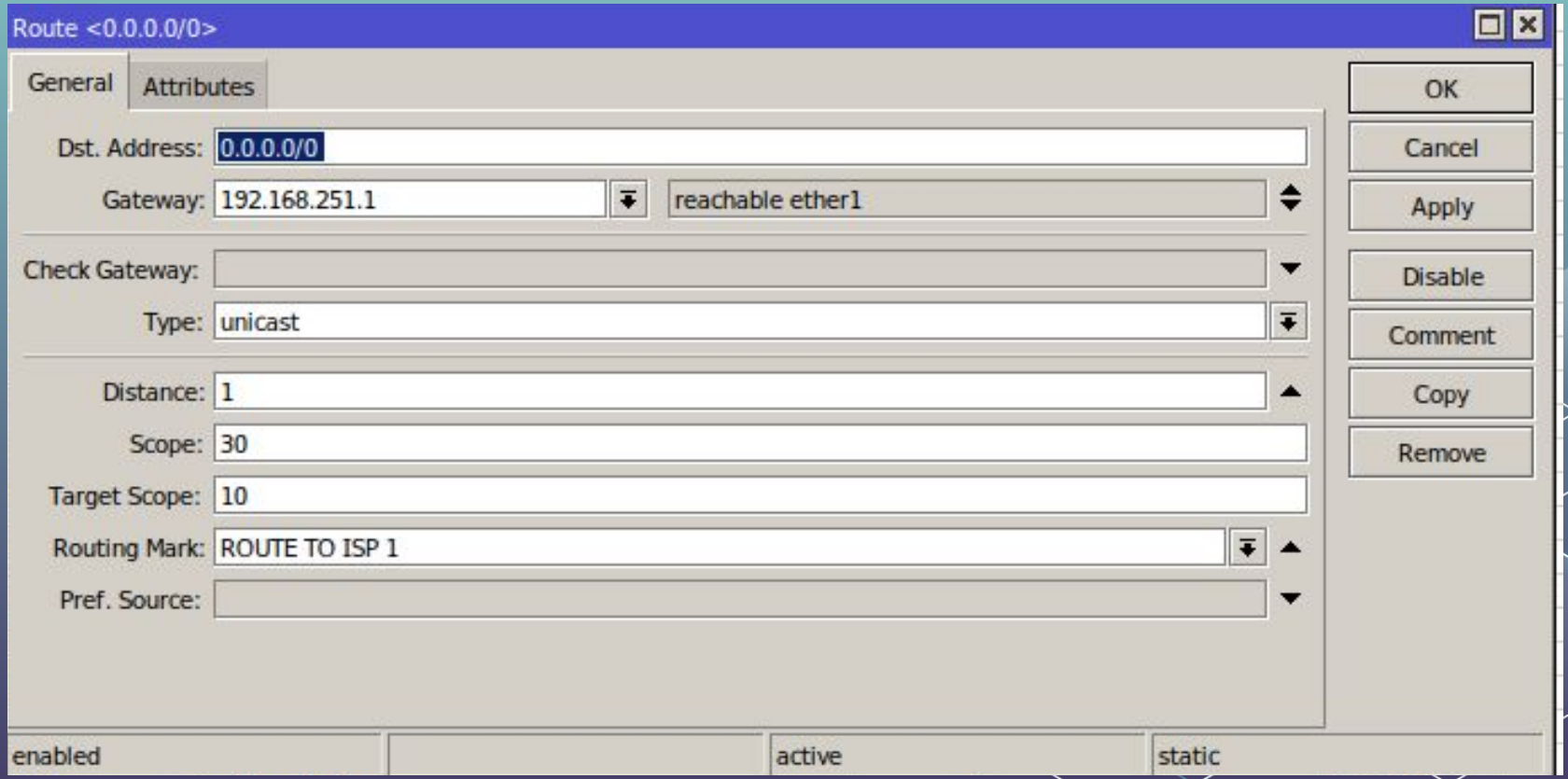


Konfigurasi Routing Mark





Konfigurasi di Tabel Routing



Permasalahan lain juga akan muncul ketika kita menggunakan setting dari salah satu DNS yang digunakan pada salah satu ISP dan ketika ISP tersebut putus maka akan berdampak pada jaringan user (Cannot resolve DNS)

Attention!

Masih banyak user yang salah paham mengenai load balance

Contohnya ketika kita memiliki 3 ISP, dengan besaran bandwith

20 + 20 + 20 = 60

1 : 1 : 1

trick

Bisa gunakan fitur address list IP Address yang akan di NAT untuk memudahkan untuk network management

Firewall

Filter Rules | NAT | Mangle | Raw | Service Ports | Connections | Address Lists | Layer7 Protocols

	Name	Address	Timeout	Creation Time
	;;; LAB. DPIB 1			
	INTERNET	192.168.0.1-192.168.0.36		Apr/16/2019 23:...
	;;; LAB. DPIB 2			
X	INTERNET	192.168.0.37-192.168.0.72		Nov/21/2019 15:...
	;;; LAB. TITL			
	INTERNET	192.168.0.73-192.168.0.109		Apr/16/2019 23:...
	;;; LAB. CNC 1			
	INTERNET	192.168.0.121-192.168.0.160		Apr/16/2019 23:...
	;;; LAB. CNC 2			
	INTERNET	192.168.0.161-192.168.0.199		Apr/16/2019 23:...

Bandwith Management

1. Simple Queue
2. Queue Tree

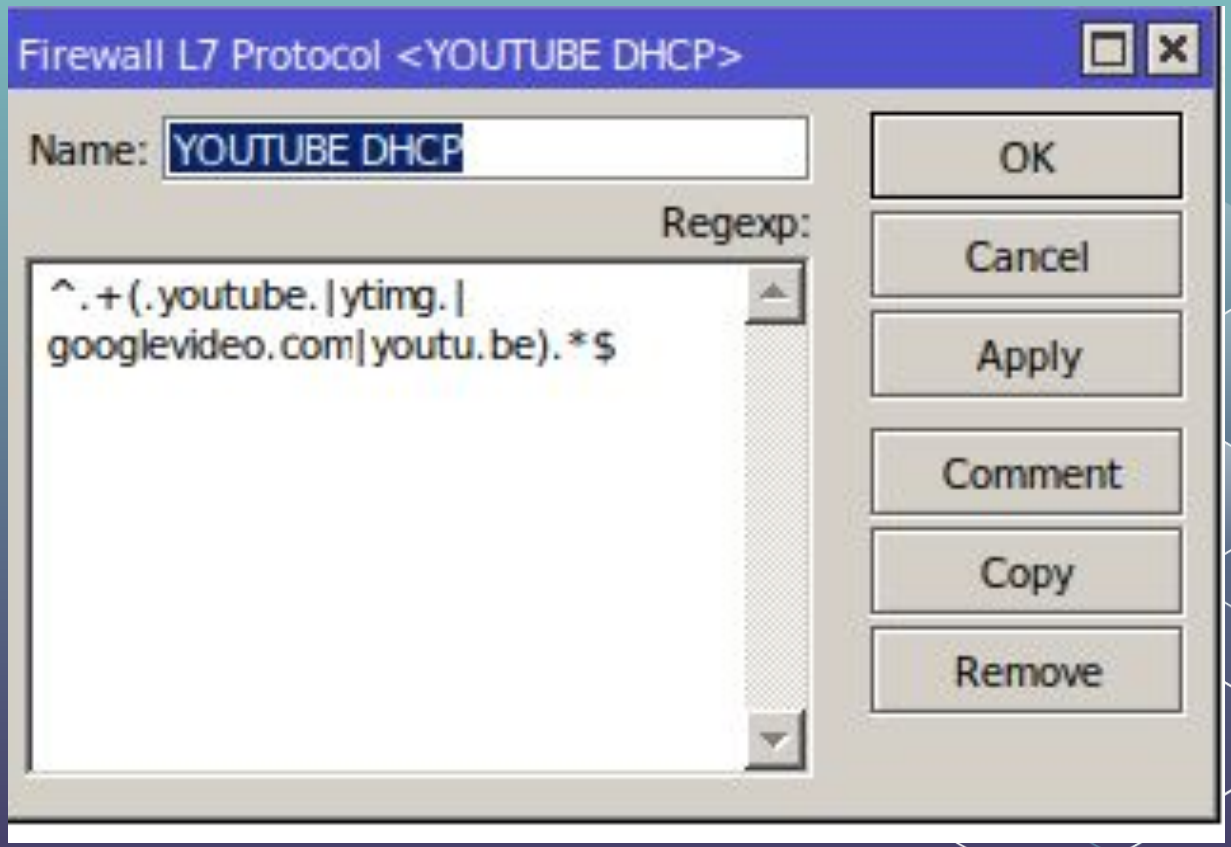
Target Address yang bisa dilimit diantaranya :

- → Single IP (192.168.7.2)
- → Network IP (192.168.7.0/24)
- → Beberapa IP sekaligus (192.168.7.3,192.168.7.4)
- → Interface ethernet

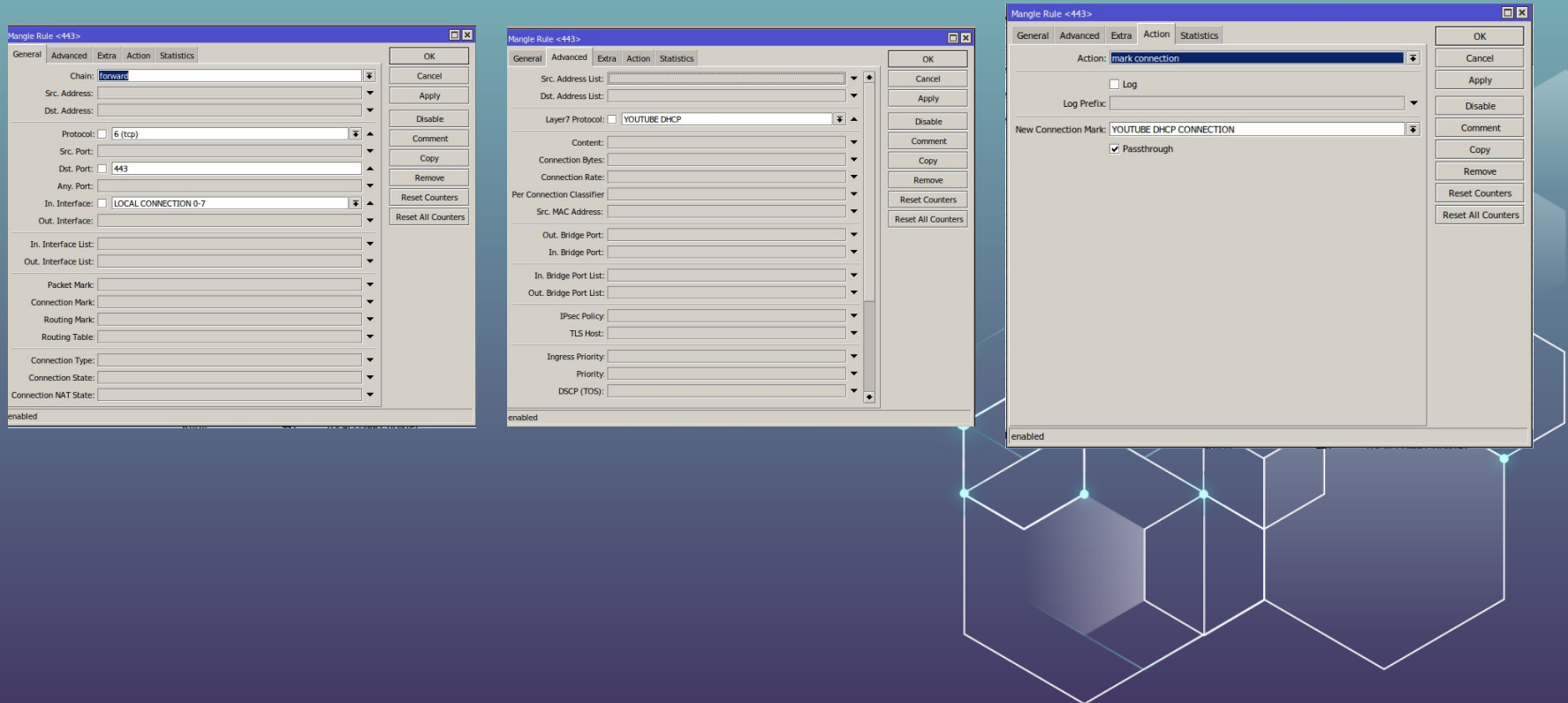
Bandwith Priority (Koneksi apa yang menghabiskan bandwith paling besar) itulah yang akan dilimit terlebih dahulu.

1) 144p = ±200Kbps (0.2Mbps)
2) 240p = ±300Kbps (0.3Mbps)
3) 360p = ±400Kbps (0.4Mbps)
4) 480p = ±500Kbps (0.5Mbps)
5) 720p @30fps = ±1.500Kbps (1.5Mbps)
6) 720p @60fps = ±2.250Kbps (2.2Mbps)
7) 1080p @30fps = ±3.000Kbps (3Mbps)
8) 1080p @60fps = ±4.500Kbps (4.5Mbps)
9) 1440p @30fps = ±6.000Kbps (6Mbps)
10) 1440p @60fps = ±9.000Kbps (9Mbps)
11) 4k / 2160p @30fps = ±13.000Kbps (13Mbps)
12) 4K/2160p @60fps = ±20.000Kbps (20Mbps)

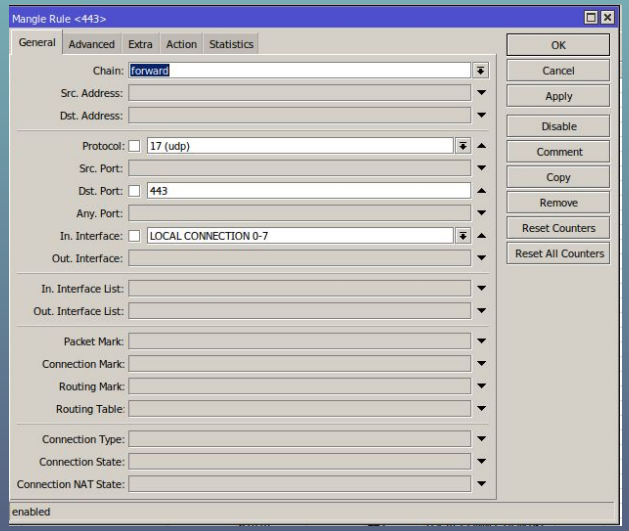
Limitasi koneksi YouTube

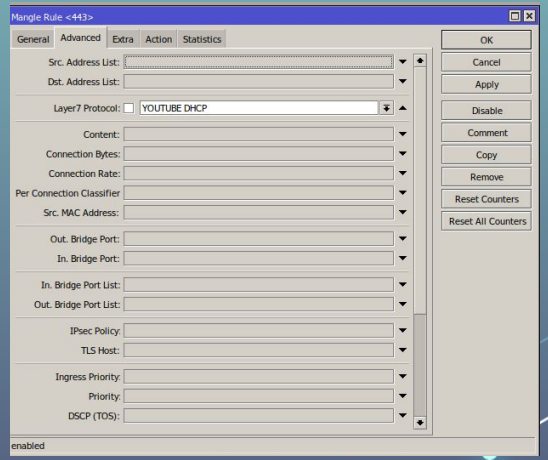


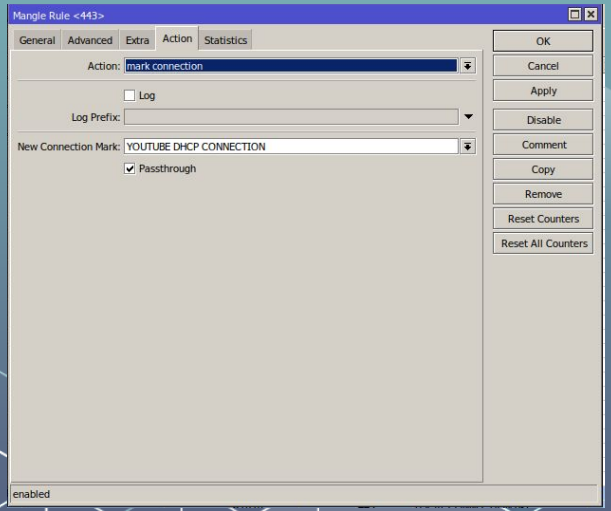
Marking TCP Connection YouTube



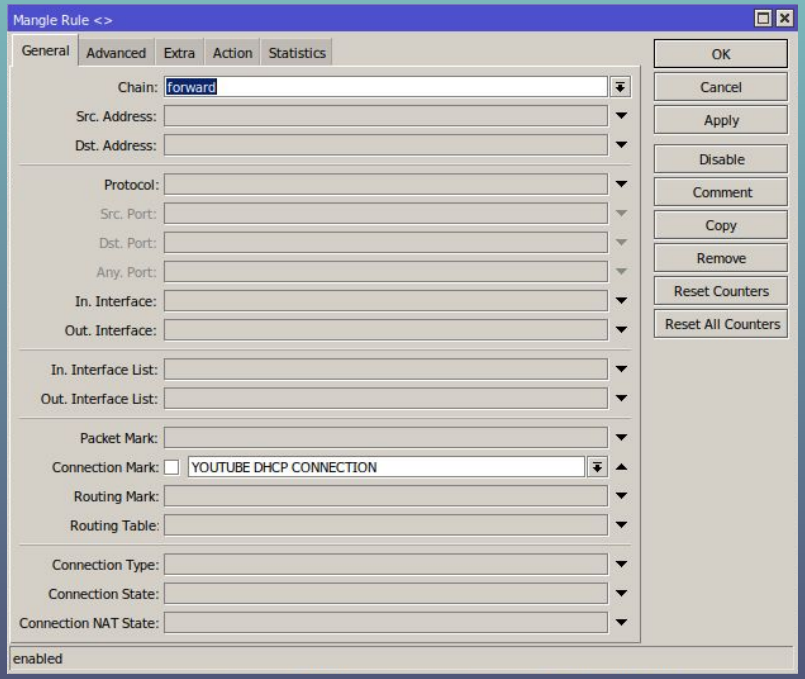
Marking UDP Connection YouTube

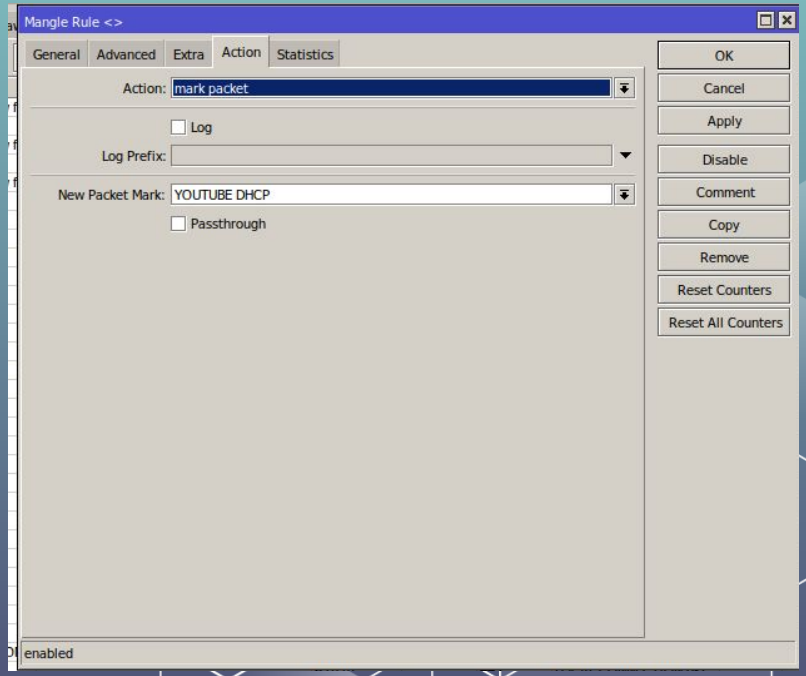




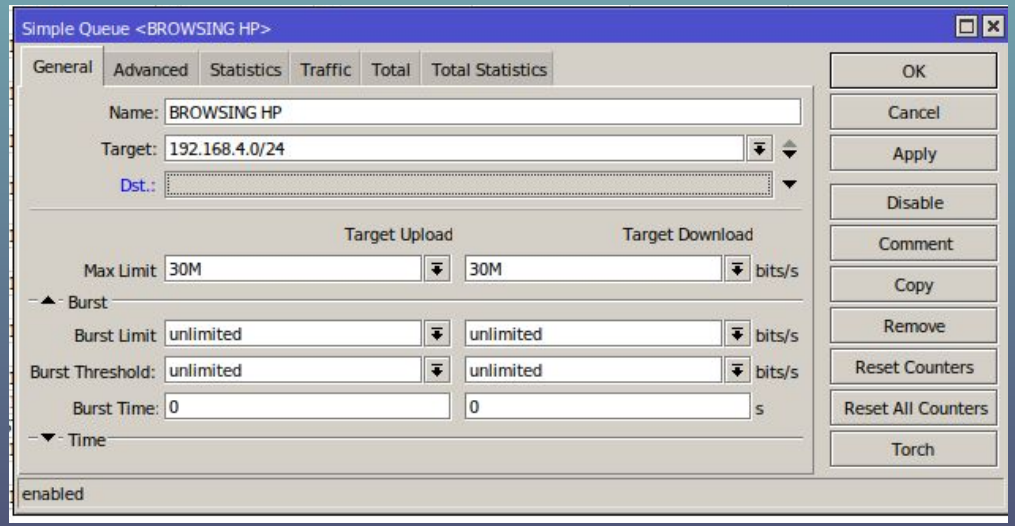


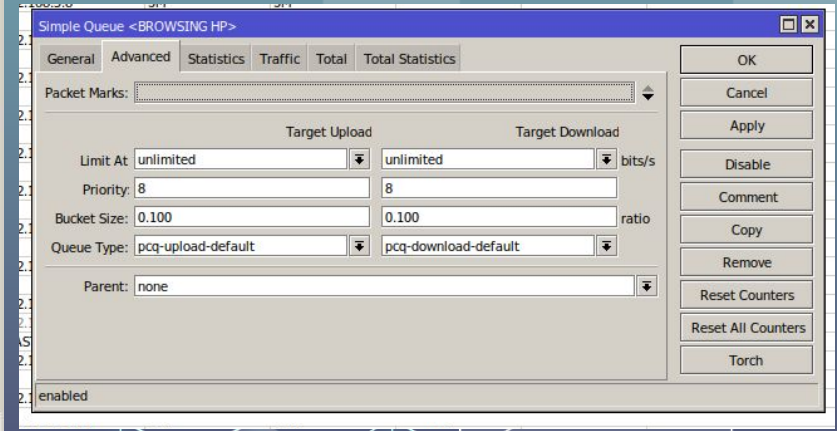
Mark Packet Connection YouTube



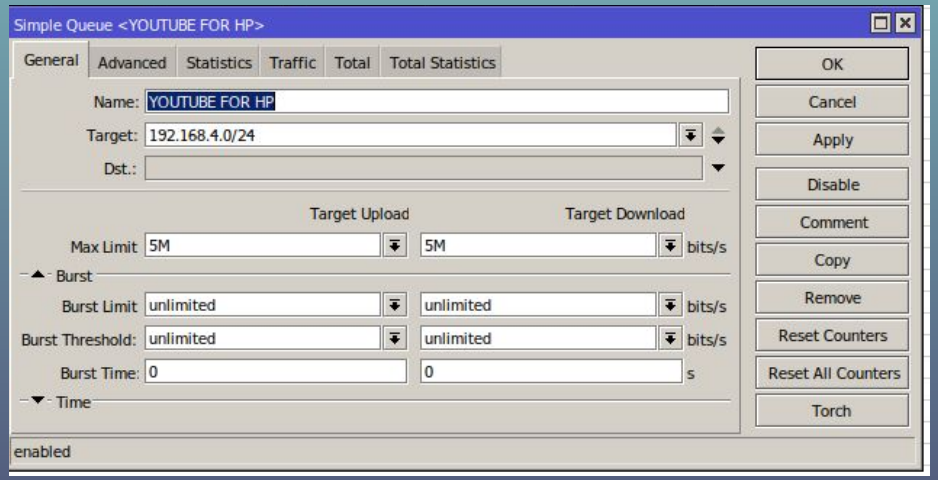


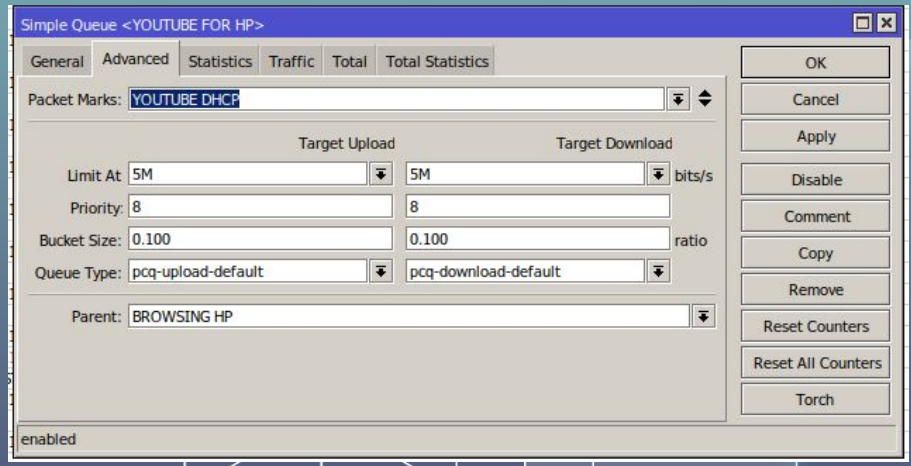
Setting Total besaran limitasi bandwith terlebih dahulu



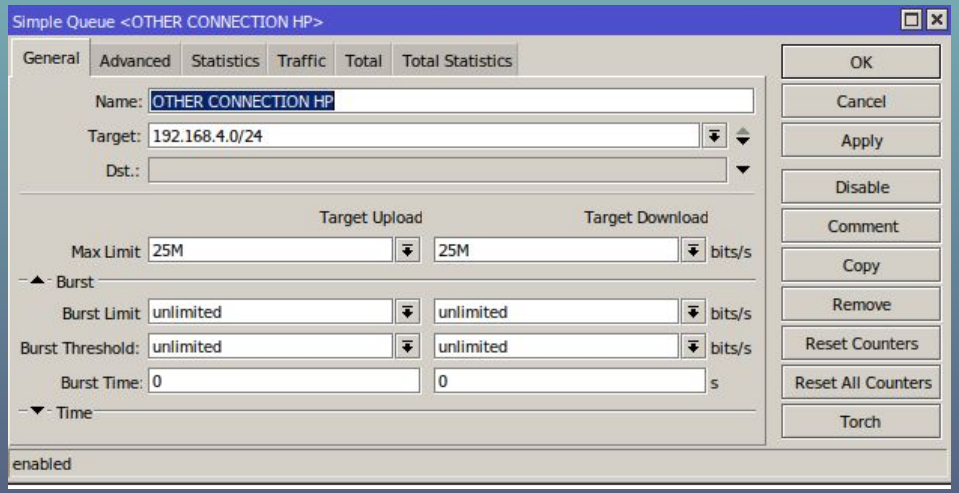


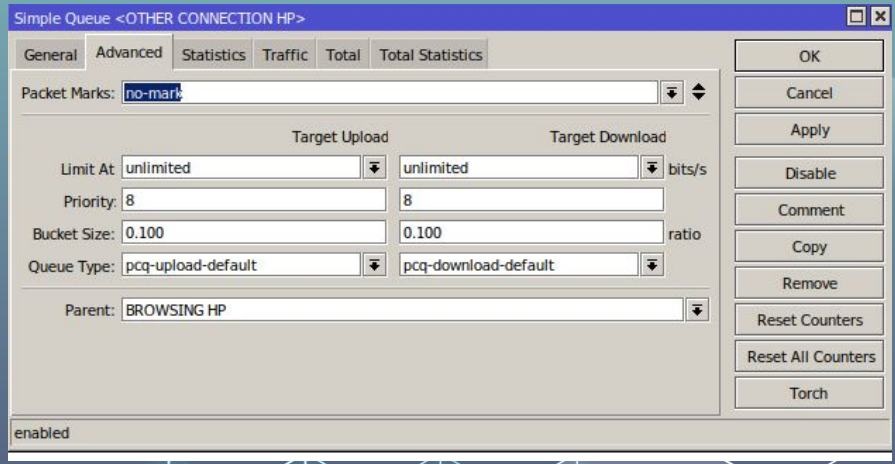
Setting besaran max limit koneksi bandwith YouTube yang akan dilimitasi





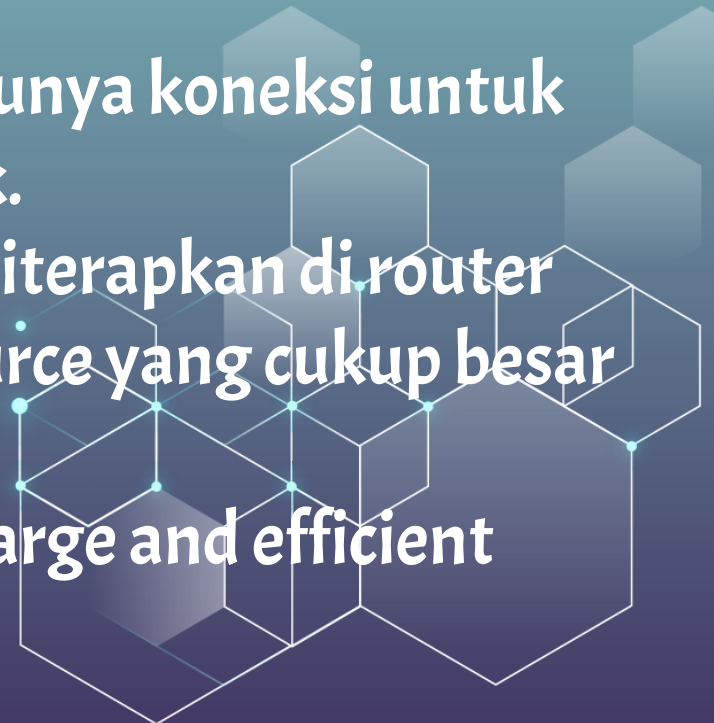
Setting besaran other connection (Untuk browsing atau koneksi yang selain streaming YouTube)





Attention!!

1. Konfigurasi yang diterapkan di masing-masing instansi berbeda-beda.
2. Untuk institusi pendidikan tentunya koneksi untuk game akan dibatasi atau diblock.
3. Semakin banyak firewall yang diterapkan di router maka akan menggunakan resource yang cukup besar pula.
4. cAP is recommended for use in large and efficient networks



Q & A

Thanks

Link presentasi : dik.si/mum-ferdian