

POORIA TAABBODI

*Microsoft: MCSA, MCSE 2003 Security
MCSE 2012 R2 & 2016 Cloud Platform and Infra
Microsoft Official Trainer*



*MikroTik: MTCNA, MTCWE, MTCRE, MTCTCE
MTCUME, MTCINE, MTCIPv6E, Trainer & Consultant*

Cisco: CCNA, CCNP

PaloSanto(VOIP): ECE, ESM

Supervisor & Technical Manager of Neda Gostar Saba



L3-PPPOE + InterVLAN Routing Implementation Over MikroTik

Powered by: POORIA TAABBODI
Armenia-October - 2017

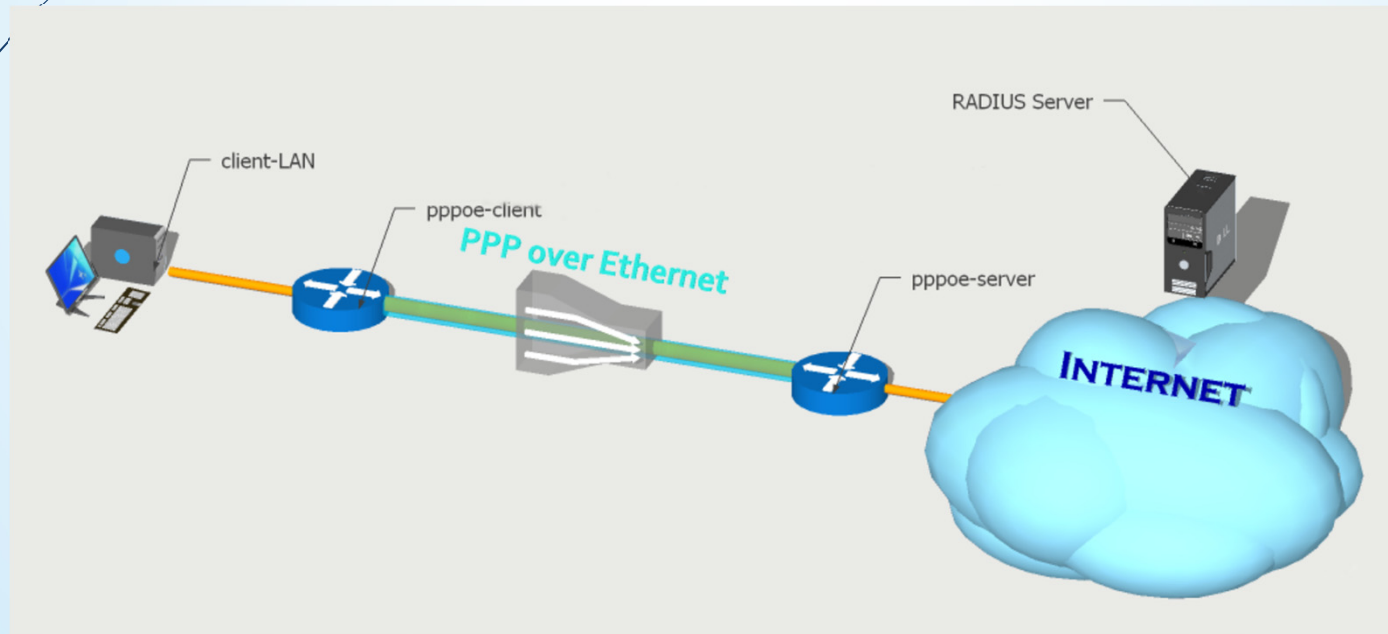
Welcome to this Workshop!

First, some basic concepts

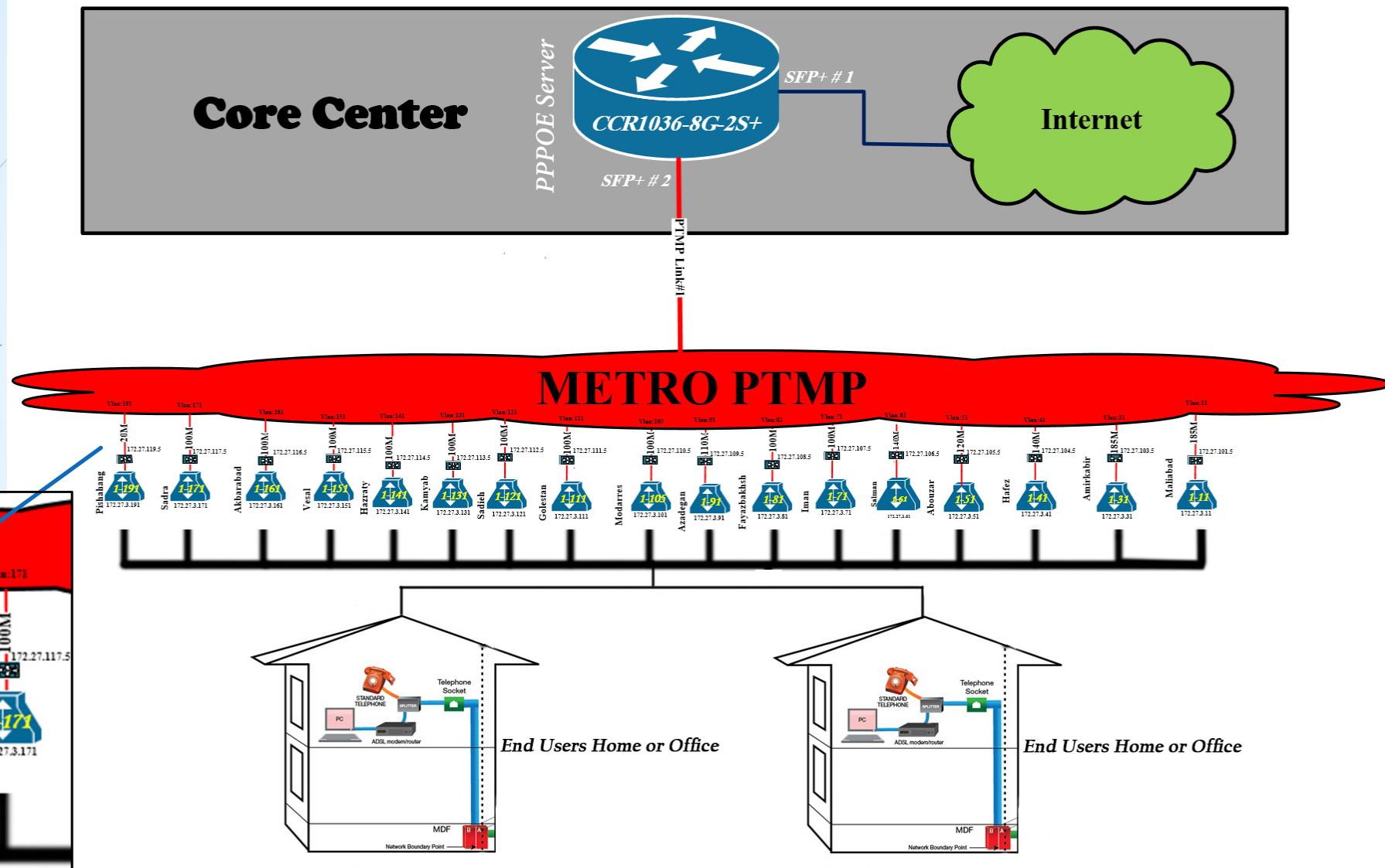


What is PPPOE?

Point-to-Point Protocol over Ethernet or PPPoE, is a Layer II network protocol that used for encapsulating Point-to-Point Protocol (PPP) frames inside Ethernet frames. It is used mainly with DSL services where individual users connect to a DSL modem over Ethernet. As you know Ethernet networks are packet-based and have no capacity for a connection or circuit. They also lack basic security features to protect against IP and MAC conflicts and rogue DHCP servers, so most Internet providers separate their users traffics to several VLANs .

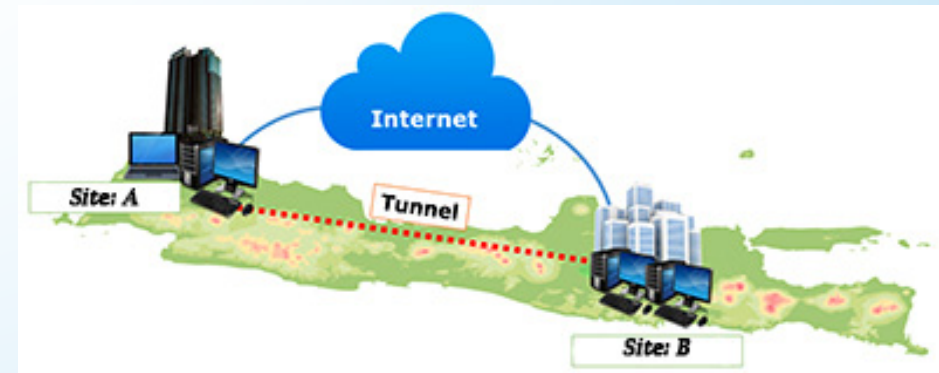


Imagine that our Network Topology is:



EoIP Tunnel

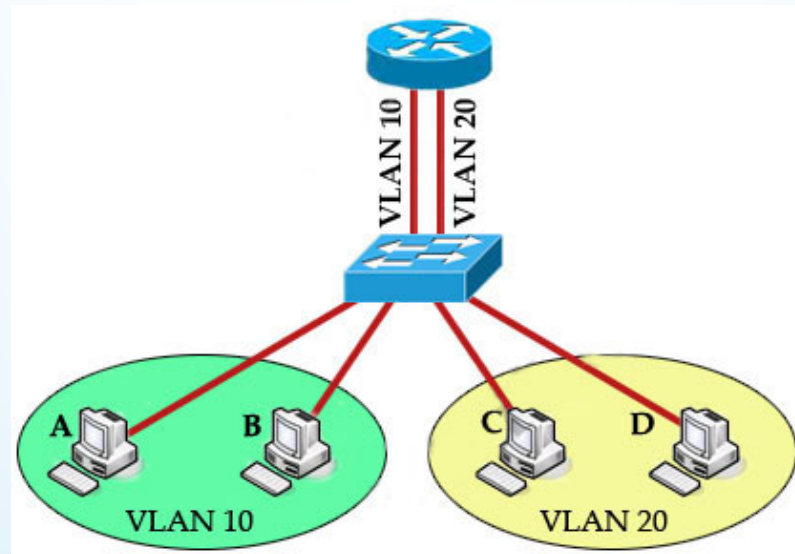
- *Ethernet over IP (EoIP) Tunneling is a MikroTik RouterOS protocol that creates an Ethernet tunnel between two routers on top of an IP connection. The EoIP tunnel may run over IPIP tunnel, PPTP tunnel or any other connections capable of transporting IP.*
- *EoIP tunnels add at least 42 bytes overhead.
(8 bytes GRE + 14 bytes Ethernet + 20 bytes IP)*



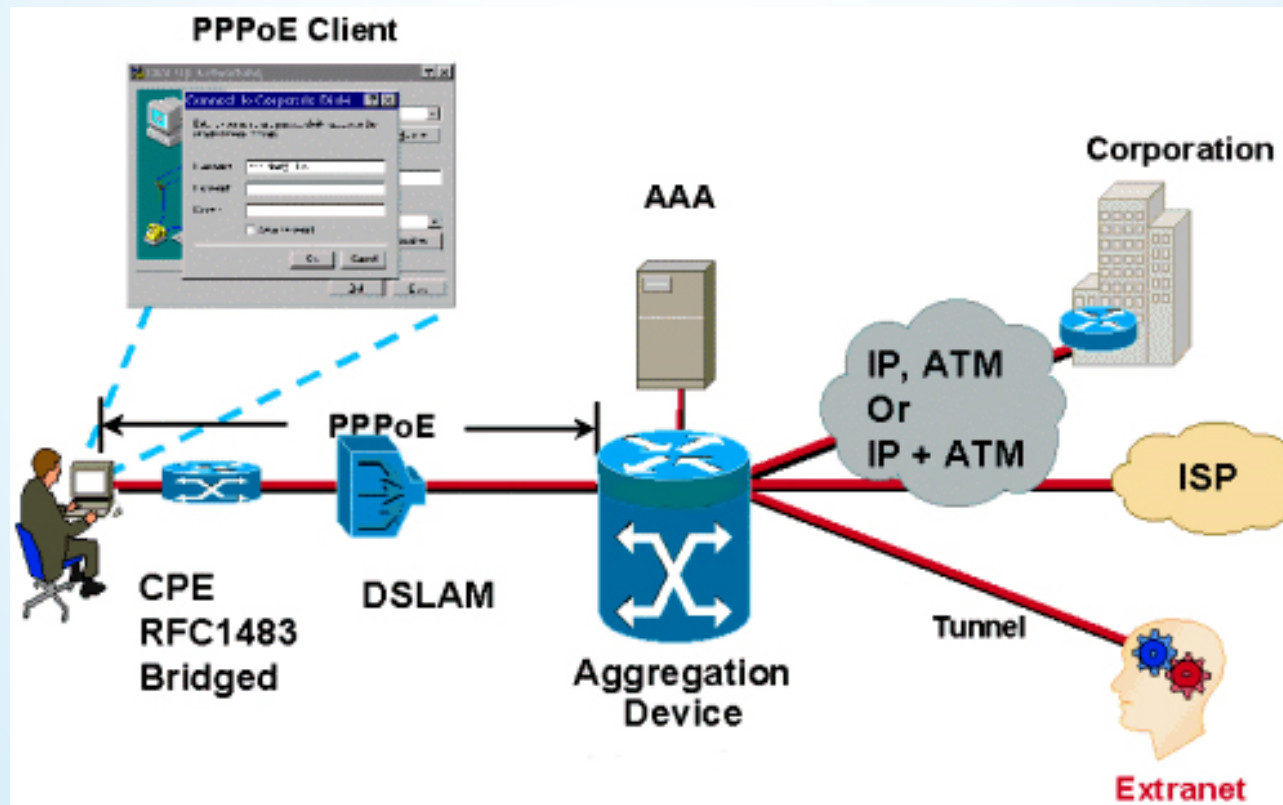
InterVLAN Routing

- Some times in addition to the PPPOE Connection you may need to have Layer III communication between your branches. (for example for managing your devices)

In this case you use InterVLAN Routing...



*Let's go to implementing PPPOE over EoIP Tunnel
And
Branches InterVLAN Routing*



Creating “VLAN Interface” for each branches on Core MikroTik

Session Settings Dashboard

Safe Mode

Session: 00:0C:29:B4:C9:F3

Quick Set

CAPsMAN

Interfaces

Wireless

Bridge

PPP

Interface List

Interface

Interface List

Ethernet

EoIP Tunnel

IP Tunnel

GRE Tunnel

VLAN

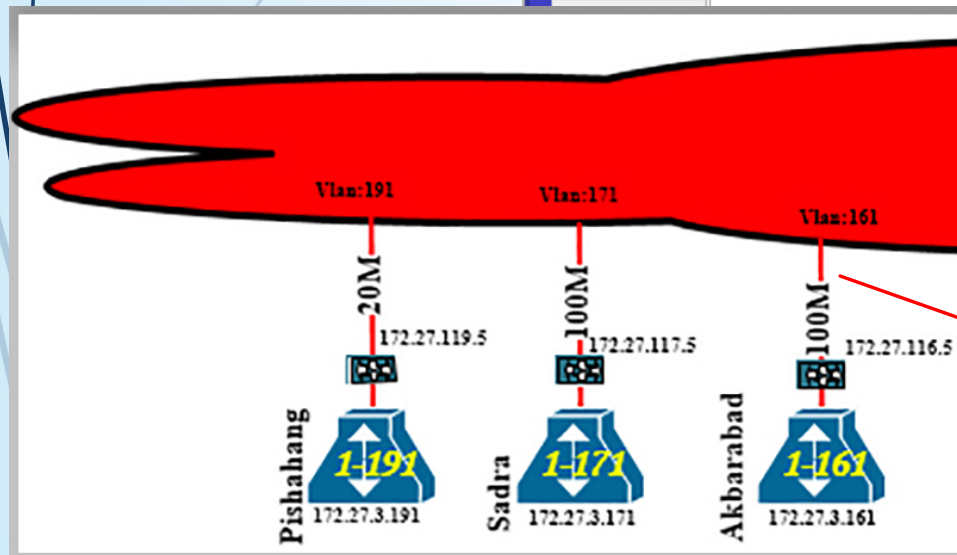
VRRP

Bonding

LTE

	Name	Type	MTU	Actual MTU	L2 MTU	Tx	Rx	Tx Packet (p/s)	Rx Packet (p/s)	FP Tx	FP Rx
R	vlan161	VLAN	1500	1500		0 bps	0 bps	0	0	0 bps	0 bps
R	vlan171	VLAN	1500	1500		0 bps	0 bps	0	0	0 bps	0 bps

Core MikroTik



New Interface

General Loop Protect Status Traffic

Name:

Type:

MTU:

Actual MTU:

L2 MTU:

MAC Address:

ARP:

ARP Timeout:

VLAN ID:

Interface:

☐ Use Service Tag

OK Cancel Apply Disable Comment Copy Remove Torch

enabled running slave

Configuring IP Address for branches VLANs

Session Settings Dashboard

Safe Mode Session: 00:0C:29:B4:C9:F3

Core MikroTik

Address List

Address	Network	Interface
172.27.116.4/24	172.27.116.0	vlan161
172.27.117.4/24	172.27.117.0	vlan171

New Address

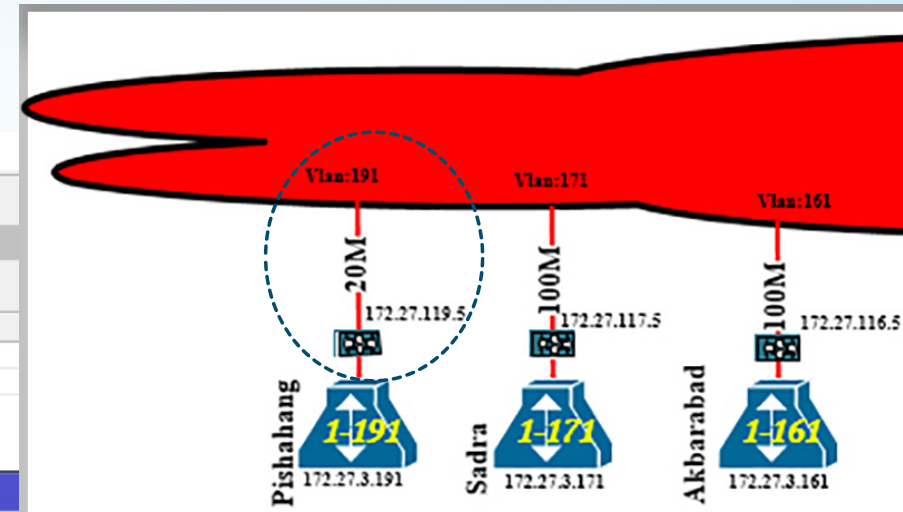
Address: 172.27.119.4/24

Network: 172.27.119.0

Interface: vlan191

OK Cancel Apply Disable Comment Copy Remove

enabled



Branches Basic IP Configurations

Branch MikroTik

RouterOS WinBox

Session Settings Dashboard

Safe Mode Session: 00:0C:29:B4:C9:F3

Address List

Address Network Interface

New Address

Address: 172.27.119.5/24

Network: 172.27.119.0

Interface: ether5->TC-PTMP

OK Cancel Apply Disable Comment Copy Remove

enabled

Route List

Routes Nexthops Rules VRF

Dst. Address Gateway

New Route

General Attributes

Dest. Address: 0.0.0.0/0

Gateway: 172.27.119.4

Check Gateway:

Type: unicast

Distance:

Scope: 30

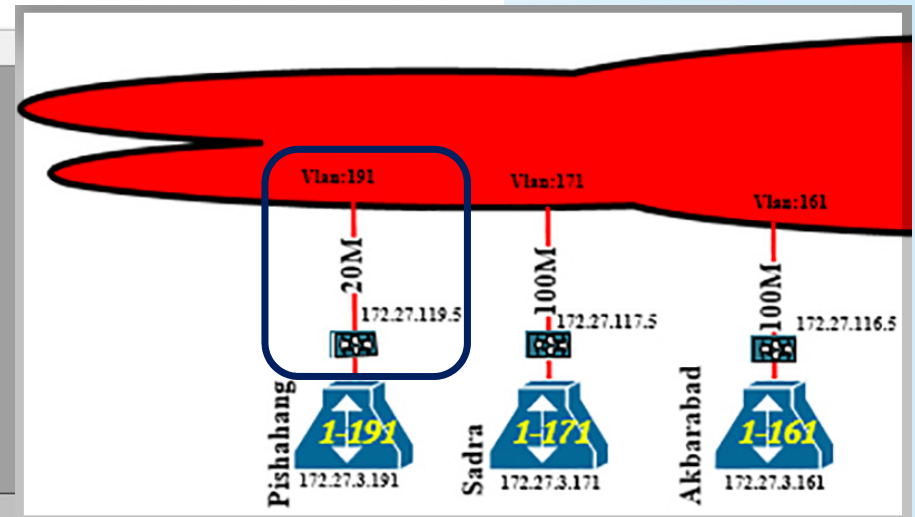
Target Scope: 10

Routing Mark:

Pref. Source:

OK Cancel Apply Disable Comment Copy Remove

enabled active



Creating & Configuring EoIP Tunnels

Core MikroTik

The screenshot shows the MikroTik WinBox interface for the Core device. The session ID is 172.27.119.4:8292. The 'Interface List' tab is active, showing a list of interfaces. The 'eoiptunnel-Pishahang' interface is selected. The configuration window for this interface is open, showing the following details:

- Name: eoiptunnel-Pishahang
- Type: EoIP Tunnel
- MTU: 1458
- L2 MTU: 65535
- MAC Address: 02:30:A9:8F:3A:B7
- ARP: enabled
- ARP Timeout:
- Local Address:
- Remote Address: 172.27.119.5 (circled in red)
- Tunnel ID: 119
- IPsec Secret:
- Keepalive:
- DSCP: inherit
- Dont Fragment: no
- ☒ Clamp TCP MSS
- ☒ Allow Fast Path

The interface status is shown as 'enabled', 'running', and 'slave'.

Branch MikroTik

The screenshot shows the MikroTik WinBox interface for the Branch device. The session ID is 172.27.119.5:8292. The 'Interface List' tab is active, showing a list of interfaces. The 'eoiptunnel-Pishahang->Valiasr' interface is selected. The configuration window for this interface is open, showing the following details:

- Name: eoiptunnel-Pishahang->Valiasr
- Type: EoIP Tunnel
- MTU: 1500
- Actual MTU: 1500
- L2 MTU: 65535
- MAC Address: 02:D9:D8:98:97:FF
- ARP: enabled
- ARP Timeout:
- Local Address:
- Remote Address: 172.27.119.4 (circled in red)
- Tunnel ID: 119
- IPsec Secret:
- Keepalive:
- DSCP: inherit
- Dont Fragment: no
- ☒ Clamp TCP MSS
- ☒ Allow Fast Path

The interface status is shown as 'enabled', 'running', and 'slave'.

Bridging EoIP Tunnel with End-Users Interface

admin@172.27.119.5:8292 (Pishahang->Valiasr) - WinBox v6.38.7 on RB450G (mipsbe)

Session Settings Dashboard

Safe Mode Session: 172.27.119.5:8292 CPU: 8% Memory: 234.9 MiB Uptime: 14d 11:26:31

Branch MikroTik

Quick Set CAPsMAN Interfaces Wireless Bridge PPP Switch Mesh IP MPLS Routing System Queues Files Log Radius

Bridge

Bridge Ports Filters NAT Hosts

	Name	Type
R	bridgePTMP	Bridge

1 item out of 7

admin@172.27.119.5:8292 (Pishahang->Valiasr) - WinBox v6.38.7 on RB450G (mipsbe)

Session Settings Dashboard

Safe Mode Session: 172.27.119.5:8292 CPU: 3% Memory: 234.9 MiB Uptime: 14d 11:25:21

Bridge

Bridge Ports Filters NAT Hosts

Interface	Bridge	Priority (h...	Path Cost	Horizon	Role
teoip-tunnel-Pishahang->Valiasr	bridgePTMP	80	10		root port
ether3-> End_User_PPPOE Client	bridgePTMP	80	10		designated port

2 items

Bridging Branches EoIP Tunnels on Core MikroTik

The screenshot displays the MikroTik WinBox interface. The left sidebar shows the 'RouterOS WinBox' menu with options like Quick Set, CAPsMAN, Interfaces, Wireless, Bridge, PPP, Mesh, IP, MPLS, Routing, System, Queues, Files, Log, Radius, Tools, New Terminal, Make Supout.rf, Manual, New WinBox, and Exit. The main window is divided into two panes. The top pane shows the 'Bridge' configuration page with a table of existing bridges. The bottom pane shows the 'New Bridge Port' dialog box, which is used to add a new port to a bridge. A red arrow points from the 'Bridge' table in the top pane to the 'New Bridge Port' dialog box in the bottom pane.

Bridge Configuration Table (Top Pane):

Name	Type	L2 MTU	Tx	Rx	Tx Packet (p/s)	Rx Packet (p/s)	FP Tx	FP Rx	FP Tx Packet (p/s)	FP Rx Packet (p/s)	MAC Address	Protocol
R-PPPOE_Bridge	Bridge	65535	0 bps	0 bps	0	0	0 bps	0 bps	0	0		rstp

New Bridge Port Dialog (Bottom Pane):

General tab selected. Interface: **eoip-tunnel-Pishahang**, Bridge: **PPPOE_Bridge**, Priority: **80** (hex), Path Cost: **10**, Horizon: **auto**, Edge: **auto**, Point To Point: **auto**, External FDB: **auto**. ☐ Auto Isolate. Status: **enabled**.

Filtering Branches Layer II Traffic

RouterOS WinBox

Session Settings Dashboard

Safe Mode Session: 172.27.2.4:8292

Core MikroTik

Bridge

Bridge Ports Filters NAT Hosts

00 Reset Counters 00 Reset All Counters

#	Action	Chain	Interfaces...	Interfaces/Out. Interface	Src. MAC Address...	Dst. MAC Address...	MAC Prot...	Bytes	Packets
13	drop	forward		leoiptunnel-Fayazbakhs			8100 (vlan)	16.3 GiB	143 970 ...
14	drop	forward		leoiptunnel-Fayazbakhs			8100 (vlan)	1549.8 MiB	25 901 477
15	drop	forward		leoiptunnel-Golestan			8100 (vlan)	13.3 GiB	134 997 ...
16	drop	forward		leoiptunnel-Golestan			8100 (vlan)	2732.5 MiB	38 734 438
17	drop	forward		leoiptunnel-Golestan			8100 (vlan)	987.9 MiB	19 157 444
18	drop	forward		leoiptunnel-Hafez			8100 (vlan)	1086.8 MiB	20 125 618
19	drop	forward		leoiptunnel-Hafez			8100 (vlan)	4.8 GiB	61 160 712
20	drop	forward		leoiptunnel-Hafez			8100 (vlan)	24.0 GiB	213 217 ...
21	drop	forward		leoiptunnel-Hafez			8100 (vlan)	5.5 GiB	59 660 018
22	drop	forward		leoiptunnel-Hafez			8100 (vlan)		
23	drop	forward		leoiptunnel-Hazraty			8100 (vlan)		
24	drop	forward		leoiptunnel-Hazraty			8100 (vlan)		
25	drop	forward		leoiptunnel-Kamyab			8100 (vlan)		
26	drop	forward		leoiptunnel-Kamyab			8100 (vlan)		
27	drop	forward		leoiptunnel-Modares			8100 (vlan)		
28	drop	forward		leoiptunnel-Modares			8100 (vlan)		
29	drop	forward		leoiptunnel-Modares			8100 (vlan)		
30	drop	forward		leoiptunnel-Pishahang			8100 (vlan)		
31	drop	forward		leoiptunnel-Malabad			8100 (vlan)		
32	drop	forward		leoiptunnel-Akbarabad			8100 (vlan)		
33	drop	forward		leoiptunnel-Akbarabad			8100 (vlan)		
34	drop	forward		leoiptunnel-Akbarabad			8100 (vlan)		
35	drop	forward		leoiptunnel-Akbarabad			8100 (vlan)		
36	drop	forward		leoiptunnel-Akbarabad			8100 (vlan)		
37	drop	forward		leoiptunnel-Akbarabad			8100 (vlan)		
38	drop	forward		leoiptunnel-Akbarabad			8100 (vlan)		
39	drop	forward		leoiptunnel-Akbarabad			8100 (vlan)		
40	drop	forward		leoiptunnel-Akbarabad			8100 (vlan)		
41	drop	forward		leoiptunnel-Akbarabad			8100 (vlan)		
42	drop	forward		leoiptunnel-Akbarabad			8100 (vlan)		
43	drop	forward		leoiptunnel-Akbarabad			8100 (vlan)		
44	drop	forward		leoiptunnel-Akbarabad			8100 (vlan)		
45	drop	forward		leoiptunnel-Akbarabad			8100 (vlan)		
46	drop	forward		leoiptunnel-Akbarabad			8100 (vlan)		
47	drop	forward		leoiptunnel-Akbarabad			8100 (vlan)		
48	drop	forward		leoiptunnel-Akbarabad			8100 (vlan)		
49	drop	forward		leoiptunnel-Akbarabad			8100 (vlan)		
50	drop	forward		leoiptunnel-Akbarabad			8100 (vlan)		
51	drop	forward		leoiptunnel-Akbarabad			8100 (vlan)		
52	drop	forward		leoiptunnel-Akbarabad			8100 (vlan)		
53	drop	forward		leoiptunnel-Akbarabad			8100 (vlan)		
54	drop	forward		leoiptunnel-Akbarabad			8100 (vlan)		
55	drop	forward		leoiptunnel-Akbarabad			8100 (vlan)		
56	drop	forward		leoiptunnel-Akbarabad			8100 (vlan)		
57	drop	forward		leoiptunnel-Akbarabad			8100 (vlan)		

97 items (1 selected)

Bridge Filter Rule <>

General Advanced ARP STP Action Statistics

Chain: forward

In. Interface: leoiptunnel-Pishahang

Out. Interface: leoiptunnel-Pishahang

In. Interface List:

Out. Interface List:

Bridges

Src. MAC Address

Dst. MAC Address

MAC Protocol

MAC Protocol-Num: 8100 (vlan)

IP

Packet Mark

Ingress Priority

enabled

Bridge Filter Rule <>

General Advanced ARP STP Action Statistics

Action: drop

Log

Log Prefix:

enabled

Bridge Filter Rule <>

General Advanced ARP STP Action Statistics

Action: drop

Log

Log Prefix:

enabled

Providing “IP Pool” for PPPoE Clients

RouterOS WinBox

Session Settings Dashboard

Safe Mode Session: 89.165.56.10

CPU: 0% Memory: 223.9 MB Uptime: 25d 00:12:28

Core MikroTik

Quick Set
CAPsMAN
Interfaces
Wireless
Bridge
PPP
Switch
Mesh
IP
MPLS
Routing
System
Queues
Files
Log
Radius
Tools
New Terminal
MetaROUTER
Partition
Make Supout.rtf
Manual
New WinBox
Ext

ARP
Accounting
Addresses
Cloud
DHCP Client
DHCP Relay
DHCP Server
DNS
Firewall
Hotspot
IPsec
Neighbors
Packing
Routes
SMB
SNMP
Services
Settings
Socks
TFTP
Traffic Flow
UPnP
Web Proxy

IP Pool

IP Pool <pool1>

Name: PPPOE_POOL

Addresses: 89.165.56.30-89.165.56.250

Next Pool: none

OK
Cancel
Apply
Copy
Remove

5 items (1 selected)

Creating “PPP Profile” for PPPOE Connections

RouterOS WinBox

Session Settings Dashboard

Safe Mode Session: 89.165.56.10 CPU: 5% Memory: 223.9 MB Uptime: 25d 00:18:07

Core Mikrotik

PPP

Interface PPPoE Servers Secrets Profiles Active Connections L2TP Secrets

Name / Local Address Remote Address Bridge Rate Limit... Only One

New PPP Profile

General Protocols Limits Queue Scripts

Name: PPPOE_Profile

Local Address: 89.165.56.1

Remote Address: PPPOE_POOL

Bridge:

Bridge Port Priority:

Bridge Path Cost:

Incoming Filter:

Outgoing Filter:

Address List:

DNS Server: 89.165.56.20

WINS Server:

- Change TCP MSS

☐ no ☒ yes ☐ default

- Use UPnP

☐ no ☒ yes ☐ default

New PPP Profile

General Protocols Limits Queue Scripts

- Use MPLS

☐ no ☐ yes ☐ required ☒ default

- Use Compression

☐ no ☐ yes ☒ default

- Use Encryption

☐ no ☒ yes ☐ required ☐ default

Creating “PPP Secret” for PPPOE Clients

RouterOS WinBox

Session Settings Dashboard

Safe Mode Session: 89.165.56.10 CPU: 2% Memory: 223.9 MB Uptime: 25d 00:39:41

Core MikroTik

PPP

Interface PPPoE Servers Secrets Profiles Active Connections L2TP Secrets

PPP Authentication&Accounting

Name Password Service Caller ID Profile Local Address Remote Address Last Logged Out

New PPP Secret

Name: ptaabodi

Password: *****

Service: any

Caller ID:

Profile: PPPOE_Profile

Local Address:

Remote Address:

Routes:

Limit Bytes In:

Limit Bytes Out:

Last Logged Out:

enabled

OK Cancel Apply Disable Comment Copy Remove

Enable & Configuring PPPOE Server

Session Settings Dashboard

Safe Mode Session: 00:0C:29:B4:C9:F3

Core MikroTik

RouterOS WinBox

Quick Set
CAPsMAN
Interfaces
Wireless
Bridge
PPP
Mesh
IP
MPLS
Routing
System
Queues
Files
Log
Radius
Tools
New Terminal
Make Supout.tif
Manual
New WinBox
Exit

PPP

Interface PPPoE Servers Secrets Profiles Active Connections L2TP Secrets

Service ... Interface Max MTU Max MRU MRRU Default Profile Authentication

0 items

New PPPoE Service

Service Name: PPPOE_Server

Interface: PPPOE_Bridge

Max MTU:

Max MRU:

MRRU:

Keepalive Timeout: 10

Default Profile: PPPOE_Profile

☐ One Session Per Host

Max Sessions:

PADO Delay: ms

Authentication: ☒ mschap2 ☒ mschap1
☒ chap ☒ pap

OK
Cancel
Apply
Disable
Copy
Remove

enabled

Conclusion

- *You have L3-Communication on Branches...*
- *Clients have Internet access by a PPPOE Client Connection*

The screenshot displays a Windows 10 desktop environment with several open windows:

- Command Prompt (C:\WINDOWS\system32\cmd.exe):** Two windows are open. The left one shows a successful ping to 8.8.8.8 with 4 packets sent and received, 0% loss, and an average round trip time of 236ms. The right one shows a successful ping to 172.27.119.5 with 4 packets sent and received, 0% loss, and an average round trip time of 11ms.
- Settings (Network & Internet):** The 'Dial-up' connection is selected under the 'Broadband Connection' section.
- Windows Security Sign in:** A dialog box is open, showing the username 'ptaabodi' and a masked password.
- Ethernet Status:** A window showing the status of the Ethernet connection. It indicates 'No network access' for both IPv4 and IPv6, and 'Enabled' for the Media State.
- Network Connection Details:** A window showing the details of the Ethernet connection. It lists various properties such as Description (Realtek PCIe GBE Family Controller), Physical Address (BC-EE-7B-01-47-6B), DHCP Enabled (No), IPv4 Address (172.27.116.5), IPv4 Subnet Mask (255.255.255.0), IPv4 Default Gateway (172.27.116.4), IPv4 DNS Server (8.8.8.8), IPv4 WINS Server, NetBIOS over Tcpip (No), Link-local IPv6 Address (fe80::1d1e:a7fa:d447:b000%12), IPv6 Default Gateway, and IPv6 DNS Server.

The desktop background is dark, and the taskbar shows the Start button and several pinned applications. The ASUS logo is visible in the bottom right corner.

Any Questions?

Thank You!



Powered by: Pooria Taabbodi

ptaabodi@hotmail.com