

México 2019

mum
Mikrotik User Meeting




MERCADOWISPMEXICO

MikroTik

SEGURIDAD EN UNA RED CON HOTSPOT (Hardening)



MikroTik

PONENTE

EMPRESA

INTRODUCCIÓN

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Los Mochis, Sinaloa.



**Certificaciones: MTCNA, MTCWE, MTCTCE, MTCIPv6E,
MTCUME, MTCRE, MTCINE.**



Presentación Anterior: "The dude"

<https://mum.mikrotik.com/2018/MX/agenda/es#0DMDN105c9>

Ocupación



- WISP local con más de 1000 suscriptores (cpe).
- Consultor MikroTik.
- Asesoría en redes y enlaces Inalámbricos.
- Soluciones Llave En Mano.
- Soporte mensual o eventual a otros WISP.



Empresa

Mercado Wisp México



**Creada en el año 2015 con la finalidad
de ofrecer servicios y equipos
principalmente para implementaciones
de Redes Wisp.**



Empresa

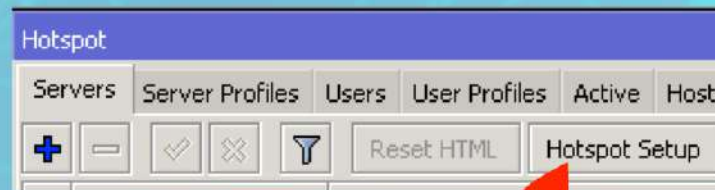
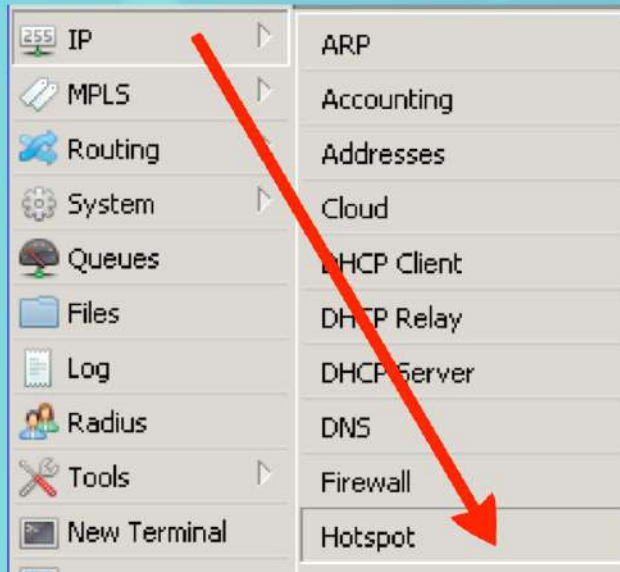
Mercado Wisp México



- **Grupo en Facebook con mas de 15 mil usuarios.**
- **Grupos de Whatsapp donde se comparten ideas y conocimiento.**
- **Somos partner de Ecatel México y ofrece cursos oficiales para certificaciones en MikroTik.**



Qué es Hotspot?



`/ip hotspot setup`



Resumen



En México existe un mercado muy grande para usar el servicio de hotspot y credenciales prepago (voucher) como forma de administrar una red y dar el servicio para acceso a internet.



Problema



Se construyen redes con hotspot de gran tamaño para poder llevar el servicio hasta los usuarios.

Se diseñan para operar con un unico dominio de broadcast exponiendo la integridad completa de la red y el servicio que se maneje (Hotspot).



Objetivo



- Trabajar con topologías de red seguras administradas con hotspot.
- Evitar ataques y fallas continuas de capa 2 dentro de este tipo de implementaciones.
- Lograr que mi hotspot **NO** sea el motivo de una mala calidad en el servicio que llega a los dispositivos finales.



Objetivo



mercadowispMexico@ [redacted] ADMINISTRADOR) - WinBox v6.4

board

Session: [redacted]

Hotspot

User Profiles Active Hosts IP Bindings Service Ports Walled Garden ...

Server	User	Address	Uptime	Session Ti...	Rx ...	Tx R...	
R	hs-vla...	cxq...	172.31.5...	00:06:44	2d 22:55:12	351.6 ...	10.3 M...
R	hs-vla...	v1rajp	172.31.19...	23:58:11	1d 19:53:43	204.1 ...	9.9 Mbps
R	hs-vla...	7uz...	172.31.55...	00:10:47	08:31:09	97.3 k...	6.7 Mbps
R	hs-vla...	oiiob0	172.31.53...	03:53:10	20d 05:53...	156.5 ...	6.0 Mbps
R	hs-vla...	yrfimi	172.31.5...	00:42:14	3d 19:55:59	67.3 k...	5.4 Mbps
R	hs-vla...	ygd...	172.31.58...	02:04:48	02:19:21	61.6 k...	5.0 Mbps
R	hs-vla...	F8:...	172.31.33...	00:11:10		63.2 k...	4.9 Mbps
R	hs-vla...	4pu...	172.31.61...	01:03:29	00:55:50	76.0 k...	4.9 Mbps
R	hs-vla...	5q5rkl	172.31.60...	04:32:55	10d 20:22...	20.5 k...	3.6 Mbps
R	hs-vla...	fcgvaz	172.31.6...	08:20:11	01:42:06	26.9 k...	3.1 Mbps
R	hs-vla...	umj...	172.31.21...	00:43:46	3d 01:47:30	73.2 k...	3.0 Mbps
R	hs-vla...	lqyrkt	172.31.5.97	00:15:37	16d 20:33...	36.5 k...	3.0 Mbps
R	hs-vla...	rmxh7l	172.31.49...	04:31:08	13:06:12	110.1 ...	2.7 Mbps
R	hs-vla...	ede...	172.31.7.79	01:38:39	2d 22:52:59	85.4 k...	2.5 Mbps
R	hs-vla...	amo...	172.31.60...	05:18:19	18d 16:24...	28.6 k...	2.3 Mbps
R	hs-vla...	E8:...	172.31.62...	00:45:53		17.2 k...	2.3 Mbps
R	hs-vla...	srmioI	172.31.21...	00:42:32	21d 00:00...	16.5 k...	2.3 Mbps
R	hs-vla...	1uiepq	172.31.67...	00:16:49	1d 23:31:54	48.7 k...	2.3 Mbps
R	hs-vla...	fpk5yz	172.31.48...	08:01:20	8d 17:35:43	26.6 k...	2.2 Mbps
R	hs-vla...	pgb...	172.31.72...	21:54:22	28d 15:37...	53.9 k...	2.2 Mbps

791 items out of 790 (1 selected)

Resources

Uptime: 3d 11:34:26

Free Memory: 3289.9 MIB

Total Memory: 3968.0 MIB

CPU: tilegx

CPU Count: 36

CPU Frequency: 1200 MHz

CPU Load: 5 %

Free HDD Space: 775.2 MIB

Total HDD Size: 1024.0 MIB

Architecture Name: tile

Board Name: CCR1036-12G-45

Version: 6.43.4 (stable)

Build Time: Oct/17/2018 06:37:48

Factory Software:

Objetivo



mercadowispmexico@

board

Session: [REDACTED]

Hotspot

User Profiles Active Hosts IP Bindings Service Ports Walled Garden ...

Server	User	Address	MAC Address	Uptime	Rx ...	Tx Rat
hs-bri...	332k...	192.168.1...	CC:FD:17:AA:...	01:55:11	29.0 k...	1067.3
hs-vla...	334u...	172.16.11...	FC:2D:5E:ED:...	14:56:16	58.1 k...	1064.8
hs-vla...	887t...	172.16.10...	D4:C9:4B:1E:...	03:40:00	35.8 k...	1037.9
hs-bri...	6643...	192.168.1...	A8:51:5B:E0:...	04:35:41	35.7 k...	1029.2
hs-bri...	4432...	192.168.1...	A8:51:5B:D6:...	1d 04:44:33	12.0 k...	1027.9
hs-bri...	554j...	192.168.1...	A0:91:69:C1:...	01:23:37	38.7 k...	1026.9
hs-bri...	554b...	192.168.1...	9C:E3:3F:D7:...	00:09:29	47.6 k...	1025.7
hs-vla...	226d...	172.16.70...	A8:A1:98:F0:...	15:29:55	27.3 k...	1025.6
hs-vla...	3342i...	172.16.23...	04:1B:6D:CC:...	22:15:36	44.0 k...	1024.1
hs-vla...	4456...	172.16.14...	84:9F:85:7A:...	20:46:45	29.3 k...	1013.2
hs-bri...	332b...	192.168.1...	B4:BF:F6:CD:...	00:11:03	31.7 k...	1012.8
hs-vla...	6643	172.16.90	50:8C:96:F0:	1d 04:43:28	21.0 k...	1004.0

2340 items

Resources

Uptime: 1d 04:46:13

Free Memory: 1501.7 MiB

Total Memory: 1939.2 MiB

CPU: tilegx

CPU Count: 16

CPU Frequency: 1200 MHz

CPU Load: 9 %

Free HDD Space: 330.1 MiB

Total HDD Size: 512.0 MiB

Architecture Name: tile

Board Name: CCR1016-12G

Qué es Hardening?



En pocas palabras para este tema es incrementar la seguridad en nuestra red con hotspot.

Qué es Firewall?



Es el encargado de la seguridad del flujo de datos de la red y del propio router.

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AGENDA

✓ Qué es Hotspot?

✓ Qué es Hardening?

Problemas en un hotspot "por qué?"

Solución

Demostración

Problemas en un Hotspot



Por qué?

Qué necesito saber



Problemas en un Hotspot



Por qué

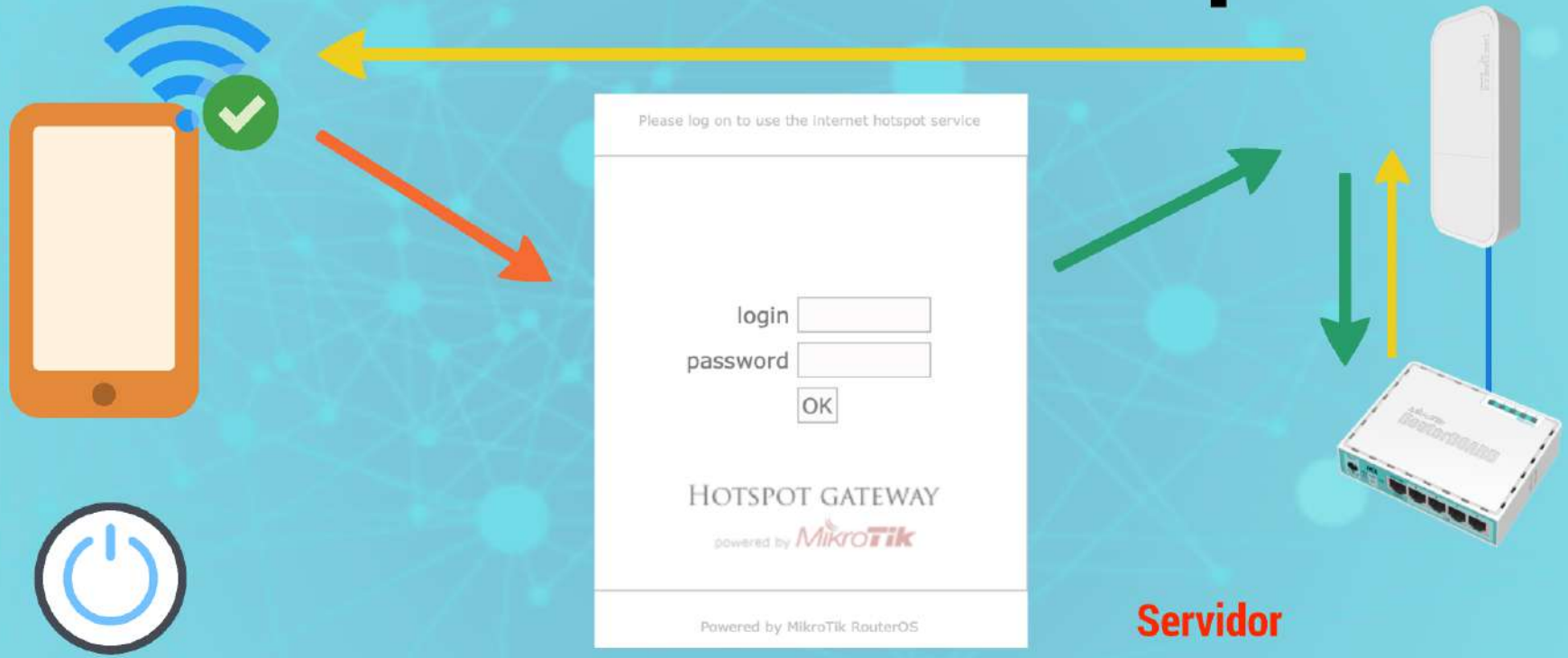
Cómo funciona un hotspot



Cómo funciona un Hotspot?



Cómo funciona un Hotspot?



Cómo funciona un Hotspot?





Qué hace un Servidor DHCP?

Es el encargado de entregar direcciones ip dinamicas y otros parametros a los equipos en la red para ello hace uso de un pool o rango de direcciones

Qué es DHCP?

Cómo funciona?



D
O
R
A

Qué es DHCP?

Cómo funciona?



Discover

Offer

Request

Ack

Qué es DHCP?

Cómo funciona?



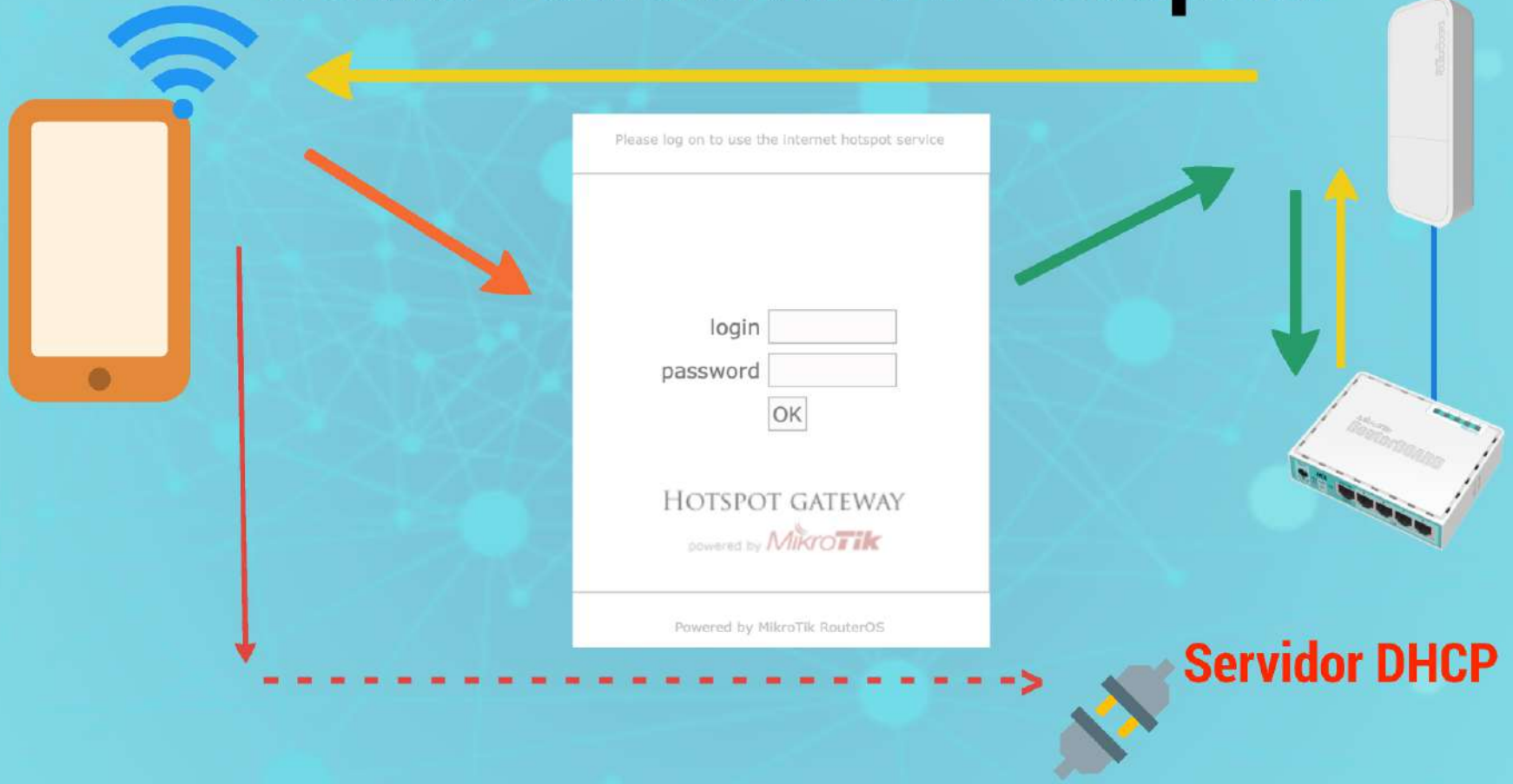
Discover **C**liente

Offer **S**ervidor

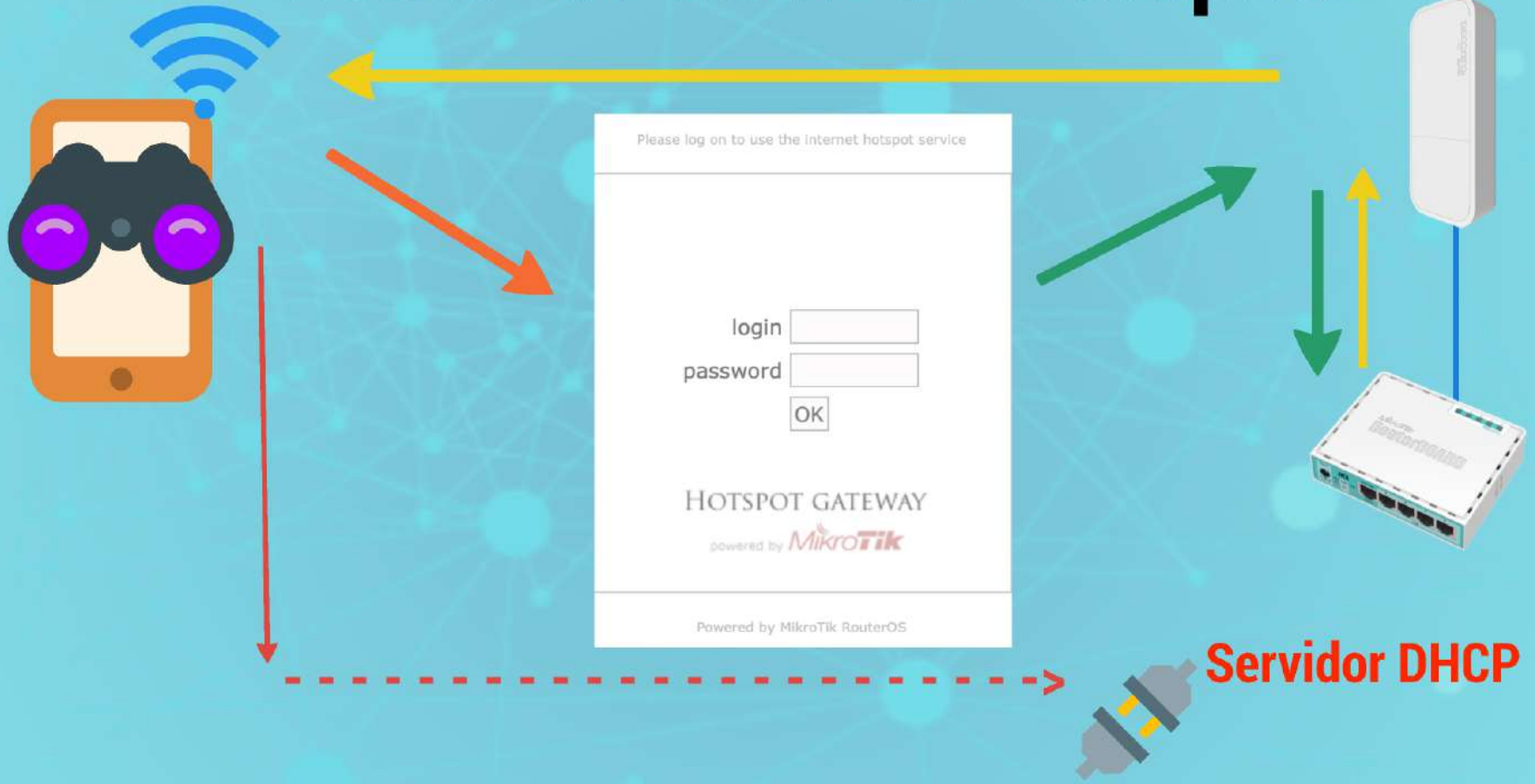
Request **C**liente

Ack **S**ervidor

Cómo funciona un Hotspot?



Cómo funciona un Hotspot?



Cómo funciona un Hotspot?



DIRECT



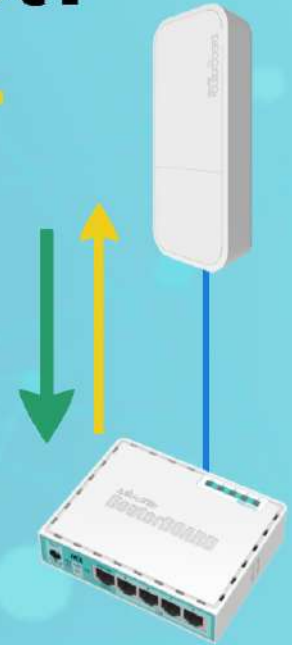
Please log on to use the internet hotspot service

login

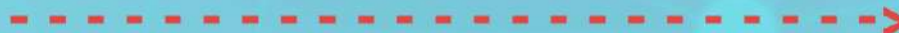
password

HOTSPOT GATEWAY
powered by MikroTik

Powered by MikroTik RouterOS



Servidor DHCP

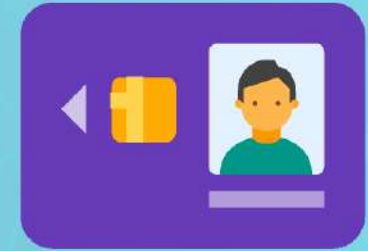


**Ahora sera mas facil
entender lo que pasa
en un Hotspot !!**





Identificación del problema



Puede suceder que sea mucho mas facil y rapido identificar y encontrar el problema, pero reconocer cual es el motivo no tanto.



Log

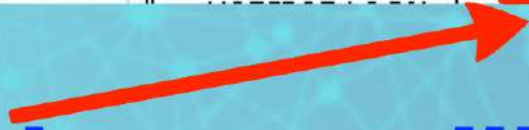
memory	dhcp, warning	dhcp-HOTSPOT-TAYOLTITA offering lease 172.16.150.161 for 50:9E:A7:74:68:1F without success
memory	dhcp, warning	dhcp-HOTSPOT-TAYOLTITA offering lease 172.16.151.52 for 30:07:4D:74:3D:86 without success
memory	dhcp, warning	dhcp-HOTSPOT-TAYOLTITA offering lease 172.16.150.161 for 50:9E:A7:74:68:1F without success
memory	dhcp, warning	dhcp-HOTSPOT-TAYOLTITA offering lease 172.16.151.52 for 30:07:4D:74:3D:86 without success
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memory	dhcp, warning	dhcp-HOTSPOT-TAYOLTITA offering lease 172.16.150.161 for 50:9E:A7:74:68:1F without success

- Files
- Log**
- RADIUS
- Tools
- New Terminal

Log

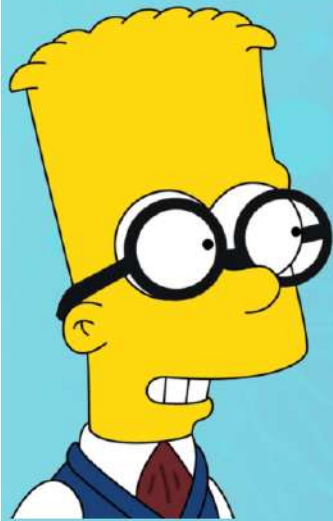
memory	dhcp, warning	dhcp-HOTSPOT-TAYOLTITA offering lease 172.16.150.161 for 50:9E:A7:74:68:1F without success
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Recuerdan que dijo DORA?



- Files
- Log**
- RADIUS
- Tools
- New Terminal

Problema en ciclo dhcp "Offer"



dhcp, warning	dhcp-HOTSPOT-TAYOLTITA offering lease 172.16.148.40 for 34:8A:7B:71:5B:48 without success
dhcp, warning	dhcp-HOTSPOT-TAYOLTITA offering lease 172.16.148.40 for 34:8A:7B:71:5B:48 without success
dhcp, warning	dhcp-HOTSPOT-TAYOLTITA offering lease 172.16.148.40 for 34:8A:7B:71:5B:48 without success
dhcp, warning	dhcp-HOTSPOT-TAYOLTITA offering lease 172.16.148.40 for 34:8A:7B:71:5B:48 without success
dhcp, warning	dhcp-HOTSPOT-TAYOLTITA offering lease 172.16.148.40 for 34:8A:7B:71:5B:48 without success
dhcp, warning	dhcp-HOTSPOT-TAYOLTITA offering lease 172.16.148.40 for 34:8A:7B:71:5B:48 without success
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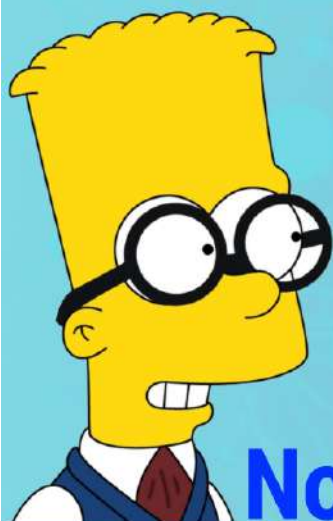
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dhcp, warning	dhcp-HOTSPOT-TAYOLTITA offering lease 172.16.148.40 for 34:8A:7B:71:5B:48 without success
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Notaste la diferencia del ejemplo anterior?

Problema en ciclo dhcp "Offer"



dhcp, warning	dhcp-HOTSPOT-TAYOLTITA offering lease 172.16.148.40 for 34:8A:7B:71:5B:48 without success
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Notaste la diferencia del ejemplo anterior?

memory	dhcp, warning	dhcp-HOTSPOT-TAYOLTITA offering lease 172.16.150.161 for 50:9E:A7:74:68:1F without success
memory	dhcp, warning	dhcp-HOTSPOT-TAYOLTITA offering lease 172.16.151.52 for 30:07:4D:74:3D:86 without success
memory	dhcp, warning	dhcp-HOTSPOT-TAYOLTITA offering lease 172.16.150.161 for 50:9E:A7:74:68:1F without success
memory	dhcp, warning	dhcp-HOTSPOT-TAYOLTITA offering lease 172.16.151.52 for 30:07:4D:74:3D:86 without success
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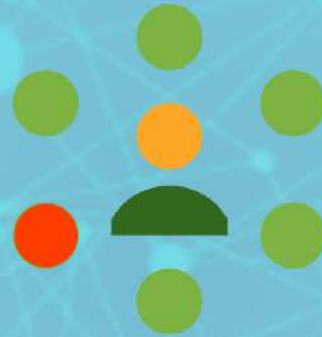


dhcp, warning	dhcp-HOTSPOT-TAYOLTITA offering lease 172.16.148.40 fo	34:8A:7B:71:5B:48	without success
dhcp, warning	dhcp-HOTSPOT-TAYOLTITA offering lease 172.16.148.40 fo	34:8A:7B:71:5B:48	without success
dhcp, warning	dhcp-HOTSPOT-TAYOLTITA offering lease 172.16.148.40 fo	34:8A:7B:71:5B:48	without success
dhcp, warning	dhcp-HOTSPOT-TAYOLTITA offering lease 172.16.148.40 fo	34:8A:7B:71:5B:48	without success
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memory	dhcp, warning	dhcp-HOTSPOT-TAYOLTITA offering lease 172.16.150.161 fo	50:9E:A7:74:68:1F	without success

Qué debo hacer?



Aislar el problema permitira tener un sistema robusto y de mayor disponibilidad.

Pool vacio en el servidor DHCP



Problema

memory	dhcp, error	dhcp-HOTSPOT-MACHOBAYO: failed to give out IP address: pool <hs-pool-HOTSPOT-MACHOBAYO> is empty
memory	dhcp, error	dhcp-HOTSPOT-MACHOBAYO: failed to give out IP address: pool <hs-pool-HOTSPOT-MACHOBAYO> is empty
memory	hotspot, error, info, ..	failed to get IP address for host 88:AE:07:7A:CD:2E/172.16.70.61: pool empty (6)



Pool vacio en el servidor DHCP



Problema

```
memory dhcp, error dhcp-HOTSPOT-MACHOBAYO: failed to give out IP address: pool <hs-pool-HOTSPOT-MACHOBAYO> is empty
memory dhcp, error dhcp-HOTSPOT-MACHOBAYO: failed to give out IP address: pool <hs-pool-HOTSPOT-MACHOBAYO> is empty
memory hotspot, error, info, .. failed to get IP address for host 88:AE:07:7A:CD:2E/172.16.70.61: pool empty (6)
```



Recuerdas como funciona un Servidor DHCP?





Pool vacio en Servidor DHCP



El Servidor DHCP almacena las direcciones ip en una tabla (leases) por un tiempo definido durante la configuracion del servidor dhcp.

Asociandolas con las direcciones mac de los clientes que lo han solicitado .



`/ip dhcp-server lease`



Pool vacio en Servidor DHCP

Recomendacion



DHCP Server <dhcp-HOTSPOT-TAYOLTITA>

Name: dhcp-HOTSPOT-TAYOLTITA

Interface: vlan-HOTSPOT-TAYOLTITA

Relay:

Lease Time: 1d 00:00:00

Bootp Lease Time: forever

Address Pool: hs-pool-HOTSPOT-TAYOLTITA

Src. Address:

Delay Threshold:

Authoritative: yes

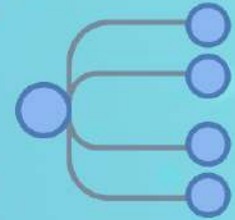
Bootp Support: static

OK
Cancel
Apply
Disable
Copy
Remove



Pool vacio en Servidor DHCP

Recomendacion



Utilizar el tamaño de red adecuado
para los requerimientos de la red





Problema en hotspot

Mala practica



Hotspot

Servers Server Profiles Users User Profiles Active Hosts IP Bindings Service Po

+ - ✓ ✗ 📁 🔍

#	MAC Address	Address	To Address	Server
34 P	🔑 CC:2D:E0:5F:87...			all
35 P	🔑 E4:8D:8C:4F:0E:74			all
36 P	🔑 68:72:51:40:F9:DE			all
37 P	🔑 E4:8D:8C:9D:A6...			all
38 P	🔑 64:D1:54:5F:6F:D7			all
39 P	🔑 64:D1:54:52:C5:...			all
40 P	🔑 44:D9:E7:BA:AD...			all
41 P	🔑 CC:2D:E0:00:24...			all
42 P	🔑 E4:8D:8C:50:EF:FF			all
43 P	🔑 E4:8D:8C:51:D5...			all
44 P	🔑 E4:8D:8C:51:D5...			all
45 P	🔑 E4:8D:8C:FA:19...			all
46 P	🔑 F4:8D:8C:B5:06:7B			all

742 items (1 selected)

Problema en hotspot

Mala practica



Hotspot

Servers Server Profiles Users User Profiles Active Hosts IP Bindings Service Po

#	MAC Address	Address	To Address	Server
34 P	CC:2D:E0:5F:87...			all
35 P	E4:8D:8C:4F:0E:74			all
36 P	68:72:51:40:F9:DE			all
37 P	E4:8D:8C:9D:A6...			all
38 P	64:D1:54:5F:6F:D7			all
39 P	64:D1:54:52:C5:...			all
40 P	44:D9:E7:BA:AD...			all
41 P	CC:2D:E0:00:24...			all
42 P	E4:8D:8C:50:EF:FF			all
43 P	E4:8D:8C:51:D5...			all
44 P	E4:8D:8C:51:D5...			all
45 P	E4:8D:8C:FA:19...			all
46 P	F4:8D:8C:85:06:7B			all

742 items (1 selected)



Problema en hotspot

Ejemplo real !!!



Apr/08/2019 05:45:48	memory	wireless, info	C4:01:7C:E6:A8:E8@wlan1 established connection on 2442000, SSID Sevilla Premium
Apr/08/2019 05:45:49	memory	wireless, info	C4:01:7C:E6:A8:E8@wlan1: lost connection, received disassociation reason unspecified (1)
Apr/08/2019 05:45:52	memory	wireless, info	C4:01:7C:E6:A8:E8@wlan1: lost connection, received disassociation reason unspecified (1)
Apr/08/2019 05:45:55	memory	wireless, info	C4:01:7C:E6:A8:E8@wlan1 established connection on 2442000, SSID Sevilla Premium
Apr/08/2019 05:45:59	memory	wireless, info	C4:01:7C:E6:A8:E8@wlan1: lost connection, received death notification class 2 frame received (6)
Apr/08/2019 05:46:02	memory	wireless, info	C4:01:7C:E6:A8:E8@wlan1 established connection on 2442000, SSID Sevilla Premium
Apr/08/2019 05:46:22	memory	system, info, account	user admin logged out via local
Apr/08/2019 05:46:23	memory	wireless, info	C4:01:7C:E6:A8:E8@wlan1: lost connection, received death notification class 2 frame received (6)
Apr/08/2019 05:46:26	memory	wireless, info	C4:01:7C:E6:A8:E8@wlan1 established connection on 2442000, SSID Sevilla Premium
Apr/08/2019 05:46:29	memory	wireless, info	C4:01:7C:E6:A8:E8@wlan1: lost connection, received death notification class 2 frame received (6)
Apr/08/2019 05:46:32	memory	wireless, info	C4:01:7C:E6:A8:E8@wlan1 established connection on 2442000, SSID Sevilla Premium



Neighbor List

Discovery Settings Find

Interface	IP Address	MAC Address	Ide...	Platform	Version	Board Name	IPv6	Age (s)	Uptime
wlan1	10.50.1.184	00:00:00:00:00:00					no	130	00:00:00
wlan1	10.50.3.184	74:4D:28:17:70:C8	Mikr...	MikroTik	6.40.9 (bugfix)	RB952Ui-5ac2nD	no	51	11:00:26
wlan1	10.50.0.131	F4:8D:8C:53:31:3B	Aul...	MikroTik	6.42.4 (stable)	RB962UGS-SHact2HnT	no	49	18:07:14
wlan1	10.50.3.242	CC:2D:E0:4E:27:43	Mikr...	MikroTik	6.44.2 (stable)	RB931-2nD	no	4	20:19:14
wlan1	192.168.2.99	08:00:27:BF:9E:A5	Mikr...	MikroTik	6.42 (stable)	x86	no	38	00:02:08

5 items (1 selected)

```
[admin@MikroTik] > /ip address print
Flags: X - disabled, I - invalid, D - dynamic
# ADDRESS NETWORK INTERFACE
0 192.168.220.254/24 192.168.220.0 ether1
1 D 10.50.1.168/20 10.50.0.0 wlan1
[admin@MikroTik] > /interface print detail
Flags: D - dynamic, X - disabled, R - running, S - slave
0 R name="ether1" default-name="ether1" type="ether" mtu=1500 actual-mtu=1500 l2mtu=1598 max-l2mtu=2028 mac-address=4C:5E:0C:14:8B:D5
last-link-up-time=jan/02/1970 00:00:42 link-downs=1

1 R name="wlan1" default-name="wlan1" type="wlan" mtu=1500 actual-mtu=1500 l2mtu=1600 max-l2mtu=2290 mac-address=4C:5E:0C:14:8B:D6
last-link-up-time=jan/02/1970 00:00:42 link-downs=0
[admin@MikroTik] > ping www.facebook.com
SEQ HOST SIZE TTL TIME STATUS
0 31.13.70.36 timeout
1 31.13.70.36 timeout
2 31.13.70.36 timeout
sent=3 received=0 packet-loss=100%
```



Interface List

Interface	Type	Actual MTU	L2 MTU	Tx	Rx	Tx Packet (p/s)	Rx Packet (p/s)	FP Tx	FP Rx
R ether1	Ethernet	1500	1598	51.8 kbps	11.3 kbps	12	15	51.8 kbps	
R wlan1	Wireless (Atheros AR...	1500	1600	1912 bps	20.9 kbps	3	20	1912 bps	

2 items (1 selected)

Neighbor List

Interface	IP Address	MAC Address	Ide...	Platform	Version	Board Name	IPv6	Age (s)	Uptime
wlan1	10.50.3.184	74:4D:28:17:70:C8	Mikr...	MikroTik	6.40.9 (bugfix)	RB952U-5ac2nD	no	18	11:19:51
wlan1	10.50.0.131	E4:8D:8C:53:31:38	Aul...	MikroTik	6.42.4 (stable)	RB962UIGS-SHacT2HnT	no	17	18:26:38

Terminal

```

0 R name="ether1" default-name="ether1" type="ether" mtu=1500 actual-mtu=1500 l2mtu=1598 max-l2mtu=2028 mac-address 4C:5E:0C:14:8B:D5
   last-link-up-time=jan/02/1970 00:00:42 link-downs=1

1 R name="wlan1" default-name="wlan1" type="wlan" mtu=1500 actual-mtu=1500 l2mtu=1600 max-l2mtu=2290 mac-address CC:2D:E0:4E:27:43
   last-link-up-time=jan/02/1970 00:27:10 link-downs=29

admin@MikroTik] > ping 8.8.8.8

```

SEQ	HOST	SIZE	TTL	TIME	STATUS
0	8.8.8.8	56	43	45ms	
1	8.8.8.8	56	43	169ms	
2	8.8.8.8	56	43	50ms	
3	8.8.8.8	56	43	79ms	
4	8.8.8.8	56	43	38ms	
5	8.8.8.8	56	43	121ms	
6	8.8.8.8	56	43	48ms	
7	8.8.8.8	56	43	90ms	
8	8.8.8.8	56	43	69ms	

```

sent=9 received=9 packet-loss=0% min-rtt=38ms avg-rtt=78ms max-rtt=169ms

admin@MikroTik] >

```

Qué debo hacer ?



Usar medidas de protección general contra todos los posibles problemas de un mismo origen sera lo mas efectivo en un hotspot





Manos a la obra!!!



MERCADOWISPMEXICO

México 2019

mum
Mikrotik User Meeting



MERCADOWISP
MEXICO

MikroTik



/ip dhcp-server

IP	▶	ARP
MPLS	▶	Accounting
Routing	▶	Addresses
System	▶	Cloud
Queues		DHCP Client
Files		DHCP Relay
Log		DHCP Server
Radius		DNS

NETWORK

DHCP

DHCP Server

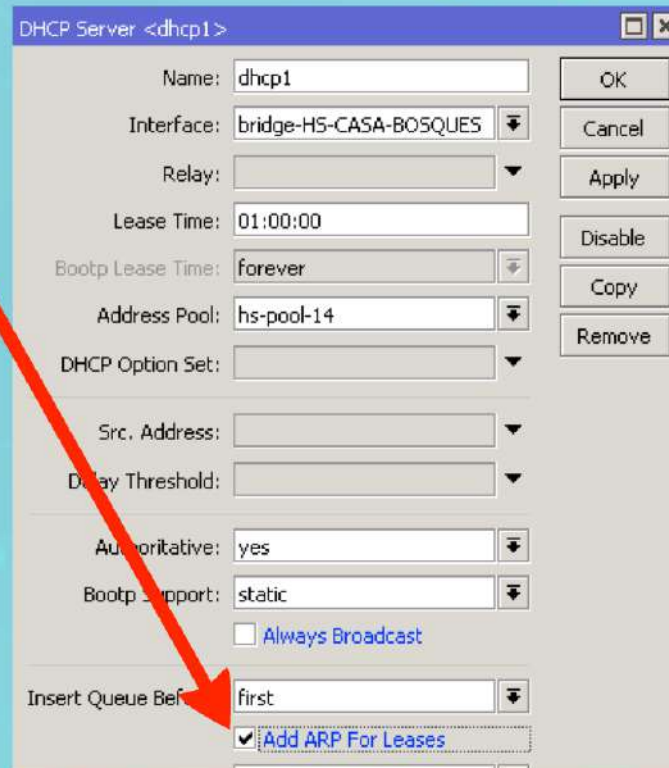
The screenshot shows a web-based DHCP server management interface. At the top, there is a blue header bar with the text 'DHCP Server'. Below this, there are several tabs: 'DHCP', 'Networks', 'Leases', 'Options', 'Option Sets', and 'Alerts'. The 'DHCP' tab is currently selected. Below the tabs, there is a toolbar with icons for adding (+), deleting (-), enabling (checkmark), disabling (cross), and filtering (funnel), along with buttons for 'DHCP Config' and 'DHCP Setup'. The main area contains a table with columns for 'Name', 'Interface', 'Lease Time', and 'Action'. The table lists several DHCP entries, with the first one selected. At the bottom of the table, it says '36 items (1 selected)'.

Name	Interface	Lease Time	Action
dhcp-HOTSPOT-...	vlan-HOTSPOT-C...	1d 00:00:00	hs
dhcp-HOTSPOT-...	vlan-HOTSPOT-C...	1d 00:00:00	hs
dhcp-HOTSPOT-...	vlan-HOTSPOT-C...	1d 00:00:00	hs

/ip dhcp-server set add-arp=yes [find]



1



DHCP Server <dhcp1>

Name: dhcp1

Interface: bridge-H5-CASA-BOSQUES

Relay:

Lease Time: 01:00:00

Bootp Lease Time: forever

Address Pool: hs-pool-14

DHCP Option Set:

Src. Address:

Delay Threshold:

Authoritative: yes

Bootp Support: static

Always Broadcast

Insert Queue Before: first

Add ARP For Leases

OK Cancel Apply Disable Copy Remove

/ip dhcp-server lease print



DHCP Server

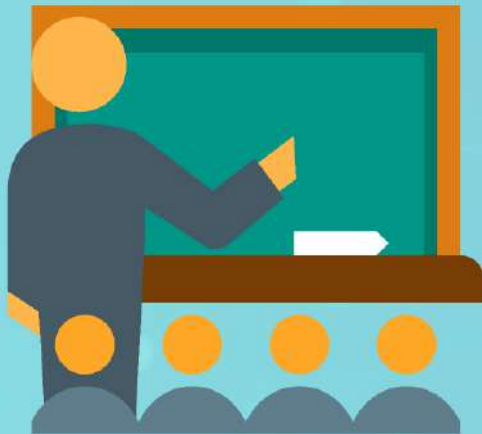
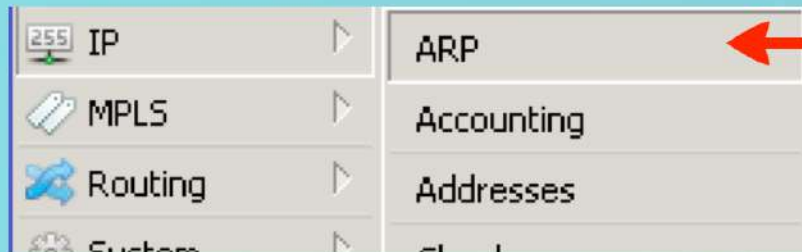
DHCP Networks Leases Options Option Sets Alerts

+ - ✓ ✗ 📄 🔍 Check Status

	Address	MAC Address	Cle...	Server	Active Address	Active MAC Addr...	Active Ho...	Expires A...	Status
D	172.16.20.200	4C:91:0C:1...		dhcp-HOTS...	172.16.20.200	4C:91:0C:1A:B3:F3	android-d...	18:31:35	bound
D	172.16.20.202	80:6C:1B:2A...		dhcp-HOTS...	172.16.20.202	80:6C:1B:2A:9D:...	android-2...	03:02:14	bound
D	172.16.20.203	BC:3D:85:84...		dhcp-HOTS...	172.16.20.203	BC:3D:85:84:D9:66	HUAWEI_...	14:48:46	bound
D	172.16.20.206	A0:39:F7:11...		dhcp-HOTS...	172.16.20.206	A0:39:F7:11:F1:42	android-2...	18:22:48	bound
D	172.16.20.209	5C:77:76:2D...		dhcp-HOTS...	172.16.20.209	5C:77:76:2D:1A:64	android-e...	21:06:34	bound
D	172.16.20.210	00:08:22:96...		dhcp-HOTS...	172.16.20.210	00:08:22:96:7C:EC	android-1...	23:28:31	bound
D	172.16.20.214	00:08:22:A5...		dhcp-HOTS...	172.16.20.214	00:08:22:A5:A8:F9	android-b...	21:00:36	bound

7018 items

/ip arp print



A screenshot of the 'ARP List' window. It features a toolbar with icons for adding, deleting, and filtering. Below the toolbar is a table with columns for IP Address, MAC Address, and Interface. The table lists 17 entries for the 172.16.20.0/24 network. At the bottom, it indicates '7080 items'.

	IP Address	MAC Address	Interface
DCH	172.16.20.26	3C:05:18:73:57:7C	vlan-HOTSPOT-
DCH	172.16.20.27	60:72:0B:8E:6C:B2	vlan-HOTSPOT-
DCH	172.16.20.28	40:4E:36:0E:3A:EC	vlan-HOTSPOT-
DCH	172.16.20.29	A0:57:E3:36:AE:74	vlan-HOTSPOT-
DCH	172.16.20.30	D0:04:01:FB:97:DD	vlan-HOTSPOT-
DCH	172.16.20.31	B8:53:AC:89:D1:3F	vlan-HOTSPOT-
DCH	172.16.20.32	CC:2D:E0:76:65:38	vlan-HOTSPOT-
DCH	172.16.20.33	38:80:DF:5C:4B:5A	vlan-HOTSPOT-
DCH	172.16.20.34	D0:04:01:7F:F0:37	vlan-HOTSPOT-
DCH	172.16.20.36	E8:93:09:2C:84:E8	vlan-HOTSPOT-
DCH	172.16.20.37	90:06:28:8C:45:45	vlan-HOTSPOT-
DCH	172.16.20.38	1C:23:2C:4E:ED:BF	vlan-HOTSPOT-
DCH	172.16.20.40	4C:91:0C:18:D0:71	vlan-HOTSPOT-
DCH	172.16.20.41	64:D1:54:52:59:84	vlan-HOTSPOT-
DCH	172.16.20.42	34:23:BA:EF:29:20	vlan-HOTSPOT-

7080 items



/interface print



`/interface vlan set number="#INTERFACE" arp=reply-only`

Interface List

Interface	Name	Type	Actual MTU	L2 MTU	Tx	Rx	Tx Packet (p
R	vlan-HOT...	VLAN	1500	1576	909.7 kbps		331.4 kbps
R	vlan-HOT...	VLAN	1500	1576	15.4 Mbps		2.6 Mbps
R	vlan-HOT...	VLAN	1500	1576	968 bps		0 bps
R	vlan-HOT...	VLAN	1500	1576	257.9 kbps		39.0 kbps
R	vlan-HOT...	VLAN	1500	1576	4.3 Mbps		774.1 kbps
R	vlan-HOT...	VLAN	1500	1576	15.5 Mbps		1549.3 kbps
R	vlan-HOT...	VLAN	1500	1576	13.1 Mbps		1714.3 kbps
R	vlan-HOT...	VLAN	1500	1576	9.3 Mbps		1218.5 kbps
R	vlan-HOT...	VLAN	1500	1576	3.5 Mbps		521.4 kbps
R	vlan-HOT...	VLAN	1500	1576	14.1 Mbps		1438.4 kbps
R	vlan-HOT...	VLAN	1500	1576	167.2 kbps		95.9 kbps
R	vlan-HOT...	VLAN	1500	1576	440 bps		2.7 kbps
R	vlan-HOT...	VLAN	1500	1576	6.3 Mbps		638.4 kbps
R	vlan-HOT...	VLAN	1500	1576	5.4 Mbps		371.5 kbps
R	vlan-HOT...	VLAN	1500	1576	6.5 Mbps		695.1 kbps

53 items

Interface <vlan-HOTSPOT-MUMMX19>

General Loop Protect Status Traffic

Name: vlan-HOTSPOT-MUMMX19

Type: VLAN

MTU: 1500

Actual MTU: 1500

L2 MTU: 1576

MAC Address: E4:8D:8...4:72:2E

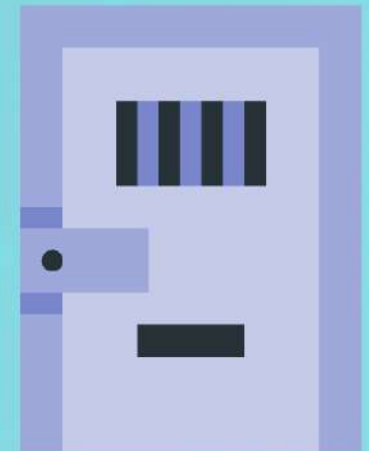
ARP: reply-only

ARP Timeout:

OK Cancel Apply Disable Comment Copy Remove Torch



Qué hicimos?

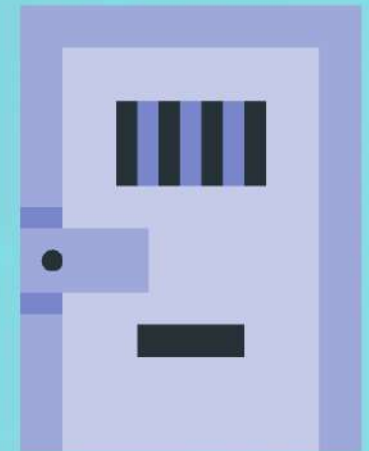




Qué hicimos?



DHCP + ARP





Qué hicimos?



DHCP + ARP

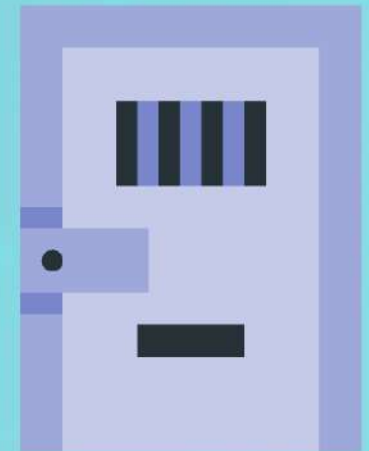




Qué hicimos?

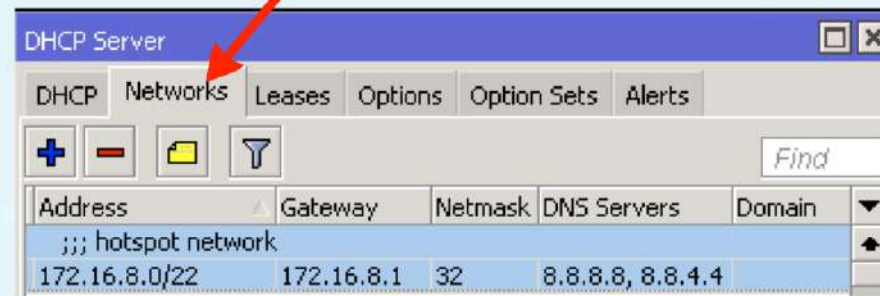


DHCP + ARP



NETWORK

`/ip dhcp-server network`



DHCP Server

DHCP Networks Leases Options Option Sets Alerts

+ - [Folder Icon] [Filter Icon] Find

Address	Gateway	Netmask	DNS Servers	Domain
;;; hotspot network				
172.16.8.0/22	172.16.8.1	32	8.8.8.8, 8.8.4.4	

/ip dhcp-server network



DHCP Network <172.16.20.0/22>

Address:	<input type="text" value="172.16.20.0/22"/>	OK
Gateway:	<input type="text" value="172.16.20.1"/>	Cancel
Netmask:	<input type="text" value="32"/>	Apply
DNS Servers:	<input type="text" value="8.8.8.8"/>	Comment
	<input type="text" value="8.8.4.4"/>	Copy



Si és posible hacer esto?



Calculadora IP

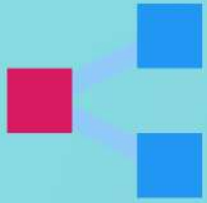
Address (Host or Network) Netmask (i.e. 24) Netmask for sub/supernet (optional)

172.16.20.1 / 32 move to:

Calcular [limpiar](#)

Address: 172.16.20.1 10101100.00010000.00010100.00000001
Netmask: 255.255.255.255 = 32 11111111.11111111.11111111.11111111
Wildcard: 0.0.0.0 00000000.00000000.00000000.00000000
=>
Hostroute: 172.16.20.1 10101100.00010000.00010100.00000001
Hosts/Net: 1 ← Class B, Private Internet

AprendaRedes.com, Versión: 0.38



DHCP vs PPPoE





Están en la misma dirección de red



Address List

Dynamic is yes

	Address	Network	Interface
D	172.19.1.252	172.19.1.1	<pppoe-ORLANDOL...
D	172.19.1.252	172.19.1.2	<pppoe-SILVIABRO...
D	172.19.1.252	172.19.1.3	<pppoe-MARTHAI...
D	172.19.1.252	172.19.1.4	<pppoe-JUANLOPEZ>
D	172.19.1.252	172.19.1.5	<pppoe-CLAUDIAA...
D	172.19.1.252	172.19.1.6	<pppoe-ANTONIAD...

Rutas con túneles PPP

Route List

Routes | Nexthops | Rules | VRF

Connected | is | yes

	Dst. Address	Gateway
DAC	▶ 172.19.1.1	<pppoe-ORLANDOL...
DAC	▶ 172.19.1.2	<pppoe-SILVIABRO...
DAC	▶ 172.19.1.3	<pppoe-MARTHAJO...
DAC	▶ 172.19.1.4	<pppoe-JUANLOPEZ...
DAC	▶ 172.19.1.5	<pppoe-CLAUDIAA...
DAC	▶ 172.19.1.6	<pppoe-ANTONIAD...
DAC	▶ 172.19.1.8	<pppoe-CRISTHIAN...

/32

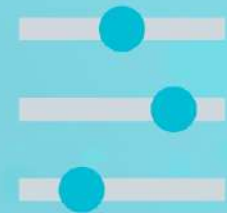


/ip firewall

255 IP	▶	ARP
MPLS	▶	Accounting
Routing	▶	Addresses
System	▶	Cloud
Queues		DHCP Client
Files		DHCP Relay
Log		DHCP Server
Radius		DNS
Tools	▶	Firewall
New Terminal		Hotspot
LCD		IPsec

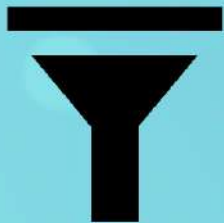


/ip firewall filter



```

# SERIAL NUMBER = A202092702DD
/ip firewall filter
add action=accept chain=input connection-state=established,related
add action=accept chain=input dst-port=179 protocol=tcp
add action=accept chain=input dst-port=8291 protocol=tcp
add action=drop chain=input connection-state=invalid
add action=drop chain=input in-interface-list=Internet
    
```



#	Action	Chain	Src. Address	Dst. Address	Prot...	Src. Port	Dst. Port	In. Int...	Out. I...	In. Int...	Out. I...	Src. A...	Dst. A...	Bytes	Packets
0	✗ drop	prerouting			6 (tcp)		53			Internet				1740 B	39
1	✗ drop	prerouting			17 (...)		53			Internet				1226.7 KiB	21 284
2	✗ drop	prerouting								Internet		IREDE...		192 B	6

DNS



DNS Settings

Servers:	8.8.8.8	OK
	8.8.4.4	Cancel
Dynamic Servers:		Apply
	<input type="checkbox"/> Allow Remote Requests	Static
Max UDP Packet Size:	4096	Cache
Query Server Timeout:	2.000 s	
Query Total Timeout:	10.000 s	
Max. Concurrent Queries:	100	
Max. Concurrent TCP Sessions:	20	
Cache Size:	2048 KIB	
Cache Max TTL:	7d 00:00:00	
Cache Used:	2048 KIB	



Conclusion

Conocer nuestra red es lo mas importante ante cualquier incidente!!!



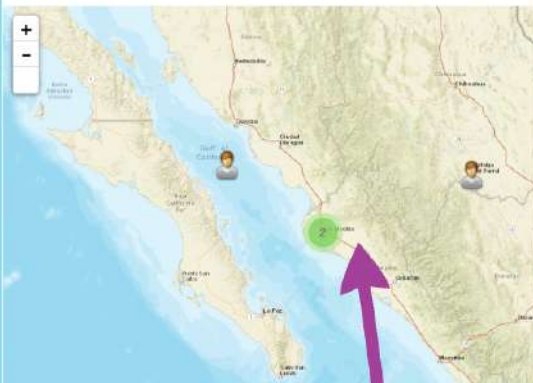
Contacto

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Correo: soporte@mercadowispmexico.com

List of MikroTik Certified Consultants



<https://mikrotik.com/consultants/latinamerica/mexico>

A screenshot of the MikroTik website's 'Support' page. The page is titled 'Support' and has a navigation menu with 'Home', 'About', 'Buy', 'Jobs', 'Hardware', 'Software', 'Support', 'Training', and 'Account'. Under 'Support', there are sub-menus for 'General', 'Forum', 'Consultants', and 'RMA'. The 'Consultants' section is active, showing a list of countries under 'Latin America' (Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala) and a detailed profile for 'Miguel Angel Felix Garcia'. The profile includes his name, a 'MUM' badge, a 'Presenter' badge, his certifications (MTCRE, MTCWE, MTCTCE, MTCUME, MTCIPv6E, MTCINE), his location (LOS MOCHIS, Mexico), and his experience and successful cases (Network Design, Routing OSPF, BGP, MPLS, VRF, Traffic Engineering, VPN, Firewall, Load Balance, Failover, Tunnels, QoS, Wireless Solutions, CAPsMAN, Hotspot, Radius and Remote WISP Consulting). Contact information is provided at the bottom: phone number 5216681055479, website www.mercadowispmexico.com.mx, email, and WhatsApp 5216681055479.

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México 2019

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Mikrotik User Meeting



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