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MIKROTIK BONDING

By: Julián Páez P.

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SOBRE S3 SIMPLE SMART SPEEDY

Pertenece al sector de las tecnologías de la información y las comunicaciones en las áreas de conectividad, Mesa de Servicios, Data Center, Virtualización, Infraestructura y Servicios orientados hacia los modelos de transformación digital tendencia en el mercado.



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S3 Simple Smart Speedy S.A.S



S3 Simple Smart Speedy



@S3_Colombia

SOBRE MI...



- ❖ Julián Páez P, Bogotano, 37 años.
- ❖ Ingeniero de Telecomunicaciones.
- ❖ Evangelizador de Mikrotik desde 2011.
- ❖ Certificado en Mikrotik, Ubiquiti, Itil V.3, ISO 9001, etc.
- ❖ PARTNER DE YOUTUBE.(canal de tutoriales de Networking y Wireless)
- ❖ Emprendedor.



@julian_koeleth



<https://www.youtube.com/user/juliman800/videos>



<https://www.linkedin.com/in/julian-paez-prieto-68aaa3a2/>

QUE ES BONDING?

Es un driver que originalmente venía con los parches para clusters beowulf, desde hace un tiempo se puede implementar en un kernel 2.2X, 2.4X y 2.6x ¿Pero qué hace realmente?, ¿Para que sirve? Es la forma de tener dos INTERFACES de red funcionando como UNA sola y aprovechando el ancho de banda de las dos a la vez En definitiva con bonding (ip network multipathing) tendríamos dos tarjetas de red físicas y por encima una virtual que suministra el servicio.

El Bonding es una técnica que permite agregar varios interfaces de red físicos en uno único virtual. A cada interfaz físico se le denominará slave (esclavo). Con esto podemos realizar un balanceo de carga entre las dos interfaces y conseguir un ancho de banda final igual a la suma de los anchos de banda de cada slave.

Necesitamos al menos dos conexiones a internet para hacer bonding.

INTERFACE BONDING

Trabajar con interfaces bonding de MikroTik nos proporciona:

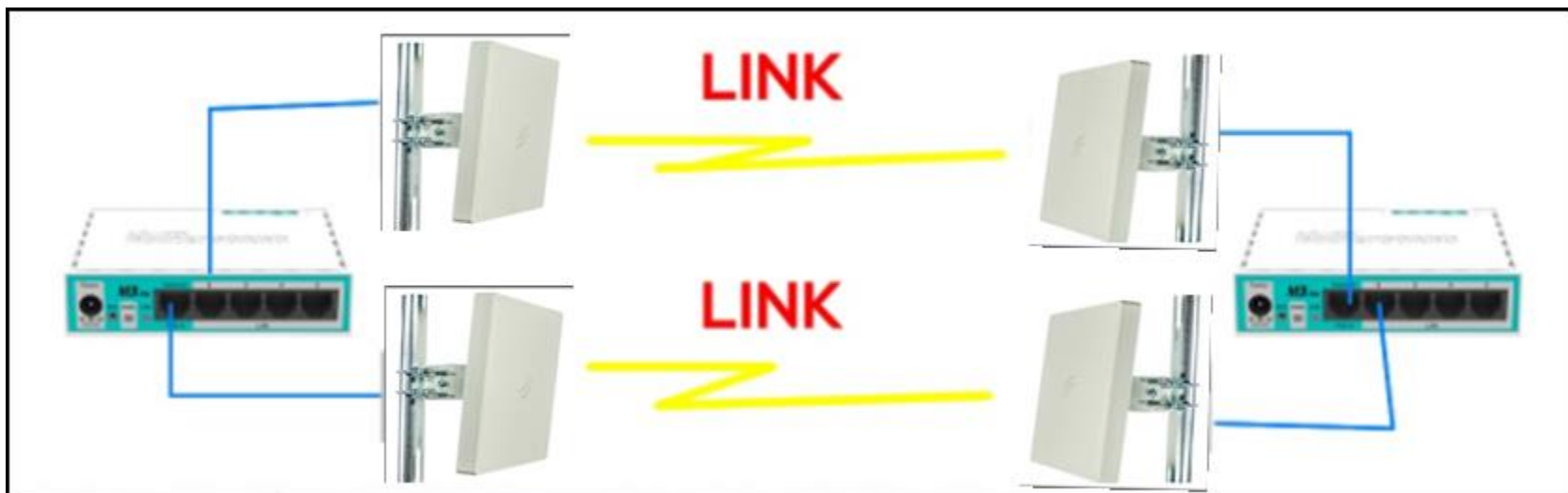
Alta disponibilidad (HA), Mayor rendimiento de ancho de banda (throughput), debido a que se trabaja con interfaces redundantes las cuales dependiendo del modo en que lo configuremos podemos realizar trabajos de balanceo de carga, backup, entre otros.

Estas interfaces se unen en capa 2 por lo general, también es posible unirlo en capa 3.

USOS DEL BONDING



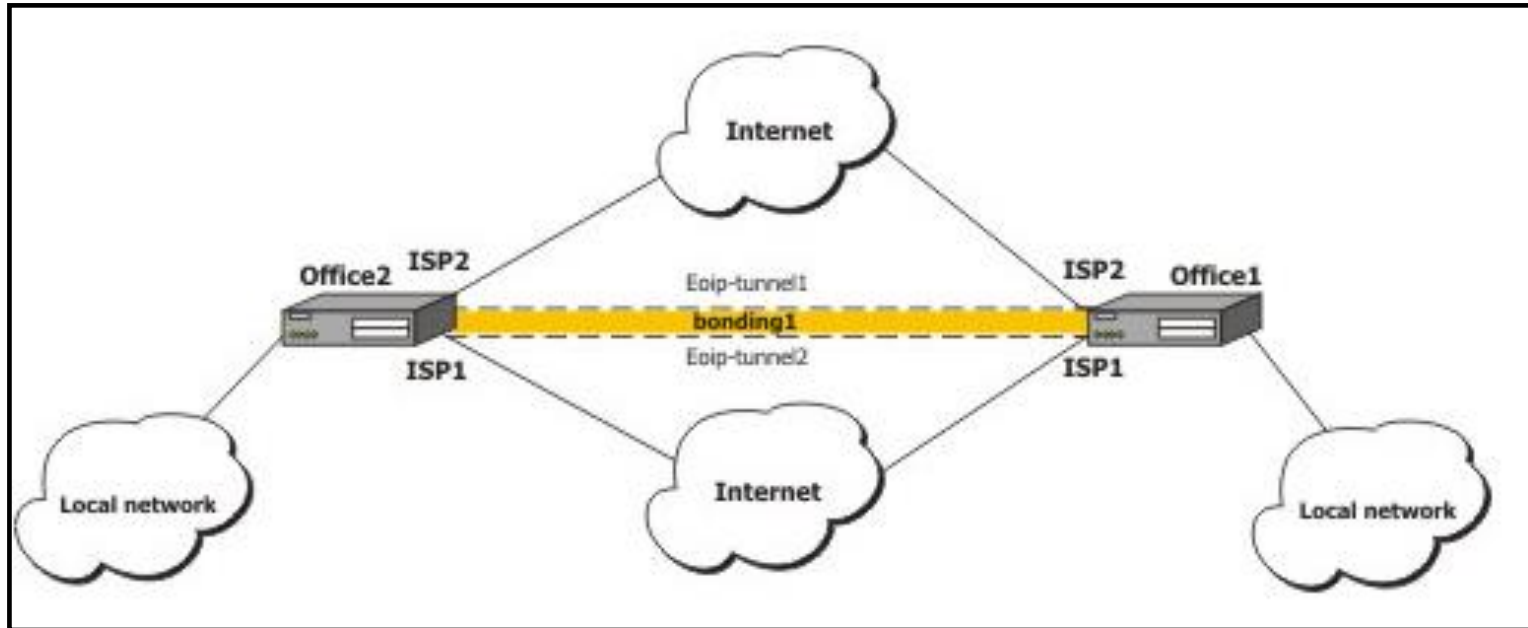
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USOS DEL BONDING



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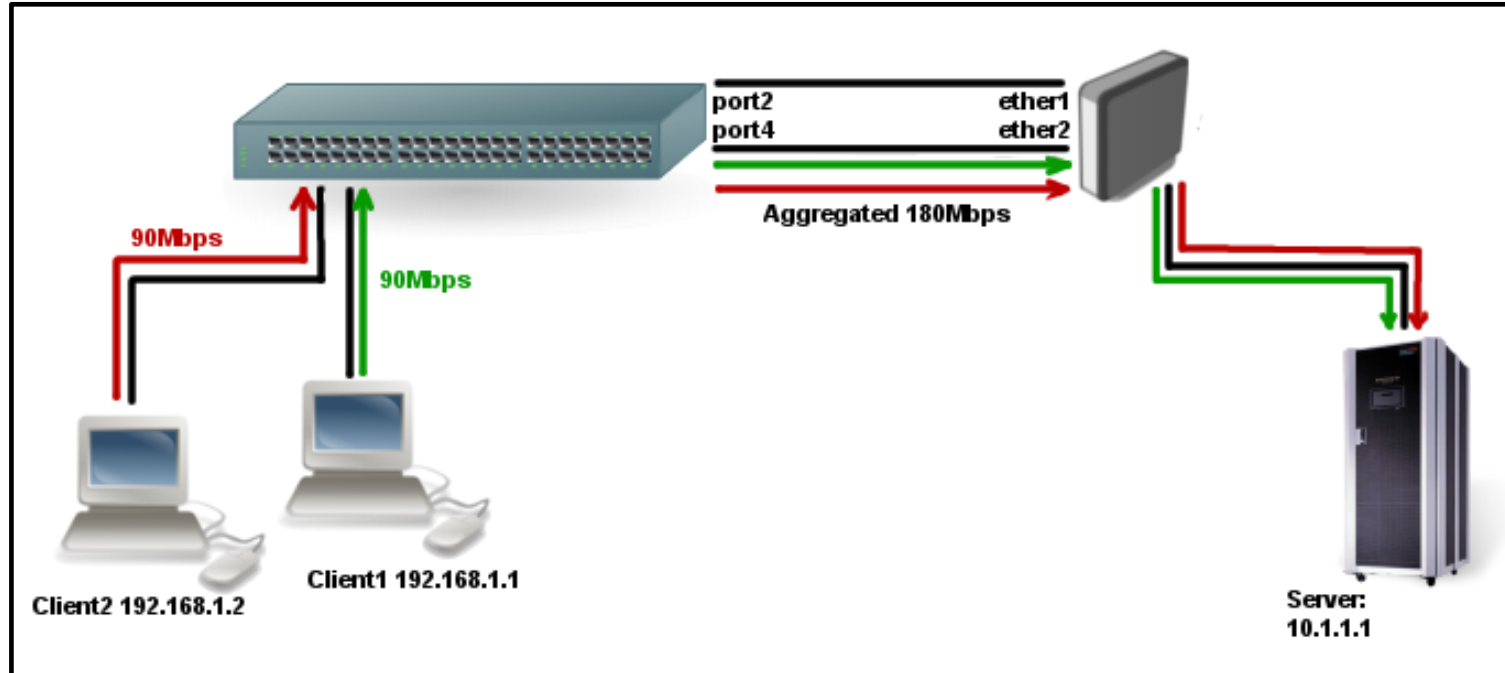


<https://www.youtube.com/watch?v=s6Fu46XSOWo>

USOS DEL BONDING



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USOS DEL BONDING



En el siguiente ejemplo crearemos una interface Bonding en modo de balanceo de carga (balance-rr) teniendo en cuenta que contamos interfaces Ethernet a 100Mbps las cuales sumarán sus velocidades en una interface virtual Bonding de 200Mbps.



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MANOS A LA OBRA...

Creamos las interfaces que en este caso están enlazadas a través de un Switch. Esto para el router #1 y el #2

Interface	Ethernet	EoIP Tunnel	IP Tunnel	GRE Tunnel	VLAN	VRRP	Bonding	LTE
Name	Type	L2 MTU	Tx					
ether1	Ethernet	1600	0 bps					
ether2_ENLACE_1	Ethernet	1598	0 bps					
ether3_ENLACE_2	Ethernet	1598	0 bps					
ether4	Ethernet	1598	0 bps					
ether5_GESTION	Ethernet	1598	45.9 kbps					

Interface	Ethernet	EoIP Tunnel	IP Tunnel	GRE Tunnel	VLAN	VRRP	Bonding	LTE
Name	Type	L2 MTU	Tx	Rx				
ether1	Ethernet	1600	0 bps	0 bps				
ether2_ENLACE_1	Ethernet	1598	0 bps	0 bps				
ether3_ENLACE_2	Ethernet	1598	0 bps	0 bps				
ether4	Ethernet	1598	0 bps	0 bps				
ether5_GESTION	Ethernet	1598	9.7 kbps	6.0 bps				



Se crean y asignan los direccionamientos IP en el par de RouterBoard.

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Address	Network	Interface
10.100.100.1/30	10.100.100.0	ether2_ENLACE_1
10.200.200.1/30	10.200.200.0	ether3_ENLACE_2

Address	Network	Interface
10.100.100.2/30	10.100.100.0	ether2_ENLACE_1
10.200.200.2/30	10.200.200.0	ether3_ENLACE_2



Se hacen pruebas de ICMP,
Ping entre cada peer del
router #1



The screenshot shows the Mikrotik WinBox interface. The 'Address List' window is open, showing two IP addresses: 10.100.100.1/30 on ether2_ENLACE_1 and 10.200.200.1/30 on ether3_ENLACE_2. The 'Ping (Running)' window is also open, with the 'Ping To' field set to 10.200.200.2. The 'Interface' is set to ether3_ENLACE_2. The 'Packet Count' is 1000 and the 'Timeout' is 1000 ms. The 'Start' button is highlighted. Below the configuration, a table shows the results of the ping test:

Seq #	Host	Time	Reply Size	TTL	Status
0	10.200.200.2	0ms	50	64	
1	10.200.200.2	0ms	50	64	
2	10.200.200.2	0ms	50	64	
3	10.200.200.2	0ms	50	64	
4	10.200.200.2	0ms	50	64	
5	10.200.200.2	0ms	50	64	

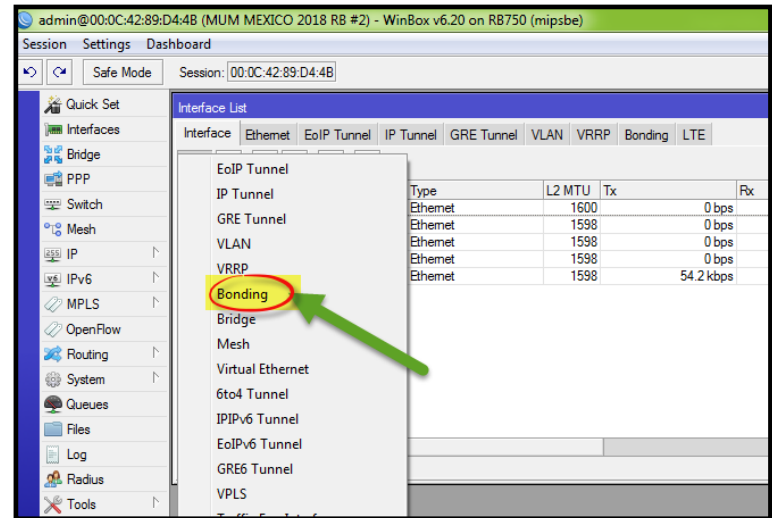
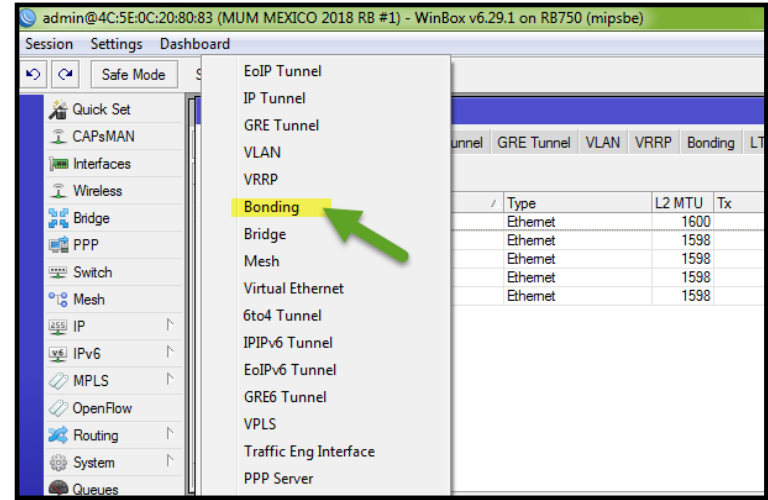
The screenshot shows the Mikrotik WinBox interface. The 'Address List' window is open, showing two IP addresses: 10.100.100.1/30 on ether2_ENLACE_1 and 10.200.200.1/30 on ether3_ENLACE_2. The 'Ping (Running)' window is also open, with the 'Ping To' field set to 10.100.100.2. The 'Interface' is set to ether2_ENLACE_1. The 'Packet Count' is 1000 and the 'Timeout' is 1000 ms. The 'Start' button is highlighted. Below the configuration, a table shows the results of the ping test:

Seq #	Host	Time	Reply Size	TTL	Status
0	10.100.100.2	0ms	50	64	
1	10.100.100.2	0ms	50	64	
2	10.100.100.2	0ms	50	64	
3	10.100.100.2	0ms	50	64	
4	10.100.100.2	0ms	50	64	
5	10.100.100.2	0ms	50	64	
6	10.100.100.2	0ms	50	64	



Creación de la interfaz virtual Bonding para el Router 1 y 2, ambos debe tener el protocolo creado.

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Asignamos al Bonding las dos interfaces “esclavas” Elegimos MODE: “balance rr” algoritmo Round Robin.

admin@4C:5E:0C:20:80:83 (MUM MEXICO 2018 RB #1) - WinBox v6.29.1 on RB750 (mipsbe)

Session Settings Dashboard

Safe Mode Session: 4C:5E:0C:20:80:83

Quick Set
CAPsMAN
Interfaces
Wireless
Bridge
PPP
Switch
Mesh
IP
IPv6
MPLS
OpenFlow
Routing
System
Queues
Files
Log
Radius
Tools
New Terminal

New Interface

General Bonding Status Traffic

Slaves: ether2_ENLACE_1 ✓
ether3_ENLACE_2 ✓

Mode: balance rr

Primary: none

Link Monitoring: mii

Transmit Hash Policy: layer 2 and 3

Down Delay: 0 ms
Up Delay: 0 ms
LACP Rate: 30 s
MII Interval: 100 ms

OK
Cancel
Apply
Disable
Comment
Copy
Remove
Torch

enabled running slave

admin@00:0C:42:89:D4:4B (MUM MEXICO 2018 RB #2) - WinBox v6.20 on RB750 (mipsbe)

Session Settings Dashboard

Safe Mode Session: 00:0C:42:89:D4:4B

Quick Set
Interfaces
Bridge
PPP
Switch
Mesh
IP
IPv6
MPLS
OpenFlow
Routing
System
Queues
Files
Log
Radius
Tools
New Terminal
MetaROUTER
Partition
Make Spout.rif

New Interface

General Bonding Traffic

Slaves: ether2_ENLACE_1 ✓
ether3_ENLACE_2 ✓

Mode: balance rr

Primary: none

Link Monitoring: none

Transmit Hash Policy: layer 2 and 3

Down Delay: 0 ms
Up Delay: 0 ms
LACP Rate: 30 s

OK
Cancel
Apply
Disable
Comment
Copy
Remove
Torch

enabled running slave

Balance Round Robin



En este modo, los paquetes se transmiten en orden secuencial desde el primer esclavo disponible hasta el último.

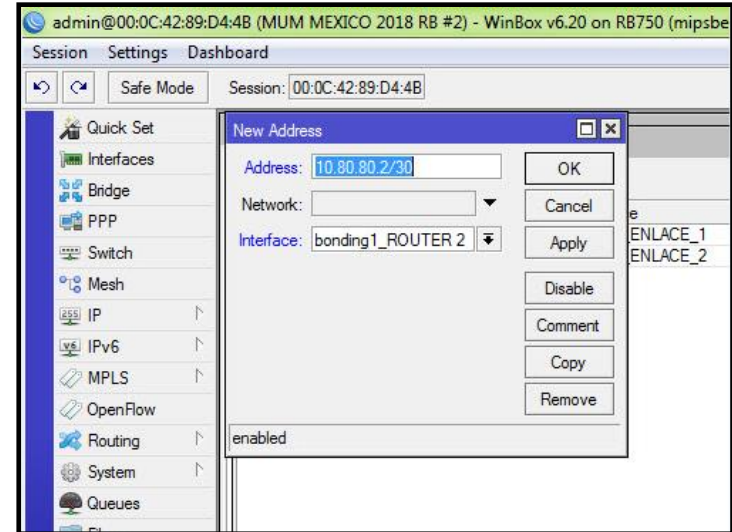
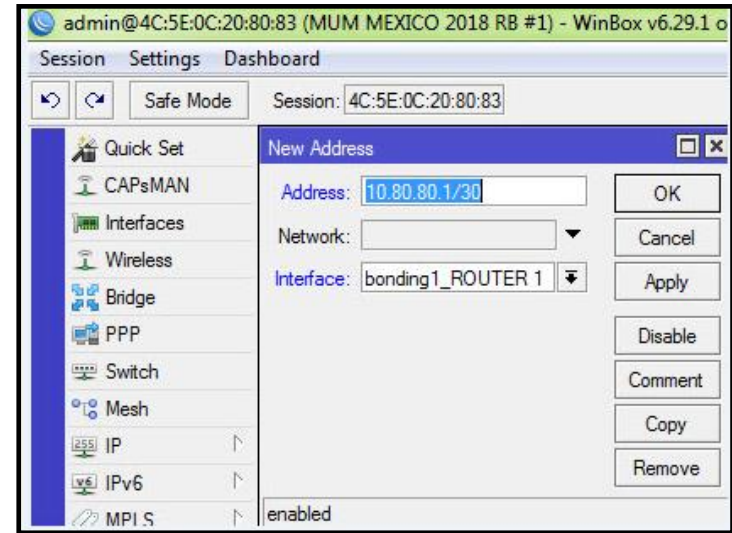
Balance-rr es el único modo que enviará paquetes a través de múltiples interfaces que pertenecen a la misma conexión TCP / IP.

Es útil para vincular varios enlaces inalámbricos, sin embargo, requiere igual ancho de banda para todos los enlaces enlazados.



Se asigna direccionamiento
a ambas interfaces virtuales
BONDING

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Session: 00:0C:42:89:D4:4B

Interface <ether2_ENLACE_1>

Ethernet Status Overall Stats Rx Stats Tx Stats ...

Auto Negotiation: done

Rate: 100Mbps

Full Duplex

Advertising: 10M half
10M full
100M half
100M full

Link Partner Advertising: 10M half
10M full
100M half
100M full

OK
Cancel
Apply
Disable
Comment
Torch
Cable Test
Blink
Reset MAC Address
Reset Counters

Interface <ether3_ENLACE_2>

Ethernet Status Overall Stats Rx Stats Tx Stats ...

Auto Negotiation: done

Rate: 100Mbps

Full Duplex

Advertising: 10M half
10M full
100M half
100M full

Link Partner Advertising: 10M half
10M full
100M half
100M full

OK
Cancel
Apply
Disable
Comment
Torch
Cable Test
Blink
Reset MAC Address
Reset Counters



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Bandwidth Test



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The screenshot displays the Mikrotik WinBox interface. The main window shows the 'Interface List' with a table of network interfaces. A green arrow points to the 'Rx' column for the 'bonding1_ROUTER 1' interface, which shows a value of 198.3 Mbps. A 'Bandwidth Test (Running)' dialog box is open on the right, showing test parameters and results.

Interface	Type	L2 MTU	Tx	Rx
R bonding1_ROUTER 1	Bonding			198.3 Mbps
ether1	Ethernet	1600	0 bps	0 bps
ether2_ENLACE_1	Ethernet	1598	560 bps	99.1 Mbps
ether3_ENLACE_2	Ethernet	1598	656 bps	99.1 Mbps
ether4	Ethernet	1598	0 bps	0 bps
ether5_GESTION	Ethernet	1598	56.0 kbps	10.8 kbps

Bandwidth Test (Running) Parameters:

- Test To: 10.80.80.2
- Protocol: udp
- Local UDP Tx Size: 1500
- Remote UDP Tx Size: 1500
- Direction: receive
- TCP Connection Count: 20
- User: admin
- Lost Packets: 1646
- Tx/Rx Current: 0 bps/194.4 Mbps
- Tx/Rx 10s Average: 0 bps/194.4 Mbps
- Tx/Rx Total Average: 0 bps/166.0 Mbps

Test Results:

- Tx: 0 bps
- Rx: 194.4 Mbps

Bandwidth Test



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admin@4C:5E:0C:20:80:83 (MUM MEXICO 2018 RB #1) - WinBox v6.29.1 on RB750 (mipsbe)

Session Settings Dashboard

Safe Mode Session: 4C:5E:0C:20:80:83

Quick Set
CAPsMAN
Interfaces
Wireless
Bridge
PPP
Switch
Mesh
IP
IPv6
MPLS
OpenFlow
Routing
System
Queues
Files
Log
Radius
Tools
New Terminal
MetaROUTER
Partition
Make Supout.nf
Manual
New WinBox
Exit

Interface List

Interface	Ethernet	EoIP Tunnel	IP Tunnel	GRE Tunnel	VLAN	VRRP	Bonding	LTE
Name	Type	L2 MTU	Tx	Rx				
R bonding1_ROUTER 1	Bonding		196.9 Mbps	1200 bps				
R ether1	Ethernet	1600	0 bps	0 bps				
RS ether2_ENLACE_1	Ethernet	1598	98.4 Mbps	552 bps				
RS ether3_ENLACE_2	Ethernet	1598	98.4 Mbps	648 bps				
R ether4	Ethernet	1598	0 bps	0 bps				
R ether5_GESTION	Ethernet	1598	78.1 kbps	10.7 kbps				

6 items

Bandwidth Test (Running)

Test To: 10.80.80.2

Protocol: udp tcp

Local UDP Tx Size: 1500

Remote UDP Tx Size: 1500

Direction: send

TCP Connection Count: 20

Local Tx Speed: bps

Remote Tx Speed: bps

Random Data

User: admin

Password:

Lost Packets: 0

Tx/Rx Current: 195.0 Mbps/0 bps

Tx/Rx 10s Average: 194.9 Mbps/0 bps

Tx/Rx Total Average: 158.3 Mbps/0 bps

Tx: 195.0 Mbps

Rx:

running...

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Probando el FAILOVER



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admin@4C:5E:0C:20:80:83 (MUM MEXICO 2018 RB #1) - WinBox v6.29.1 on RB750 (mipsbe)

Session Settings Dashboard

Safe Mode Session: 4C:5E:0C:20:80:83

Quick Set
CAPsMAN
Interfaces
Wireless
Bridge
PPP
Switch
Mesh
IP
IPv6
MPLS
OpenFlow
Routing
System
Queues
Files
Log
Radius
Tools
New Terminal
MetaROUTER
Partition
Make Supout.rf
Manual
New WinBox
Exit

Interface List

Interface	Ethernet	EoIP Tunnel	IP Tunnel	GRE Tunnel	VLAN	VRPP	Bonding	LTE
R	↔ bonding1_ROUTER 1							
	↳ ether1							
RS	↳ ether2_ENLACE_1							
	↳ ether3_ENLACE_2							
R	↳ ether4							
R	↳ ether5_GESTION							

6 items (1 selected)

Bandwidth Test (Running)

Test To: 10.80.80.2

Protocol: udp tcp

Local UDP Tx Size: 1500

Remote UDP Tx Size: 1500

Direction: send

TCP Connection Count: 20

Local Tx Speed: bps

Remote Tx Speed: bps

Random Data

User: admin

Password:

Lost Packets: 0

Tx/Rx Current: 97.5 Mbps/0 bps

Tx/Rx 10s Average: 97.4 Mbps/0 bps

Tx/Rx Total Average: 163.4 Mbps/0 bps

running...

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Probando el FAILOVER



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The screenshot shows the MikroTik WinBox interface. The main window displays the 'Interface List' with the following data:

Name	Type	L2 MTU	Tx	Rx
bonding1_ROUTER 1	Bonding		99.4 Mbps	3.1 kbps
ether1	Ethernet	1600	0 bps	0 bps
ether2_ENLACE_1	Ethernet	1598	0 bps	1216 bps
ether3_ENLACE_2	Ethernet	1598	99.4 Mbps	1968 bps
ether4	Ethernet	1598	0 bps	0 bps
ether5_GESTION	Ethernet	1598	4.5 kbps	8.0 kbps

A green arrow points to the '99.4 Mbps' value in the Tx column of the 'bonding1_ROUTER 1' row. A red 'X' is visible over the 'ether1' row.

On the right, the 'Bandwidth Test (Running)' window shows the following configuration and results:

- Test To: 10.80.80.2
- Protocol: udp (selected), tcp
- Local UDP Tx Size: 1500
- Remote UDP Tx Size: 1500
- Direction: send
- TCP Connection Count: 20
- Local Tx Speed: [empty] bps
- Remote Tx Speed: [empty] bps
- Random Data: [unchecked]
- User: admin
- Password: [empty]
- Lost Packets: 0
- Tx/Rx Current: 97.4 Mbps/0 bps
- Tx/Rx 10s Average: 95.4 Mbps/0 bps
- Tx/Rx Total Average: 58.7 Mbps/0 bps

The bandwidth test results show a Tx speed of 97.4 Mbps, indicated by a green checkmark in the graph area.

Restablecemos Interfaces..



admin@00:0C:42:89:D4:4B (MUM MEXICO 2018 RB #2) - WinBox v6.20 on RB750 (mipsbe)

Session Settings Dashboard

Safe Mode Session: 00:0C:42:89:D4:4B

Quick Set

Interfaces

Bridge

PPP

Switch

Mesh

IP

IPv6

MPLS

OpenFlow

Routing

System

Queues

Files

Log

Radius

Tools

New Terminal

MetaROUTER

Partition

Make Supout.tif

Manual

New WinBox

Exit

OS WinBox

Interface List

Interface	Ethernet	EoIP Tunnel	IP Tunnel	GRE Tunnel	VLAN	VRRP	Bonding	LTE
Name	Type	L2 MTU	Tx	Rx	Tx Pa			
R bonding1_ROUTER 2	Bonding		12.16 Mbps	198.4 Mbps				
R ether1	Ethernet	1600	0 bps	0 bps				
RS ether2_ENLACE_1	Ethernet	1598	560 bps	99.2 Mbps				
RS ether3_ENLACE_2	Ethernet	1598	656 bps	99.2 Mbps				
R ether4	Ethernet	1598	0 bps	0 bps				
R ether5_GESTION	Ethernet	1598	62.4 kbps	13.8 kbps				

Bandwidth Test (Running)

Test To: 10.80.80.1

Protocol: udp tcp

Local UDP Tx Size: 1500

Remote UDP Tx Size: 1500

Direction: receive

TCP Connection Count: 20

Local Tx Speed: bps

Remote Tx Speed: bps

Random Data

User: admin

Password:

Lost Packets: 1950

Tx/Rx Current: 0 bps/194.8 Mbps

Tx/Rx 10s Average: 0 bps/194.7 Mbps

Tx/Rx Total Average: 0 bps/157.5 Mbps

Tx: Rx: 194.8 Mbps

running...

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PREGUNTAS?



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