



# VoIP en la PYME

## MUM SPAIN 2016

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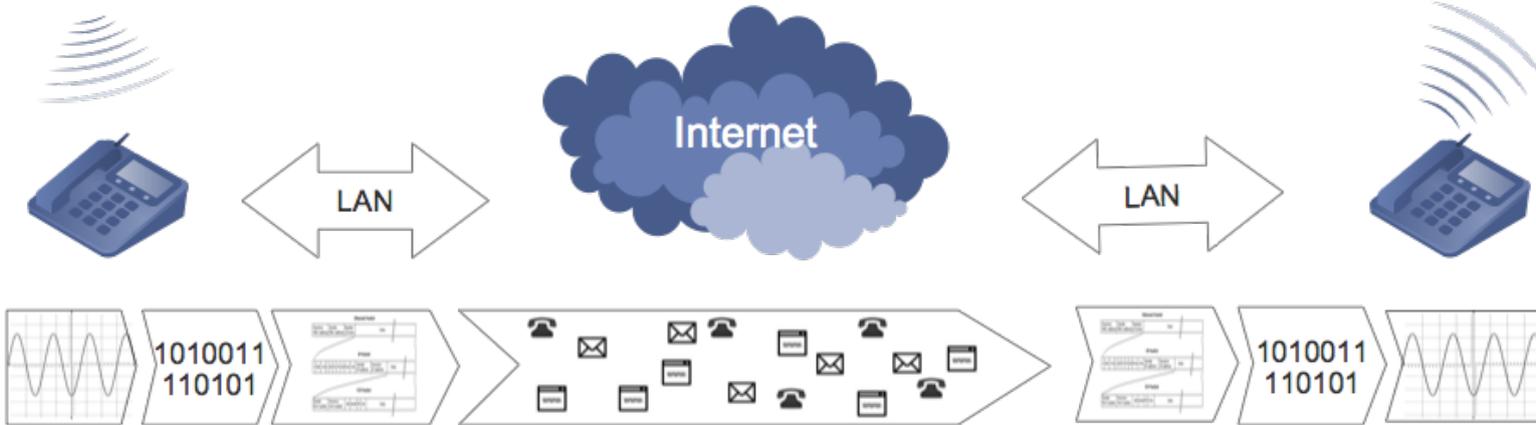
# ¿QUÉ VAMOS A VER HOY?



## INTRODUCCIÓN

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

# CÓMO SE TRANSMITE LA VOZ



CODIFICAMOS

DECODIF...

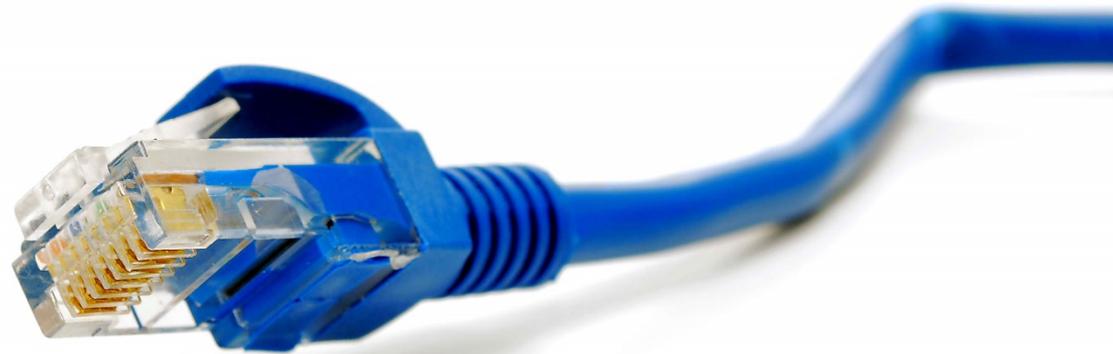
RETARDO/JITTER/PAQUETES PERDIDOS

RETARDO MÁXIMO TOLERABLE 150ms (EN UN SENTIDO)

# VoIP, ES UN TRÁFICO SENSIBLE



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



> Filter rules

> Mangle

> Queues

> Torch

> Log

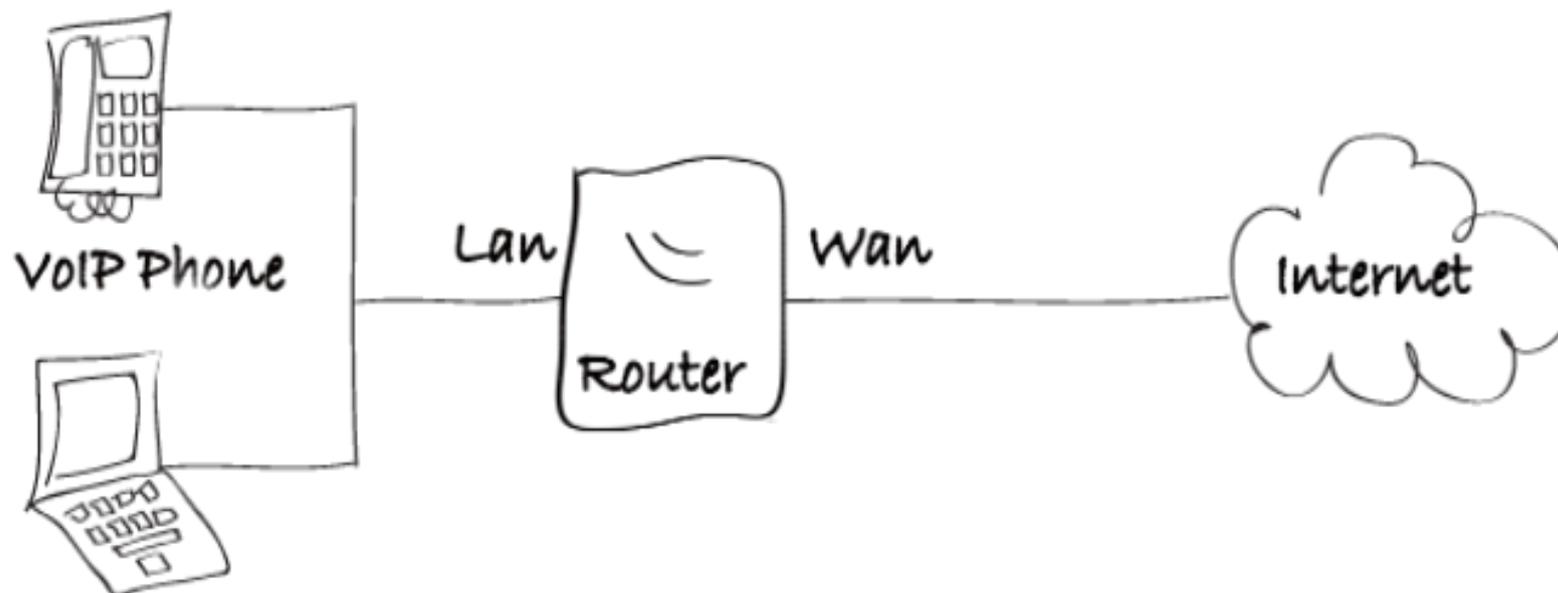


# LECCIONES APRENDIDAS

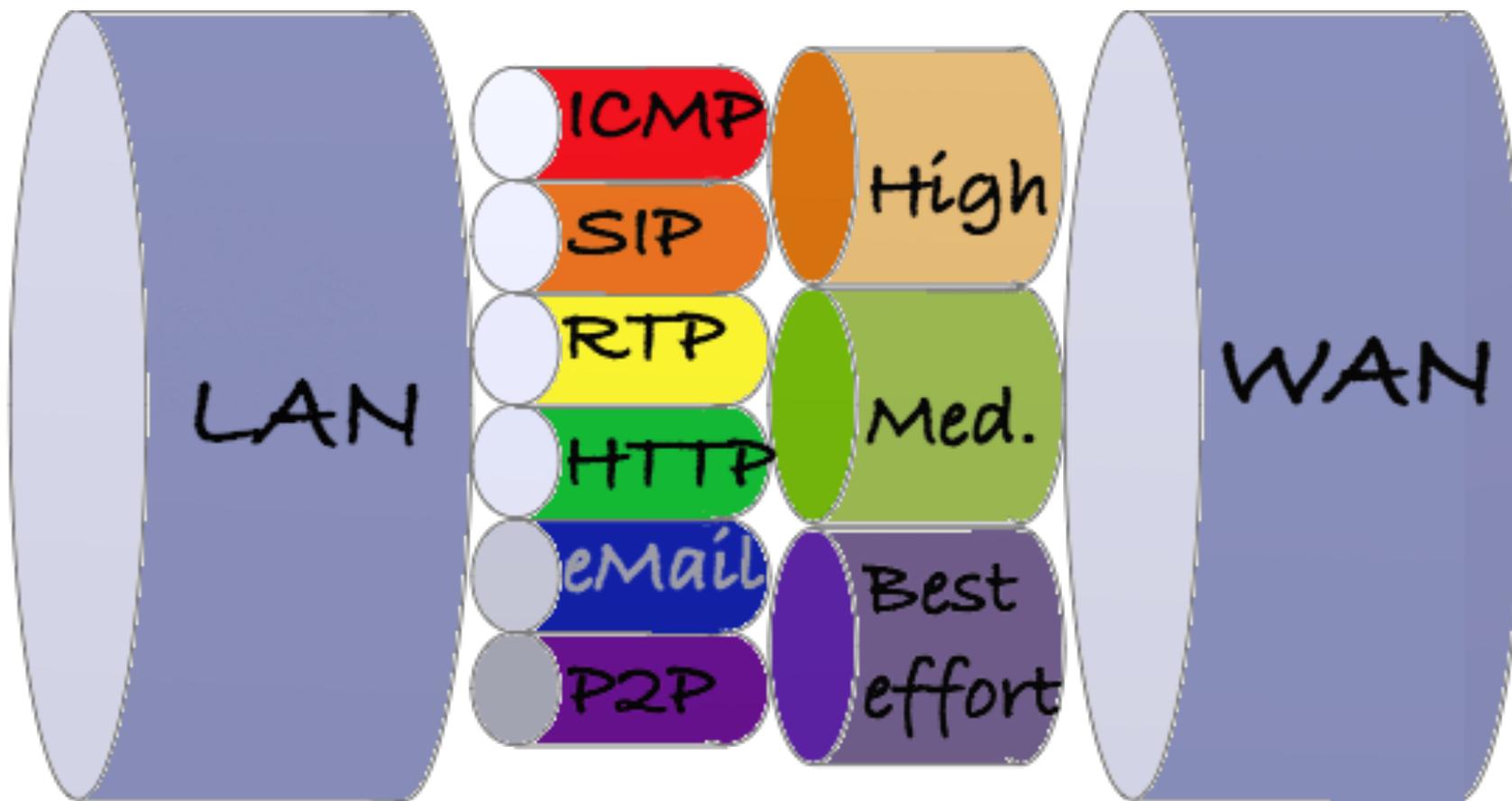
- > **No es cosa de dos**
- > **Queremos que sea fácil**
- > **La base es IP**
- > **SIP Helpers**



# 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



#	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	



#	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:

Log

Log Prefix:

**Address List:**

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

+ - ✓ ✗ [Filter Icon] [Reset Counters] [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

+ - ✓ ✗ [Filter Icon] [Reset Counters] [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_UNKNOW				
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:

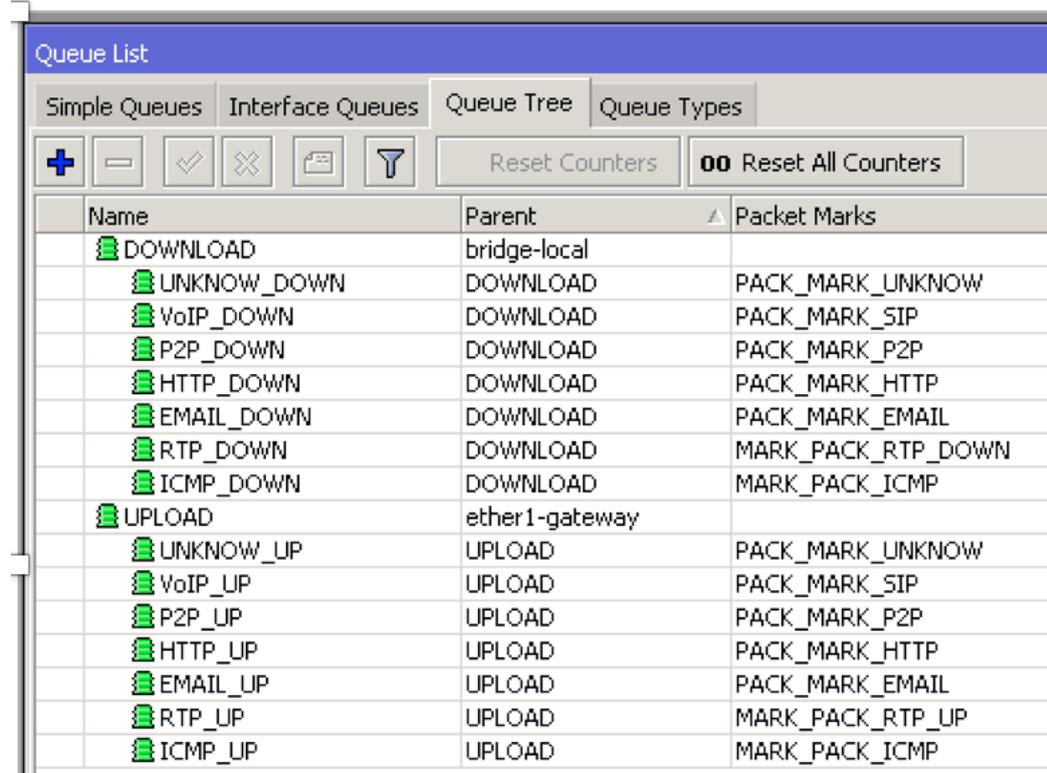
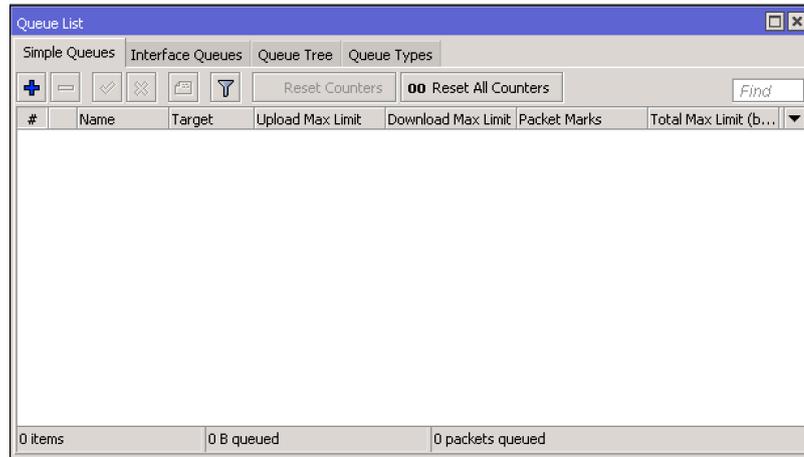
New Packet Mark: PACK\_MARK\_RTP\_DOWN

New Mangle Rule

General Advanced Extra Action Statistics

Src. Address List:  RTP\_ON\_INTERNET

# QUEUES



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

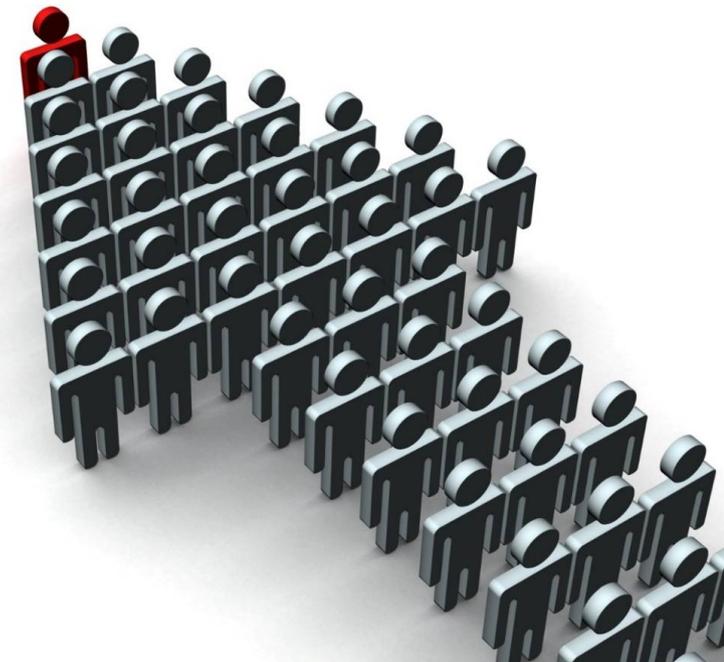


## Clasificando el tráfico:

- > 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?



Firewall

Filter Rules NAT Mangle Service Ports Connections Address Lists Layer7 Protocols

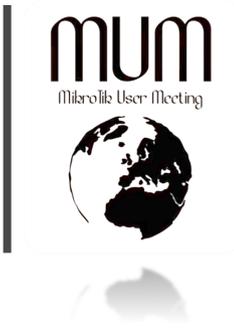
Find all

	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	

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**

