

# TUNELES 6to4

con:



## Sobre Nosotros:

- Emprendimiento Colombiano 100%.
- Operamos en todo Latinoamérica y Caribe.
- Asesoría y Diseño de Soluciones WISP y Cableadas
- Administración Delegada de Infraestructura IT.
- Soporte técnico de Redes. Internet para Eventos.
- Zonas WIFI.



**EVANGIT**  
Soluciones de Conectividad

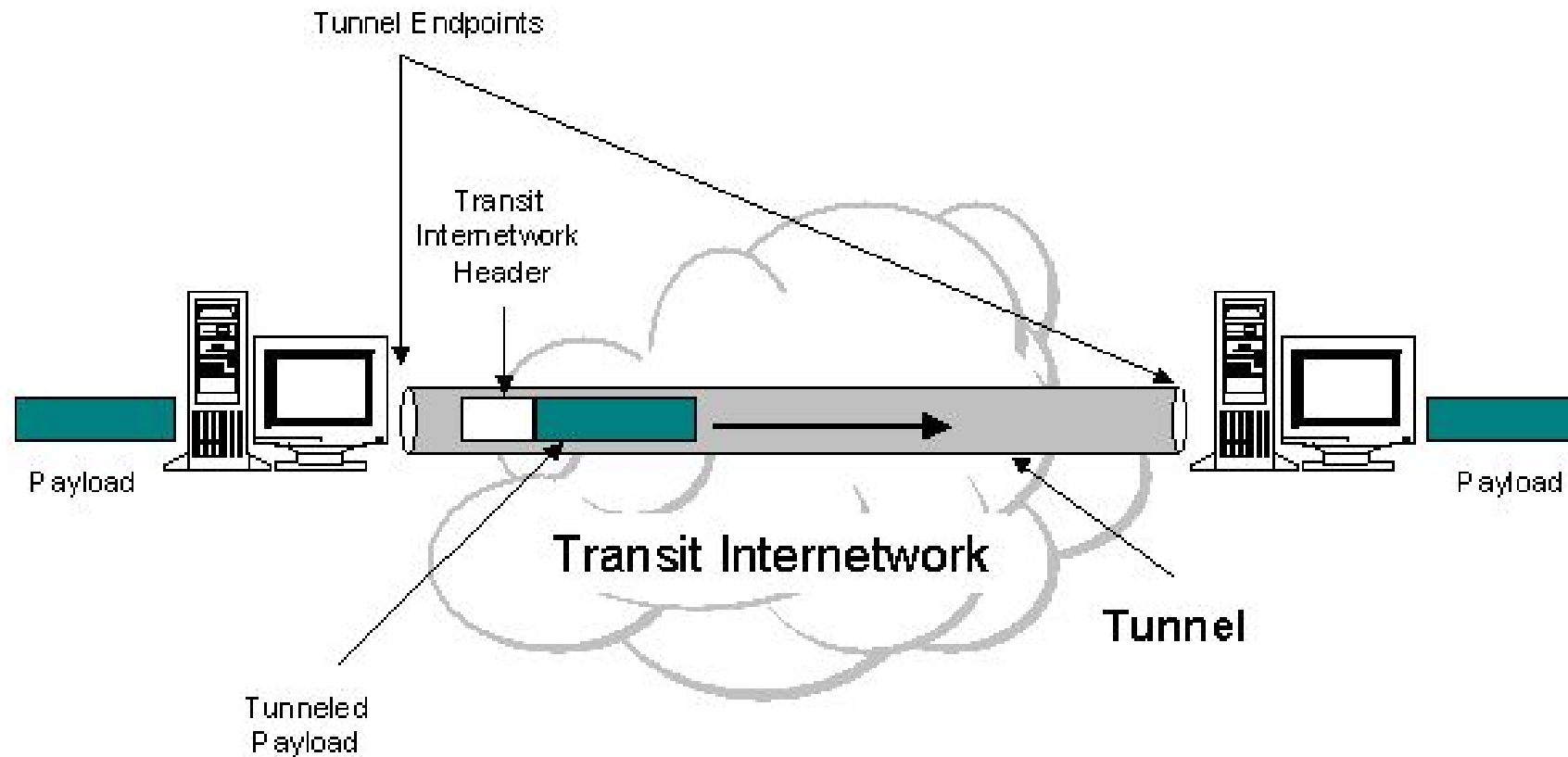
## Sobre Mi:



- ❖ Julián Páez P, Bogotano.
- ❖ CEO & Founder de **EVANGIT**.
- ❖ Ingeniero de Telecomunicaciones (Universidad Piloto de Colombia).
- ❖ Evangelizador de Mikrotik desde 2011.
- ❖ Certificado en Mikrotik, y otros Vendors, Itil V.3, ISO 9001, etc.
- ❖ PARTNER DE **YOUTUBE**.(Canal de Tutoriales de Networking y Wireless).
- ❖ Emprendedor.



# QUE ES UN TUNEL?:



Es un protocolo de comunicaciones que permite el movimiento de datos de una red a otra. Implica permitir el envío de comunicaciones de redes privadas a través de una red pública (como Internet) a través de un proceso llamado encapsulación.

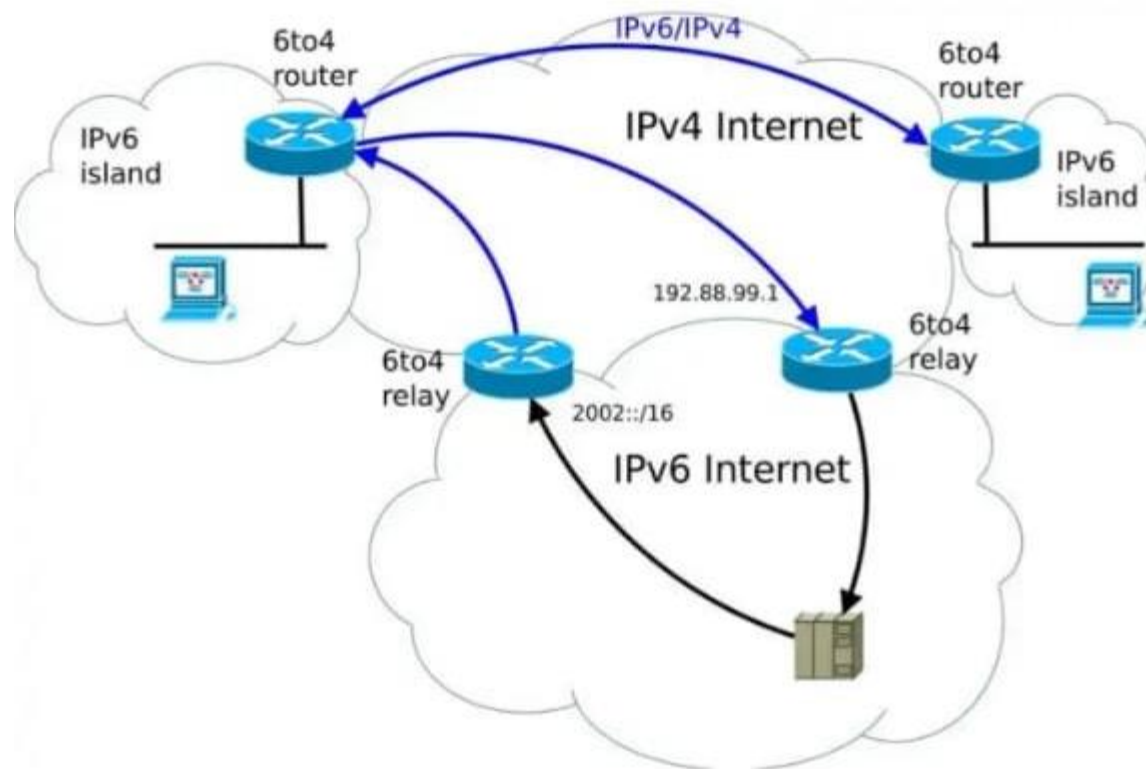
Debido a que la tunelización implica volver a empaquetar los datos de tráfico en una forma diferente, tal vez con el cifrado como estándar, puede ocultar la naturaleza del tráfico que se ejecuta a través de un túnel.

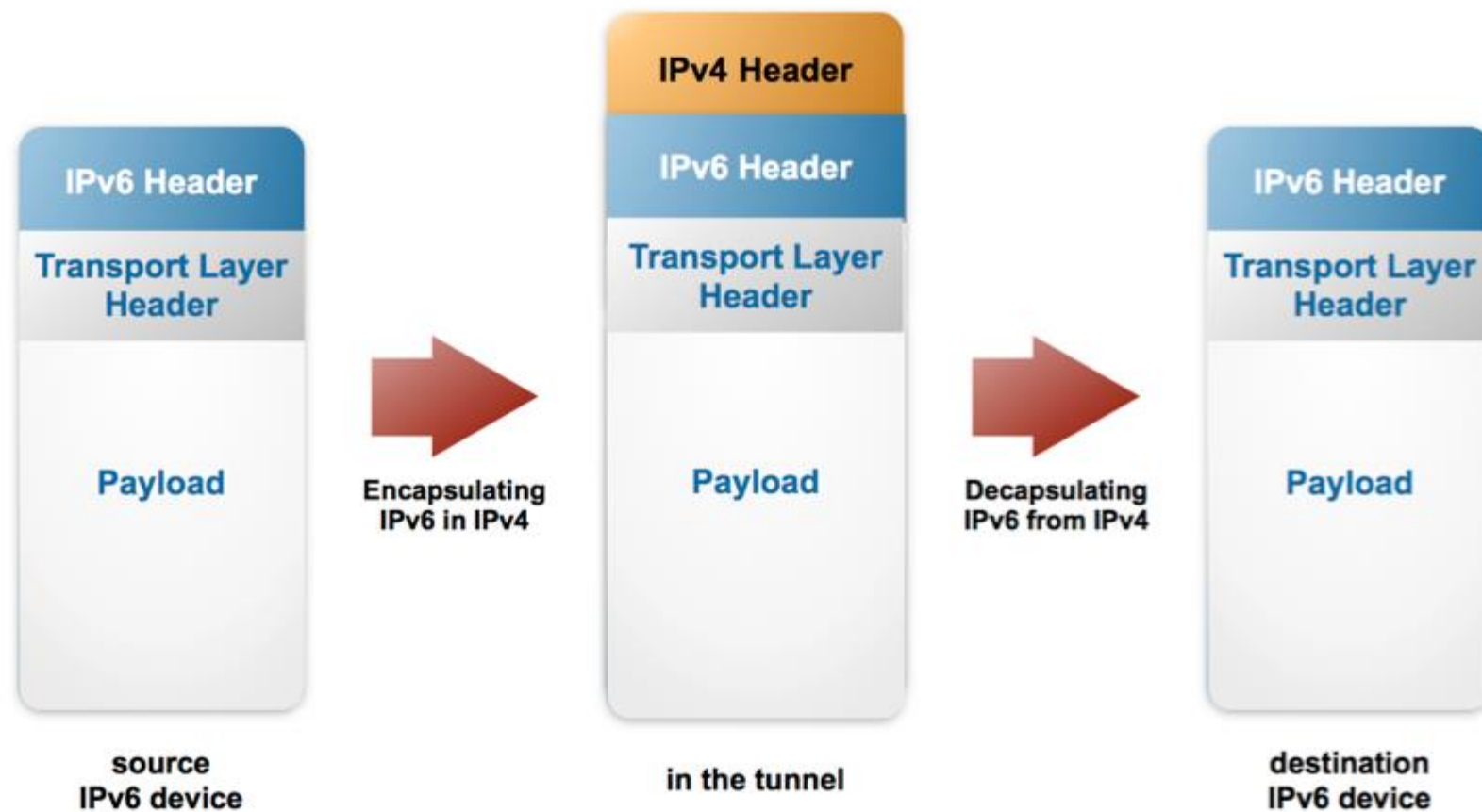
Funciona mediante el uso de la porción de datos de un paquete (la carga útil) para transportar los paquetes que realmente proporcionan el servicio. La tunelización utiliza un modelo de protocolo en capas, como los del conjunto de protocolos OSI o TCP / IP.

## 6to4 TUNNEL

- 6to4 (<https://tools.ietf.org/html/rfc3056>) es uno de los varios mecanismos de transición a IPv6 ([4in6](#) [4over6](#) – [ISATAP](#) [NAT64](#) / [DNS64](#) – [Teredo](#) – [SIIT](#) - [MAPA](#))
- Este mecanismo permite tener una red local con IPv6 y acceder con direcciones globalmente ruteables (públicas) a todos aquellos sitios que tengan IPv6 habilitado por medio de una red IPv4.





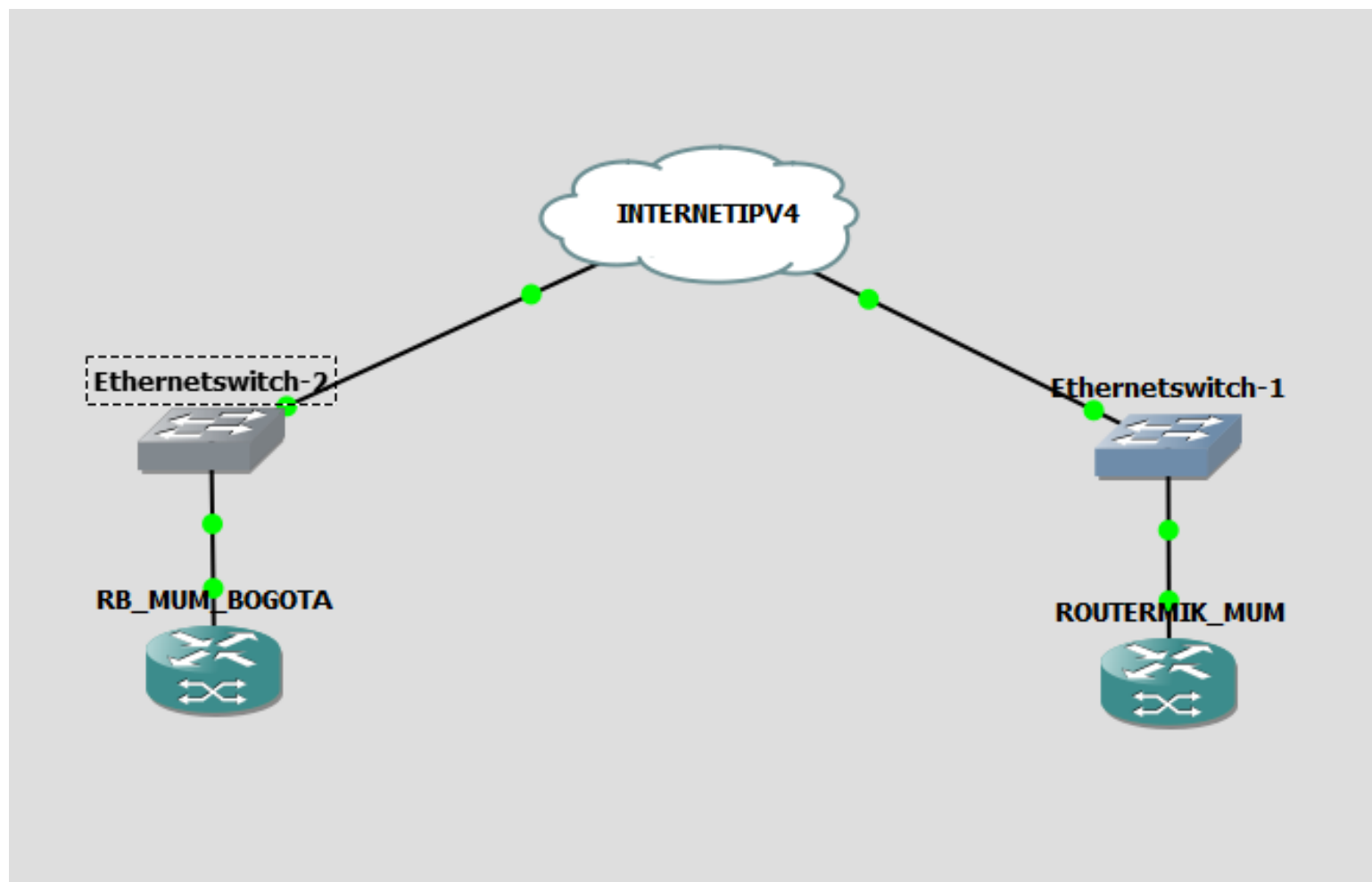




## LO PROBAMOS EN:







admin@08:00:27:5C:27:B5 (MUM BOGOTA) - WinBox v6.44.5 on x86 (x86)

Session Settings Dashboard

Safe Mode Session: 08:00:27:5C:27:B5

Quick Set  
CAPsMAN  
Interfaces  
Wireless  
Bridge  
PPP  
Mesh  
IP  
IPv6  
MPLS  
Routing  
System  
Queues  
Files  
Log  
RADIUS  
Tools  
New Terminal  
Dude  
KVM  
Make Supout.rtf  
Manual

Address List

	Address	Network	Interface
D	192.168.0.21/24	192.168.0.0	ether3_WAN
	192.168.10.1/24	192.168.10.0	ether2_LAN

2 items

IPv6 Address List

	Address	From Pool	Interface	Adverti
DL	fe80::a00:27ff:fe37:70e1/64		ether3_WAN	no
DL	fe80::a00:27ff:fe5c:27b5/64		ether2_LAN	no
DL	fe80::a00:27ff:fe4d:2a5e/64		ether1	no
DL	fe80::a00:27ff:feeb:2534/64		ether4	no

admin@08:00:27:77:0B:E1 (MikroTik\_MUM) - WinBox v6.44.5 on x86 (x86)

Session Settings Dashboard

Safe Mode Session: 08:00:27:77:0B:E1

Quick Set  
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Address List

	Address	Network	Interface
D	192.168.0.20/24	192.168.0.0	ether3_WAN
	192.168.56.10	192.168.56.10	ether2

2 items

IPv6 Address List

	Address	From Pool	Interface	Adve
DL	fe80::a00:27ff:fe41:c22/64		ether4	no
DL	fe80::a00:27ff:fe52:64e6/64		ether2	no
DL	fe80::a00:27ff:fe72:68ea/64		ether1	no
DL	fe80::a00:27ff:fe77:be1/64		ether3_WAN	no

4 items



## CREAMOS LA INTERFAZ...

admin@08:00:27:77:0B:E1 (MikroTik\_MUM) - WinBox v6.44.5 on x86 (x86)

Session Settings Dashboard

Safe Mode Session: 08:00:27:77:0B:E1

Interface <6to4tunnel1>

General Status Traffic

Name: 6to4tunnel1

Type: 6to4 Tunnel

MTU: 1480

Actual MTU: 1480

L2 MTU: 65535

Local Address: 192.168.0.20

Remote Address: 192.88.99.1

IPsec Secret:

Keepalive:

DSCP: 10

Dont Fragment: no

☒ Clamp TCP MSS

Address List

Address	Network	Interface
192.168.0.20/24	192.168.0.0	ether3_WAN
192.168.56.10	192.168.56.10	ether2

2 items

Interface List

Interface	Name	Type	Actual MTU	L2 MTU	Tx	Rx	Tx Packet (p/s)	Rx Packet
R	6to4tunnel1	6to4 Tunnel	1480	65535	0 bps	0 bps	0	0
R	ether1	Ethernet	1500		0 bps	0 bps	0	0
R	ether2	Ethernet	1500		34.1 kbps	16.0 kbps	6	6
R	ether3_WAN	Ethernet	1500		0 bps	1400 bps	0	0
R	ether4	Ethernet	1500		0 bps	0 bps	0	0

admin@08:00:27:5C:27:B5 (MUM BOGOTA) - WinBox v6.44.5 on x86 (x86)

Session Settings Dashboard

Safe Mode Session: 08:00:27:5C:27:B5

Interface <6to4tunnel1>

General Status Traffic

Name: 6to4tunnel1

Type: 6to4 Tunnel

MTU: 1480

Actual MTU: 1480

L2 MTU: 65535

Local Address: 192.168.0.21

Remote Address: 192.88.99.1

IPsec Secret:

Keepalive:

DSCP: 10

Dont Fragment: no

☒ Clamp TCP MSS

Address List

Address	Network	Interface
192.168.0.21/24	192.168.0.0	ether3_WAN
192.168.10.1/24	192.168.10.0	ether2_LAN

2 items

Interface List

Interface	Name	Type	Actual MTU	L2 MTU	Tx	Rx	Tx Packet (p/s)	Rx Packet
R	6to4tunnel1	6to4 Tunnel	1480	65535	0 bps	0 bps	0	0
R	ether1	Ethernet	1500		0 bps	0 bps	0	0
R	ether2_LAN	Ethernet	1500		24.4 kbps	12.4 kbps	3	3
R	ether3_WAN	Ethernet	1500		0 bps	3.5 kbps	0	0
R	ether4	Ethernet	1500		0 bps	0 bps	0	0

## Ping entre WANs...

admin@08:00:27:77:0B:E1 (MikroTik\_MUM) - WinBox v6.44.5 on x86 (x86)

ion Settings Dashboard

Safe Mode Session: 08:00:27:77:0B:E1

Quick Set CAPsMAN Interfaces Wireless Bridge PPP Mesh IP IPv6 MPLS Routing System Queues Files Log RADIUS Tools New Terminal Dude KVM Make Supout.tif

Ping (Running)

General Advanced

Ping To: 192.168.0.21

Interface:

☐ ARP Ping

Packet Count:

Timeout: 1000 ms

Start Stop Close New Window

Seq #	Host	Time	Reply Size	TTL	Status
0	192.168.0.21	0ms	50	64	
1	192.168.0.21	0ms	50	64	
2	192.168.0.21	0ms	50	64	
3	192.168.0.21	0ms	50	64	
4	192.168.0.21	0ms	50	64	
5	192.168.0.21	0ms	50	64	
6	192.168.0.21	0ms	50	64	
7	192.168.0.21	0ms	50	64	
8	192.168.0.21	0ms	50	64	
9	192.168.0.21	0ms	50	64	
10	192.168.0.21	0ms	50	64	
11	192.168.0.21	0ms	50	64	

admin@08:00:27:5C:27:B5 (MUM BOGOTA) - WinBox v6.44.5 on x86 (x86)

ision Settings Dashboard

Safe Mode Session: 08:00:27:5C:27:B5

Quick Set CAPsMAN Interfaces Wireless Bridge PPP Mesh IP IPv6 MPLS Routing System Queues Files Log RADIUS Tools New Terminal Dude

Ping (Running)

General Advanced

Ping To: 192.168.0.20

Interface:

☐ ARP Ping

Packet Count:

Timeout: 1000 ms

Start Stop Close New Window

Seq #	Host	Time	Reply Size	TTL	Status
0	192.168.0.20	0ms	50	64	
1	192.168.0.20	0ms	50	64	
2	192.168.0.20	0ms	50	64	
3	192.168.0.20	0ms	50	64	
4	192.168.0.20	0ms	50	64	
5	192.168.0.20	0ms	50	64	
6	192.168.0.20	0ms	50	64	





## “TRADUCIENDO” DE IPv4 a IPv6:

IPv4/IPv6 subnet calculator

GestióIP  
IP address management software

☒ IPv4 ☐ IPv6

IP address

BM

IP address	192.168.0.20
class	C
type	PRIVATE (For Use in a private network. Not routable in the Internet <a href="#">[rfc1918]</a> )
network	192.168.0.0
bitmask	24
netmask	255.255.255.0
wildcardmask	0.0.0.255
host range	192.168.0.1-192.168.0.254
broadcast address	192.168.0.255
total IP addresses	254
short	192.168.0.20
integer ID	3232235540
hexadecimal ID I	0xc0a80014
hexadecimal ID II	3139322e3136382e302e3230
binary ID	110000001010100000000000000010100
in-addr.arpa format	20.0.168.192.in-addr.arpa
mapped IPv4 address	<b>::ffff:c0a8:0014</b>
6to4 prefix	2002:c0a8:0014::/48

IPv4/IPv6 subnet calculator

GestióIP  
IP address management software

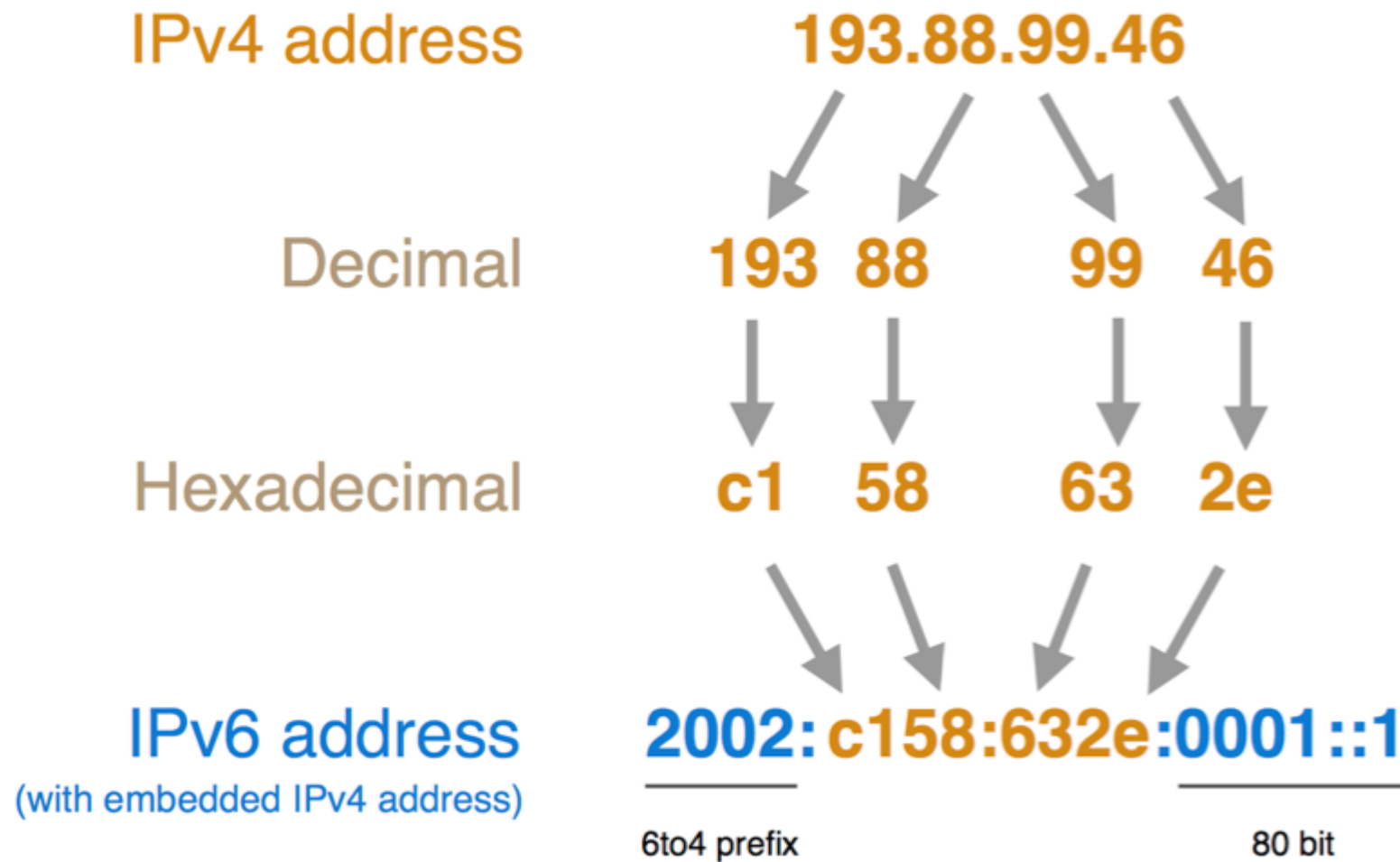
☒ IPv4 ☐ IPv6

IP address

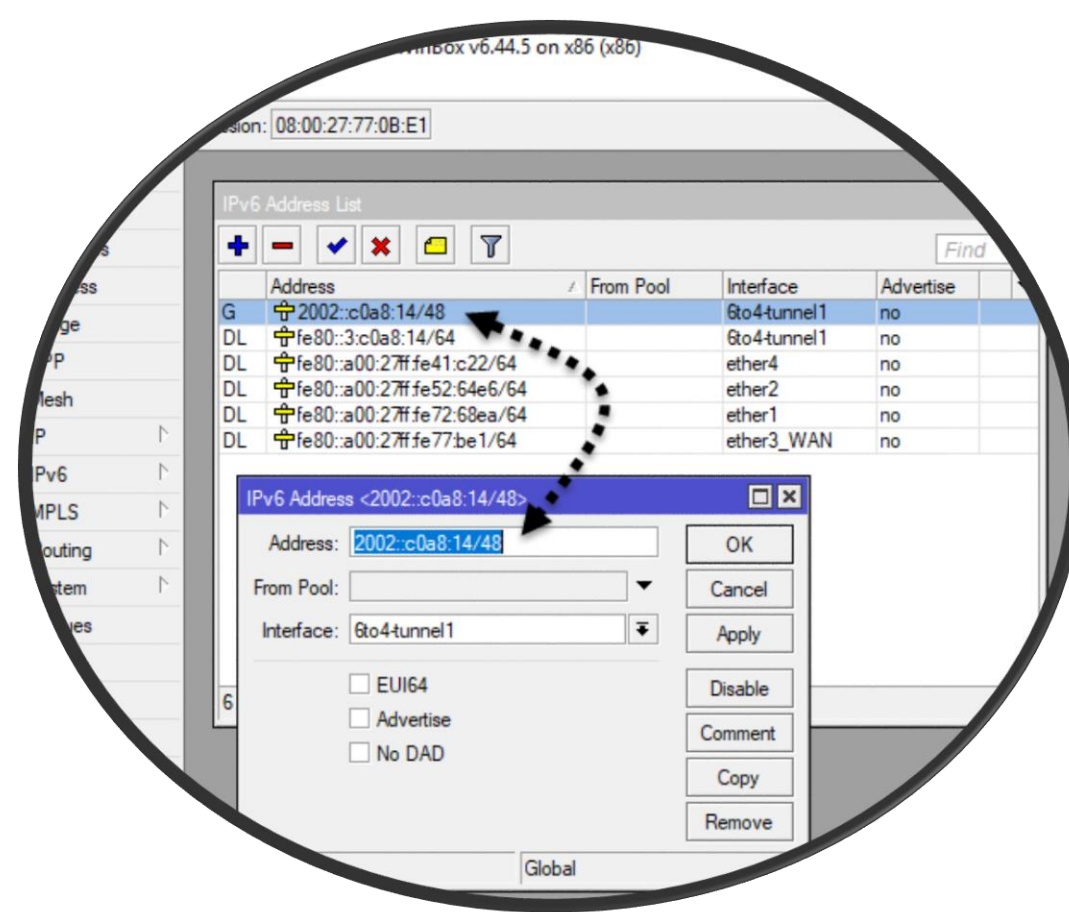
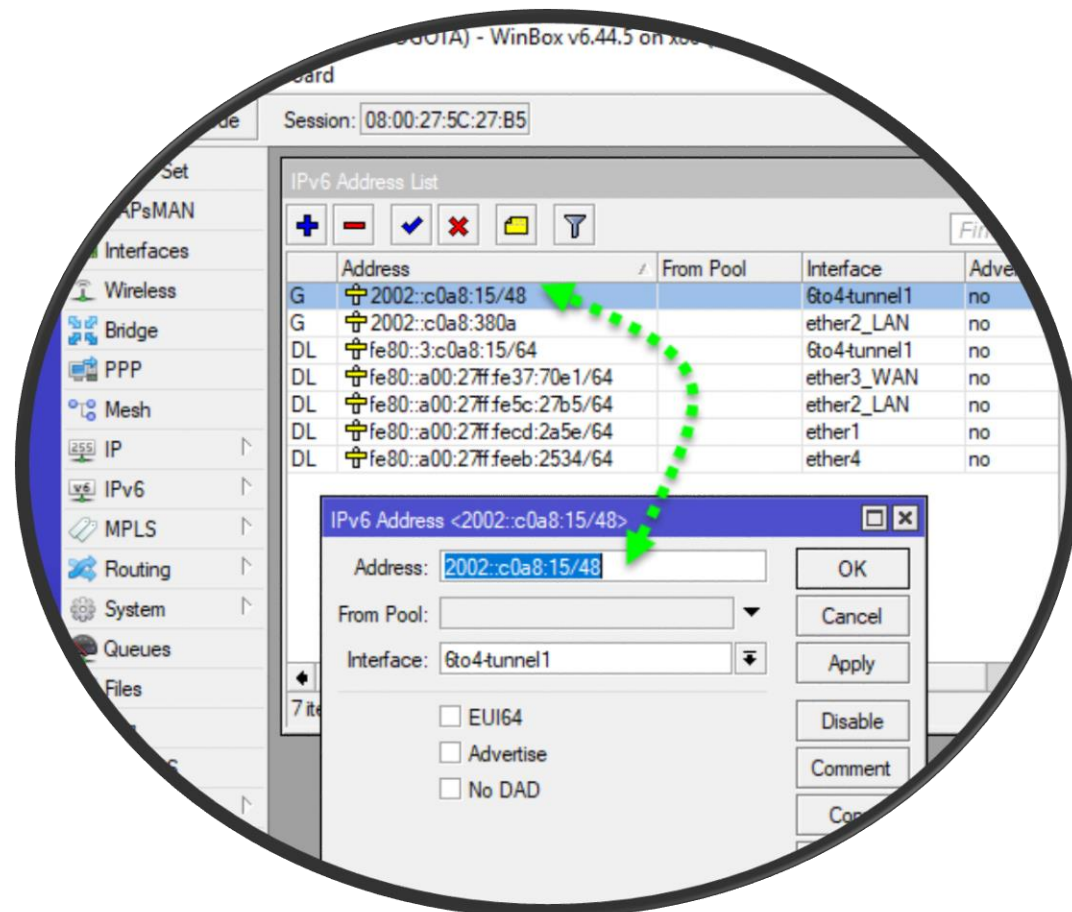
BM

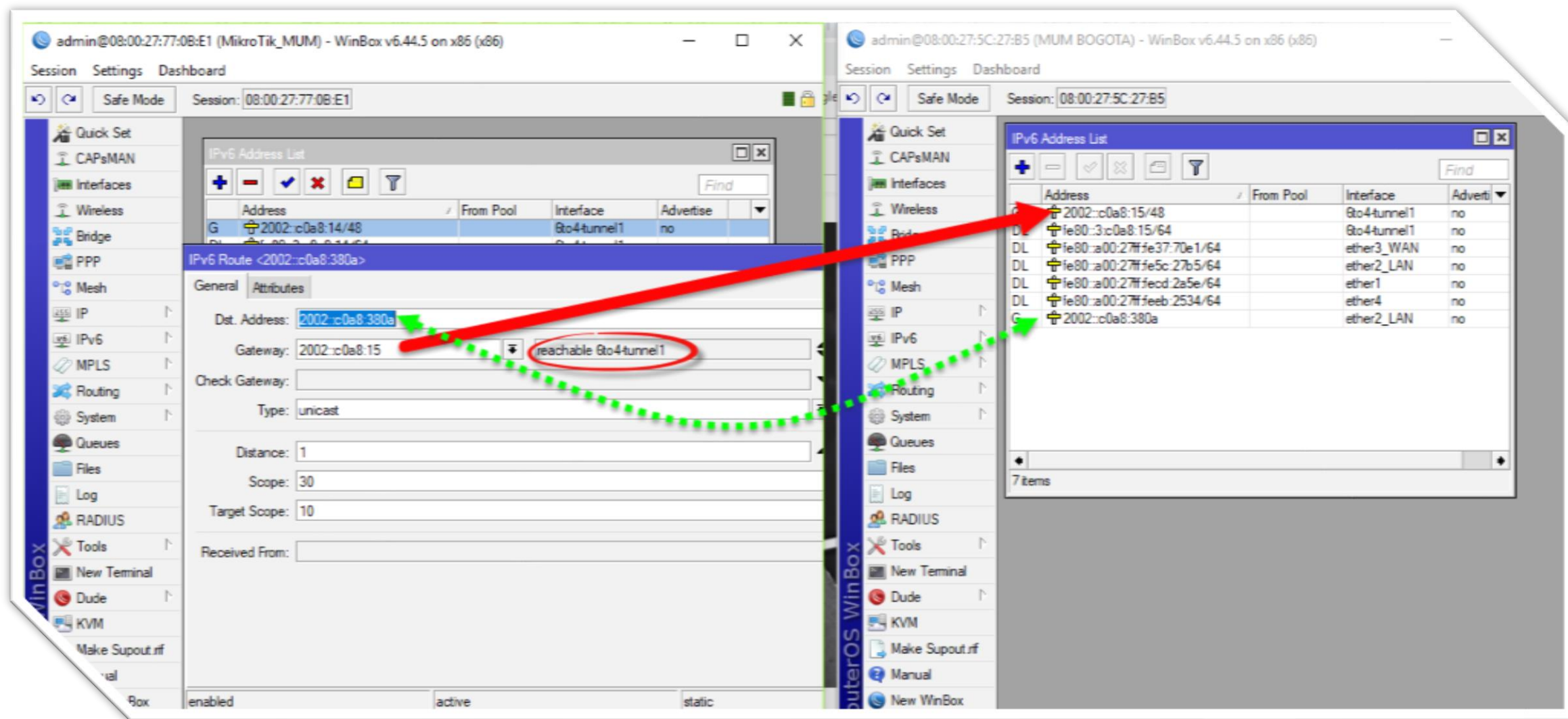
IP address	192.168.0.21
class	C
type	PRIVATE (For Use in a private network. Not routable in the Internet <a href="#">[rfc1918]</a> )
network	192.168.0.0
bitmask	24
netmask	255.255.255.0
wildcardmask	0.0.0.255
host range	192.168.0.1-192.168.0.254
broadcast address	192.168.0.255
total IP addresses	254
short	192.168.0.21
integer ID	3232235541
hexadecimal ID I	0xc0a80015
hexadecimal ID II	3139322e3136382e302e3231
binary ID	110000001010100000000000000010101
in-addr.arpa format	21.0.168.192.in-addr.arpa
mapped IPv4 address	<b>::ffff:c0a8:0015</b>
6to4 prefix	2002:c0a8:0015::/48











The image displays two Mikrotik WinBox windows side-by-side, illustrating the configuration of an IPv6 route and its corresponding address list.

**Left Window (MikroTik\_MUM):**

- IPv6 Address List:** Shows a single entry:
 

Address	From Pool	Interface	Advertise
2002::c0a8:14/48		8to4tunnel1	no
- IPv6 Route <2002::c0a8:380a>:**
  - General:**
    - Dst. Address: 2002::c0a8:380a
    - Gateway: 2002::c0a8:15
    - Check Gateway: ☐
    - Type: unicast
    - Distance: 1
    - Scope: 30
    - Target Scope: 10
    - Received From:
  - Attributes:**
    - Reachable: 8to4tunnel1 (circled in red)

**Right Window (MUM BOGOTA):**

- IPv6 Address List:** Shows a list of addresses:
 

Address	From Pool	Interface	Advertise
2002::c0a8:15/48		8to4tunnel1	no
DL fe80::3c0a8:15/64		8to4tunnel1	no
DL fe80::a00:27ff:fe37:70e1/64		ether3_WAN	no
DL fe80::a00:27ff:fe5c:27b5/64		ether2_LAN	no
DL fe80::a00:27ff:fe0d:2a5e/64		ether1	no
DL fe80::a00:27ff:feeb:2534/64		ether4	no
G 2002::c0a8:380a		ether2_LAN	no

Red arrows indicate the flow of information: one arrow points from the 'Reachable' attribute in the route configuration to the 'From Pool' column in the address list, and another points from the 'Dst. Address' in the route configuration to the 'Address' column in the address list.

## PROS - CONS

- ✓ resolvió la desventaja de que la técnica de túnel 6in4 no es escalable. Un proveedor podría usarlo para implementar la implementación de IPv6 en una gran base de clientes
- ✓ puede causar latencias inaceptablemente largas, lo que resulta en experiencias negativas para el usuario (arriba de los 300ms)



# PREGUNTAS?

