

Failover using VRRP, OSPF & BFD

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Second Dubai MUM, Emirates

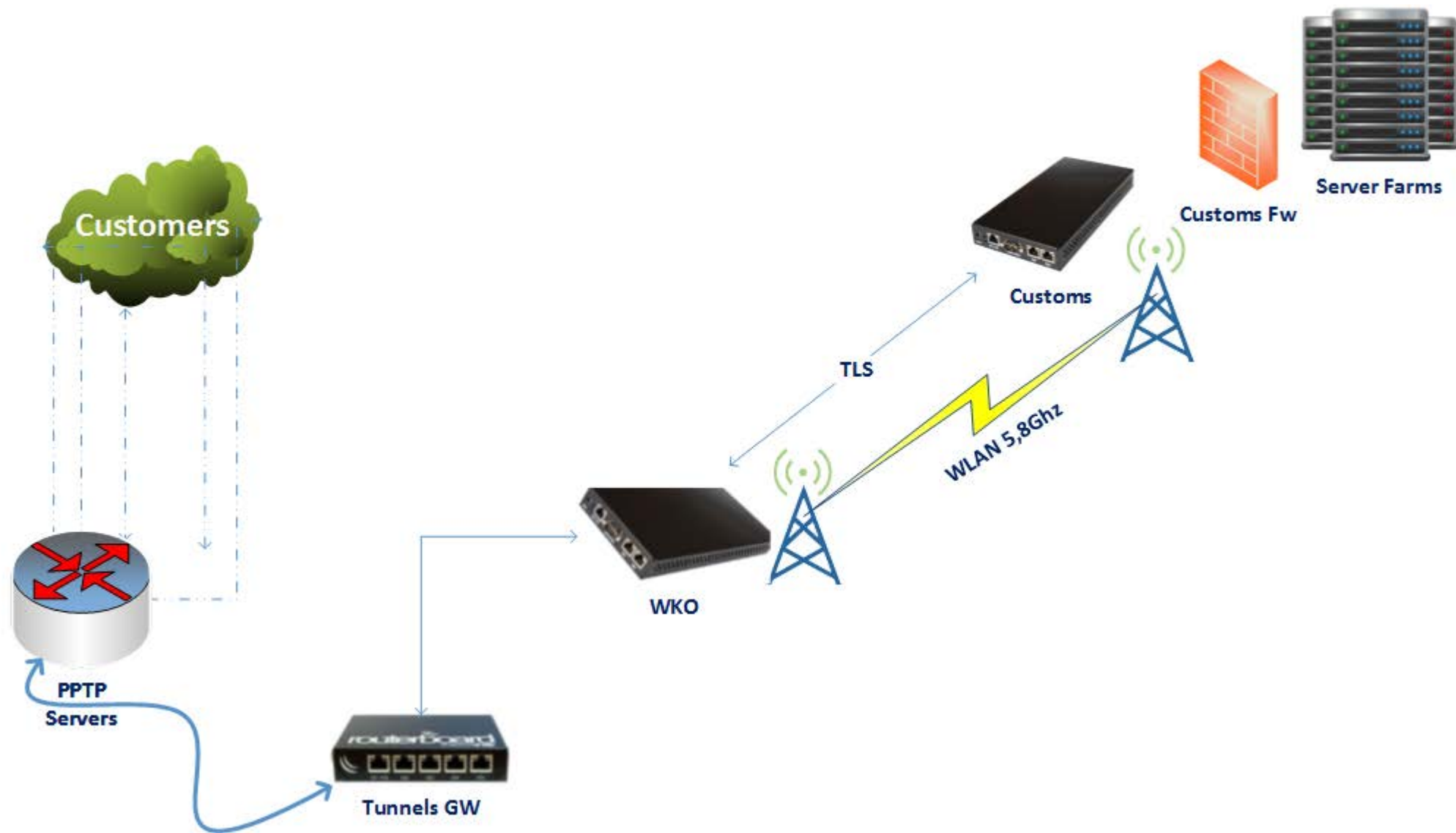


S O L U C I O N E S
WORKOUT

- 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

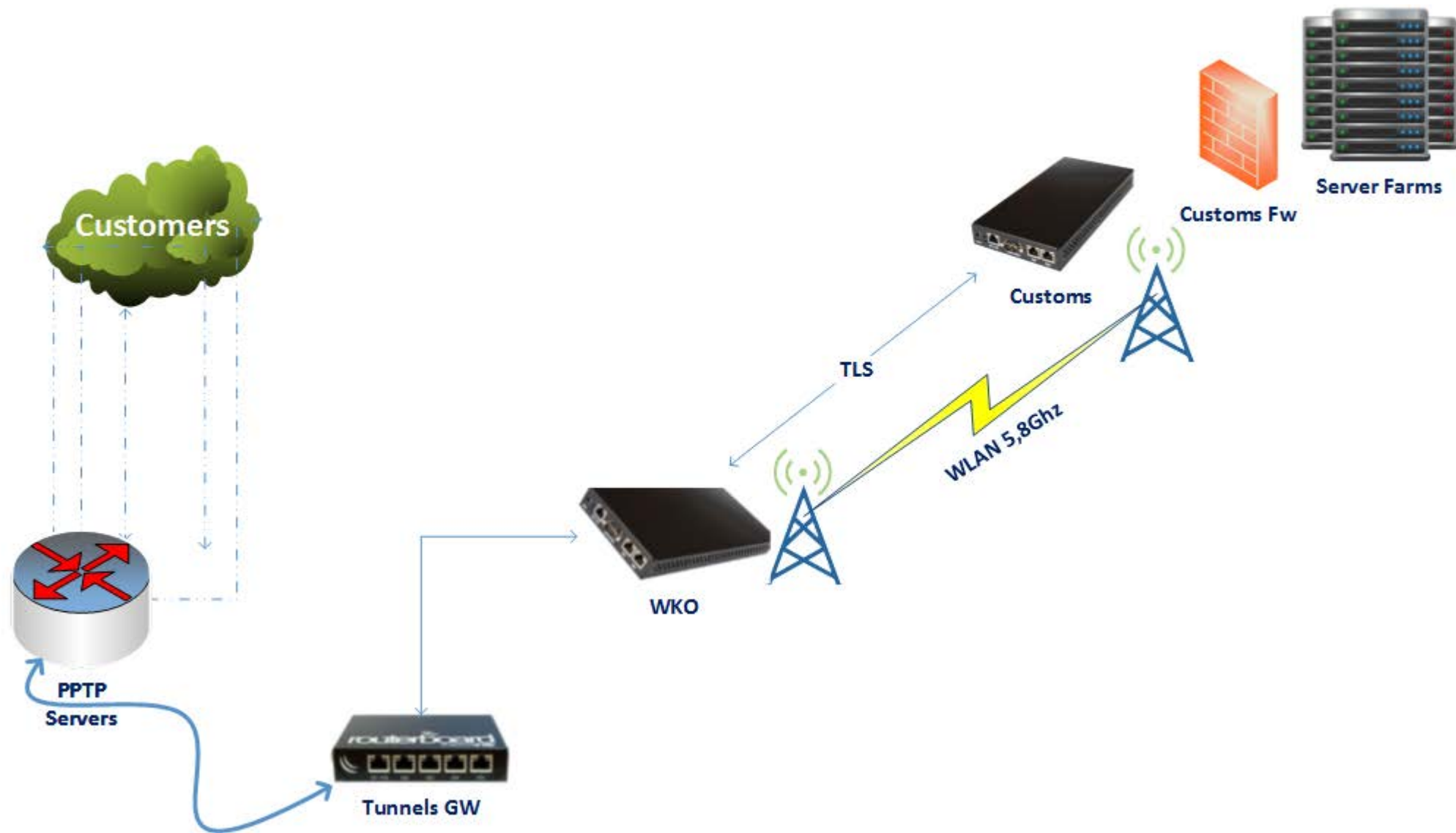
OSPF (Open Shortest Path First)

- Internal Gateway Protocol
- Best path

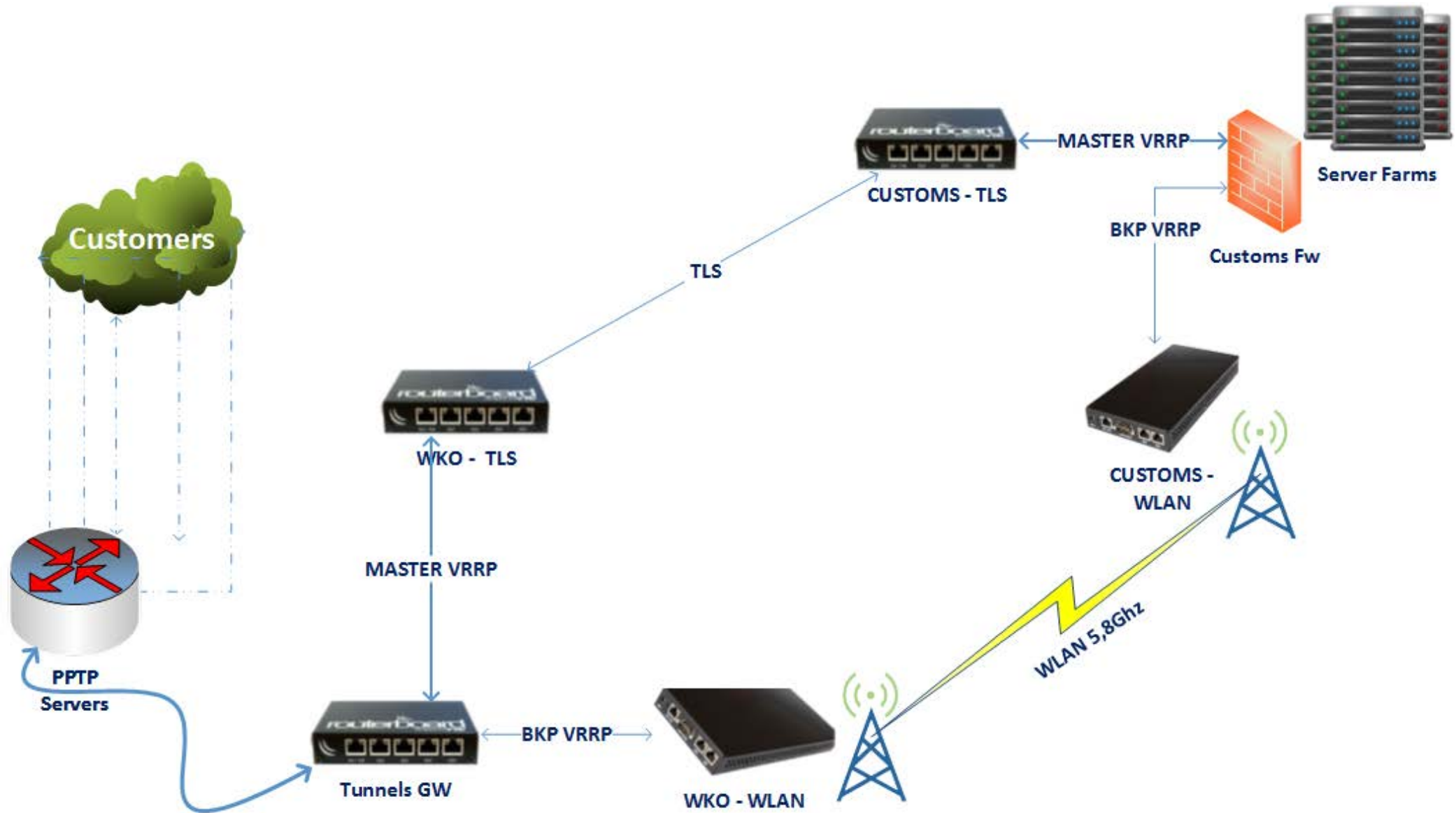
Bidirectional Forwarding Detection

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

Original Network Topology

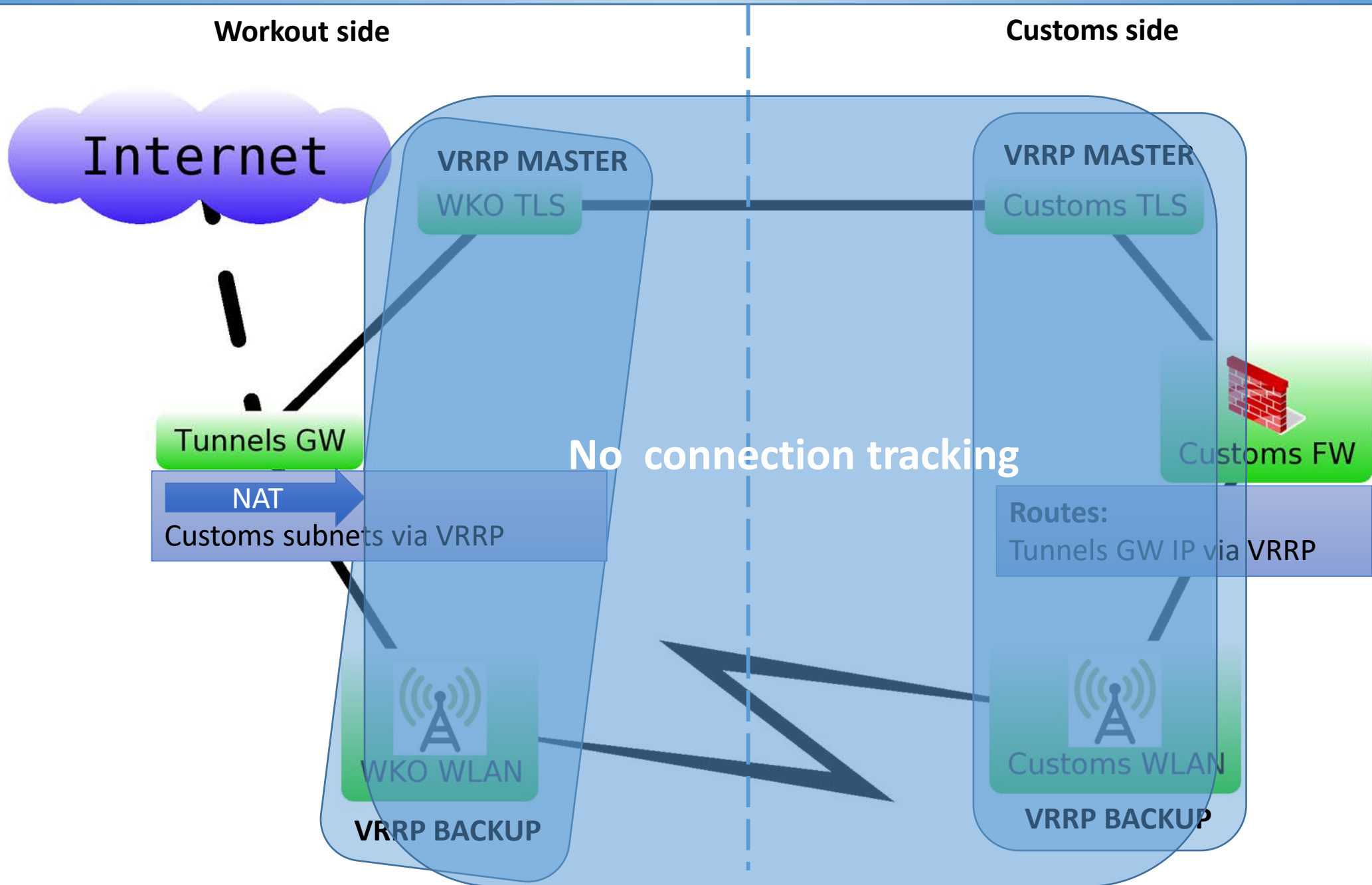


Goal Network Topology



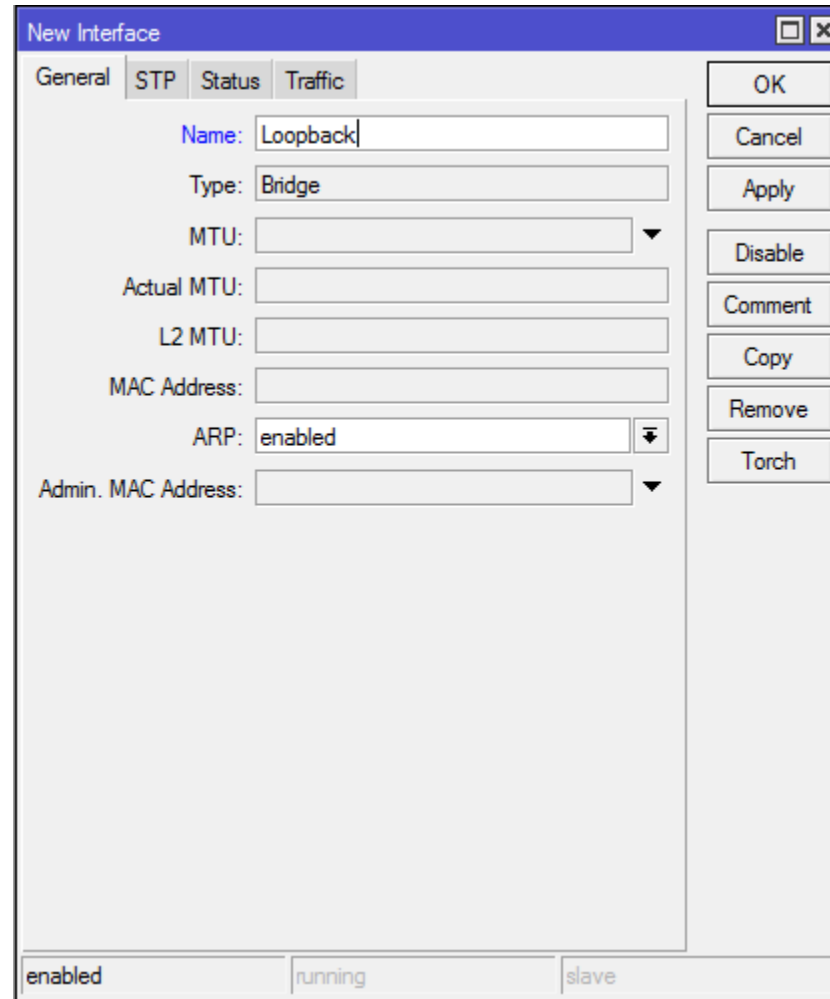
- Custom's network has only 1 IP as GW for ours
- Non static ARP entries
- Wireless distance: Less than 400 meters
- No connection tracking used in redundant routers

Things to consider

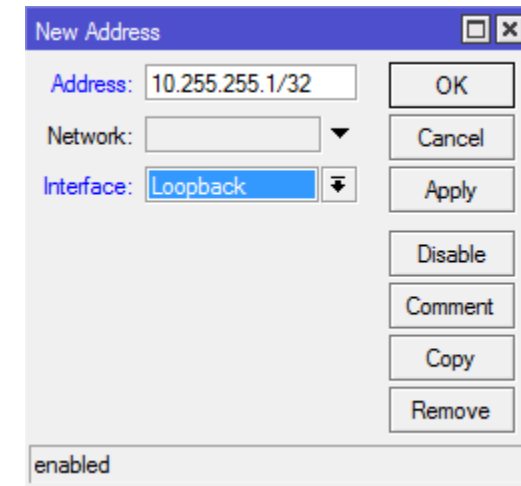


Loopback

- Best Practice
- Management
- Bridge -> Add

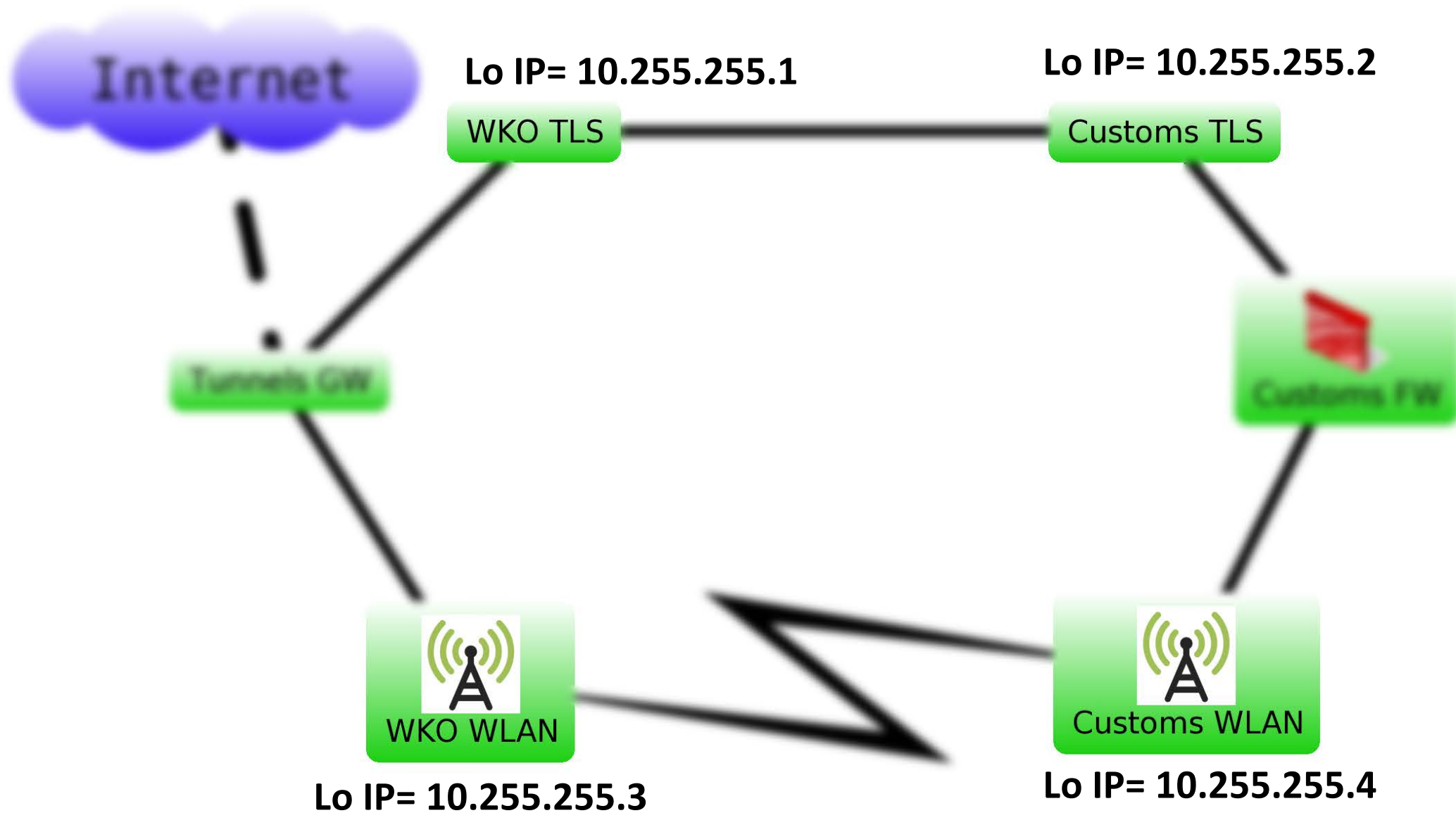


The 'New Interface' window is shown with the 'General' tab selected. The 'Name' field contains 'Loopback', and the 'Type' is set to 'Bridge'. The 'MTU' field has a dropdown arrow. The 'Actual MTU' and 'L2 MTU' fields are empty. The 'MAC Address' field is empty. The 'ARP' field is set to 'enabled'. The 'Admin. MAC Address' field has a dropdown arrow. On the right side, there are buttons for 'OK', 'Cancel', 'Apply', 'Disable', 'Comment', 'Copy', 'Remove', and 'Torch'. At the bottom, there are three status indicators: 'enabled', 'running', and 'slave'.



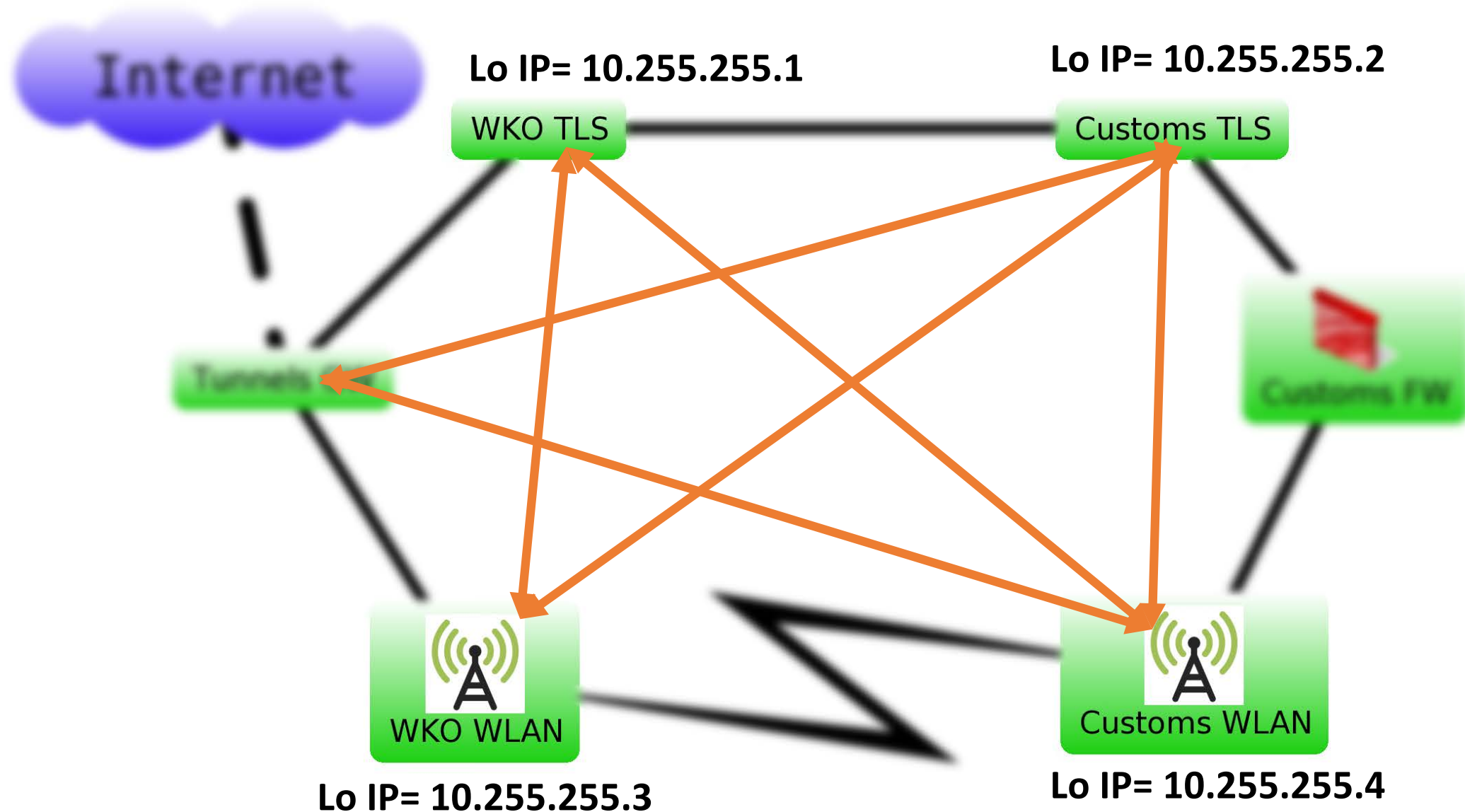
The 'New Address' window is shown with the 'Address' field containing '10.255.255.1/32'. The 'Network' field has a dropdown arrow. The 'Interface' field is set to 'Loopback' and has a dropdown arrow. On the right side, there are buttons for 'OK', 'Cancel', 'Apply', 'Disable', 'Comment', 'Copy', and 'Remove'. At the bottom, there is a status indicator: 'enabled'.

Loopback

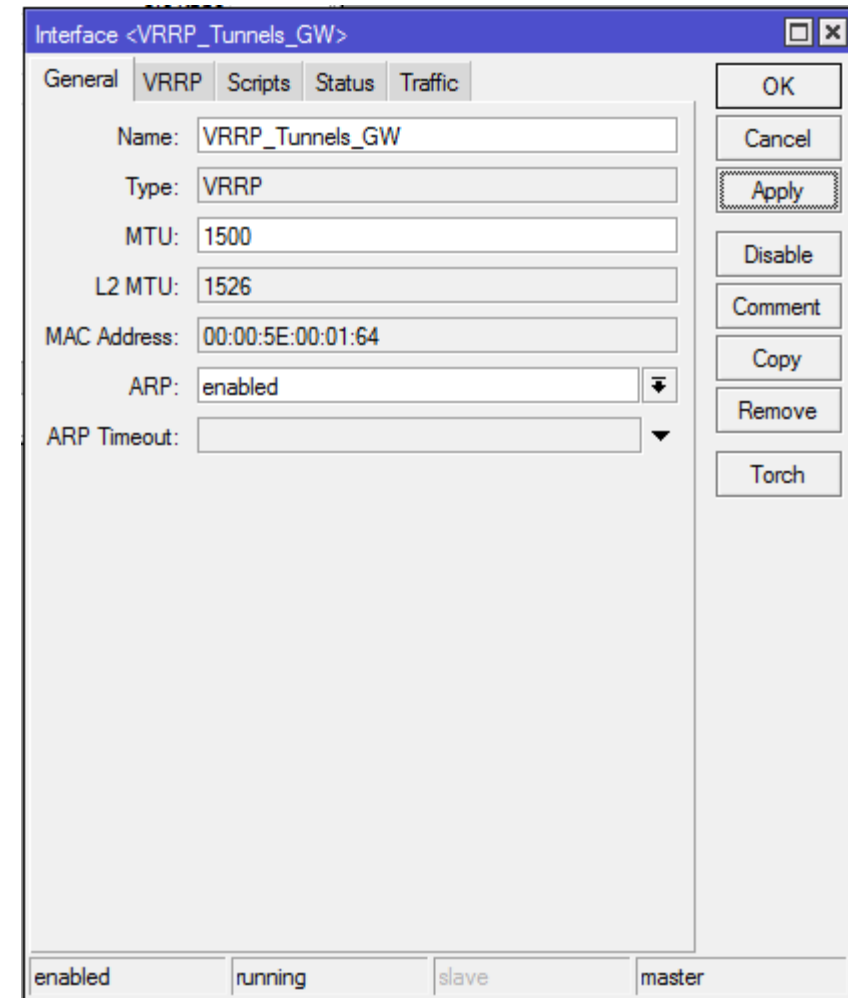
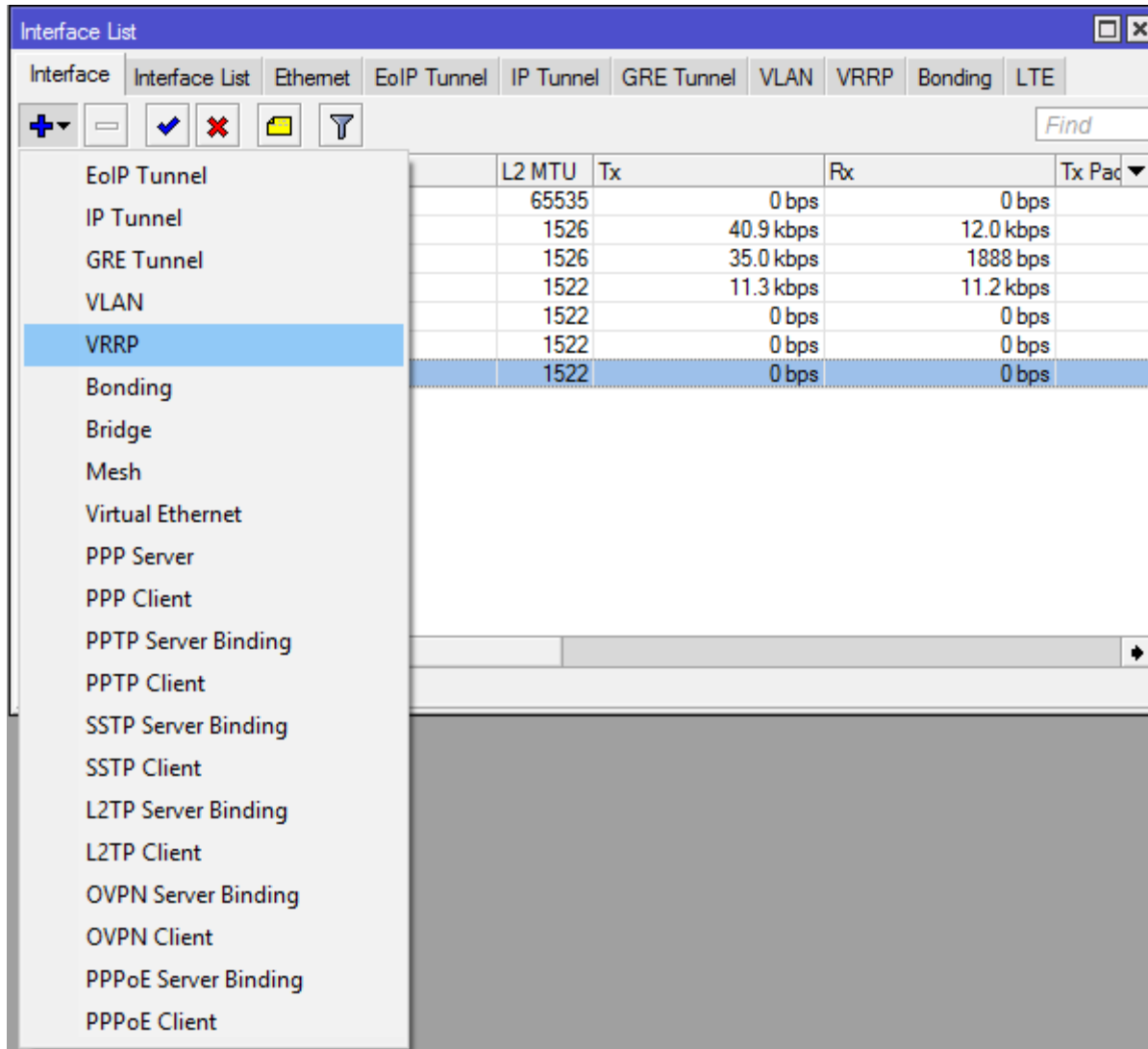


Loopback

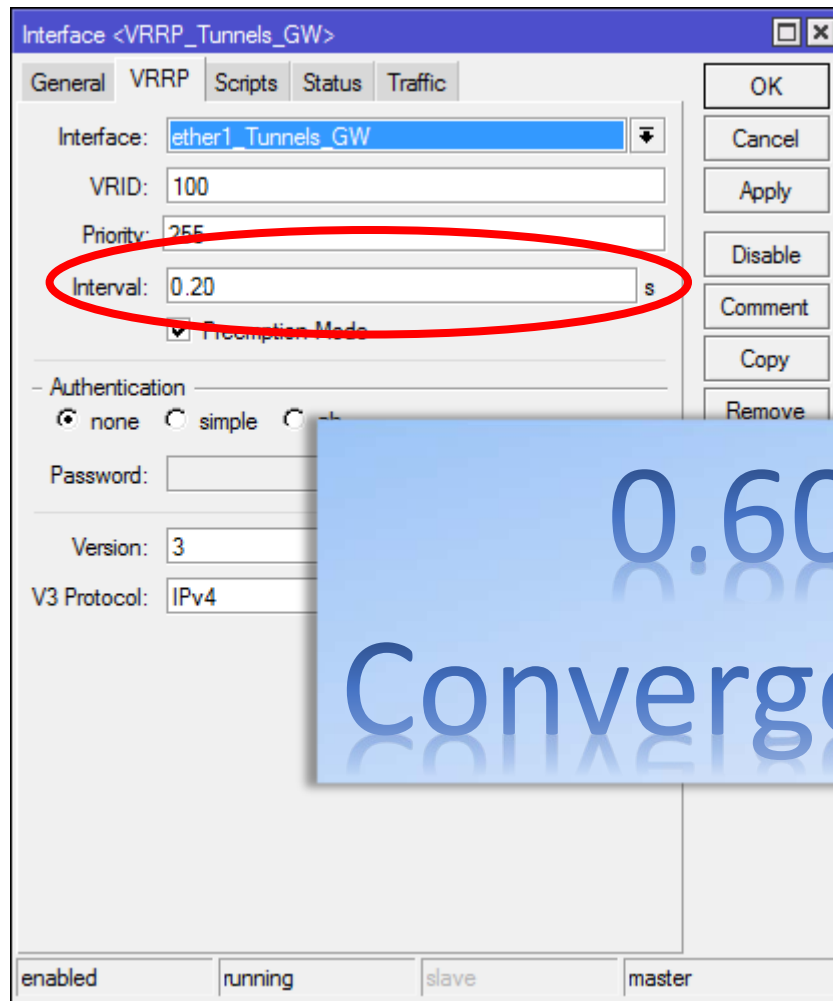
- Static routes between all routers to reach Loopback IP's (not physical mesh)



- How to



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:

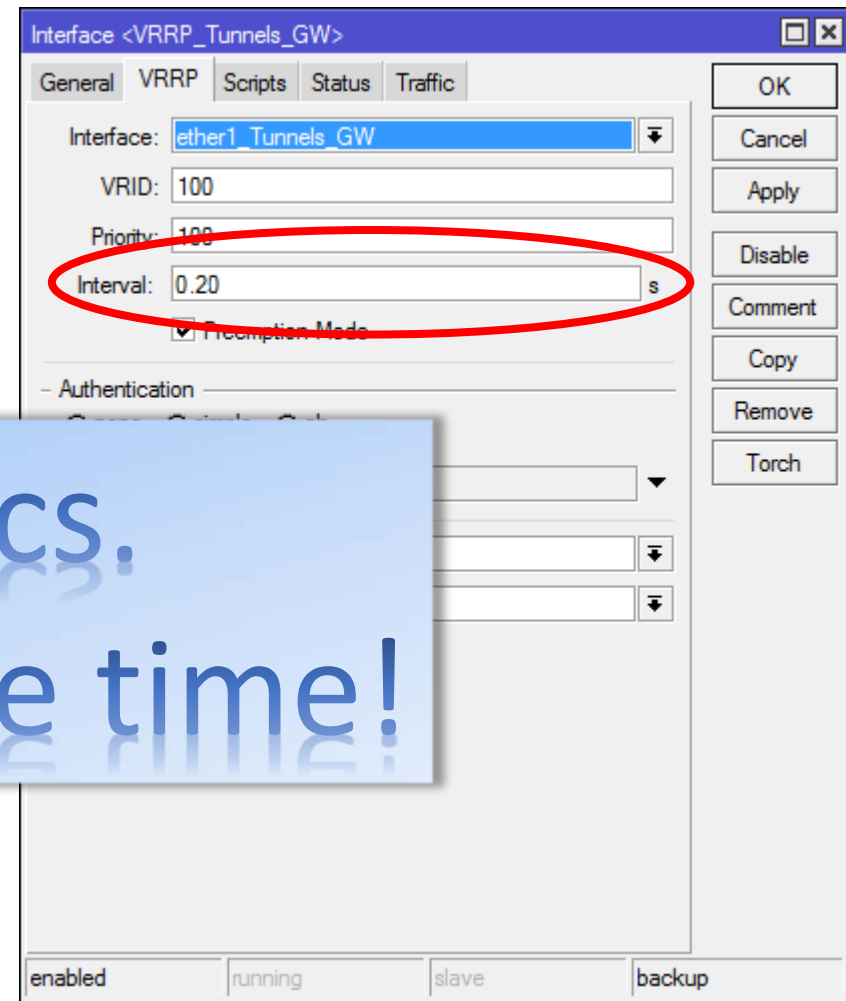
Version: 3

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 ...

+ - ✓ ✗ 📁 🔍 Find

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

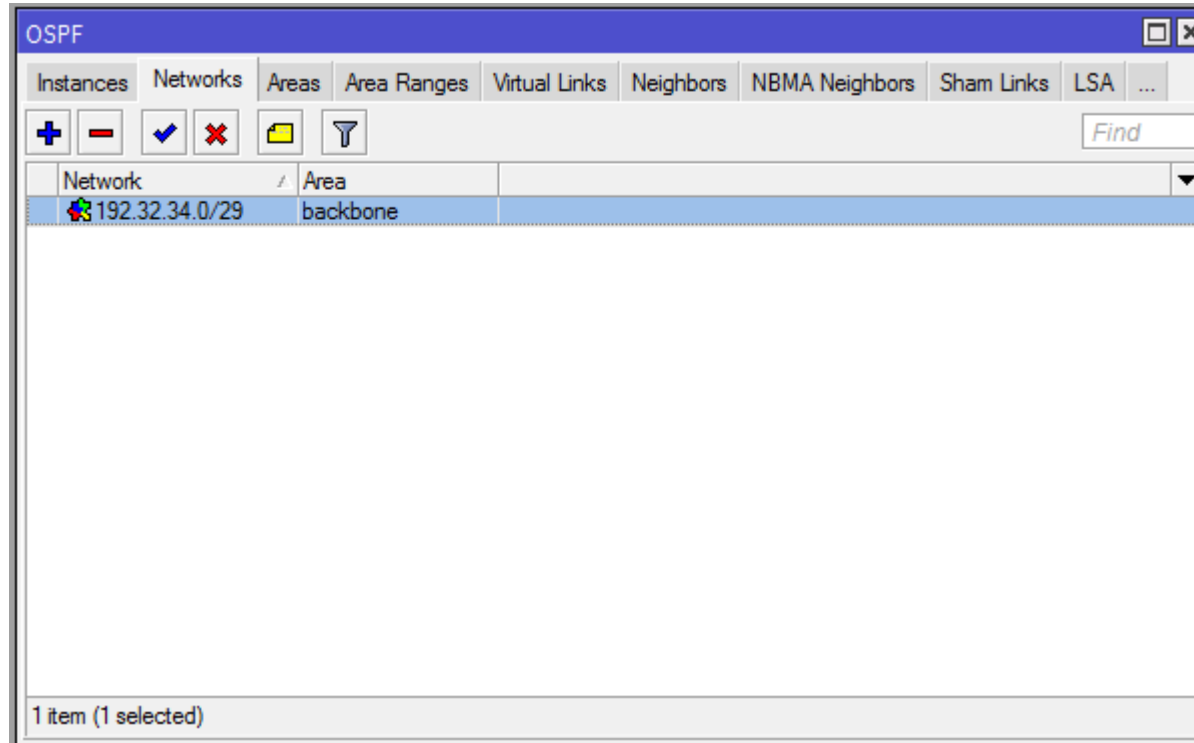
Redistribute Default Route: never
Redistribute Connected Routes: as type 1
Redistribute Static Routes: as type 1
Redistribute RIP Routes: no
Redistribute BGP Routes: no
Redistribute Other OSPF Routes: no

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

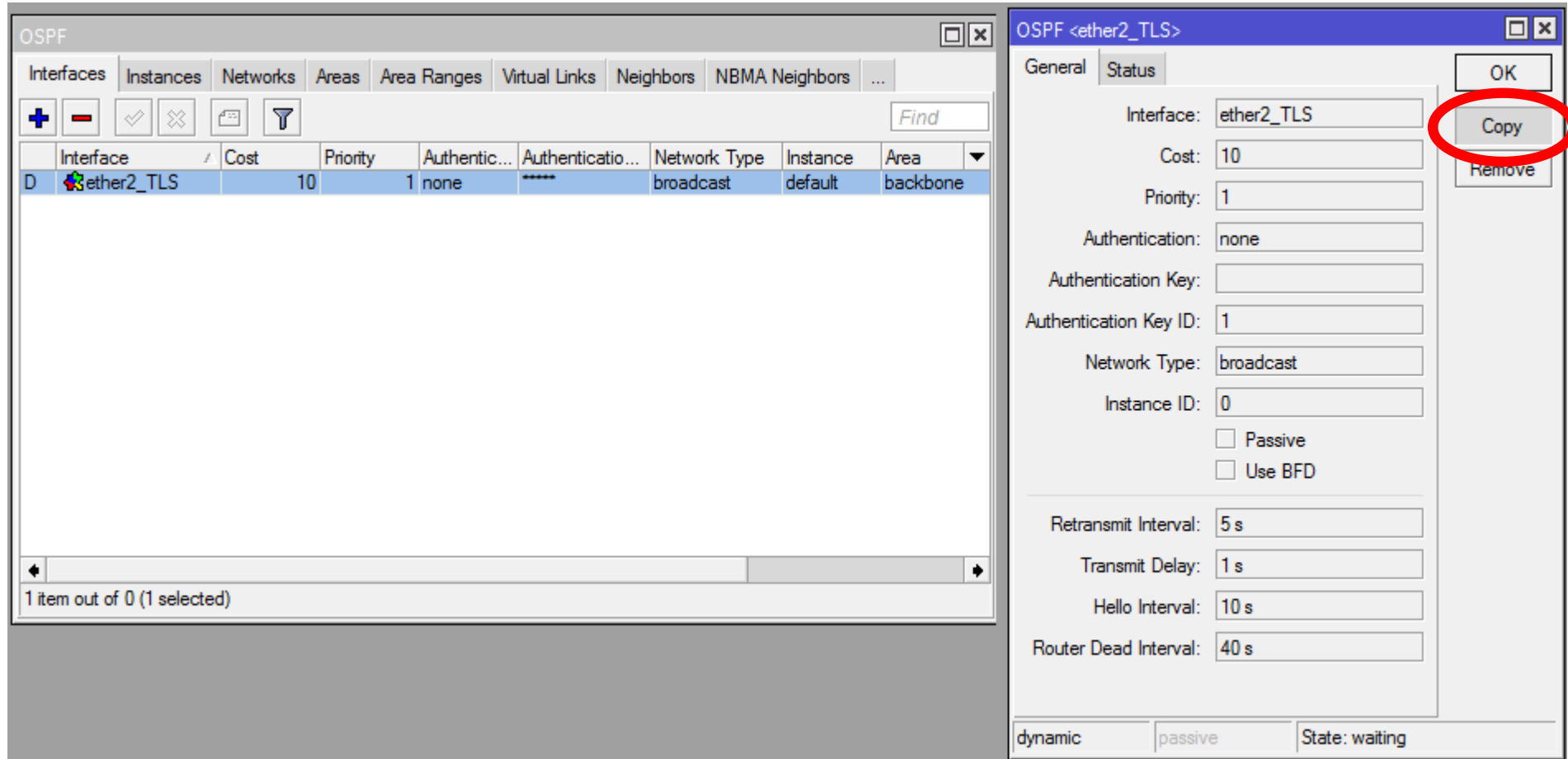
enabled default

OK
Cancel
Apply
Disable
Comment
Copy
Remove

- Add network to start running the protocol



- Make a customizable static interface



- 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

OK Cancel Apply Disable Comment Copy Remove

enabled passive State: point to point

OSPF

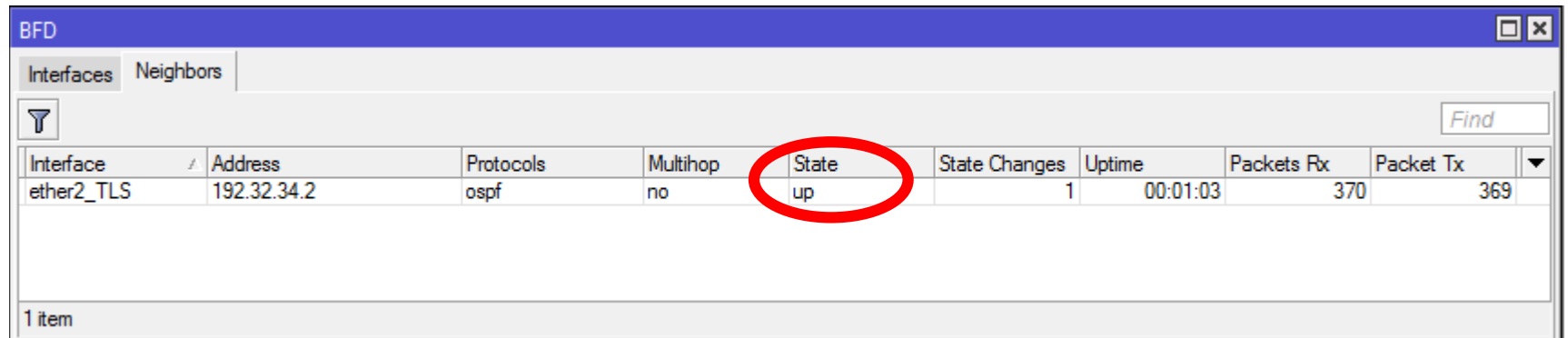
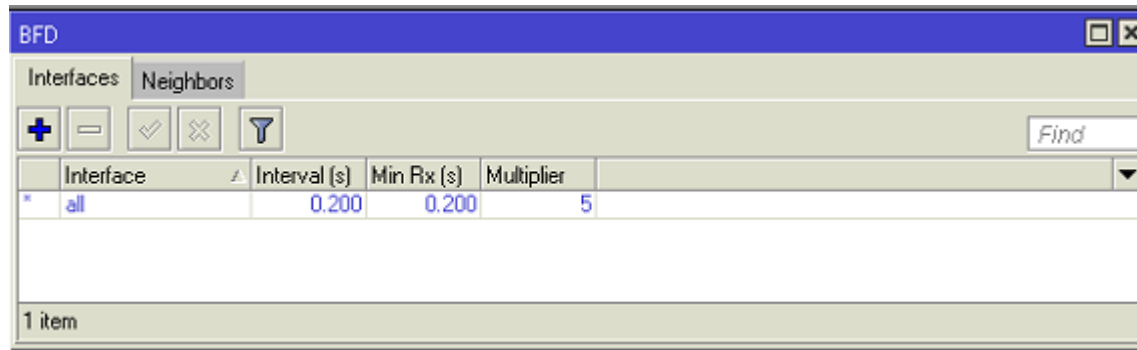
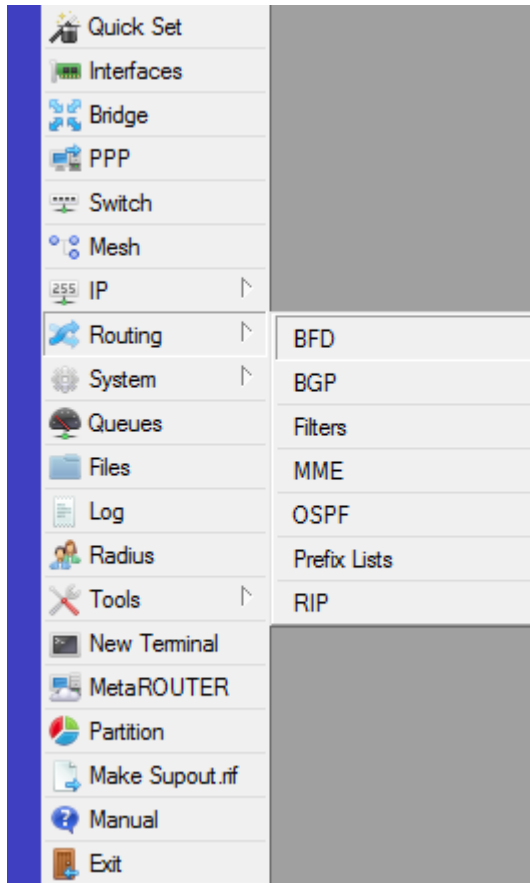
Interfaces Instances Networks Areas Area Ranges Virtual Links Neighbors NBMA Neighbors ...

Find

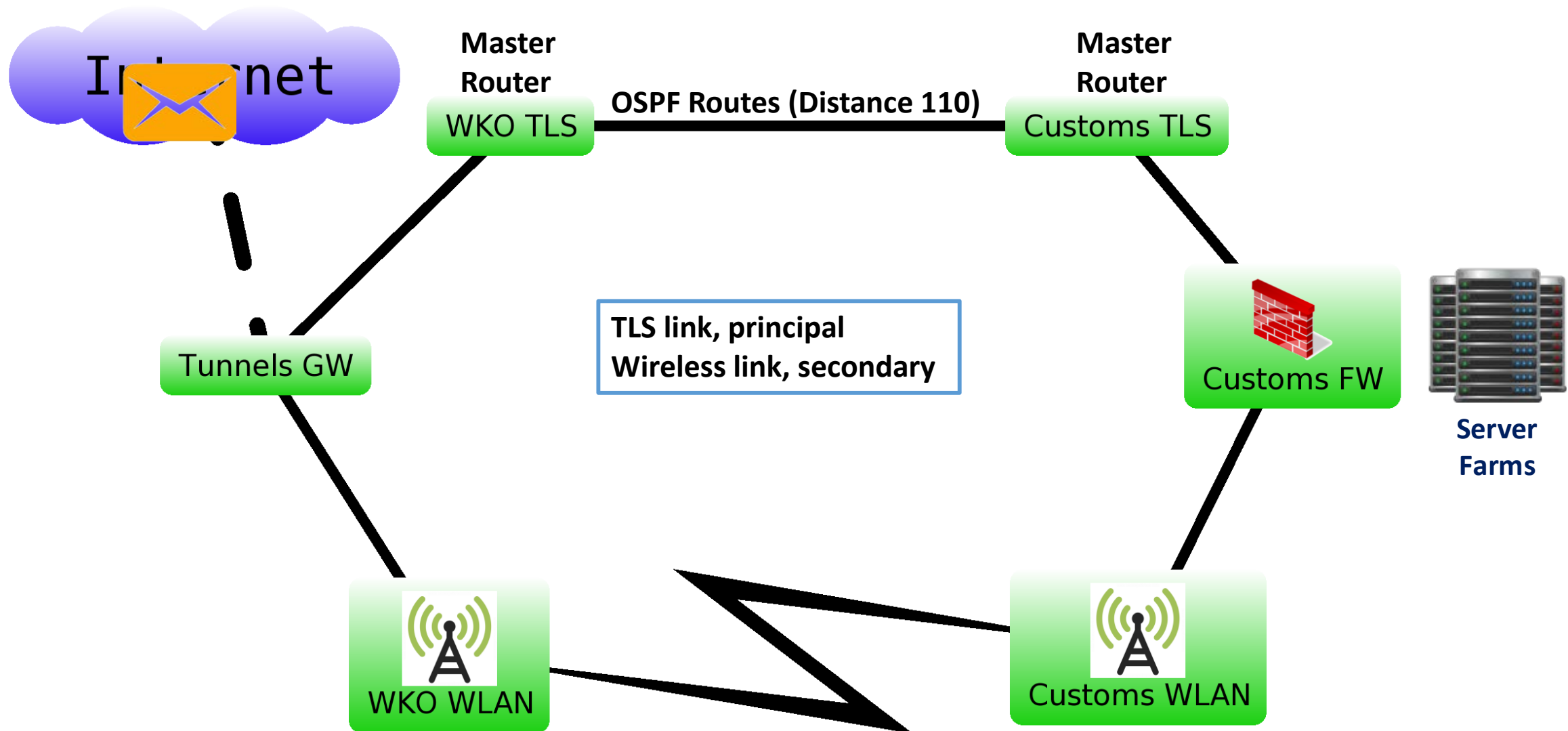
Interface	Cost	Priority	Authentic...	Authenticatio...	Network Type	Instance	Area
ether2_TLS	10	1	none	*****	point to point	default	backbone

1 item (1 selected)

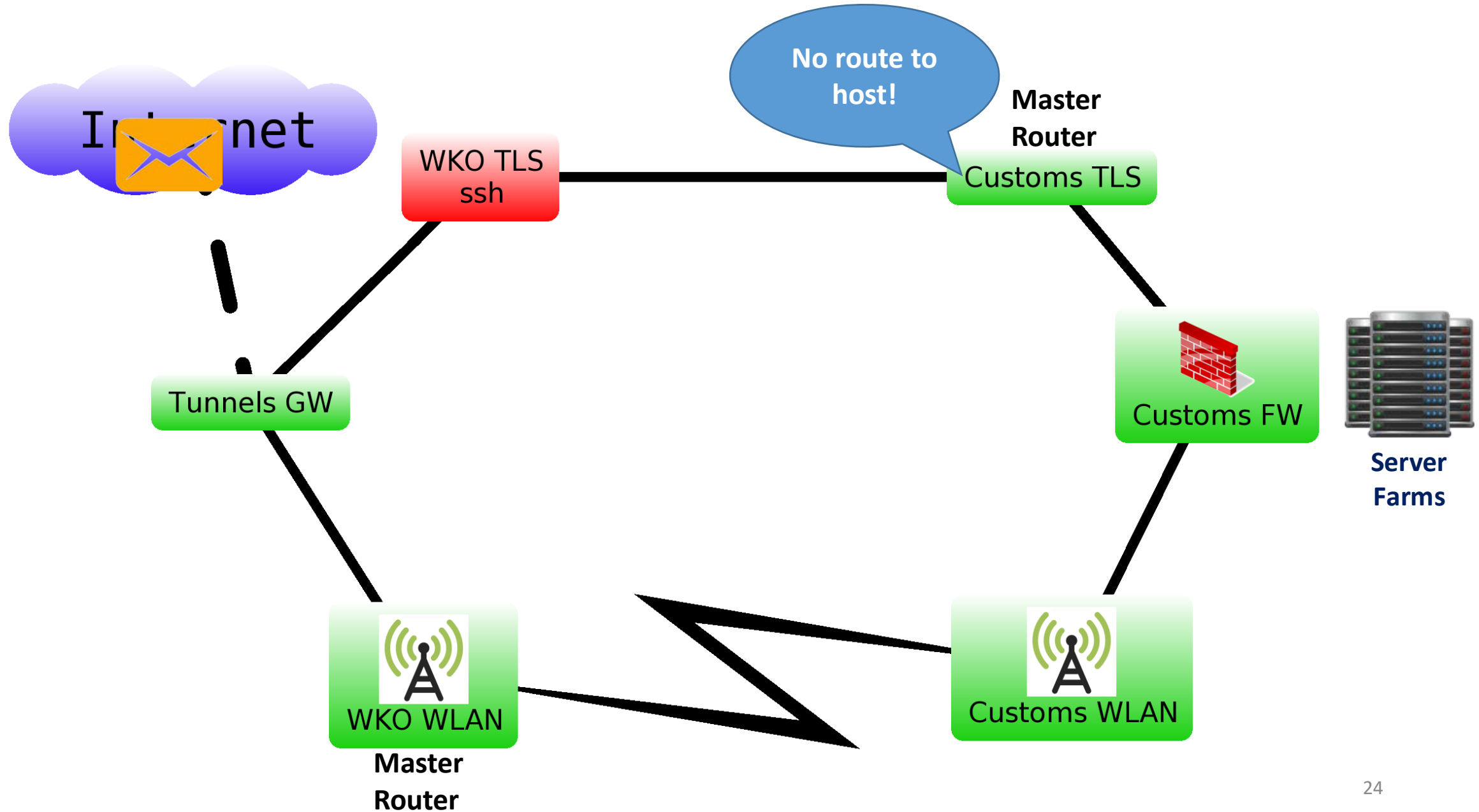
- Default Setup
- Check neighbors



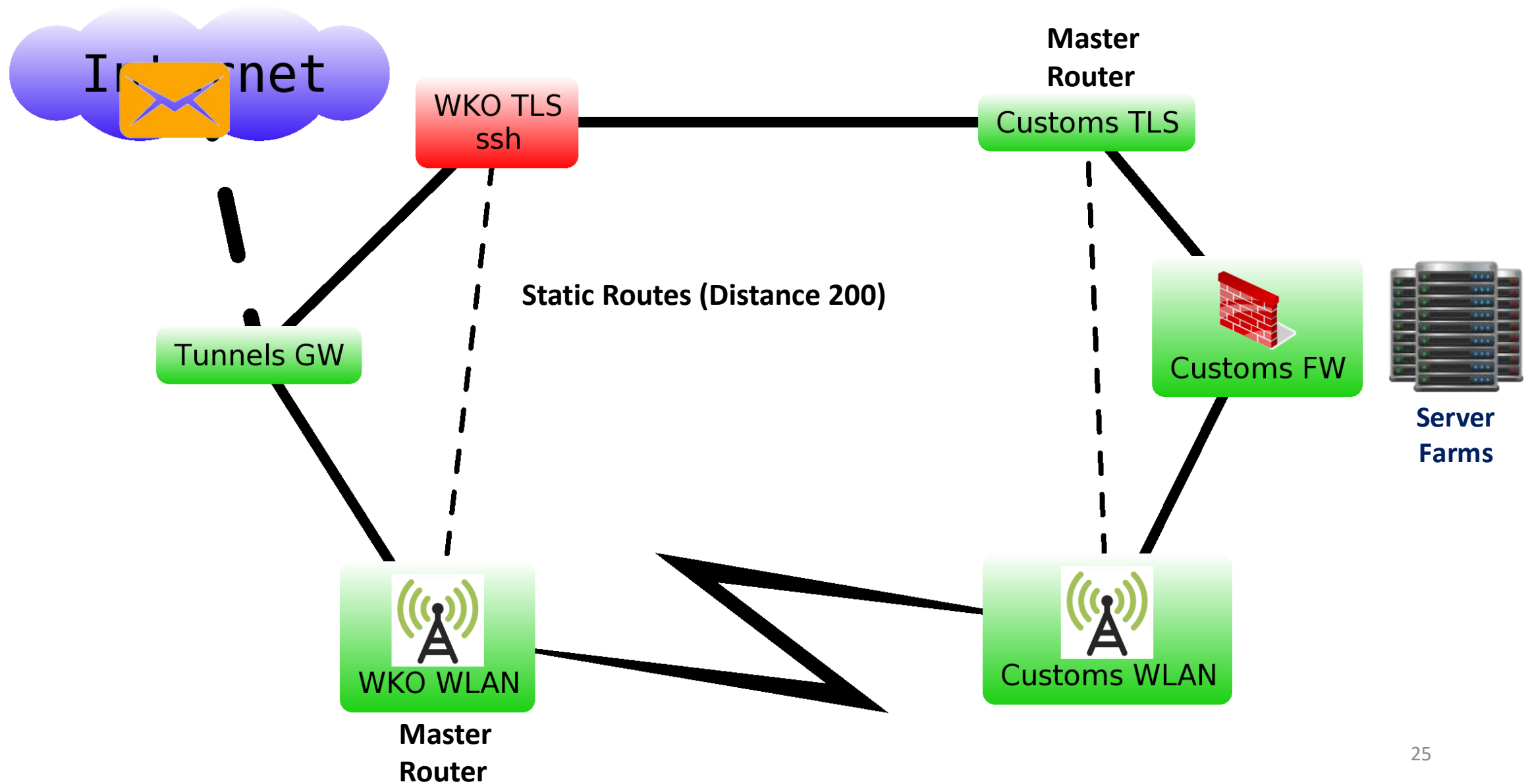
Normal Packet Flow



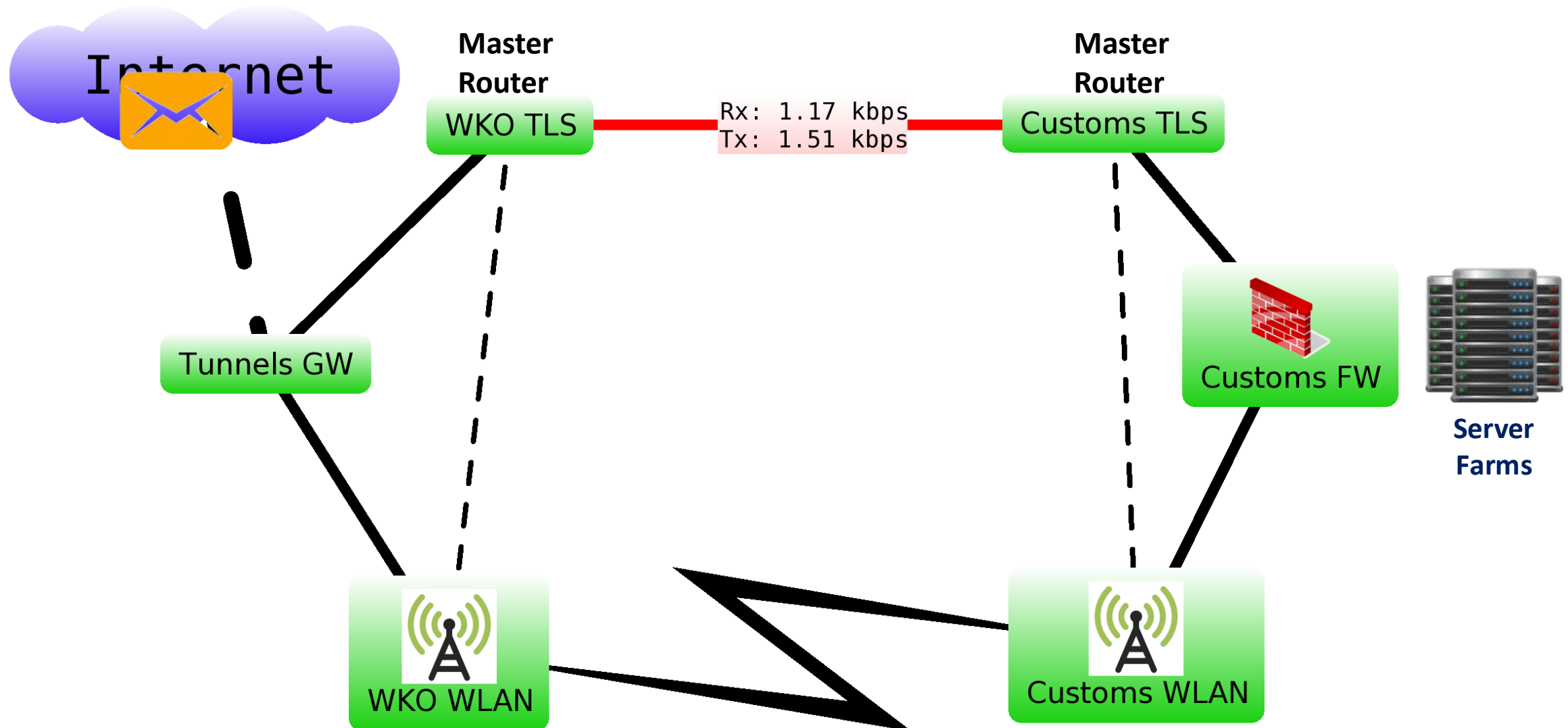
WKO TLS Router Fail



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 five tabs: "General", "VRRP", "Scripts", "Status", and "Traffic". The "Scripts" tab is selected. Inside this tab, there are two sections: "On Master:" and "On Backup:". Each section contains a text area with a script command. The "On Master:" script is: `/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:" script is: `/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".

Interface <VRRP_Tunnels_GW>

General VRRP Scripts Status Traffic

On Master:

```
/tool e-mail send to="noc@workout.com.ar"
subject="VRRP_ADVICE" body="The secondary VRRP on
WKO side, is now active"
```

On Backup:

```
/tool e-mail send to="noc@workout.com.ar"
subject="VRRP_ADVICE" body="The primary VRRP on WKO
side, is now active"
```

OK
Cancel
Apply
Disable
Comment
Copy
Remove
Torch

enabled running slave backup



Any other question?

Thank you!



MUM Middle East, October 2016

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