

The Brothers WISP



Route it like it's **HOT**

Greg Sowell Consulting

High Availability With
Mikrotik



StrayaNet

Who Am I

- ▶ Greg Sowell – A+, Network+, CCNA, CCNP, CCIE Written, MTCNA, MTCRE, MTCINE, Mikrotik Certified Trainer
- ▶ VP of Technology FIBERTOWN Datacenters
- ▶ Consultant – GregSowell.com
- ▶ Author at Lynda.com/gregsowell
- ▶ President of StrayaNet.com

The Brothers WISP

TheBrothersWISP.com

- ▶ WISP/Network industry scuttlebutt
- ▶ Greg Sowell - Texas
- ▶ Andrew Cox - Australia
- ▶ Andrew Thrift – New Zealand
- ▶ Tomas Kirnak – Slovakia
- ▶ Tom Smyth – Ireland
- ▶ Mike Hammett - Chicago
- ▶ JJ Boyd – North Carolina
- ▶ Alex Heart – Oregon
- ▶ Justin Miller – Virginia
- ▶ Justin Wilson – Indiana



- ▶ MDU/Apartment ISP
- ▶ You deliver Internet, or we can
- ▶ Support all the way down to the end user
- ▶ Profit sharing with MDU
- ▶ Extremely customizable hotspot pages

Assumptions

- ▶ You are familiar with the Mikrotik interface
 - ▶ Adding Addresses
 - ▶ Adding Static Routes
- ▶ You are familiar with dynamic routing
 - ▶ Some knowledge of OSPF

What is High availability?

- ▶ In simplest terms it refers to a system or component that is continuously operational for a desirably long length of time.
- ▶ Processes by which you can maximize uptime/reliability of a network.

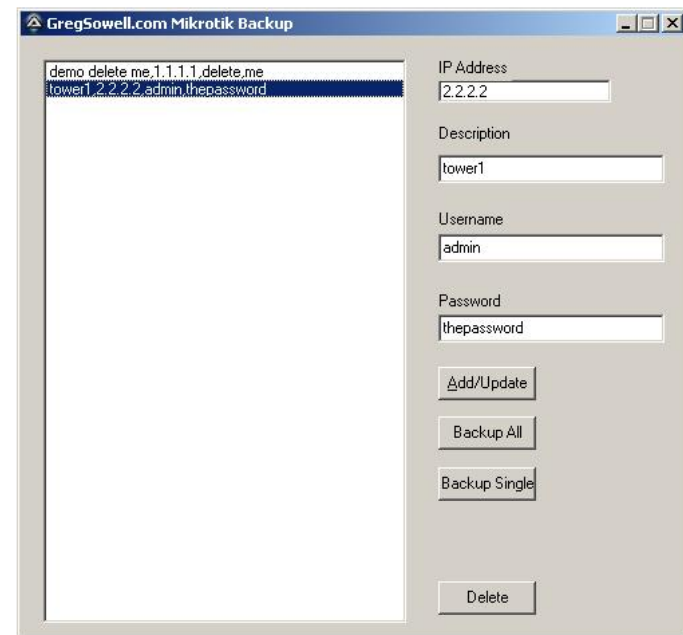
Change Control

- ▶ Create a policy.
 - ▶ Change Windows
 - ▶ Notify Customers *for major changes
 - ▶ Create a change procedure document
 - ▶ Add test steps
 - ▶ Add backout procedures
 - ▶ Have someone else approve it

- ▶ Last...FOLLOW YOUR POLICY!

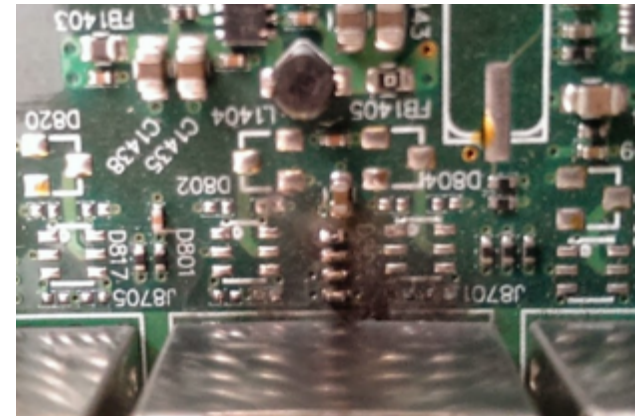
Backups

- ▶ Maintain Regular Backups
 - ▶ Ensure it is automated
 - ▶ Verify backups on a schedule
- ▶ Greg Sowell Automated Backup =>
- ▶ Daily email backups
- ▶ Some RANCID integration
- ▶ Tomhas' Backup Program, Unimus!
<http://www.unimus.net/>



Spares

- ▶ Keep a spare on the shelf.
 - ▶ Strikes/Surges happen
 - ▶ Great for testing
 - ▶ Emergency build outs
 - ▶ Affordable enough to spare



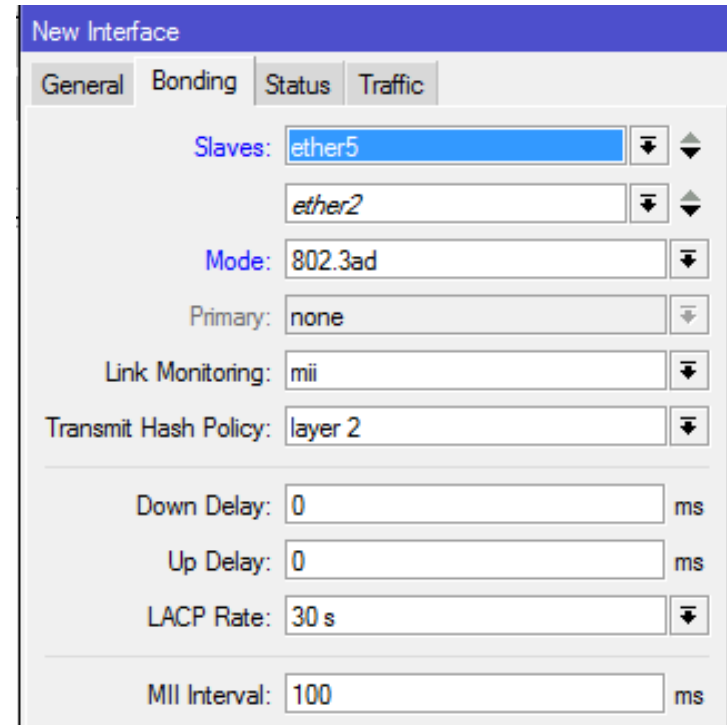
Backup Power

- ▶ UPS
- ▶ Redundant PSU – CCR1072/x86
- ▶ Dual power source devices
 - ▶ DC via barrel jack & POE port simultaneously – like 450G



Bonding/LACP

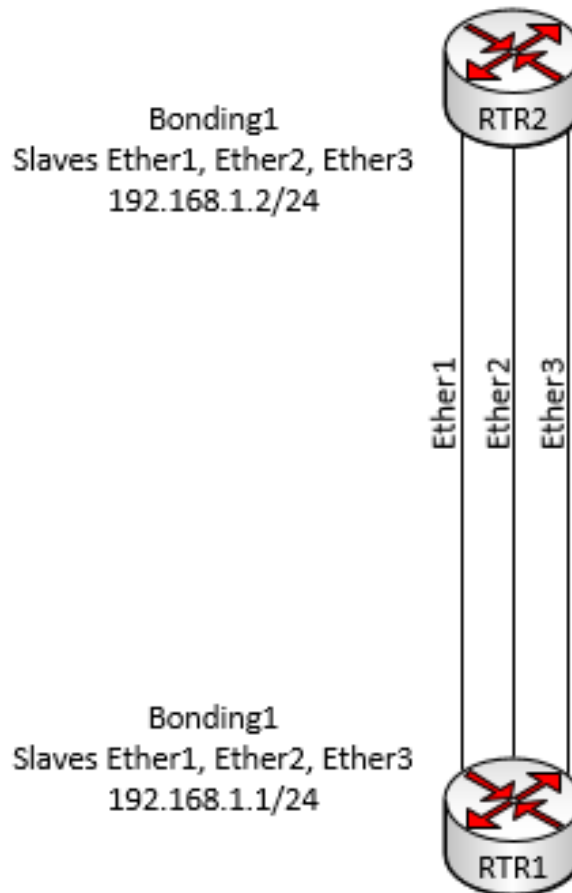
- ▶ Two or more interfaces
- ▶ Mikrotik utilizes several methods to send while bonding
 - ▶ Protocol based LACP(802.3ad)
 - ▶ Active/Backup
 - ▶ Etc.
- ▶ Can share traffic load
- ▶ Mitigate link failures



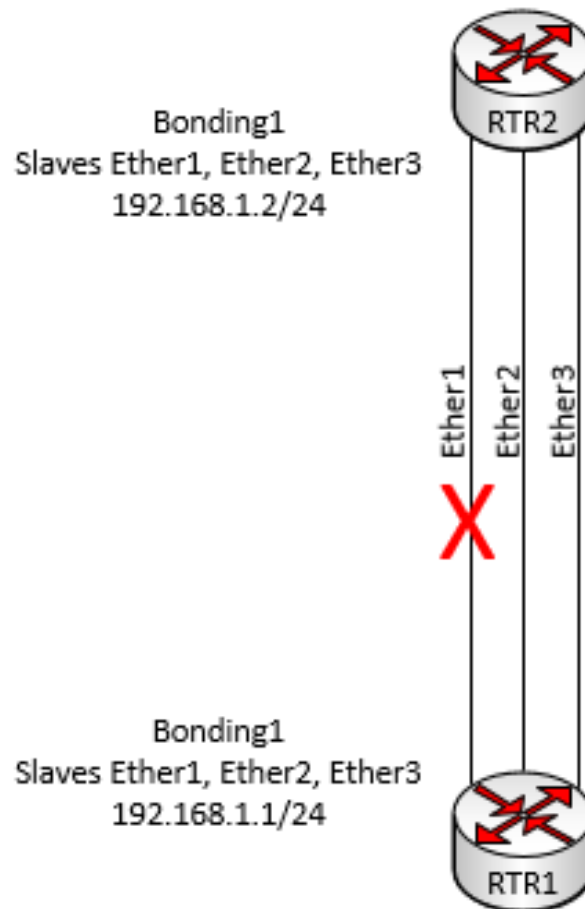
The screenshot shows the 'New Interface' configuration window in Mikrotik WinBox, specifically the 'Bonding' tab. The configuration is as follows:

Field	Value	Unit
Slaves	ether5	
	ether2	
Mode	802.3ad	
Primary	none	
Link Monitoring	mii	
Transmit Hash Policy	layer 2	
Down Delay	0	ms
Up Delay	0	ms
LACP Rate	30 s	
MII Interval	100	ms

Bonding/LACP

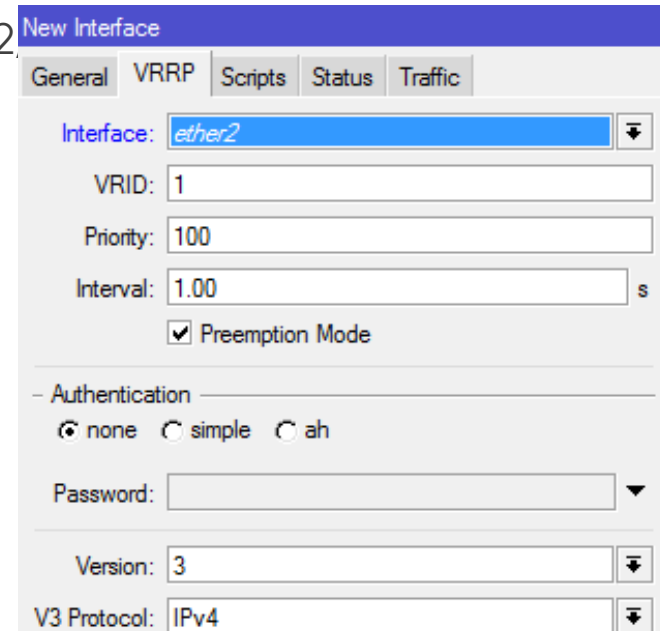


Bonding/LACP



Next Hop Redundancy - VRRP

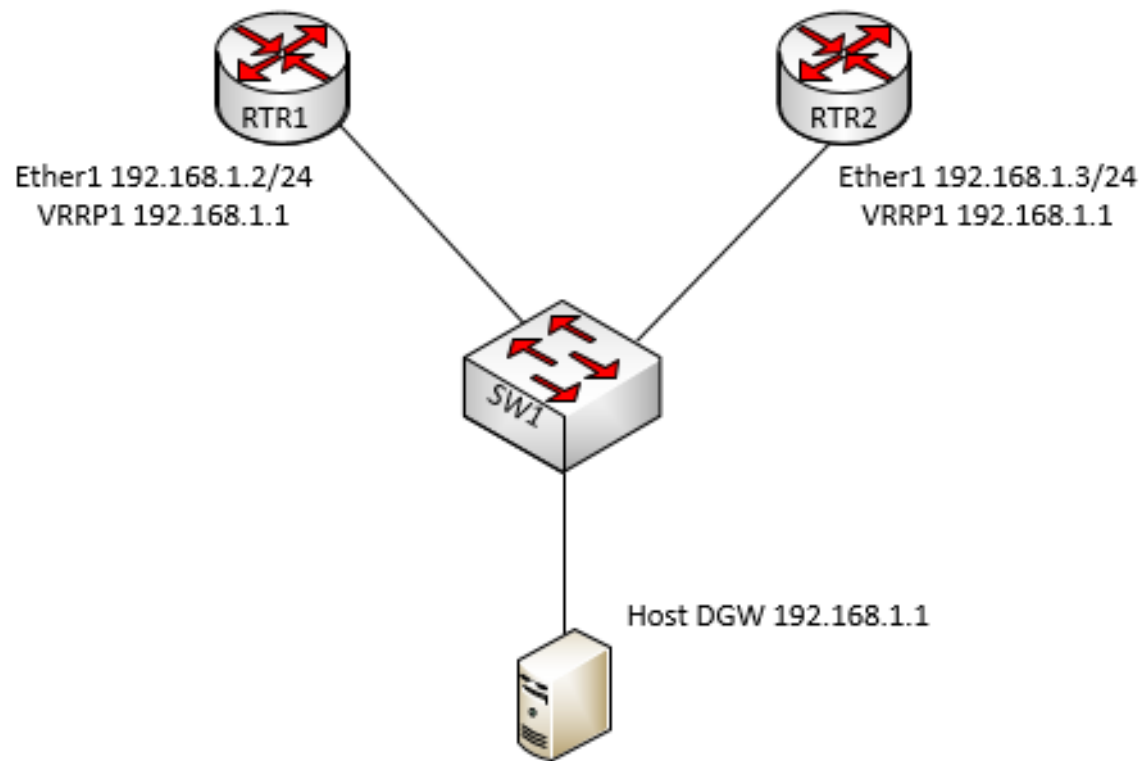
- ▶ Virtual Router Redundancy Protocol
 - ▶ Many routers on same subnet can act as default gateway
 - ▶ 1 router is chosen as Master – all others backup
 - ▶ Virtual MAC address to advertise DG IP address
 - ▶ VRRP subnet interfaces must share same Layer 2 switched segment



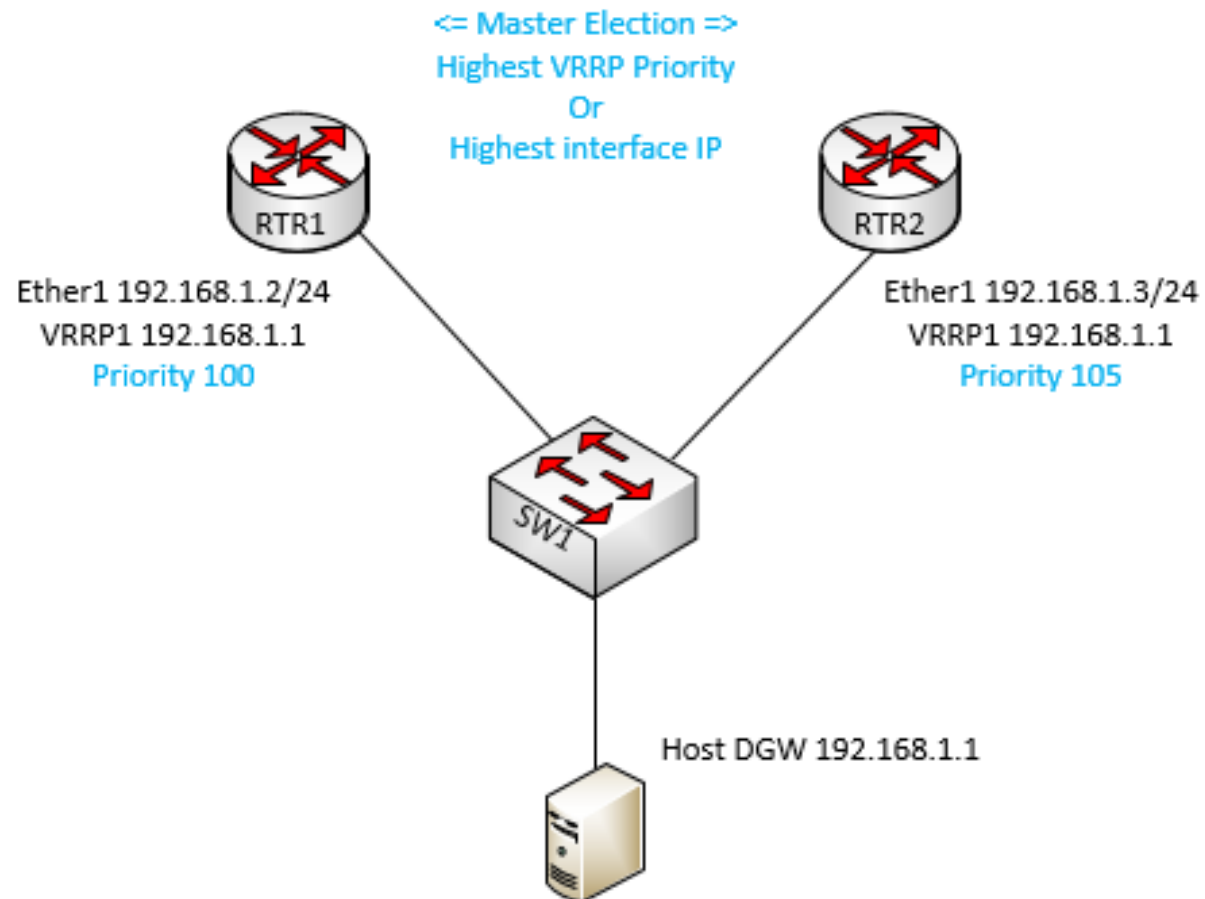
The screenshot shows the 'New Interface' configuration window with the 'VRRP' tab selected. The configuration is as follows:

Field	Value
Interface	ether2
VRID	1
Priority	100
Interval	1.00 s
Preemption Mode	<input checked="" type="checkbox"/>
Authentication	<input checked="" type="radio"/> none <input type="radio"/> simple <input type="radio"/> ah
Password	
Version	3
V3 Protocol	IPv4

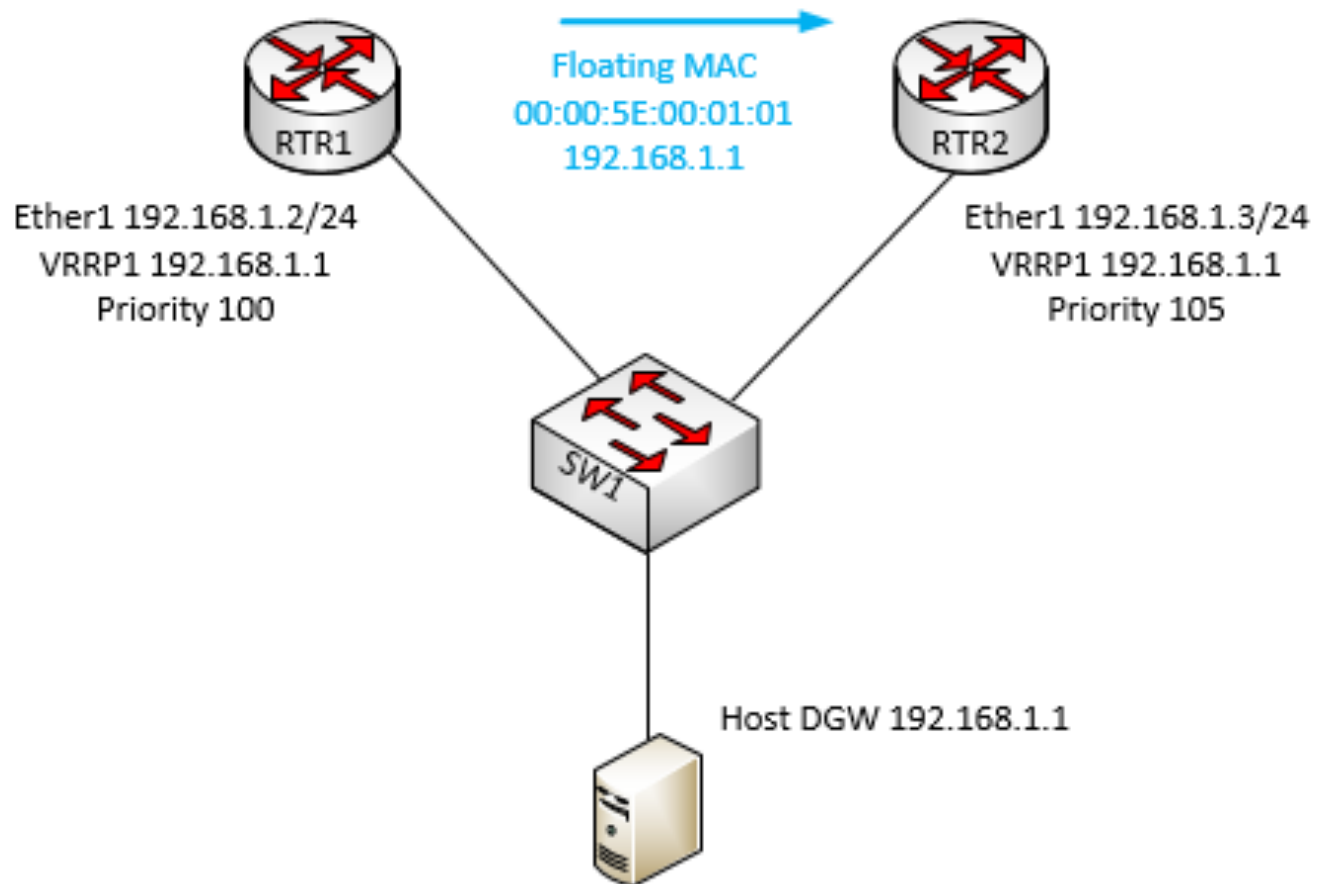
VRRP



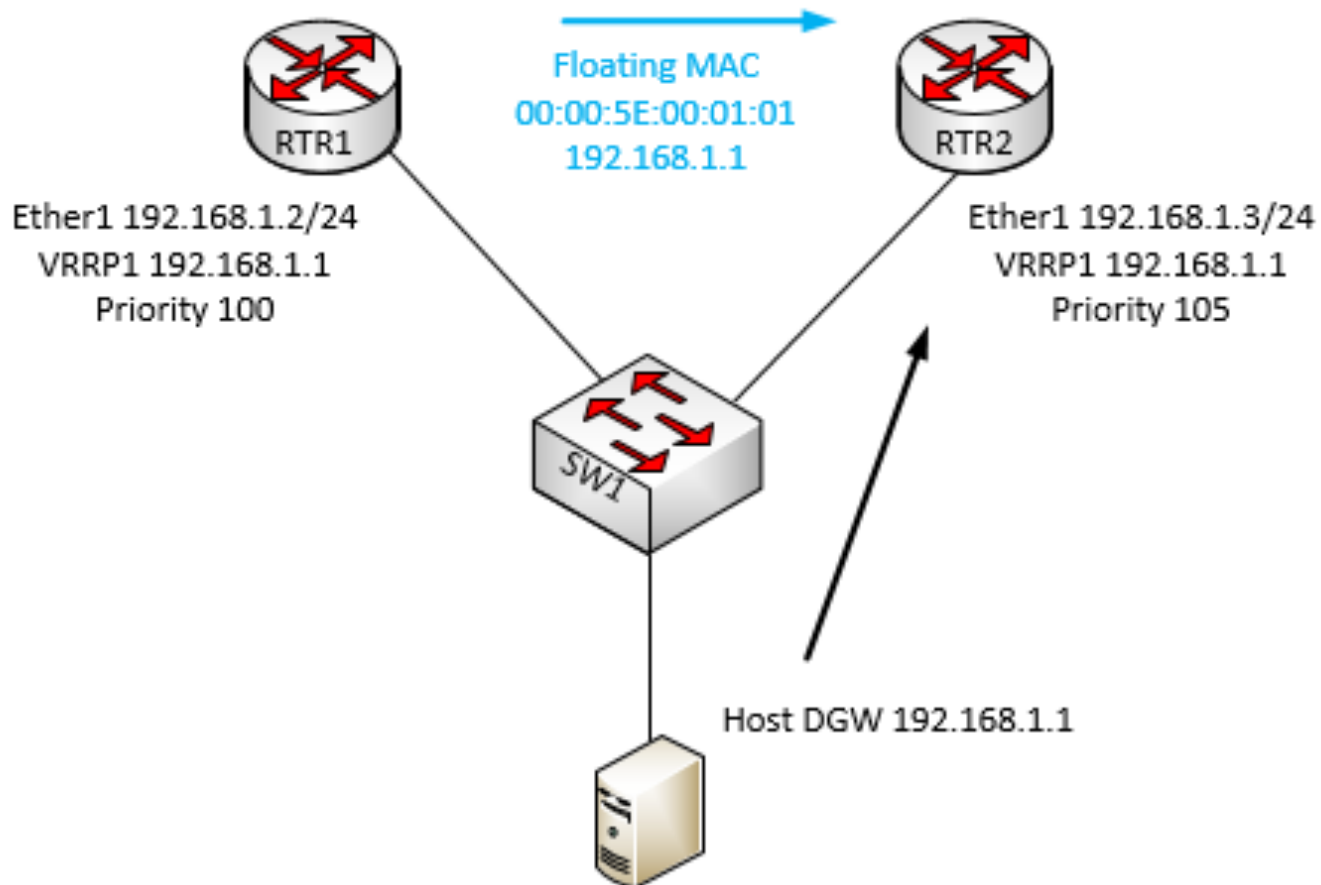
VRRP



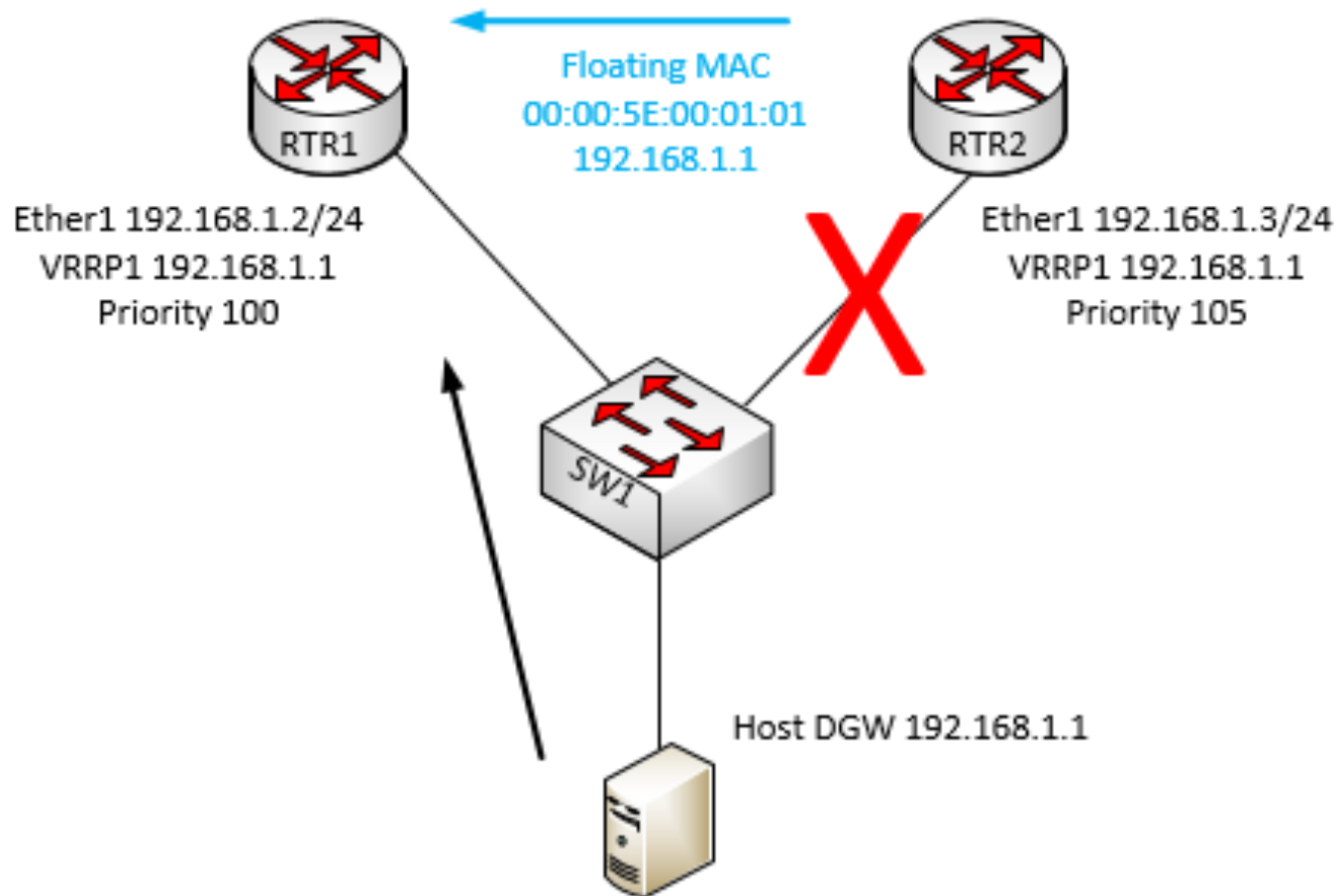
VRRP



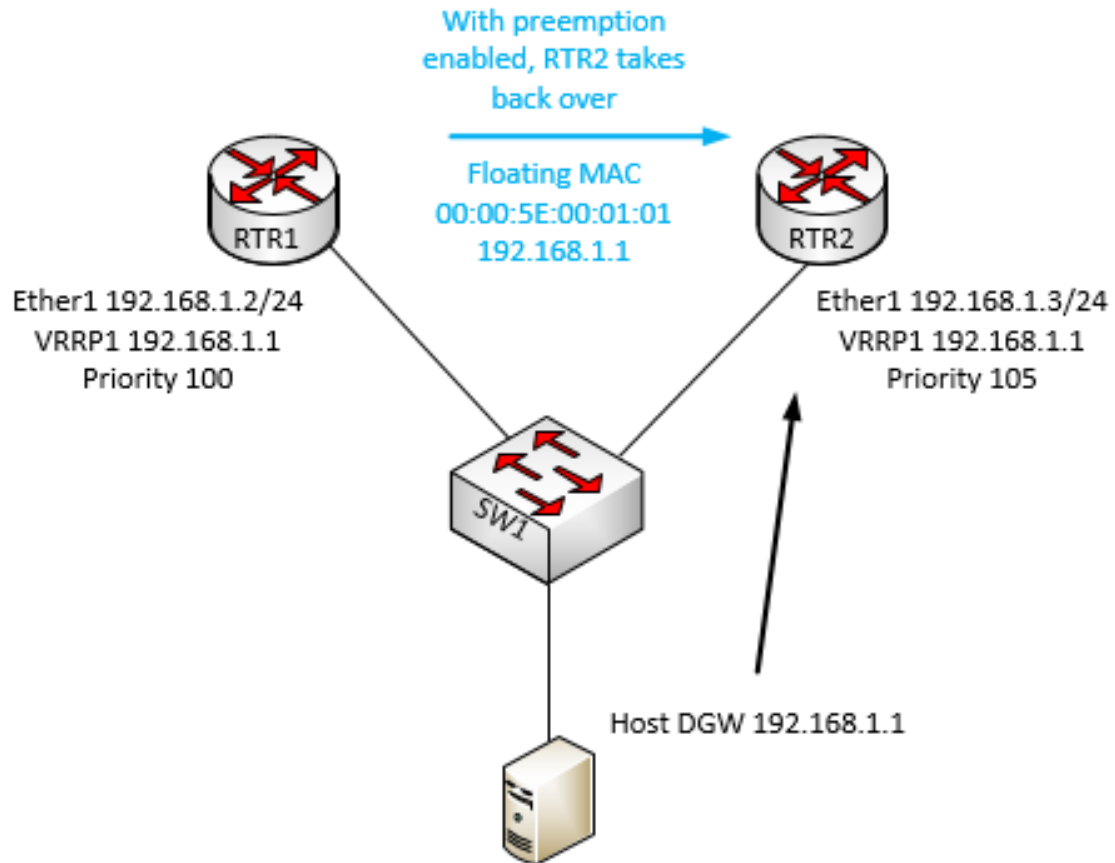
VRRP



VRRP



VRRP

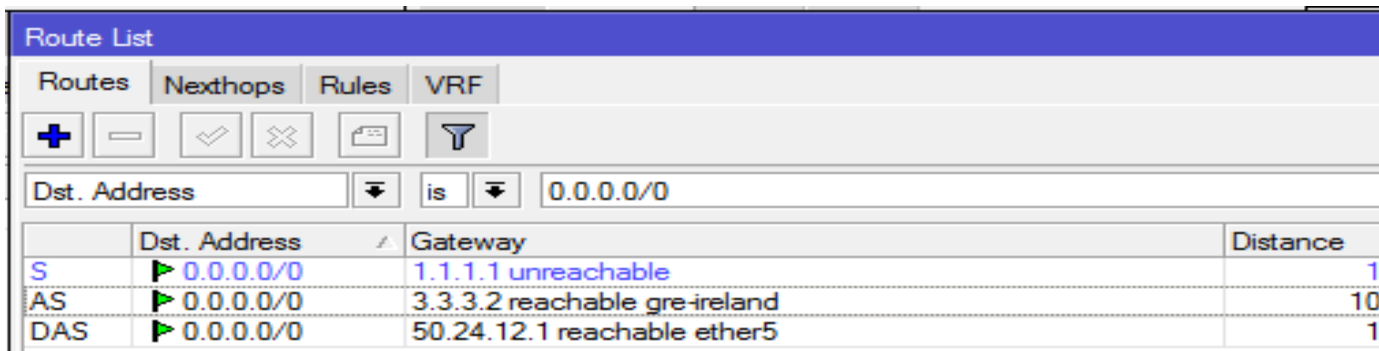


VRRP Feature Request

- ▶ Interface tracking with priority decrement/increment

HA Routing – Floating Routes

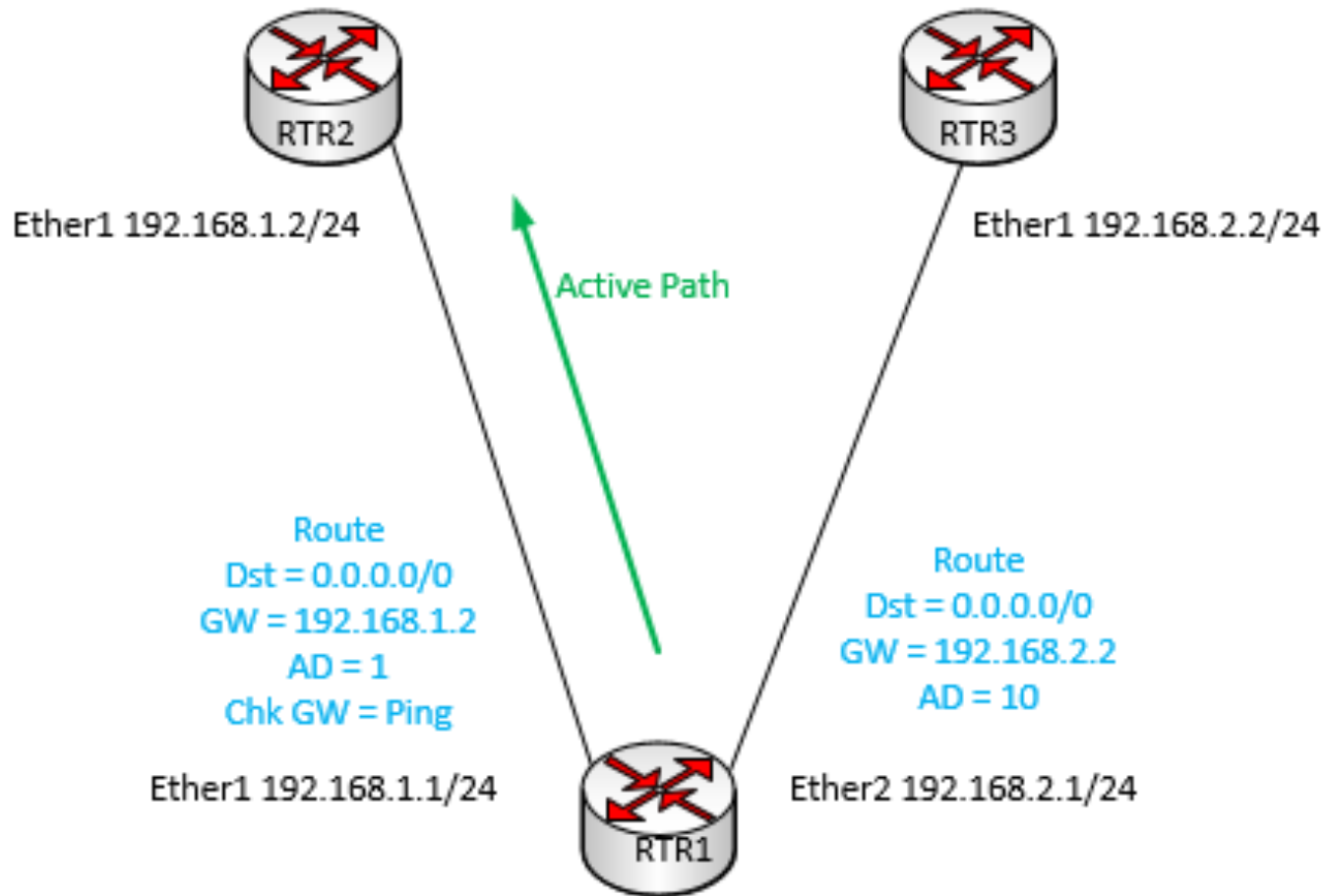
- ▶ Single router, multiple exit paths
- ▶ Two identical route statements with different Administrative Distances
 - ▶ AD used to determine the trustworthiness of a route
 - ▶ Lower = more trusted
 - ▶ 0 to 255
 - ▶ Different methods of learning routes have differing default AD values



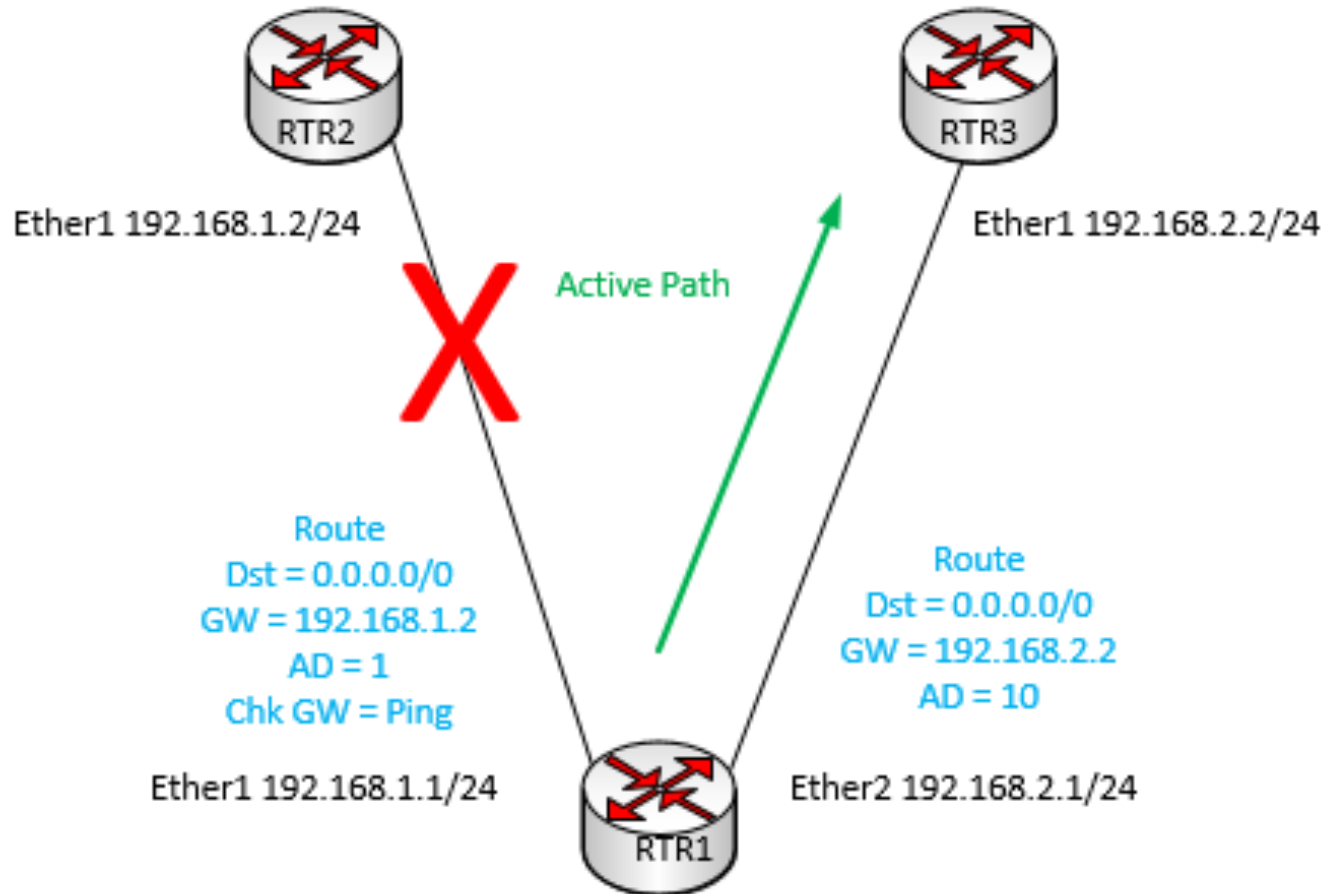
The screenshot shows a network device's configuration interface for a Route List. The title bar is 'Route List'. Below the title bar are tabs for 'Routes', 'Nexthops', 'Rules', and 'VRF'. There are several icons for adding, deleting, and filtering routes. The main area shows a search filter for 'Dst. Address' set to '0.0.0.0/0'. Below this is a table of routes.

	Dst. Address	Gateway	Distance
S	▶ 0.0.0.0/0	1.1.1.1 unreachable	1
AS	▶ 0.0.0.0/0	3.3.3.2 reachable gre-ireland	10
DAS	▶ 0.0.0.0/0	50.24.12.1 reachable ether5	1

Floating Static Routes

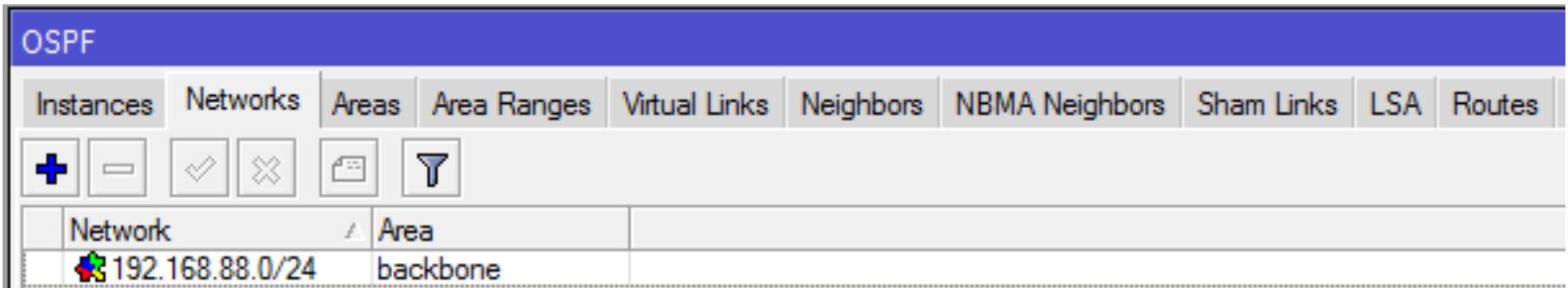


Floating Static Routes



Dynamic Routing

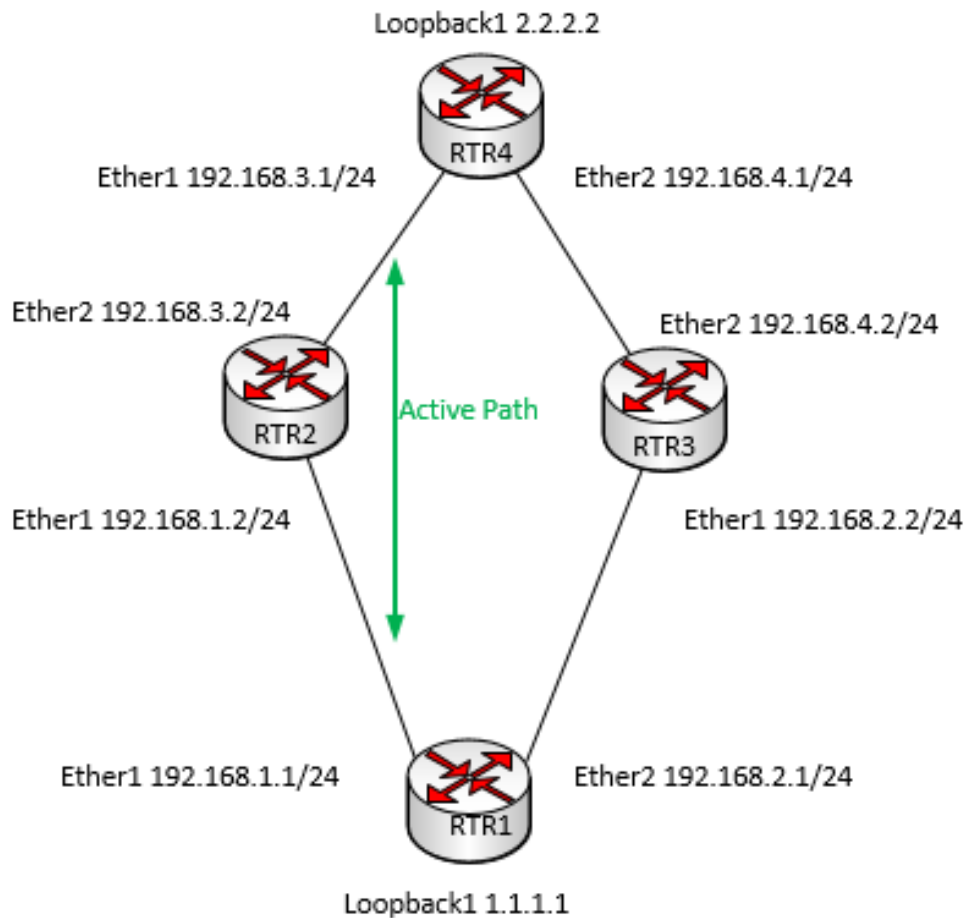
- ▶ OSPF, BGP, RIP (please no)
- ▶ Dynamically learns best path
- ▶ During failures, it can route around the issue



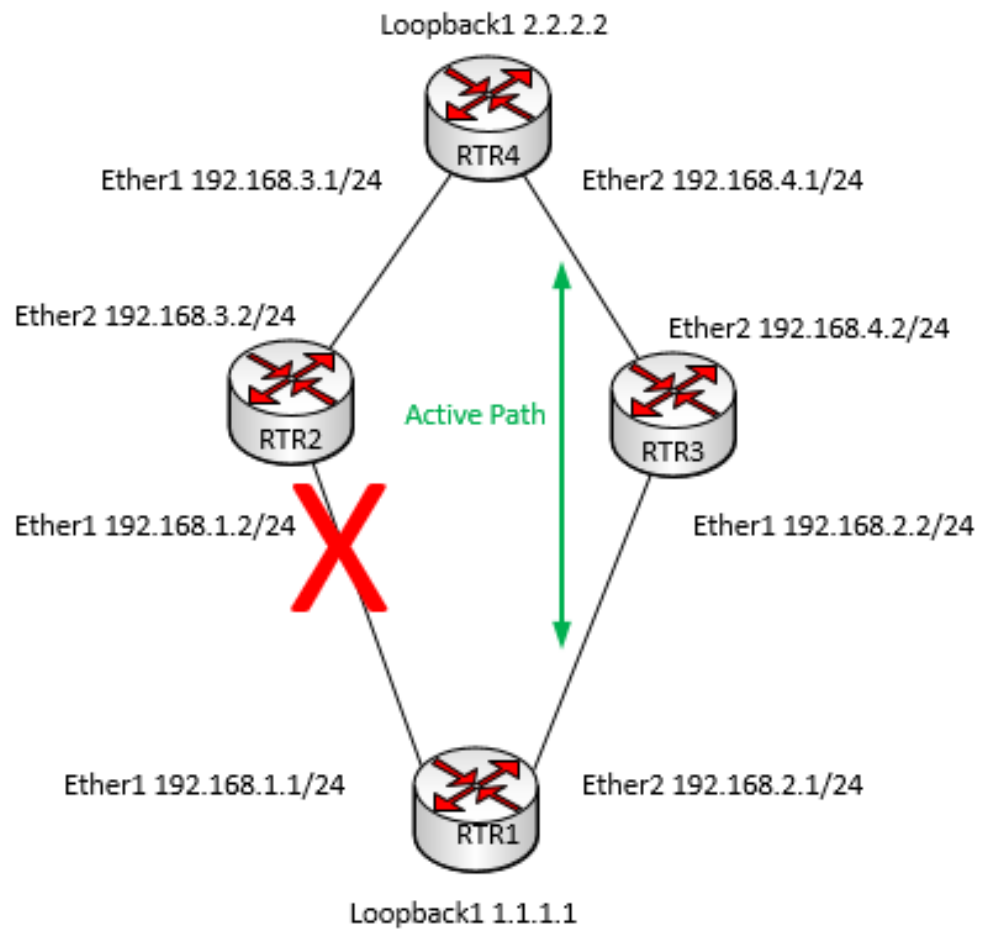
The screenshot shows a software interface for OSPF configuration. At the top is a blue header with the text "OSPF". Below the header is a navigation bar with several tabs: "Instances", "Networks", "Areas", "Area Ranges", "Virtual Links", "Neighbors", "NBMA Neighbors", "Sham Links", "LSA", and "Routes". The "Networks" tab is currently selected. Below the navigation bar is a toolbar with icons for adding (+), removing (-), checking (✓), deleting (✗), creating a new entry (document icon), and filtering (funnel icon). Below the toolbar is a table with two columns: "Network" and "Area". The table contains one row of data: a network address "192.168.88.0/24" in the "Network" column and the word "backbone" in the "Area" column.

Network	Area
192.168.88.0/24	backbone

OSPF

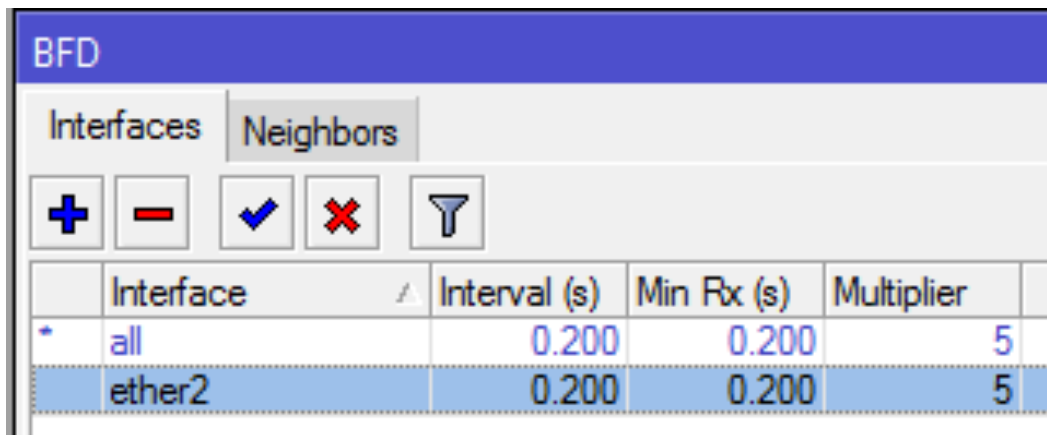


OSPF



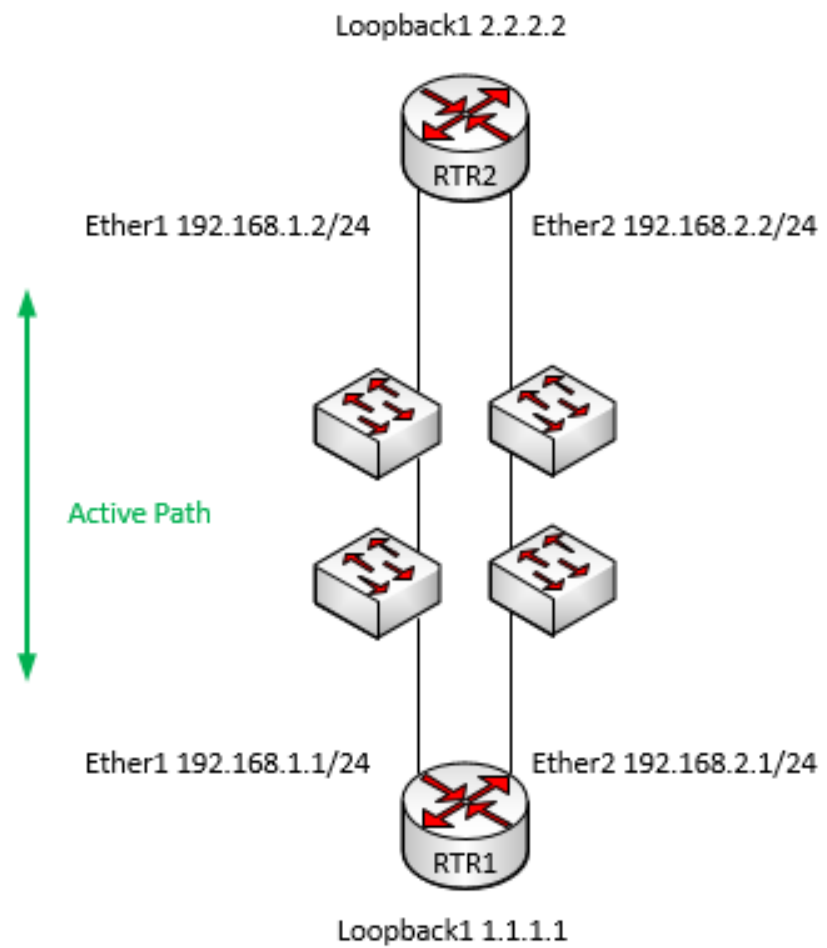
Bidirectional Forwarding Detection

- ▶ Hello protocol
- ▶ Fast failure detection – default < 2 seconds, can be tuned to < 1 second
- ▶ BFD supplements OSPF/BGP

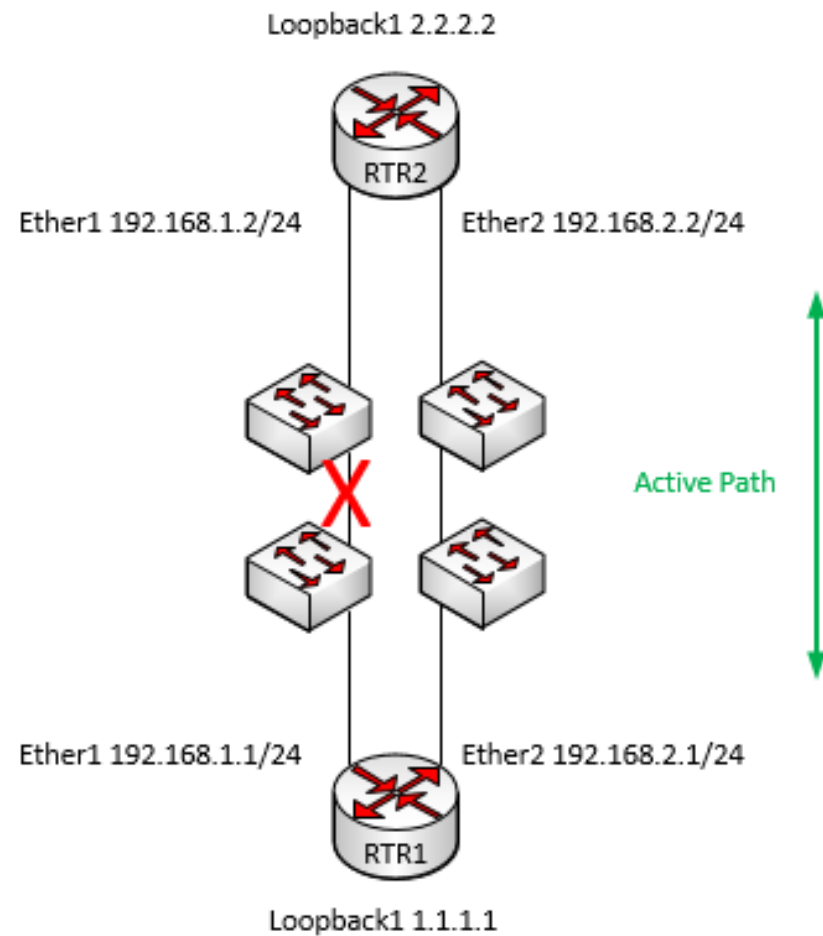


Interface	Interval (s)	Min Rx (s)	Multiplier
all	0.200	0.200	5
ether2	0.200	0.200	5

BFD



BFD





One last thing, shake my hand, tell me your story, and buy the brothers a beer!

Thanks and happy routing!

Resources

- ▶ Greg's Blog
 - ▶ <http://GregSowell.com>
- ▶ TheBrothersWISP
 - ▶ <http://thebrotherswisp.com/>
- ▶ Link to script files
 - ▶ <http://gregsowell.com/files/MUM2016Scripts.zip>
- ▶ StrayaNet
 - ▶ <http://StrayaNet.com>
- ▶ Unimus Backup
 - ▶ <http://www.unimus.net/>