April 13 2016
Marco Polo Hotel
Manila, Philippines

Unit 105 ECRDC Building
496 Barangka Drive corner Talumpong Street
Mandaluyong 1550 Philippines
Tel: +63(2)997-9125
Web: Http://www.cygnaltech.net
eCommerce: http://online.cygnaltech.net

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

Site #2

2.5 km

<1 km

4 km

Site #1

Site #3
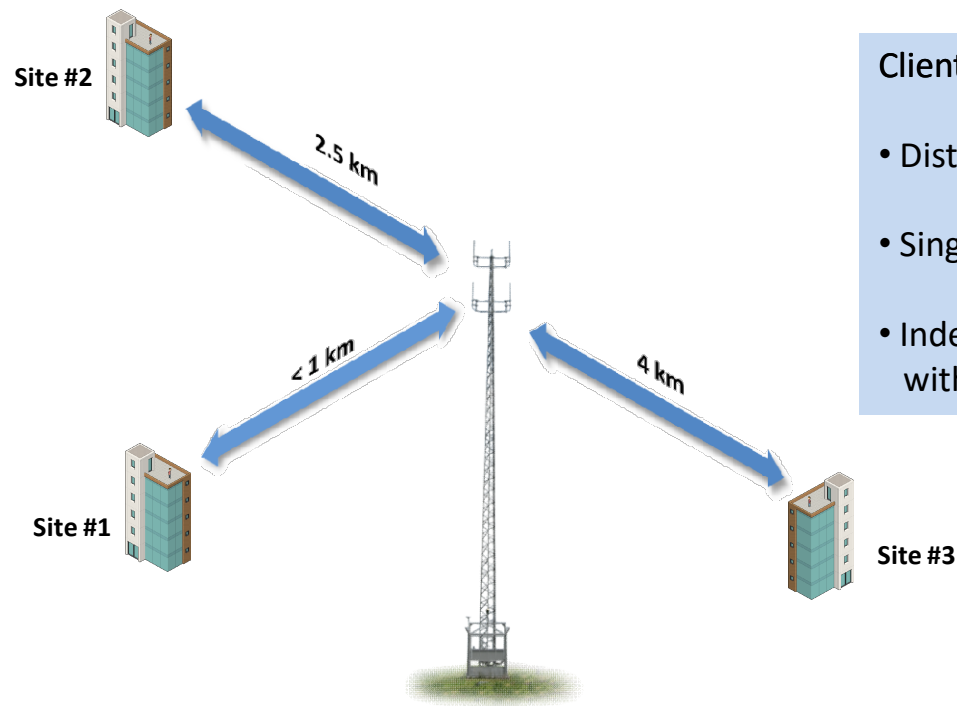
Client's requirements:

- 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

Typical Solution
(Point to Multipoint)

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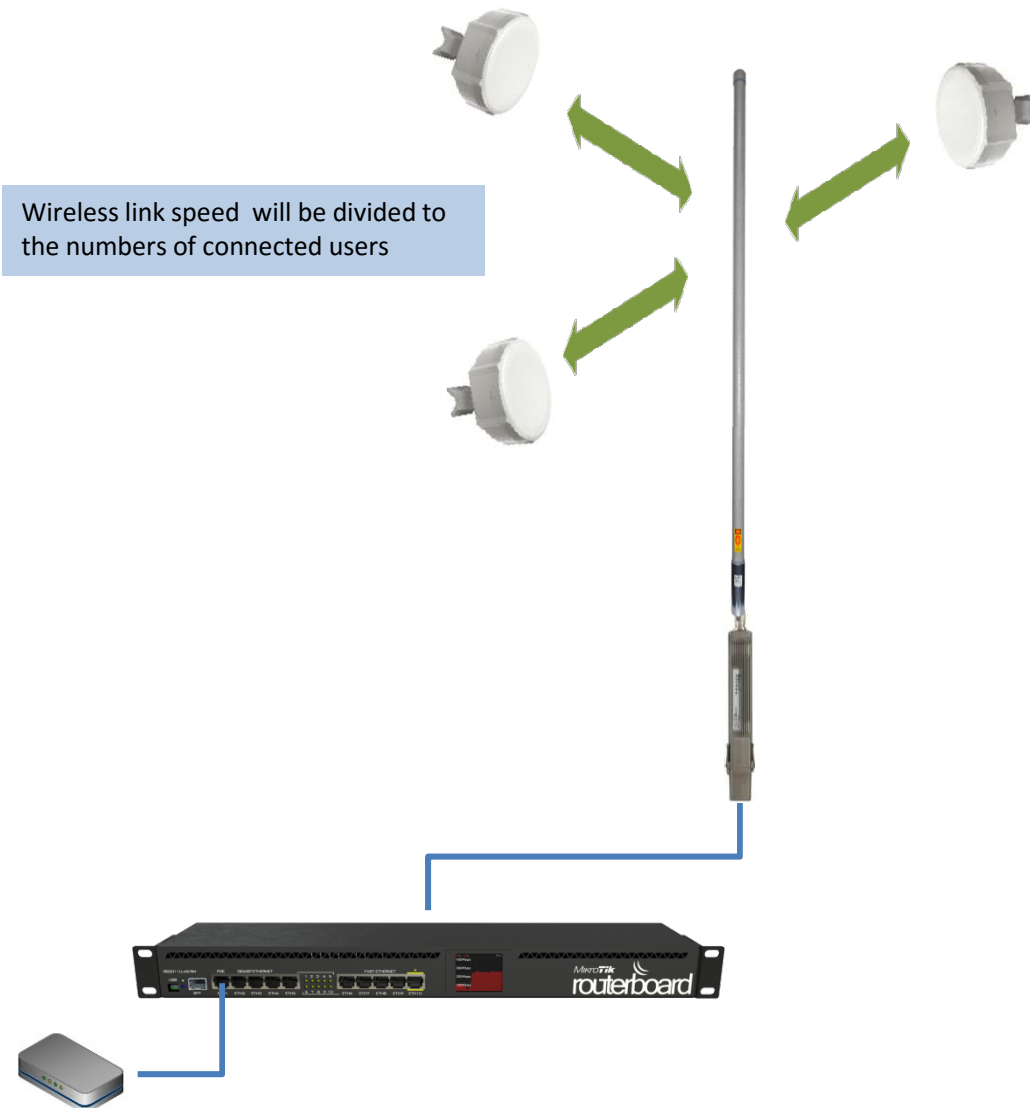
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MikroTik
routerboard

Typical Solution
(Point to Multipoint)

192.168.3.2/24

192.168.4.2/24

Wireless link speed will be divided to the numbers of connected users
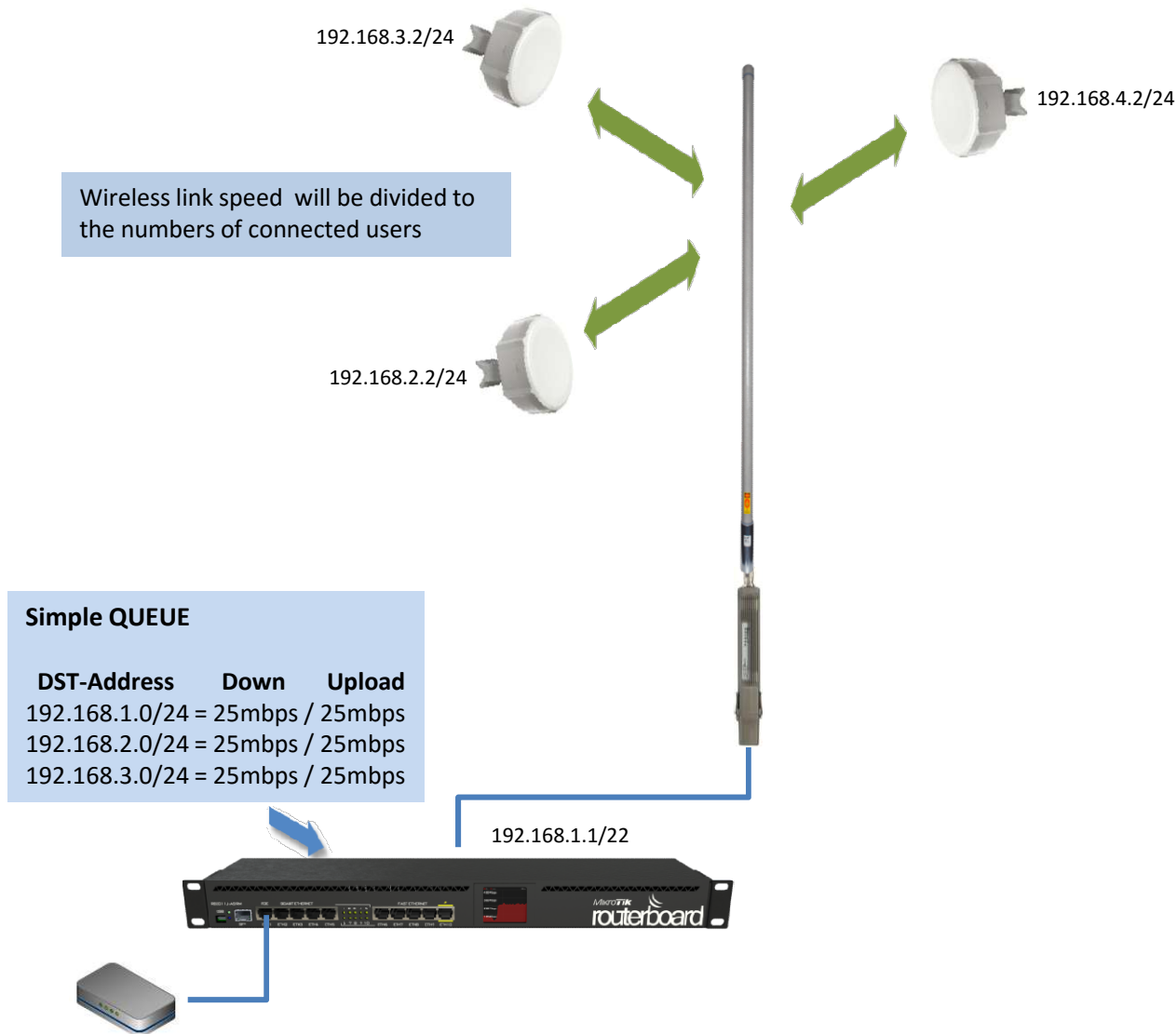
192.168.2.2/24

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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

192.168.1.1/22

routerboard

Typical Solution
(Point to Multipoint)

192.168.3.2/24

192.168.4.2/24

Mangle and Bandwidth management in each site
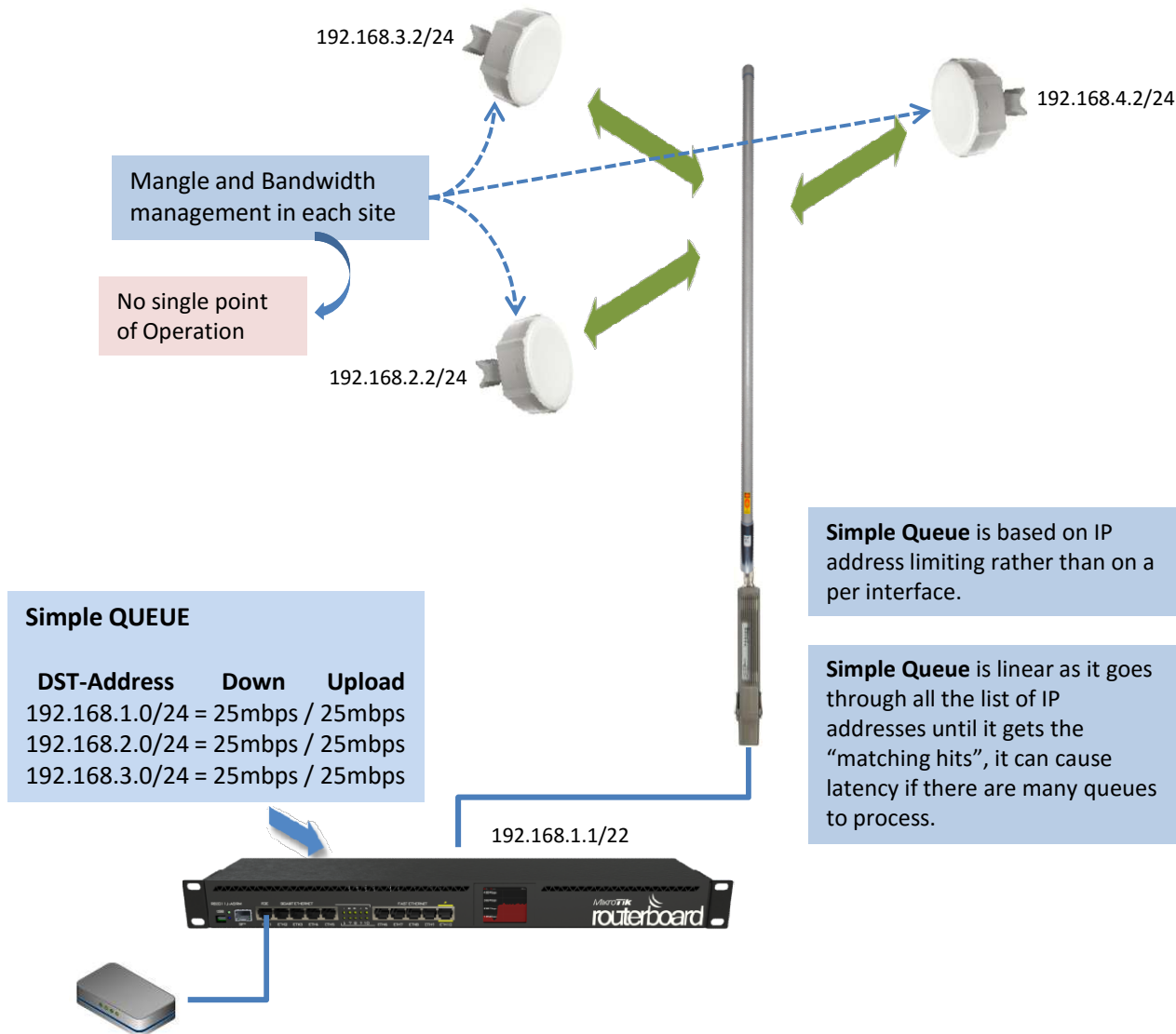
No single point of Operation

192.168.2.2/24

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

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

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.

192.168.1.1/22

routerboard

A Better Solution
(Point to Point)

802.11n

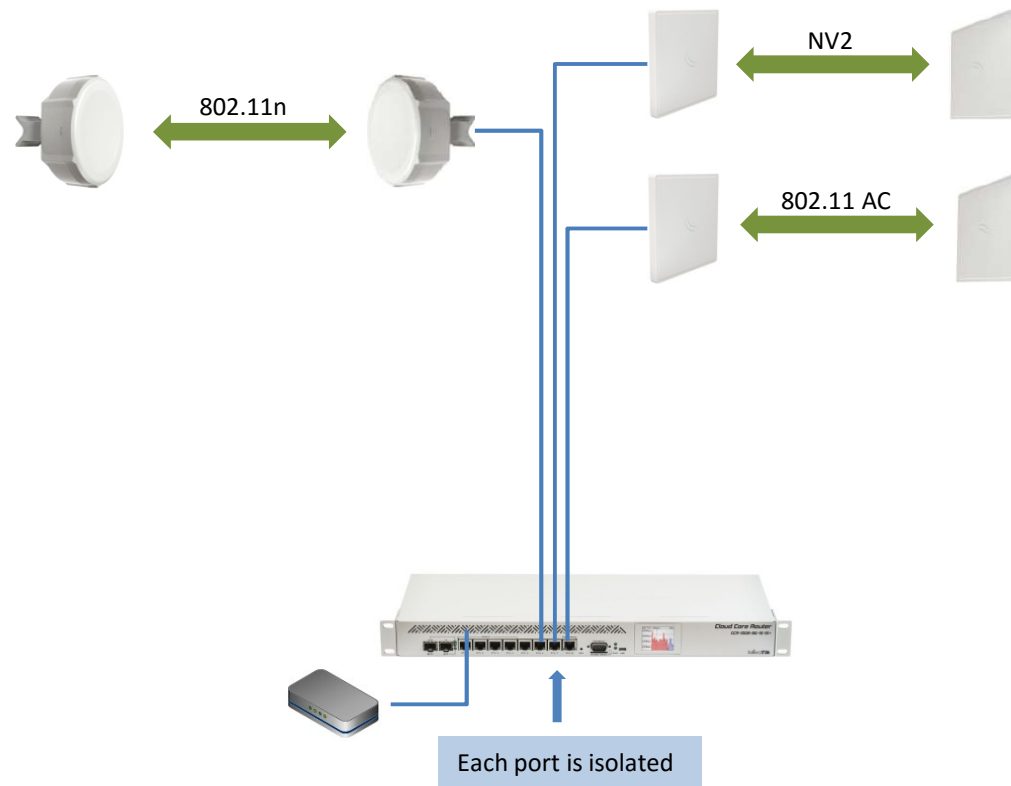NV2

802.11 AC

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.

A Better Solution
(Point to Point)

802.11n

NV2

802.11 AC

Cloud Core Router

Each port is isolated

Disadvantage:
• Expensive to deploy

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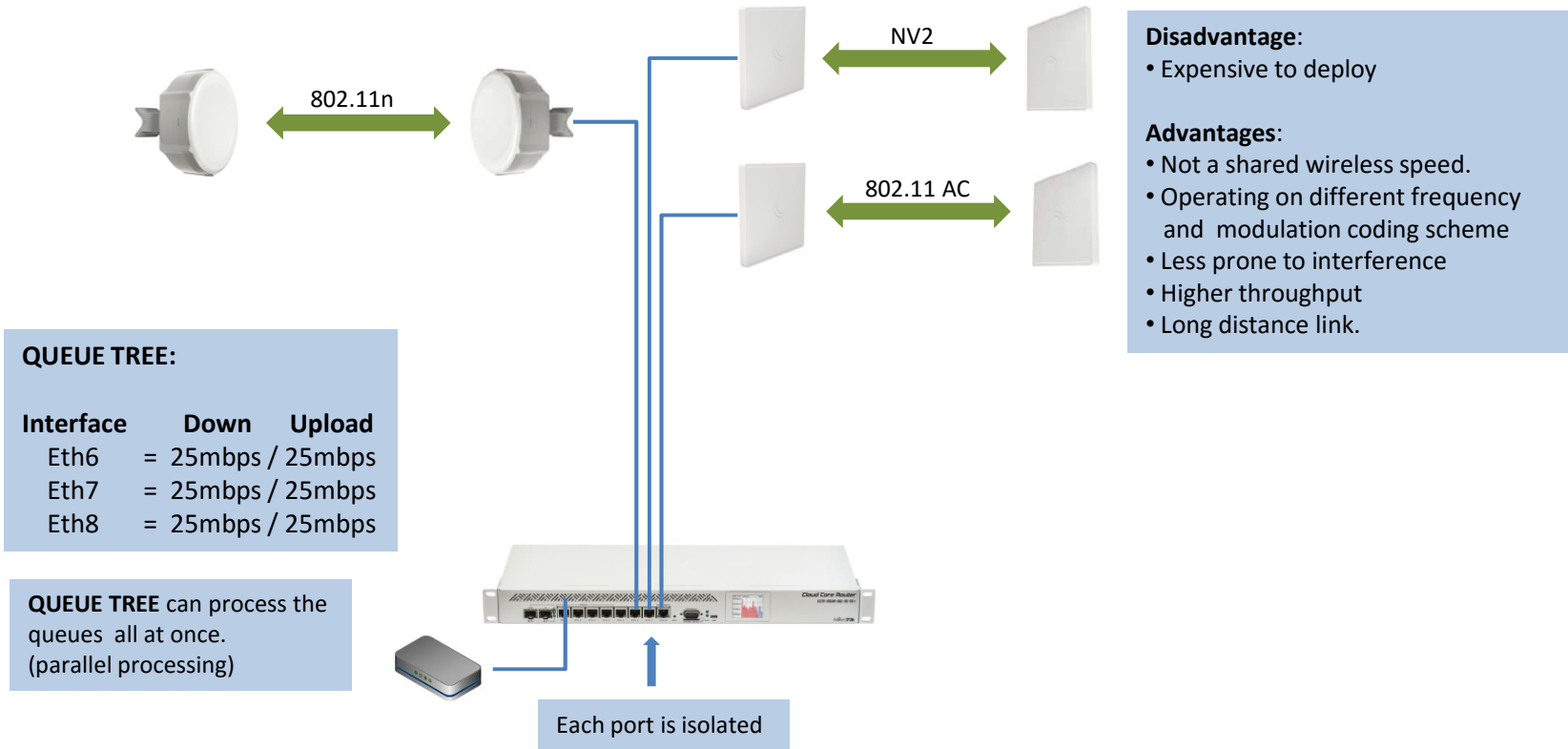• Long distance link.

A Better Solution
(Point to Point)

802.11n

NV2

802.11 AC

Disadvantage:
• Expensive to deploy

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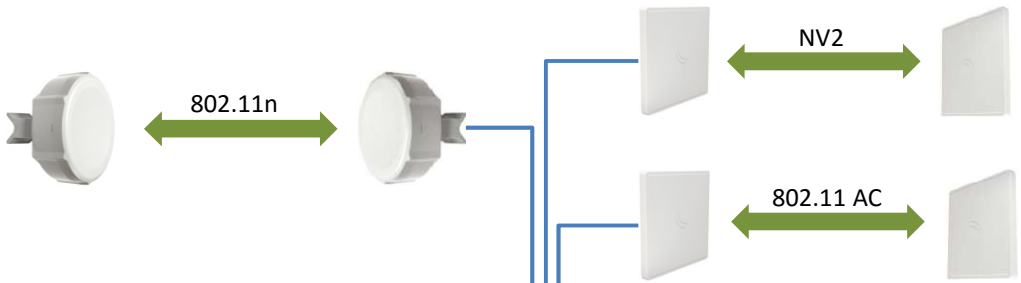• Less prone to interference
• Higher throughput
• Long distance link.

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)

Each port is isolated

A Better Solution
(Point to Point)

802.11n

NV2

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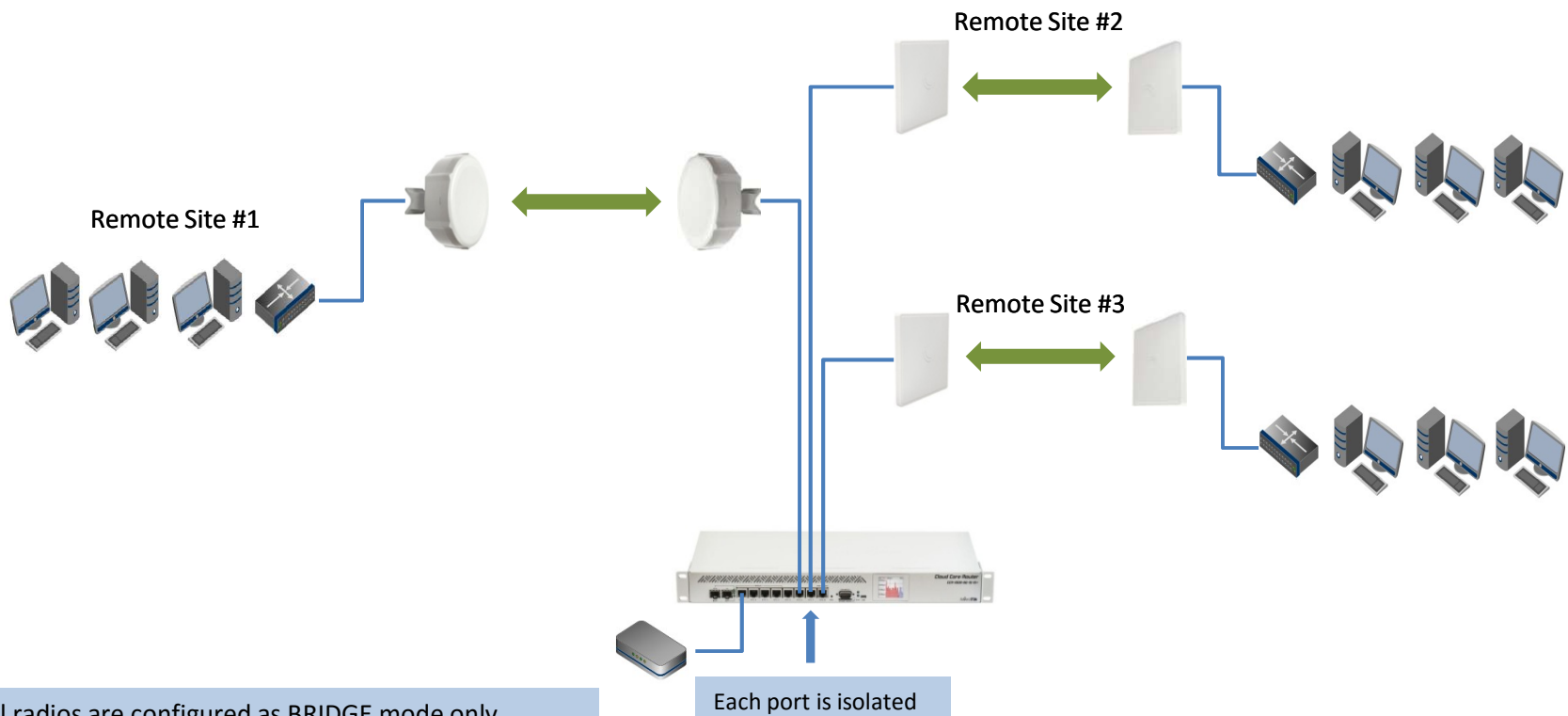
All mangle rules and bandwidth management for each site is controlled at the core router.

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)

Remote Site #2
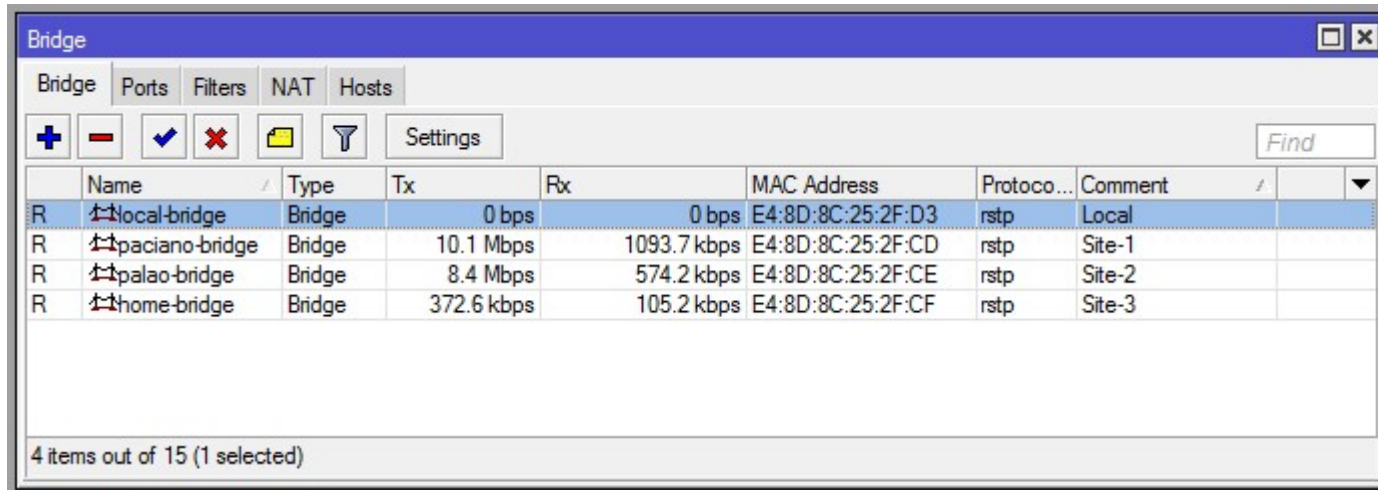
Remote Site #1

Remote Site #3

Each port is isolated

- 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
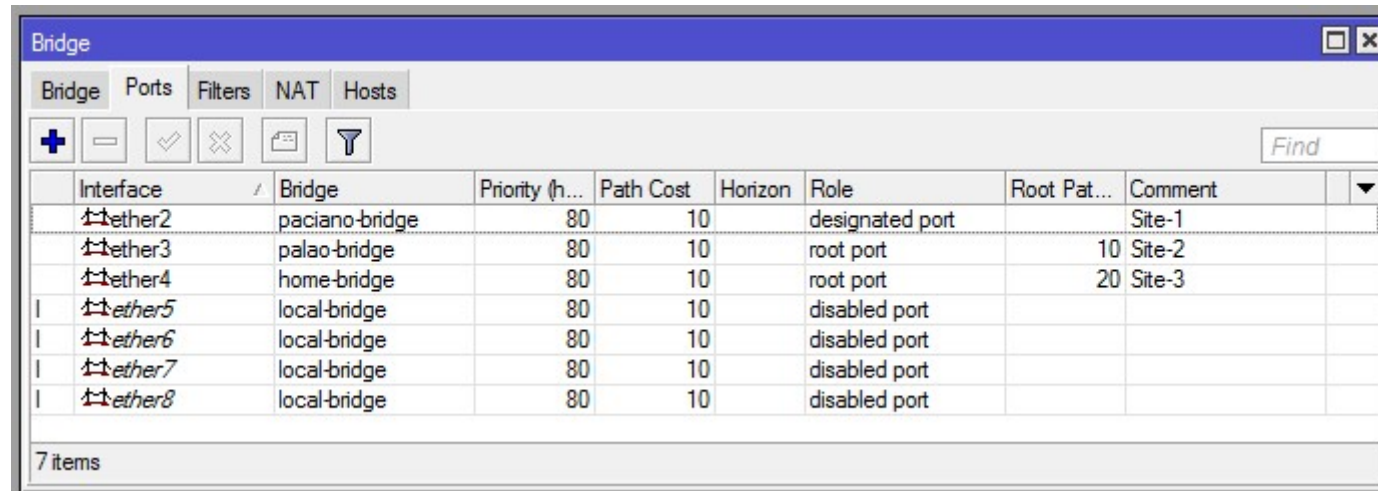
Configuration
(Bridging)

Create a bridge interface

	Name	Type	Tx	Rx	MAC Address	Protoco...	Comment	
R	local-bridge	Bridge	0 bps	0 bps	E4:8D:8C:25:2F:D3	rstp	Local	
R	paciano-bridge	Bridge	10.1 Mbps	1093.7 kbps	E4:8D:8C:25:2F:CD	rstp	Site-1	
R	palao-bridge	Bridge	8.4 Mbps	574.2 kbps	E4:8D:8C:25:2F:CE	rstp	Site-2	
R	home-bridge	Bridge	372.6 kbps	105.2 kbps	E4:8D:8C:25:2F:CF	rstp	Site-3	

Bridge — Bridge / Ports / Filters / NAT / Hosts — Settings — Find

4 items out of 15 (1 selected)

Bind the physical interface to the bridge interface

	Interface	Bridge	Priority (h...	Path Cost	Horizon	Role	Root Pat...	Comment	
	ether2	paciano-bridge	80	10		designated port		Site-1	
	ether3	palao-bridge	80	10		root port	10	Site-2	
	ether4	home-bridge	80	10		root port	20	Site-3	
I	ether5	local-bridge	80	10		disabled port			
I	ether6	local-bridge	80	10		disabled port			
I	ether7	local-bridge	80	10		disabled port			
I	ether8	local-bridge	80	10		disabled port			

Bridge — Bridge / Ports / Filters / NAT / Hosts — Find

7 items

Configuration
(Mangle)

Create the mangle rule for the applications

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

➕ ➖ ✓ ✗ ▣ ▽ | 00 Reset Counters | 00 Reset All Counters | Find | all | ▼

#	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
22	mark connection	prerouting		6 (tcp)	2099,5000...					yes	lol-conn	274.2 KiB	2 574
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
28	mark packet	prerouting						crossfire-conn	crossfire-packet	no		0 B	0
29	mark connection	prerouting		6 (tcp)				no-mark		yes	unknown-conn	582.9 KiB	5 097
30	mark connection	prerouting		17 (udp)				no-mark		yes	unknown-conn	9.2 MiB	95 218
31	mark packet	prerouting						unknown-conn	unknown-packet	no		1921.1 MiB	7 658 258

32 items

Configuration
(Mangle)

Create the mangle rule for the applications

Firewall

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

00 Reset Counters | 00 Reset All Counters   Find | all

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32 items

Configuration
(QUEUE TREE and QUEUE TYPES)

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