MikroTik User Meeting

April 13 2016
Marco Polo Hotel
Manila, Philippines

CYGNALTECHNOLOGIES
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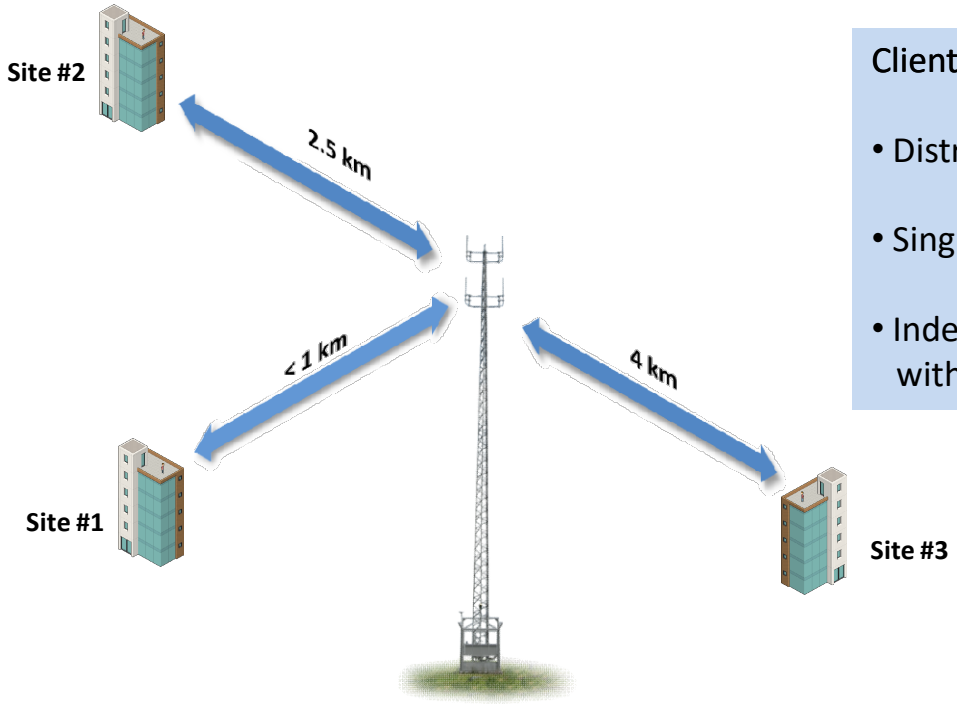
Case Study

A Main site with the only access to Fiber service

Multiple Sites with different distances from the main site

1) Less than 1km 2) Approx. 2.5km 3) Approx 4km



Client's requirements:

- Distribute the bandwidth dynamically and equally
- Single point of operation (NOC)
- Independent bandwidth management of each site without affecting other sites.

Typical Solution
(Point to Multipoint)

Wireless link speed will be divided to the numbers of connected users

Disadvantages:
- Slow wireless speed due to multiple access on a single channel (simplex mode)
- Prone to high interference
- Unpredictable speed
- Short distance only
- Must use same modulation and coding scheme

Advantage:
- Cheaper to deploy
- Good enough for short range hotspot application

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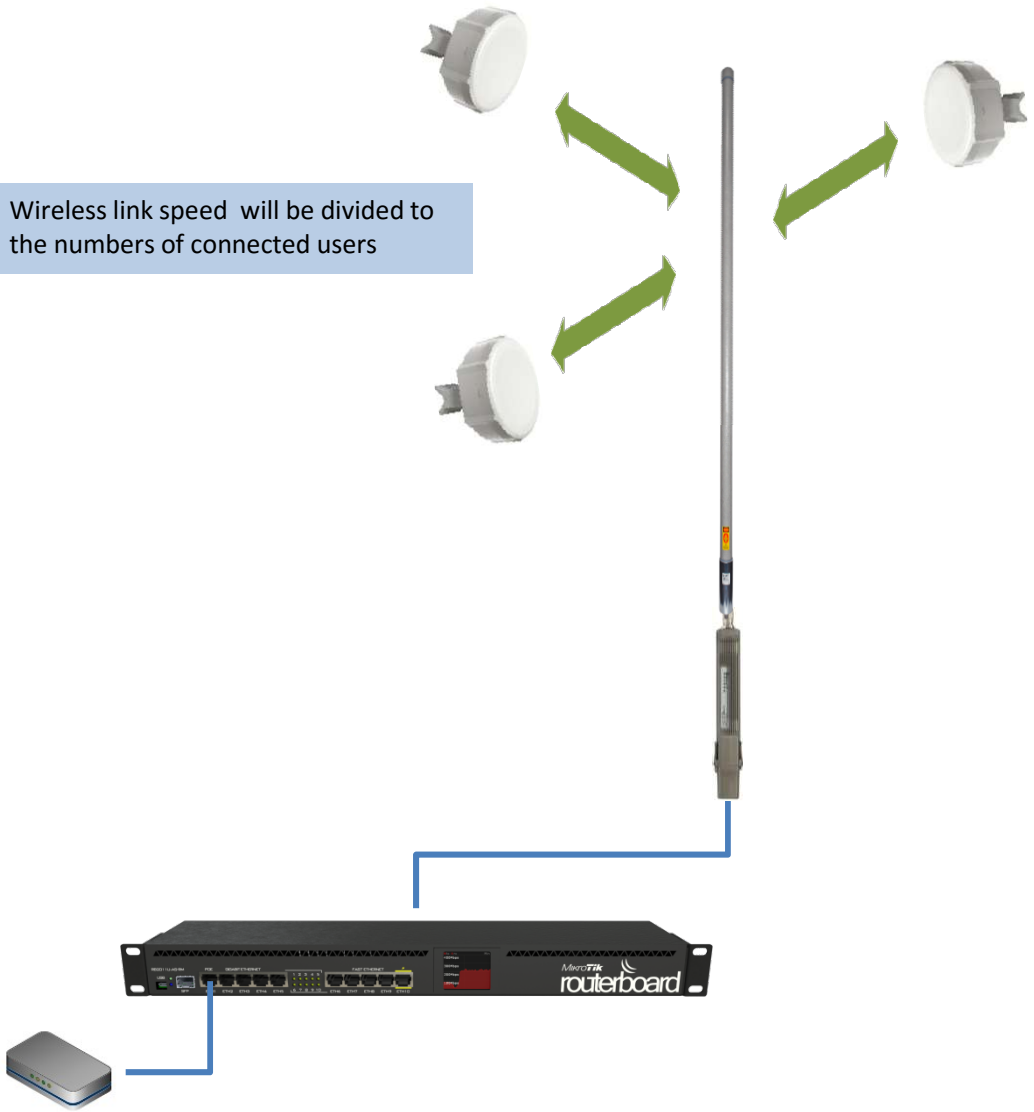

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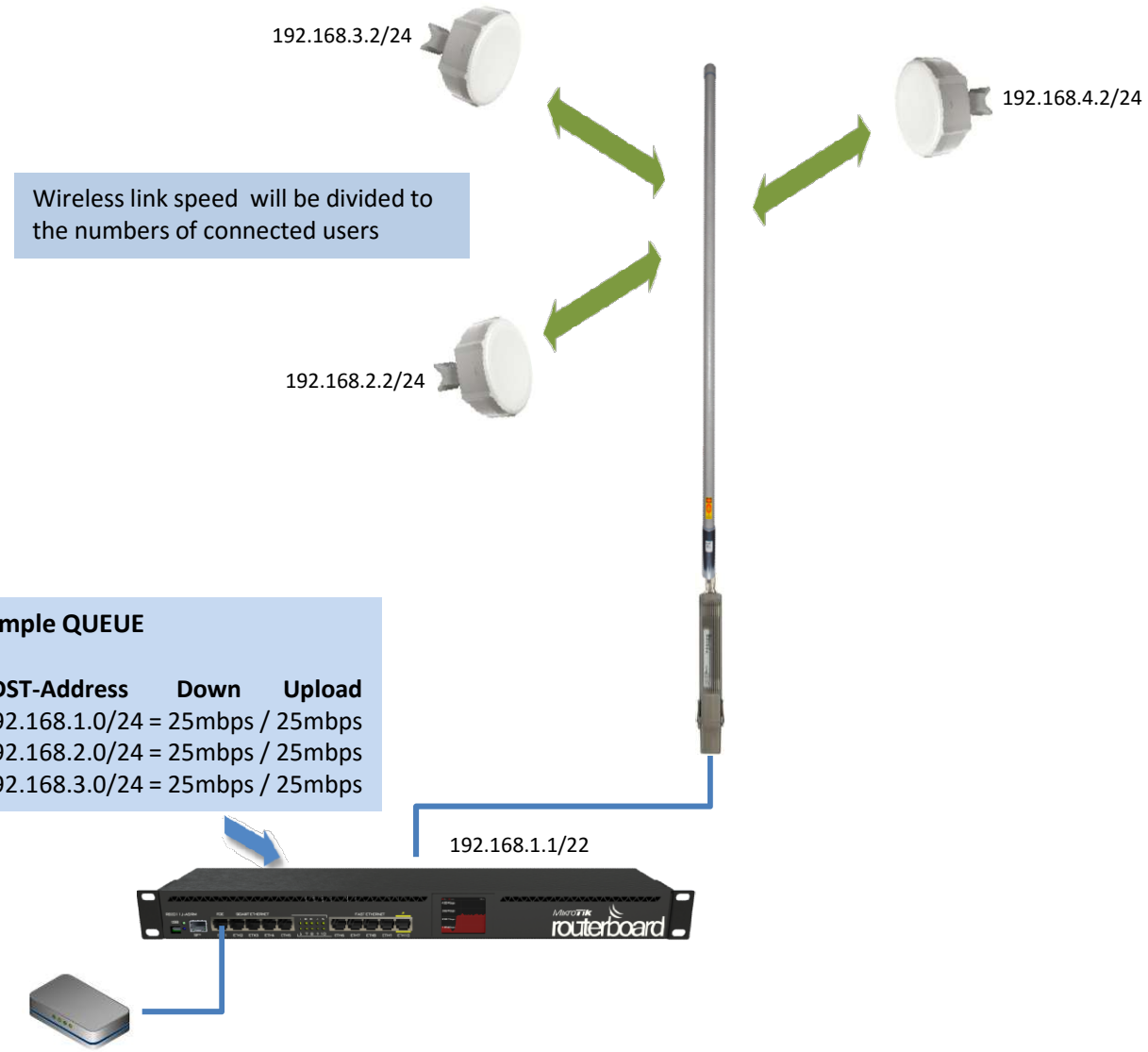

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Simple QUEUE

DST-Address	Down	Upload
192.168.1.0/24 =	25mbps /	25mbps
192.168.2.0/24 =	25mbps /	25mbps
192.168.3.0/24 =	25mbps /	25mbps

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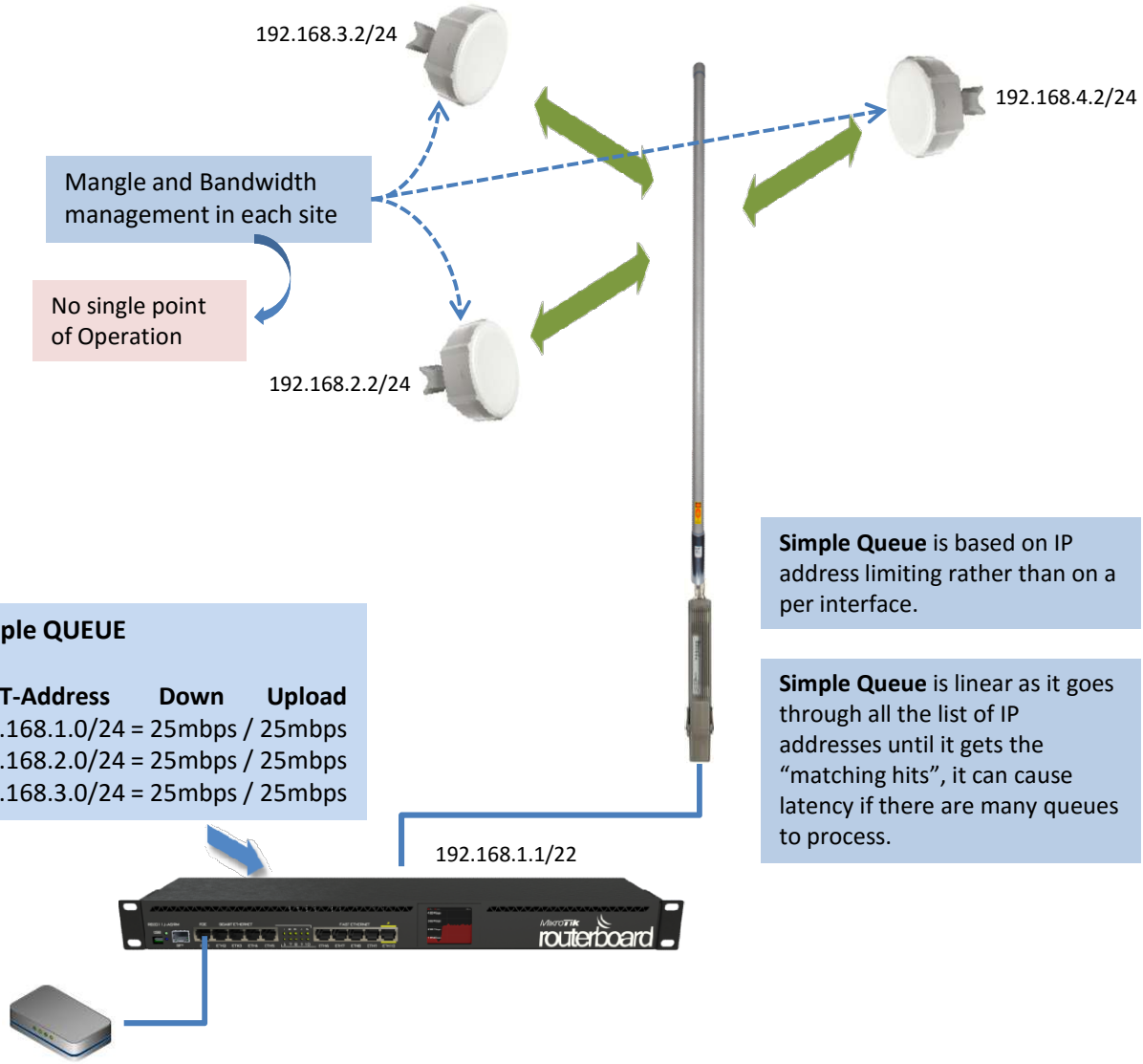

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Simple Queue is based on IP address limiting rather than on a per interface.

Simple Queue is linear as it goes through all the list of IP addresses until it gets the "matching hits", it can cause latency if there are many queues to process.

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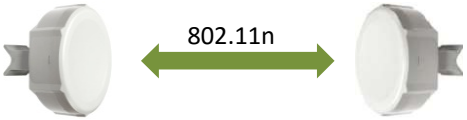
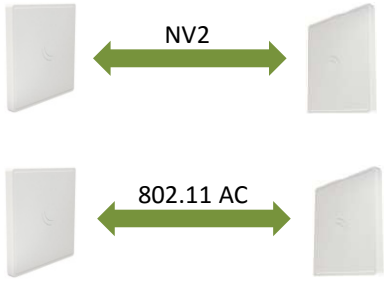
A Better Solution

(Point to Point)





Disadvantage:
- Expensive to deploy

Advantages:
- Not a shared wireless speed.
- Operating on different frequency and modulation coding scheme
- Less prone to interference
- Higher throughput
- Long distance link.

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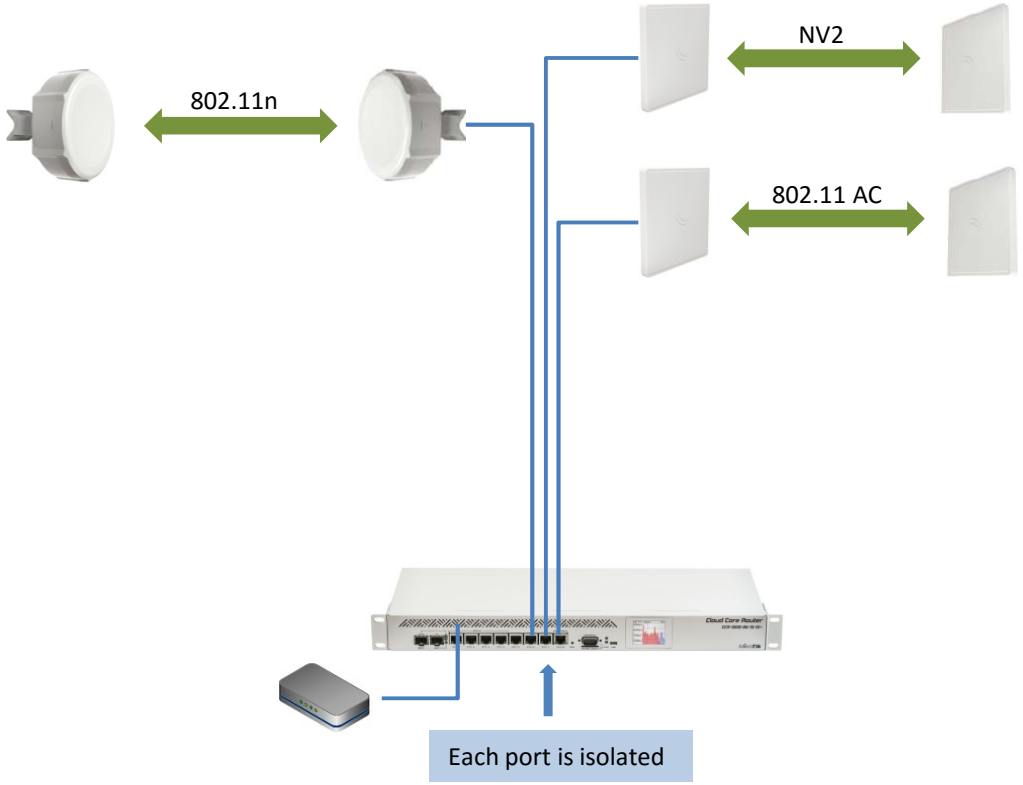
(Point to Point)



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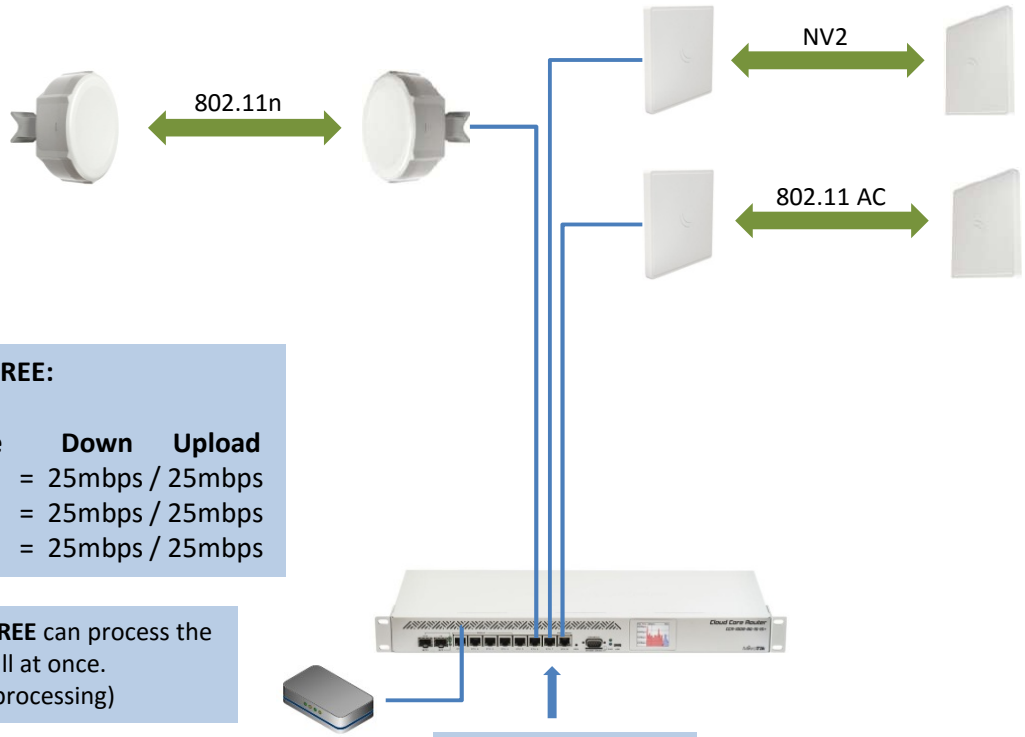

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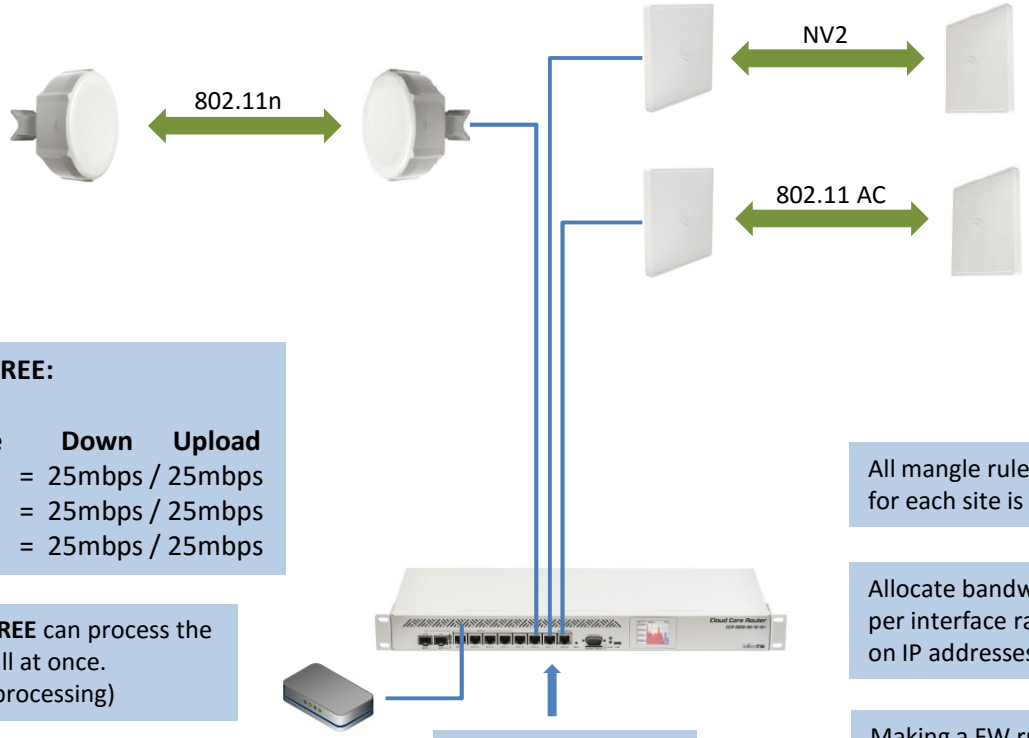
QUEUE TREE:

Interface		Down / Upload
Eth6	=	25mbps / 25mbps
Eth7	=	25mbps / 25mbps
Eth8	=	25mbps / 25mbps

QUEUE TREE can process the queues all at once.
(parallel processing)

A Better Solution

(Point to Point)



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All mangle rules and bandwidth management for each site is controlled at the core router.

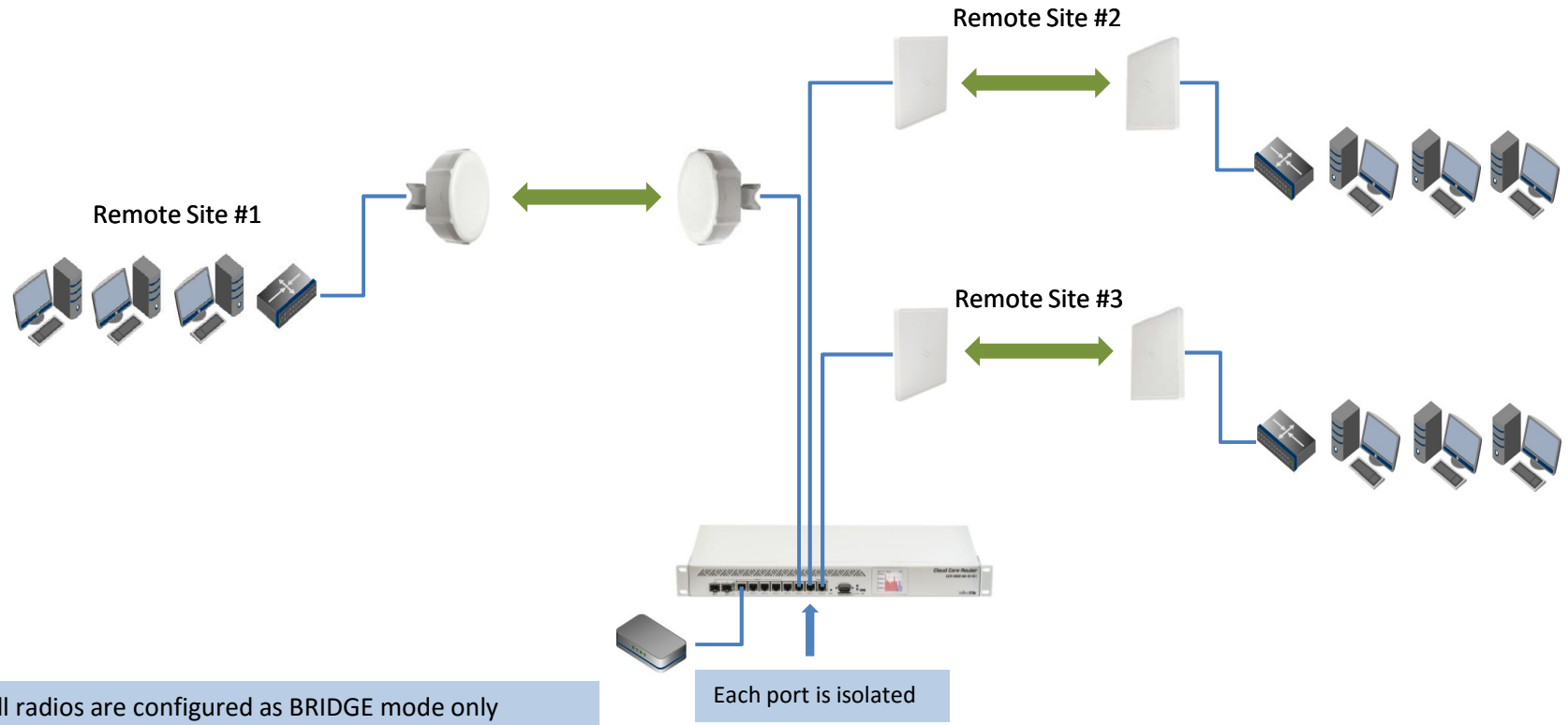
Allocate bandwidth on a per interface rather than on IP addresses or subnets.

Each port is isolated

Making a FW rule is a lot easier.

Network Design

(Point to Point)

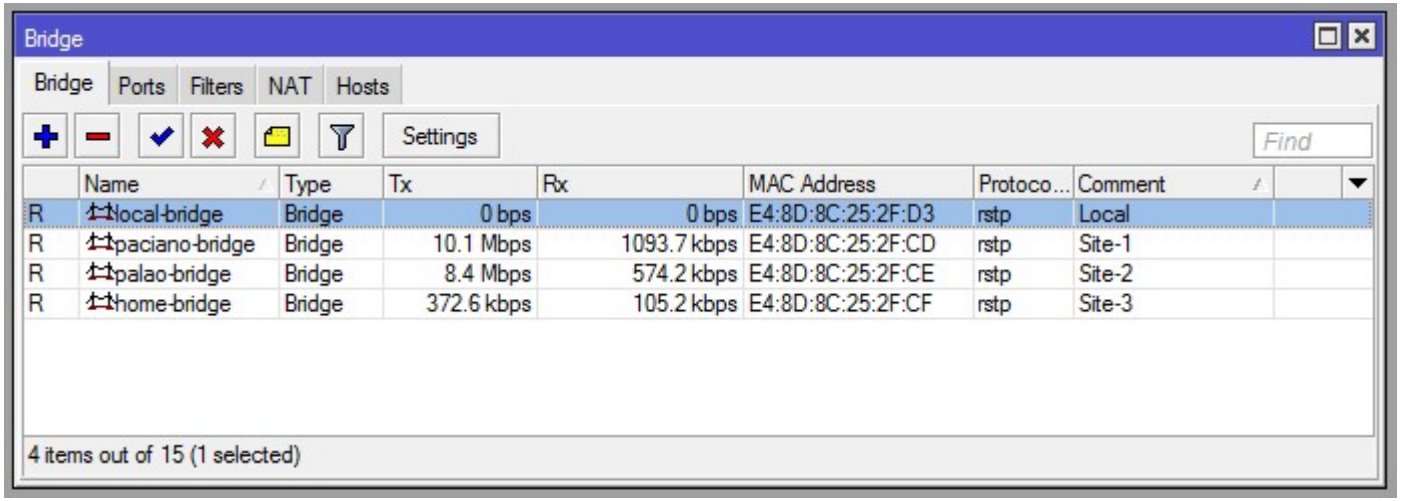


- All radios are configured as BRIDGE mode only
- No BW or FW management on radios
- All radios and remote sites are controlled at the core router.
- Higher throughput on each segment on both wireless and core router interface port
- Single point of operation (NOC)

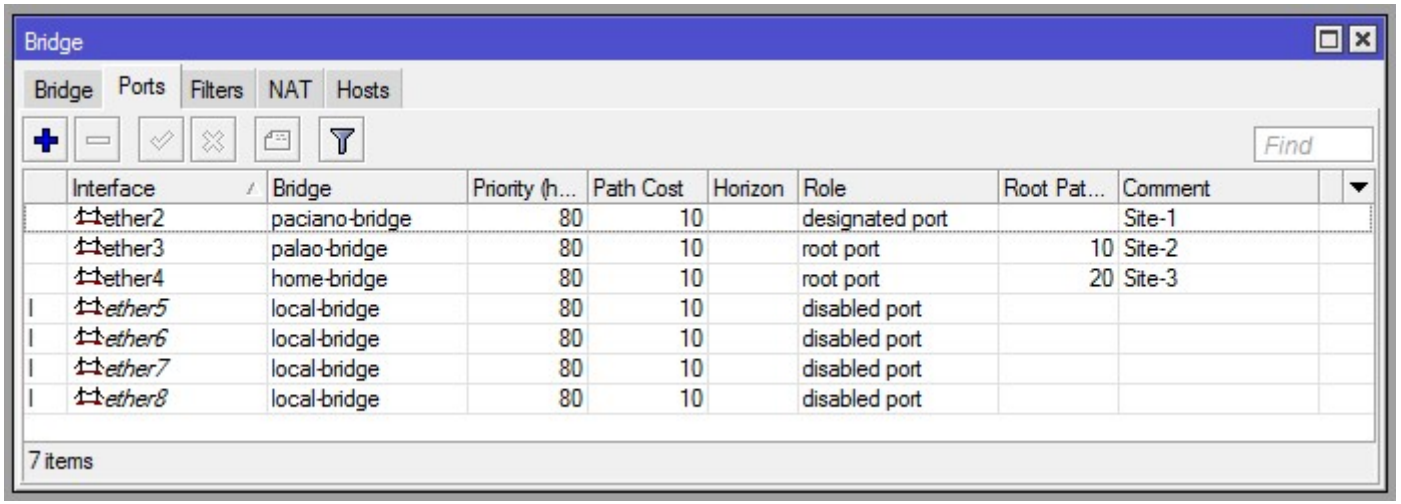
Configuration

Configuration
(Bridging)

Create a bridge interface

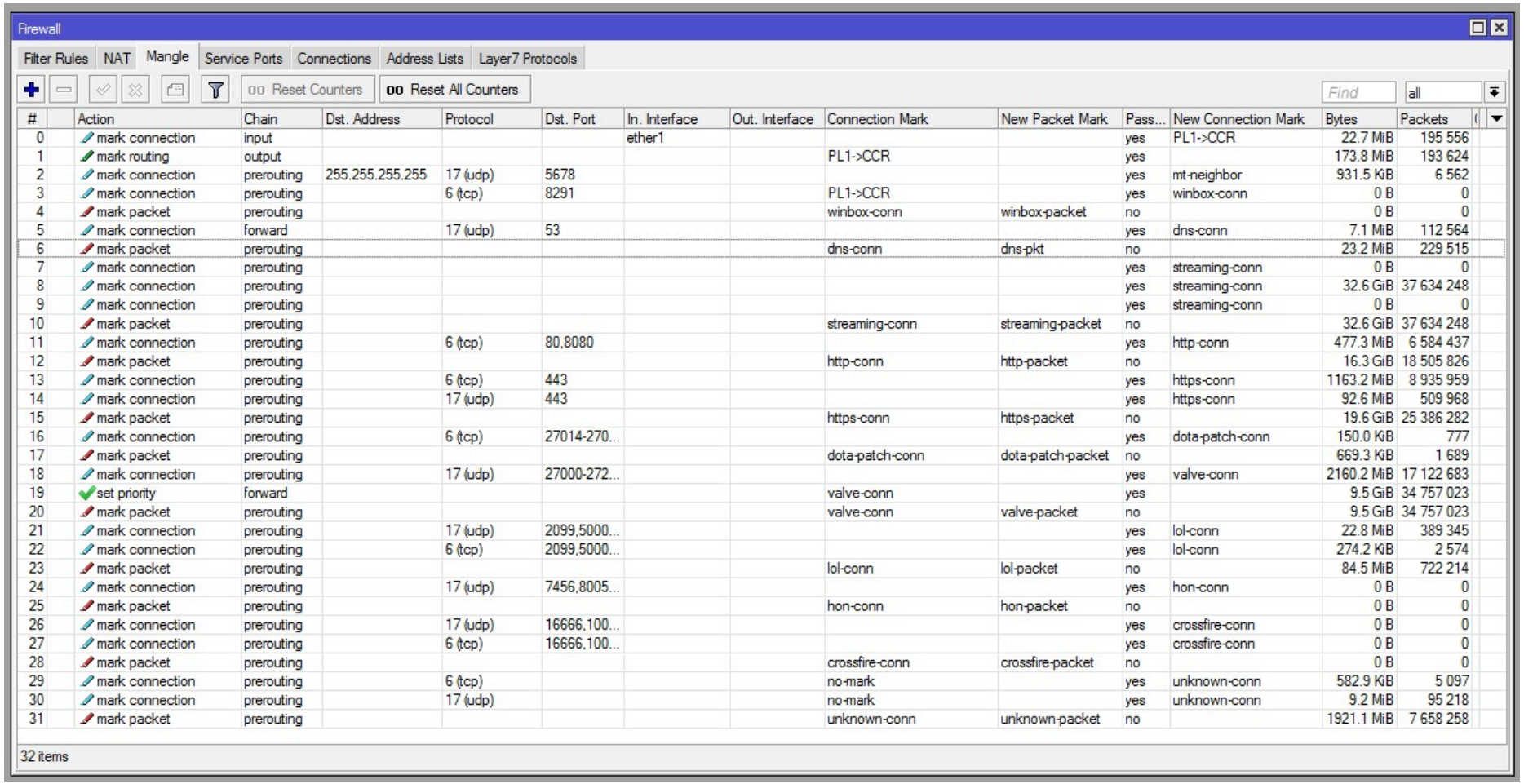


Bind the physical interface to the bridge interface



Configuration
(Mangle)

Create the mangle rule for the applications



#	Action	Chain	Dst. Address	Protocol	Dst. Port	In. Interface	Out. Interface	Connection Mark	New Packet Mark	Pass...	New Connection Mark	Bytes	Packets
0	mark connection	input				ether1				yes	PL1->CCR	22.7 MiB	195 556
1	mark routing	output						PL1->CCR		yes		173.8 MiB	193 624
2	mark connection	prerouting	255.255.255.255	17 (udp)	5678					yes	mt-neighbor	931.5 KiB	6 562
3	mark connection	prerouting		6 (tcp)	8291			PL1->CCR		yes	winbox-conn	0 B	0
4	mark packet	prerouting						winbox-conn	winbox-packet	no		0 B	0
5	mark connection	forward		17 (udp)	53					yes	dns-conn	7.1 MiB	112 564
6	mark packet	prerouting						dns-conn	dns-pkt	no		23.2 MiB	229 515
7	mark connection	prerouting								yes	streaming-conn	0 B	0
8	mark connection	prerouting								yes	streaming-conn	32.6 GiB	37 634 248
9	mark connection	prerouting								yes	streaming-conn	0 B	0
10	mark packet	prerouting						streaming-conn	streaming-packet	no		32.6 GiB	37 634 248
11	mark connection	prerouting		6 (tcp)	80,8080					yes	http-conn	477.3 MiB	6 584 437
12	mark packet	prerouting						http-conn	http-packet	no		16.3 GiB	18 505 826
13	mark connection	prerouting		6 (tcp)	443					yes	https-conn	1163.2 MiB	8 935 959
14	mark connection	prerouting		17 (udp)	443					yes	https-conn	92.6 MiB	509 968
15	mark packet	prerouting						https-conn	https-packet	no		19.6 GiB	25 386 282
16	mark connection	prerouting		6 (tcp)	27014-270...					yes	dota-patch-conn	150.0 KiB	777
17	mark packet	prerouting						dota-patch-conn	dota-patch-packet	no		669.3 KiB	1 689
18	mark connection	prerouting		17 (udp)	27000-272...					yes	valve-conn	2160.2 MiB	17 122 683
19	set priority	forward						valve-conn		yes		9.5 GiB	34 757 023
20	mark packet	prerouting						valve-conn	valve-packet	no		9.5 GiB	34 757 023
21	mark connection	prerouting		17 (udp)	2099,5000...					yes	lol-conn	22.8 MiB	389 345
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23	mark packet	prerouting						lol-conn	lol-packet	no		84.5 MiB	722 214
24	mark connection	prerouting		17 (udp)	7456,8005...					yes	hon-conn	0 B	0
25	mark packet	prerouting						hon-conn	hon-packet	no		0 B	0
26	mark connection	prerouting		17 (udp)	16666,100...					yes	crossfire-conn	0 B	0
27	mark connection	prerouting		6 (tcp)	16666,100...					yes	crossfire-conn	0 B	0
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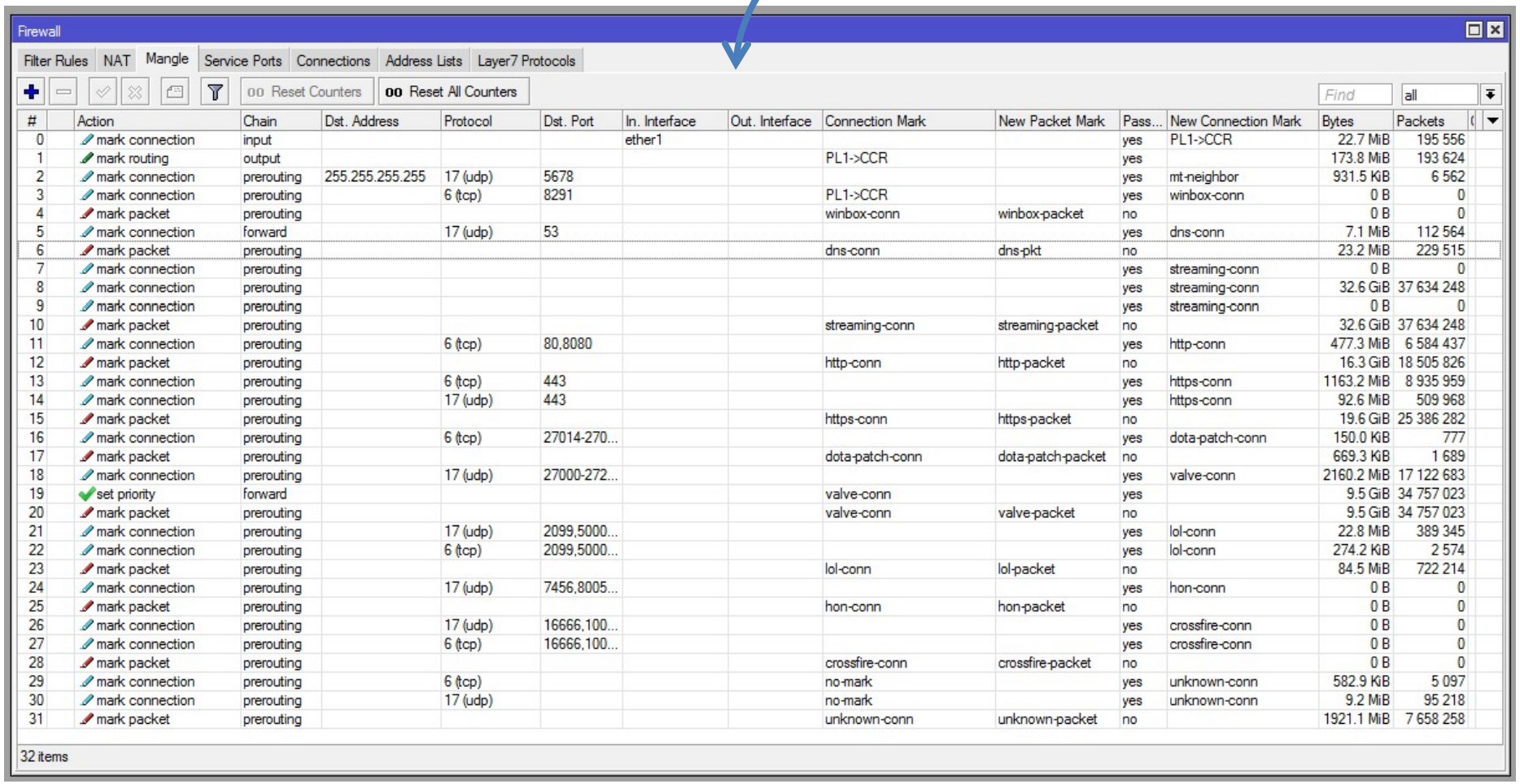
31	mark packet	prerouting						unknown-conn	unknown-packet	no		1921.1 MiB	7 658 258

Configuration

(Mangle)

Create the mangle rule for the applications

Do not reference any interface for the INPUT and OUTPUT interface, this will enable us to re-use the mangle rule for all interfaces.



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32 items

Configuration

(QUEUE TREE and QUEUE TYPES)

According to Mikrotik Wiki…

"Discard packets for QoS
Protocols such as TCP/IP have a back-off mechanism - when lost packets are not acknowledged by the receiver - the sender starts sending less data. From the point of view of Internet Applications and protocols, packet loss is considered normal and informative.

RouterOS can drop packets out of the set bandwidth limit as well as according to priority configuration. This way we have free capacity for priority packets - exactly when we need it. According to set max-limit - RouterOS knows exactly how much to drop so that the router forwards only the packets that we want it to - high priority + as much low priority packets as there is available bandwidth within the remaining from that max-limit. "

Source: http://wiki.mikrotik.com/wiki/NetworkPro_on_Quality_of_Service#What_is_a_Queue

Bandwidth control is based on dropping the packets when the QUEUE size HITS it maximum limit.