

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



CODIFICAMOS

DECODIF...

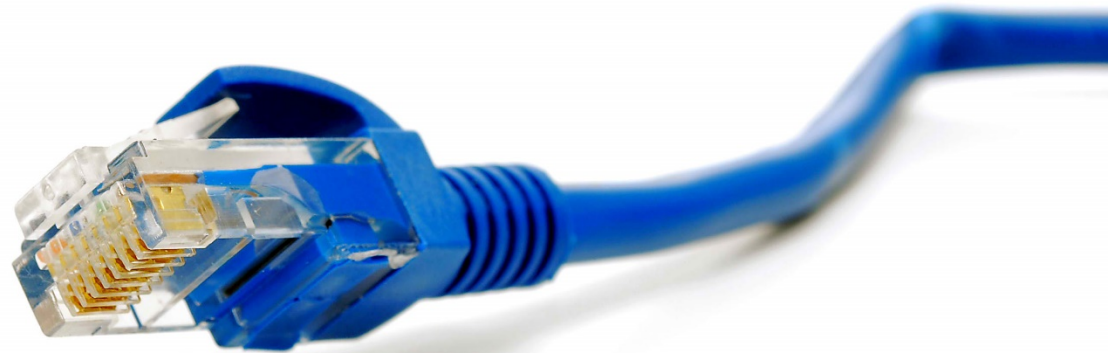
RETARDO/JITTER/PAQUETES PERDIDOS

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



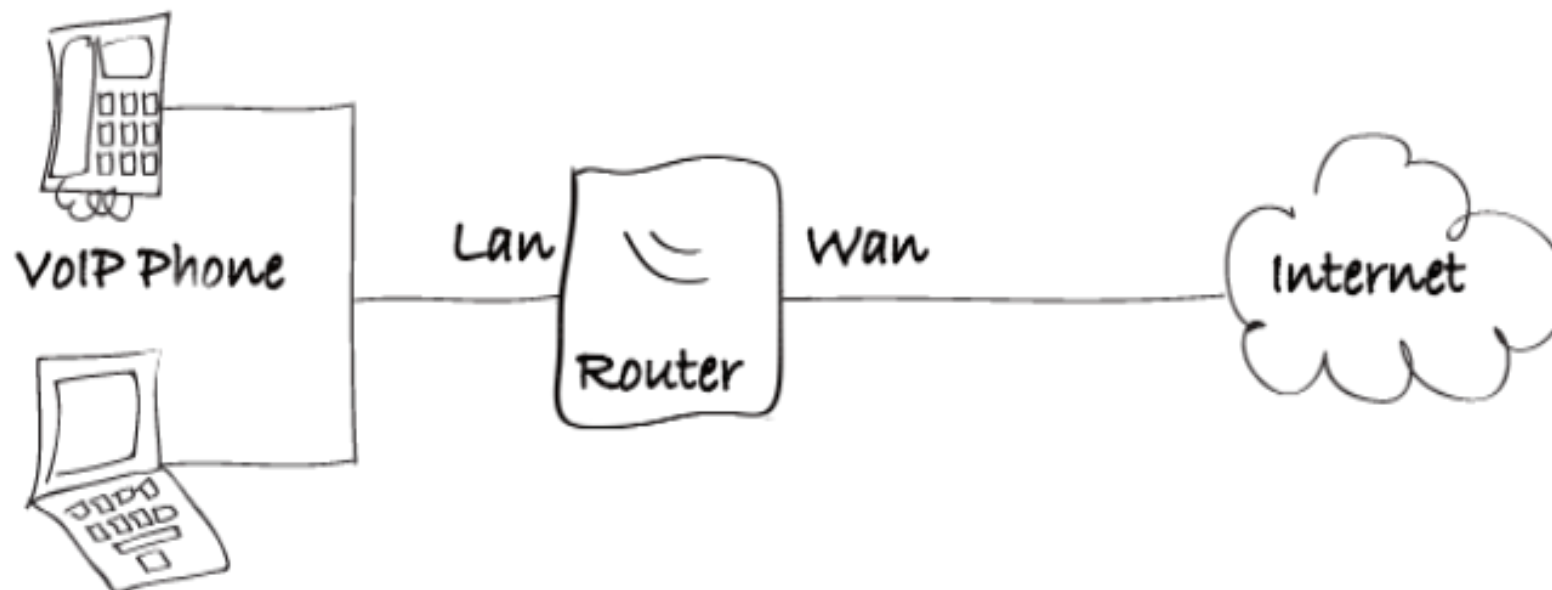
LECCIONES APRENDIDAS



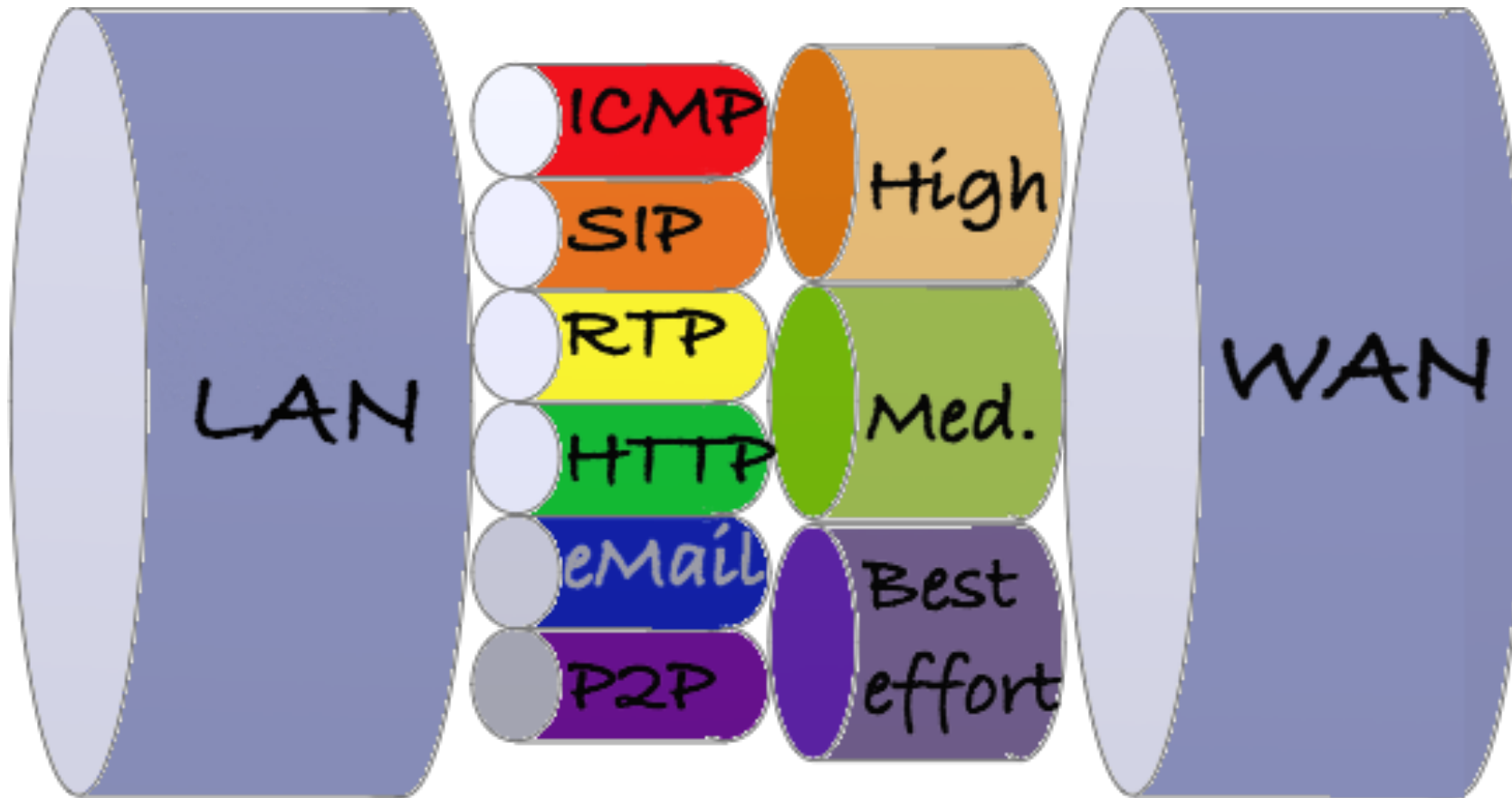
- > **No es cosa de dos**
- > **Queremos que sea fácil**
- > **La base es IP**
- > **SIP Helpers**



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	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	
;;; 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:

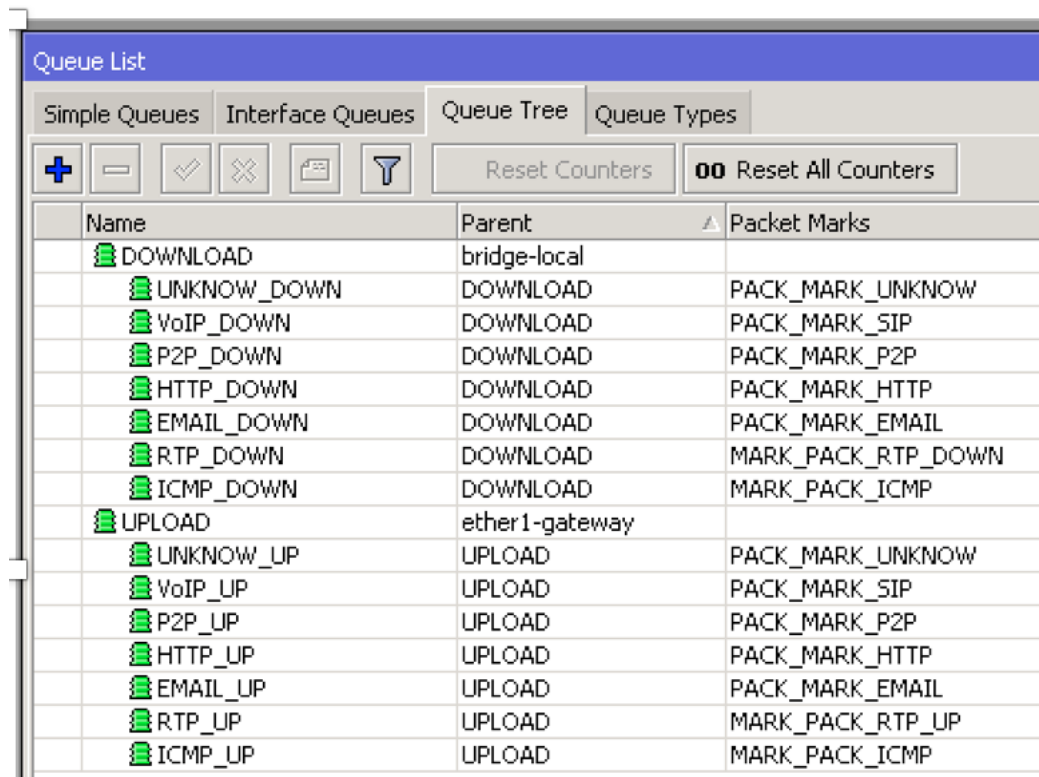
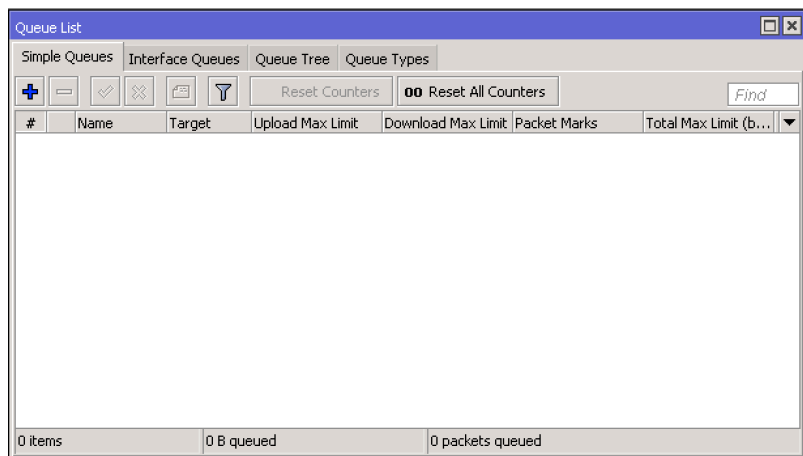
New Packet Mark: PACK_MARK_RTP_DOWN

New Mangle Rule

General Advanced Extra Action Statistics

Src. Address List: RTP_ON_INTERNET

QUEUES



Queue List

Simple Queues Interface Queues Queue Tree Queue Types

+ - ✓ ✗ 📄 🔍 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

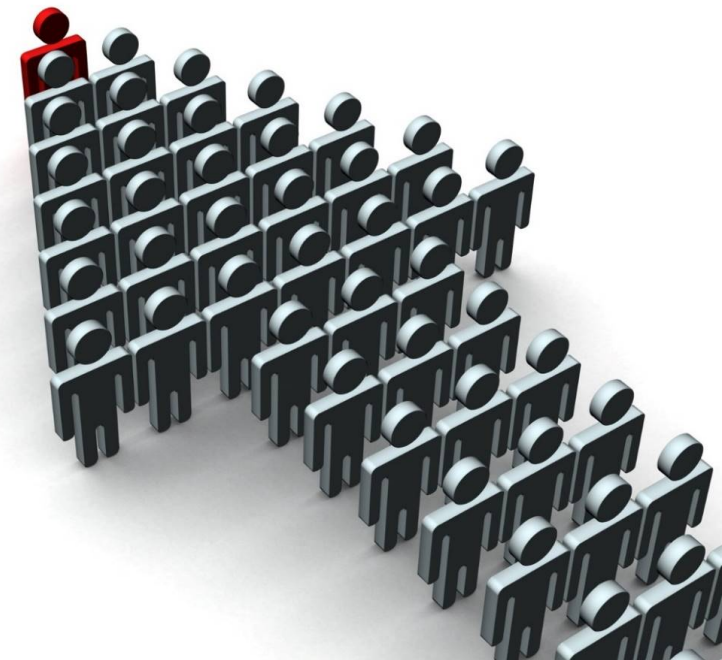


Clasificando el tráfico:

- > 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?



Firewall

Filter Rules NAT Mangle Service Ports Connections Address Lists Layer7 Protocols

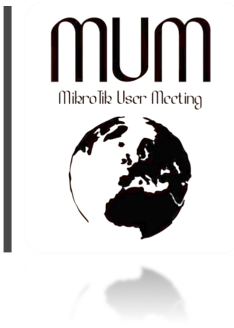
Find all

	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!**



mum
MikroTik User Meeting



¿Preguntas?



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Gracias



@alhambraeidos
@monterolabs

