



Operaciones de un ISP— Troubleshooting de OSPF para IPv4/IPv6 en RouterOS

PRESENTED BY:

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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)

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Expertos en Networking

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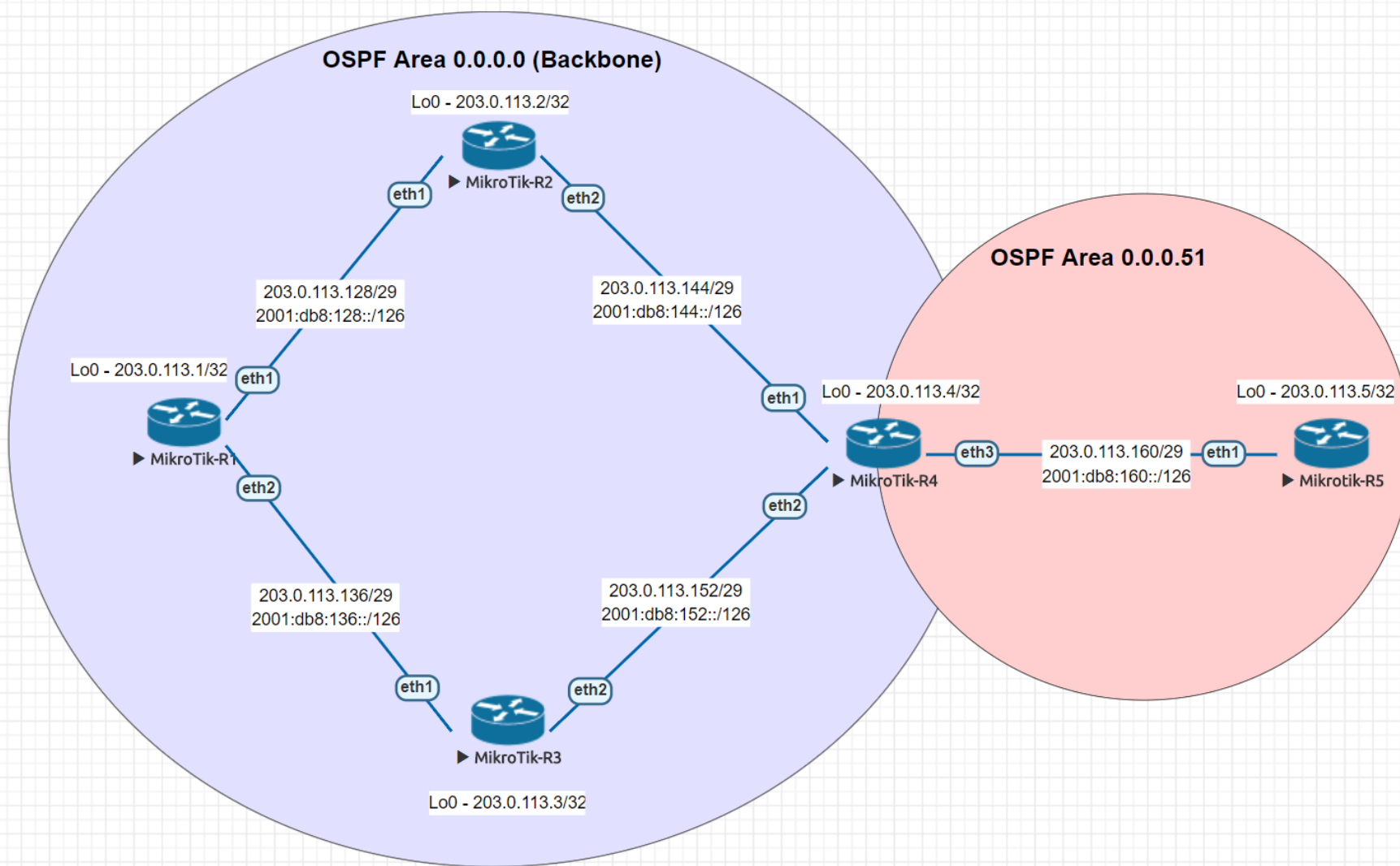
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Meta de esta presentación: Cuando esta presentación acabe, habremos aclarado algunos conceptos clave:

- Como diagnosticar problemas con OSPF en RouterOS utilizando logs y verificaciones.
- Similitudes (y diferencias) en el troubleshooting the OSPF v3 para IPv6 e IPv4.
- Revisión de problemas y bugs.



- OSPFv2 require lo siguiente para formar una adyacencia:
 - Deben coincidir los Hello timers
 - Deben coincidir los Dead timers
 - Debe coincidir el tipo de red.
 - Interfaces deben estar en la misma área.
 - El comando Network y la subred en la interfaz deben coincidir (excepto para redes punto-a-punto)
 - MTU debe coincidir
- Veamos que pasa cuando estos parámetros no hacen match:



Sección 1: OSPFv2 para IPv4

Escenarios de
troubleshooting básico

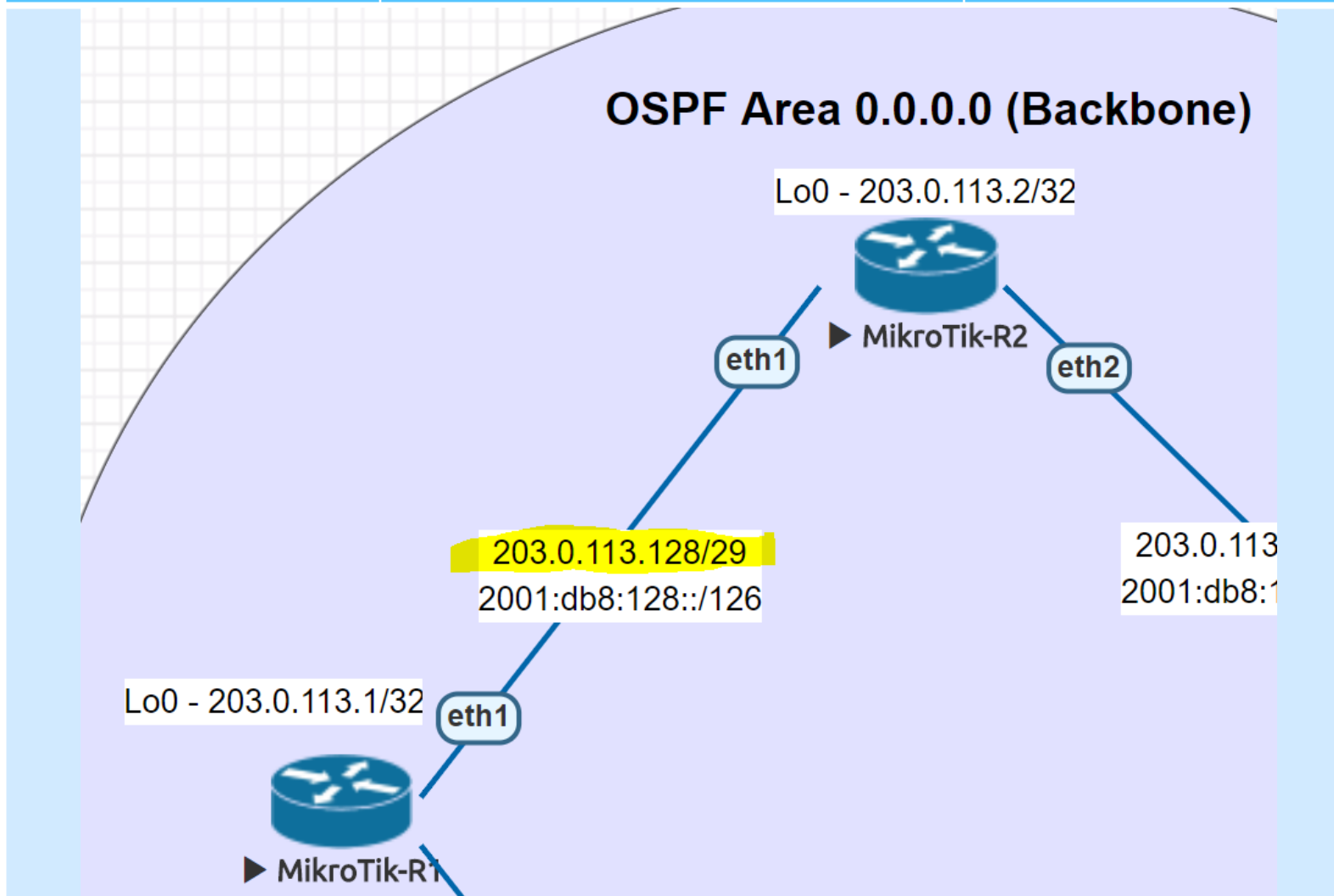


Escenario 1: Hello Timer Mismatch

OSPFv2

Hello Timer Mismatch

R1 a R2



OSPFv2	Hello Timer Mismatch	R1 a R2
R1 <pre>/routing ospf interface add hello-interval=20s interface=ether1</pre>		
R2 No hay configuración de interfaz en el export.... Que nos dice esto? La interfaz fue creada dinámicamente utilizando configuraciones por defecto.		



Operaciones: OSPF troubleshooting – interface status comparison

OSPFv2

Hello Timer Mismatch

R1 a R2

R1

```
[admin@MikroTik-R1] > routing ospf interface print detail
where interface
Flags: X - disabled, I - inactive, D - dynamic, P - passive
0      interface=ether1 cost=10 priority=1 authentication=none
authentication-key="" authentication-key-id=1 network-
type=default instance-id=0 retransmit-interval=5s
      transmit-delay=1s hello-interval=20s dead-interval=40s
use-bfd=no
```

R2

```
[admin@MikroTik-R2] > routing ospf interface print detail
where interface=ether1
Flags: X - disabled, I - inactive, D - dynamic, P - passive
0 D    interface=ether1 cost=10 priority=1 authentication=none
authentication-key="" authentication-key-id=1 network-
type=broadcast instance-id=0 retransmit-interval=5s
      transmit-delay=1s hello-interval=10s dead-interval=40s
use-bfd=no
```




OSPFv2

Hello Timer Mismatch

R1 a R2

R1

```
12:34:22 route,ospf,info Discarding Hello
packet: mismatch in hello-interval
12:34:22 route,ospf,info mine=20
12:34:22 route,ospf,info remote=10
12:34:22 route,ospf,info
source=203.0.113.130
```

R2

```
13:00:08 route,ospf,info Discarding Hello
packet: mismatch in hello-interval
13:00:08 route,ospf,info mine=10
13:00:08 route,ospf,info remote=20
13:00:08 route,ospf,info
source=203.0.113.129
```

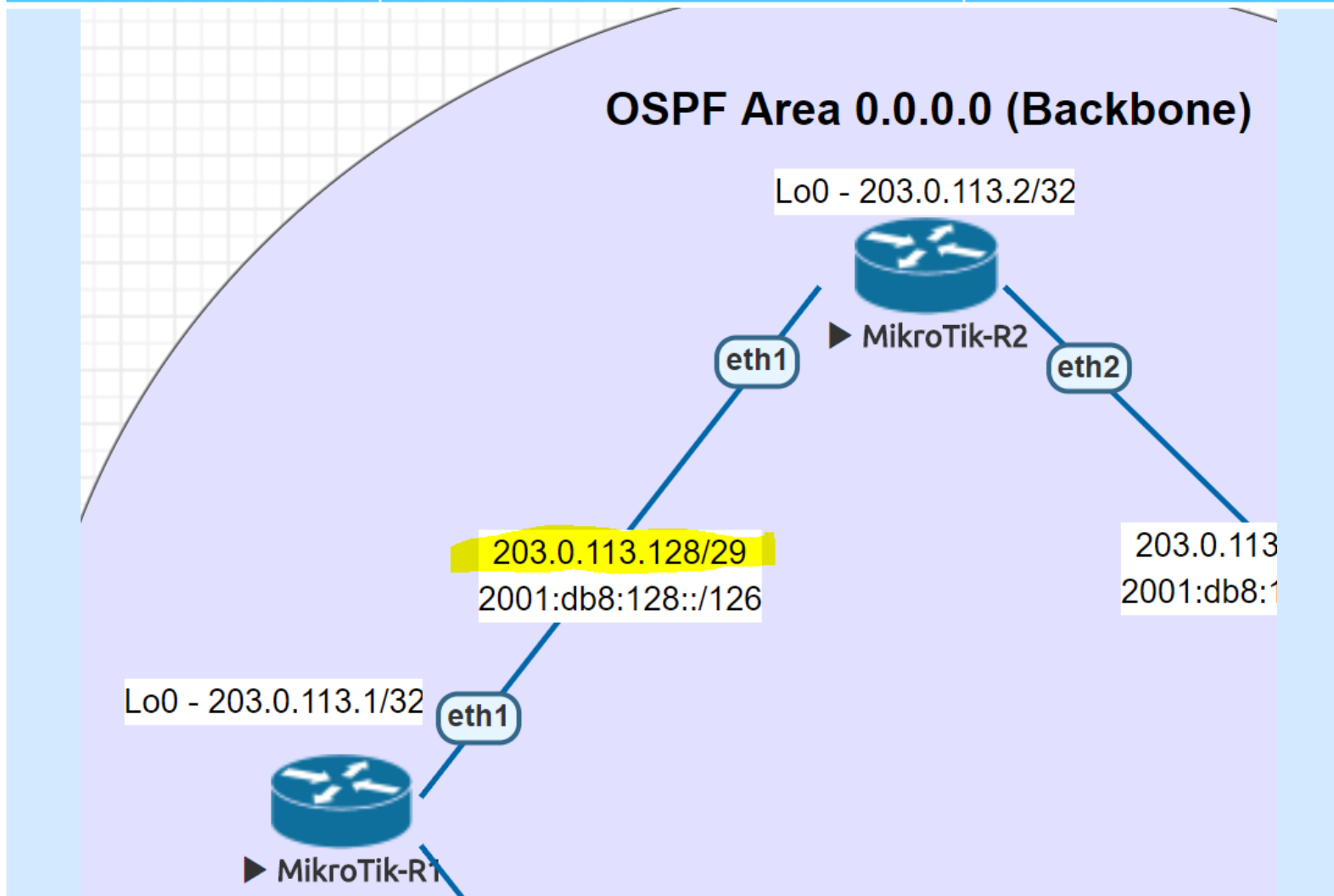


Escenario 2: Dead Timer Mismatch

OSPFv2

Dead Timer Mismatch

R1 a R2



OSPFv2	Dead Timer Mismatch	R1 a R2
R1 <pre>/routing ospf interface add dead-interval=1m20s interface=ether1</pre>		
R2 No hay configuración de interfaz en el export.... Que nos dice esto? La interfaz fue creada dinámicamente utilizando configuraciones por defecto.		



Operaciones: OSPF troubleshooting – interface status comparison

OSPFv2

Dead Timer Mismatch

R1 a R2

R1

```
[admin@MikroTik-R1] > routing ospf interface print detail
where interface
Flags: X - disabled, I - inactive, D - dynamic, P - passive
0      interface=ether1 cost=10 priority=1 authentication=none
authentication-key="" authentication-key-id=1 network-
type=default instance-id=0 retransmit-interval=5s
      transmit-delay=1s hello-interval=10s dead-interval=1m20s
use-bfd=no
```

R2

```
[admin@MikroTik-R2] > routing ospf interface print detail
where interface=ether1
Flags: X - disabled, I - inactive, D - dynamic, P - passive
0 D    interface=ether1 cost=10 priority=1 authentication=none
authentication-key="" authentication-key-id=1 network-
type=broadcast instance-id=0 retransmit-interval=5s
      transmit-delay=1s hello-interval=10s dead-interval=40s
use-bfd=no
```



OSPFv2

Dead Timer Mismatch

R1 a R2

R1

```
12:34:22 route,ospf,info Discarding Hello
packet: mismatch in dead-interval
12:34:22 route,ospf,info mine=80
12:34:22 route,ospf,info remote=40
12:34:22 route,ospf,info
source=203.0.113.130
```

R2

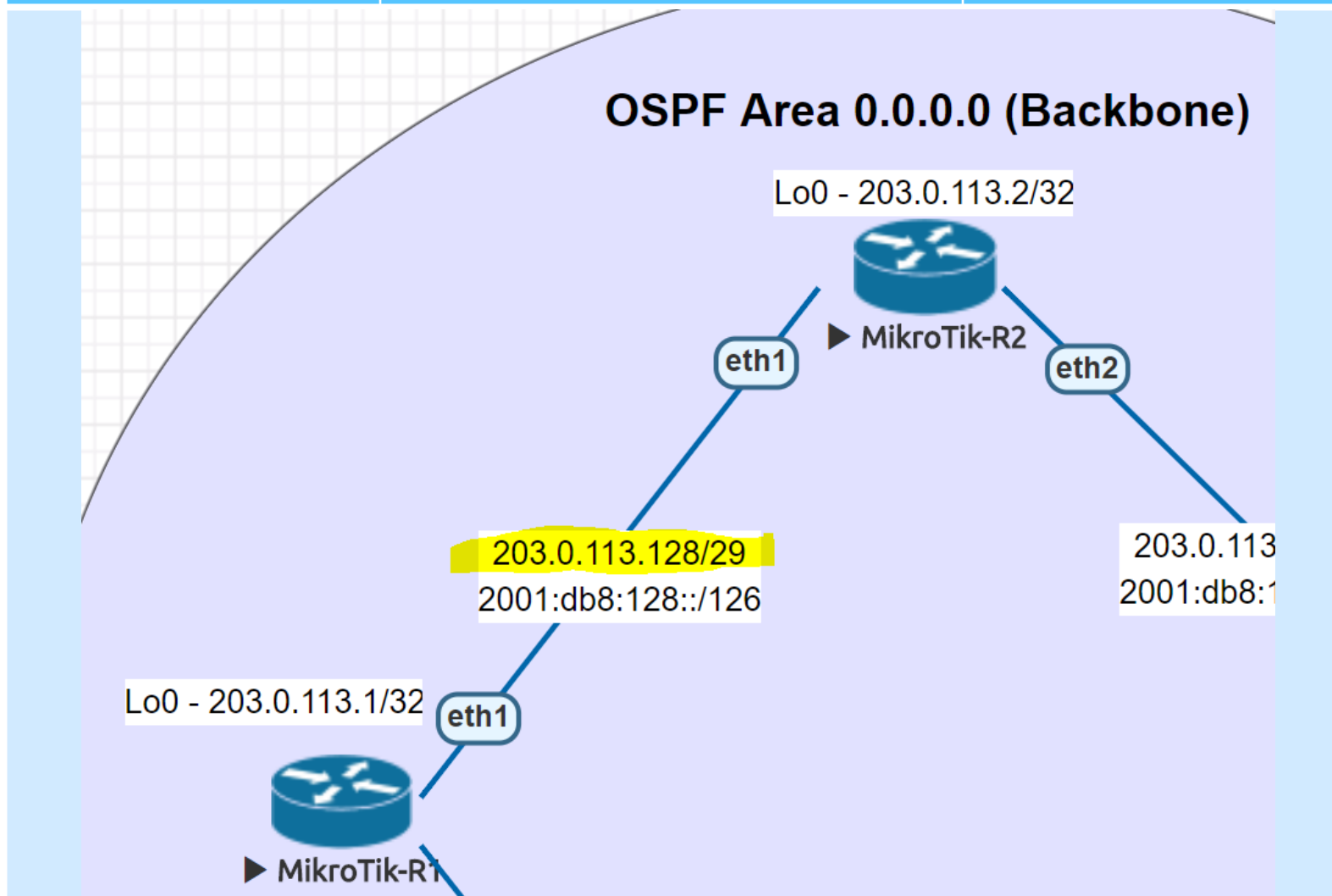
```
13:00:08 route,ospf,info Discarding Hello
packet: mismatch in dead-interval
13:00:08 route,ospf,info mine=40
13:00:08 route,ospf,info remote=80
13:00:08 route,ospf,info
source=203.0.113.129
```


Escenario 3: Network Type Mismatch

OSPFv2

Network Type Mismatch

R1 a R2



OSPFv2	Network Type Mismatch	R1 a R2
R1 <pre>/routing ospf interface add interface=ether1 network- type=ptmp</pre>		
R2 <pre>/routing ospf interface add interface=ether1 network- type=nbma</pre>		



Operaciones: OSPF troubleshooting – interface status comparison

OSPFv2

Network Type Mismatch

R1 a R2

R1

```
[admin@MikroTik-R1] > routing ospf interface print detail
where interface=ether1
Flags: X - disabled, I - inactive, D - dynamic, P - passive
0      interface=ether1 cost=10 priority=1 authentication=none
authentication-key="" authentication-key-id=1 network-
type=ptmp instance-id=0 retransmit-interval=5s
transmit-delay=1s hello-interval=10s dead-interval=40s
use-bfd=no
```

R2

```
[admin@MikroTik-R2] > routing ospf interface print detail
where interface=ether1
Flags: X - disabled, I - inactive, D - dynamic, P - passive
0 D    interface=ether1 cost=10 priority=1 authentication=none
authentication-key="" authentication-key-id=1 network-
type=nbma instance-id=0 retransmit-interval=5s
transmit-delay=1s hello-interval=10s dead-interval=40s
use-bfd=no
```



Operaciones: **OSPF troubleshooting – log comparison**

OSPFv2	Network Type Mismatch	R1 a R2
R1		
No hay entrada en los logs para este problema		
R2		
No hay entrada en los logs para este problema		

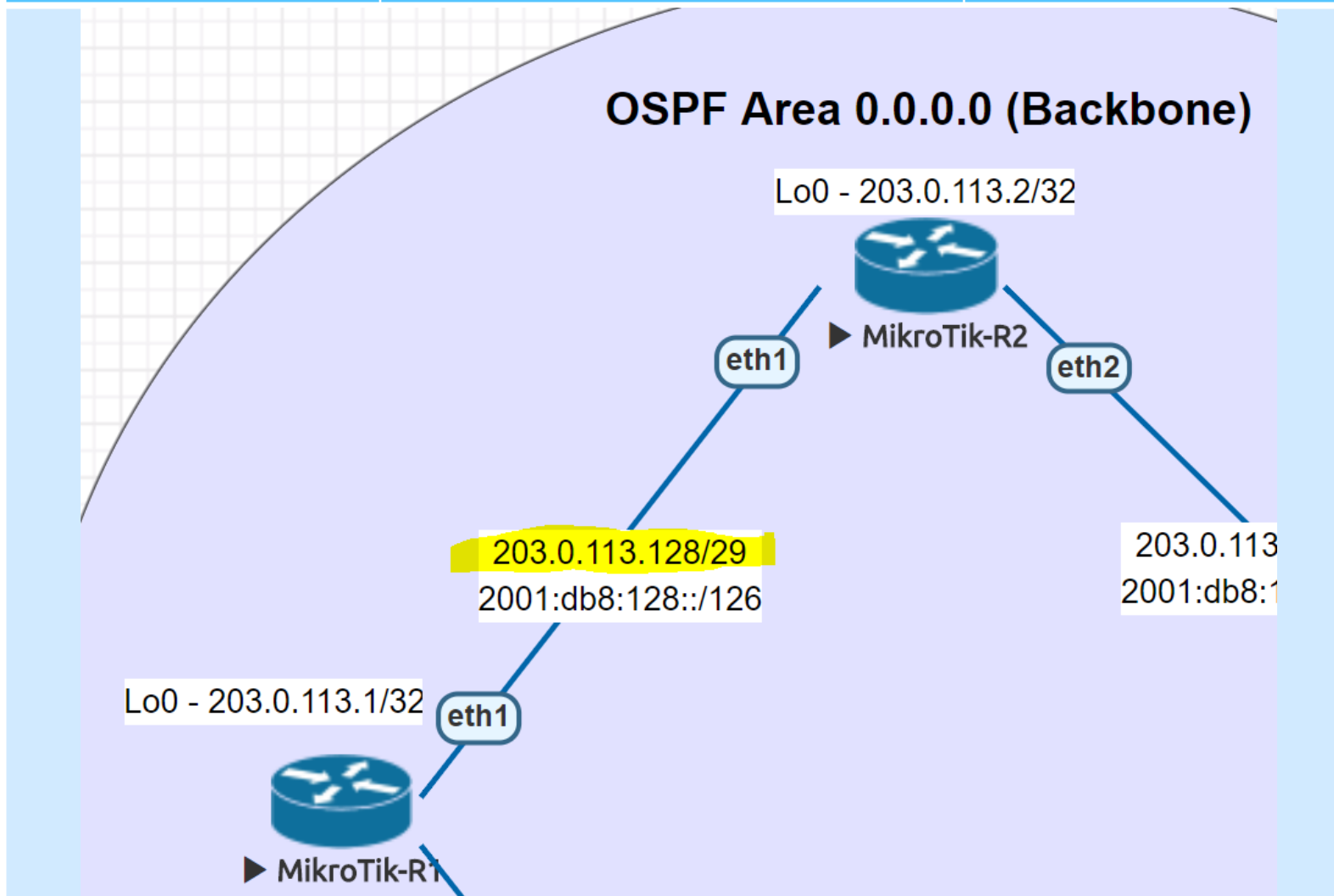


Escenario 4: Area Mismatch

OSPFv2

Area Mismatch

R1 a R2



OSPFv2	Area Mismatch	R1 a R2
R1 <pre>/routing ospf network add area=Area51 network=203.0.113.128/29 add area=backbone network=203.0.113.1/32 add area=backbone network=203.0.113.136/29</pre>		
R2 <pre>/routing ospf network add area=backbone network=203.0.113.128/29 add area=backbone network=203.0.113.2/32 add area=backbone network=203.0.113.144/29</pre>		



Operaciones: **OSPF troubleshooting – interface status comparison**

OSPFv2

Area Mismatch

R1 a R2

R1

```
[admin@MikroTik-R1] > routing ospf network print
Flags: X - disabled, I - invalid
#          NETWORK          AREA
0  203.0.113.128/29  Area51
1  203.0.113.1/32    backbone
2  203.0.113.136/29  backbone
```

R2

```
[admin@MikroTik-R2] > routing ospf network print
Flags: X - disabled, I - invalid
#          NETWORK          AREA
0  203.0.113.128/29  backbone
1  203.0.113.1/32    backbone
2  203.0.113.136/29  backbone
```



Operaciones: OSPF troubleshooting – log comparison

OSPFv2

Area Mismatch

R1 a R2

R1

12:34:22 route,ospf,info Discarding packet: mismatched
area ID

12:34:22 route,ospf,info mine=0.0.0.51
12:34:22 route,ospf,info received=0.0.0.0
12:34:22 route,ospf,info source=203.0.113.130

R2

12:34:22 route,ospf,info Discarding packet: mismatched
area ID

12:34:22 route,ospf,info mine=0.0.0.0
12:34:22 route,ospf,info received=0.0.0.51
12:34:22 route,ospf,info source=203.0.113.130

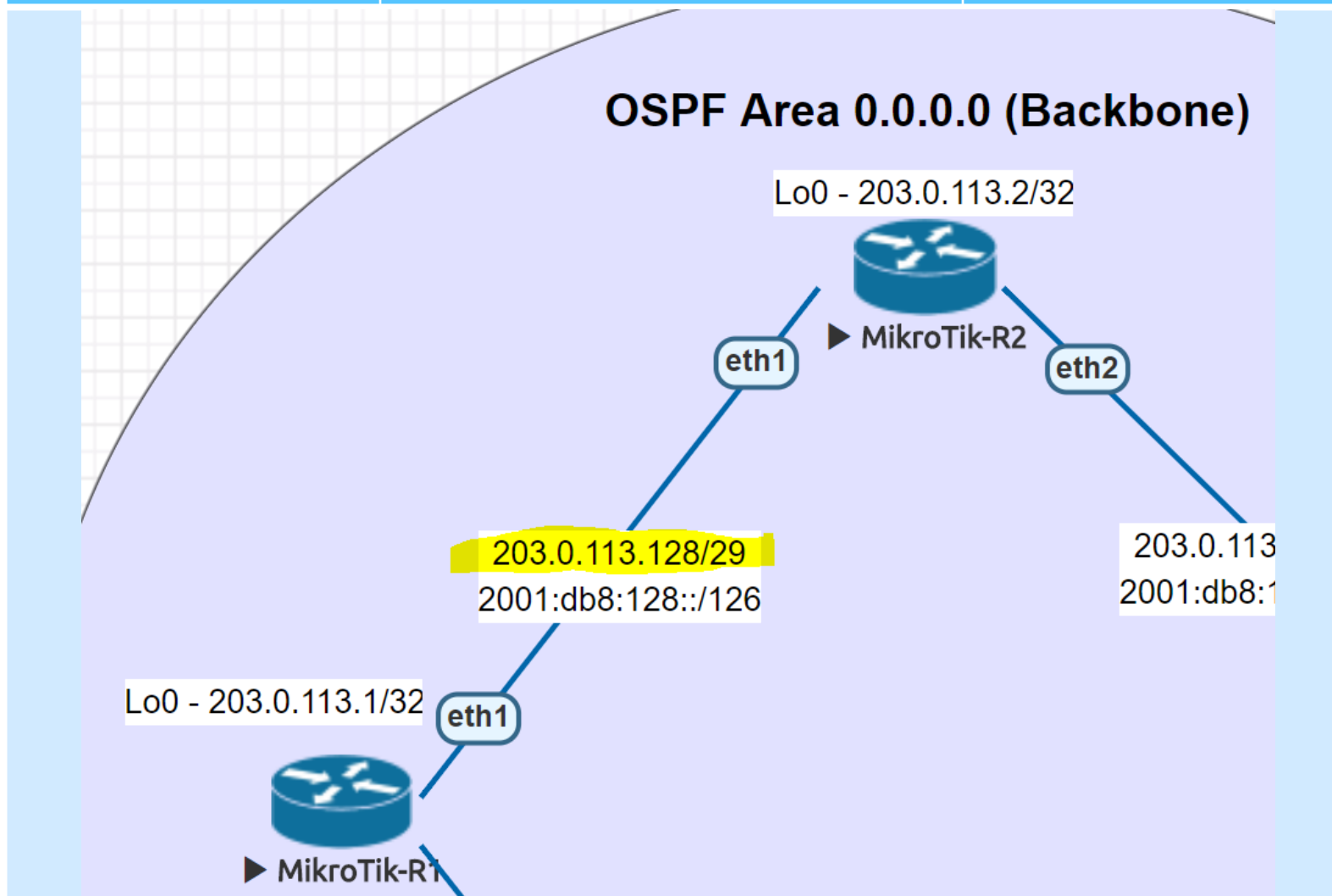


Escenario 5: MTU Mismatch

OSPFv2

MTU Mismatch

R1 a R2





Operaciones: **OSPF troubleshooting – config comparison**

OSPFv2	MTU Mismatch	R1 a R2
R1 <pre>/interface ethernet set [find default-name=ether1] mtu=1450</pre>		
R2 No existe configuración de MTU en el export.... Que nos dice esto? El MTU Capa 3 tiene valores por defecto de 1500		



Operaciones: OSPF troubleshooting – interface status comparison

OSPFv2

MTU Mismatch

R1 a R2

R1

```
[admin@MikroTik-R1] > interface print detail where  
interface=ether1
```

```
Flags: D - dynamic, X - disabled, R - running, S -  
slave
```

```
0 R name="ether1" type="ether" mtu=1450 actual-  
mtu=1450 mac-address=50:00:00:01:00:00 fast-path=no  
last-link-up-time=jul/17/2018 20:57:38 link-downs=0
```

R2

```
[admin@MikroTik-R2] > interface print detail where  
interface=ether1
```

```
Flags: D - dynamic, X - disabled, R - running, S -  
slave
```

```
0 R name="ether1" type="ether" mtu=1500 actual-  
mtu=1450 mac-address=50:00:00:02:00:00 fast-path=no  
last-link-up-time=jul/17/2018 20:59:12 link-downs=0
```



Operaciones: OSPF troubleshooting – log comparison

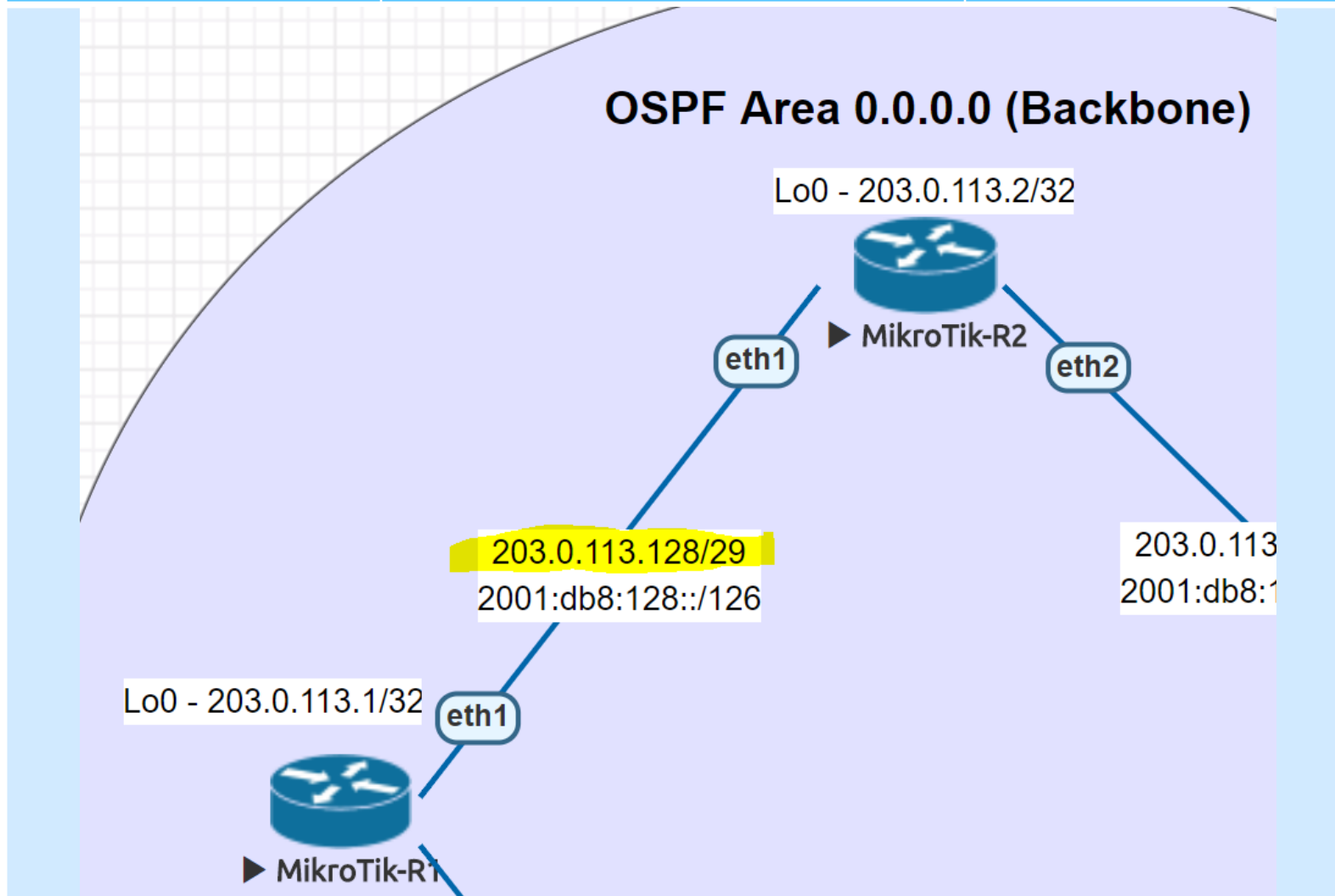
OSPFv2	MTU Mismatch	R1 a R2
R1		
12:34:22 route,ospf,info Discarding Database Description packet: too large MTU		
12:34:22 route,ospf,info		mine=1450
12:34:22 route,ospf,info		received=1500
R2		
12:34:22 route,ospf,info Discarding Database Description packet: different MTU		
12:34:22 route,ospf,info		mine=1500
12:34:22 route,ospf,info		received=1450

Sección 2: OSPFv2 for IPv4

Escenarios avanzados de troubleshooting

Escenario 6:

Router-id duplicado en routers adyacentes

OSPFv2**Router ID duplicados en
routers adyacentes****R1 a R2**



Operaciones: **OSPF troubleshooting – config comparison**

OSPFv2	Router ID duplicados en routers adyacentes	R1 a R2
R1		
<pre>/routing ospf instance set [find default=yes] router-id=203.0.113.2</pre>		
R2		
<pre>/routing ospf instance set [find default=yes] router-id=203.0.113.2</pre>		



Operaciones: OSPF troubleshooting – interface status comparison

OSPFv2

Router ID duplicados en routers adyacentes

R1 a R2

R1

```
[admin@MikroTik-R1] > routing ospf instance print  
Flags: X - disabled, * - default
```

```
0   *   name="default" router-id=203.0.113.2 distribute-default=never  
      redistribute-connected=no redistribute-static=no redistribute-  
      rip=no redistribute-bgp=no redistribute-other-ospf=no metric-  
      default=1 metric-connected=20 metric-static=20 metric-rip=20  
      metric-bgp=auto metric-other-ospf=auto in-filter=ospf-in out-  
      filter=ospf-out
```

R2

```
[admin@MikroTik-R2] > routing ospf instance print  
Flags: X - disabled, * - default
```

```
0   *   name="default" router-id=203.0.113.2 distribute-default=never  
      redistribute-connected=no redistribute-static=no redistribute-  
      rip=no redistribute-bgp=no redistribute-other-ospf=no metric-  
      default=1 metric-connected=20 metric-static=20 metric-rip=20  
      metric-bgp=auto metric-other-ospf=auto in-filter=ospf-in out-  
      filter=ospf-out
```



Operaciones: OSPF troubleshooting – log comparison

OSPFv2

Router ID duplicados en
routers adyacentes

R1 a R2

R1

```
10:28:12 route,ospf,info local and remote  
router-id are the same
```

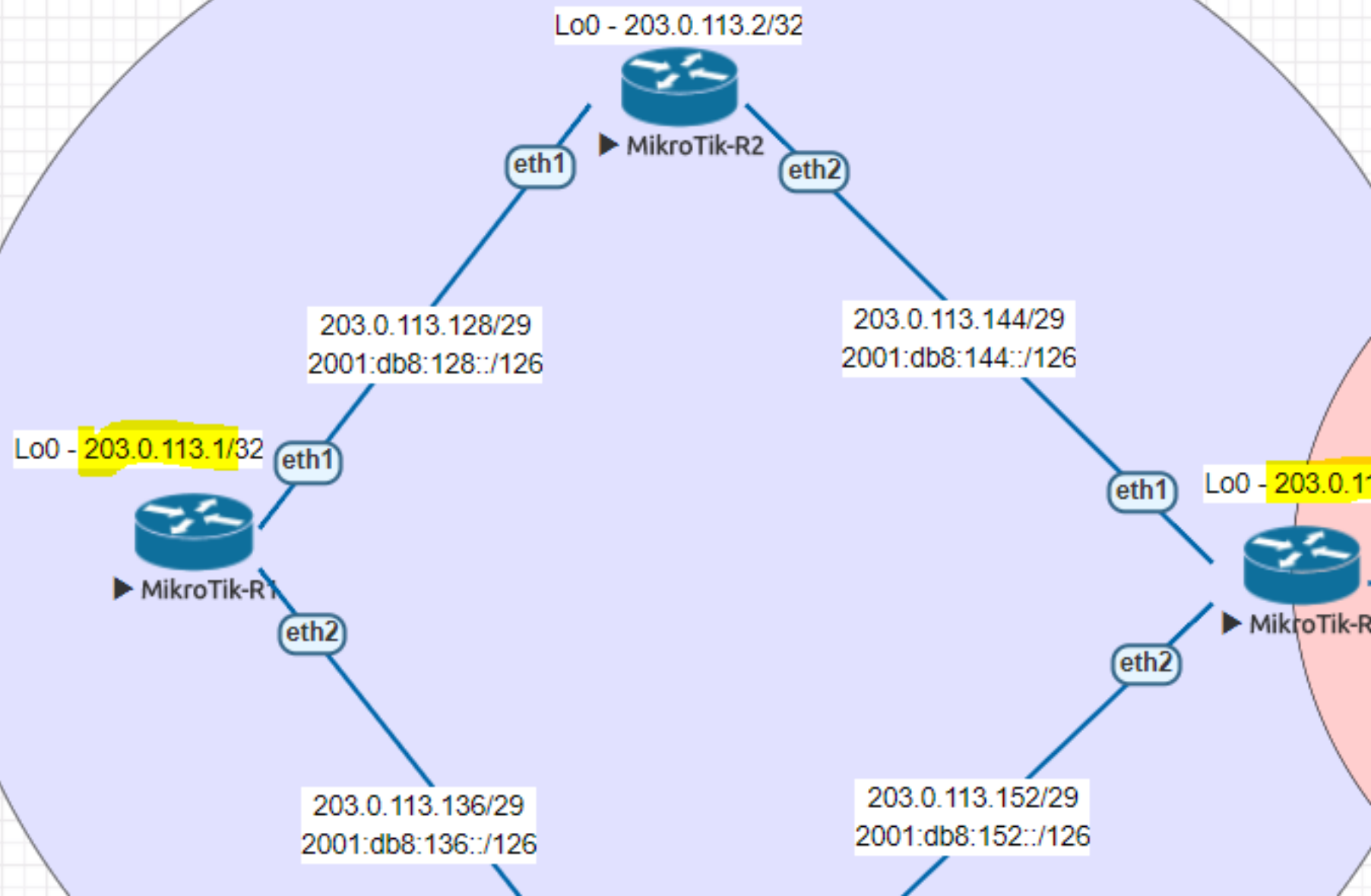
R2

```
10:29:11 route,ospf,info local and remote  
router-id are the same
```

Escenario 7:

Router-id duplicado en routers no- adyacentes

OSPF Area 0.0.0.0 (Backbone)





Operaciones: **OSPF troubleshooting – config comparison**

OSPFv2	Router ID duplicados en routers no-adyacentes	R1 a R4
R1		
<pre>/routing ospf instance set [find default=yes] router-id=203.0.113.4</pre>		
R4		
<pre>/routing ospf instance set [find default=yes] router-id=203.0.113.4</pre>		



Operaciones: OSPF troubleshooting – interface status comparison

OSPFv2

Router ID duplicados en routers adyacentes

R1 a R2

R1

```
[admin@MikroTik-R1] > routing ospf instance print  
Flags: X - disabled, * - default
```

```
0    *  name="default" router-id=203.0.113.4 distribute-default=never  
      redistribute-connected=no redistribute-static=no redistribute-  
      rip=no redistribute-bgp=no redistribute-other-ospf=no metric-  
      default=1 metric-connected=20 metric-static=20 metric-rip=20  
      metric-bgp=auto metric-other-ospf=auto in-filter=ospf-in out-  
      filter=ospf-out
```

R4

```
[admin@MikroTik-R4] > routing ospf instance print  
Flags: X - disabled, * - default
```

```
0    *  name="default" router-id=203.0.113.4 distribute-default=never  
      redistribute-connected=no redistribute-static=no redistribute-  
      rip=no redistribute-bgp=no redistribute-other-ospf=no metric-  
      default=1 metric-connected=20 metric-static=20 metric-rip=20  
      metric-bgp=auto metric-other-ospf=auto in-filter=ospf-in out-  
      filter=ospf-out
```



Operaciones: OSPF troubleshooting – log comparison

OSPFv2

Router ID duplicados en routers no-adyacentes

R1 to R4

R1

```
10:49:09 route,ospf,debug Received update of a self-originated LSA
10:49:09 route,ospf,debug type=Network LSA
10:49:09 route,ospf,debug Installing an LSA
10:49:09 route,ospf,debug lsa=Network LSA id=203.0.113.154
originator=203.0.113.4 seqnum=0x80000026
```

... (log editado para mostrar un resumen)...

```
10:49:09 route,ospf,debug Deleting an LSA
10:49:09 route,ospf,debug lsa=Network LSA id=203.0.113.154
originator=203.0.113.4 seqnum=0x80000026
```

Comentarios:

El log de OSPF por defecto no mostrará esta información, para verlo se debe activar el debug de OSPF con el siguiente comando:

```
/system log add topics=ospf action=memory
```



OSPFv2

Router ID duplicados en routers no-adyacentes

R1 to R4

R4

```
10:49:09 route,ospf,debug Received update of a self-originated LSA
10:49:09 route,ospf,debug type=Network LSA
10:49:09 route,ospf,debug Installing an LSA
10:49:09 route,ospf,debug lsa=Network LSA id=203.0.113.146
originator=203.0.113.4 seqnum=0x80000026
```

... (log editado para mostrar un resumen)...

```
10:49:09 route,ospf,debug Deleting an LSA
10:49:09 route,ospf,debug lsa=Network LSA id=203.0.113.146
originator=203.0.113.4 seqnum=0x80000026
```

Comentarios:

El término “self-originated LSA” significa que el router cree que ha recibido un LSA advertise de el mismo. Este es un buen indicador que existe un router en algun lado con un Router-ID duplicado

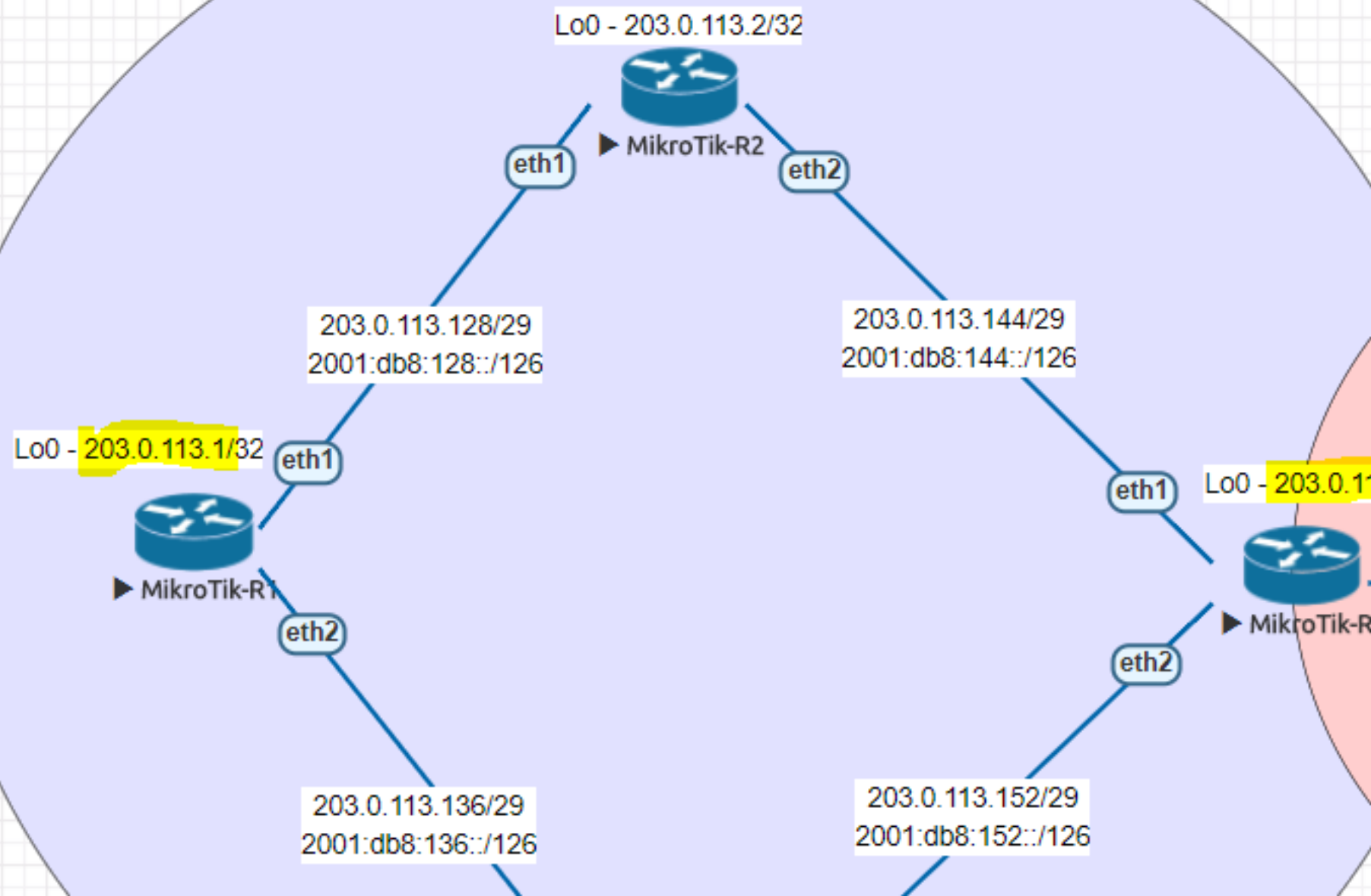
Section 3: OSPFv3 para IPv6

Escenarios básicos de troubleshooting

Escenario 8:

Hello-timer Mismatch (IPv6)

OSPF Area 0.0.0.0 (Backbone)



OSPFv3**Hello Timer Mismatch****R1 a R2****R1**

```
/routing ospf-v3 interface  
add area=backbone hello-  
interval=20s interface=ether1
```

R2

No hay configuración de interfaz en el export.... Que nos dice esto?

La interfaz fue creada dinámicamente utilizando configuraciones por defecto.



Operaciones: **OSPF troubleshooting – interface status comparison**

OSPFv3

Hello Timer Mismatch

R1 a R2

R1

```
[admin@MikroTik-R1] > routing ospf-v3 interface print detail
where interface=ether1
Flags: X - disabled, I - inactive, D - dynamic, P - passive
0      area=backbone interface=ether1 cost=10 priority=1
network-type=default retransmit-interval=5s transmit-delay=1s
hello-interval=20s dead-interval=40s instance-id=0 use-bfd=no
```

R2

```
[admin@MikroTik-R2] > routing ospf-v3 interface print detail
where interface=ether1
Flags: X - disabled, I - inactive, D - dynamic, P - passive
0      area=backbone interface=ether1 cost=10 priority=1
network-type=default retransmit-interval=5s transmit-delay=1s
hello-interval=10s dead-interval=40s instance-id=0 use-bfd=no
```




OSPFv3

Hello Timer Mismatch

R1 a R2

R1

```
12:34:22 route,ospf,info Discarding Hello
packet: mismatch in hello-interval
12:34:22 route,ospf,info mine=20
12:34:22 route,ospf,info remote=10
12:34:22 route,ospf,info
source=fe80::5200:ff:fe02:0
```

R2

```
13:00:08 route,ospf,info Discarding Hello
packet: mismatch in hello-interval
13:00:08 route,ospf,info mine=10
13:00:08 route,ospf,info remote=20
13:00:08 route,ospf,info
source=fe80::5200:ff:fe01:0
```

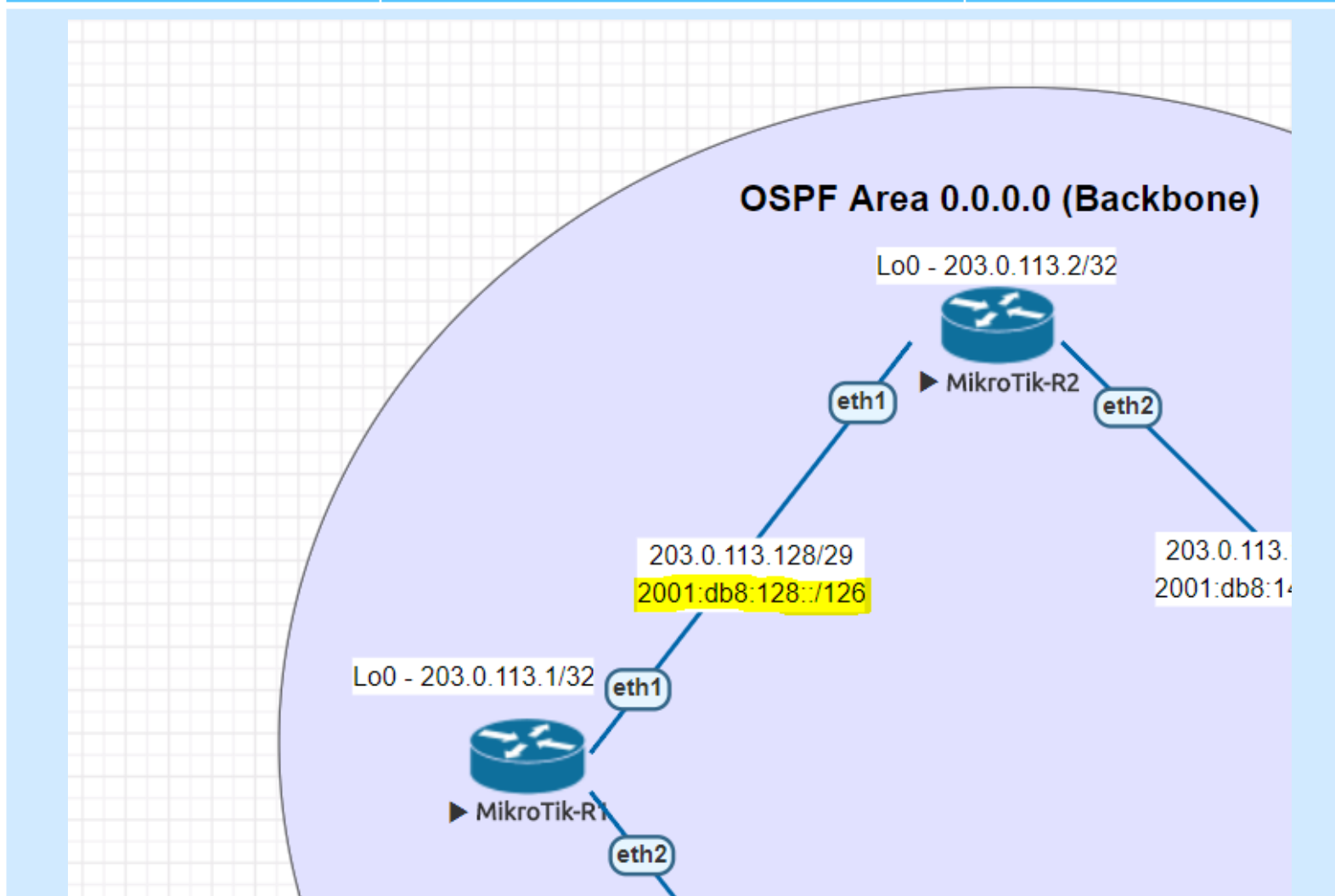


Escenario 9: Area Mismatch (IPv6)

OSPFv3

Area Mismatch

R1 a R2



OSPFv3	Area Mismatch	R1 a R2
R1		
<pre>/routing ospf-v3 interface add area=backbone hello-interval=10s interface=ether1</pre>		
R2		
<pre>/routing ospf-v3 interface add area=Area51-v6 hello-interval=10s interface=ether1</pre>		
Nota: IPv6 no utiliza los comandos Network		



Operaciones: **OSPF troubleshooting – interface status comparison**

OSPFv3

Area Mismatch

R1 a R2

R1

```
[admin@MikroTik-R1] > routing ospf-v3 interface print detail  
where interface=ether1
```

Flags: X - disabled, I - inactive, D - dynamic, P - passive
0 **area=backbone** interface=ether1 cost=10 priority=1 network-
type=default retransmit-interval=5s transmit-delay=1s hello-
interval=10s dead-interval=40s instance-id=0 use-bfd=no

R2

```
[admin@MikroTik-R2] > routing ospf-v3 interface print detail  
where interface=ether1
```

Flags: X - disabled, I - inactive, D - dynamic, P - passive
0 **area=Area51-v6** interface=ether1 cost=10 priority=1 network-
type=default retransmit-interval=5s transmit-delay=1s hello-
interval=10s dead-interval=40s instance-id=0 use-bfd=no



Operaciones: OSPF troubleshooting – log comparison

OSPFv3

Area Mismatch

R1 a R2

R1

```
12:48:32 route,ospf,debug Discarding packet: invalid area ID
12:48:32 route,ospf,debug source=fe80::5200:ff:fe02:0
12:48:32 route,ospf,debug mine=0.0.0.0
12:48:32 route,ospf,debug packet's=0.0.0.51
```

NOTE: Se requiere habilitar el debug de OSPF para observar este mensaje en IPv6, a diferencia de IPv4

R2

```
12:53:12 route,ospf,debug Discarding packet: invalid area ID
12:53:12 route,ospf,debug source=fe80::5200:ff:fe01:0
12:53:12 route,ospf,debug mine=0.0.0.51
12:53:12 route,ospf,debug packet's=0.0.0.0
```

Causas comunes de problemas con OSPF

- Firewall bloquea el protocolo OSPF
- Una excesiva pérdida de paquetes causa que los neighbors de OSPF se caigan
- Elevado uso de CPU en el router
- Existe un Bug en OSPF que causa la caída

Bugs de OSPF conocidos en RouterOS

- OSPFv2 - MD5 Authentication tiene problemas al momento que se empiezan a perder paquetes y la adyacencia se reinicia.
- OSPFv3 – Enrutamiento recursivo
- OSPFv2 – Máximo 120 LSAs por un bug de fragmentación de paquetes



Design: **Questions?**

Preguntas??