

REDES MESH

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REDES MESH

IMPLEMENTACION DE REDES MESH
UTILIZANDO MIKROTIK RouterOS

HWMP

WDS + RSTP

Requerimientos para MESH

- RouterOS v3.x - v4.x - v5.x – v6.x enabled package Wireless.
- Una o dos wireless cards chipset Atheros r52hn.
- Antennas (Omni, sector, directional) Para la Banda – 2.4Ghz - 5Ghz.
- RouterBoard 435G.

Wireless Mesh Network WDS HWMP

Mesh Network es una topología que permite tener conectividad bidireccional completa entre sus nodos .

En este modo, todos los nodos de la red (son punto de acceso).

En Mesh tienen algunos modos como (Full Mesh , Mesh parcial o Hybird Mesh).

La Redes Mesh Tienen alguna ventaja como:
capacidad Roaming, cobertura total ,
redundancia y tolerancia a fallos entre algunos
enlaces etc ...

En Router Mikrotik aconsejo que se puede
configurar en dos modelos :

Modelo 1 : MESH WDS inalámbrico con MESH
Interface

Modelo 2 : MESH WDS inalámbrico con
BRIDGE Interface

Modelo 1

En este modelo tenemos que configurar la red inalámbrica de todos nuestros RouterBoard , con los mismos parametros (Modo, banda , frecuencia, seguridad , ...)

Mi RouterBoard tiene esta configuración :

Modo: Ap -Bridge

Band : 2 Ghz - Sólo N

Ancho de canal : 20 Mhz

SSID: UNIVISA

Frecuencia: 2474

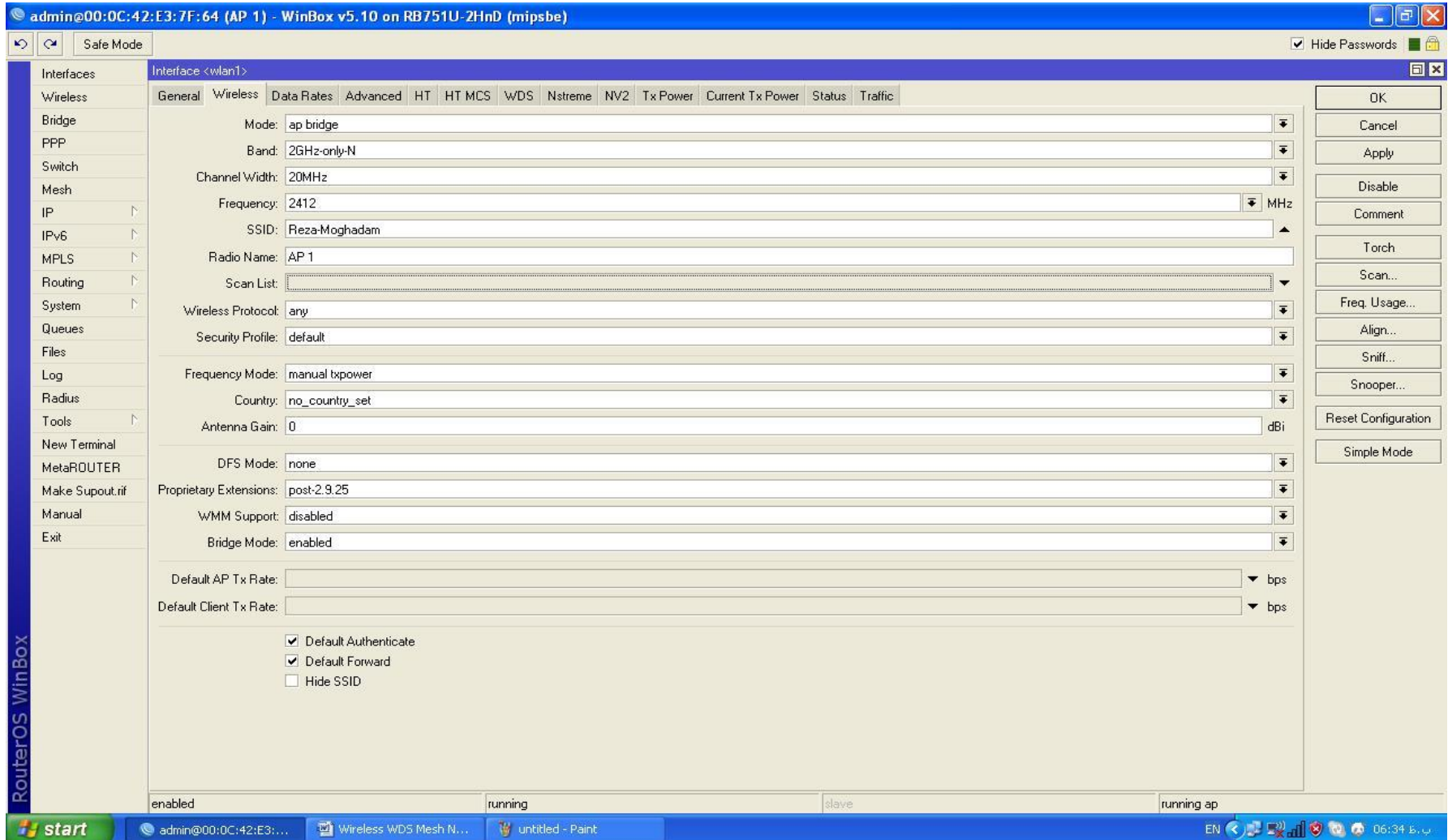
Modo WDS : Acoplamiento dinámico Mesh

WDS Puente defecto: Mesh -Interface

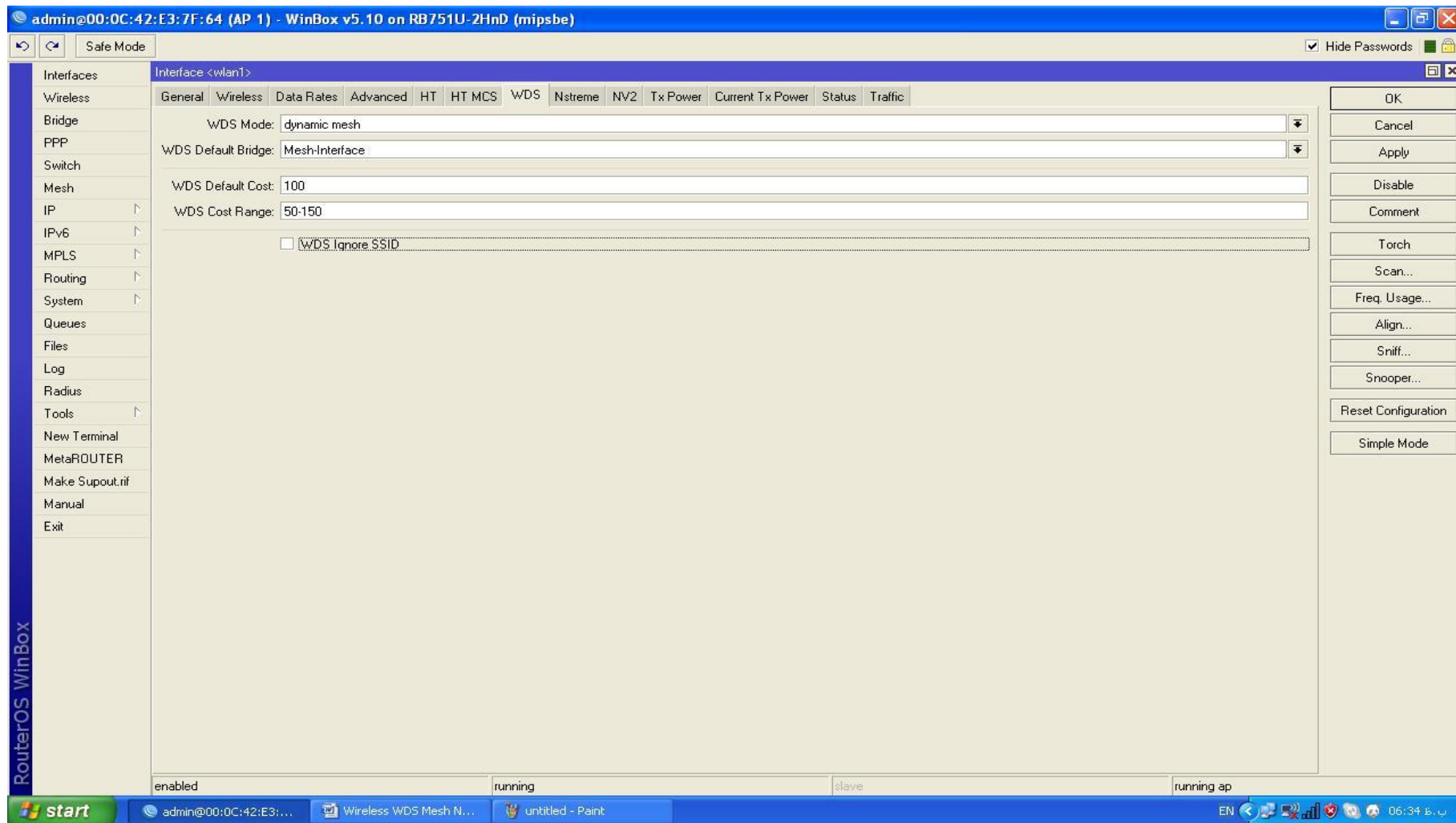
Mesh : Mesh -Interface

Mesh puerto: Ether1 - Wlan1 - Wlan2

Mesh Network HWMP



Mesh Network HWMP



Mesh Network HWMP

The screenshot displays the MikroTik WinBox v5.10 interface. The top bar shows the user 'admin@00:0C:42:E3:7F:64 (AP 1)' and the device 'RB751U-2HnD (mipsbe)'. The left sidebar contains a menu with options like Interfaces, Wireless, Bridge, PPP, Switch, Mesh, IP, IPv6, MPLS, Routing, System, Queues, Files, Log, Radius, Tools, New Terminal, MetaROUTER, Make Supout.nif, Manual, and Exit. The main window is titled 'Mesh' and shows a table of mesh interfaces. A dialog box titled 'Interface <Mesh-Interface>' is open, showing the configuration for the 'Mesh-Interface'. The dialog has tabs for 'General', 'HWMP', and 'Traffic'. The 'General' tab is active, showing fields for Name, Type, MTU, L2 MTU, MAC Address, ARP, and Admin. MAC Address. The 'HWMP' tab is also visible. The 'Traffic' tab is not active. The 'General' tab shows the following values: Name: Mesh-Interface, Type: Mesh, MTU: 1500, L2 MTU: (empty), MAC Address: 00:0C:42:E3:7F:65, ARP: enabled, Admin. MAC Address: (empty). The 'HWMP' tab shows the 'enabled' checkbox checked. The 'Traffic' tab is not active. The dialog has buttons for OK, Cancel, Apply, Disable, Comment, Copy, Remove, Torch, and Mesh Traceroute. The status bar at the bottom shows '1 item out of 11 (1 selected)'.

Name	Type	L2 MTU	Tx	Rx	Tx Pac...	Rx Pac...	Tx Drops	Rx Drops	Tx Errors	Rx Errors	MAC Address
R Mesh-Interface	Mesh		0 bps	0 bps	0	0	0	0	0	0	00:0C:42:E3:7F:65

Interface <Mesh-Interface>

General HWMP Traffic

Name: Mesh-Interface

Type: Mesh

MTU: 1500

L2 MTU:

MAC Address: 00:0C:42:E3:7F:65

ARP: enabled

Admin. MAC Address:

enabled running slave

OK Cancel Apply Disable Comment Copy Remove Torch Mesh Traceroute

Mesh Network HWMP

Mesh

IP

Routing

System

Queues

Files

Log

Radius

Tools

New Terminal

Make Supout.tif

Manual

Exit

R	bridge1	Bridge	1598	34.2 kbps	820.0 kbps	72	83	0	0
R	ether1	Ethernet	1598	902.0 kbps	41.3 kbps	90	78	0	0
R	ether10	Ethernet	1600	107.5 kbps	22.0 kbps	64	33	0	0
R	ether2	Ethernet	1598	0 bps	0 bps	0	0	0	0

Mesh

Mesh Ports FDB

+

-

✓

✗

📄

🔍

Mesh Traceroute

Find

Name	Type	L2 MTU	Tx	Rx	Tx Pac...	Rx Pac...	Tx Drops	Rx Drops	Tx Errors	Rx Errors	MAC Address
------	------	--------	----	----	-----------	-----------	----------	----------	-----------	-----------	-------------

New Interface

General HWMP Traffic

☒ Mesh Portal

Default Hoplimit: 32

PREQ Waiting Time: 4 s

PREQ Retries: 2

☒ PREQ Destination Only

☒ PREQ Reply and Forward

PREP Lifetime: 00:05:00

RANN Interval: 00:00:10

RANN Propagation Delay: 500 ms

RANN Lifetime: 00:00:22

☐ Reoptimize Paths

OK

Cancel

Apply

Disable

Comment

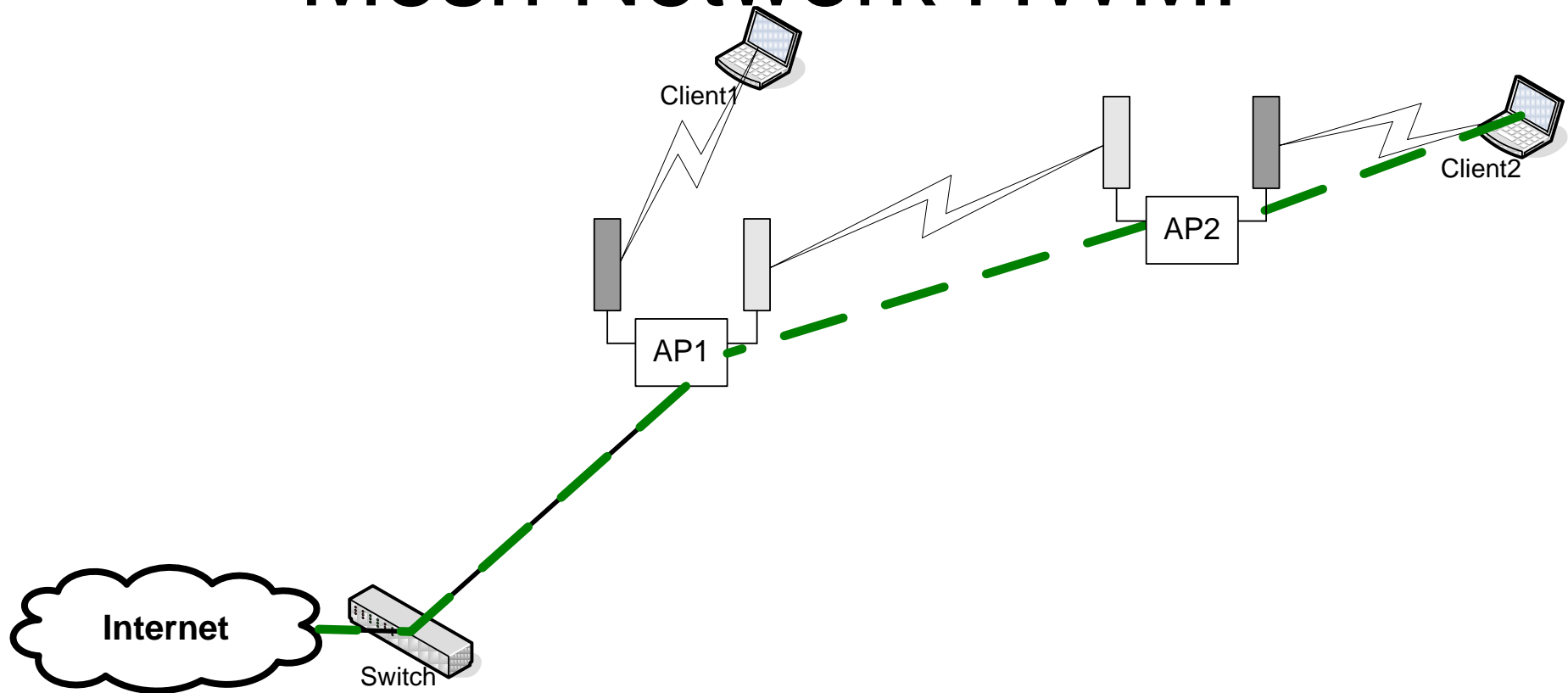
Copy

Remove

Torch

Mesh Traceroute

Mesh Network HWMP



Path

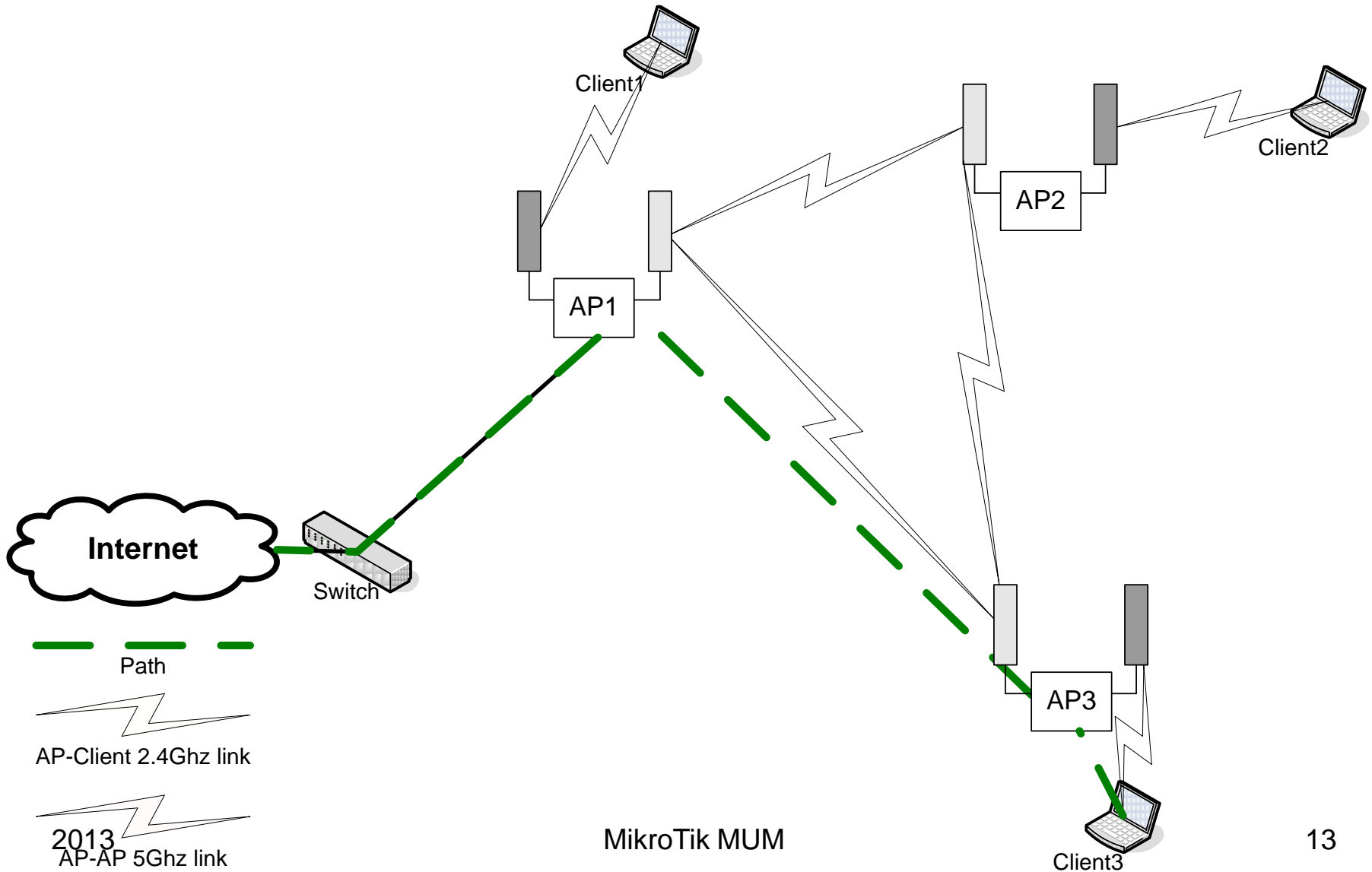
AP-Client 2.4Ghz link

2013
AP-AP 5Ghz link

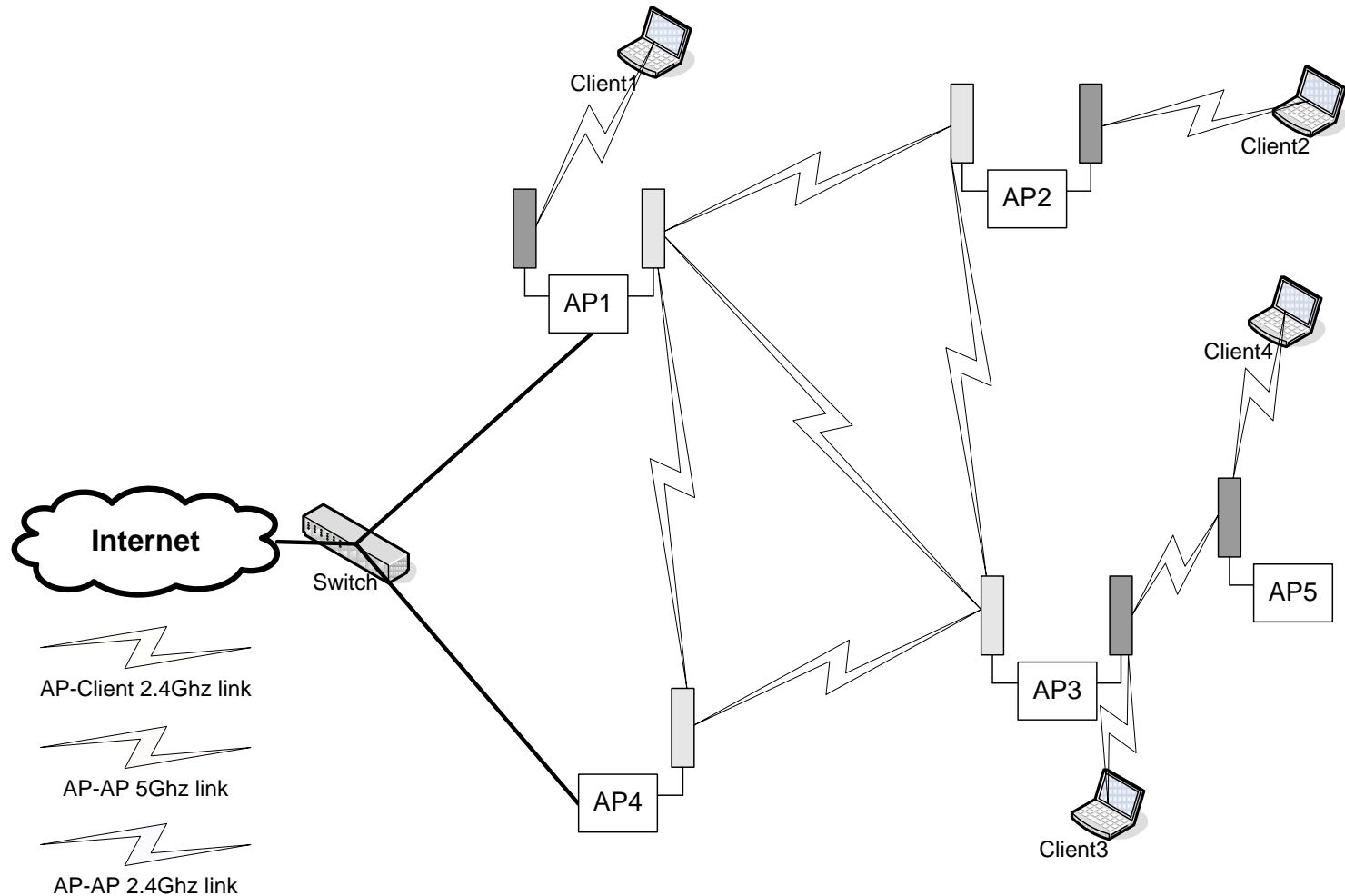
MikroTik MUM

Client3

Mesh Network HWMP



Mesh Network HWMP



Mesh Network HWMP

admin@00:0C:42:E3:7F:64 (AP 1) - WinBox v5.10 on RB751U-2HnD (mipsbe)

Safe Mode

Hide Passwords

RouterOS WinBox

Interfaces

Wireless

Bridge

PPP

Switch

Mesh

IP

IPv6

MPLS

Routing

System

Queues

Files

Log

Radius

Tools

New Terminal

MetaROUTER

Make Supout.nif

Manual

Exit

Mesh

Mesh Ports FDB

Interface Mesh

ether5	Mesh-Interface
wds1	Mesh-Interface
wds2	Mesh-Interface
wds3	Mesh-Interface
wds4	Mesh-Interface

Find

Mesh Port <ether5>

Interface: ether5

Mesh: Mesh-Interface

Path Cost: 10

Hello Interval: 10 s

Port Type: auto

DR Address: 00:00:00:00:00:00

enabled inactive Active Type: ethernet bridge

OK Cancel Apply Disable Comment Copy Remove

5 items [1 selected]

start admin@00:0C:42:E3:7F:64 (AP 1) - WinBox v5.10 on RB751U-2HnD (mipsbe) Wireless WDS Mesh N... untitled - Paint EN 06:35

Mesh Network HWMP

admin@00:0C:42:E3:7F:64 (AP 1) - WinBox v5.10 on RB751U-2HnD (mipsbe)

Safe Mode

Hide Passwords

Wireless Tables

Interfaces Nstream Dual Access List Registration Connect List Security Profiles

Scanner Freq. Usage Alignment Wireless Sniffer Wireless Snooper

Name	Type	L2 MTU	Tx	Rx	Tx Pac...	Rx Pac...	Tx Drops	Rx Drops	Tx Errors	Rx Errors	MAC Address	ARP	Mode	Band	Chann...	Frequen...	SSID
R wlan1	Wireless (Atheros 11N)	2290	0 bps	0 bps	0	0	0	0	0	0	0 00:0C:42:E3:7F:65	enabled	ap bri...	2GHz...	20MHz	2412	Reza-Mo...
DRA wds1	WDS	2290	0 bps	0 bps	0	0	0	0	0	0	0 00:0C:42:E3:7F:65	enabled					
DRA wds2	WDS	2290	0 bps	0 bps	0	0	0	0	0	0	0 00:0C:42:E3:7F:65	enabled					
DRA wds3	WDS	2290	0 bps	0 bps	0	0	0	0	0	0	0 00:0C:42:E3:7F:65	enabled					
DRA wds4	WDS	2290	0 bps	0 bps	0	0	0	0	0	0	0 00:0C:42:E3:7F:65	enabled					

5 items out of 11

RouterOS WinBox

start admin@00:0C:42:E3:... Wireless WDS Mesh N... EN 06:33

Mesh Network HWMP

admin@00:0C:42:E3:7F:64 (AP 1) - WinBox v5.10 on RB751U-2HnD (mipsbe)

Safe Mode

Hide Passwords

Wireless Tables

Interfaces Nstreme Dual Access List Registration Connect List Security Profiles

Find

Radio Name	MAC Address	Interface	Uptime	AP	W...	Last Activit...	Tx/Rx Signal ...	Tx/Rx Rate
AP 2	00:0C:42:E2:23:60	wlan1	00:03:23	yes	yes	3.180 -6		11.0Mbps...
AP 3	00:0C:42:E1:A9:15	wlan1	00:27:11	yes	yes	3.170 -9/-20		48.0Mbps...
AP 4	00:0C:42:E1:7A:74	wlan1	00:27:06	yes	yes	3.180 -15/-16		54.0Mbps...
AP 5	00:0C:42:E4:71:2D	wlan1	00:27:11	yes	yes	3.180 -17/-20		54.0Mbps...

4 items

RouterOS WinBox

start admin@00:0C:42:E3:7F:64 ... Wireless WDS Mesh N... untitled - Paint EN 06:33

Mesh Network HWMP

admin@00:0C:42:E2:23:5F (AP 2) - WinBox v5.10 on RB751U-2HnD (mipsbe)

Safe Mode

Hide Passwords

Interfaces

Wireless

Bridge

PPP

Switch

Mesh

IP

IPv6

MPLS

Routing

System

Queues

Files

Log

Radius

Tools

New Terminal

MetaROUTER

Make Supout.nif

Manual

Exit

Neighbor List

Neighbors

Discovery Interfaces

Interface	IP Address	MAC Address	Identity	Platform	Version	Board Na...	IPv6	Age (s)
Mesh-Interface	192.168.88.4	00:0C:42:E1:7A:74	AP 4	MikroTik	5.10	RB751U-...	yes	49
Mesh-Interface	192.168.88.3	00:0C:42:E1:A9:15	AP 3	MikroTik	5.10	RB751U-...	yes	43
Mesh-Interface	192.168.88.5	00:0C:42:E4:71:20	AP 5	MikroTik	5.10	RB751U-...	yes	33
Mesh-Interface	192.168.88.1	00:0C:42:E3:7F:65	AP 1	MikroTik	5.10	RB751U-...	yes	32
ether5	1.1.1.1	00:00:00:00:00:00					no	135

Wireless Tables

Interfaces

Nstreme Dual

Access List

Registration

Connect List

Security Profiles

Name	Type	L2 MTU	Tx	Rx	Tx Pac...	Rx Pac...	Tx Drops	Rx Drops	Tx Errc
wlan1	Wireless (Atheros 11N)	2290	592 bps	592 bps	1	1	0	0	0
DR1	WDS	2290	0 bps	0 bps	0	0	0	0	0
DR2	WDS	2290	592 bps	592 bps	1	1	0	0	0
DR3	WDS	2290	0 bps	0 bps	0	0	0	0	0
DR4	WDS	2290	0 bps	0 bps	0	0	0	0	0

Address List

Address	Network	Interface
192.168.88.2/...	192.168.88.0	Mesh-Interface

Mesh

Mesh Ports

FDB

Name	Type	L2 MTU	Tx	Rx	Tx P...
Mesh-Interface	Mesh		512 bps	512 bps	

Interface <wlan1>

HT MCS

WDS

Nstreme

NV2

Tx Power

WDS Mode: dynamic mesh

WDS Default Bridge: Mesh-Interface

WDS Default Cost: 100

WDS Cost Range: 50-150

☐ WDS Ignore SSID

OK

Cancel

Apply

Disable

Comment

Torch

Scan...

Freq. Usage...

Align...

Sniff...

Snooper...

Ping (Running)

General

Advanced

Ping To: 192.168.88.5

Interface:

☐ ARP Ping

Packet Count:

Timeout: 1000

Seq #	Host	Time	Reply Size	TTL
0	192.168.88.5	8ms	50	64
1	192.168.88.5	5ms	50	64
2	192.168.88.5	5ms	50	64
3	192.168.88.5	5ms	50	64
4	192.168.88.5	7ms	50	64
5	192.168.88.5	4ms	50	64

RouterOS WinBox

start

Wireless WDS Mesh N...

untitled - Paint

admin@00:0C:42:E2:...

EN

06:41

WDS + RSPT

- Modelo 2
- Este modo es similar al MESH , pero tienen una diferencia , la diferencia es que en este modelo utilizamos BRIDGE de interfaz en lugar de MESH de interfaz , y también utilizar STP (Spanning Tree Protocol) tales como (STP , RSTP) .
- STP , RSTP Protocolo que evita los Loop de ruta libre en la capa de red 2 , en esta modalidad a cada RouterBoard le da una prioridad para Actuar como bridge root En la capa 2 de red , el cual permite analizar y supervisar la red de capa 2 con envío y recepción BPDU (Bridge Protocolo Datos Unidad) .
- Si él ve algunas BPDU en la red , Envía un comando para Bloquear a esa ruta (a otra AP) evitando los Loop.

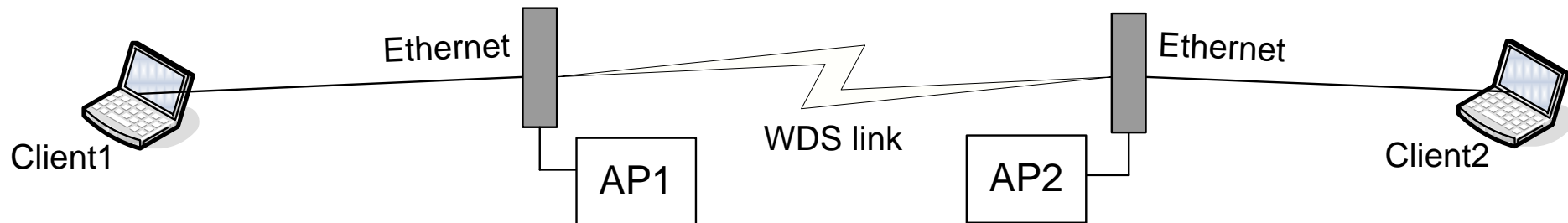
WDS + RSPT

- He configurado mi RouterBoard con esta configuración :
- Modo: Ap -Bridge
- Band : 2 Ghz - Sólo N
- Ancho de canal : 20 Mhz
- SSID: - UNIVISA
- Frecuencia: 2474
- Perfil de seguridad: por defecto

WDS + RSPT

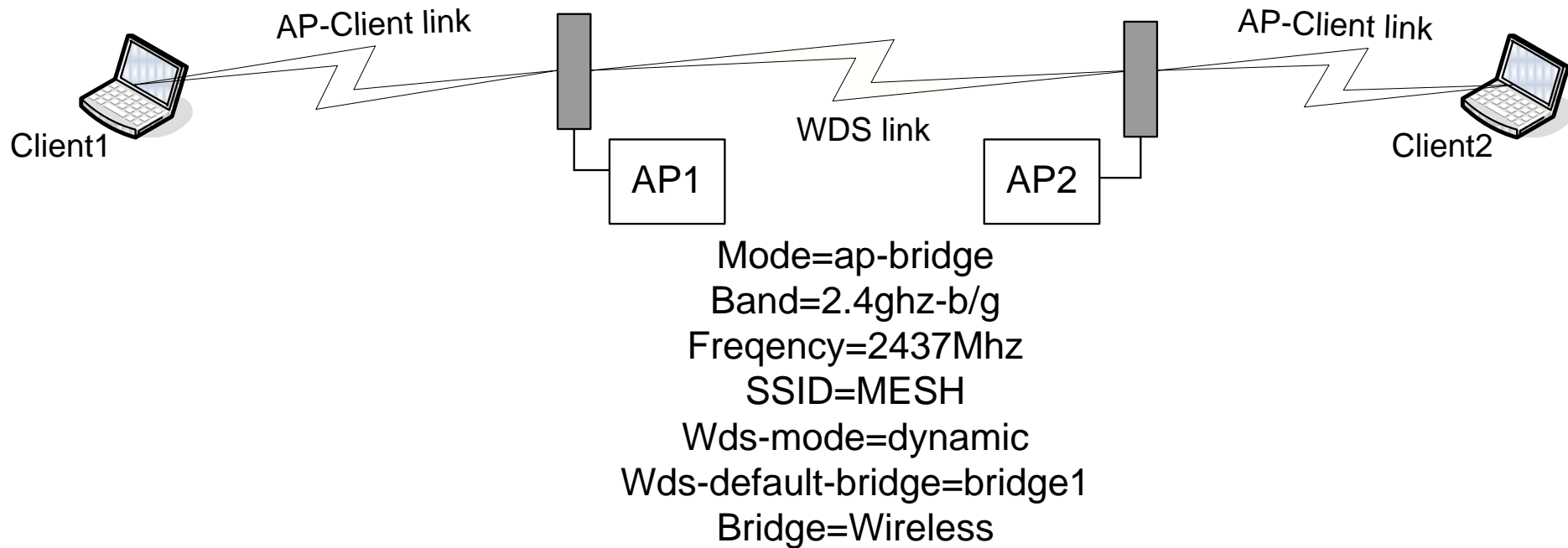
- Modo WDS : Acoplamiento dinámico
- WDS Puente defecto: BRIDGE - Interface
- BRIDGE : BRIDGE - Interface
- BRIDGE Modo STP : Modo RSTP
- BRIDGE - PORT : Ether1 - Wlan1 - Wlan2

AP-AP communication

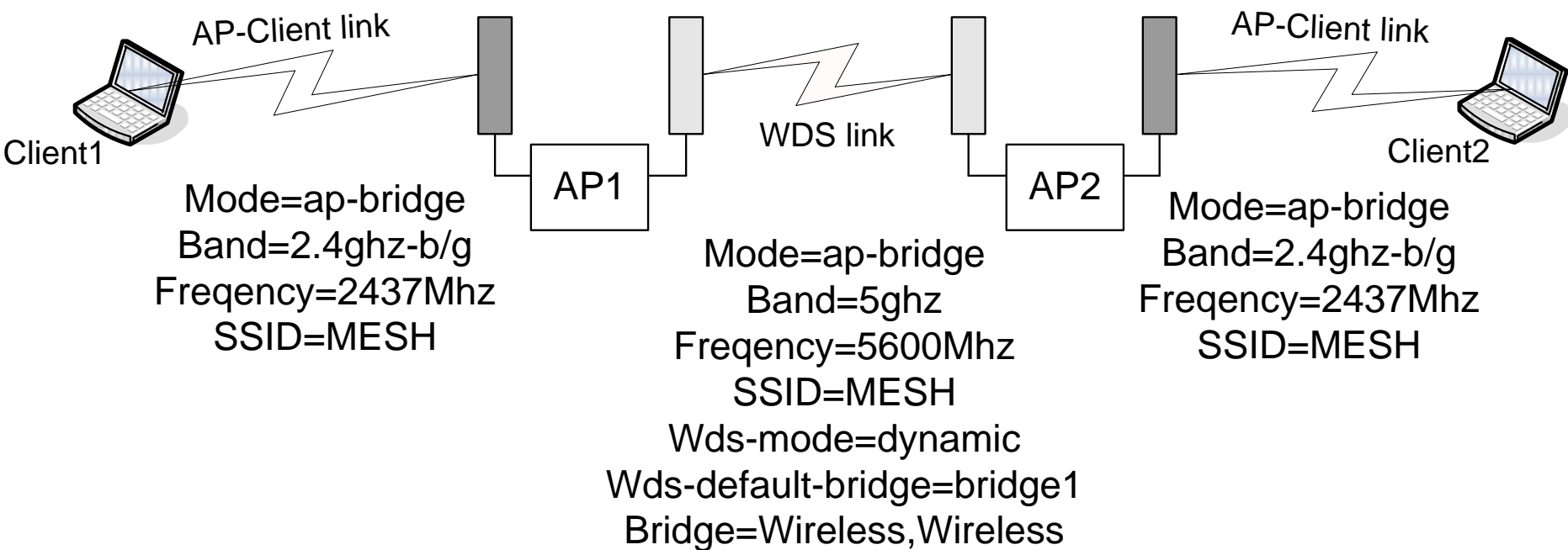


Mode=ap-bridge
Band=2.4ghz-b/g
Frequency=2437Mhz
SSID=MESH
Wds-mode=dynamic
Wds-default-
bridge=bridge1
Bridge=Ethernet,Wireless

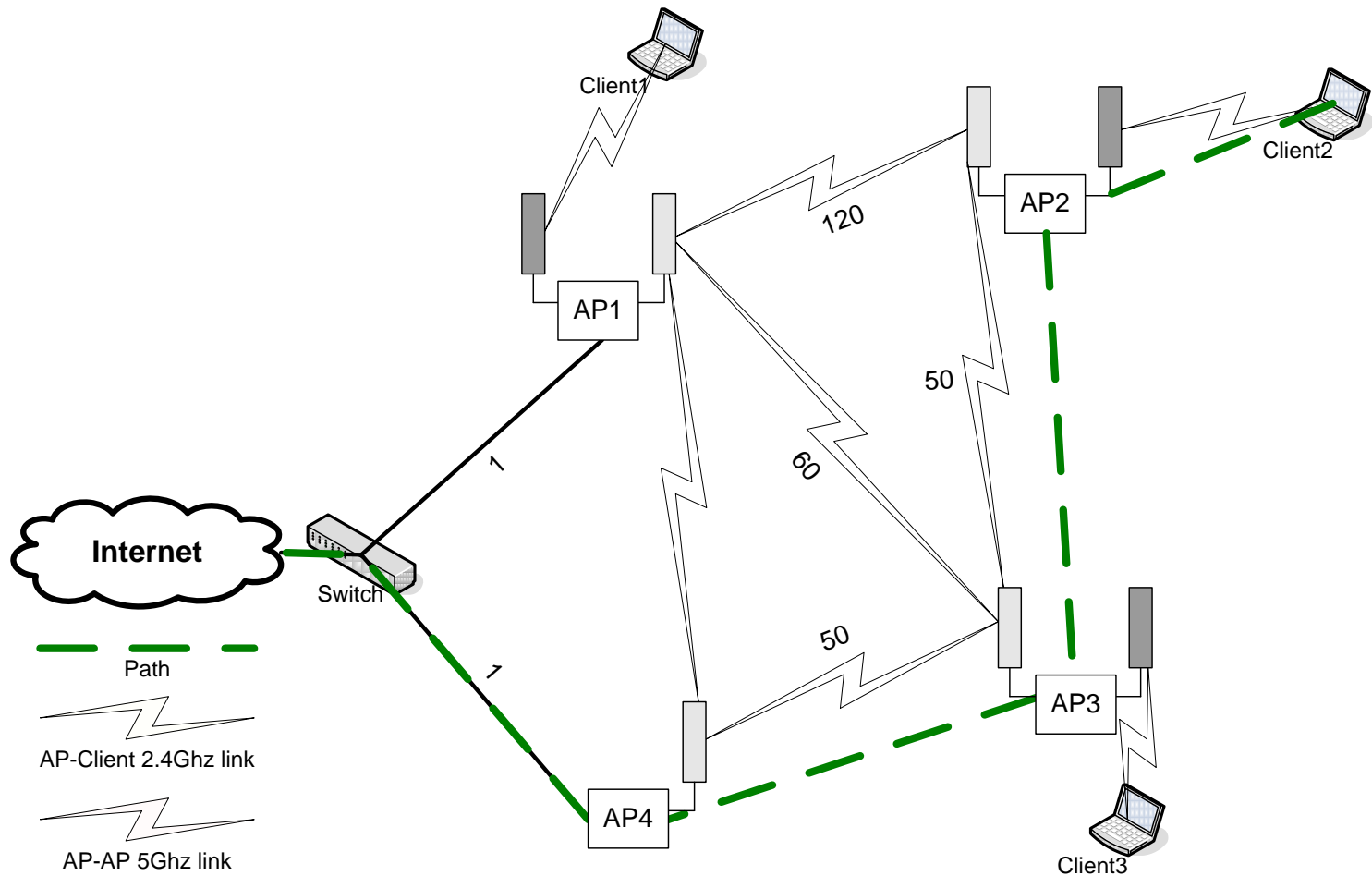
SIMPLE MESH



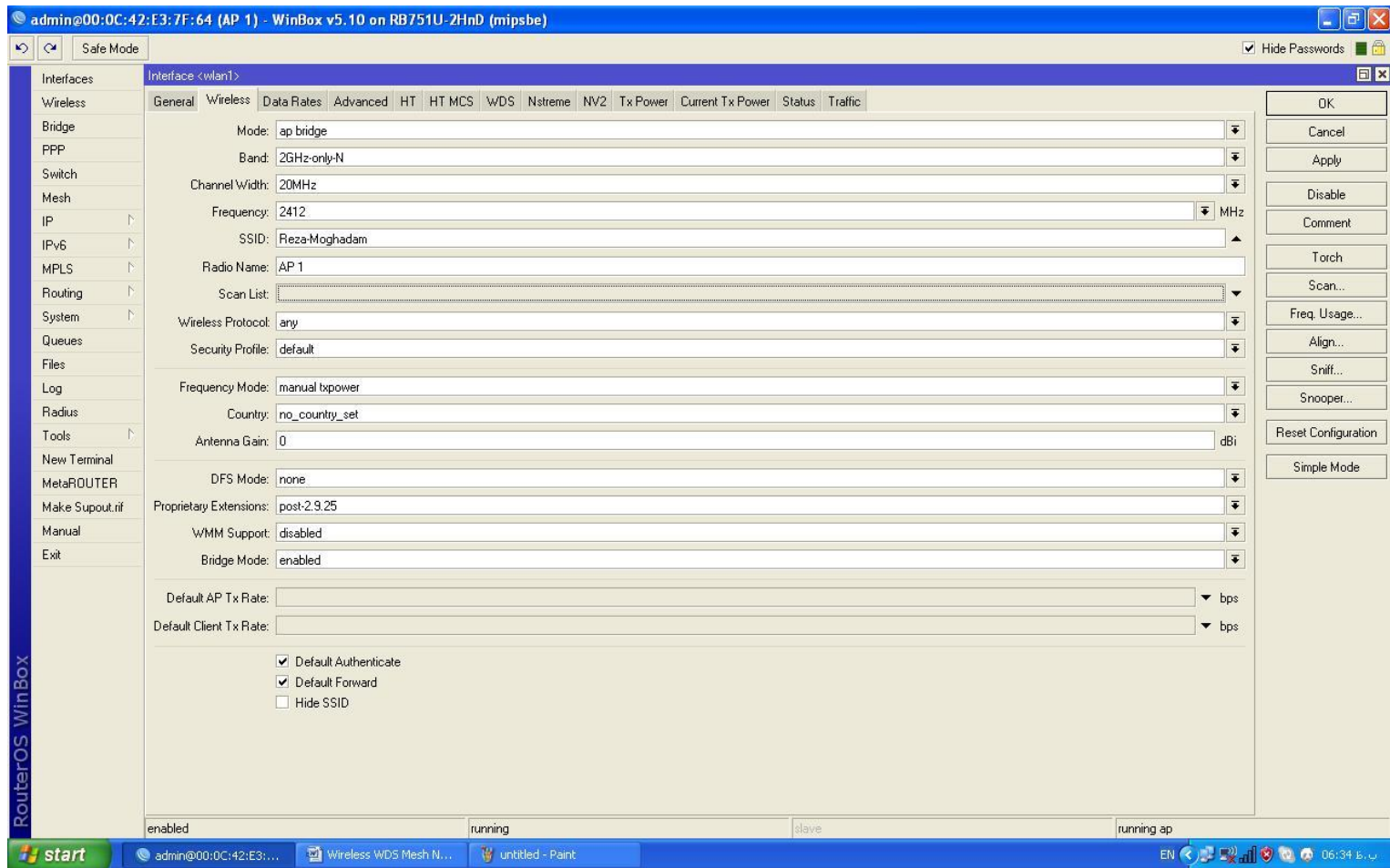
DUAL BAND MESH



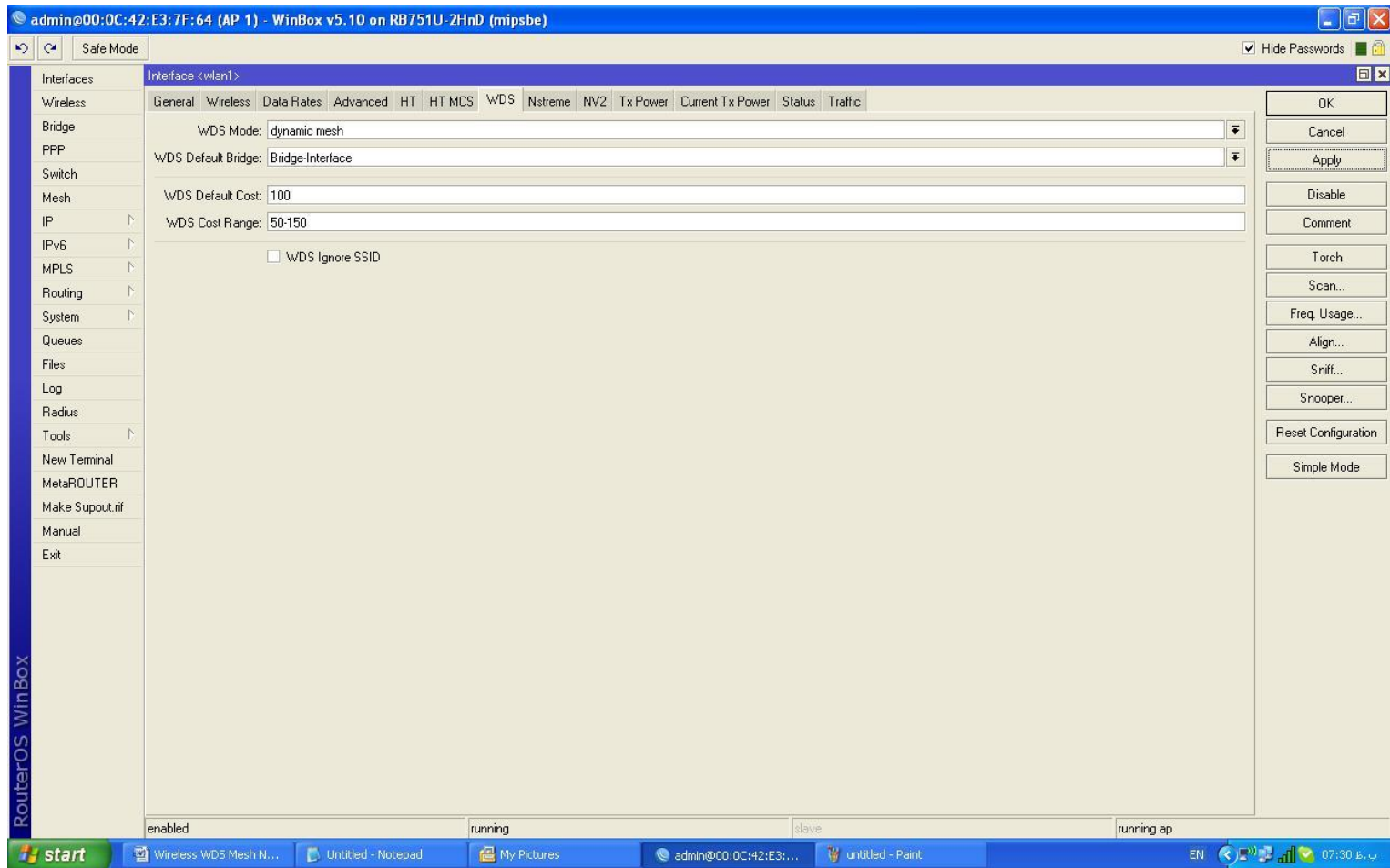
WDS + RSPT



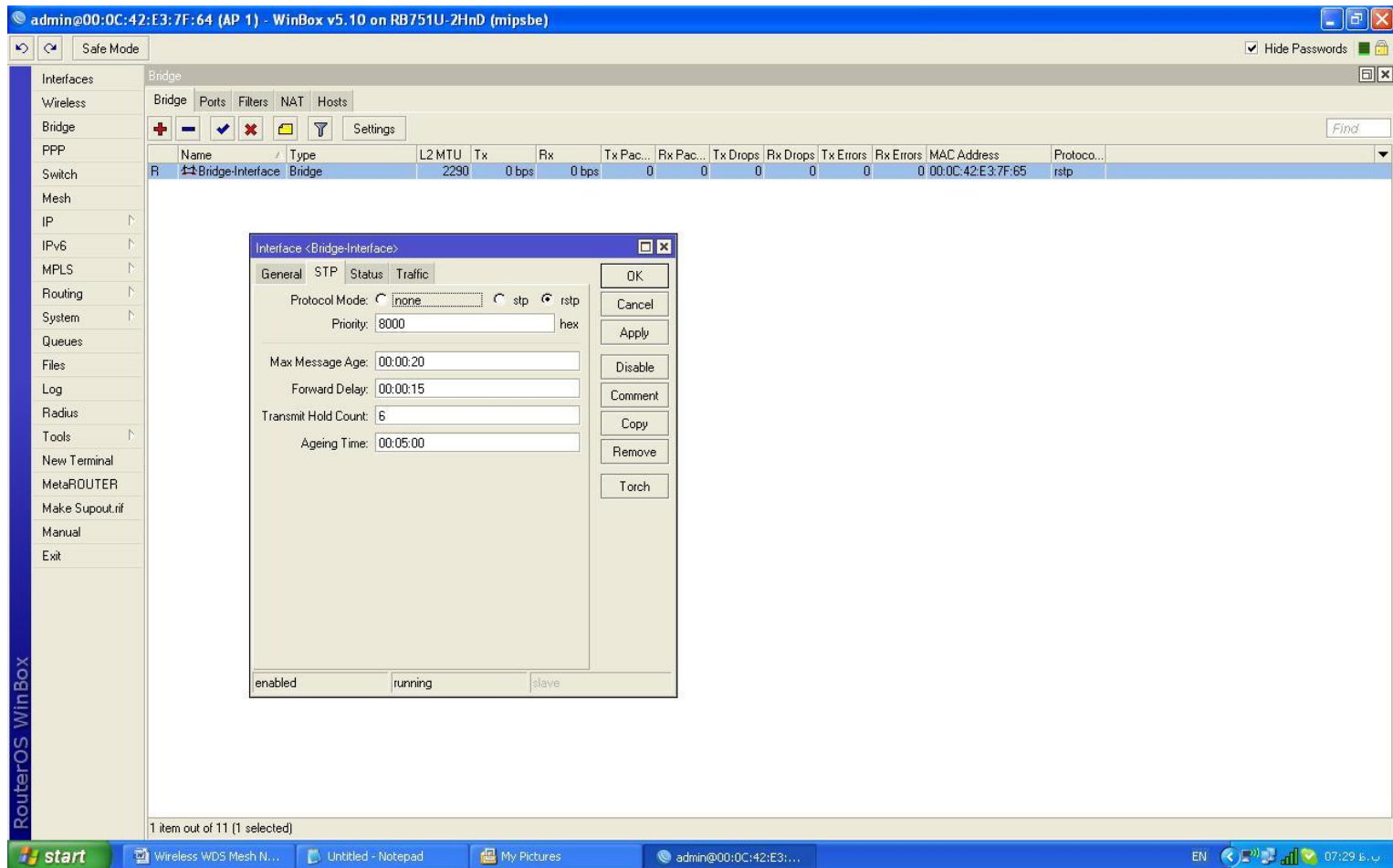
WDS + RSPT



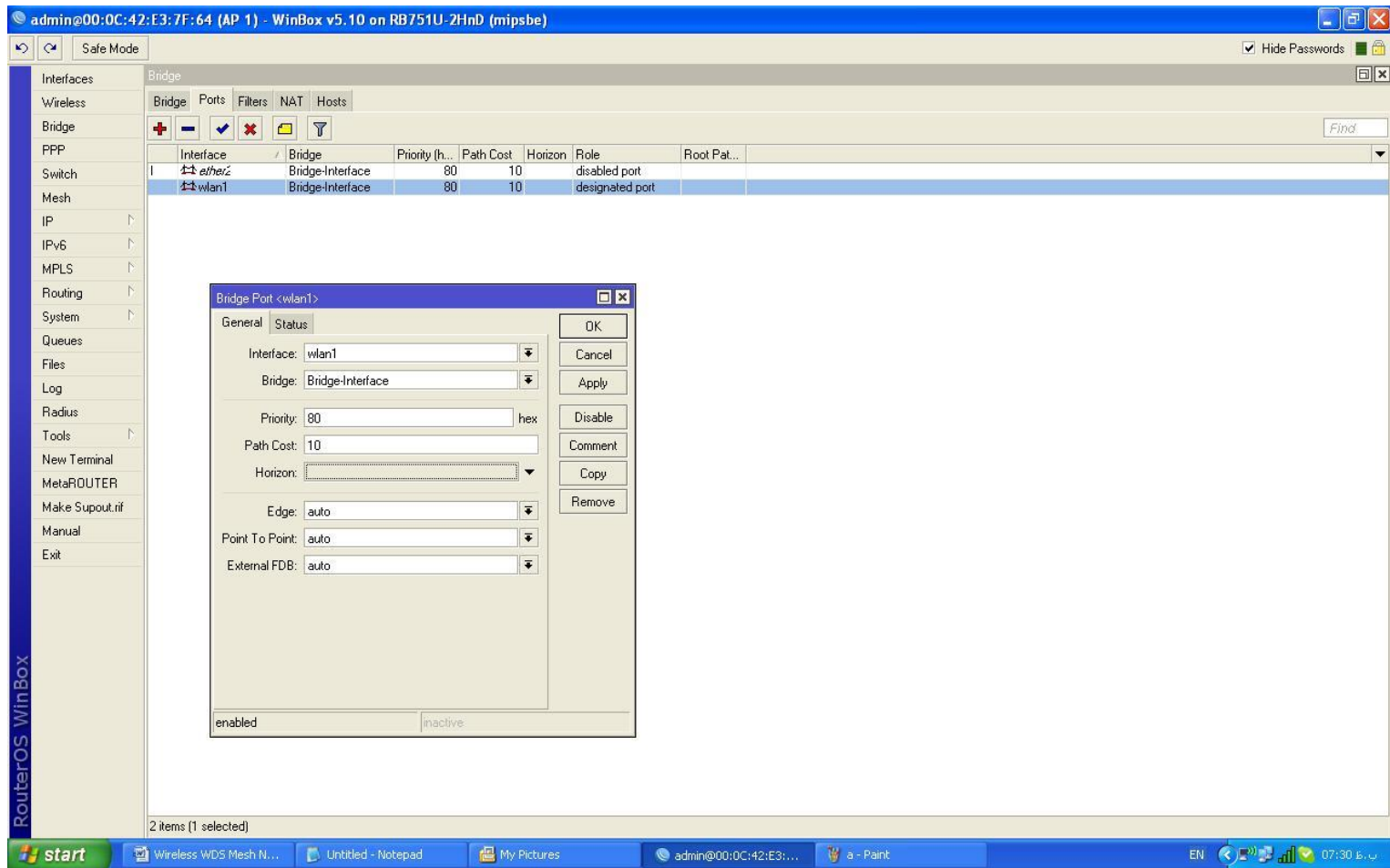
WDS + RSPT



WDS + RSPT



WDS + RSPT



PREGUNTAS

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