



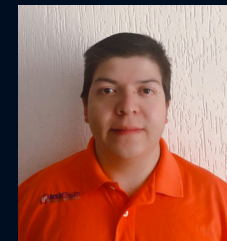
Operaciones de un ISP— Troubleshooting de OSPF para IPv4/IPv6 en RouterOS

PRESENTED BY:

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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)

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Certificaciones:

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

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IP

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Expertos en Networking

Whitebox | ISP | Data Center | Enterprise

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

Locations in: US | Canada | South America

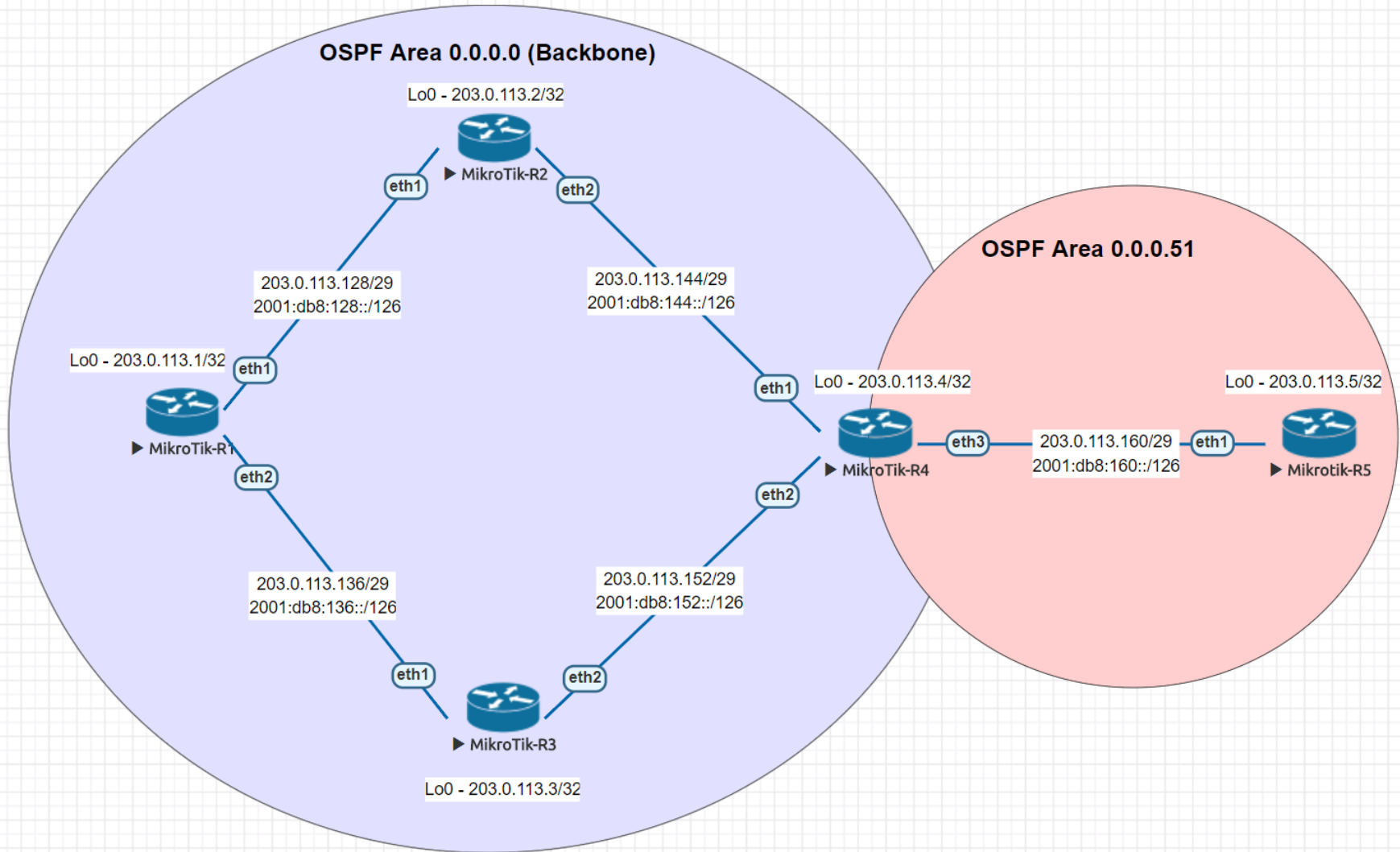
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Meta de esta presentación: Cuando esta presentación acabe, habremos aclarado algunos conceptos clave:

- 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

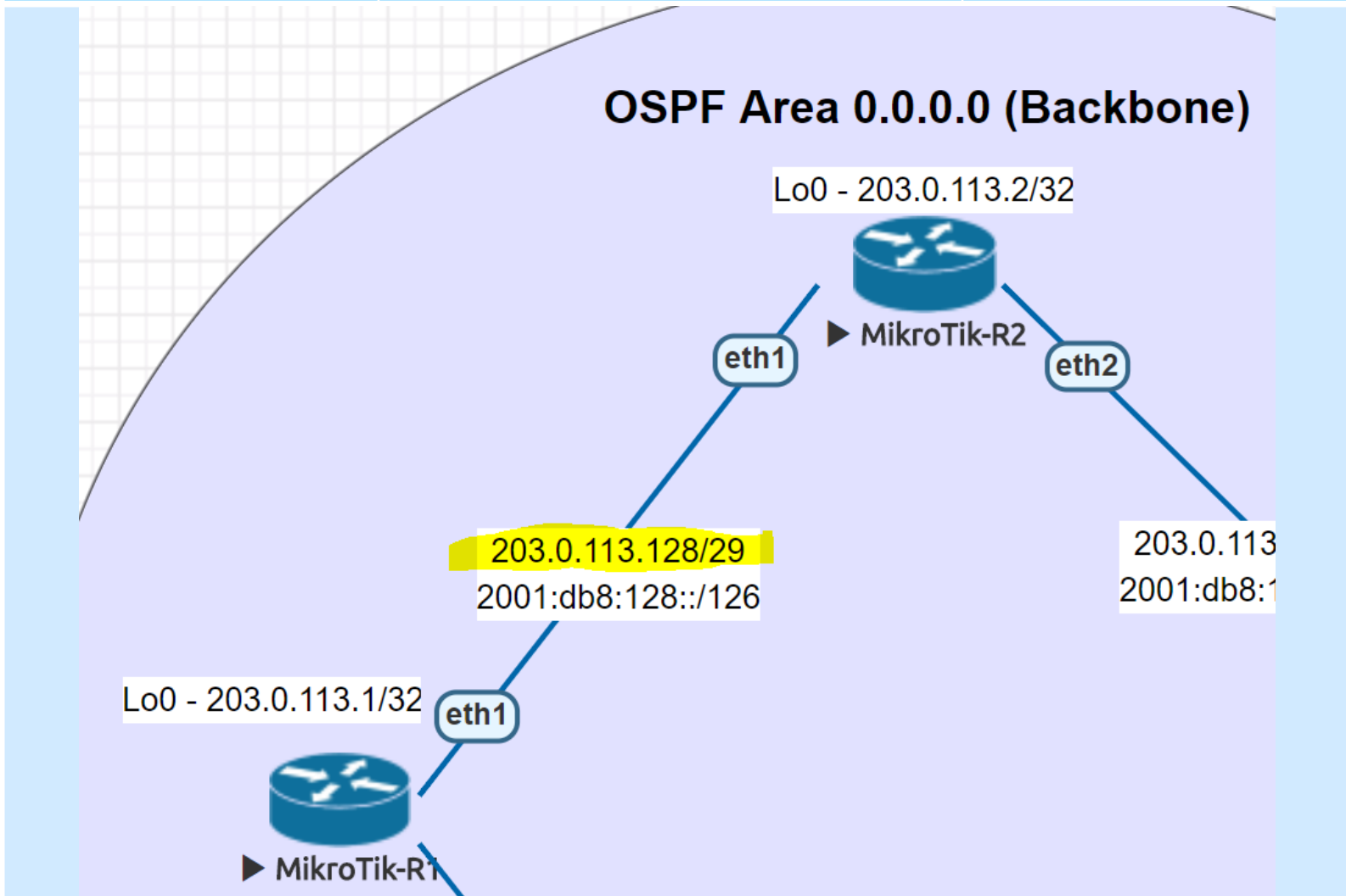
Escenarios de troubleshooting básico

Escenario 1: Hello Timer Mismatch

OSPFv2

Hello Timer Mismatch

R1 a R2



OSPFv2**Hello Timer Mismatch****R1 a R2****R1**

```
/routing ospf interface  
add 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.

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**

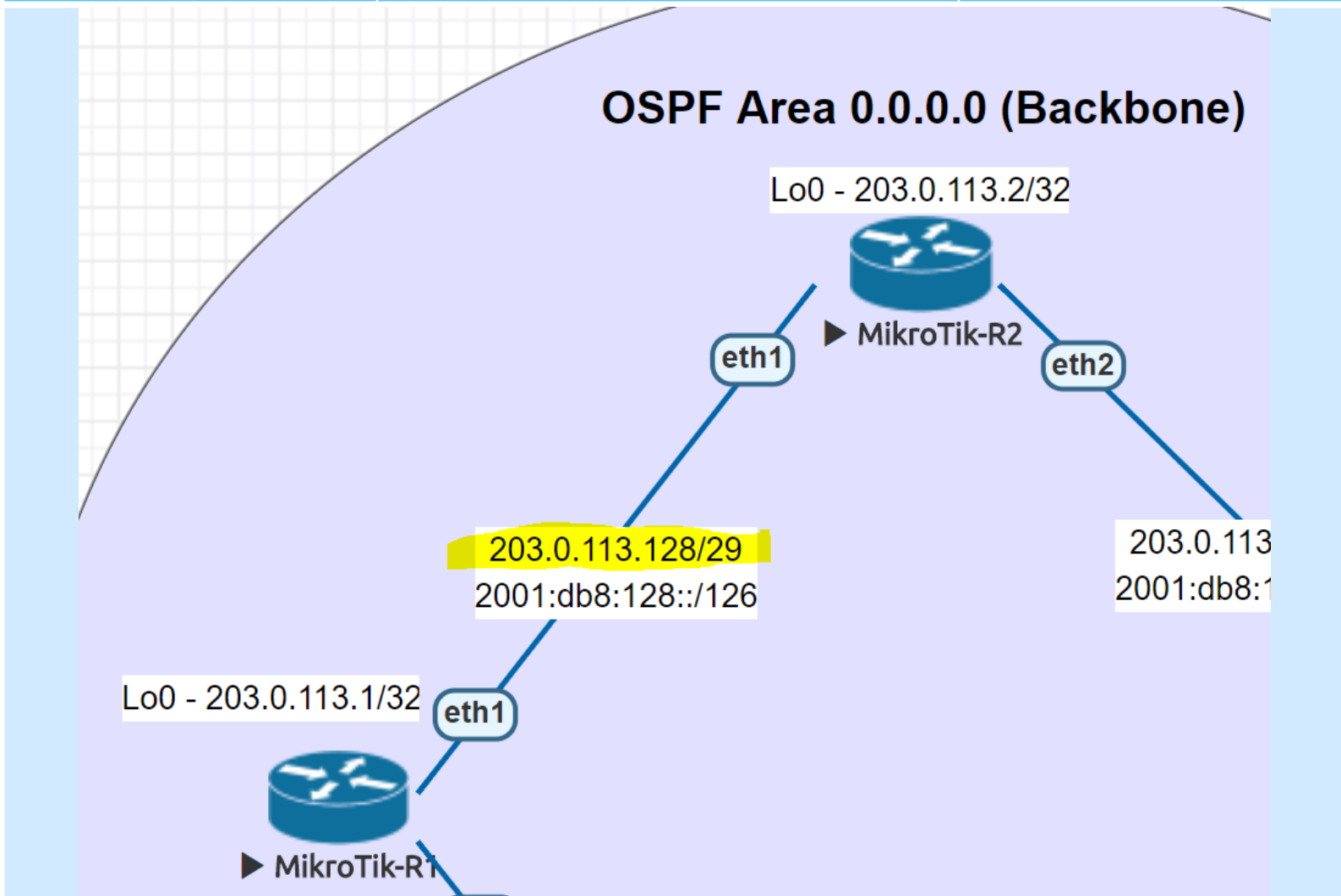
```
12:34:22 route,ospf,info Discarding Hello
packet: mismatch in hello-interval
12:34:22 route,ospf,info mine=20
12:34:22 route,ospf,info remote=10
12:34:22 route,ospf,info
source=203.0.113.130
```

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
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OSPFv2**Dead Timer Mismatch****R1 a R2****R1**

```
/routing ospf interface  
add dead-interval=1m20s  
interface=ether1
```

R2

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

La interfaz fue creada dinámicamente utilizando configuraciones por defecto.

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**

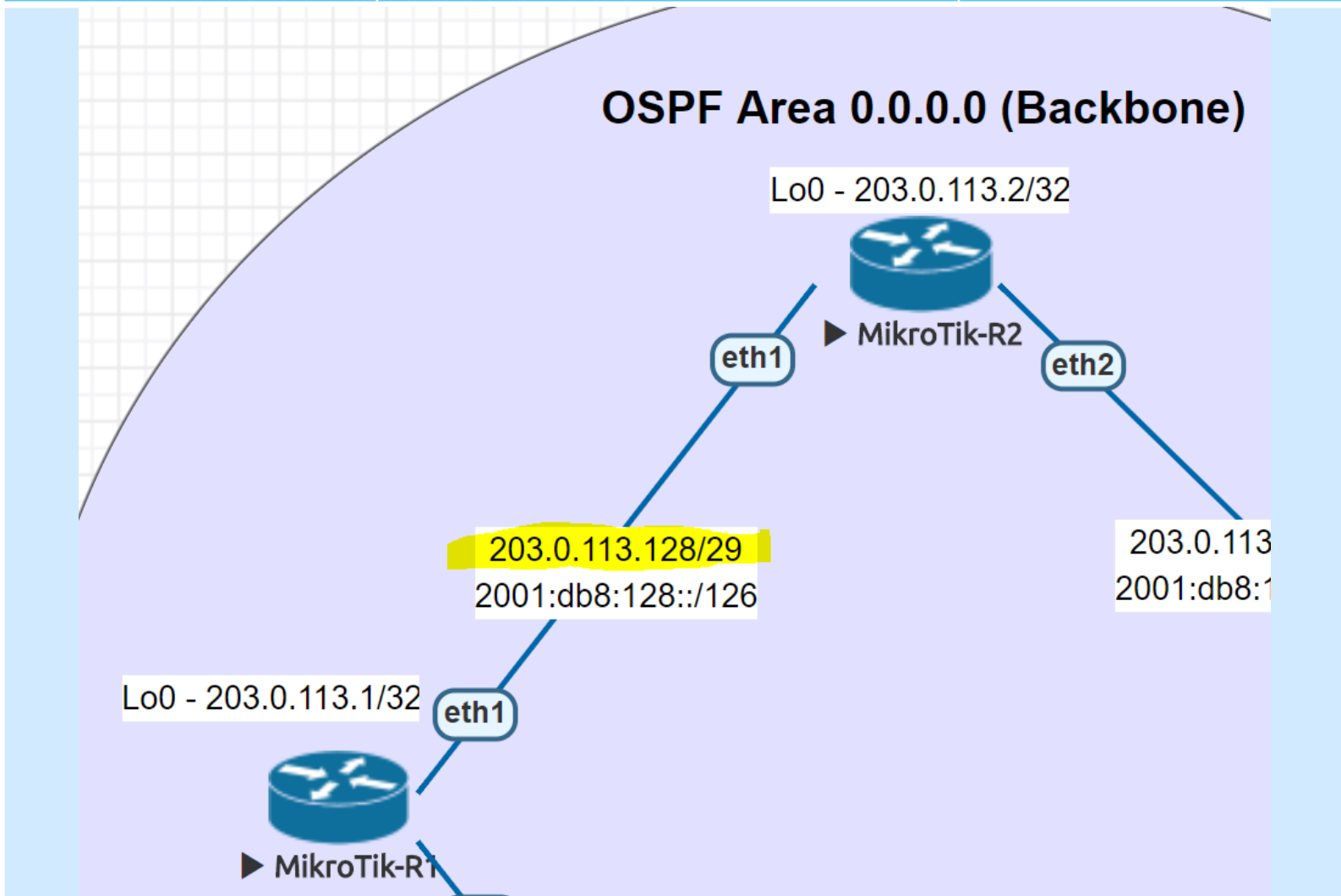
```
12:34:22 route,ospf,info Discarding Hello
packet: mismatch in dead-interval
12:34:22 route,ospf,info mine=80
12:34:22 route,ospf,info remote=40
12:34:22 route,ospf,info
source=203.0.113.130
```

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
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OSPFv2

Network Type Mismatch

R1 a R2

R1

```
/routing ospf interface  
add interface=ether1 network-  
type=ptmp
```

R2

```
/routing ospf interface  
add interface=ether1 network-  
type=nbma
```


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
```

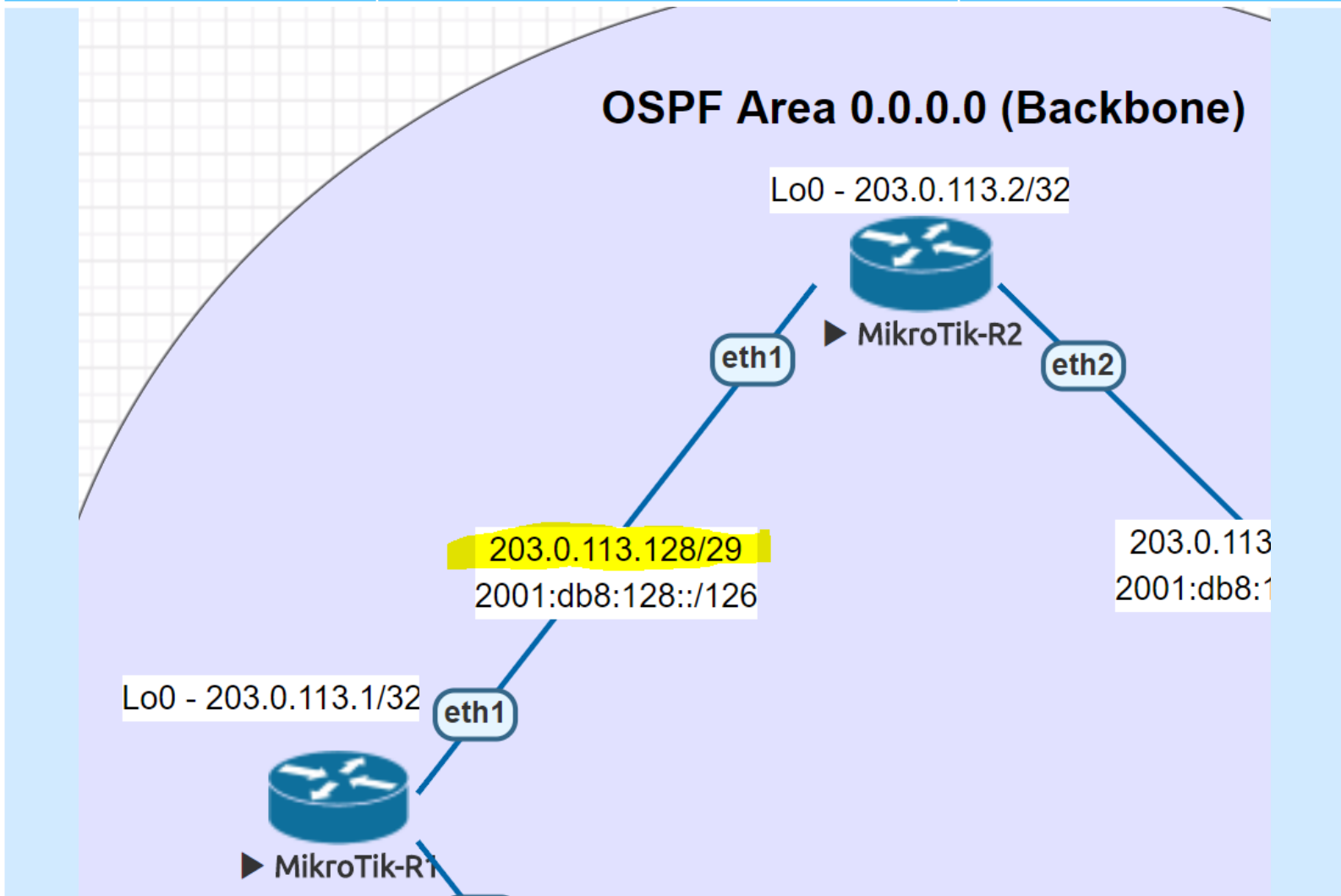


Operaciones: **OSPF troubleshooting – log comparison**

OSPFv2	Network Type Mismatch	R1 a R2
<p data-bbox="73 329 125 368">R1</p> <p data-bbox="73 501 1296 562">No hay entrada en los logs para este problema</p>		
<p data-bbox="73 858 125 896">R2</p> <p data-bbox="73 1062 1296 1123">No hay entrada en los logs para este problema</p>		

Escenario 4: Area Mismatch

OSPFv2	Area Mismatch	R1 a R2
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OSPFv2**Area Mismatch****R1 a R2****R1**

```
/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
```

R2

```
/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
```

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
```

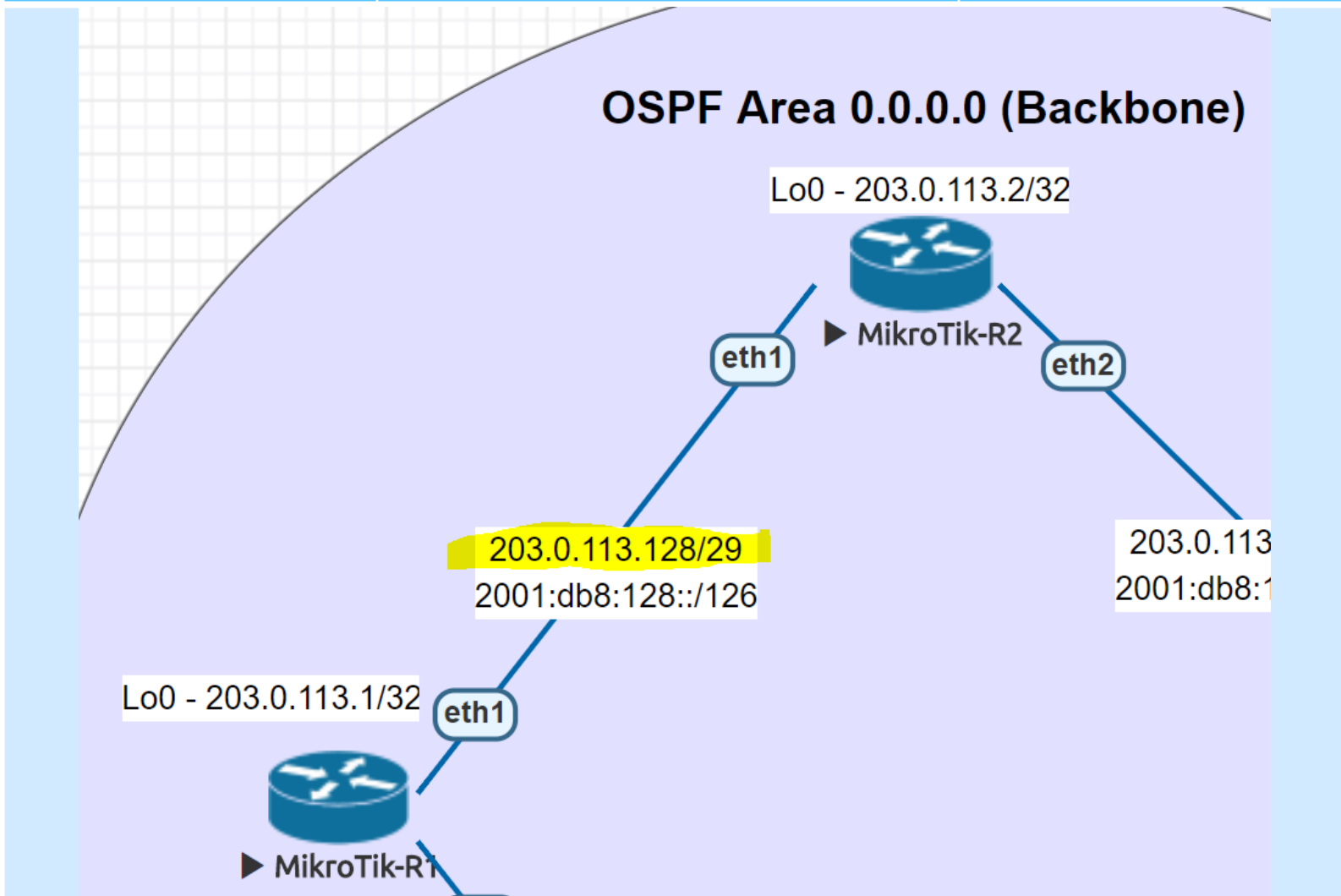


Operaciones: OSPF troubleshooting – log comparison

OSPFv2	Area Mismatch	R1 a R2
R1		
12:34:22 route,ospf,info area ID	Discarding packet: mismatched	
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 area ID	Discarding packet: mismatched	
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
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OSPFv2	MTU Mismatch	R1 a R2
R1 <pre data-bbox="183 428 1506 542">/interface ethernet set [find default-name=ether1] mtu=1450</pre>		
R2 <p data-bbox="183 1013 1709 1063">No existe configuración de MTU en el export.... Que nos dice esto?</p> <p data-bbox="183 1142 1246 1192">El MTU Capa 3 tiene valores por defecto de 1500</p>		

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

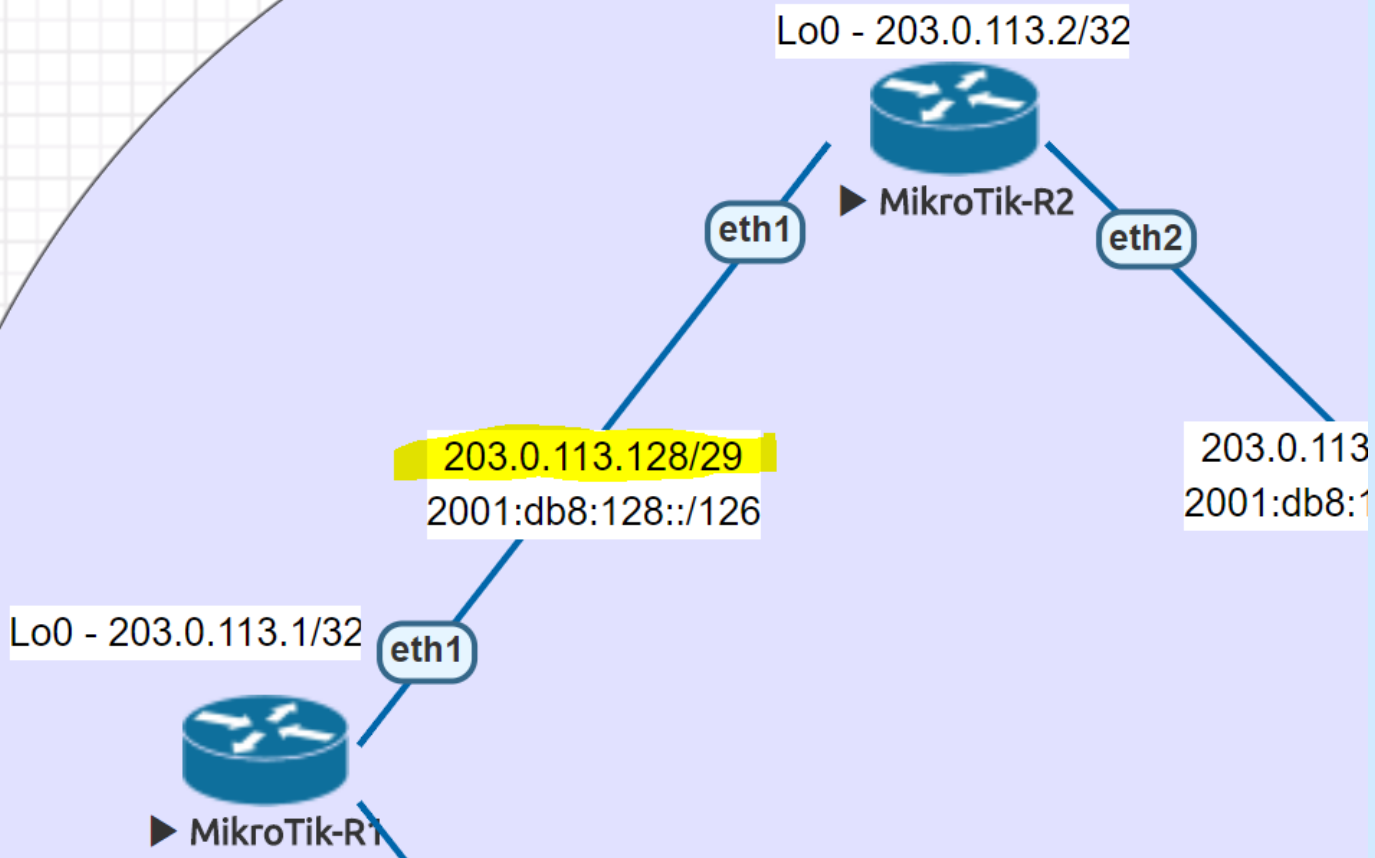
Escenario 6: Router-id duplicado en routers adyacentes

OSPFv2

Router ID duplicados en
routers adyacentes

R1 a R2

OSPF Area 0.0.0.0 (Backbone)



OSPFv2	Router ID duplicados en routers adyacentes	R1 a R2
R1 <pre data-bbox="189 586 1663 696">/routing ospf instance set [find default=yes] router-id=203.0.113.2</pre>		
R2 <pre data-bbox="189 1082 1663 1192">/routing ospf instance set [find default=yes] router-id=203.0.113.2</pre>		

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

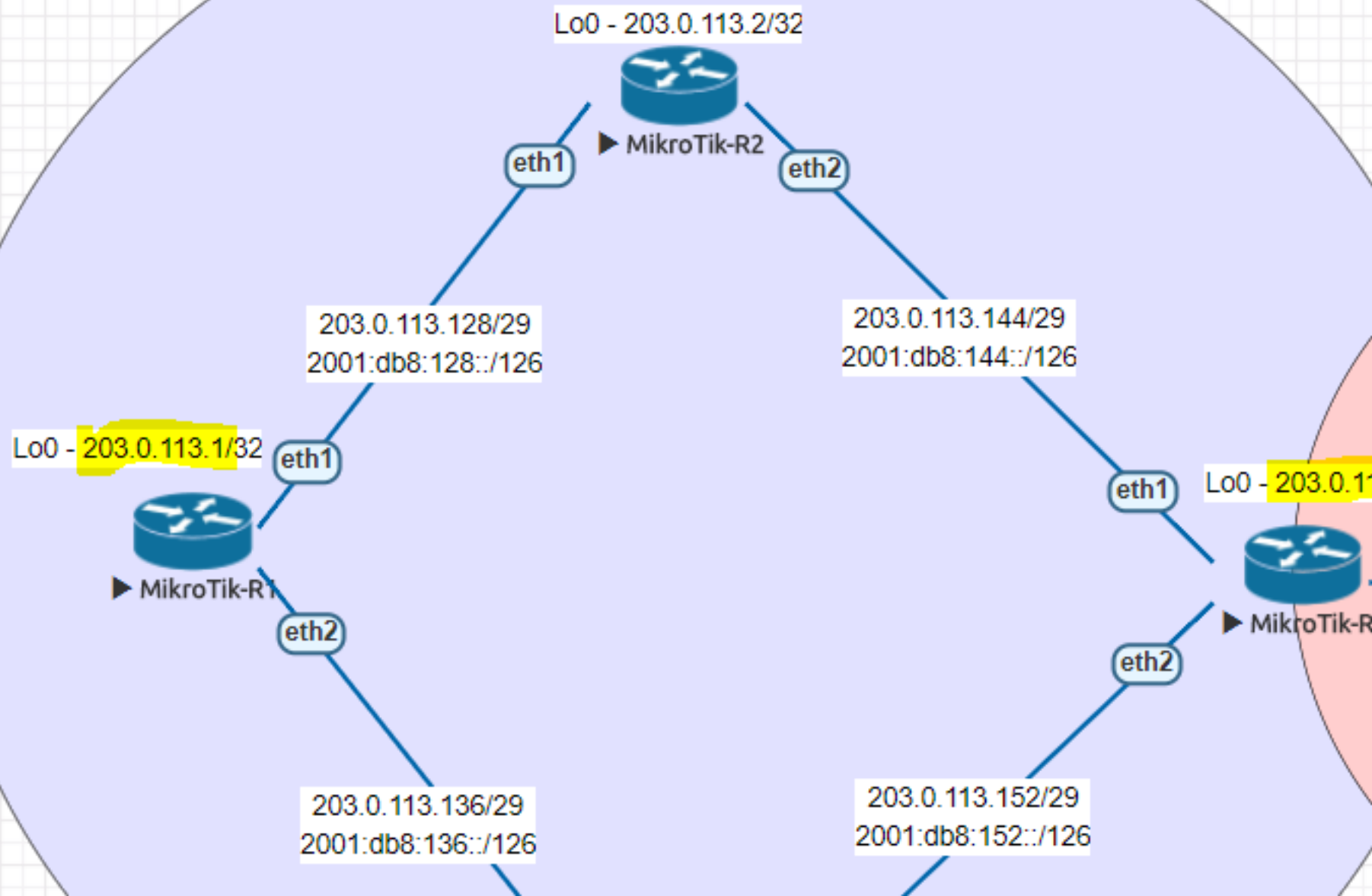
```
10:28:12 route,ospf,info local and remote  
router-id are the same
```

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)



OSPFv2**Router ID duplicados en
routers no-adyacentes****R1 a R4****R1**

```
/routing ospf instance  
set [ find default=yes ] router-id=203.0.113.4
```

R4

```
/routing ospf instance  
set [ find default=yes ] router-id=203.0.113.4
```


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
```

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

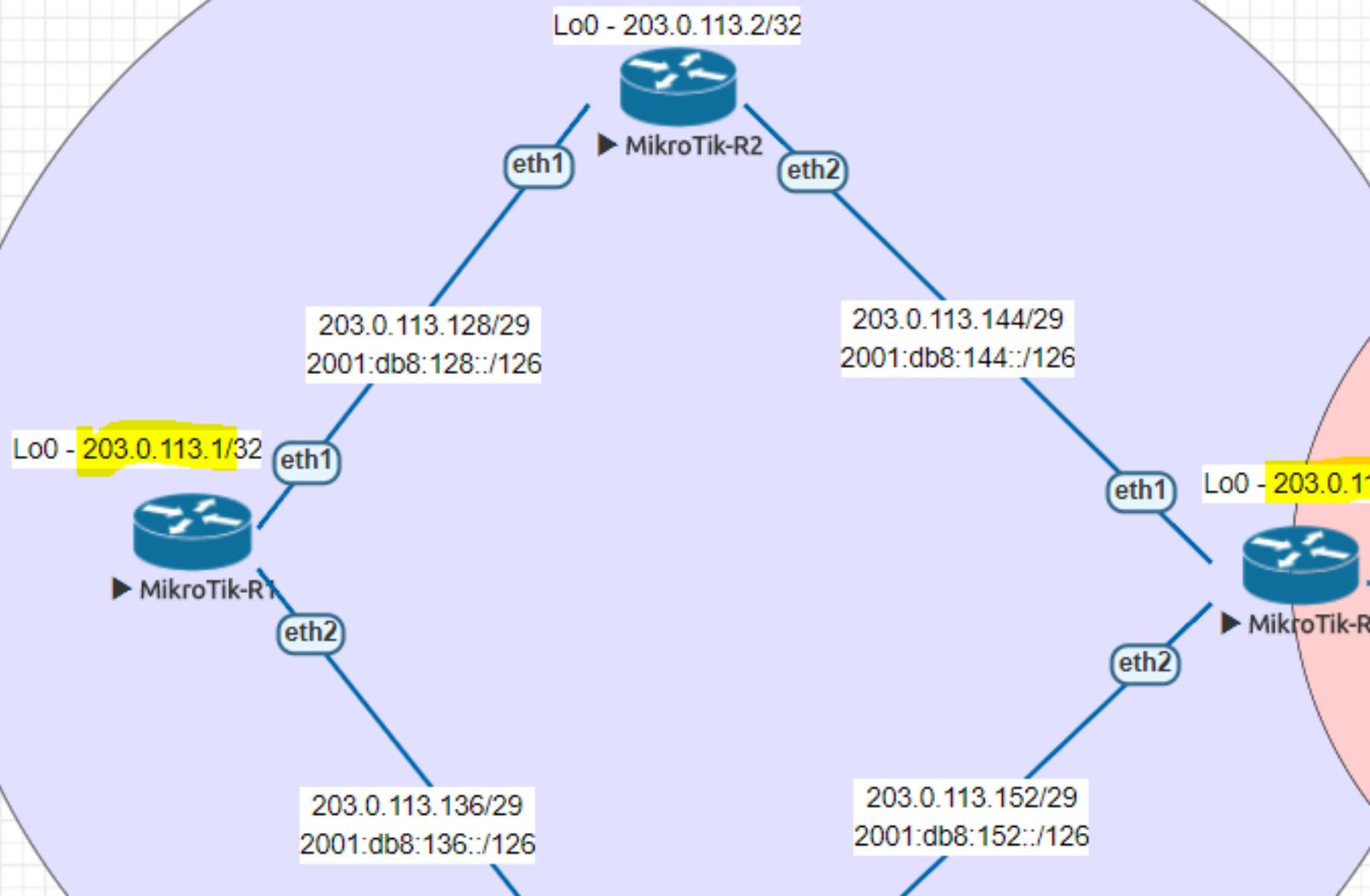
Section 3: OSPFv3 para IPv6

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.

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

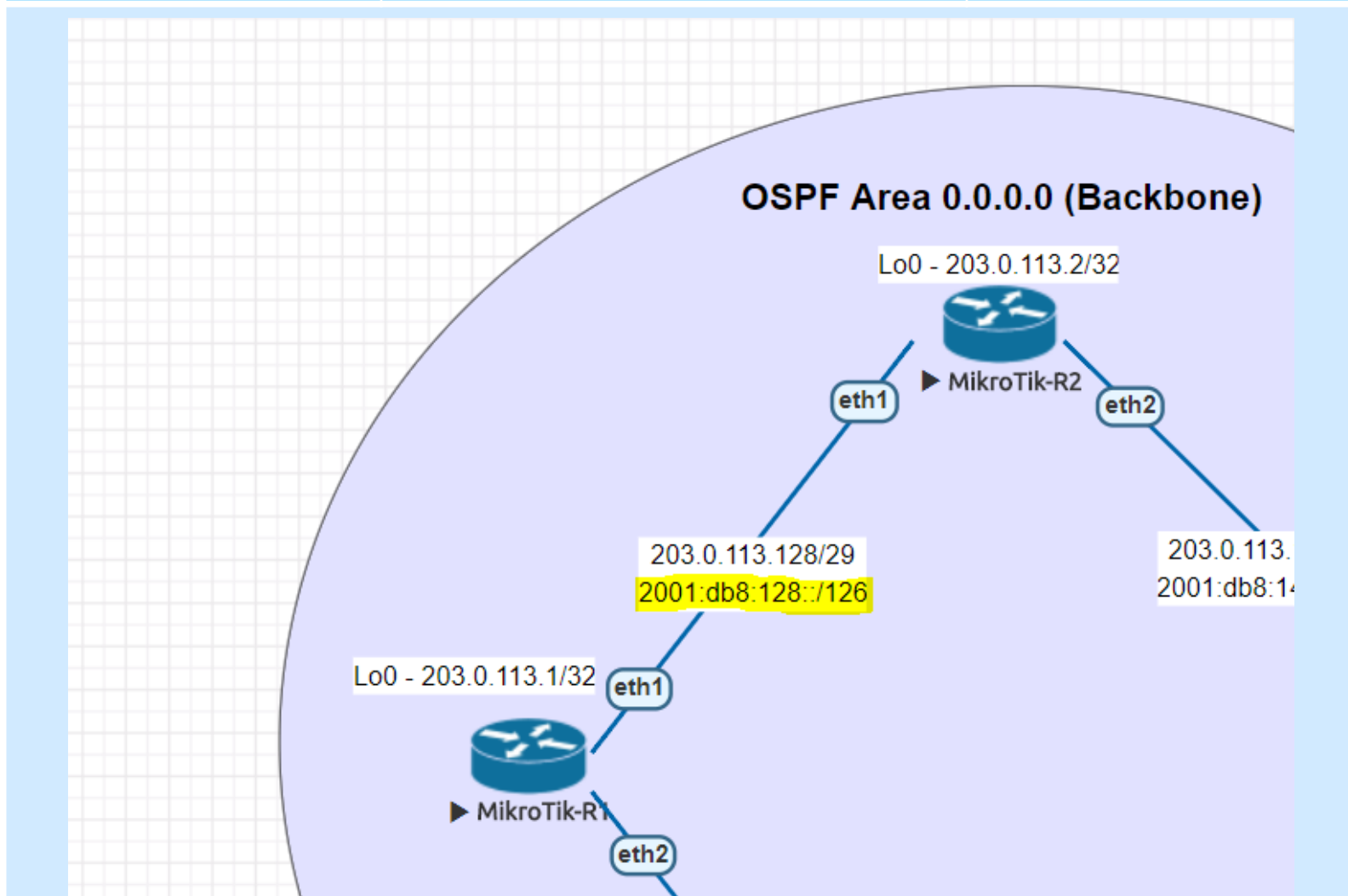
```
13:00:08 route,ospf,info Discarding Hello
packet: mismatch in hello-interval
13:00:08 route,ospf,info mine=10
13:00:08 route,ospf,info remote=20
13:00:08 route,ospf,info
source=fe80::5200:ff:fe01:0
```

Escenario 9: Area Mismatch (IPv6)

OSPFv3

Area Mismatch

R1 a R2



OSPFv3	Area Mismatch	R1 a R2
R1 <pre data-bbox="185 544 1568 743">/routing ospf-v3 interface add area=backbone hello-interval=10s interface=ether1</pre>		
R2 <pre data-bbox="185 1025 1373 1196">/routing ospf-v3 interface add area=Area51-v6 hello-interval=10s interface=ether1</pre> Nota: IPv6 no utiliza los comandos Network		

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
```

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??