

# Failover using VRRP, OSPF & BFD

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Second Dubai MUM, Emirates

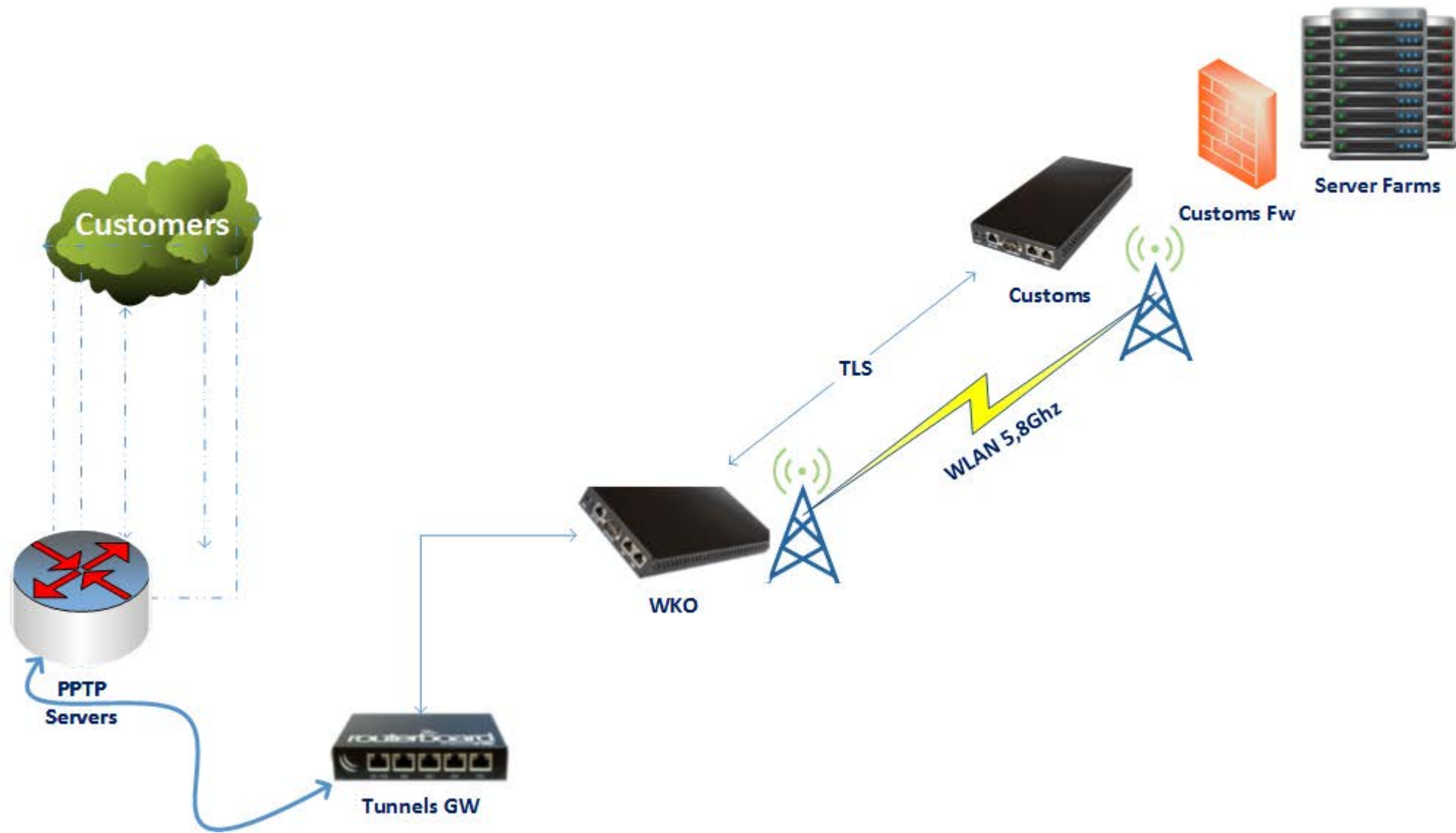


S O L U C I O N E S  
**WORKOUT**

- Bachelor's Degree in Organization's Information Systems (In progress)
- MTCNA (1511NA064)
- MTCRE (1511RE099)
- MTCTCE (1511TCE030)
- MTCINE (1604INE052)
- 4 years working in networking with MikroTik

- VRRP, OSPF & BFD: Description and properties
- Steps for configuration
- Testing failover
- Final comments
- Q & A

# Original Network Topology



- Only 1 IP address allowed and unique gateway
- Second router with VRRP, OSPF & BFD
- Building only accessible during working hours
- Time to coordinate replacements

- Virtual Router Redundancy Protocol (RFC 3768)
- Virtual interface over physical
- Priorities (Master: 255, Backups: 1-254)
- Time of convergence
- IP address /32

## How does it work?

- Multicast packets
- Same IP Addresses
- MAC Address 00-00-5E-00-01-XX



VRID in Hex

## **OSPF (Open Shortest Path First)**

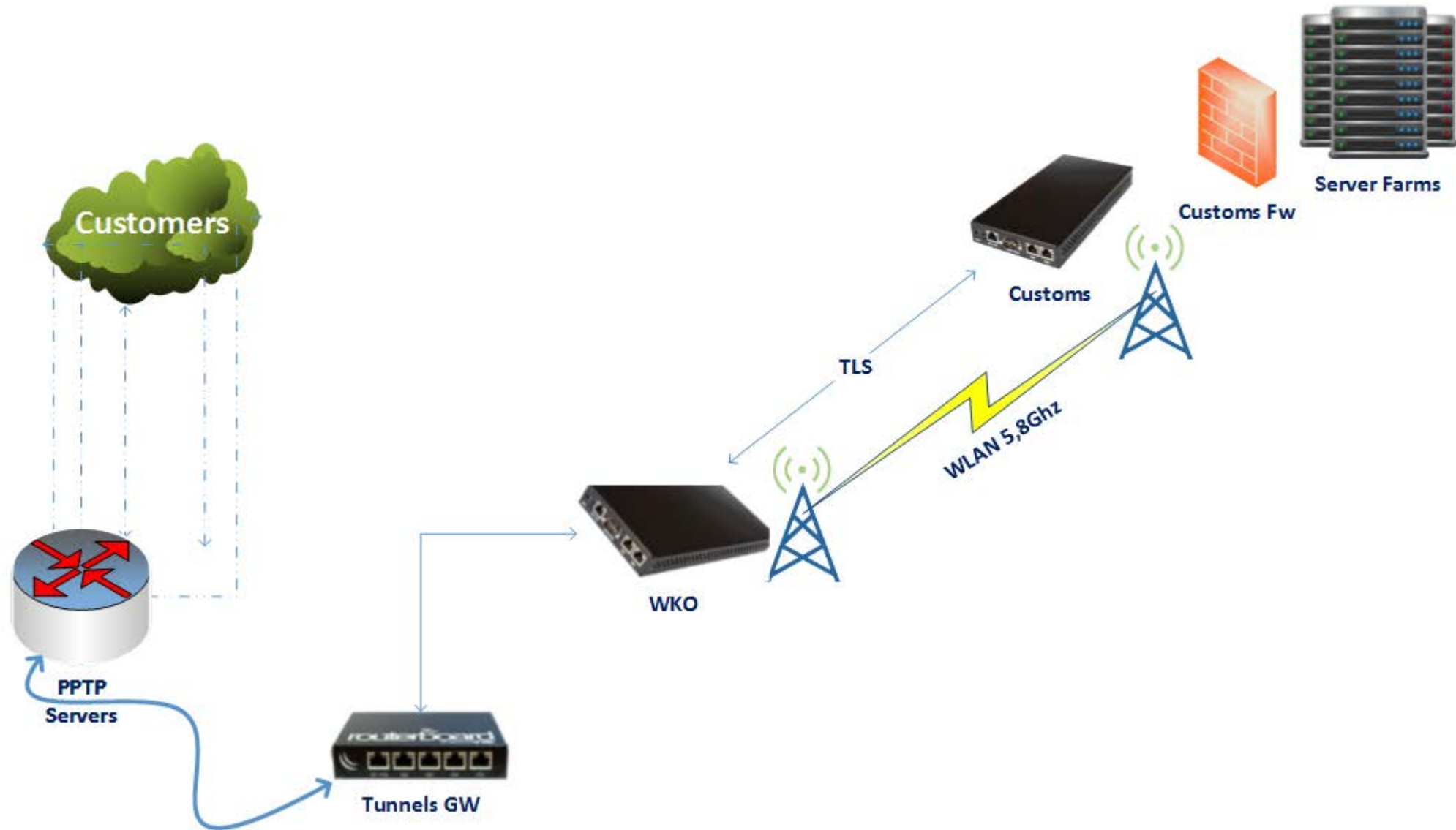
- Internal Gateway Protocol
- Best path

## **Bidirectional Forwarding Detection**

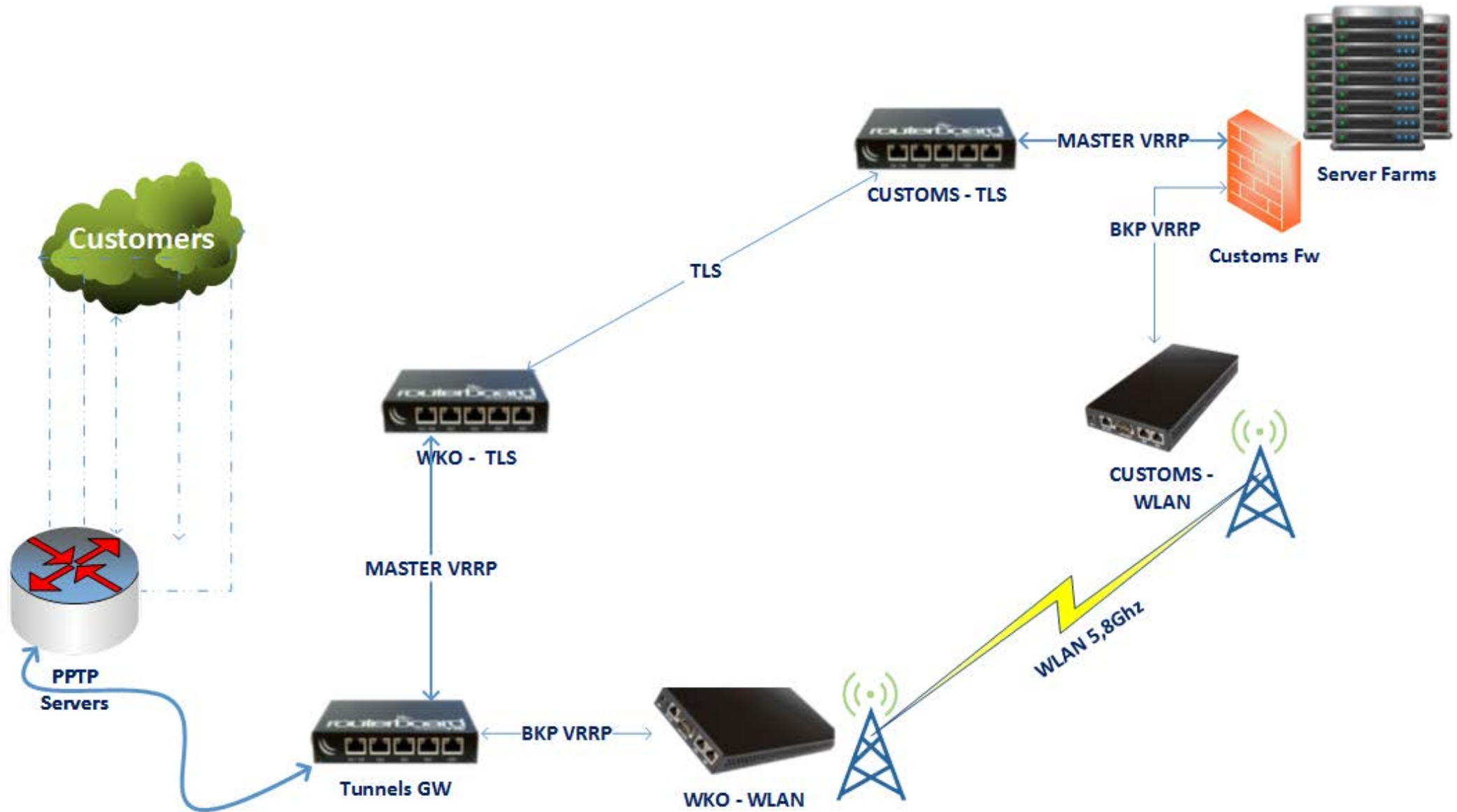
- Session between two endpoints
- Hello packets each 200ms
- Wireless considerations



# Original Network Topology

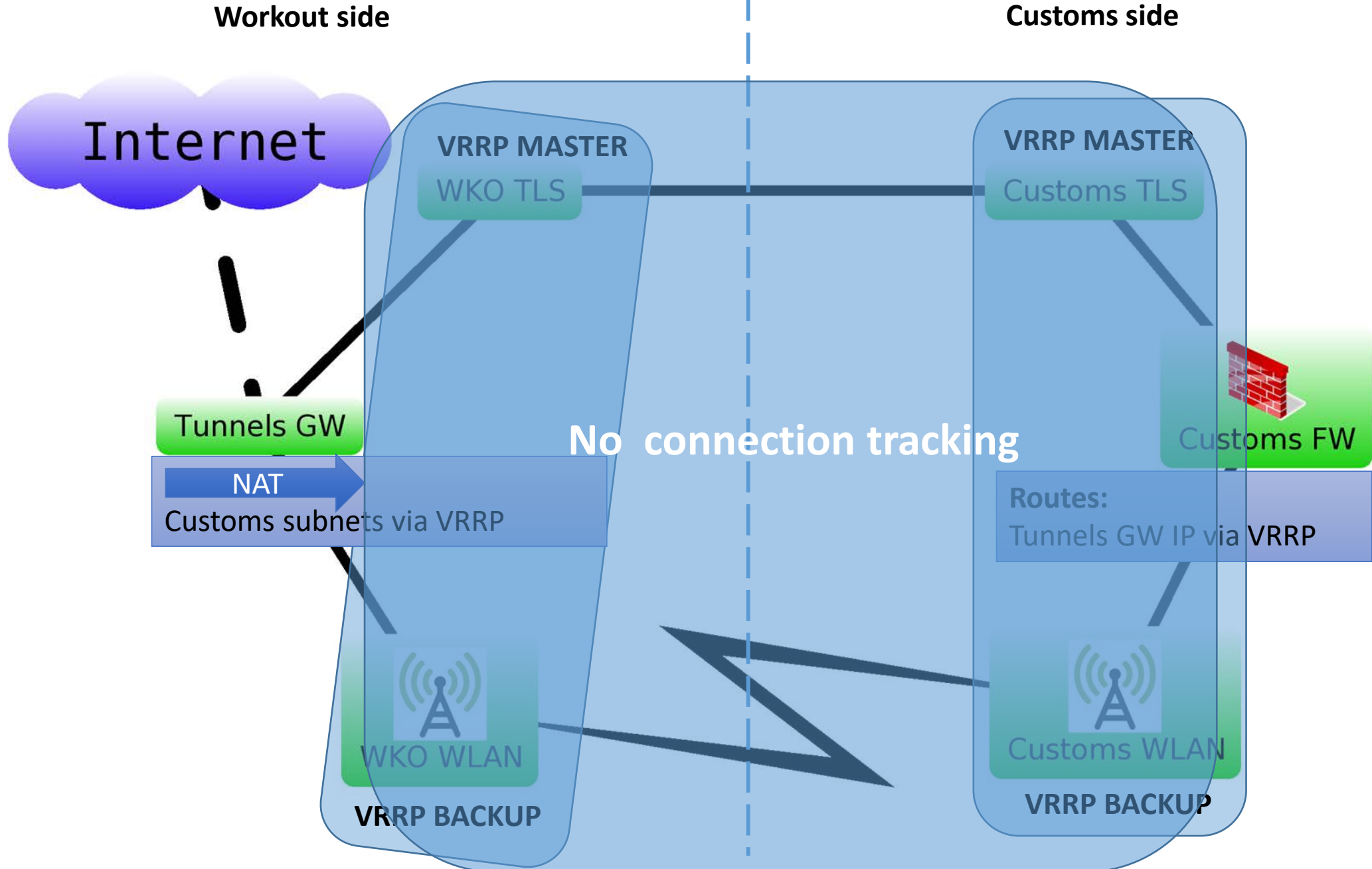


# Goal Network Topology



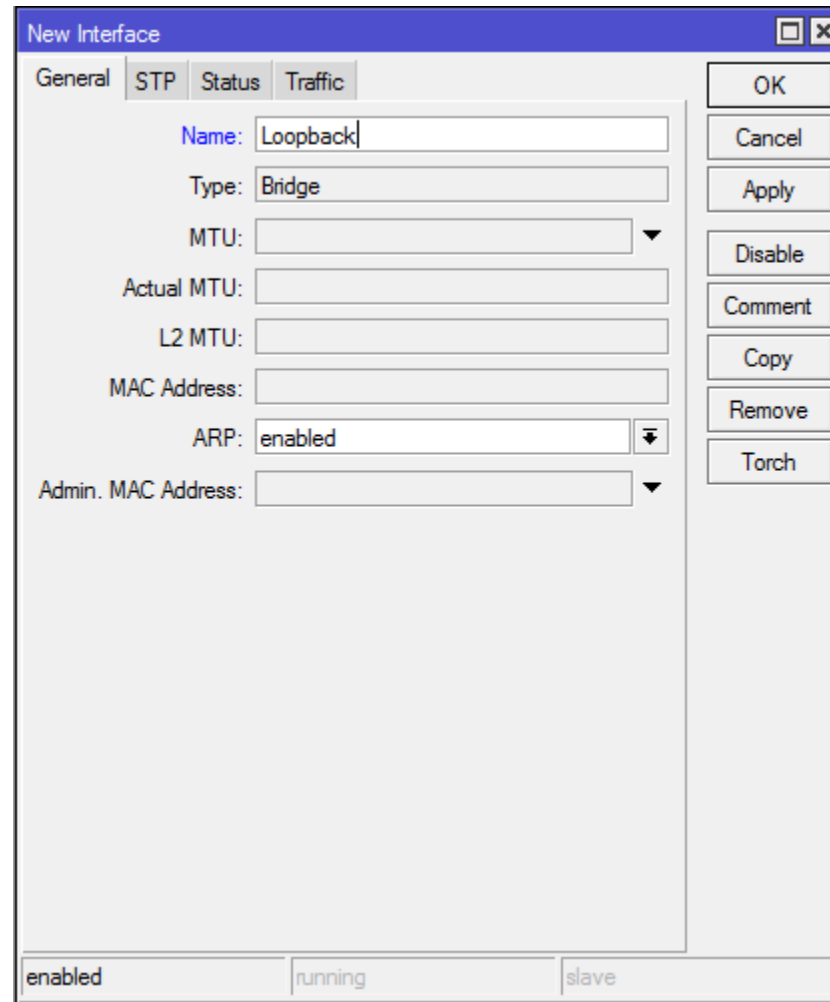
- Custom's network has only 1 IP as GW for ours
- Non static ARP entries
- Wireless distance: Less than 400 meters
- No connection tracking used in redundant routers

# Things to consider



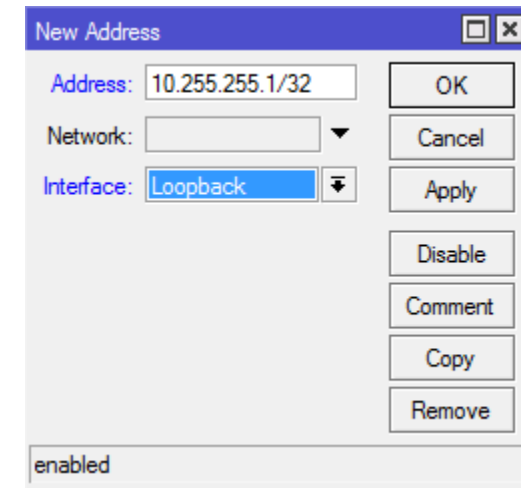
# Loopback

- Best Practice
- Management
- Bridge -> Add



The 'New Interface' dialog box is shown with the 'General' tab selected. The 'Name' field contains 'Loopback', and the 'Type' is set to 'Bridge'. The 'ARP' checkbox is checked and labeled 'enabled'. At the bottom, there are three status indicators: 'enabled', 'running', and 'slave'.

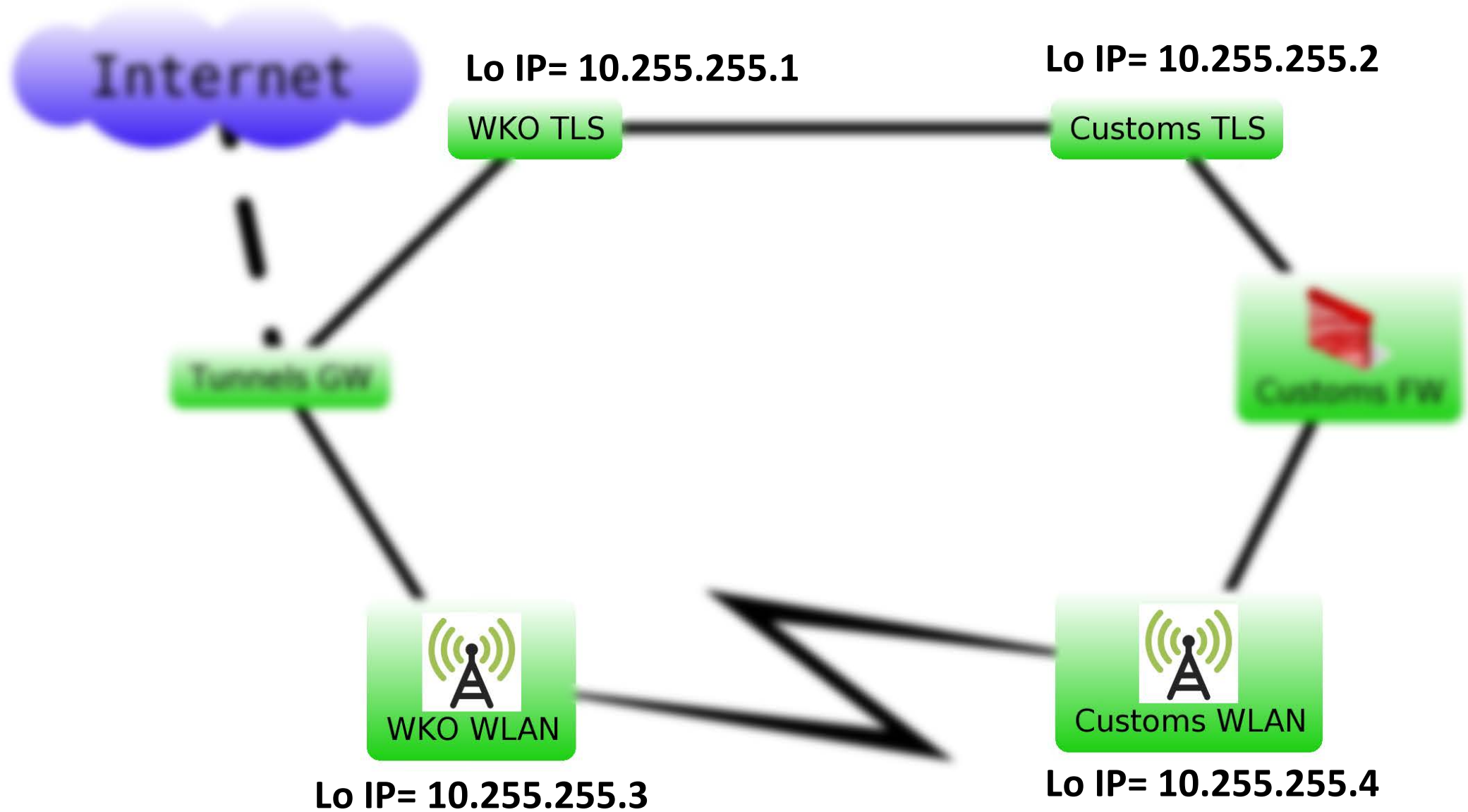
enabled	running	slave
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The 'New Address' dialog box is shown with the 'Address' field set to '10.255.255.1/32' and the 'Interface' dropdown set to 'Loopback'. The 'enabled' checkbox at the bottom is checked.

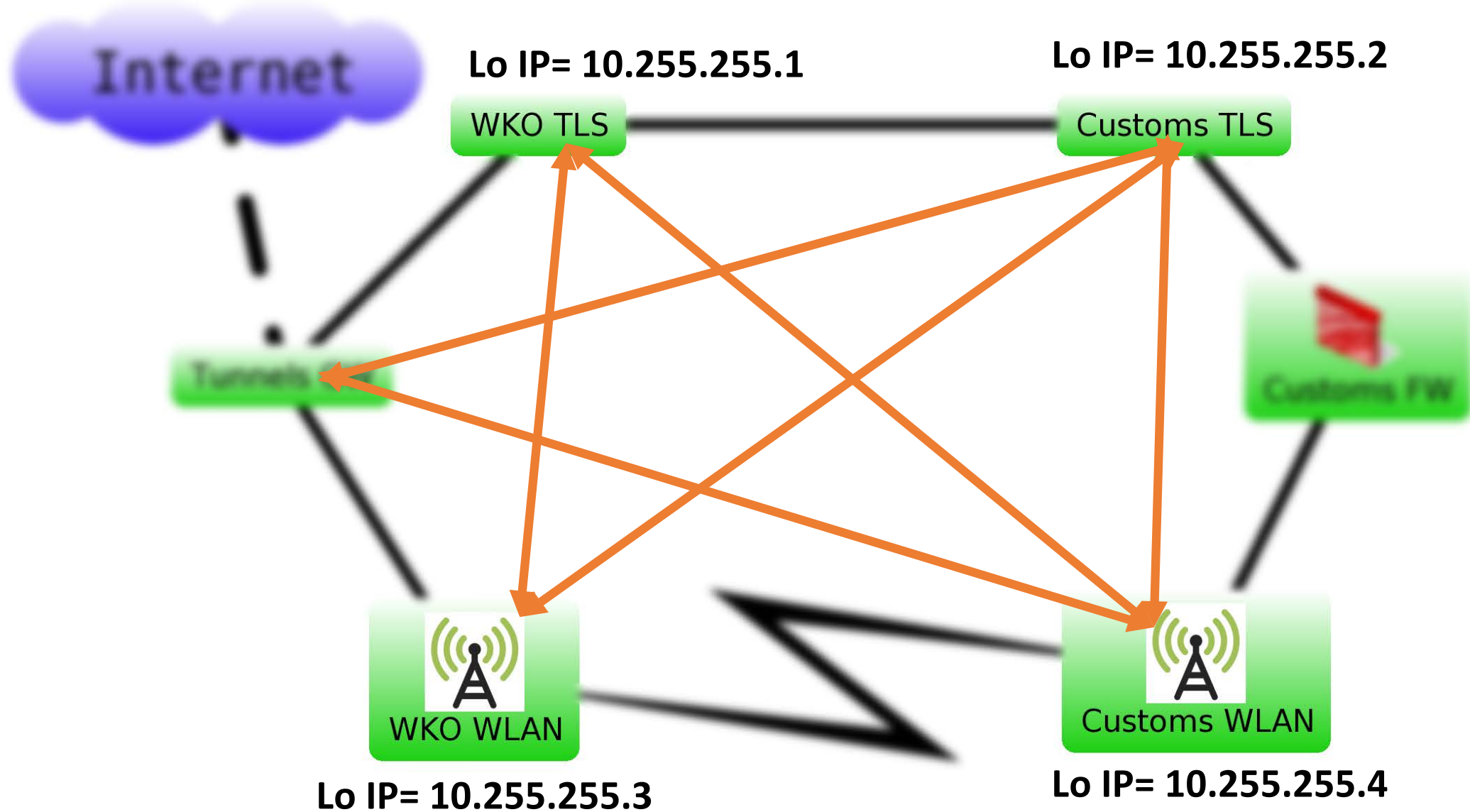
enabled
---------

# Loopback



# Loopback

- Static routes between all routers to reach Loopback IP's (not physical mesh)



- How to

The screenshot shows the 'Interface List' window with a dropdown menu open. The 'VRRP' option is highlighted in blue. The background table shows interface statistics for various types.

Interface	L2 MTU	Tx	Rx	Tx Pac
EoIP Tunnel	65535	0 bps	0 bps	
IP Tunnel	1526	40.9 kbps	12.0 kbps	
GRE Tunnel	1526	35.0 kbps	1888 bps	
VLAN	1522	11.3 kbps	11.2 kbps	
VRRP	1522	0 bps	0 bps	
Bonding	1522	0 bps	0 bps	

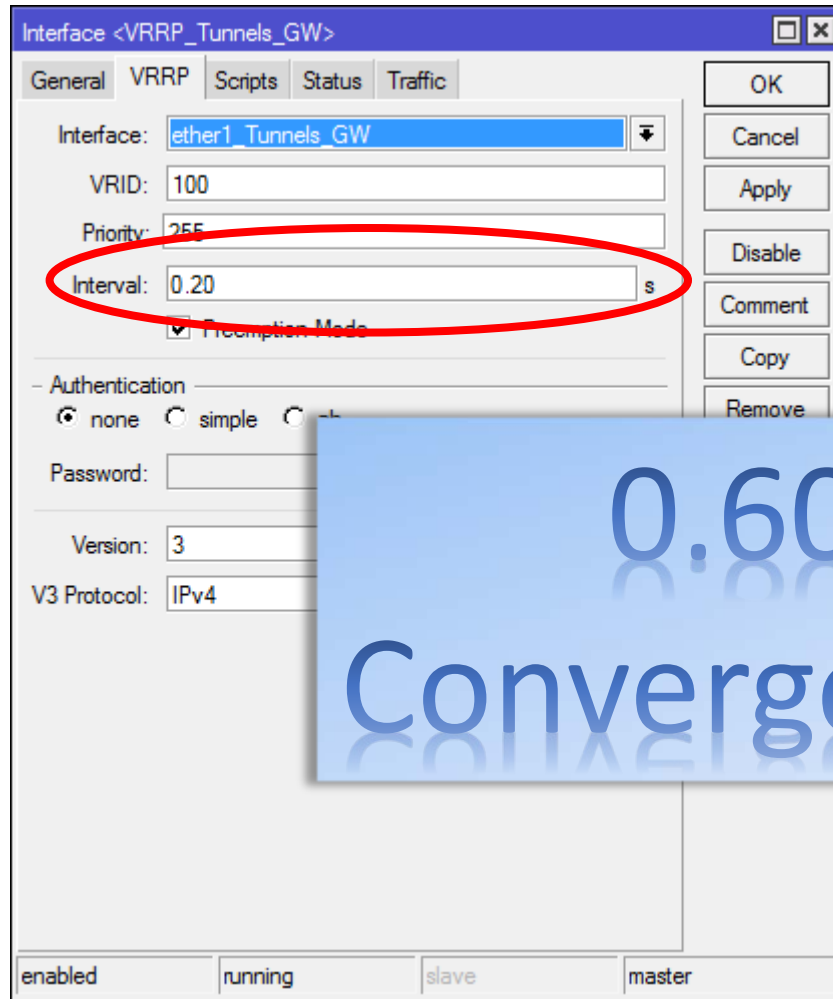
The screenshot shows the configuration window for the 'VRRP\_Tunnels\_GW' interface. The 'VRRP' tab is active, displaying the following settings:

- Name: VRRP\_Tunnels\_GW
- Type: VRRP
- MTU: 1500
- L2 MTU: 1526
- MAC Address: 00:00:5E:00:01:64
- ARP: enabled
- ARP Timeout: (empty)

At the bottom of the window, the status is shown as: enabled | running | slave | master



# VRRP



Interface <VRRP\_Tunnels\_GW>

General VRRP Scripts Status Traffic

Interface: ether1\_Tunnels\_GW

VRID: 100

Priority: 255

Interval: 0.20 s

Preemption Mode

- Authentication

none  simple  other

Password:

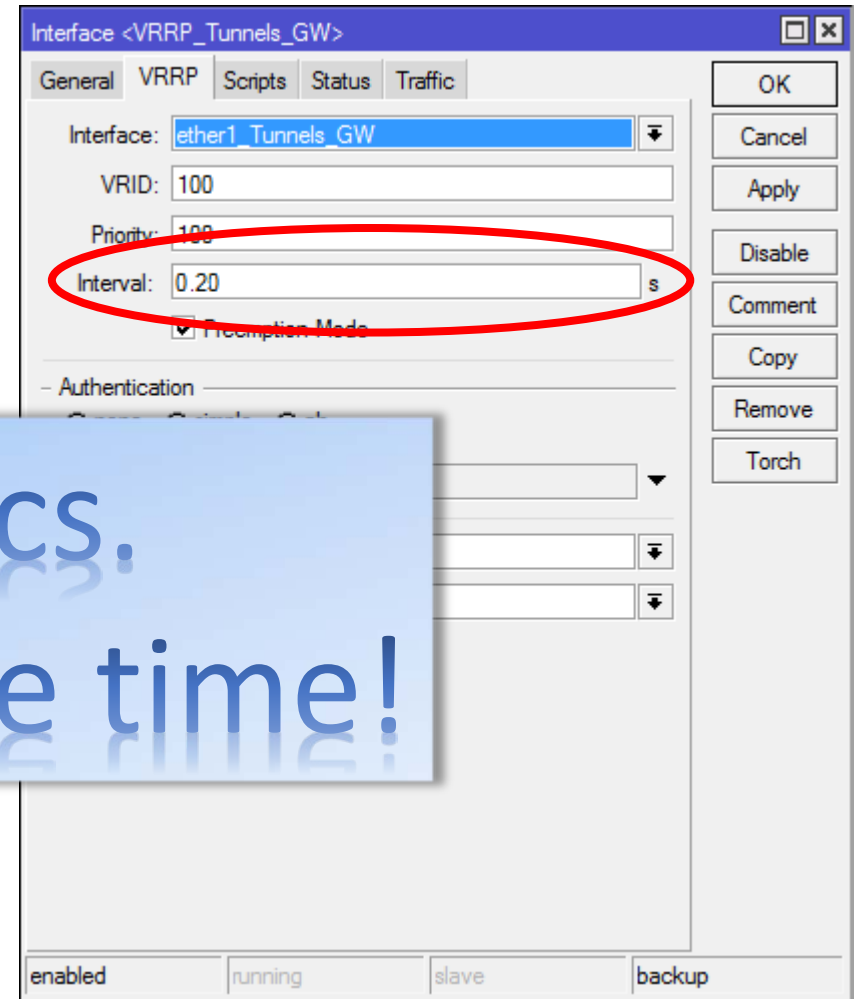
Version: 3

V3 Protocol: IPv4

OK Cancel Apply Disable Comment Copy Remove

enabled running slave master

**VRRP Master Interface**



Interface <VRRP\_Tunnels\_GW>

General VRRP Scripts Status Traffic

Interface: ether1\_Tunnels\_GW

VRID: 100

Priority: 100

Interval: 0.20 s

Preemption Mode

- Authentication

none  simple  other

Password:

Version: 3

V3 Protocol: IPv4

OK Cancel Apply Disable Comment Copy Remove Torch

enabled running slave backup

**VRRP Backup Interface**

0.60 secs.  
Convergence time!

- Assign Loopback IP to the default OSPF Instance on each router

admin@172.24.32.3 (WKO-CUSTOMS-TLS) - WinBox v6.36.3 on RB450 (mipsbe)

Safe Mode

Quick Set  
Interfaces  
Bridge  
PPP  
Switch  
Mesh  
IP  
Routing  
System  
Queues  
Files  
Log  
Radius  
Tools  
New Terminal  
MetaROUTER  
Partition  
Make Supout.tif  
Manual  
Exit

BFD  
BGP  
Filters  
MME  
OSPF  
Prefix Lists  
RIP

OSPF

Interfaces Instances Networks Areas Area Ranges Virtual Links Neighbors NBMA Neighbors ...

Name	Router ID	Running
default	10.255.255.1	yes

1 item (1 selected)

OSPF Instance <default>

General Metrics MPLS Status

Name: default  
Router ID: 10.255.255.1

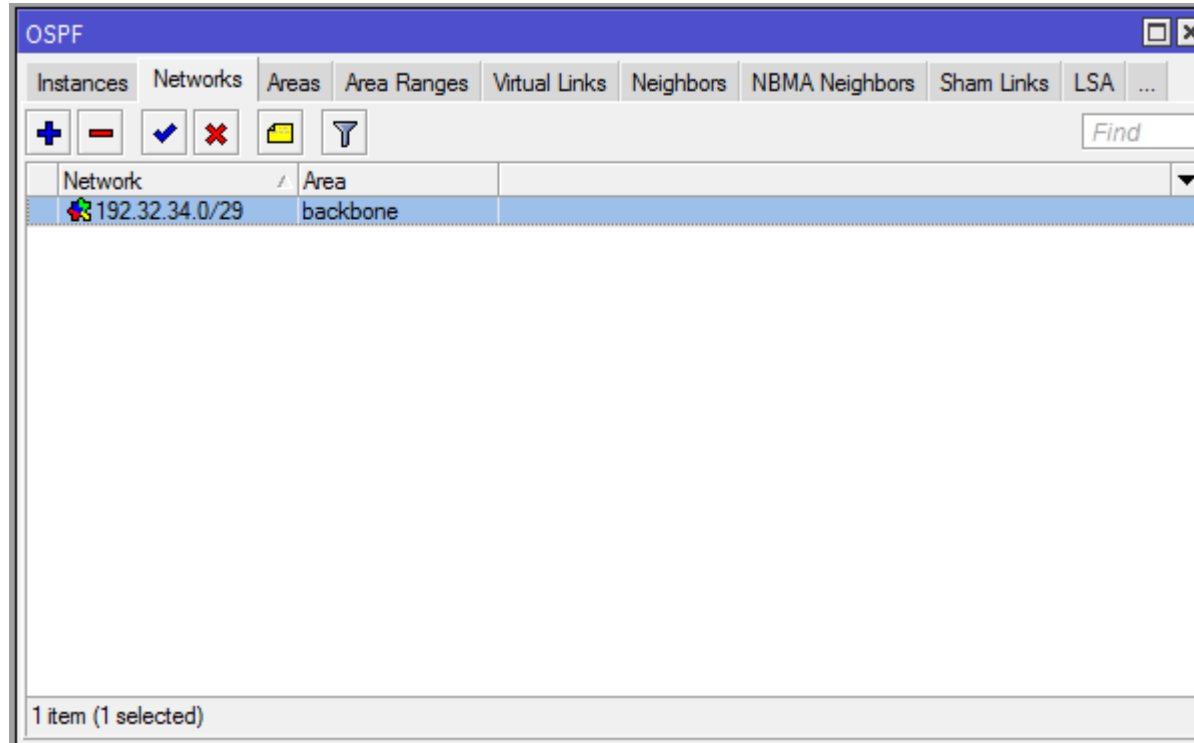
Redistribute Default Route: never  
Redistribute Connected Routes: as type 1  
Redistribute Static Routes: as type 1  
Redistribute RIP Routes: no  
Redistribute BGP Routes: no  
Redistribute Other OSPF Routes: no

In Filter: ospf-in  
Out Filter: ospf-out

enabled default

OK  
Cancel  
Apply  
Disable  
Comment  
Copy  
Remove

- Add network to start running the protocol



- Make a customizable static interface

The screenshot shows two windows from a network configuration application. The left window, titled 'OSPF', displays a table of OSPF interfaces. The right window, titled 'OSPF <ether2\_TLS>', shows the configuration details for the selected interface.

Interface	Cost	Priority	Authentic...	Authenticatio...	Network Type	Instance	Area
D ether2_TLS	10	1	none	*****	broadcast	default	backbone

The right window 'OSPF <ether2\_TLS>' has a 'General' tab with the following settings:

- Interface: ether2\_TLS
- Cost: 10
- Priority: 1
- Authentication: none
- Authentication Key: (empty)
- Authentication Key ID: 1
- Network Type: broadcast
- Instance ID: 0
- Passive
- Use BFD
- Retransmit Interval: 5 s
- Transmit Delay: 1 s
- Hello Interval: 10 s
- Router Dead Interval: 40 s

Buttons 'OK', 'Copy', and 'Remove' are visible on the right side of the dialog. The 'Copy' button is circled in red. At the bottom, there are radio buttons for 'dynamic' (selected), 'passive', and 'State: waiting'.

- Adjust parameters

OSPF <ether2\_TLS>

General | Status

Interface: ether2\_TLS

Cost: 10

Priority: 1

Authentication: none

Authentication Key:

Authentication Key ID: 1

Network Type: point to point

Instance ID: 0

Passive

Use BFD

Retransmit Interval: 5 s

Transmit Delay: 1 s

Hello Interval: 5 s

Router Dead Interval: 10 s

enabled | passive | State: point to point

OK  
Cancel  
Apply  
Disable  
Comment  
Copy  
Remove

OSPF

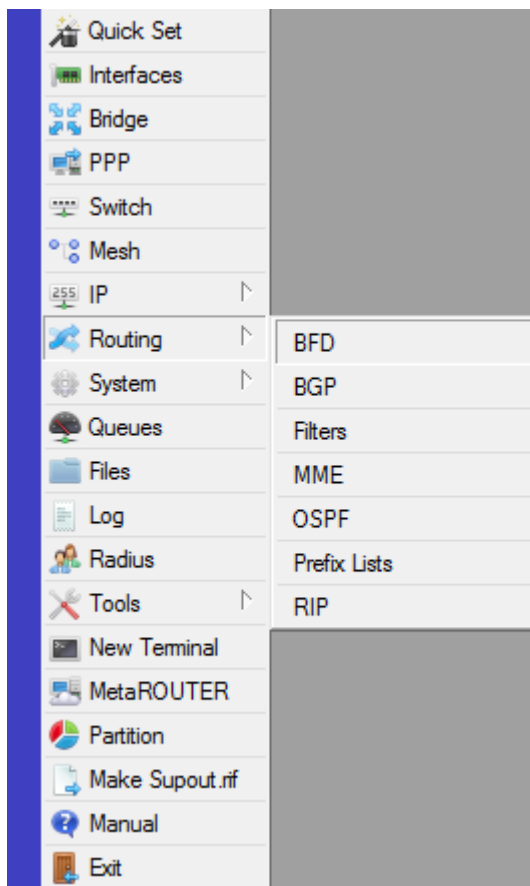
Interfaces | Instances | Networks | Areas | Area Ranges | Virtual Links | Neighbors | NBMA Neighbors | ...

+ - ✓ ✗ 📄 🔍 Find

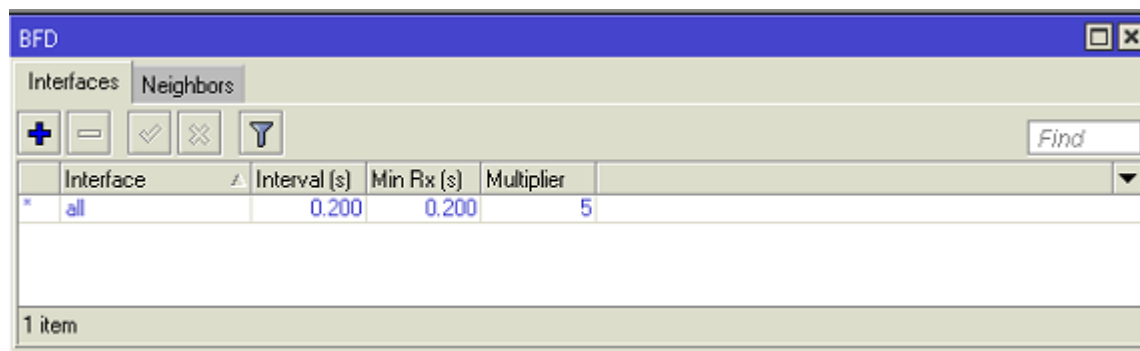
Interface	Cost	Priority	Authentic...	Authenticatio...	Network Type	Instance	Area
ether2_TLS	10	1	none	*****	point to point	default	backbone

1 item (1 selected)

- Default Setup
- Check neighbors



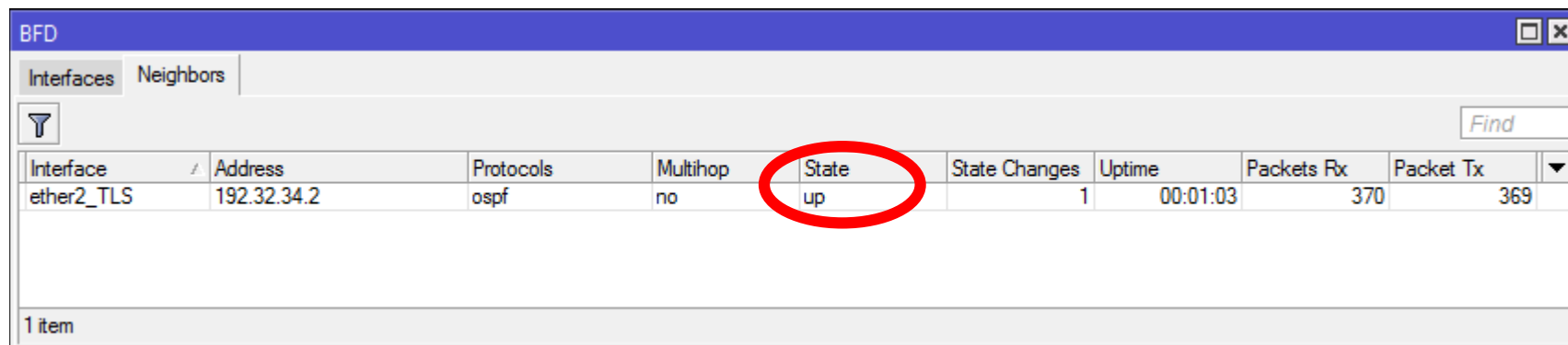
A vertical menu on the left side of the interface. The 'Routing' section is expanded, showing 'BFD' as the selected option. Other options in the menu include Quick Set, Interfaces, Bridge, PPP, Switch, Mesh, IP, Routing, System, Queues, Files, Log, Radius, Tools, New Terminal, MetaROUTER, Partition, Make Supout.rf, Manual, and Exit.



The BFD configuration window shows the 'Neighbors' tab. A table lists the configuration for all interfaces.

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

1 item

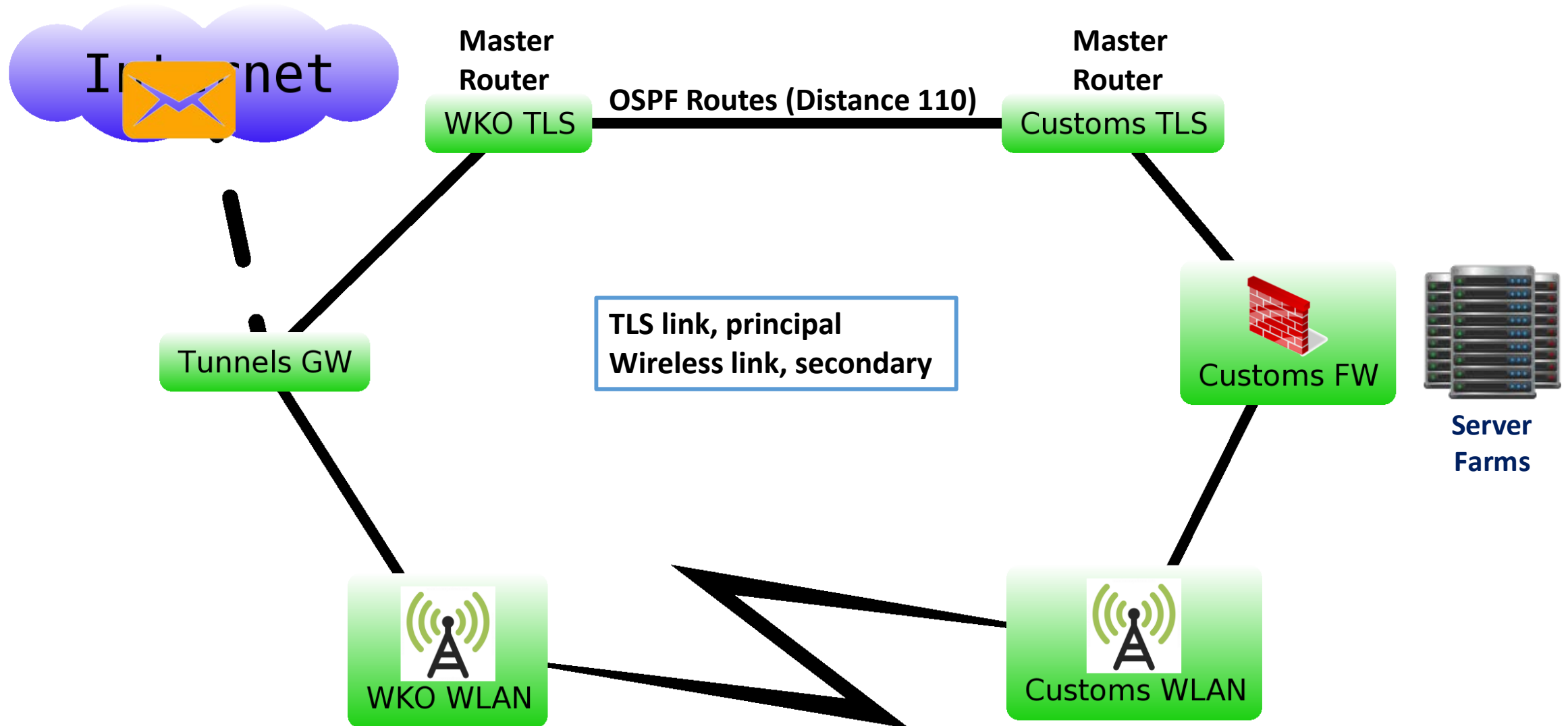


The BFD neighbors status window shows the 'Neighbors' tab. A table lists the status of the neighbor on the ether2\_TLS interface. The 'State' column is circled in red.

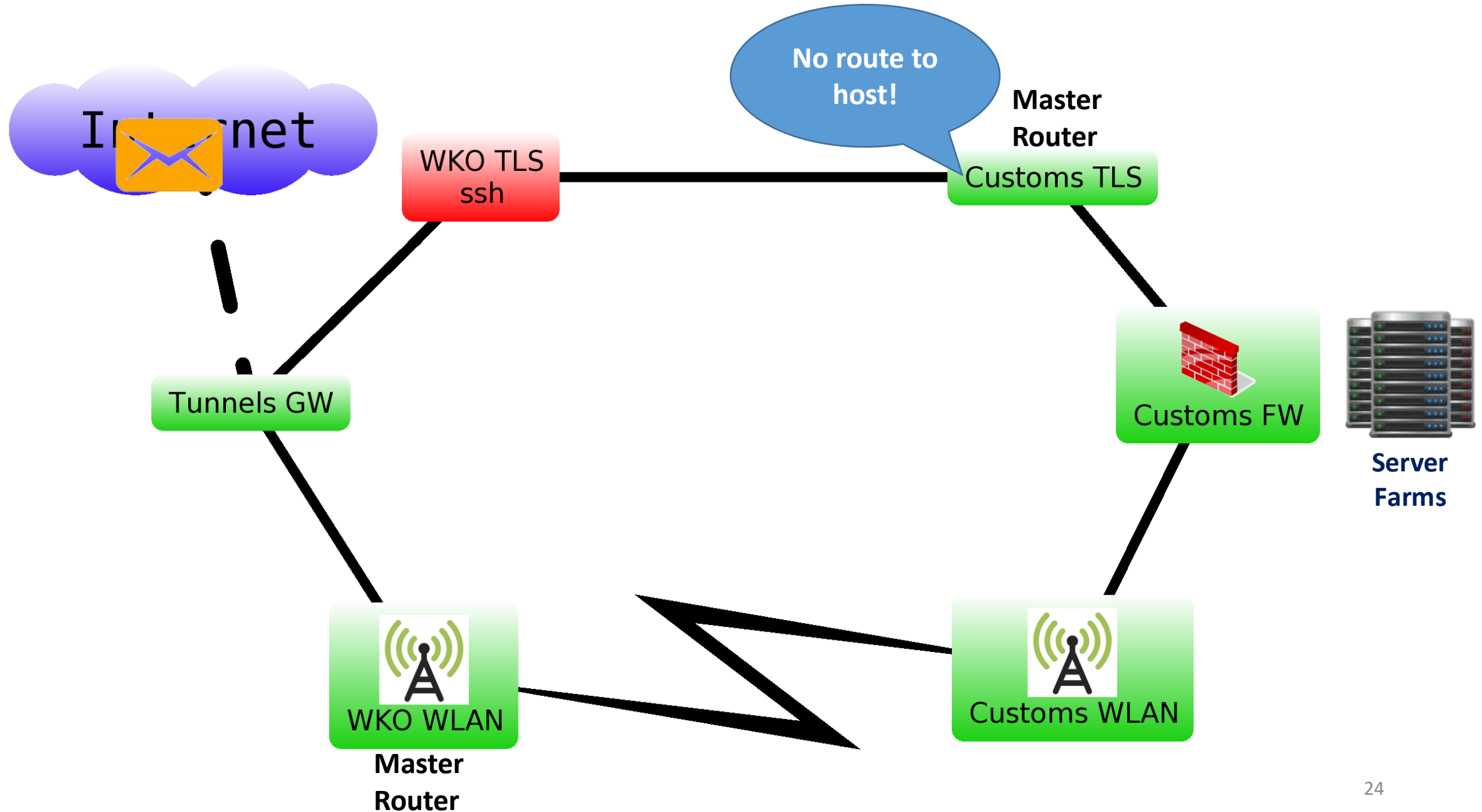
Interface	Address	Protocols	Multihop	State	State Changes	Uptime	Packets Rx	Packet Tx
ether2_TLS	192.32.34.2	ospf	no	up	1	00:01:03	370	369

1 item

# Normal Packet Flow

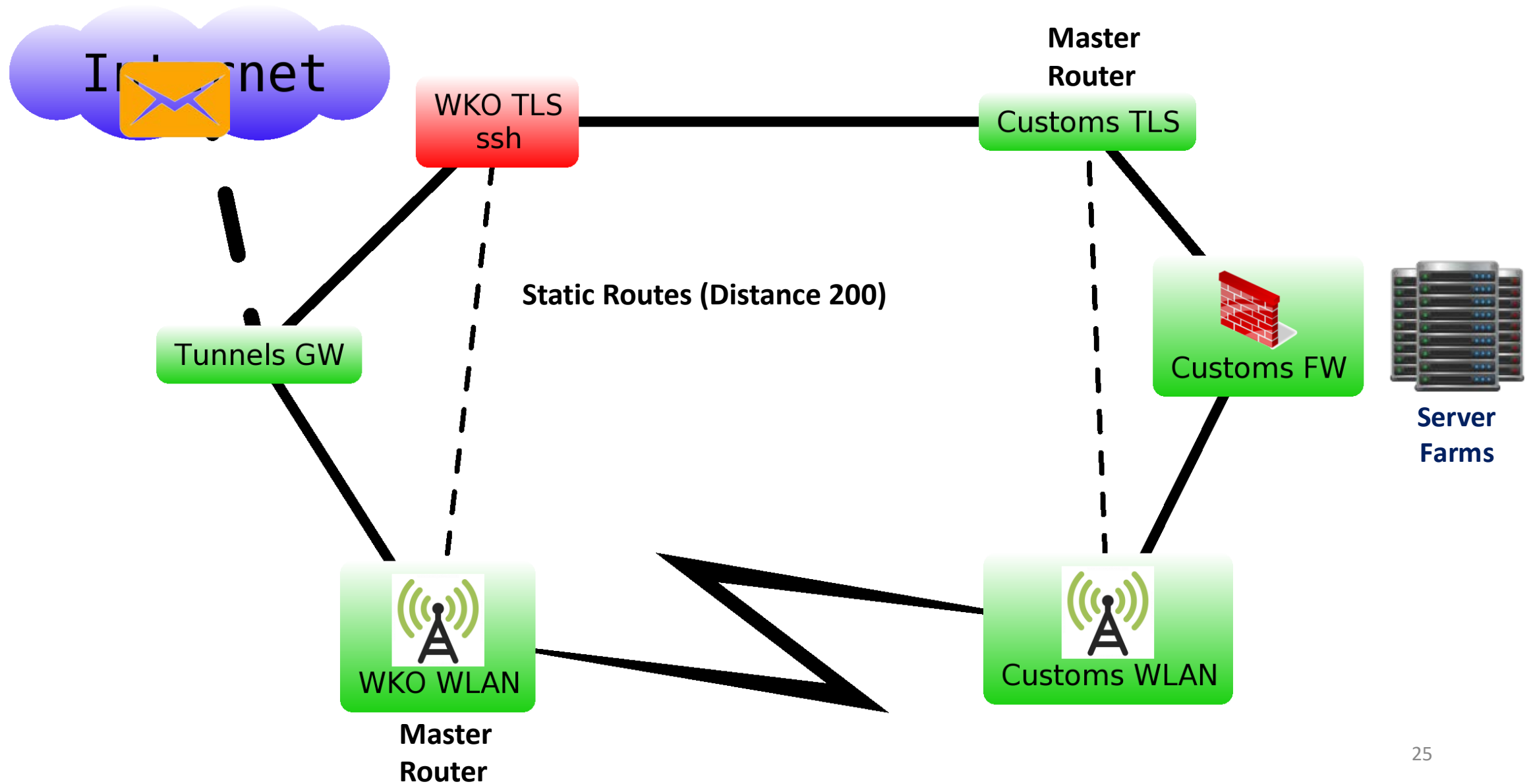


# WKO TLS Router Fail

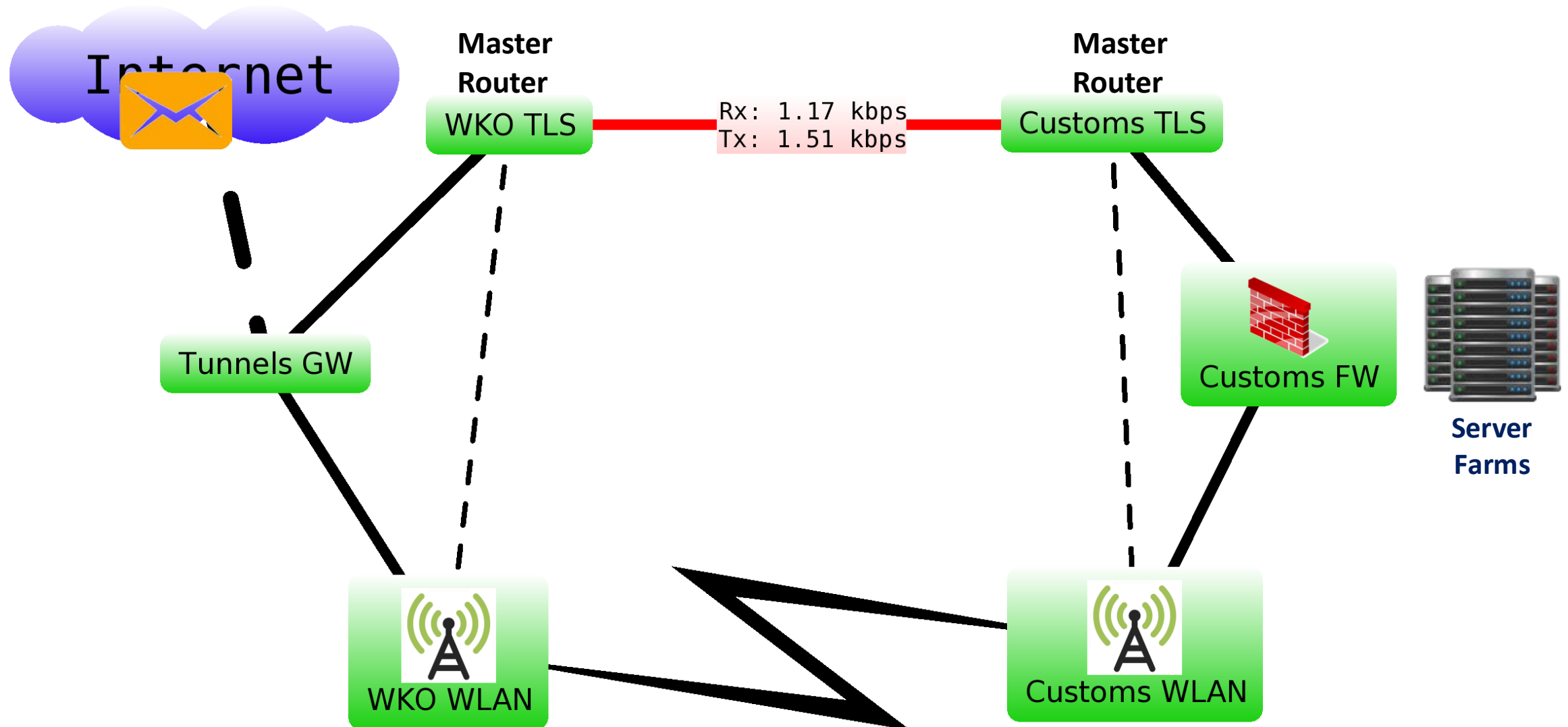




# WKO TLS Router Fail



# TLS Failure



- Check Gateway: Ping
- Avoid manually add static routes

- Very useful

## Email notification

The screenshot shows a configuration window titled "Interface <VRRP\_Tunnels\_GW>". It has tabs for "General", "VRRP", "Scripts", "Status", and "Traffic", with "Scripts" selected. The window is divided into two sections: "On Master:" and "On Backup:". Each section contains a text area with a scroll bar. The "On Master:" text area contains the command: `/tool e-mail send to="noc@workout.com.ar" subject="VRRP_ADVICE" body="The secondary VRRP on WKO side, is now active"`. The "On Backup:" text area contains the command: `/tool e-mail send to="noc@workout.com.ar" subject="VRRP_ADVICE" body="The primary VRRP on WKO side, is now active"`. To the right of these text areas is a vertical stack of buttons: "OK", "Cancel", "Apply", "Disable", "Comment", "Copy", "Remove", and "Torch". At the bottom of the window, there are four status indicators: "enabled", "running", "slave", and "backup".



*Any other question?*

*Thank you!*



*MUM Middle East, October 2016*

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