

8 Types of Fail over and load balance



Egypt MUM 2007.

Dhaka MUM 2016

AS a Trainer

AKM Jahangir

Managing Director, Bijoy Online Ltd.

(Mikrotik listed 1st consultant of Bangladesh)

Web: www.bijoy.net/jahan/ [01819-231755](tel:01819-231755), [fb/akm.jahangir](https://www.facebook.com/akm.jahangir)

8 Types of Fail over and load balance

- 1. Using distance**
- 2. Using bridge**
- 3. Using vrrp**
- 4. Using OSPF**

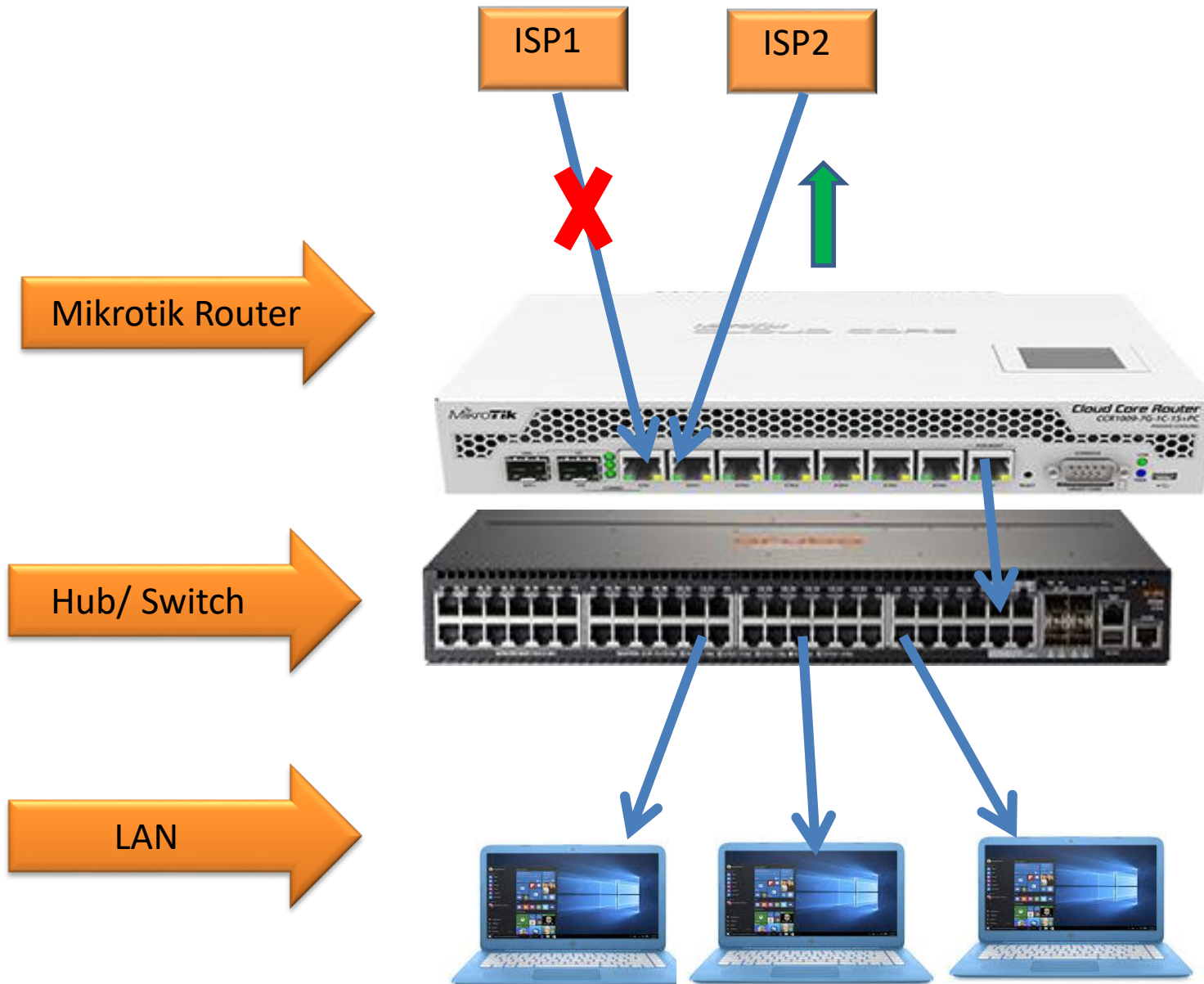
- 1. Using mangle prerouting chain**
- 2. Using mangle input-output chain**
- 3. Using BGP**
- 4. Using Bonding**

Fail Over Using Distance in default Route

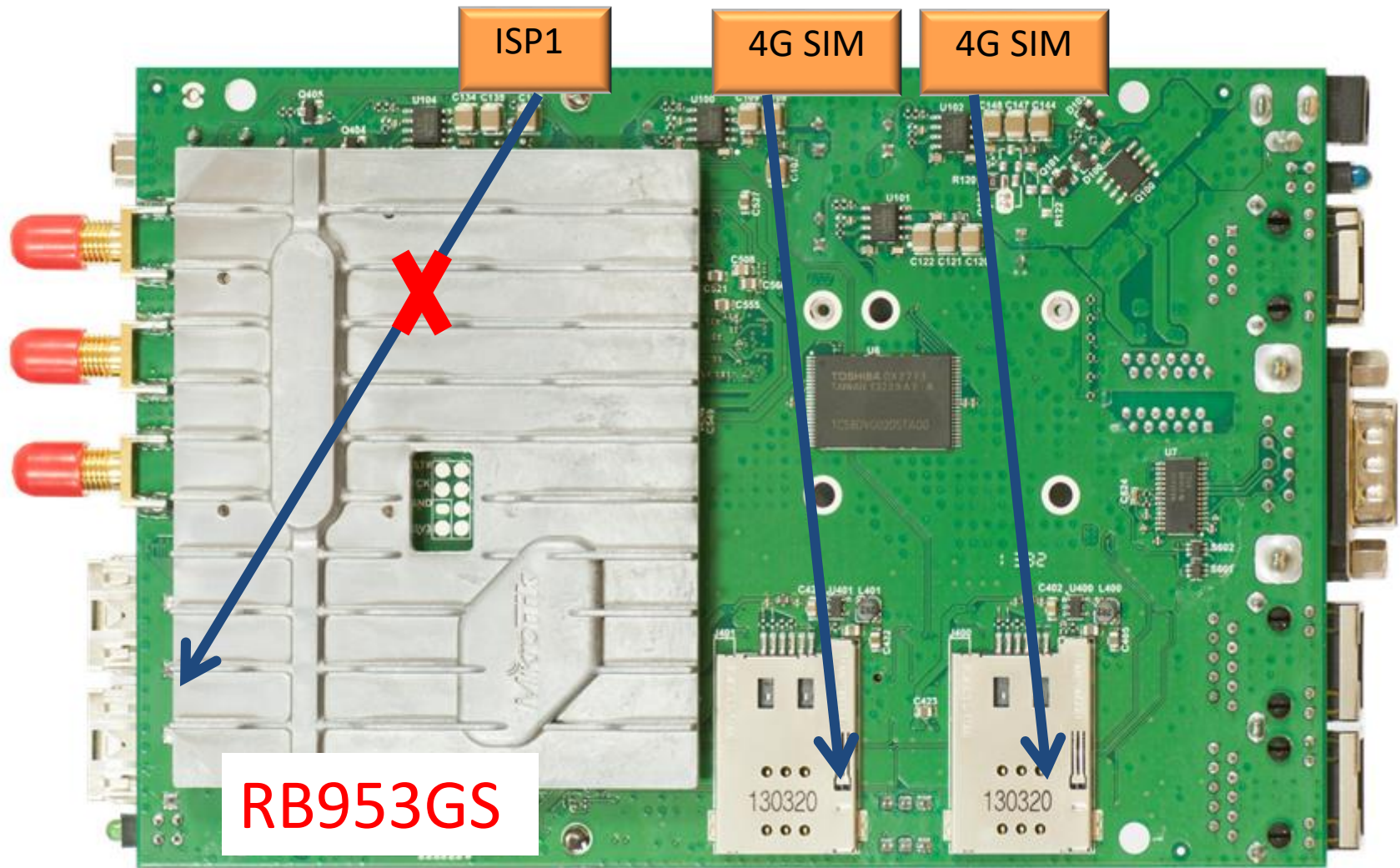
Situation: Two ISP has given me two IP, When primary fails, secondary will be live auto.

IP > Route > add gateway with distance 1 and add another gateway with distance 2. lowest distance will be primary

Auto Fail Over Using Distance



Auto Fail Over Using Distance



How to Configure:

admin@4C:5E:0C:FB:8D:CF (Test) - WinBox v6.40.8 on RB2011UiAS-2HnD (mipsbe)

Safe Mode Hide Password

Address List

Address	Network	Interface
202.191.126.180/29	202.191.126.176	ether1
192.168.1.1/24	192.168.1.0	ether3
10.8.8.15/24	10.8.8.0	wlan1

DHCP Client

DHCP Client Options

Interface	Use P...	Add D...	IP Address	Expires After	Status
wlan1	yes	yes	10.8.8.15/24	00:06:09	bound

Route List

	Dst. Address	Gateway	Distance	Routing Mark	Pref. Source
AS	0.0.0.0/0	202.191.126.177 reachable ether1	1		
DS	0.0.0.0/0	10.8.8.1 reachable wlan1	2		
DAC	10.8.8.0/24	wlan1 reachable	0		10.8.8.15
DAC	192.168.1.0/24	ether3 reachable	0		192.168.1.1
DAC	202.191.126.1...	ether1 reachable	0		202.191.126...

5 items

DHCP Client

Advanced

DHCP Options: hostname, clientid

Default Route Distance: 2

enabled Status: bound

Fail Over Using Bridge Technology

Situation: Point to Point/ Router to Router Connected with two/multiple fiber or Radio, If primary fails another will be live auto.

Bridge has STP/RSTP protocol, STP/RSTP control loop and work as failover. So No need any configure other than bridge

Fail Over With Bridge

Mikrotik Router-1



Mikrotik Router-2



Hub/ Switch



LAN



How to Configure:

admin@4C:5E:0C:FB:8D:CF (Test) - WinBox v6.40.8 on RB2011UiAS-2HnD (mipsbe) Hide Passwords

Safe Mode

- Quick Set
- CAPsMAN
- Interfaces
- Wireless
- Bridge**
- PPP
- Switch
- Mesh
- IP
- OpenFlow
- Routing
- System
- Queues

Bridge | Ports | Filters | NAT | Hosts

Interface	Bridge	Pr
ether1	bridge 1	
ether2	bridge 1	

Address List

Address	Network	Interface
192.168.1.1/24	192.168.1.0	ether2
202.191.126.180/29	202.191.126.176	bridge 1

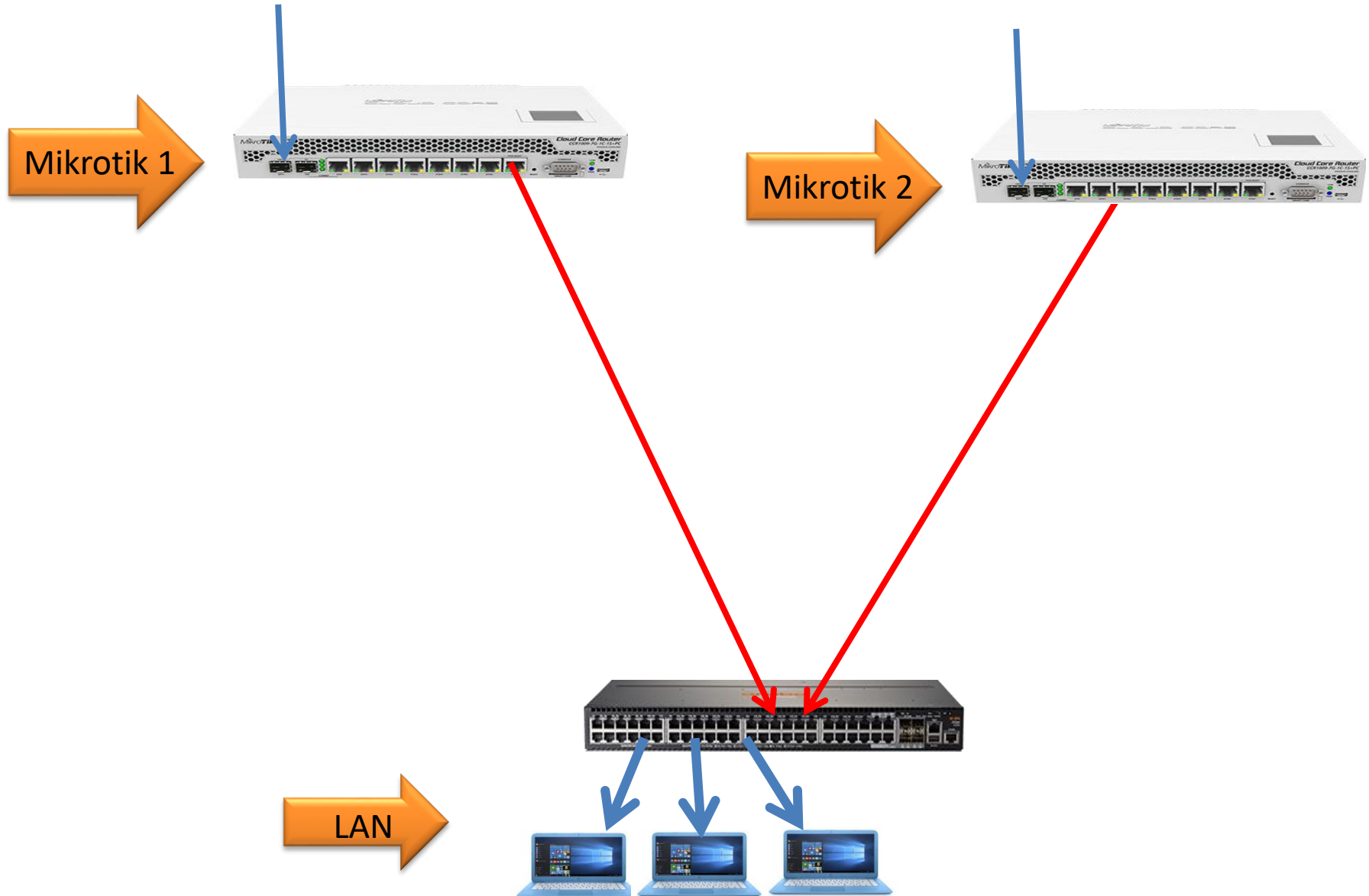
Fail Over Using VRRP Technology

Situation: Client wants failover with Hub or switch, There is no router at client end.

ISP end required Mikrotik: LAN configure on VRRP (logical Interface).

Both end Router will contain Same(gateway) IP

Fail Over With VRRP



How to Configure:

admin@4C:5E:0C:FB:8D:CF (Test) - WinBox v6.40.8 on RB2011UiAS-2HnD (mipsbe)

Safe Mode

- Quick Set
- CAPMAN
- Interfaces**
- Wireless
- Bridge
- PPP
- Switch
- Mesh
- IP
- OpenFlow
- Routing
- System
- Queues
- Files
- Log
- Radius
- Tools
- New Terminal
- TR069
- LCD
- MetaROUTER
- Partition
- Make Supout.rf
- Manual
- Exit

Interface <vmp1>

General **VRRP** Scripts Status Traffic

Interface: ether3-LAN

VRID: 1

Priority: 100

Interval: 1.00 s

Preemption Mode

OK Cancel Apply Disable Comment Copy

Address List

Address	Network	Interface
192.168.1.1/24	192.168.1.0	ether3-LAN
192.168.3.1/24	192.168.3.0	vmp1
202.191.126.180/29	202.191.126.176	ether1

3 items

Interface List

Interface	Interface List	Ethernet	EoIP Tunnel	IP Tunnel	GRE Tunnel	VLAN	VRRP	Bonding	LTE
R	ether3-LAN	Ethernet					198.1 kbps		8.1
RM	vmp1	VRRP					368 bps		6.5
	ether4	Ethernet					0 bps		0
	ether5	Ethernet					0 bps		0
	ether6	Ethernet					0 bps		0
	ether7	Ethernet					0 bps		0
	ether8	Ethernet					0 bps		0
	ether9	Ethernet					0 bps		0
	ether10	Ethernet					0 bps		0
	sfp1	Ethernet					0 bps		0
R	wlan1	Wireless (Atheros AR9...					0 bps		0

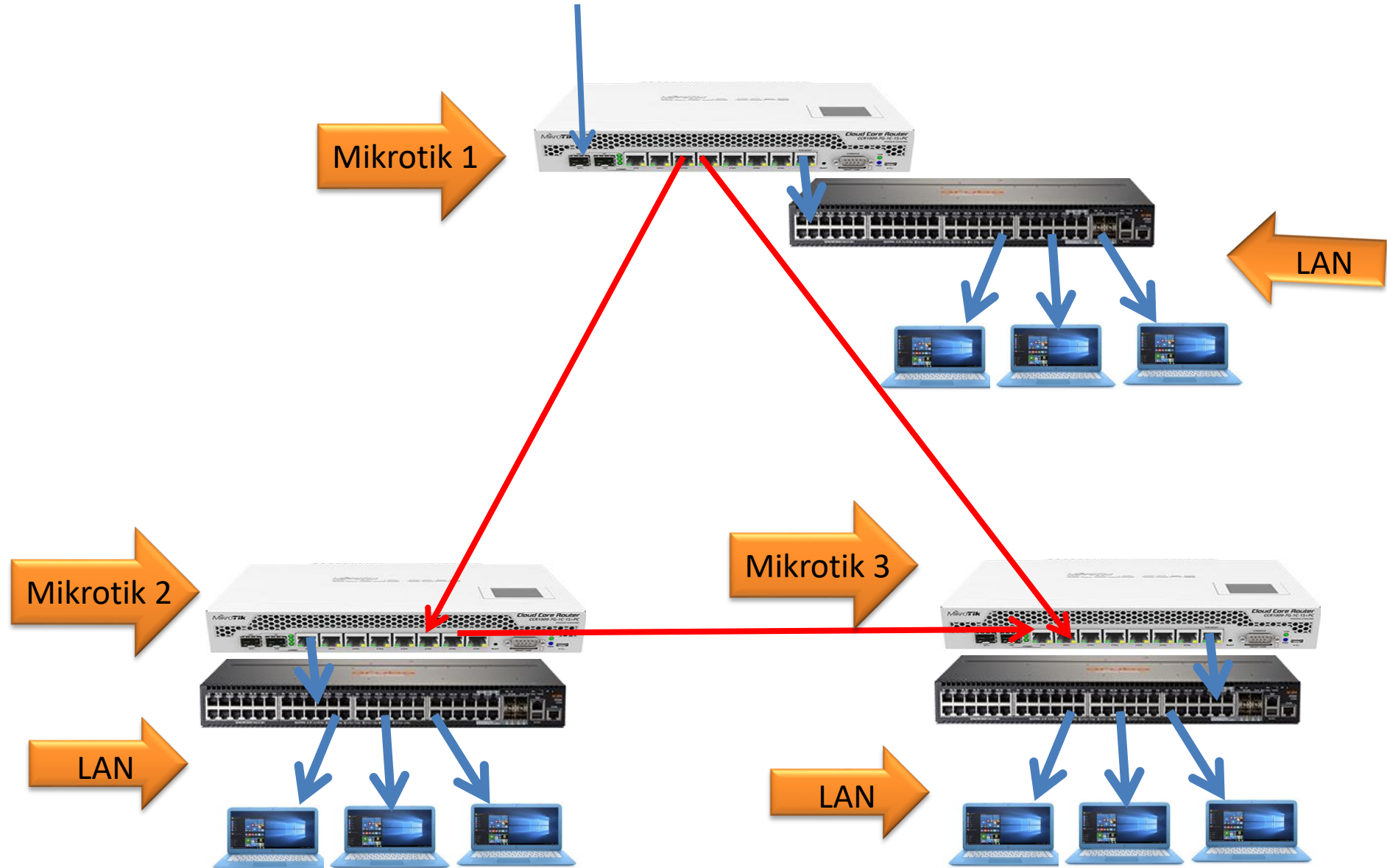
Fail Over With OSPF Routing Technology

4. Using OSPF:

Situation: Nationwide very large network with Router and multiple link, OSPF used for internal fail over and auto update of Routing table.

add peering IP, add Network address with bit from OSPF > Network, Then only in main router you need to select: “if install as type2” from Routing > OSPF > Instance > “Redistribute default route”

Fail Over With OSPF



How to Configure:

admin@4C:5E:0C:FB:8D:CF (Test) - WinBox v6.40.8 on RB2011UiAS-2HnD (mipsbe)

Safe Mode

Quick Set
CAPsMAN
Interfaces
Wireless
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PPP
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Mesh
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OpenFlow
Routing
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Radius
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New Terminal
TR069
LCD
MetaROUTER
Partition
Make Supout.tif
Manual
Exit

Interface List

Interface	Interface List	Ethernet	EoIP Tunnel	IP Tunnel	GRE Tunnel	VLAN	VRRP	Bonding	LTE
Name / Type									
ether1-Primary / Ethernet									
ether2-Backup / Ethernet									
ether3-LAN / Ethernet									
ether4 / Ethernet									
ether5 / Ethernet									

Address List

Address	Network	Interface
10.0.0.2/30	10.0.0.0	ether1-Primary
10.0.0.6/30	10.0.0.4	ether2-Backup
192.168.1.1/24	192.168.1.0	ether3-LAN

OSPF

Instances Networks Areas Area Ranges Virtual Links

Interface	Cost	Priority	Authentic...	Authentic...
ether1-Primary	10	1	none	****
ether2-Backup	40	1	none	****

OSPF

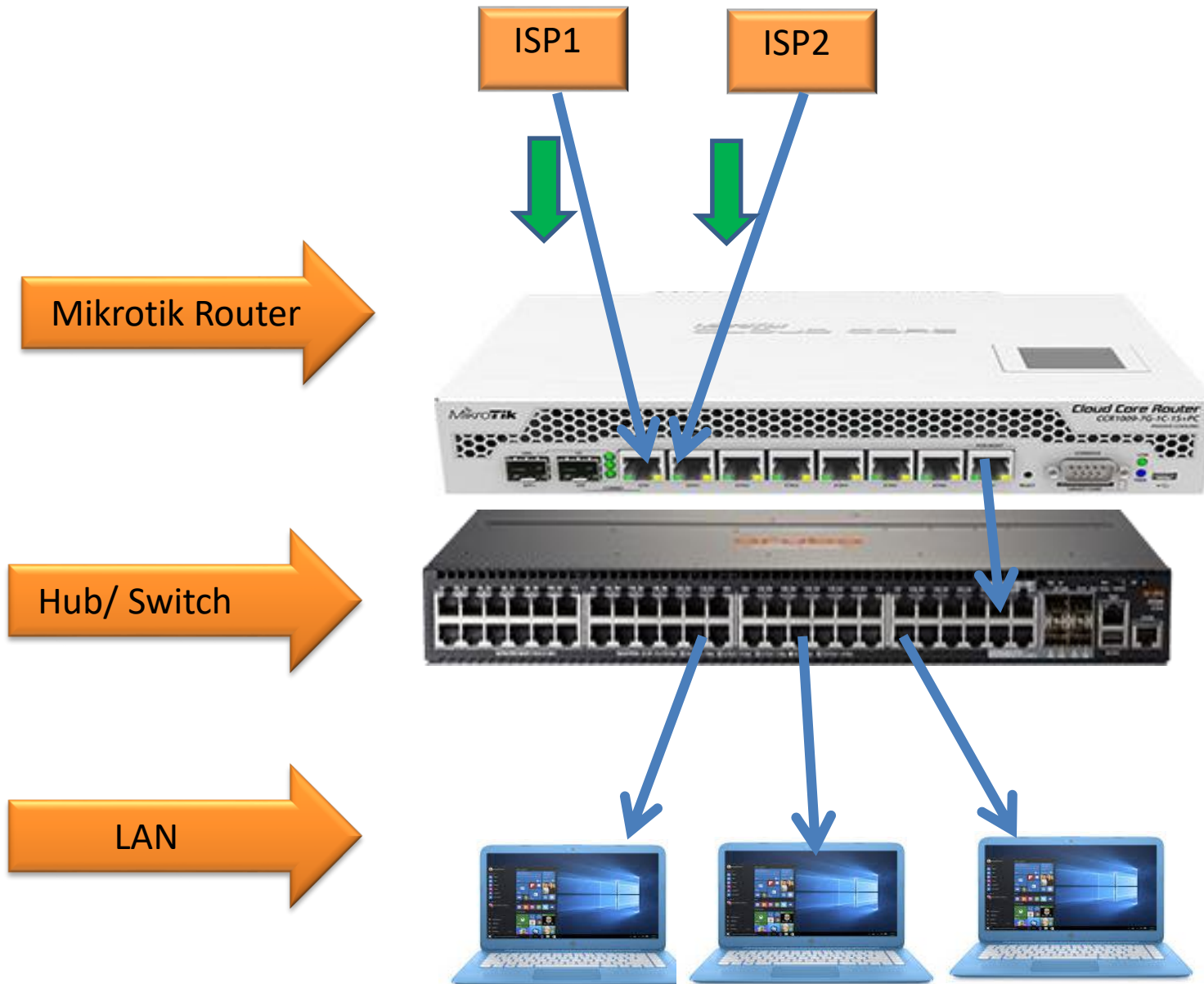
Instances Networks Areas Area Ranges Virtual Links Neighbors NBMA Neighbors Sham Links LSA Routes AS Border Routers

Network	Area
10.0.0.0/30	backbone
10.0.0.4/30	backbone
192.168.1.0/30	backbone

Load Balance with Failover Using mangle marking LAN IP

Situation: Two or more WAN from different ISP, we want to merge all bandwidth including failover. Some IPs will be marked for ISP1 and Some IPs will be marked for ISP2

Load Balance with Fail Over



How to Configure:

admin@4C:5E:0C:FB:8D:CF (Test) - WinBox v6.40.8 on RB2011UiAS-2HnD (mipsbe)

Safe Mode

Quick Set
CAPsMAN
Interfaces
Wireless
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Make Supout.rif
Manual
Exit

Interface List

Interface	Name	IP Address	Netmask	State
R	ether1	10.0.0.1	24	up
R	ether2	10.0.0.5	24	up
R	ether3	192.168.1.1	24	up

Route List

Routes	Nexthops	Rules	VRF
AS	0.0.0.0/0	10.0.0.1 reachable ether1-ISP-1	1 isp1
AS	0.0.0.0/0	10.0.0.5 reachable ether2-ISP2	1 isp2
AS	0.0.0.0/0	10.0.0.1 reachable ether1-ISP-1, 10.0.0.5 reachable ether2-...	1
DAC	10.0.0.0/30	ether1-ISP-1 reachable	0 10.0.0.2
DAC	10.0.0.4/30	ether2-ISP2 reachable	0 10.0.0.6
DAC	192.168.1.0/24	ether3-LAN reachable	0 192.168.1.1

Address List

Address	Network	Interface
10.0.0.2/30	10.0.0.0	ether1
10.0.0.6/30	10.0.0.4	ether2
192.168.1.1/24	192.168.1.0	ether3

Route <0.0.0.0/0>

General

Dst. Address: 0.0.0.0/0

Gateway: 10.0.0.1 reachable ether1-ISP-1

Check Gateway:

Type: unicast

Distance: 1

Scope: 30

Target Scope: 10

Routing Mark: isp1

Pref. Source:

OK
Cancel
Apply

Route <0.0.0.0/0>

General

Dst. Address: 0.0.0.0/0

Gateway: 10.0.0.5 reachable ether2-ISP2

Check Gateway:

Type: unicast

Distance: 1

Scope: 30

Target Scope: 10

Routing Mark: isp2

Pref. Source:

Route <0.0.0.0/0>

General

Dst. Address: 0.0.0.0/0

Gateway: 10.0.0.1 reachable ether1-ISP-1

Gateway: 10.0.0.5 reachable ether2-ISP2

Check Gateway:

Type: unicast

Distance: 1

Scope: 30

Target Scope: 10

Routing Mark:

Pref. Source:

enabled

How to Configure:

admin@4C:5E:0C:FB:8D:CF (Test) - WinBox v6.40.8 on RB2011U/AS-2HnD (mipsbe)

Safe Mode

Firewall

Filter Rules NAT Mangle Raw Service Ports Connections Address Lists Layer7 Protocols

#	Action	Chain	Src. Address	Dst. Address	Proto...	Src. Port	Dst. Port	In.
0	mark routing	prerouting	192.168.1.0/25					
1	mark routing	prerouting	192.168.1.128/25					

Mangle Rule <192.168.1.0/25>

General Advanced Extra Action Statistics

Chain: prerouting

Src. Address: 192.168.1.0/25

Dst. Address:

Protocol:

Src. Port:

Dst. Port:

New Mangle Rule

General Advanced Extra Action Statistics

Action: mark routing

Log

Log Prefix:

New Routing Mark: isp1

Passthrough

Mangle Rule <192.168.1.128/25>

General Advanced Extra Action Statistics

Chain: prerouting

Src. Address: 192.168.1.128/25

Dst. Address:

Protocol:

Src. Port:

Dst. Port:

New Mangle Rule

General Advanced Extra Action Statistics

Action: mark routing

Log

Log Prefix:

New Routing Mark: isp2

Passthrough

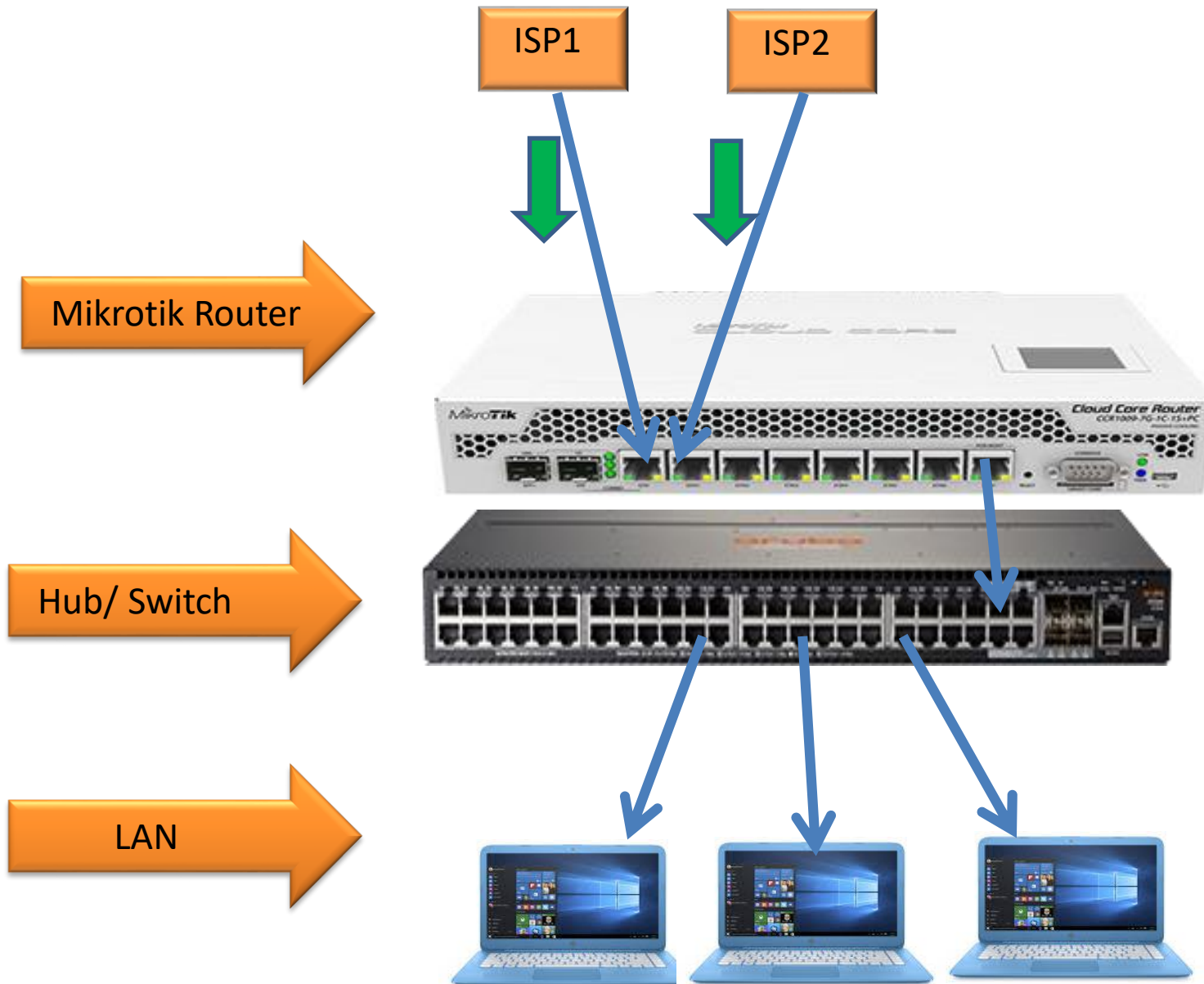
Load Balance with Failover Using mangle marking WAN Connection

5. Using mangle input-output chain:

Situation: Two or more WAN from different ISP, we want to merge all bandwidth including failover.

Mark connection with input chain, then mark routing for that connection which has marked.

Load Balance with Fail Over



How to Configure:

admin@4C:5E:0C:FB:8D:CF (Test) - WinBox v6.40.8 on RB2011UiAS-2HnD (mipsbe)

Safe Mode

Quick Set
CAPsMAN
Interfaces
Wireless
Bridge
PPP
Switch
Mesh
IP
OpenFlow
Routing
System
Queues
Files
Log
Radius
Tools
New Terminal
TR069
LCD
MetaROUTER
Partition
Make Supout.rif
Manual
Exit

Interface List

Interface	Name	IP Address	Netmask	State
R	ether1	10.0.0.1	255.255.255.0	up
R	ether2	10.0.0.5	255.255.255.0	up
R	ether3	192.168.1.1	255.255.255.0	up

Route List

Routes	Nexthops	Rules	VRF
AS	0.0.0.0/0	10.0.0.1 reachable ether1-ISP-1	1 isp1
AS	0.0.0.0/0	10.0.0.5 reachable ether2-ISP2	1 isp2
AS	0.0.0.0/0	10.0.0.1 reachable ether1-ISP-1, 10.0.0.5 reachable ether2-ISP2	1
DAC	10.0.0.0/30	ether1-ISP-1 reachable	0 10.0.0.2
DAC	10.0.0.4/30	ether2-ISP2 reachable	0 10.0.0.6
DAC	192.168.1.0/24	ether3-LAN reachable	0 192.168.1.1

Address List

Address	Network	Interface
10.0.0.2/30	10.0.0.0	ether1
10.0.0.6/30	10.0.0.4	ether2
192.168.1.1/24	192.168.1.0	ether3

Route <0.0.0.0/0>

General

Dst. Address: 0.0.0.0/0

Gateway: 10.0.0.1 reachable ether1-ISP-1

Check Gateway:

Type: unicast

Distance: 1

Scope: 30

Target Scope: 10

Routing Mark: isp1

Pref. Source:

OK
Cancel
Apply

Route <0.0.0.0/0>

General

Dst. Address: 0.0.0.0/0

Gateway: 10.0.0.5 reachable ether2-ISP2

Check Gateway:

Type: unicast

Distance: 1

Scope: 30

Target Scope: 10

Routing Mark: isp2

Pref. Source:

Route <0.0.0.0/0>

General

Dst. Address: 0.0.0.0/0

Gateway: 10.0.0.1 reachable ether1-ISP-1

Gateway: 10.0.0.5 reachable ether2-ISP2

Check Gateway:

Type: unicast

Distance: 1

Scope: 30

Target Scope: 10

Routing Mark:

Pref. Source:

How to Configure:

admin@4C:5E:0C:FB:8D:CF (Test) - WinBox v6.40.8 on RB2011UiAS-2HnD (mipsbe)

Safe Mode

RouterOS WinBox

Quick Set
CAPsMAN
Interfaces
Wireless
Bridge
PPP
Switch
Mesh
IP
OpenFlow
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MetaROUTER
Partition
Make Supout.rf
Manual
Exit

Firewall

Filter Rules NAT Mangle Raw Service Ports Connections Address Lists Layer7 Protocols

#	Action	Chain	Src. Address	Dst. Address	Proto...	Src. Port	Dst. Port	In. Interface
0	mark routing	prerouting	192.168.1.0/25					
1	mark routing	prerouting	192.168.1.128/25					
2	mark connect...	input						ether1-ISP
3	mark connect...	input						ether2-ISP
4	mark routing	output						
5	mark routing	output						

Mangle Rule <>

General Advanced Extra Action Statistics

Chain: output

Src. Address:

Dst. Address:

Protocol:

Src. Port:

Dst. Port:

Any. Port:

In. Interface:

Out. Interface:

In. Interface List:

Out. Interface List:

Packet Mark:

Connection Mark: conn-1

Routing Mark:

Routing Table:

New Mangle Rule

General Advanced Extra Action Statistics

Action: mark routing

Log Prefix:

New Routing Mark: isp1

Passthrough

Mangle Rule <>

General Advanced Extra Action Statistics

Chain: input

Src. Address:

Dst. Address:

Protocol:

Src. Port:

Dst. Port:

Any. Port:

In. Interface: ether1-ISP-1

Out. Interface:

New Mangle Rule

General Advanced Extra Action Statistics

Action: mark connection

Log Prefix:

New Connection Mark: conn-1

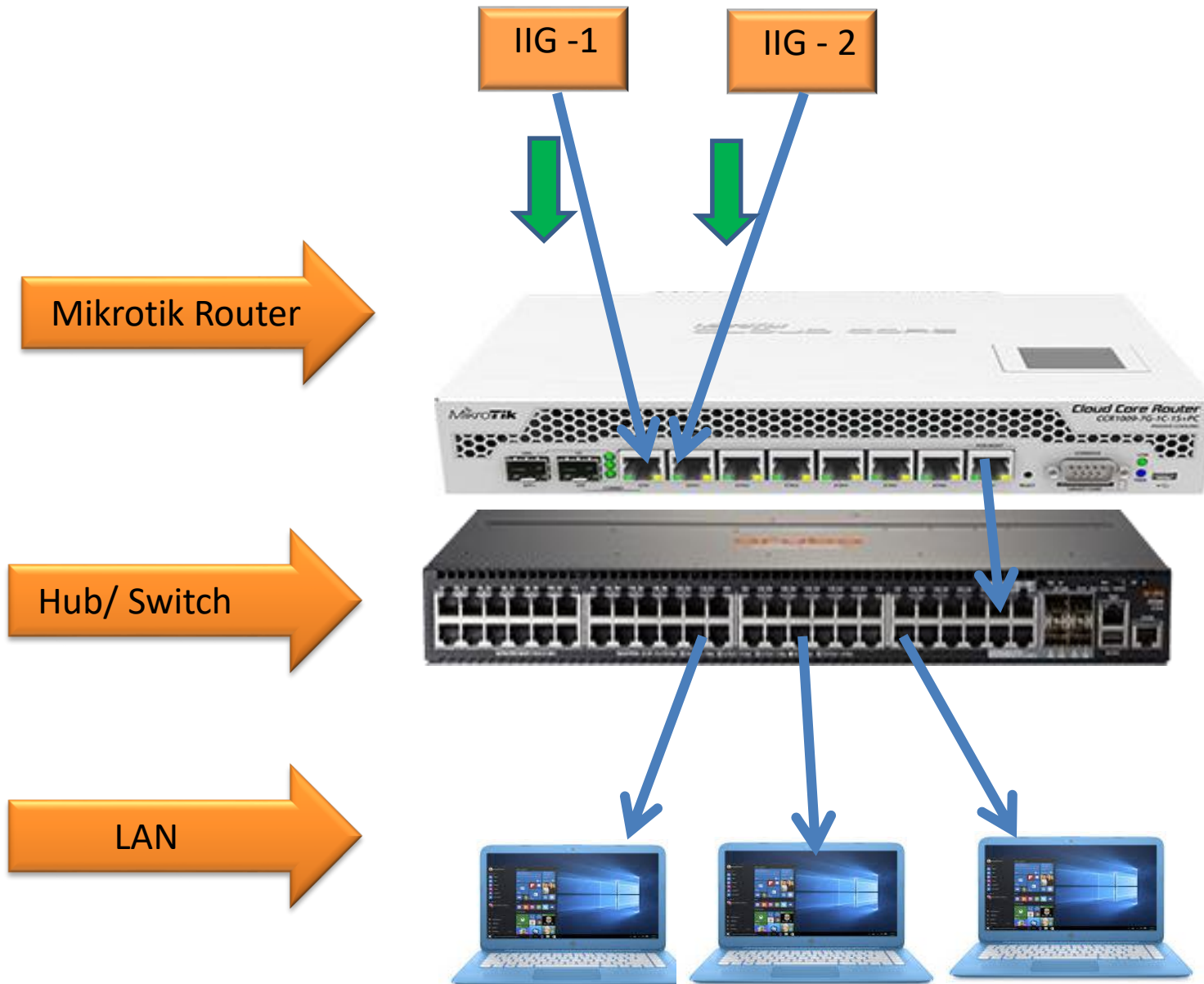
Passthrough

Load Balance with Failover With BGP routing

Situation: ISP is connected with multiple IIG, ISP has own Real IP and ASN

- a) add Peering IP, Routing > BGP > Instance > Self ASN and IP,
- b) BGP > Peer > Other's ASN and IP
- c) BGP > Network: add /24 and aggregate like /23, /22
- d) Routing Filter: Create filter for specify network advertise.

Load Balance with BGP



How to Configure Instance, Peer & Network:

admin@D4:CA:6D:63:F1:C9 (MikroTik) - WinBox v6.27 on RB450G (mipsbe)

Safe Mode

BGP Instance <default>

Name: default
AS: 3333
Router ID: 202.191.120.1

BGP Peer <mango>

General | Advanced | Status

Name: mango
Instance: default
Remote Address: 10.1.1.1
Remote Port:
Remote AS: 1111

BGP Peer <btcl>

General | Advanced | Status

Name: btcl
Instance: default
Remote Address: 10.2.2.1
Remote Port:
Remote AS: 2222

BGP

Instances | VRFs | Peers | **Networks** | Aggregates

Network	Synchroni...
202.191.120.0/23	no
202.191.120.0/24	no
202.191.121.0/24	no

enabled







How to Configure Route Filter:

admin@D4:CA:6D:63:F1:C9 (BJOY BGP) - WinBox v6.25 on RB450G (mipsbe)

Safe Mode

Hi

Route Filters

#	Chain	Prefix	Action
0	mango-out	202.191.120.0/23	accept
5	mango-out	202.191.120.0/24	accept
7	mango-out	202.191.121.0/24	discard
3	mango-out	0.0.0.0/0	discard
4	btcl-out	202.191.120.0/23	accept
6	btcl-out	202.191.120.0/24	discard
1	btcl-out	202.191.121.0/24	accept
2	btcl-out	0.0.0.0/0	discard

- Quick Set
- CAPsMAN
- Interfaces
- Wireless
- Bridge
- PPP
- Switch
- Mesh
- IP
- IPv6
- MPLS
- OpenFlow
- Routing

Load Balance with Failover Using Bonding Technology

Situation: To increase capacity of link / ether
Used only for Router to Router

Interface add bonding Slave = ether1, ether2,
Link Monitorin=ARP, remote IP=

Fail Over With Bonding

Mikrotik Router-1



Mikrotik Router-2



Hub/ Switch



LAN



How to Configure:

admin@4C:5E:0C:FB:8D:CF (Test) - WinBox v6.40.8 on RB2011UiAS-2HnD (mipsbe)

Safe Mode

Quick Set
CAPsMAN
Interfaces
Wireless
Bridge
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Switch
Mesh
IP
OpenFlow
Routing
System
Queues
Files
Log
Radius
Tools
New Terminal
TR069
LCD
MetaROUTER
Partition
Make Supout.nf

Interface List

Interface	Interface List	Ethernet	EoIP Tunnel	IP Tunnel	GRE Tunnel	VLAN	VRRP	Bonding	LTE
R	bonding1	Bonding							
RS	ether1	Ethernet							
RS	ether2	Ethernet							
R	ether3-LAN	Ethernet							
	ether4	Ethernet							
	ether5	Ethernet							
	ether6	Ethernet							
	ether7	Ethernet							
	ether8	Ethernet							
	ether9	Ethernet							
	ether10	Ethernet							
	sfp1	Ethernet							
R	wlan1	Wireless (Athe							

13 items (1 selected)

Interface <bonding1>

General Bonding Status Traffic

Slaves: ether1
ether2

Mode: balance rr

Primary: none

Link Monitor: arp

Transmit Hash Policy: layer 2

Min. Links: 0

Down Delay: 0 ms

Up Delay: 0 ms

LACP Rate: 30 s

ARP Interval: 100 ms

ARP IP Targets: 10.0.0.2

OK
Cancel
Apply
Disable
Comment
Copy
Remove
Torch

Address List

Address	Network	Interface
10.0.0.1/30	10.0.0.0	bonding1
192.168.1.1/24	192.168.1.0	ether8-LAN

2 items (1 selected)

THANK YOU



8 Types of Fail over and load balance



AKM Jahangir

Managing Director, Bijoy Online Ltd.

(Mikrotik listed 1st consultant of Bangladesh)

Web: www.bijoy.net/jahan/ [01819-231755](tel:01819-231755), [fb/akm.jahangir](https://fb.com/akm.jahangir)