

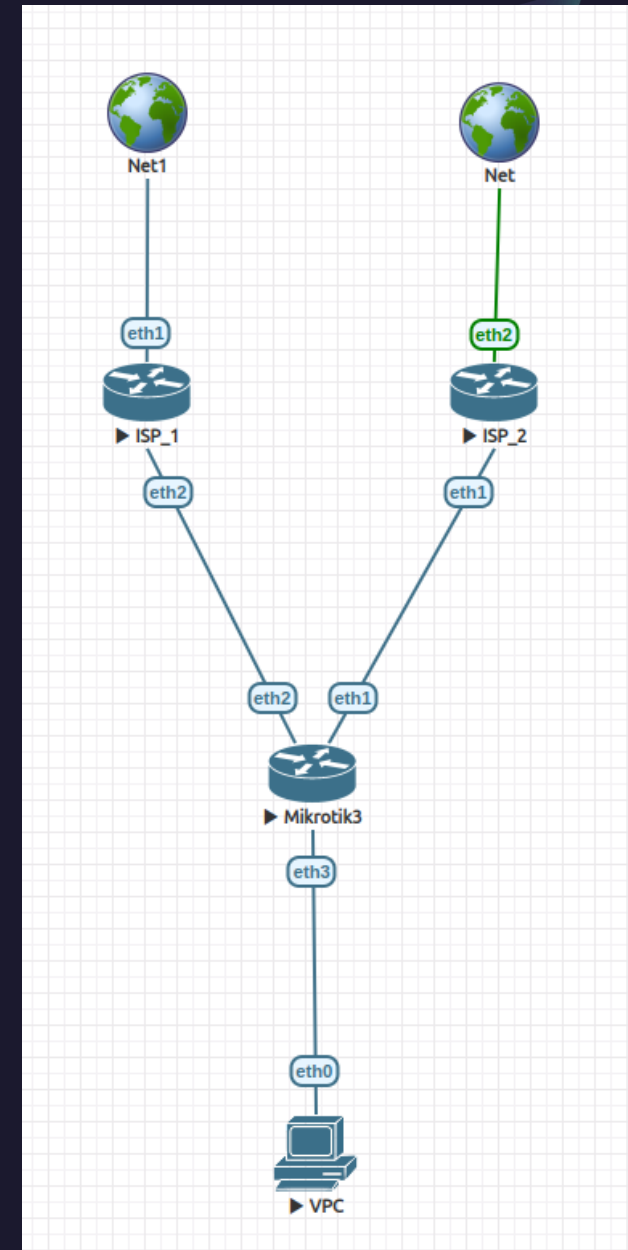
Laboratoare Administarea Retelelor de Calculatoare

Rutare Recursiva



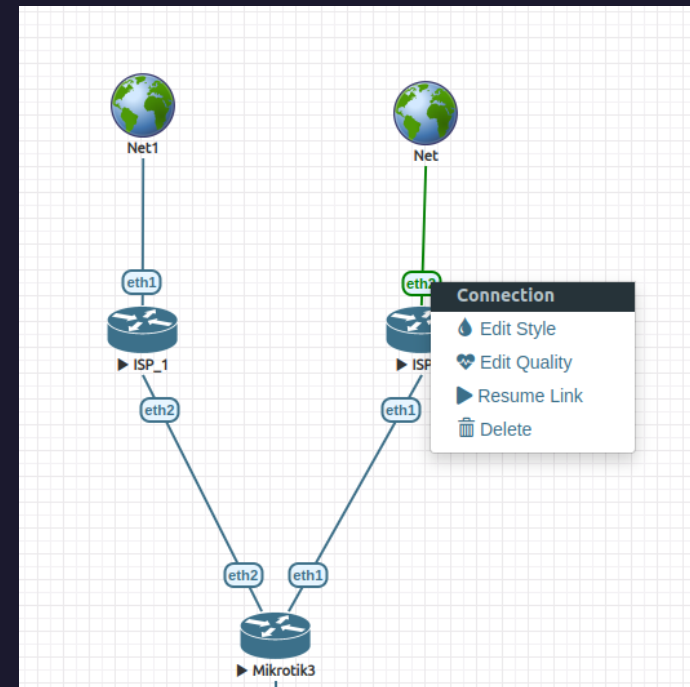
Topologie

- In acest laborator topologia va fi formata din doua routere care vor tine locul a doi ISP (Internet Service Providers, ISP_1 si ISP_2)
- Un router care va agrega conexiunile de la cei doi ISP si va face rutarea recursiva.
- Aceasta o folosim pentru a detecta intreruperi pe toata ruta spre internet si pentru a comuta pe o noua ruta atunci cand detectam intreruperi.
- Acest lucru nu este posibil cu rute de tipul WAN Failover sau ECMP pentru ca nu putem detecta decat daca legatura intre noi si ISP este cu probleme.
- Cei doi ISP ofera internet prin NAT si DHCP iar configuratia o facem doar pe routerul Mikrotik3.



Topologie

- In vairanta de failover daca oprim link-ul intre internet si ISP_2 nu vom detecta o problema.
- Chiar daca noi practic nu mai avem conexiune la internet si chiar si in cazul ECMP o sa avem intreruperi pentru ca va incerca sa ruteze intre ambele gateway-uri.



Route List					Distance	Pref.	Source
DAd+	0.0.0.0/0	192.168.2.1			1		
Dd	0.0.0.0/0	192.168.1.1			2		
DAC	192.168.1.0/24	ether2			0		
DAC	192.168.2.0/24	ether1			0		
DAC	192.168.100.0/24	ether3			0		

```
VPCS> trace google.ro
google.ro resolved to 142.250.201.195
trace to google.ro, 8 hops max, press Ctrl+C to stop
 1  192.168.100.1  0.353 ms  0.250 ms  0.260 ms
 2  192.168.2.1  0.921 ms  0.784 ms  0.770 ms
 3  192.168.122.1  2.060 ms  1.411 ms  1.478 ms
 4  192.168.88.1  8.522 ms  6.989 ms  6.398 ms
 5  10.0.0.1  6.415 ms  6.543 ms  8.411 ms
 6  10.5.50.97  7.188 ms  6.861 ms  6.926 ms
 7  10.220.197.132  7.275 ms  7.421 ms  6.101 ms
 8  10.220.153.18  20.447 ms  19.743 ms  41.810 ms
```

```
VPCS> trace google.ro
Cannot resolve google.ro
```

```
VPCS> trace google.ro
Cannot resolve google.ro
```

```
VPCS> trace google.ro
^C Cannot resolve google.ro
```

```
VPCS> trace google.ro
Cannot resolve google.ro
```

```
VPCS> █
```

Congiruirea conexiunilor

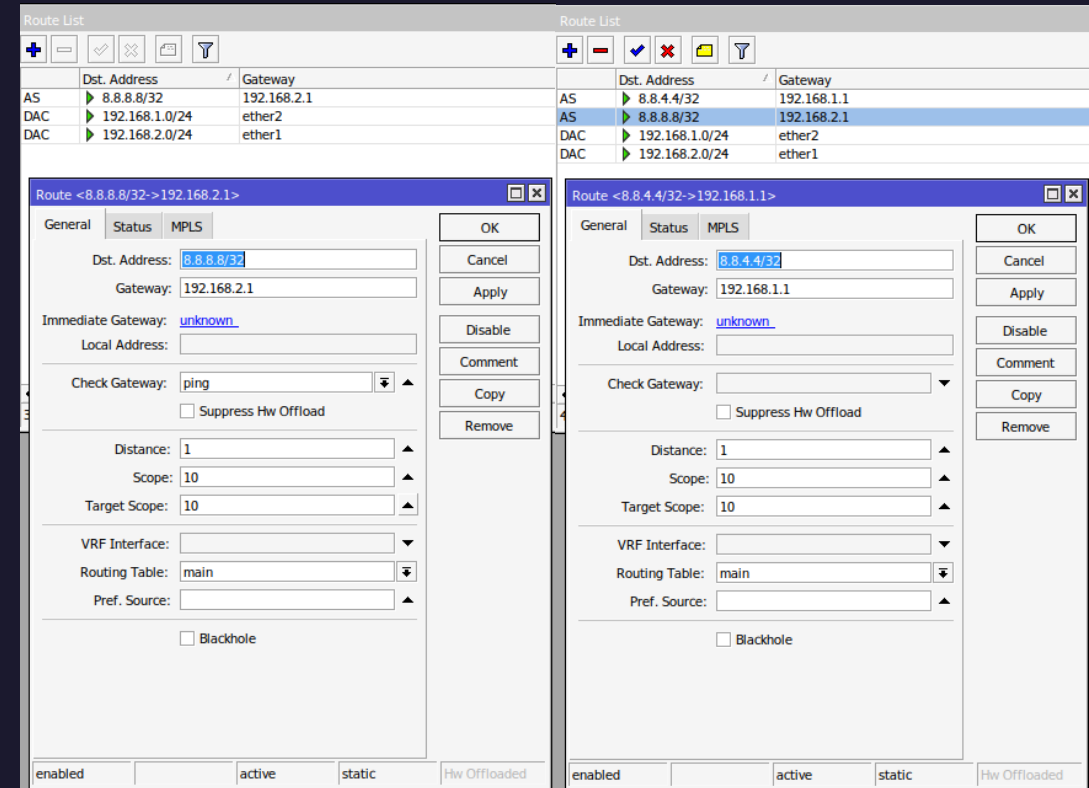
- Incepem prin a elimina din configul default de client dhcp routa default.
- Dupa care adaugam al doilea client dhcp.
- In cazul conexiunilor statice acest pas nu este necesar.
- Dupa cum putem vedea in lista de rute, nu avem setate rute default (0.0.0.0/0)

The screenshot displays the Mikrotik WinBox interface. At the top, the 'DHCP Client' window is open, showing a table with one entry for 'ether1' with IP address '192.168.1.25...' and status 'bound'. Below this, the 'DHCP Client <ether1>' configuration window is open, showing the 'Advanced' tab with 'Interface' set to 'ether1', 'Use Peer DNS' and 'Use Peer NTP' checked, and 'Add Default Route' set to 'no'. Below this, the 'New DHCP Client' window is open, showing the 'Advanced' tab with 'Interface' set to 'ether2', 'Use Peer DNS' and 'Use Peer NTP' checked, and 'Add Default Route' set to 'no'. At the bottom, the 'Route List' window is open, showing a table with two entries:

	Dst. Address	Gateway	Distance	Pref. S
DAC	192.168.1.0/24	ether2	0	
DAC	192.168.2.0/24	ether1	0	

Configurarea rutelor

- Incepem prin a configura ruta de detectie intre ISP_2 si internet folosind ca gateway 8.8.8.8.
- Practic zicem ca putem ajunge la adresa 8.8.8.8 prin gateway-ul ISP_2 si trebuie declarat Scope 10 marcand astfel ca o ruta accesibila direct intre ISP si ip.
- Repetam acelasi lucru pentru ISP_1 si ii facem pereche cu celalat server de DNS de la Google (8.8.4.4).



Configurarea rutelor

- Acum vom face o ruta recursiva in care practic spunem ca accesul la internet (0.0.0.0/0) se va face prin gateway-ul 8.8.8.8 care este intermediar setand target-scope cu 11 si se va ruta recursiv catre gateway-ul ISP_2 si verificarea se va face cu ping.
- Repetam procedura si pentru ISP_1 doar ca setam distanta cu 2 pentru a-l transforma in gateway de backup, in cazul in care ramaneam cu el pe 1 se activa modul ECMP.
- Dupa cum putem vedea din detalii rutelor, cele doua destinatii ajung recursiva la ether1 respectiv ether2.

Route <0.0.0.0/0->8.8.8.8>

General Status MPLS

Dst. Address: 0.0.0.0/0

Gateway: 8.8.8.8

Immediate Gateway: 192.168.2.1%ether1

Local Address:

Check Gateway: ping

Distance: 1

Scope: 30

Target Scope: 11

VRF Interface:

Routing Table: main

Pref. Source:

Blackhole

enabled active static Hw Offload ECMP

Route <0.0.0.0/0->8.8.4.4>

General Status MPLS

Dst. Address: 0.0.0.0/0

Gateway: 8.8.4.4

Immediate Gateway: 192.168.1.1%ether2

Local Address:

Check Gateway: ping

Distance: 2

Scope: 30

Target Scope: 11

VRF Interface:

Routing Table: main

Pref. Source:

Blackhole

enabled active static Hw Offload ECMP

Route List											
AS	Dst. Address:	0.0.0.0/0	Gateway:	8.8.8.8	Immediate Gateway:	192.168.2.1%ether1	Local Address:		Check Gateway:	ping	Suppress Hw Offload:
	Distance:	1	Scope:	30	Target Scope:	11	Routing Table:	main	Pref. Source:		Blackhole:
	Belongs To:	static	AFI:	ip4	Contribution:	active	Route Cost:	0	Total Cost:	0	Peer:
	Aggregator:		AS Path:		Cluster List:		Communities:		Ext. Communities:		Large Communities:
	Unknown:		Originator ID:		Nexthops:		Out Nexthop:		IGP Metric:	0	
S	Dst. Address:	0.0.0.0/0	Gateway:	8.8.4.4	Immediate Gateway:	192.168.1.1%ether2	Local Address:		Check Gateway:	ping	Suppress Hw Offload:
	Distance:	2	Scope:	30	Target Scope:	11	Routing Table:	main	Pref. Source:		Blackhole:
	Belongs To:	static	AFI:	ip4	Contribution:	best candidate	Route Cost:	0	Total Cost:	0	Peer:
	Aggregator:		AS Path:		Cluster List:		Communities:		Ext. Communities:		Large Communities:
	Unknown:		Originator ID:		Nexthops:		Out Nexthop:		IGP Metric:	0	
AS	Dst. Address:	8.8.4.4/32	Gateway:	192.168.1.1	Immediate Gateway:	192.168.1.1%ether2	Local Address:		Suppress Hw Offload:	no	Distance:
	Scope:	10	Target Scope:	10	Routing Table:	main	Pref. Source:		Blackhole:	no	Belongs To:
	AFI:	ip4	Contribution:	active	Route Cost:	0	Total Cost:	0	Peer:	unknown	Aggregator:
	AS Path:		Cluster List:		Communities:		Ext. Communities:		Large Communities:		Unknown:
	Originator ID:		Nexthops:		Out Nexthop:		IGP Metric:	0			
AS	Dst. Address:	8.8.8.8/32	Gateway:	192.168.2.1	Immediate Gateway:	192.168.2.1%ether1	Local Address:		Suppress Hw Offload:	no	Distance:
	Scope:	10	Target Scope:	10	Routing Table:	main	Pref. Source:		Blackhole:	no	Belongs To:
	AFI:	ip4	Contribution:	active	Route Cost:	0	Total Cost:	0	Peer:	unknown	Aggregator:
	AS Path:		Cluster List:		Communities:		Ext. Communities:		Large Communities:		Unknown:
	Originator ID:		Nexthops:		Out Nexthop:		IGP Metric:	0			
DAC	Dst. Address:	192.168.1.0/24	Gateway:	ether2	Immediate Gateway:	ether2	Local Address:	192.168.1.254%eth...	Suppress Hw Offload:	no	Distance:
	Scope:	10	Routing Table:	main	Blackhole:	no	Belongs To:	connected	AFI:	ip4	Contribution:
	Route Cost:	0	Total Cost:	0	Peer:	unknown	Aggregator:		AS Path:		Cluster List:
	Communities:		Ext. Communities:		Large Communities:		Unknown:		Originator ID:		Nexthops:
	Out Nexthop:		IGP Metric:	0							
DAC	Dst. Address:	192.168.2.0/24	Gateway:	ether1	Immediate Gateway:	ether1	Local Address:	192.168.2.254%eth...	Suppress Hw Offload:	no	Distance:
	Scope:	10	Routing Table:	main	Blackhole:	no	Belongs To:	connected	AFI:	ip4	Contribution:
	Route Cost:	0	Total Cost:	0	Peer:	unknown	Aggregator:		AS Path:		Cluster List:
	Communities:		Ext. Communities:		Large Communities:		Unknown:		Originator ID:		Nexthops:
	Out Nexthop:		IGP Metric:	0							
DAC	Dst. Address:	192.168.100.0/24	Gateway:	ether3	Immediate Gateway:	ether3	Local Address:	192.168.100.1%eth...	Suppress Hw Offload:	no	Distance:
	Scope:	10	Routing Table:	main	Blackhole:	no	Belongs To:	connected	AFI:	ip4	Contribution:
	Route Cost:	0	Total Cost:	0	Peer:	unknown	Aggregator:		AS Path:		Cluster List:
	Communities:		Ext. Communities:		Large Communities:		Unknown:		Originator ID:		Nexthops:
	Out Nexthop:		IGP Metric:	0							

Testarea failover-ului

- Am facut un server de dhcp pentru clientul VPC din topologie si acesta are asignata o configuratie valida.
- Acum putem suspenda legatura intre internet si ISP_2
- Routele vor fi cazute pentru cateva secunde pentru ca doar dupa ce va primi doua ping-uri time out va trece pe celalata ruta. Procesul nu este seamless dar rezolva o problema importanta a redundantei conexiunilor.

DHCP Server

	Address	MAC Address	Client ID	Server	Active Address	Active MAC Address	Active Host
D	192.168.100.254	00:50:79:66:68:04	1:0:50:79:66:68:4	dhcp1	192.168.100....	00:50:79:66:68:04	VPCS

VPCS

```
VPCS> show ip
```

```
NAME       : VPCS[1]
IP/MASK    : 192.168.100.254/24
GATEWAY    : 192.168.100.1
DNS        : 192.168.122.1 192.168.122.1
DHCP SERVER : 192.168.100.1
DHCP LEASE : 357, 600/300/525
MAC        : 00:50:79:66:68:04
LPORT      : 20000
RHOST:PORT : 127.0.0.1:30000
MTU        : 1500
```

VPCS> █

VPCS> trace google.ro
google.ro resolved to 142.251.208.99
trace to google.ro, 8 hops max, press Ctrl+C to stop

	Address	Time	Time	Time
1	192.168.100.1	0.463 ms	0.289 ms	0.394 ms
2	192.168.2.1	1.373 ms	0.994 ms	1.080 ms
3	192.168.122.1	1.203 ms	1.179 ms	1.482 ms

Dupa intrerupere

Route List

	Dest. Address	Gateway	Distance	Prefer. Source
RUSH	0.0.0.0/0	8.8.8.8	1	1
S	0.0.0.0/0	8.8.4.4	2	2
AS	8.8.4.4/32	192.168.1.1	1	1
AS	8.8.8.8/32	192.168.2.1	1	1
DAC	192.168.1.0/24	ether2	0	0
DAC	192.168.2.0/24	ether1	0	0
DAC	192.168.100.0/24	ether3	0	0

VPCS> trace google.ro
google.ro resolved to 142.251.208.99
trace to google.ro, 8 hops max, press Ctrl+C to stop

	Address	Time	Time	Time
1	192.168.100.1	0.446 ms	0.350 ms	0.328 ms
2	192.168.1.1	1.477 ms	0.791 ms	0.619 ms
3	192.168.122.1	1.235 ms	1.409 ms	1.106 ms