



ISP Operations–Troubleshooting BGP en RouterOS

PRESENTED BY:

ANDRES OCAMPO,
SR NETWORK ENGINEER



Perfil: **Sobre Andrés Ocampo**

Background:

- 5+ años en Networking / ISP / WISP
- Diseñado/Creado redes en todo América
- Certificado MikroTik y Cisco



Trayectoria:

Puntonet (Operador de NOC / Activaciones / Soporte VIP)

Telefónica Ec (Ing. Sr. Soporte Servicio de Datos)

Fibramax (Supervisor General de Telecomunicaciones)

Certificaciones:

Cisco (CCNA R&S, CCNA Security, CCNP R&S)

Mikrotik (MTCNA, MTCTCE)

TEC Monterrey (Maestría en Administración de TI)



Perfil: Sobre IP ArchiTechs



Expertos en Networking

Whitebox | ISP | Data Center | Enterprise

- ✓ Consultoría Global
- ✓ Administración de Redes
- ✓ Monitoreo
- ✓ Test de Carga
- ✓ Desarrollo

Locations in: US | Canada | South America

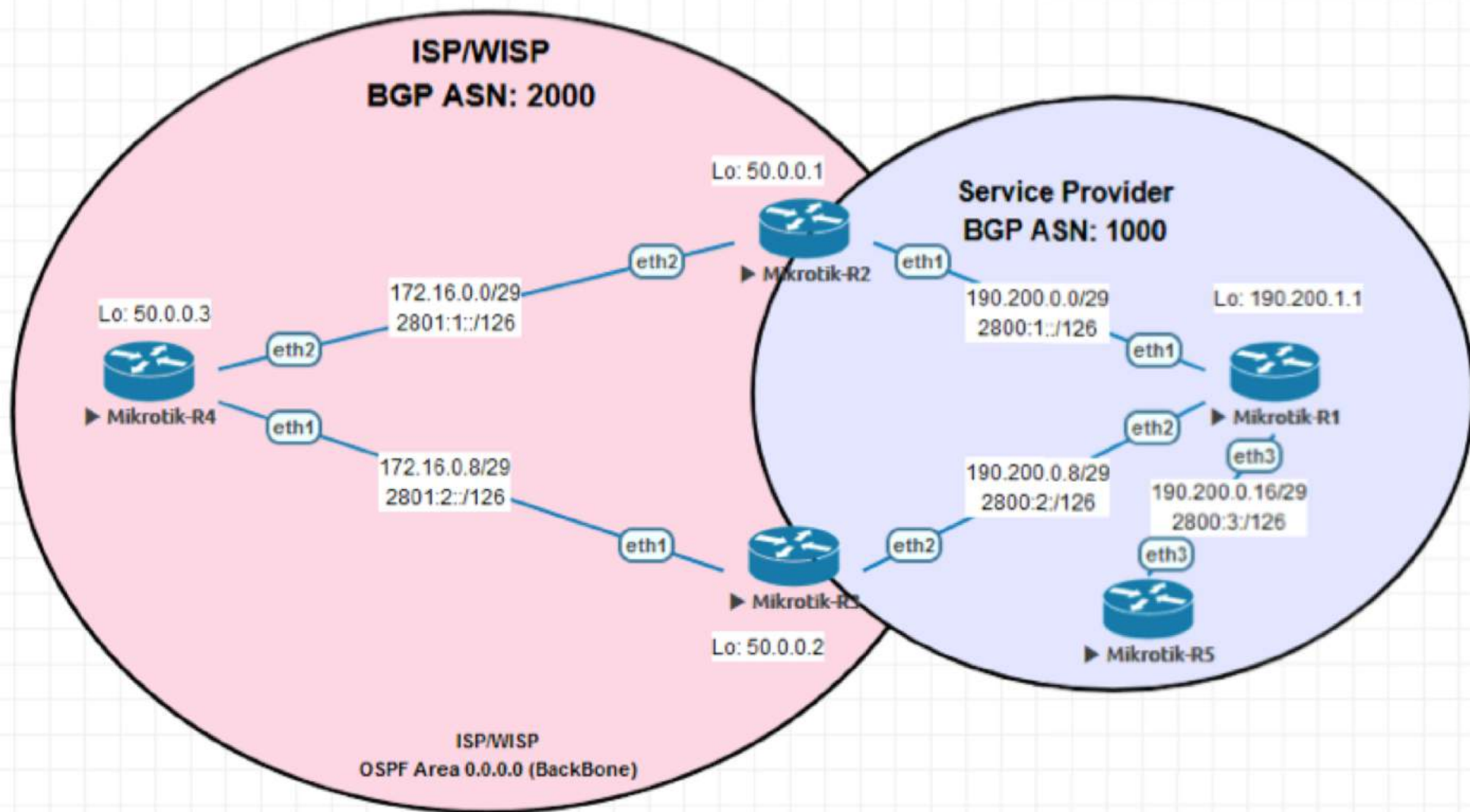
Call us at: +1 855-645-7684

E-mail: consulting@iparchitech.com

Web: www.iparchitech.com

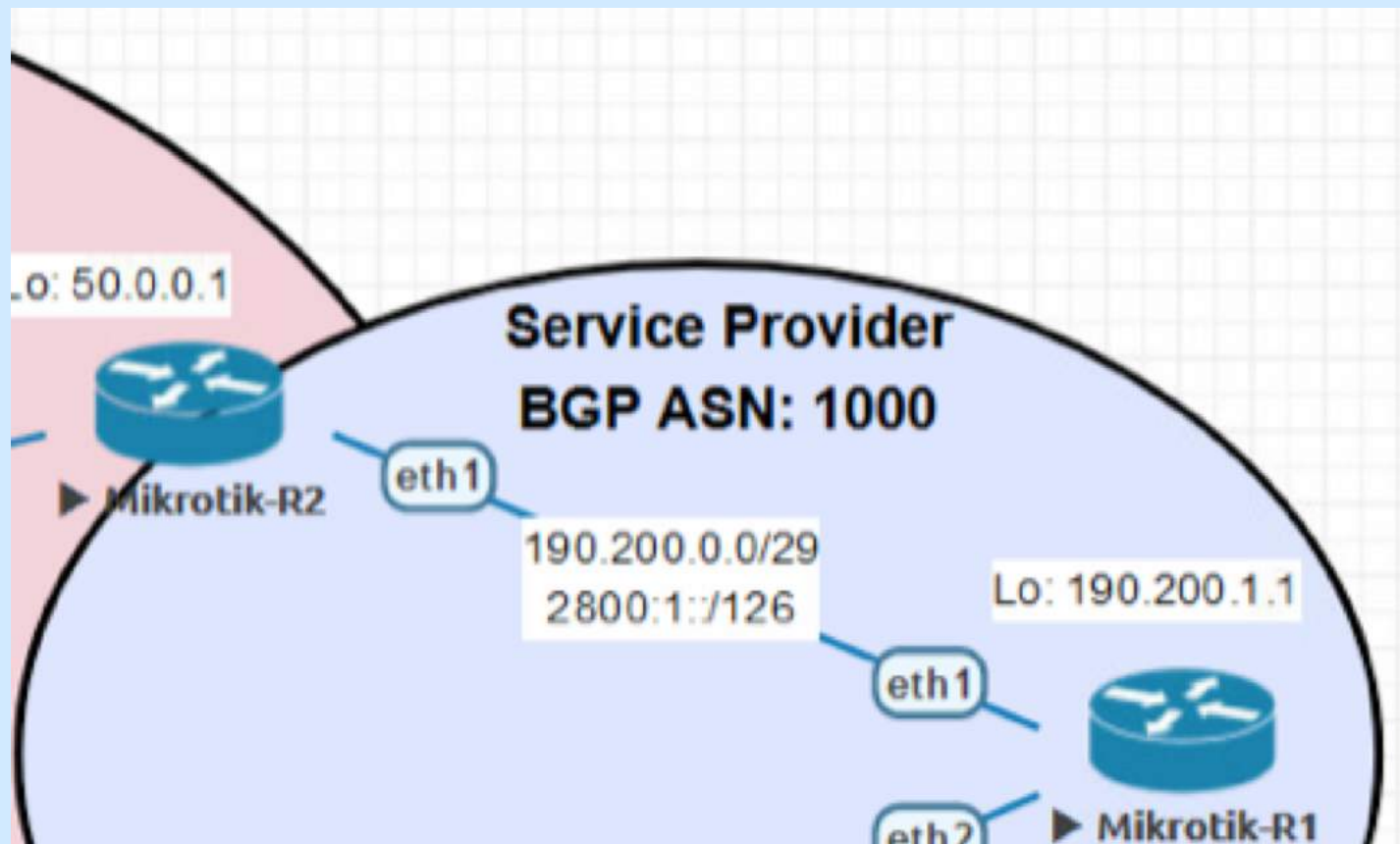
Meta de esta presentación: Cuando esta presentación finalice, abremos aclarado ciertos conceptos clave:

- Cómo resolver problemas de BGP en RouterOS utilizando verificación y logging.
- Que causas afectan a que una sesión BGP se establezca adecuadamente.



- BGP require los siguientes requisitos para establecer una sesión entre dos Peers:
 - Local AS / Remote AS
 - Autenticación
 - Multihop (eBGP únicamente)
 - MTU
- Veamos que puede pasar cuando no se cumplen estos requisitos:

Escenario 1: Remote AS Mismatch

BGP**Remote AS Mismatch****R1 to R2**



Operations: **BGP troubleshooting – config comparison**

BGP	Remote AS Mismatch	R1 to R2
R1 /routing bgp instance set default as=1000 /routing bgp peer add name=To-MikrotikR2 remote-address=190.200.0.2 \ remote-as=200		
R2 /routing bgp instance set default as=2000 router-id=50.0.0.1 /routing bgp peer add name=To-MikrotikR1 remote-address=190.200.0.1 \ remote-as=1000		

BGP**Remote AS Mismatch****R1 to R2****R1**

```
[admin@Mikrotik-R1] > routing bgp peer print status
Flags: X - disabled, E - established
 0          name="Mikrotik-R2"      instance=default      remote-
address=190.200.0.2  remote-as=200    tcp-md5-key=""    nexthop-
choice=default      multihop=no      route-reflect=no    hold-time=3m
ttl=255 in-filter="" out-filter="" address-families=ip update-
source=ether1      default-originate=always  remove-private-as=no
as-override=no passive=no use-bfd=no  state=opensent
```

R2

```
[admin@Mikrotik-R2] > routing bgp peer print status
Flags: X - disabled, E - established
 0          name="To-MikrotikR1"    instance=default      remote-
address=190.200.0.1  remote-as=1000    tcp-md5-key=""    nexthop-
choice=default      multihop=no      route-reflect=no    hold-time=3m
ttl=255 in-filter="" out-filter="" address-families=ip update-
source=ether1 default-originate=never remove-private-as=no as-
override=no passive=no use-bfd=no  state=idle
```



Operations: BGP troubleshooting – log comparison

BGP

Remote AS Mismatch

R1 to R2

R1

```
02:24:21 route,bgp,info Connection opened by remote
host
02:24:21 route,bgp,info RemoteAddress=190.200.0.2
02:24:21 route,bgp,error Invalid remote AS, expected
200
02:24:21 route,bgp,error RemoteAddress=190.200.0.2
02:24:21 route,bgp,error RemoteAs=2000
```

R2

```
02:24:21 route,bgp,info TCP connection established

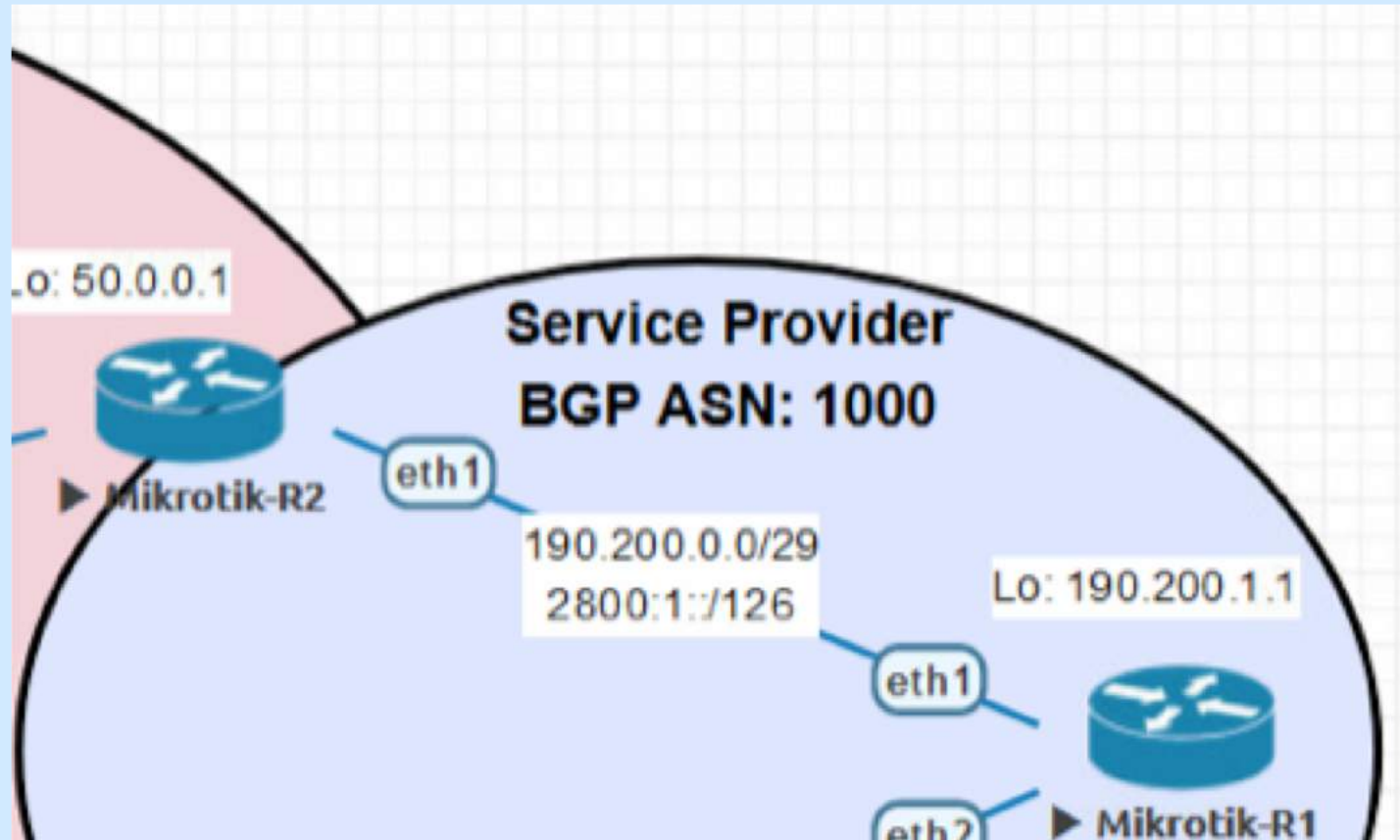
02:24:21 route,bgp,info RemoteAddress=190.200.0.1

02:24:21 route,bgp,error Received notification

02:24:21 route,bgp,error OPEN error: bad remote-as
```



Escenario 2: Dirección IP Incorrecta

BGP**Dirección IP Incorrecta****R1 to R2**



Operations: **BGP troubleshooting – config comparison**

BGP	Dirección IP Incorrecta	R1 to R2
R1 /routing bgp instance set default as=1000 /routing bgp peer add name=To-MikrotikR2 remote-address=190.200.0.20 \ remote-as=200		
R2 /routing bgp instance set default as=2000 router-id=50.0.0.1 /routing bgp peer add name=To-MikrotikR1 remote-address=190.200.0.1 \ remote-as=1000		

BGP	Dirección IP Incorrecta	R1 to R2
R1		
<pre>[admin@Mikrotik-R1] > routing bgp peer print status Flags: X - disabled, E - established 0 name="Mikrotik-R2" instance=default remote- address=190.200.0.20 remote-as=2000 tcp-md5-key="" nexthop- choice=default multihop=no route-reflect=no hold-time=3m ttl=255 in-filter="" out-filter="" address-families=ip update-source=ether1 default-originate=always remove- private-as=no as-override=no passive=no use-bfd=no state=idle</pre>		
R2		
<pre>[admin@Mikrotik-R2] > routing bgp peer print status Flags: X - disabled, E - established 0 name="To-MikrotikR1" instance=default remote- address=190.200.0.1 remote-as=1000 tcp-md5-key="" nexthop- choice=default multihop=no route-reflect=no hold-time=3m ttl=255 in-filter="" out-filter="" address-families=ip update-source=ether1 default-originate=never remove-private- as=no as-override=no passive=no use-bfd=no state=opensent</pre>		



Operations: **BGP troubleshooting – log comparison**

BGP

Dirección IP Incorrecta

R1 to R2

R1

```
02:47:59 route,bgp,info Failed to open TCP connection: Network  
is unreachable
```

```
02:47:59 route,bgp,info RemoteAddress=190.200.0.20
```

R2

```
02:37:41 route,bgp,info TCP connection established
```

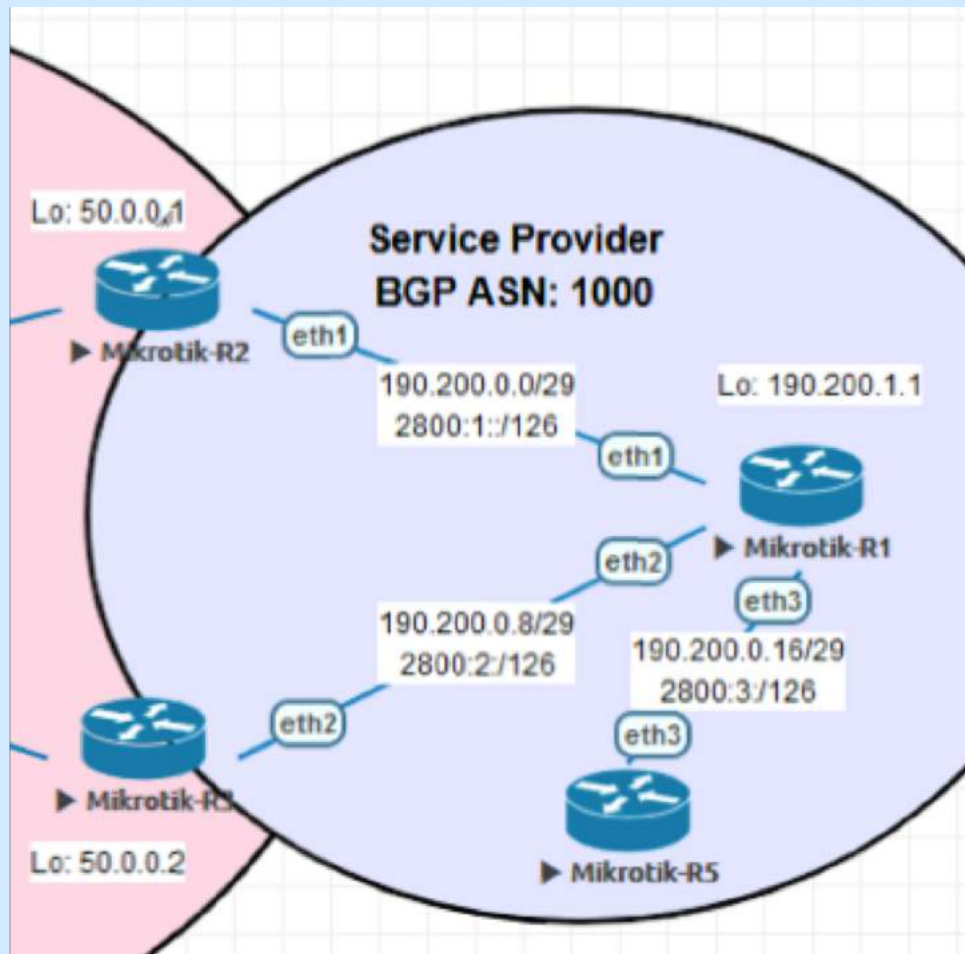
```
02:37:41 route,bgp,info RemoteAddress=190.200.0.1
```

```
02:37:41 route,bgp,info Connection terminated
```

```
02:37:41 route,bgp,info RemoteAddress=190.200.0.1
```



Escenario 3: MultiHop

BGP**Multihop****R5 to R2**



Operations: **BGP troubleshooting – config comparison**

BGP	MultiHop	R5 to R2
R5 /routing bgp instance set default as=1000 /routing bgp peer add name=To-Mikrotik-R2 remote-address=190.200.0.2 remote-as=2000 update-source=ether3		
R2 /routing bgp instance set default as=2000 router-id=50.0.0.1 /routing bgp peer add multihop=yes name=To-Mikrotik-R5 remote-address=190.200.0.18 remote-as=1000 update-source=ether1		



Operations: **BGP troubleshooting – peer status comparison**

BGP

Multihop

R5 to R2

R5

```
[admin@Mirktoik-R5] > routing bgp peer print status
Flags: X - disabled, E - established
name="To-Mikrotik-R2" instance=default remote-address=190.200.0.2
remote-as=2000 tcp-md5-key="" nexthop-choice=default multihop=no
route-reflect=no hold-time=3m ttl=255 in-filter="" out-filter=""
address-families=ip update-source=ether3 default-originate=never
remove-private-as=no as-override=no passive=no use-bfd=no
state=active
```

R2

```
[admin@Mikrotik-R2] > routing bgp peer print status
Flags: X - disabled, E - established
name="To-Mikrotik-R5" instance=default remote-address=190.200.0.18
remote-as=1000 tcp-md5-key="" nexthop-choice=default multihop=yes
route-reflect=no hold-time=3m ttl=255 in-filter="" out-filter=""
address-families=ip update-source=ether1 default-originate=never
remove-private-as=no as-override=no passive=no use-bfd=no
state=opensent
```



Operations: **BGP troubleshooting – log comparison**

BGP

Multihop

R5 to R2

R5

03:27:20 route,bgp,info Connection opened by remote host

03:27:20 route,bgp,info RemoteAddress=190.200.0.2

03:27:20 route,bgp,info Reject connection: EBGP peer is not on a shared network and multihop is not configured

R2

03:27:00 route,bgp,info RemoteAddress=190.200.0.18

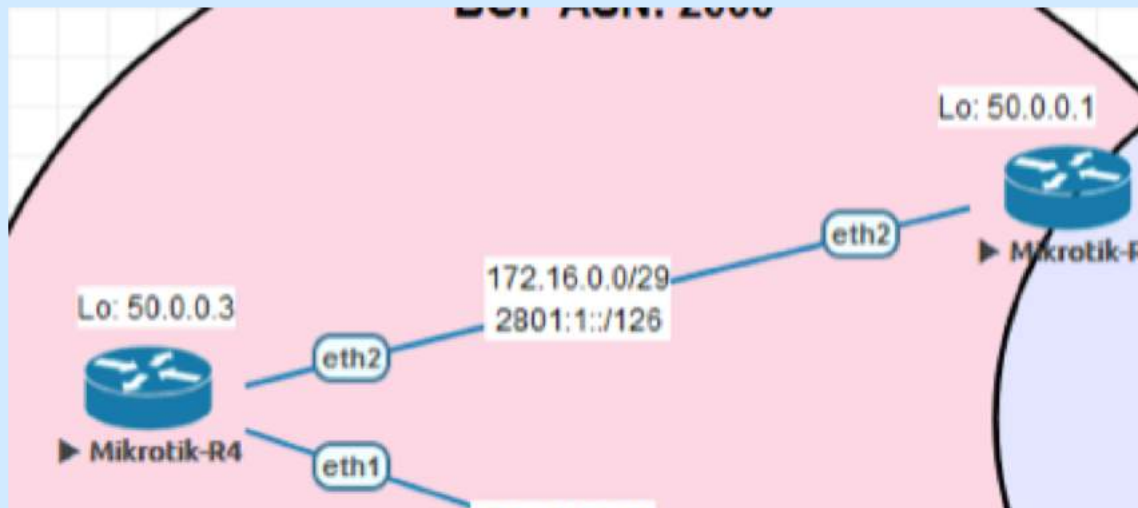
03:27:20 route,bgp,info TCP connection established

03:27:20 route,bgp,info RemoteAddress=190.200.0.18

03:27:20 route,bgp,info Connection terminated



Escenario 4: Autenticación

BGP**Multihop****R4 to R2**

BGP	Authentication Mismatch	R4 to R2
R4 <pre>/routing bgp instance set default as=2000 router-id=50.0.0.3 /routing bgp peer add name=Ro-Mikrotik-R2 remote-address=50.0.0.1 remote-as=2000 update-source=Lo0</pre>		
R2 <pre>/routing bgp instance set default as=2000 router-id=50.0.0.1 /routing bgp peer add default-originate=if-installed name=To-MikrotikR4 remote-address=50.0.0.3 remote-as=2000 update- source=Lo0 tcp-md5-key=demo</pre>		

BGP**Authentication Mismatch****R₄ to R₂****R₄**

```
[[admin@Mikrotik-R4] > routing bgp peer print statu
Flags: X - disabled, E - established
 1   name="Ro-Mikrotik-R2" instance=default remote-
address=50.0.0.1 remote-as=2000 tcp-md5-key="" nexthop-
choice=default multihop=no route-reflect=no hold-time=3m
ttl=255 in-filter="" out-filter="" address-families=ip
default-originate=never remove-private-as=no as-override=no
passive=no use-bfd=no state=opensent
```

R₂

```
[admin@Mikrotik-R2] > routing bgp peer print status
Flags: X - disabled, E - established
 1   name="To-MikrotikR4" instance=default remote-
address=50.0.0.3 remote-as=2000 tcp-md5-key="demo" nexthop-
choice=default multihop=no route-reflect=no hold-time=3m
ttl=255 in-filter="" out-filter="" address-families=ip update-
source=Lo0 default-originate=if-installed remove-private-as=no
as-override=no passive=no use-bfd=no state=connect
```



Operations: **BGP troubleshooting – log comparison**

BGP

Authentication Mismatch

R₄ to R₂

R₄

No existen logs sobre este error

R₂

No existen logs sobre este error



Escenario 5: Otras causas posibles

- Si luego de revisar todo, la sesión sigue con problemas, entonces hay otras posibles causas de este fallo:
 - MTU mismatch
 - Reglas de Firewall
 - Reglas de NAT

- Causas:
 - L3 MTU diferente entre los peers
 - L2 MTU diferente entre ambos equipos
 - Path MTU discovery determinó un tamaño incorrecto de Ventana para la sesión TCP de BGP
 - BGP Path Maximum Transmission Unit Discovery (PMTUD) puede fallar por bloqueos de paquetes PMTUD ICMP (firewall o ACL)
- Efectos
 - Sesión BGP inestable

- Causas:
 - Reglas de Firewall bloqueando la sincronización de BGP (TCP/179).
 - NAT que enmascara la IP original del neighbor con otra del mismo router.
- Efectos
 - No se puede levantar la sesión BGP

- Causas:
 - Envío de muchos prefijos hacia un router con limitación de cantidad de prefijos
- Efectos
 - Si se supera el Max-Prefix-limit el router terminará y bloqueará la conexión BGP hacia este peer.



Design: **Questions?**

Preguntas??