

VoIP en la PYME

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Jorge Montero

Systems Architect | Alhambra-Eidos

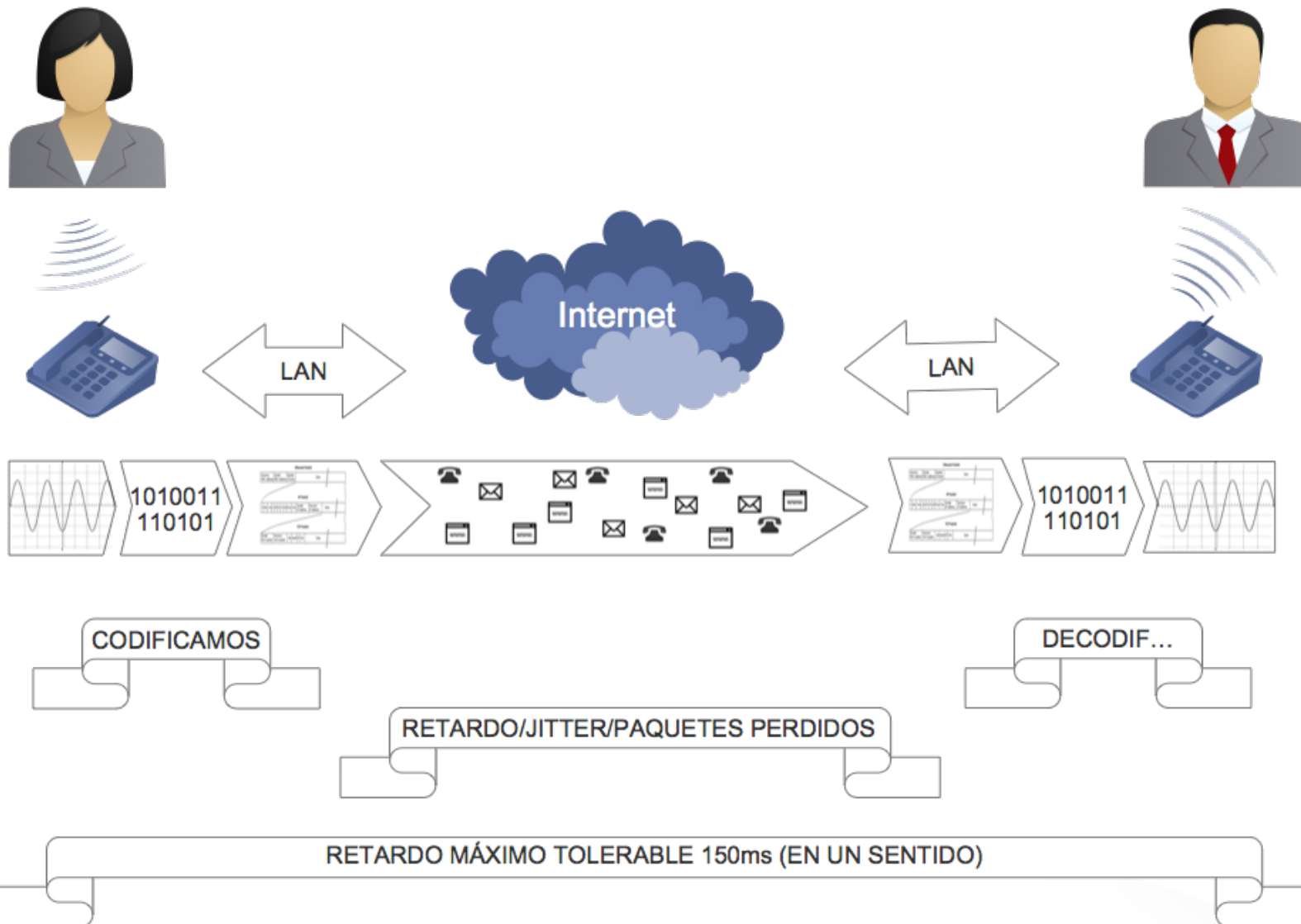
¿QUÉ VAMOS A VER HOY?



INTRODUCCIÓN

- > **VoIP: Es un tráfico sensible**
- > **RouterOS tiene las herramientas**
- > **Lecciones aprendidas**
- > **El escenario más común**

CÓMO SE TRANSMITE LA VOZ



VoIP, ES UN TRÁFICO SENSIBLE



- > **No tolera retardos**
- > **No admite perdida de paquetes**
- > **No jitter**
- > **No NAT**



> Filter rules

> Mangle

> Queues

> Torch

> Log

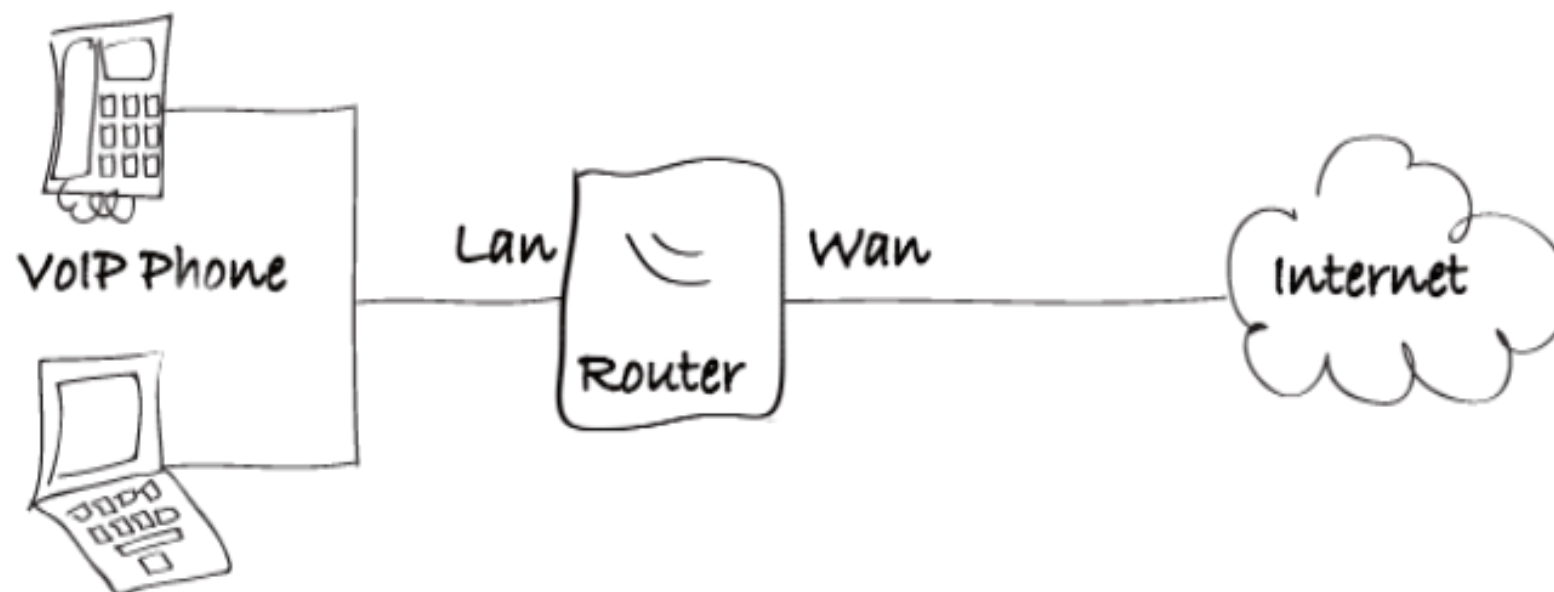


LECCIONES APRENDIDAS

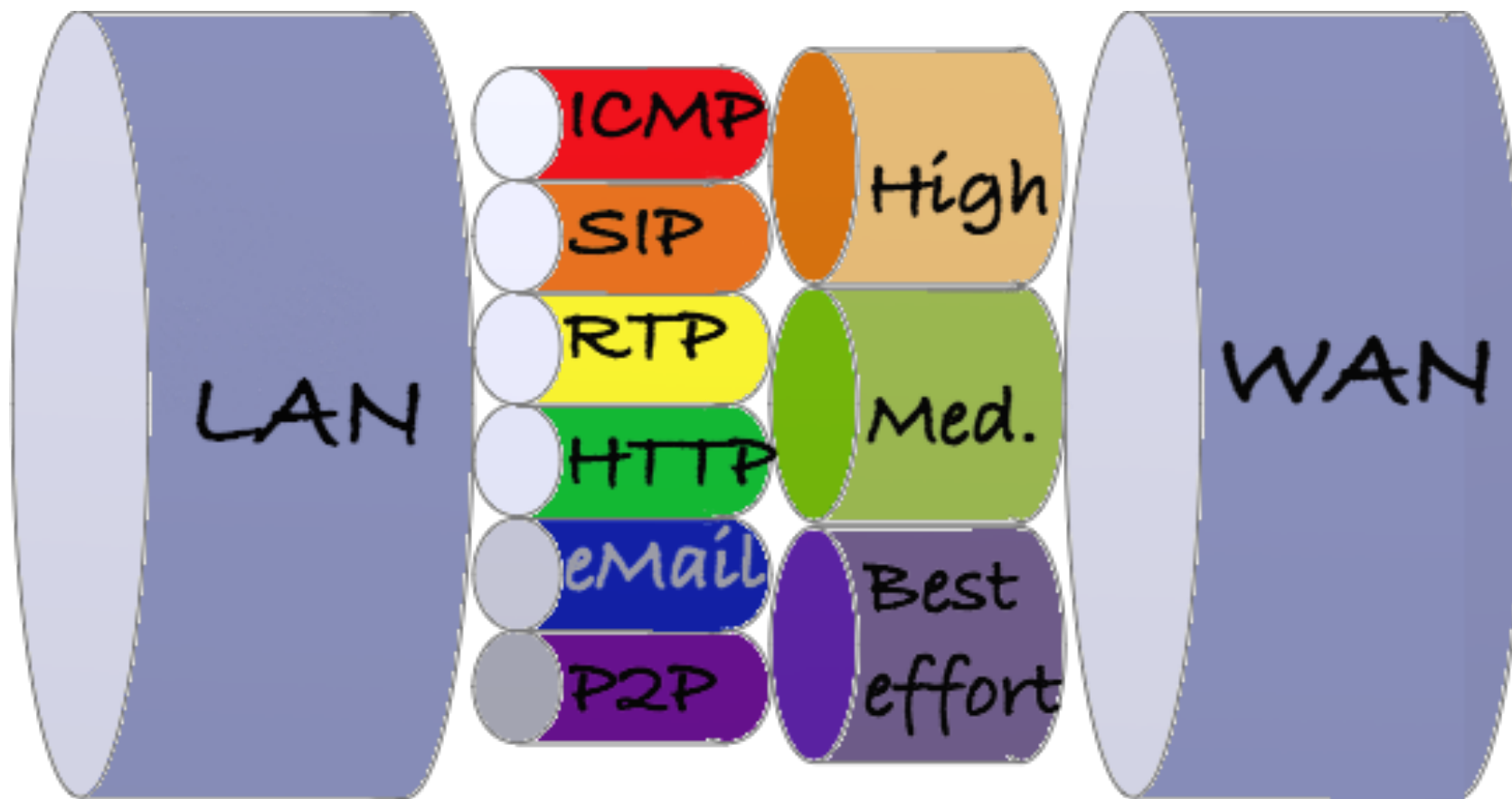
- > **No es cosa de dos**
- > **Queremos que sea fácil**
- > **La base es IP**
- > **SIP Helpers**



ESCENARIO MÁS COMÚN



OBJETIVO



Desde parte LAN*

*sucio y sin orden

Filtrado

-Firewall-

Clasificado

-Mangle/Queues-

Hacia el exterior*

*limpio y clasificado

¿CÓMO SE HACE?

Clasificando:

- > El tráfico conocido
- > Listando el tráfico desconocido

Marcando:

- > Usa las funciones de RouterOS
- > Monitoriza el consumo

Repartiendo:

- > VoIP es nuestro objetivo, cuida el resto

FILTER RULES

Firewall

Filter Rules NAT Mangle Service Ports Connections Address Lists Layer7 Protocols

00 Reset Counters

00 Reset All Counters

#	Action	Chain	Src
;;; special dummy rule to show fasttrack counters			
0 D	accept	forward	
;;; default configuration			
1	accept	input	
;;; default configuration			
2	accept	input	
;;; default configuration			
3	drop	input	
;;; default configuration			
4	Fasttrack connection	forward	
;;; default configuration			
5	accept	forward	
;;; default configuration			
6	drop	forward	
;;; default configuration			
7	drop	forward	

Firewall							
Filter Rules		NAT	Mangle	Service Ports	Connections	Address Li	
						Reset Counters	00 Reset
#		Action	Chain				
;;; special dummy rule to show fasttrack counters							
0	D	 accept	forward				
;;; default configuration							
1		 accept	input				
;;; default configuration							
2		 accept	input				
;;; default configuration							
3		 drop	input				
;;; ADD_PHONE_PBX_ACL							
4		 add src to address list	forward				
;;; default configuration							
5	X	 fasttrack connection	forward				
;;; default configuration							
6		 accept	forward				
;;; default configuration							
7		 drop	forward				
;;; default configuration							
8		 drop	forward				

FILTRADO DINÁMICO



¿Cuál es la IP de la PBX?

Firewall Rule <5060,5061->192.168.88.0/24>

General Advanced Extra Action Statistics

Chain: forward

Src. Address:

Dst. Address: ☐ 192.168.88.0/24

Protocol: ☐ 17 (udp)

Src. Port: ☐ 5060,5061

Dst. Port:

Any. Port:

P2P:

In. Interface: ☐ ether1-gateway

Out. Interface: ☐ bridge-local



New Firewall Rule

General Advanced Extra Action Statistics

Action: **add dst to address list**

☐ Log

Log Prefix:

Address List: **PBX_INTERNET**

Timeout:

FILTRADO DINÁMICO

¿IP del teléfono?

Firewall Rule <5060,5061>

General Advanced Extra Action Statistics

Chain: forward

Src. Address:

Dst. Address:

Protocol: ☐ 17 (udp)

Src. Port:

Dst. Port: ☐ 5060,5061

Any. Port:

P2P:

In. Interface: ☐ bridge-local



Firewall Rule <5060,5061>

General Advanced Extra Action Statistics

Action: add src to address list

☐ Log

Log Prefix:

Address List: PHONE_INSIDE

Timeout:

¿VIENE LA VOZ DESDE LA PBX?



¡Señalización y audio no es lo mismo!

Firewall Rule <!5060,5061>

General Advanced Extra Action Statistics

Chain: forward

Src. Address:

Dst. Address:

Protocol: ☐ 17 (udp)

Src. Port:

Dst. Port: ! 5060,5061

Any. Port:

P2P:

In. Interface: ☐ ether1-gateway

Out. Interface: ☐ bridge-local

Firewall Rule <!5060,5061>

General Advanced Extra Action Statistics

Action: add src to address list

☐ Log

Log Prefix:

Address List: RTP_ON_INTERNET

Timeout:



Firewall Rule <!5060,5061>

General Advanced Extra Action Statistics

Src. Address List:

Dst. Address List: ☐ PHONE_ON_LAN

MANGLE

Firewall												
Filter Rules		NAT	Mangle	Service Ports	Connections	Address Lists	Layer7 Protocols					
+		-	✓	✗	📄	🔍		00 Reset Counters		00 Reset All Counters		
#	Action	Chain	Src. Address	Dst. Address	Prot...	Src. Port	Dst. Port	In. Int...	Out. I...	Bytes	Packets	
;;; special dummy rule to show fasttrack counters												
0	D ✓ accept	prerouting								30.4 MiB	43 816	
;;; special dummy rule to show fasttrack counters												
1	D ✓ accept	forward								30.4 MiB	43 816	
;;; special dummy rule to show fasttrack counters												
2	D ✓ accept	postrouting								30.4 MiB	43 816	

Firewall							
Filter Rules		NAT	Mangle	Service Ports	Connections	Address Lists	Layer7 Protocols
						Reset Counters 00 Reset All Counters	
#	Action			Chain	Src. Address	Dst. Address	
;;; CONN_MARK_WEB							
0		mark connection		prerouting		!192.168.88.0/24	
1		mark packet		prerouting			
;;; CONN_MARK_SIP							
2		mark connection		forward		!192.168.88.0/24	
3		mark packet		forward			
;;; PACK_MARK_RTP_UP							
4		mark packet		forward		!192.168.88.0/24	
;;; PACK_MARK_RTP_DOWN							
5		mark packet		forward			
;;; CONN_MARK_EMAIL_UP							
6		mark connection		prerouting		!192.168.88.0/24	
7		mark packet		prerouting			
;;; CONN_MARK_ICMP							
8		mark connection		prerouting		!192.168.88.0/24	
9		mark packet		prerouting			
;;; CONN_MARK_P2P							
10		mark connection		prerouting		!192.168.88.0/24	
11		mark packet		prerouting			
;;; CONN_MARK_UNKNOWN							
12		mark connection		prerouting		!192.168.88.0/24	
13		mark packet		prerouting			

MARCANDO RTP CON MANGLE (SALIDA)

¡Ahora podemos poner todo en orden!

Mangle Rule <!192.168.88.0/24>

General Advanced Extra Action Statistics

Chain: forward

Src. Address:

Dst. Address: ! 192.168.88.0/24

Protocol: ☐ 17 (udp)

Mangle Rule <!192.168.88.0/24>

General Advanced Extra Action Statistics

Action: mark packet

☐ Log

Log Prefix:

New Packet Mark: MARK_PACK_RTP_UP

☐ Passthrough



Mangle Rule <!192.168.88.0/24>

General Advanced Extra Action Statistics

Src. Address List: ☐ PHONE_INSIDE

Dst. Address List:

Layer7 Protocol:

MARCANDO RTP CON MANGLE (ENTRADA)



New Mangle Rule

General Advanced Extra Action Statistics

Chain: forward

Src. Address:

Dst. Address:

Protocol: ☐ udp

Src. Port:

Dst. Port:

Any. Port:

P2P:

In. Interface: ☐ ether1-gateway

Out. Interface: ☐ bridge-local



New Mangle Rule

General Advanced Extra Action Statistics

Action: mark packet

☐ Log

Log Prefix:

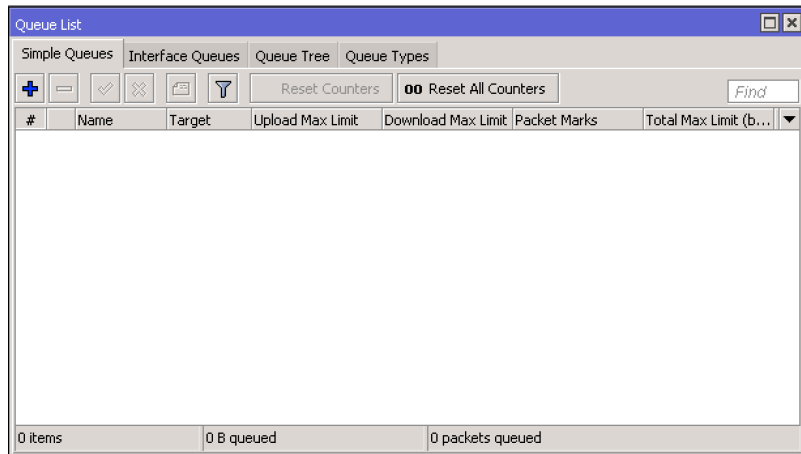
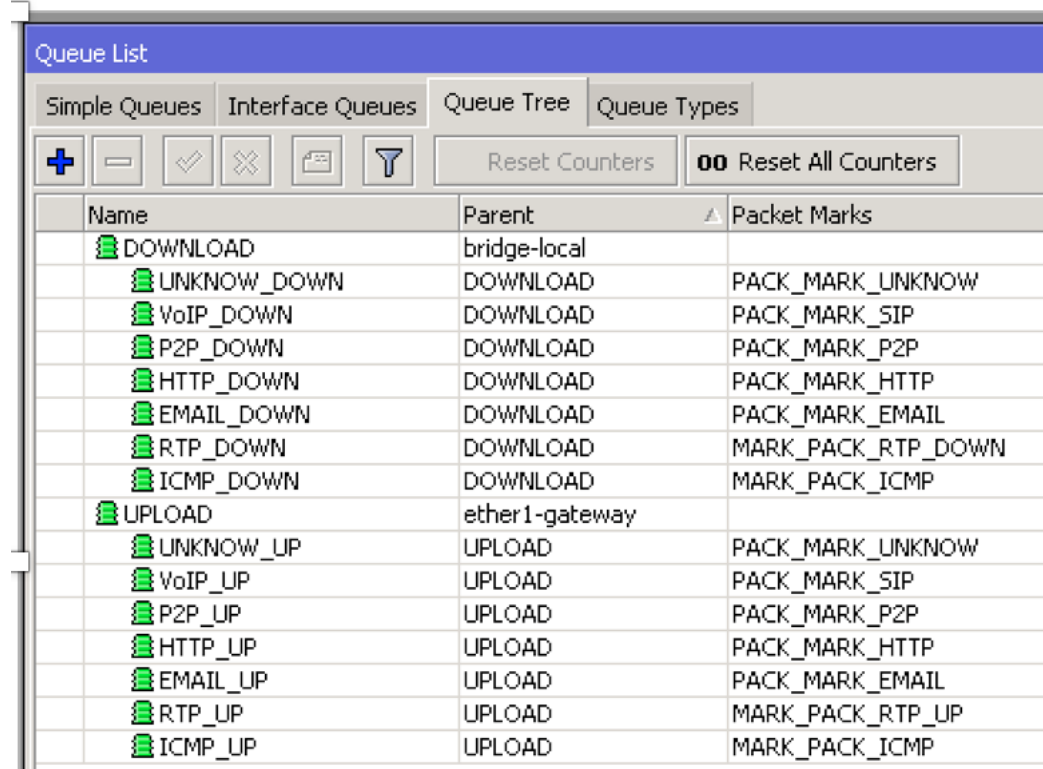
New Packet Mark: PACK_MARK_RTP_DOWN

New Mangle Rule

General Advanced Extra Action Statistics

Src. Address List: ☐ RTP_ON_INTERNET

QUEUES

Queue List

Simple Queues Interface Queues Queue Tree Queue Types

+ - ✓ ✗ [icon] [icon] Reset Counters 00 Reset All Counters

Name	Parent	Packet Marks
DOWNLOAD	bridge-local	
UNKNOWN_DOWN	DOWNLOAD	PACK_MARK_UNKNOWN
VoIP_DOWN	DOWNLOAD	PACK_MARK_SIP
P2P_DOWN	DOWNLOAD	PACK_MARK_P2P
HTTP_DOWN	DOWNLOAD	PACK_MARK_HTTP
EMAIL_DOWN	DOWNLOAD	PACK_MARK_EMAIL
RTP_DOWN	DOWNLOAD	MARK_PACK_RTP_DOWN
ICMP_DOWN	DOWNLOAD	MARK_PACK_ICMP
UPLOAD	ether1-gateway	
UNKNOWN_UP	UPLOAD	PACK_MARK_UNKNOWN
VoIP_UP	UPLOAD	PACK_MARK_SIP
P2P_UP	UPLOAD	PACK_MARK_P2P
HTTP_UP	UPLOAD	PACK_MARK_HTTP
EMAIL_UP	UPLOAD	PACK_MARK_EMAIL
RTP_UP	UPLOAD	MARK_PACK_RTP_UP
ICMP_UP	UPLOAD	MARK_PACK_ICMP

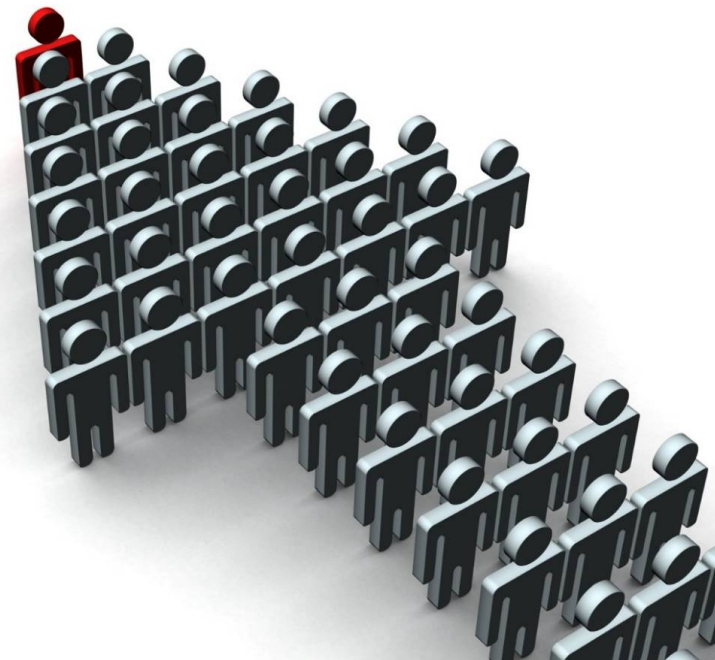
OBJETIVOS

Clasificando el tráfico:

- > Mangle es genial, y fácil de usar
- > Organiza en capas

Marcando el tráfico:

- > Verifica que las colas funcionan
- > No solo tiene que parecer, debe ser

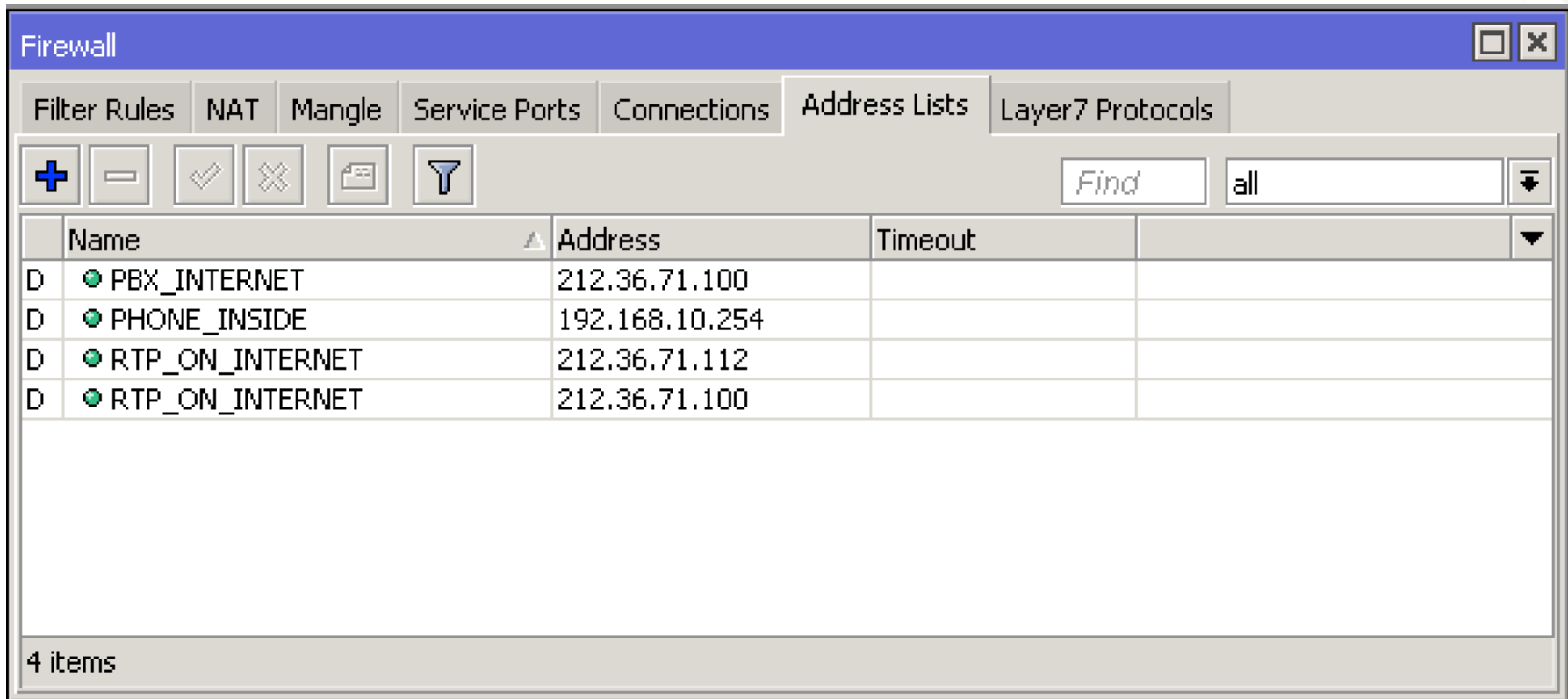


PRUEBA EN VIVO



- > **Accedemos al Router**
- > **Registramos un softphone**
- > **Hacemos una llamada***

¿FUNCIONA?



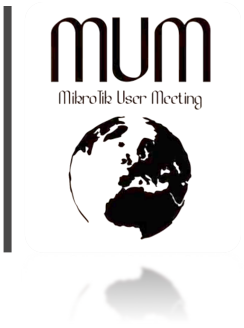
The screenshot shows the Mikrotik WinBox Firewall configuration window, specifically the 'Address Lists' tab. The window has a title bar 'Firewall' and several tabs: 'Filter Rules', 'NAT', 'Mangle', 'Service Ports', 'Connections', 'Address Lists' (selected), and 'Layer7 Protocols'. Below the tabs is a toolbar with icons for adding, removing, enabling, disabling, saving, and filtering, along with a 'Find' search box containing the text 'all'. The main area displays a table with 4 items. The table has columns for 'Name', 'Address', and 'Timeout'. The items are:

	Name	Address	Timeout
D	PBX_INTERNET	212.36.71.100	
D	PHONE_INSIDE	192.168.10.254	
D	RTP_ON_INTERNET	212.36.71.112	
D	RTP_ON_INTERNET	212.36.71.100	

At the bottom of the window, it says '4 items'.

Tenemos las IPs que no conocíamos

PRUEBA EN VIVO



- > **Revisamos las listas**
- > **Verificamos contadores y colas**

*Es una empresa seria ;-)

RESUMEN

- > **Clasificar y marcar**
- > **Puntos a vigilar: Jitter, packetloss, Queues**
- > **RouterOS lo pone fácil**
- > **QoS/Traffic nos da ventaja**
- > **No pares de innovar, el negocio lo requiere**
- > **Promueve la excelencia y... ¡diviértete!**



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¿Preguntas?

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Gracias



@alhambraeidos
@monterolabs



25
years