

8 Types of Fail over and load balance



Egypt MUM 2007.



Dhaka MUM 2016



AS a Trainer



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8 Types of Fail over and load balance

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

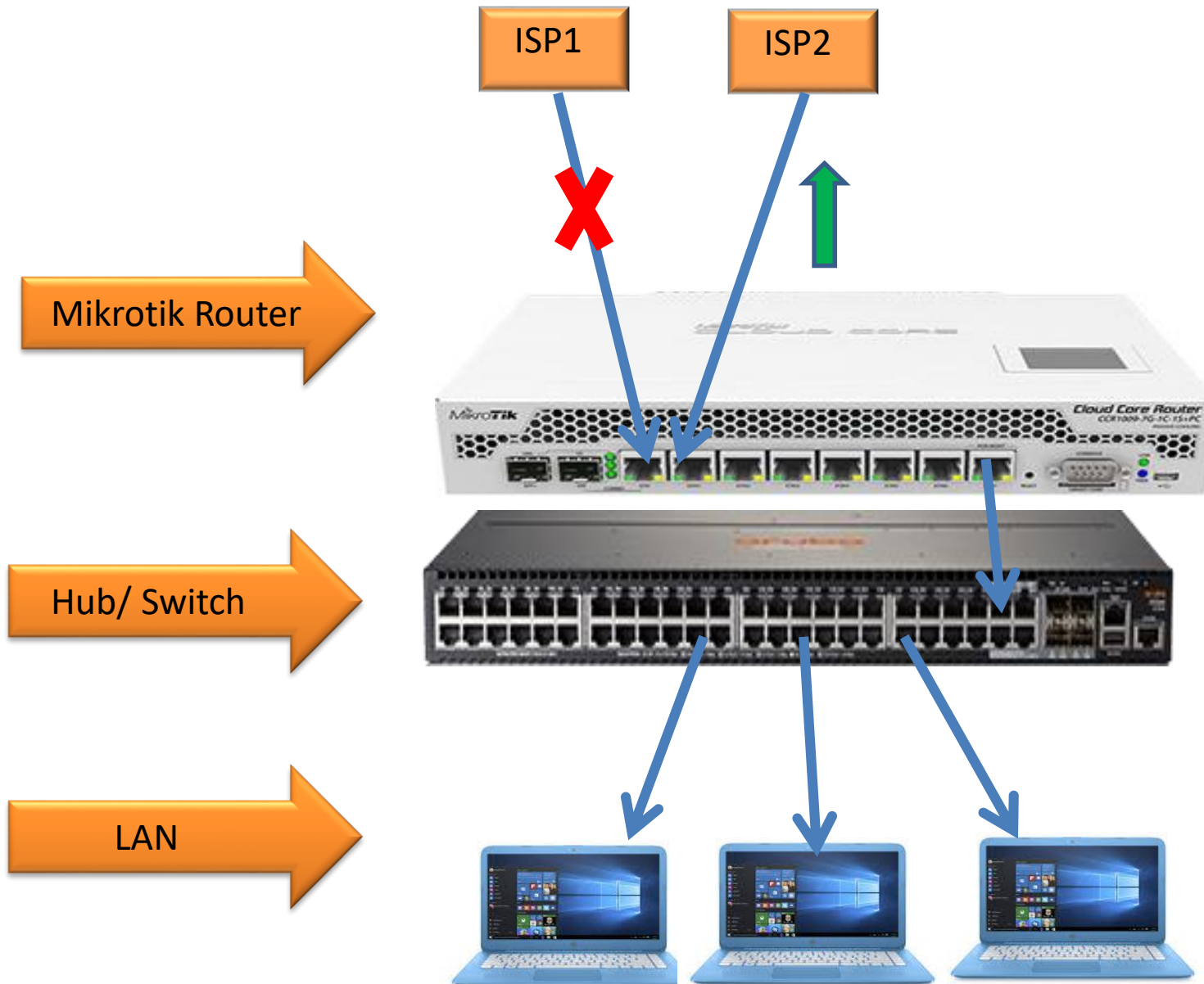
- 1. Using mangle prerouting chain**
- 2. Using mangle input-output chain**
- 3. Using BGP**
- 4. Using Bonding**

Fail Over Using Distance in default Route

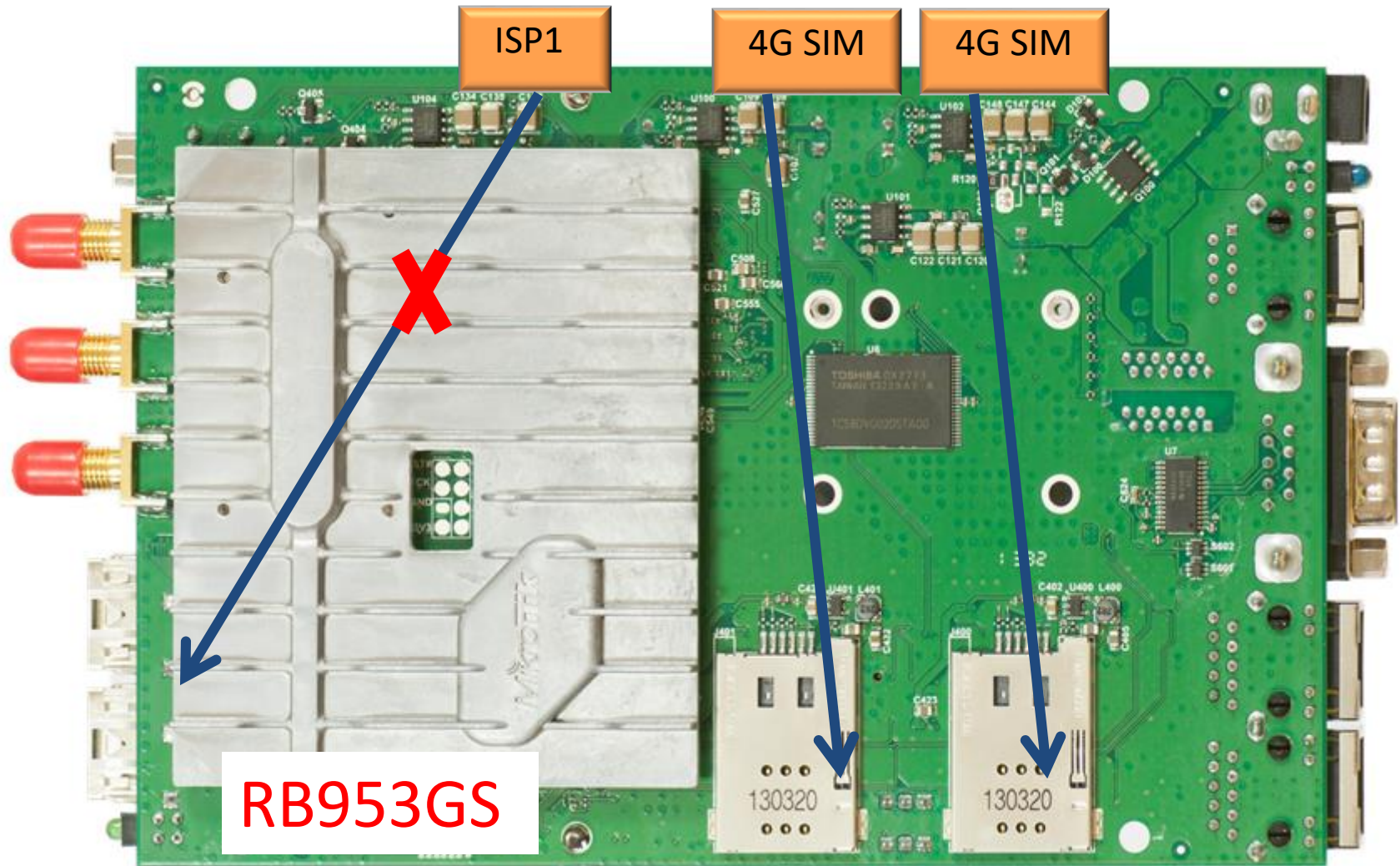
Situation: Two ISP has given me two IP, When primary fails, secondary will be live auto.

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

	Dest. 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

Script:

enabled Status: bound

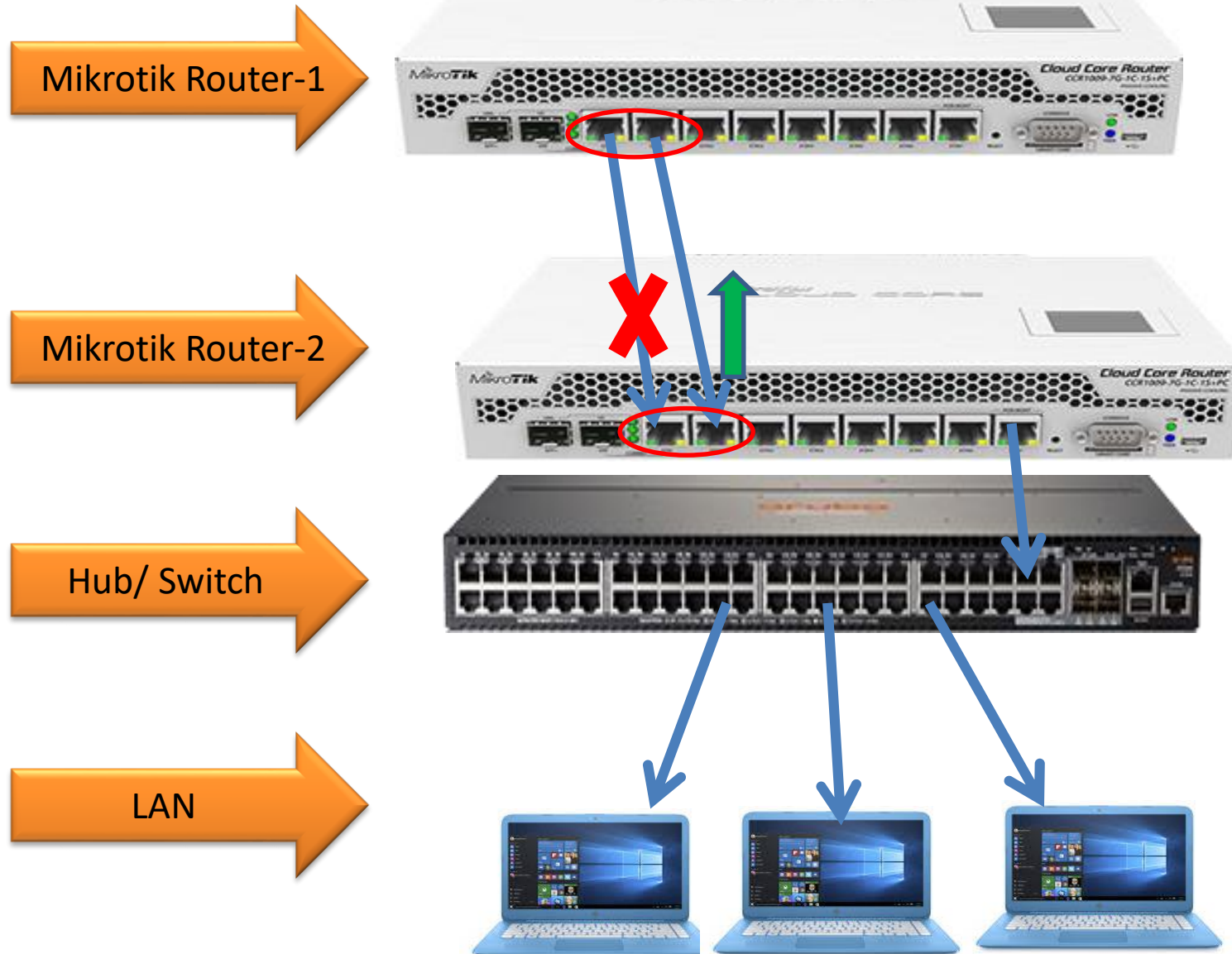
OK Cancel Apply Disable Comment Copy Remove Release Renew

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



How to Configure:

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

Safe Mode ☒ Hide Passwords

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

Bridge

Bridge Ports Filters NAT Hosts

Interface Bridge Pri

1	ether1	bridge1	
1	ether2	bridge1	

Address List

Address	Network	Interface
192.168.1.1/24	192.168.1.0	ether2
202.191.126.180/29	202.191.126.176	bridge1

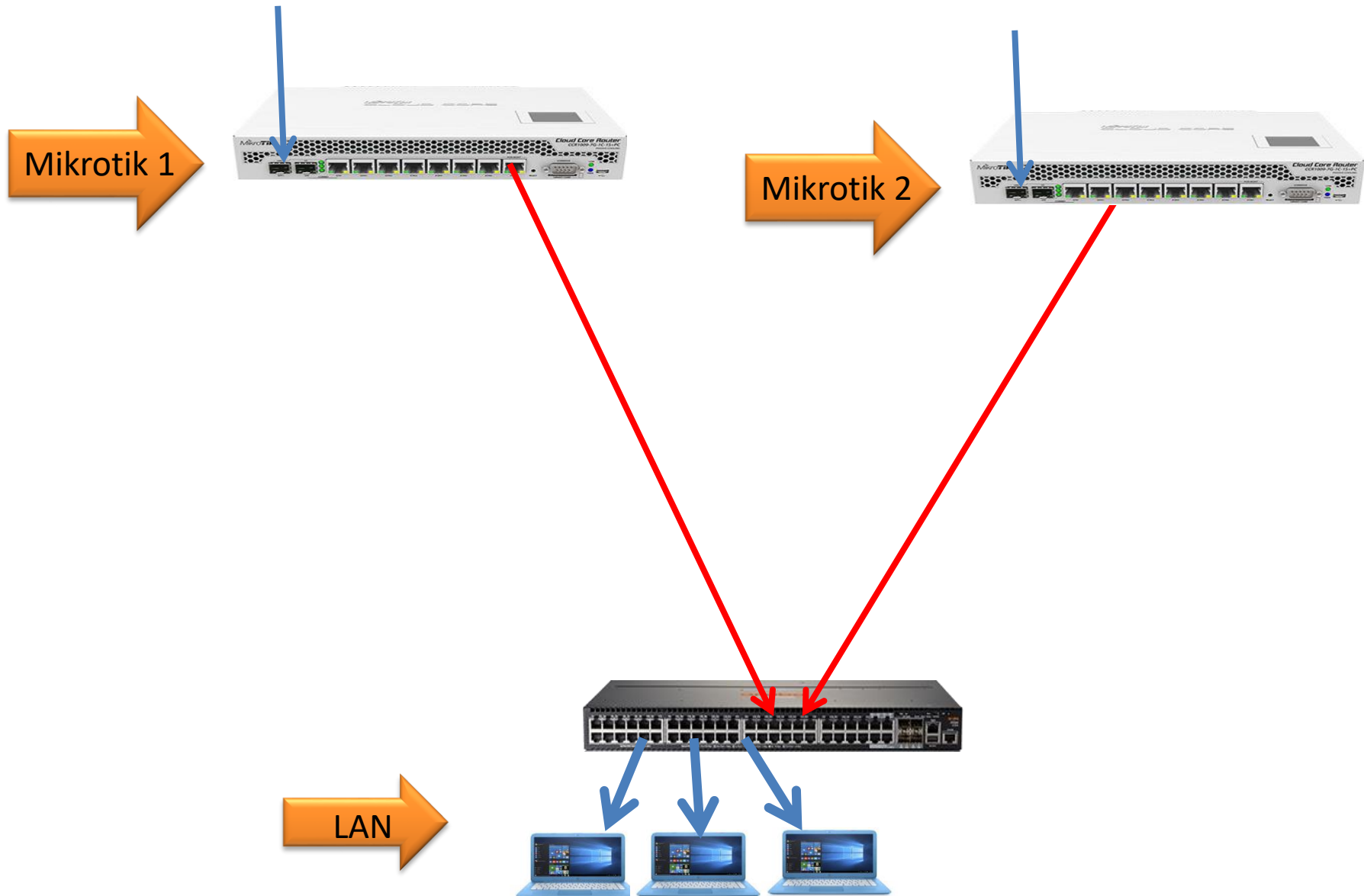
Fail Over Using VRRP Technology

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.tif
- 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

Interface List

Interface Interface List Ethernet EoIP Tunnel IP Tunnel GRE Tunnel VLAN VRRP Bonding LTE

+ - ✓ ✗ 📁 🔍 Find

	Name	Type	Actual MTU	L2 MTU	Tx	Rx
	ether1	Ethernet	1500	1598	0 bps	0
	ether2	Ethernet	1500	1598	0 bps	0
R	ether3-LAN	Ethernet	1500	1598	198.1 kbps	8.1
RM	vmp1	VRRP	1500	1598	368 bps	6.5
	ether4	Ethernet	1500	1598	0 bps	0
	ether5	Ethernet	1500	1598	0 bps	0
	ether6	Ethernet	1500	1598	0 bps	0
	ether7	Ethernet	1500	1598	0 bps	0
	ether8	Ethernet	1500	1598	0 bps	0
	ether9	Ethernet	1500	1598	0 bps	0
	ether10	Ethernet	1500	1598	0 bps	0
	sfp1	Ethernet	1500	1598	0 bps	0
R	wlan1	Wireless (Atheros AR9...	1500	1600	0 bps	0

Address List

+ - ✓ ✗ 📁 🔍 Find

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

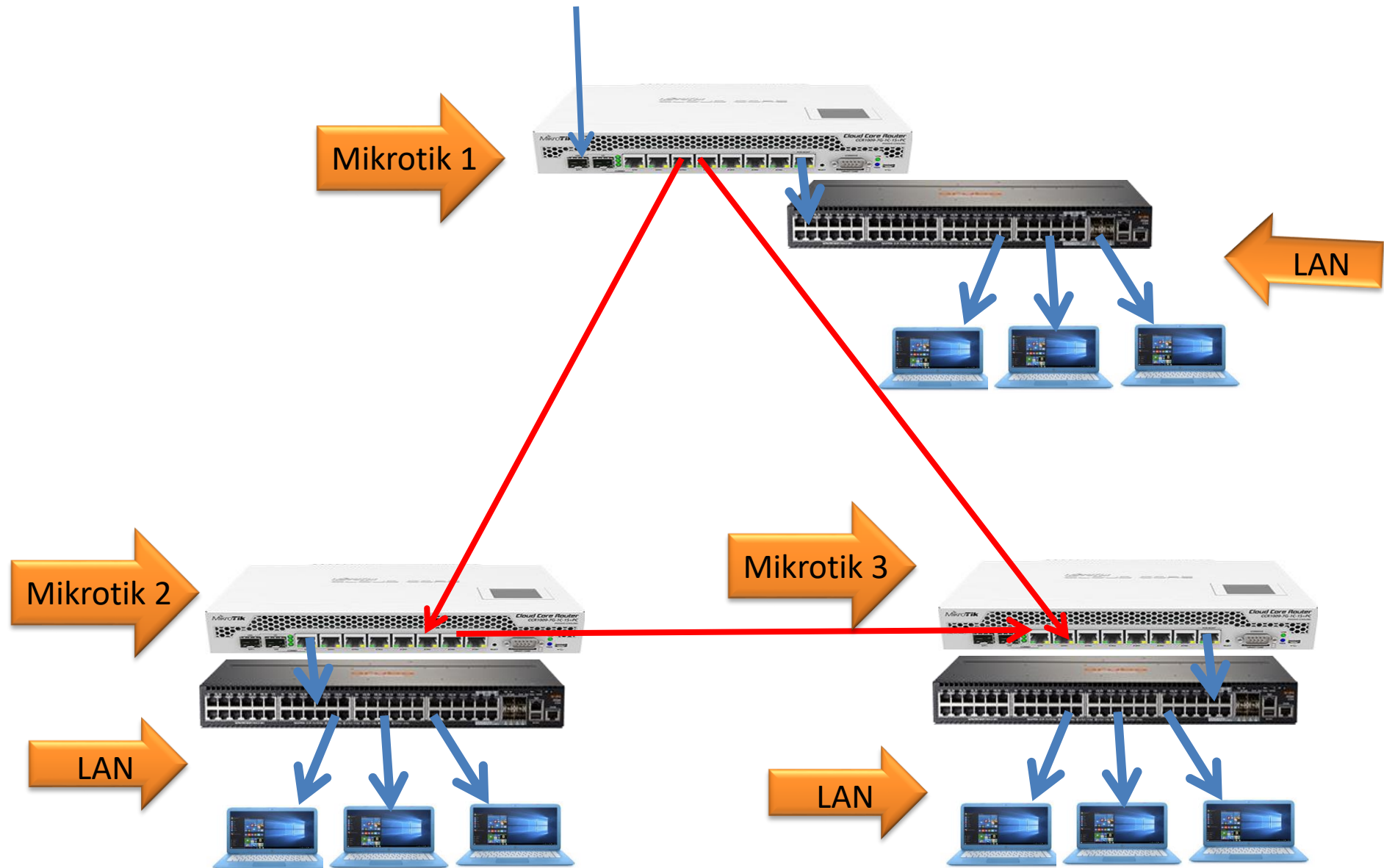
Fail Over With OSPF Routing Technology

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)

WinBox v6.40.8 on RB2011UiAS-2HnD (mipsbe)

admin@4C:5E:0C:FB:8D:CF (Test)

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.rtf
Manual
Exit

Interface List

Interface	Type	Actual MTU	L2 MTU	Tx	Rx
ether1-Primary	Ethernet	1500	1598	0 bps	0
ether2-Backup	Ethernet	1500	1598	0 bps	0
ether3-LAN	Ethernet	1500	1598	187.3 kbps	7.0 k
ether4	Ethernet	1500	1598	0 bps	0
ether5	Ethernet	1500	1598	0 bps	0

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

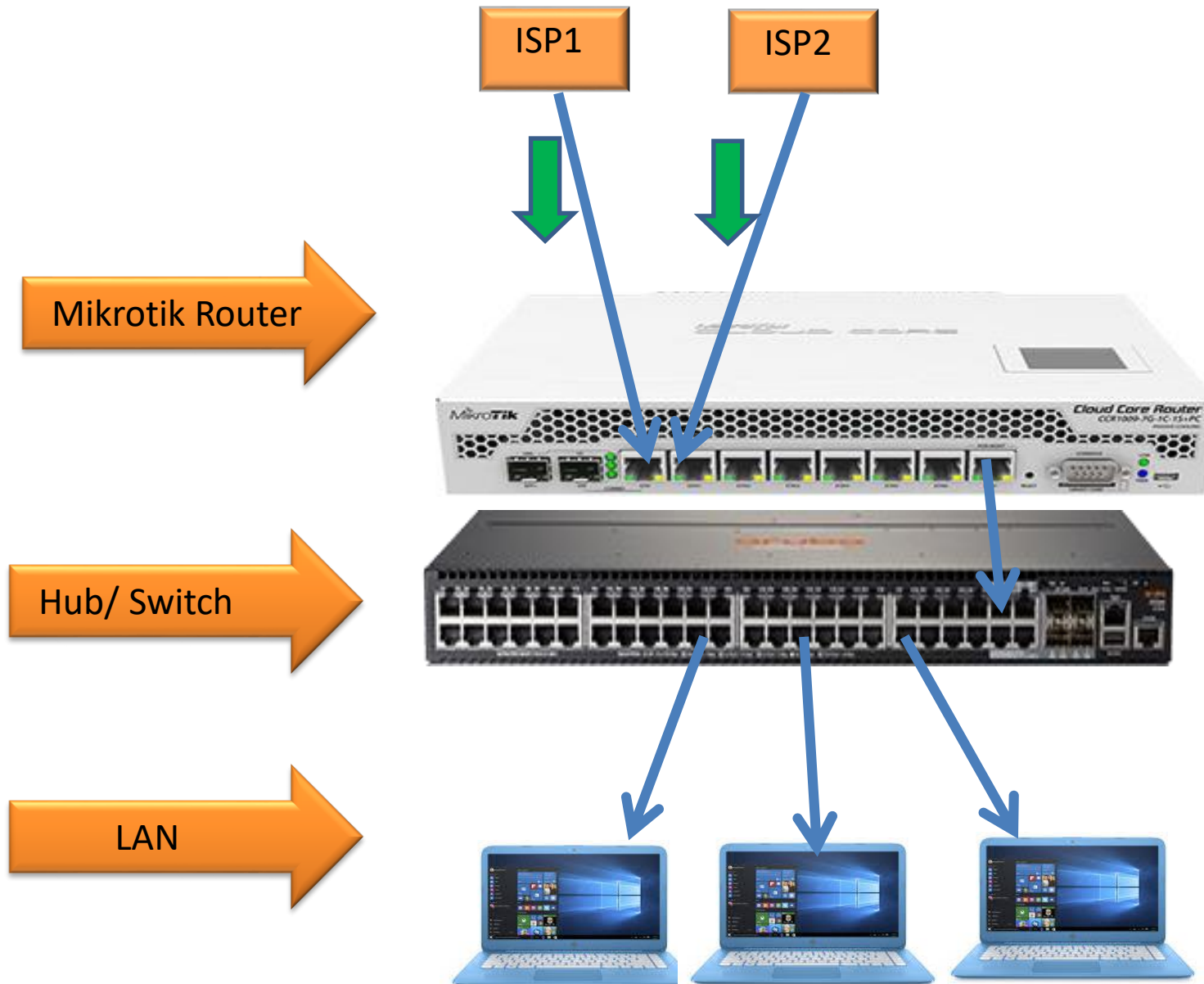
Address List

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

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 of 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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PPP
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Queues
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Log
Radius
Tools
New Terminal
TR069
LCD
MetaROUTER
Partition
Make Supout.tif
Manual
Exit

Interface List

Interface	Name	IP Address	Netmask	State
AS	AS	10.0.0.0/0		Up
AS	AS	10.0.0.0/0		Up
AS	AS	10.0.0.0/0		Up
DAC	DAC	10.0.0.0/30		Up
DAC	DAC	10.0.0.4/30		Up
DAC	DAC	192.168.1.0/24		Up

Route List

Routes	Nexthops	Rules	VRF
AS	10.0.0.0/0	10.0.0.1 reachable ether1-ISP-1	1 isp1
AS	10.0.0.0/0	10.0.0.5 reachable ether2-ISP2	1 isp2
AS	10.0.0.0/0	10.0.0.1 reachable ether1-ISP-1, 10.0.0.5 reachable ether2-ISP-1	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-ISP-1
10.0.0.6/30	10.0.0.4	ether2-ISP-2
192.168.1.1/24	192.168.1.0	ether3-LAN

Route <0.0.0.0/0>

General

Dst. Address: 0.0.0.0/0

Gateway: 10.0.0.1

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

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

10.0.0.5

Check Gateway:

Type: unicast

Distance: 1

Scope: 30

Target Scope: 10

Routing Mark:

Pref. Source:

RouterOS WinBox

How to Configure:

admin@4C:5E:0C:F8:D:CF (Test) - WinBox v6.40.8 on RB2011U/AS-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.tif
Manual

Firewall

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

+ - ✓ ✗ [icon] [icon] Reset Counters 00 Reset All Counters

#	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

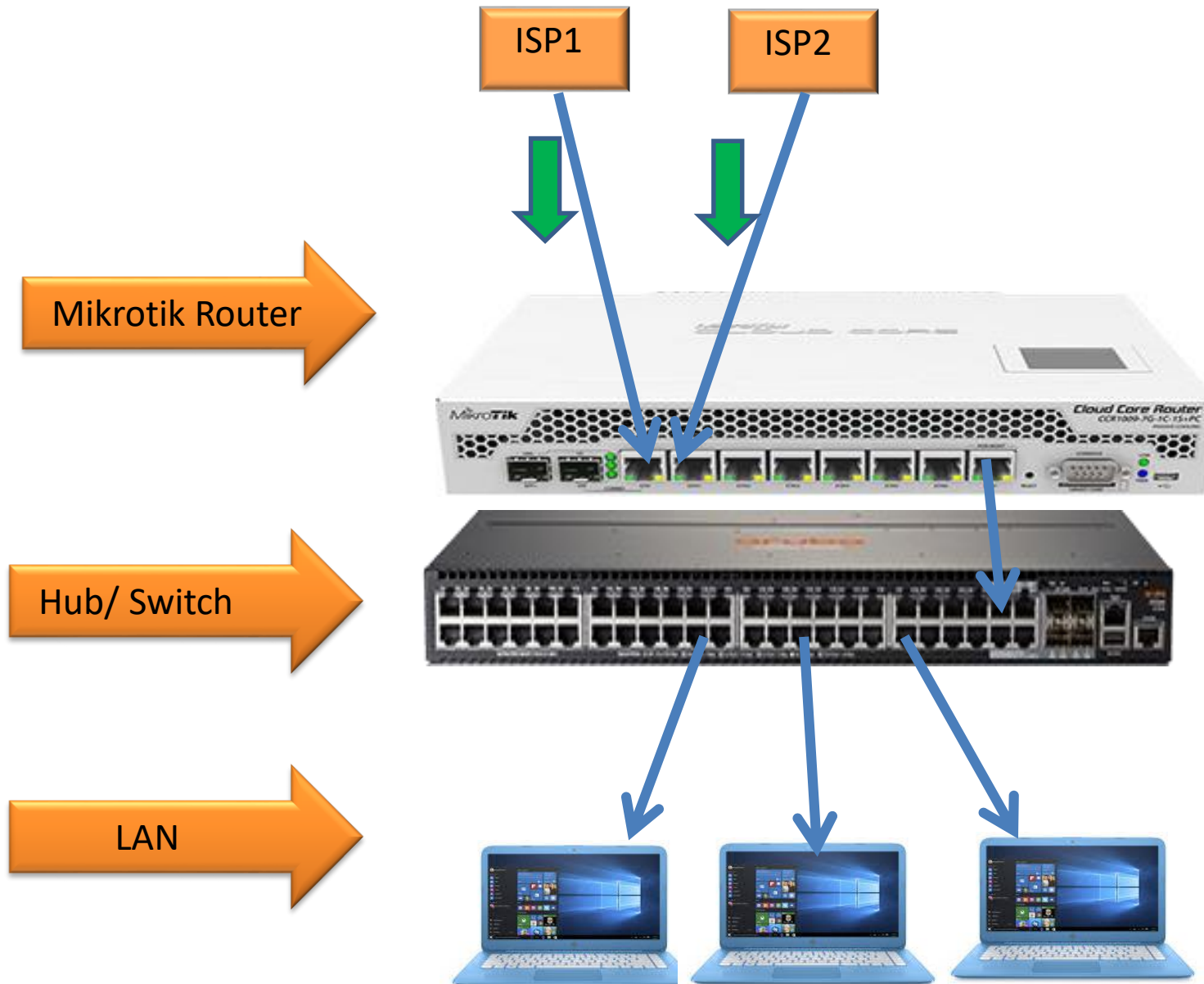
Load Balance with Failover Using mangle marking WAN Connection

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.tif
Manual
Exit

Interface List

Interface	Name	IP Address	Netmask	Gateway	State
AS	AS	10.0.0.0/0		10.0.0.1 reachable ether1-ISP-1	Up
AS	AS	10.0.0.0/0		10.0.0.5 reachable ether2-ISP2	Up
AS	AS	10.0.0.0/0		10.0.0.1 reachable ether1-ISP-1, 10.0.0.5 reachable ether2-ISP2	Up
DAC	DAC	10.0.0.0/30		ether1-ISP-1 reachable	Up
DAC	DAC	10.0.0.4/30		ether2-ISP2 reachable	Up
DAC	DAC	192.168.1.0/24		ether3-LAN reachable	Up

Route List

Routes	Nexthops	Rules	VRF
+	-	✓	✗

Find: all

Address List

Address	Network	Interface
10.0.0.2/30	10.0.0.0	ether1-ISP-1
10.0.0.6/30	10.0.0.4	ether2-ISP2
192.168.1.1/24	192.168.1.0	ether3-LAN

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

Check Gateway:

Type: unicast

Distance: 1

Scope: 30

Target Scope: 10

Routing Mark:

Pref. Source:

OK
Cancel
Apply

How to Configure:

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

RouterOS WinBox

Firewall

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

00 Reset Counters 00 Reset All Counters

#	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: input

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

New Mangle Rule

General Advanced Extra Action Statistics

Action: mark connection

Log Prefix:

New Connection Mark: conn-1

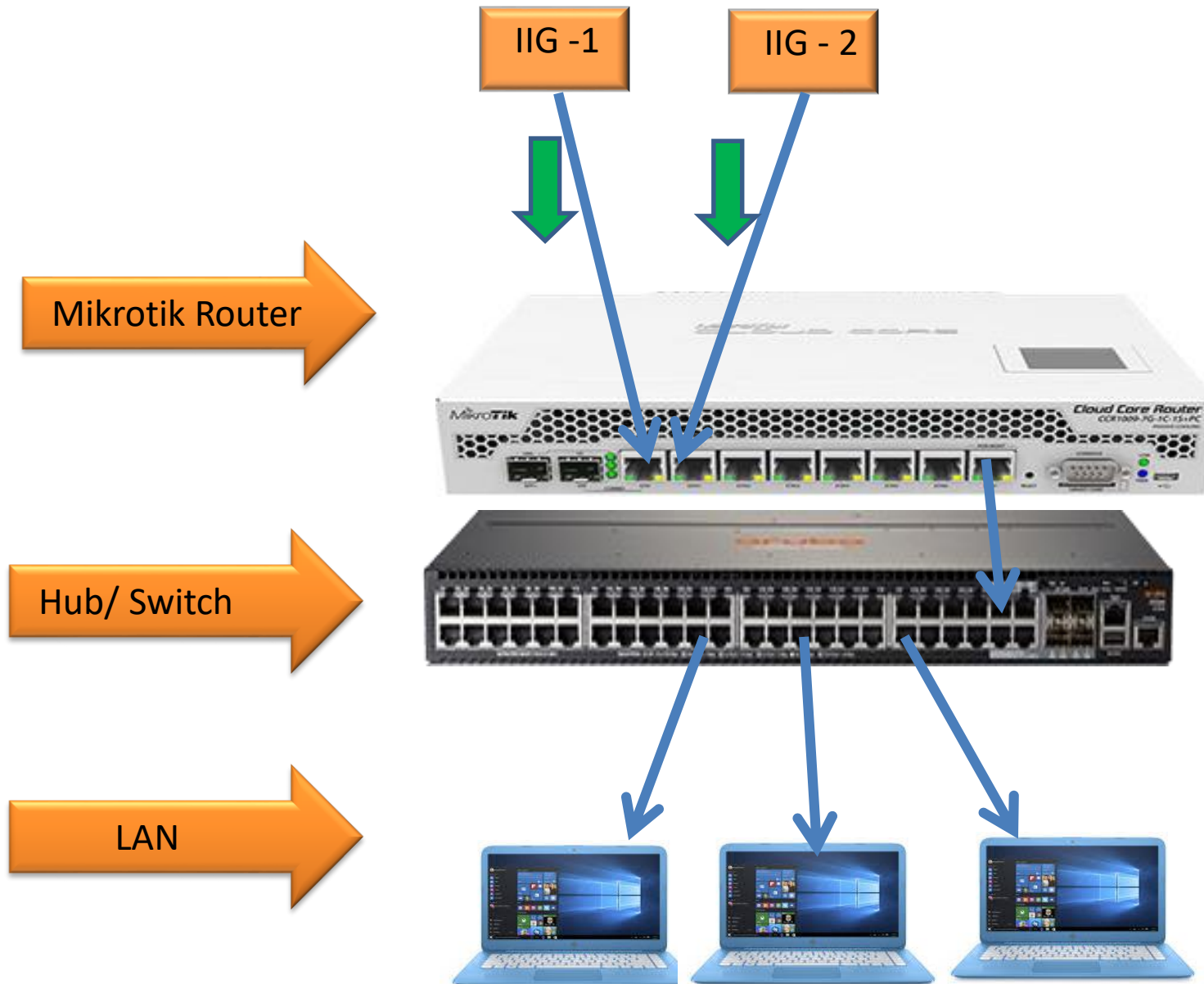
☒ Passthrough

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

☐ Redistribute Connected
☐ Redistribute Static
☐ Redistribute RIP
☐ Redistribute OSPF
☐ Redistribute BGP

Out Filter:
Confederation:
Confederation Peers:
Cluster ID:
Routing Table:
☒ Client
☐ Ignore

enabled

BGP Peer <mango>

General Advanced Status

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

OK Cancel Apply Disable Comment Copy Remove Refresh

BGP Peer <btcl>

General Advanced Status

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

TCP MD5 Key:
Nexthop Choice: default
☐ Multihop
☐ Route Reflect

Hold Time: 180
Keepalive Time:

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

How to Configure Route Filter:

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

↶

↷

Safe Mode

✓ Hi

Quick Set

CAPsMAN

Interfaces

Wireless

Bridge

PPP

Switch

Mesh

IP

IPv6

MPLS

OpenFlow

Routing

Route Filters

+

−

✓

✗

📁

🔍

Find

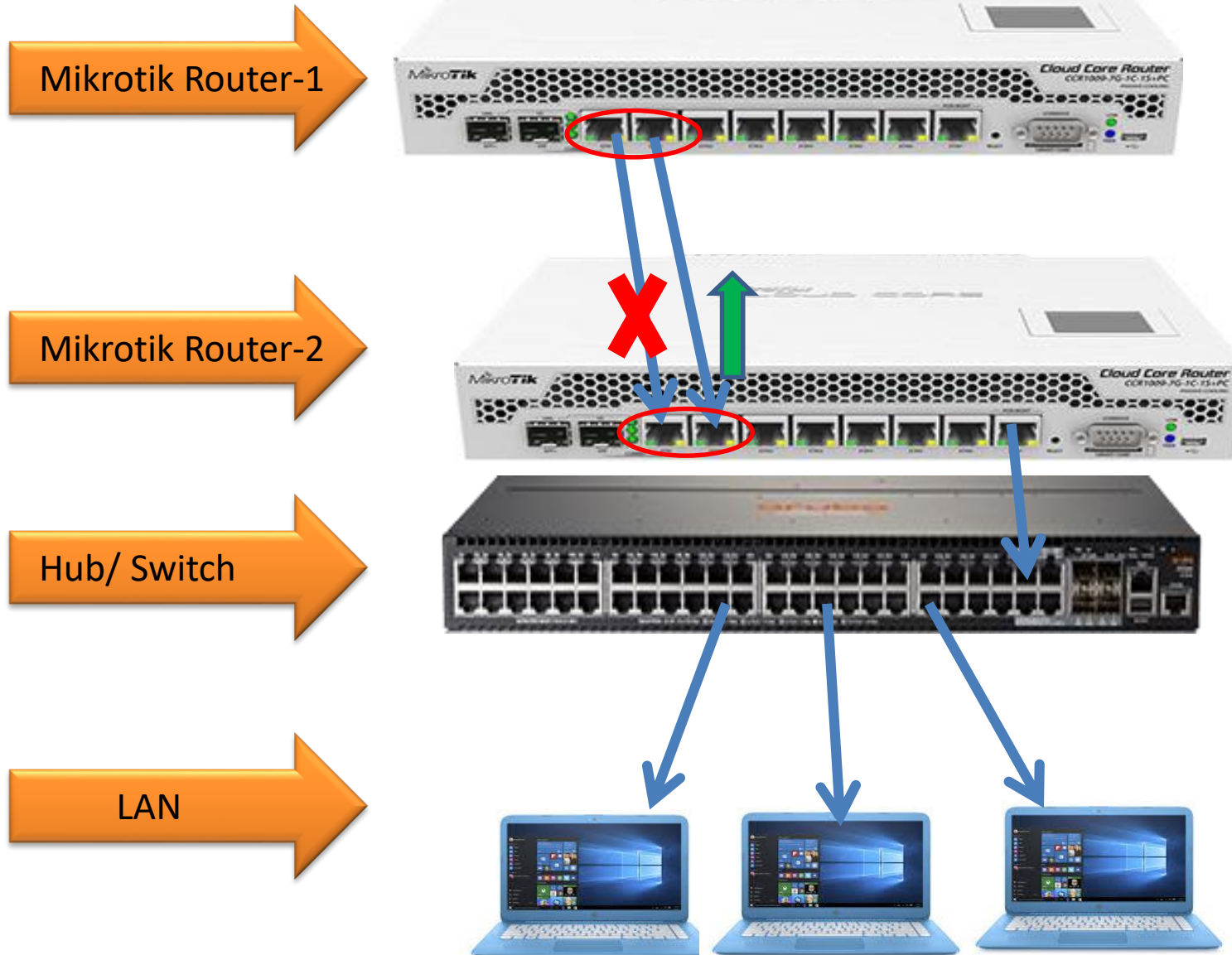
#	Chain	Prefix	Action
0	mango-out	202.191.120.0/23	accept
5	mango-out	202.191.120.0/24	accept
7	mango-out	202.191.121.0/24	discard
3	mango-out	0.0.0.0/0	discard
4	btcl-out	202.191.120.0/23	accept
6	btcl-out	202.191.120.0/24	discard
1	btcl-out	202.191.121.0/24	accept
2	btcl-out	0.0.0.0/0	discard

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



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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OpenFlow
Routing
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Queues
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Log
Radius
Tools
New Terminal
TR069
LCD
MetaROUTER
Partition
Make Supout.tif

Interface List

Interface	Type
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 Monitoring: 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	ether3-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