Intro to MikroTik RouterOS

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MikroTik

Latvian manufacturer of computer networking equipment

It sells wireless products and routers

Developers of MikroTik RouterOS

- RouterBOARD series (Level 6)
- Standard x86-based computers

Router OS

Level number	0 (Trial mode)	1 (Free Demo)	3 (WISP CPE)	4 (WISP)	5 (WISP)	6 (Controller)
Price	no key	registration required	volume only	$45	$95	$250
Initial Config Support	-	-	-	15 days	30 days	30 days
Wireless AP	24h trial	-	-	yes	yes	yes
Wireless Client and Bridge	24h trial	-	yes	yes	yes	yes
RIP, OSPF, BGP protocols	24h trial	-	yes(*)	yes	yes	yes
EoIP tunnels	24h trial	1	unlimited	unlimited	unlimited	unlimited
PPPoE tunnels	24h trial	1	200	200	500	unlimited
PPTP tunnels	24h trial	1	200	200	500	unlimited
L2TP tunnels	24h trial	1	200	200	500	unlimited
OVPN tunnels	24h trial	1	200	200	unlimited	unlimited
VLAN interfaces	24h trial	1	unlimited	unlimited	unlimited	unlimited
HotSpot active users	24h trial	1	1	200	500	unlimited
RADIUS client	24h trial	-	yes	yes	yes	yes
Queues	24h trial	1	unlimited	unlimited	unlimited	unlimited
Web proxy	24h trial	-	yes	yes	yes	yes
User manager active sessions	24h trial	1	10	20	50	Unlimited
Number of KVM guests	none	1	Unlimited	Unlimited	Unlimited	Unlimited

Router OS

- Routing
- Firewalling
- Virtual Private Network (VPN)
- Bandwidth Shaping
- Quality of service
- Wireless access point

Setting up RouterOS

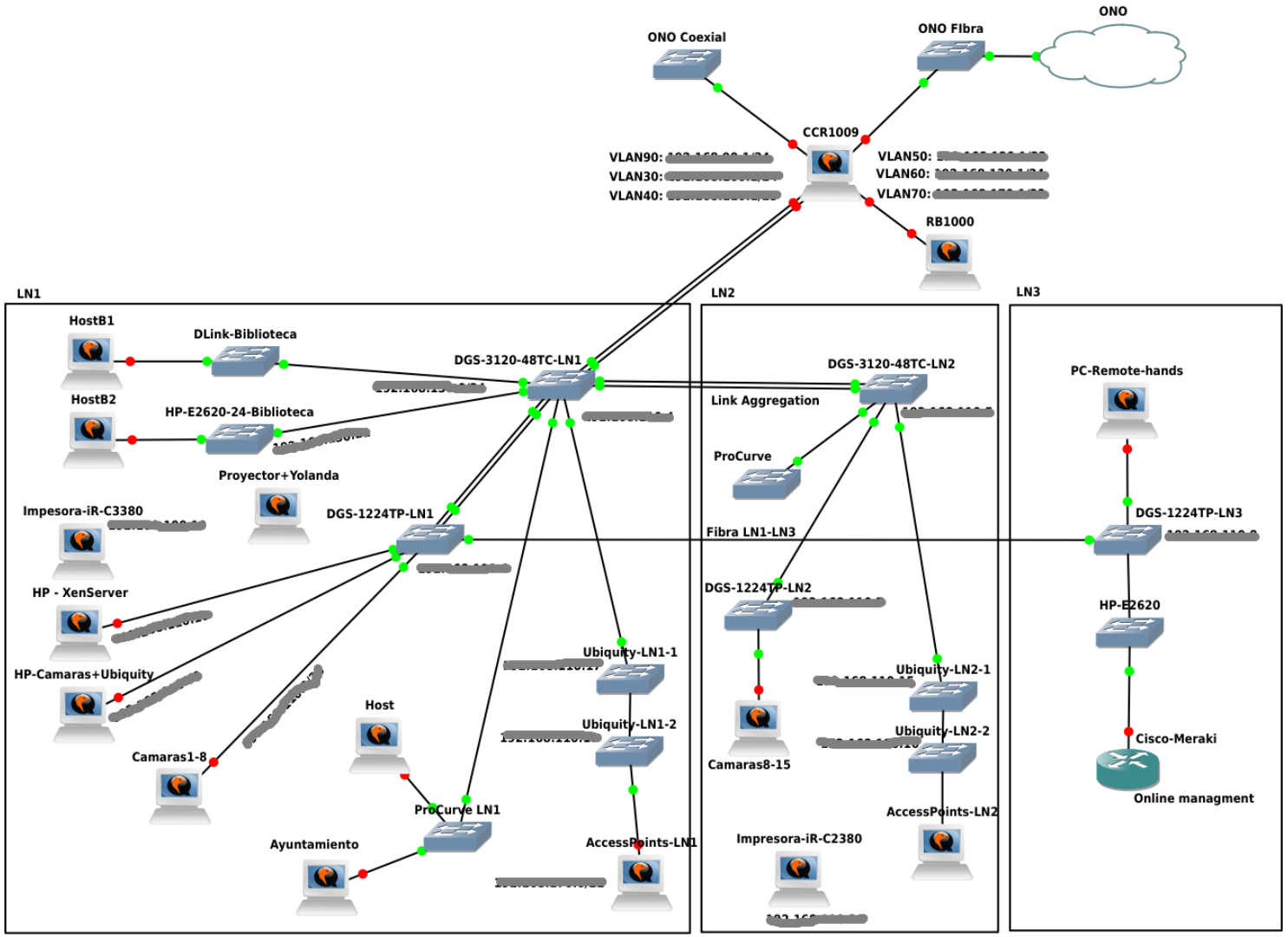
Connecting to RouterOS

- Via FTP
- Via Telnet
- Via SSH
- Via HTTP (Web application)
- Via Winbox (Graphical configuration tool for RouterOS)

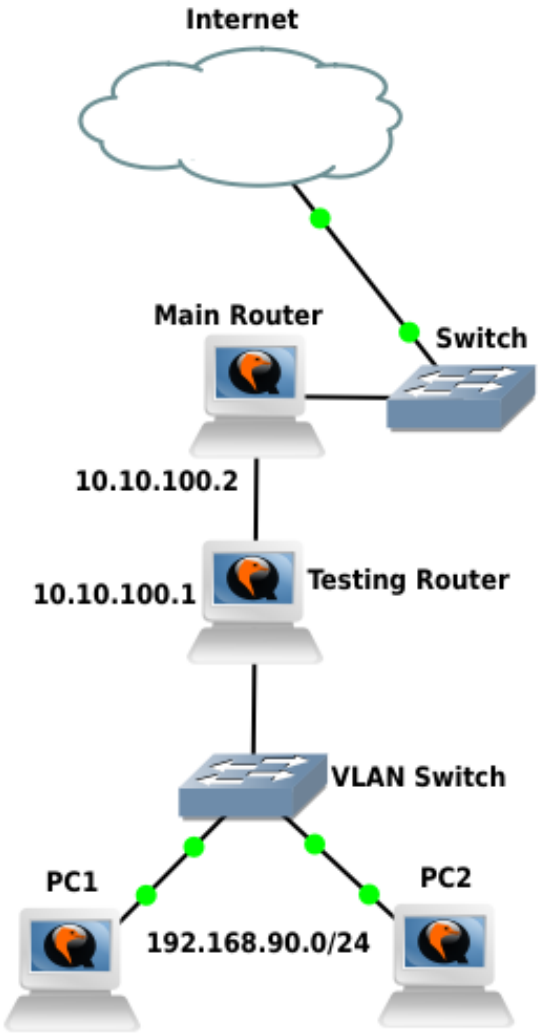
Network Simulators

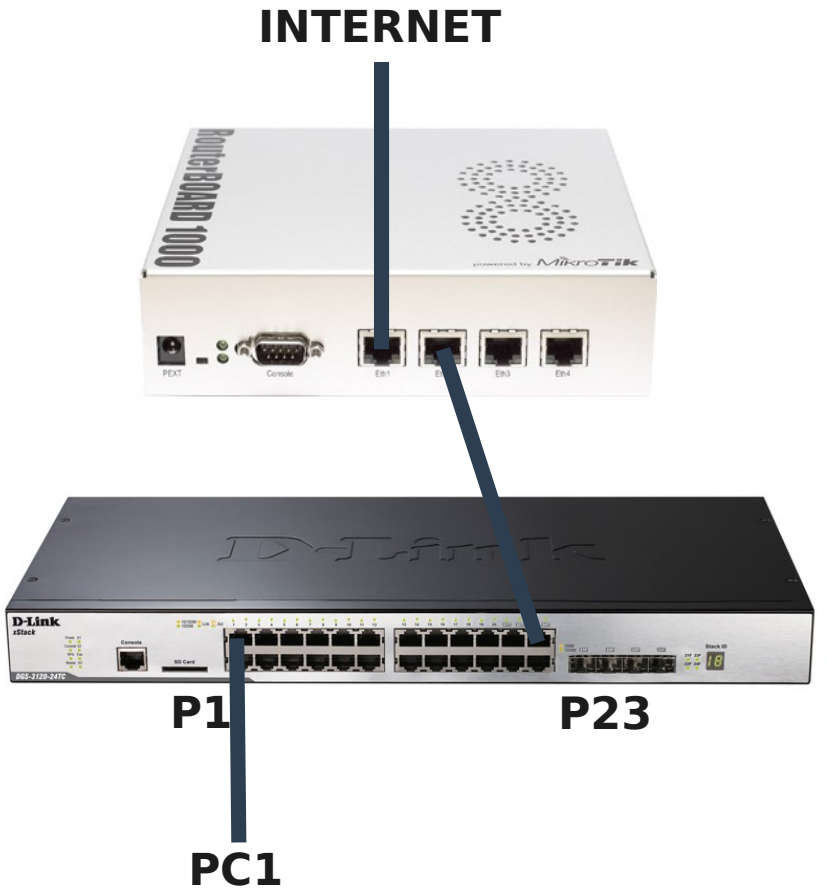
- GNS3(www.gns3.com)

Real Case


ONO
ONO Coexial
ONO Fibra
CCR1009
VLAN90:
VLAN30:
VLAN40:
VLAN50:
VLAN60:
VLAN70:
RB1000
LN1
LN2
LN3
HostB1
DLink-Biblioteca
DGS-3120-48TC-LN1
HostB2
HP-E2620-24-Biblioteca
Proyector+Yolanda
Impresora-iR-C3380
DGS-1224TP-LN1
HP - XenServer
HP-Camaras+Ubiquity
Camaras1-8
Host
ProCurve LN1
Ayuntamiento
Ubiquity-LN1-1
Ubiquity-LN1-2
AccessPoints-LN1
DGS-3120-48TC-LN2
Link Aggregation
ProCurve
Fibra LN1-LN3
DGS-1224TP-LN2
Camaras8-15
Impresora-iR-C2380
Ubiquity-LN2-1
Ubiquity-LN2-2
AccessPoints-LN2
PC-Remote-hands
DGS-1224TP-LN3
HP-E2620
Cisco-Meraki
Online managment

Straight Forward Example





Virtual LANs

Virtual Local Area Network (VLAN)

Used protocol: 802.1Q

OSI Layer 2 (Data Link Layer)

Adds 4 byte tag into an Ethernet frame

Each VLAN is treated as separate subnet. Though Mikrotik supports Vlan over Vlan

Multiple LAN in a single physical interface

VLANs increase security

Priority

Virtual LANs – Type of ports

Edge ports

Untagged or Access Ports

Used for PCs, printers, servers, etc

Core ports

Tagged or Trunk Ports

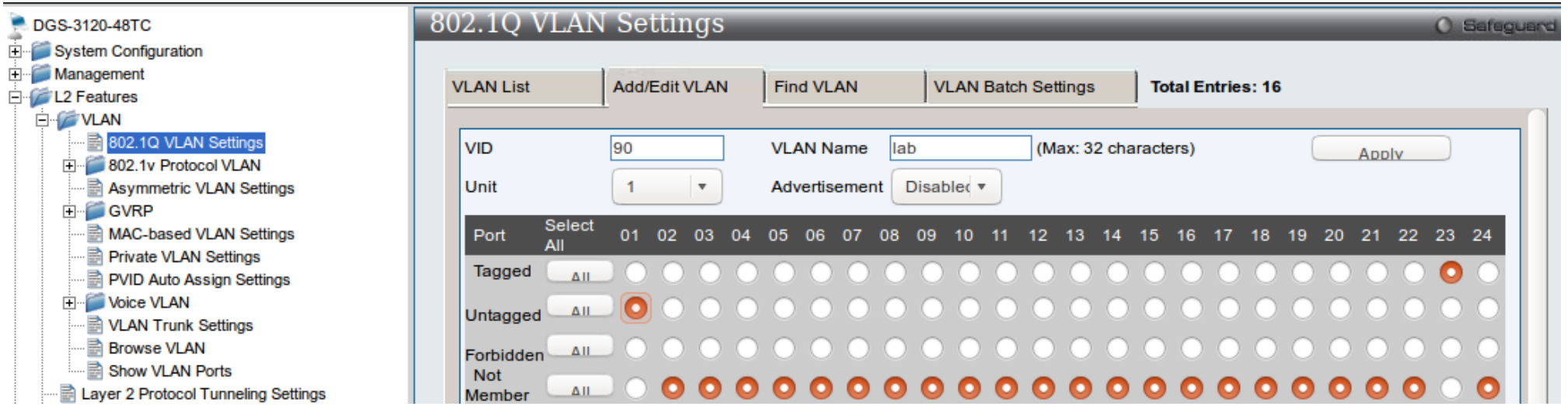
Send 4 byte

Used for devices that support VLANs technology (Switch, Router, etc)

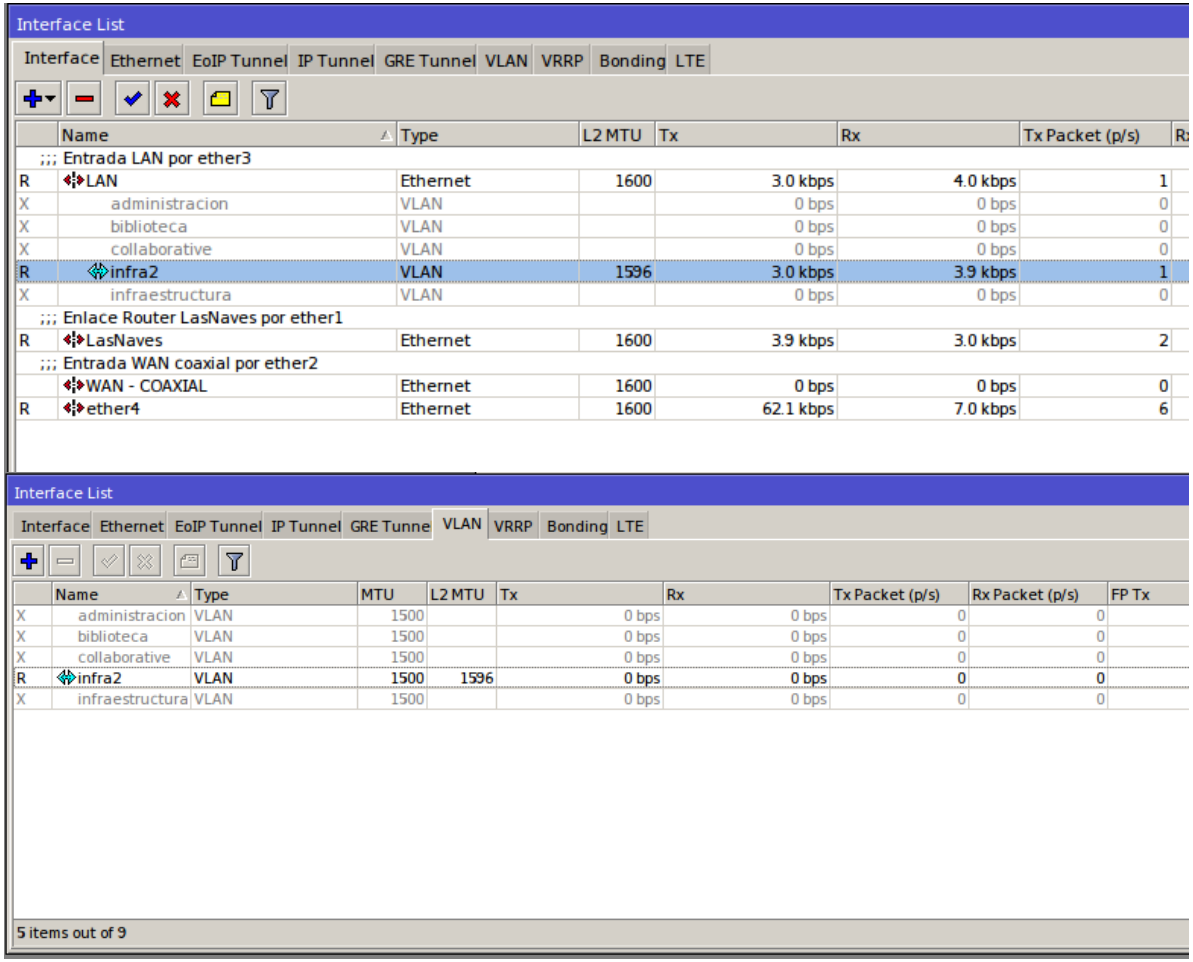
OSI Layers

OSI Model			
Layer		**Protocol data unit (PDU)**	**Function**[3]
Host layers	7. Application	Data	High-level APIs, including resource sharing, remote file access
	6. Presentation		Translation of data between a networking service and an application; including character encoding, data compression and encryption/decryption
	5. Session		Managing communication sessions, i.e. continuous exchange of information in the form of multiple back-and-forth transmissions between two nodes
	4. Transport	Segment (TCP) / Datagram (UDP)	Reliable transmission of data segments between points on a network, including segmentation, acknowledgement and multiplexing
Media layers	3. Network	Packet	Structuring and managing a multi-node network, including addressing, routing and traffic control
	2. Data link	Frame	Reliable transmission of data frames between two nodes connected by a physical layer
	1. Physical	Bit	Transmission and reception of raw bit streams over a physical medium

VLAN Switch Configuration

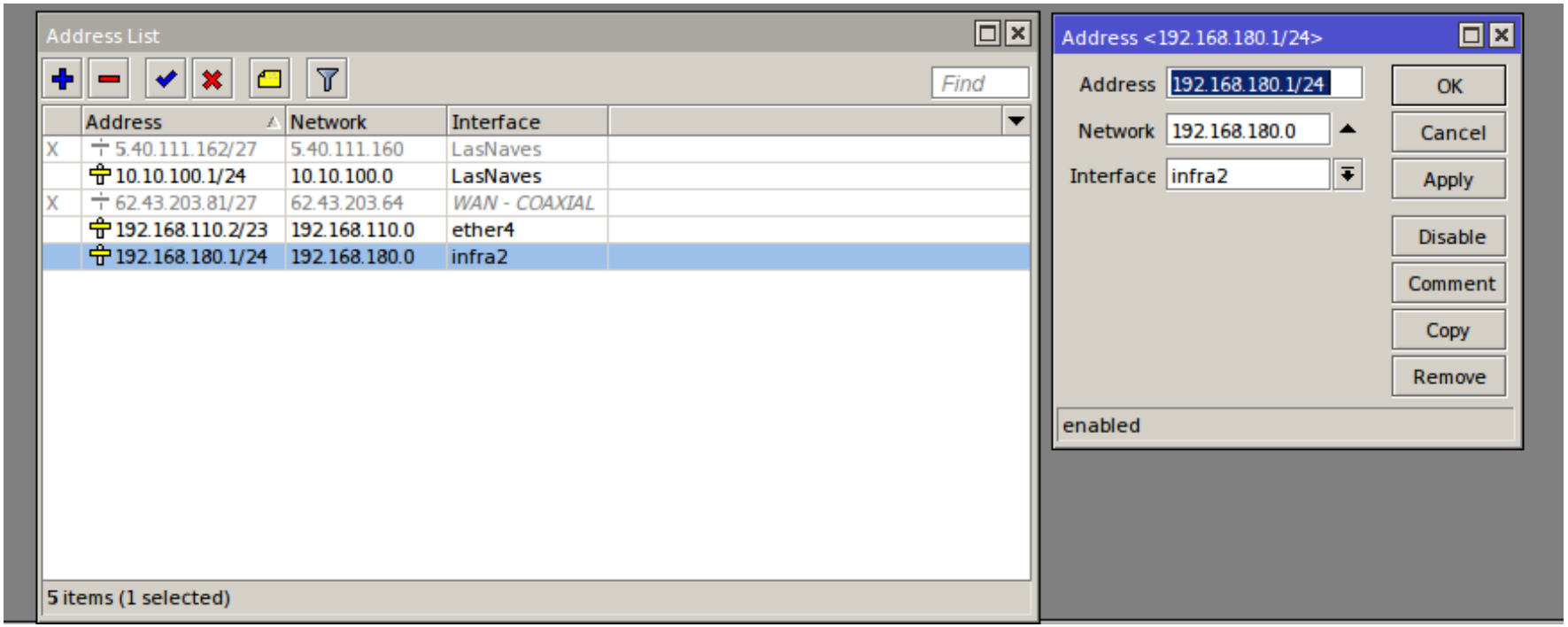


Interface & VLAN



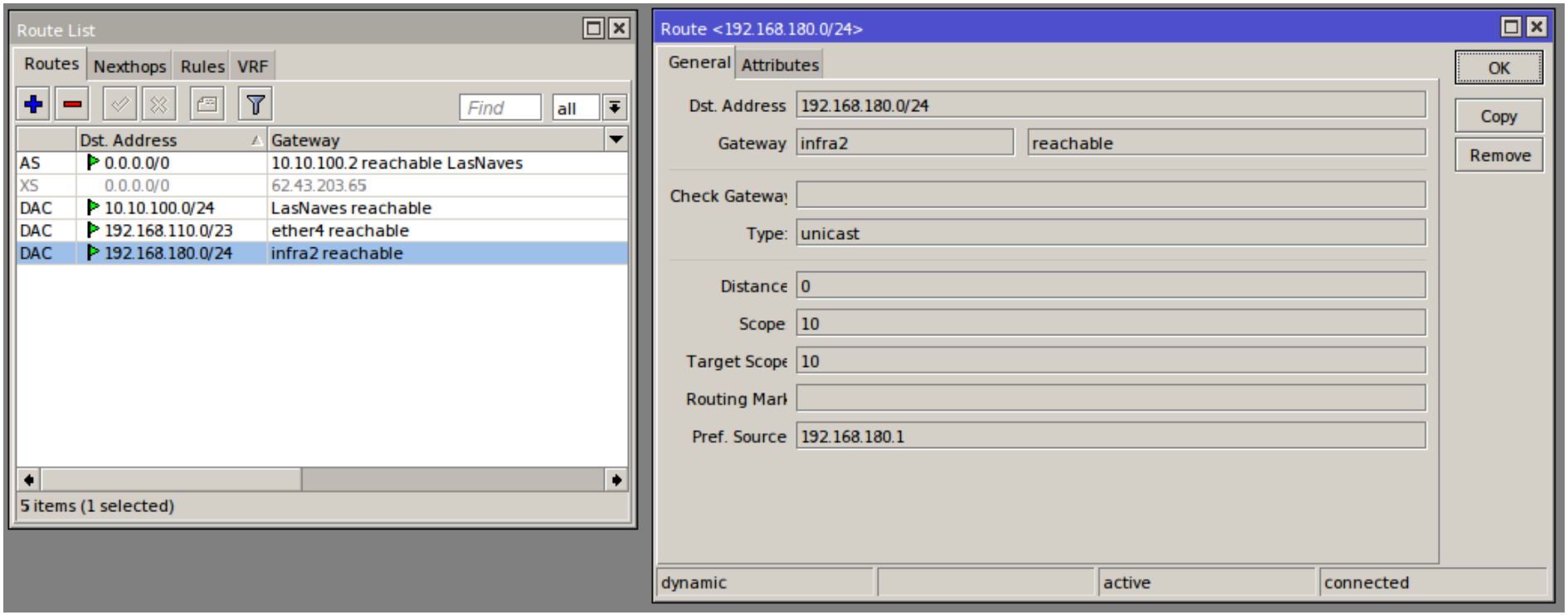
/interface vlan add name=test vlan-id=66 interface=LAN disabled=no

IP Addresses

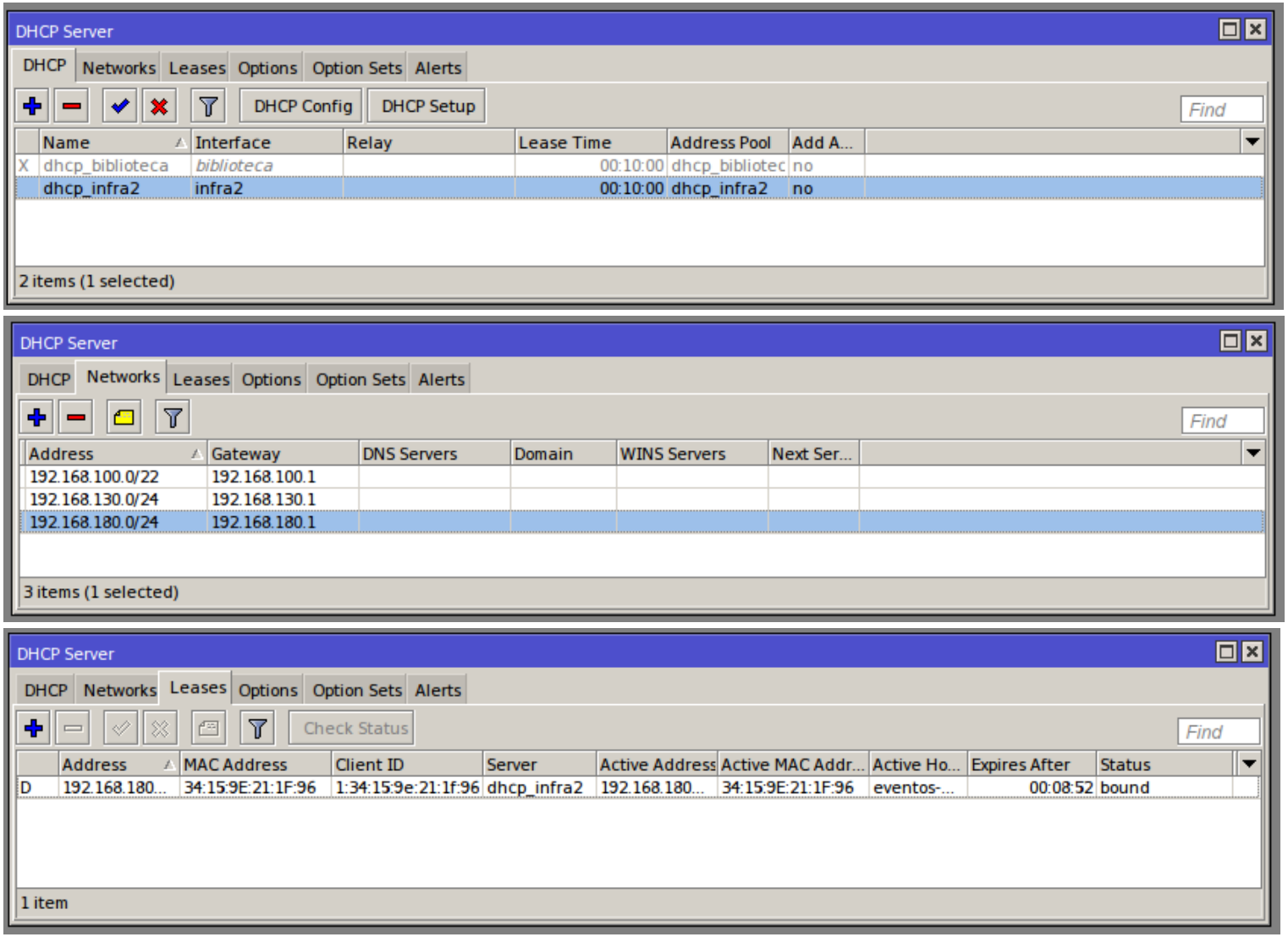


/ip address
add address=10.10.10.3/24 interface=infra2

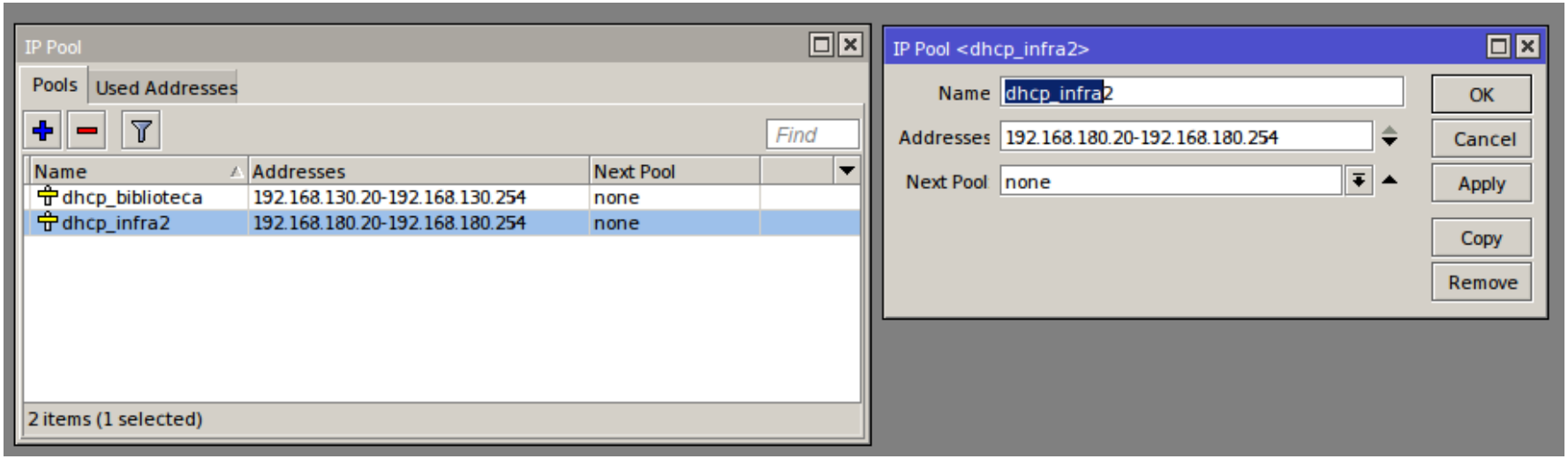
Routing


Route List
Routes
Nexthops
Rules
VRF
Find
all
Dst. Address
Gateway
AS 0.0.0.0/0 10.10.100.2 reachable LasNaves
XS 0.0.0.0/0 62.43.203.65
DAC 10.10.100.0/24 LasNaves reachable
DAC 192.168.110.0/23 ether4 reachable
DAC 192.168.180.0/24 infra2 reachable
5 items (1 selected)
Route <192.168.180.0/24>
General
Attributes
OK
Copy
Remove
Dst. Address 192.168.180.0/24
Gateway infra2 reachable
Check Gatewa
Type: unicast
Distance 0
Scope 10
Target Scope 10
Routing Mark
Pref. Source 192.168.180.1
dynamic
active
connected

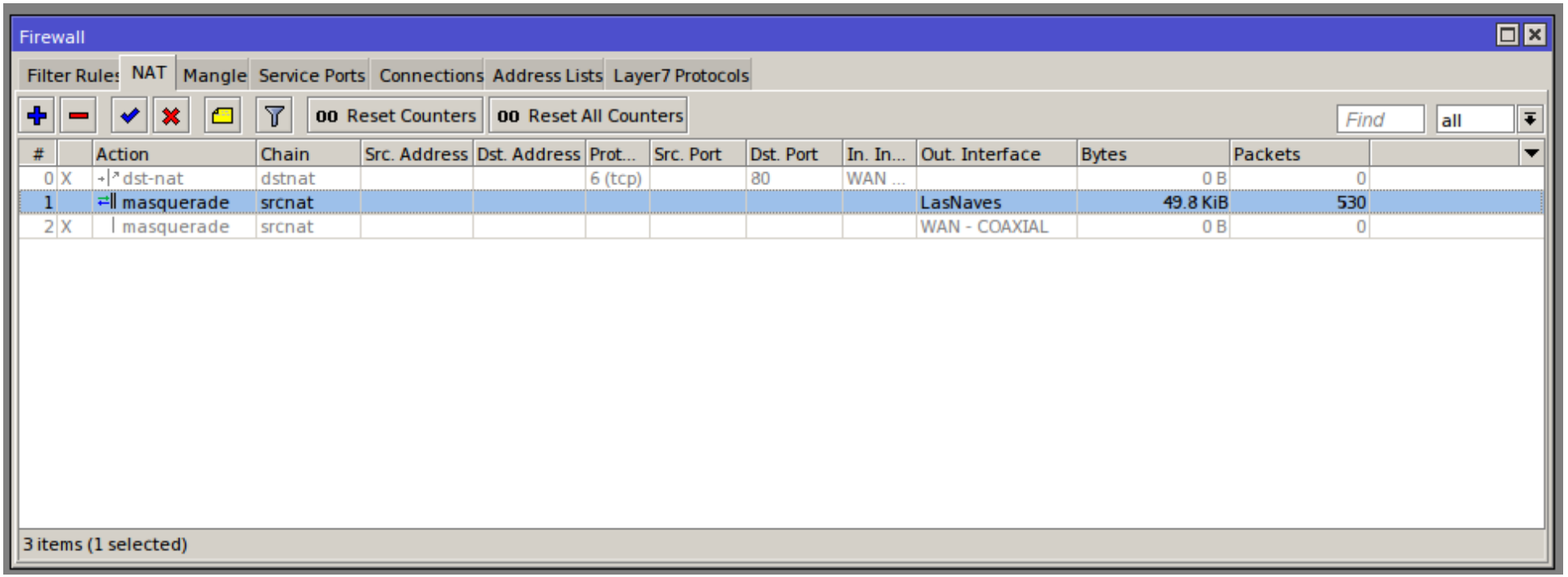
DHCP Server


DHCP Server
DHCP
Networks
Leases
Options
Option Sets
Alerts
DHCP Config
DHCP Setup
Find
Name
Interface
Relay
Lease Time
Address Pool
Add A...
X dhcp_biblioteca biblioteca 00:10:00 dhcp_bibliotec no
dhcp_infra2 infra2 00:10:00 dhcp_infra2 no
2 items (1 selected)
DHCP Server
DHCP
Networks
Leases
Options
Option Sets
Alerts
Find
Address
Gateway
DNS Servers
Domain
WINS Servers
Next Ser...
192.168.100.0/22 192.168.100.1
192.168.130.0/24 192.168.130.1
192.168.180.0/24 192.168.180.1
3 items (1 selected)
DHCP Server
DHCP
Networks
Leases
Options
Option Sets
Alerts
Check Status
Find
Address
MAC Address
Client ID
Server
Active Address
Active MAC Addr...
Active Ho...
Expires After
Status
D 192.168.180... 34:15:9E:21:1F:96 1:34:15:9e:21:1f:96 dhcp_infra2 192.168.180... 34:15:9E:21:1F:96 eventos-... 00:08:52 bound
1 item

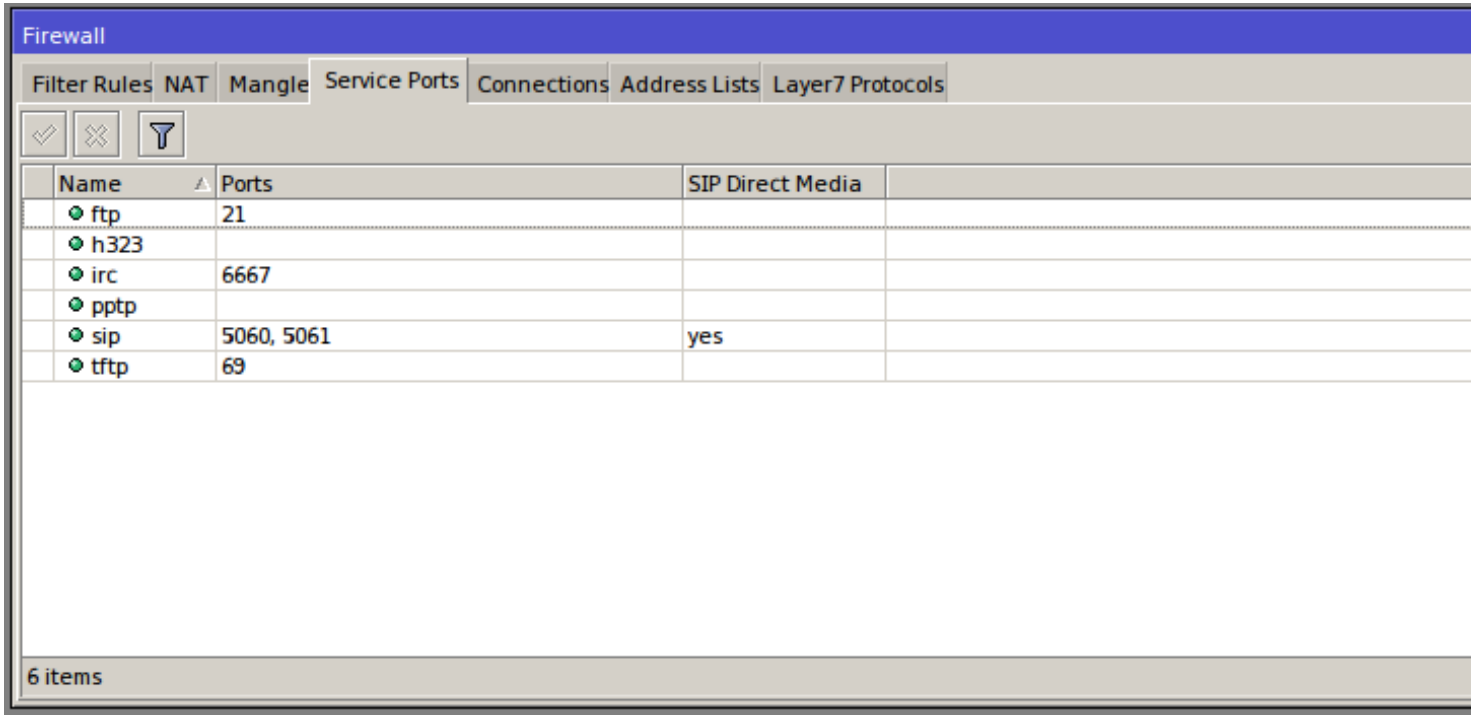
DHCP Pool


IP Pool
Pools
Used Addresses
Find
Name
Addresses
Next Pool
dhcp_biblioteca
192.168.130.20-192.168.130.254
none
dhcp_infra2
192.168.180.20-192.168.180.254
none
2 items (1 selected)
IP Pool <dhcp_infra2>
Name
dhcp_infra2
Addresses
192.168.180.20-192.168.180.254
Next Pool
none
OK
Cancel
Apply
Copy
Remove

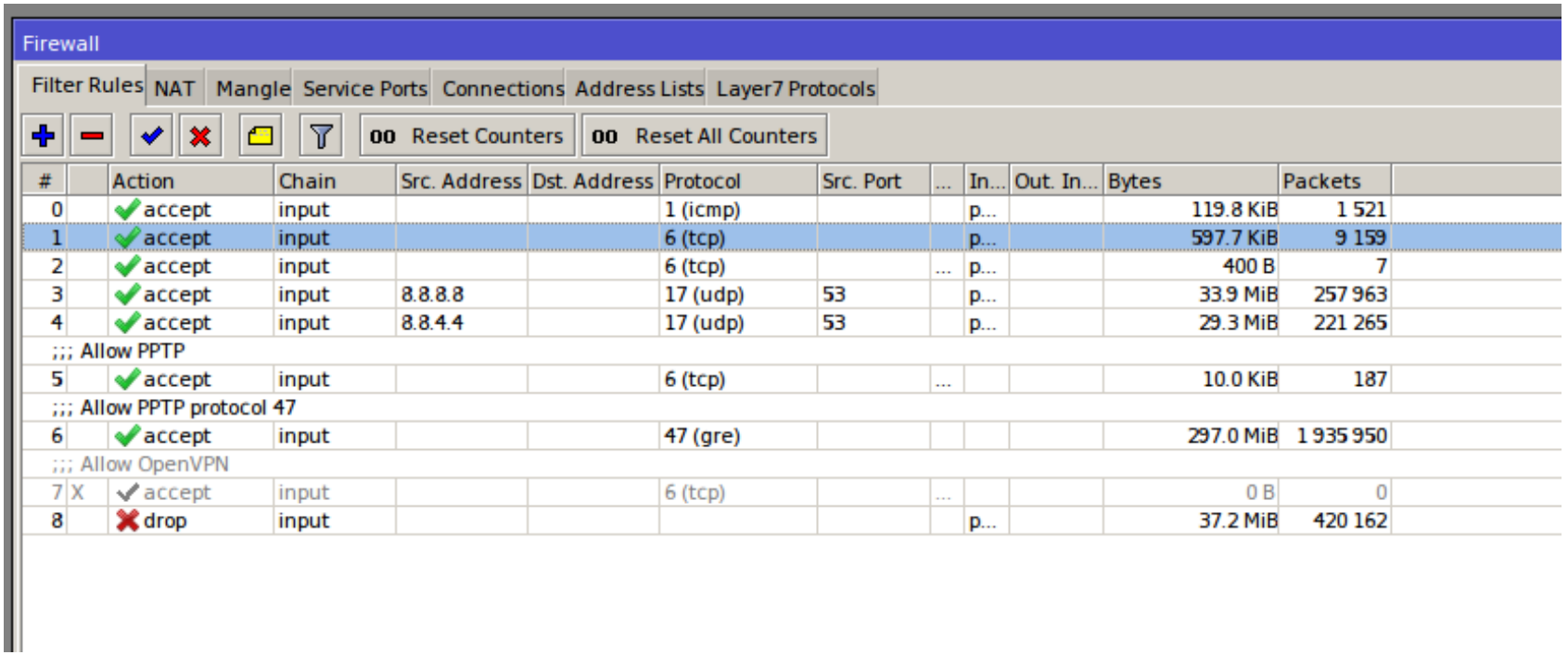
Firewall - NAT



Firewall – Service Ports

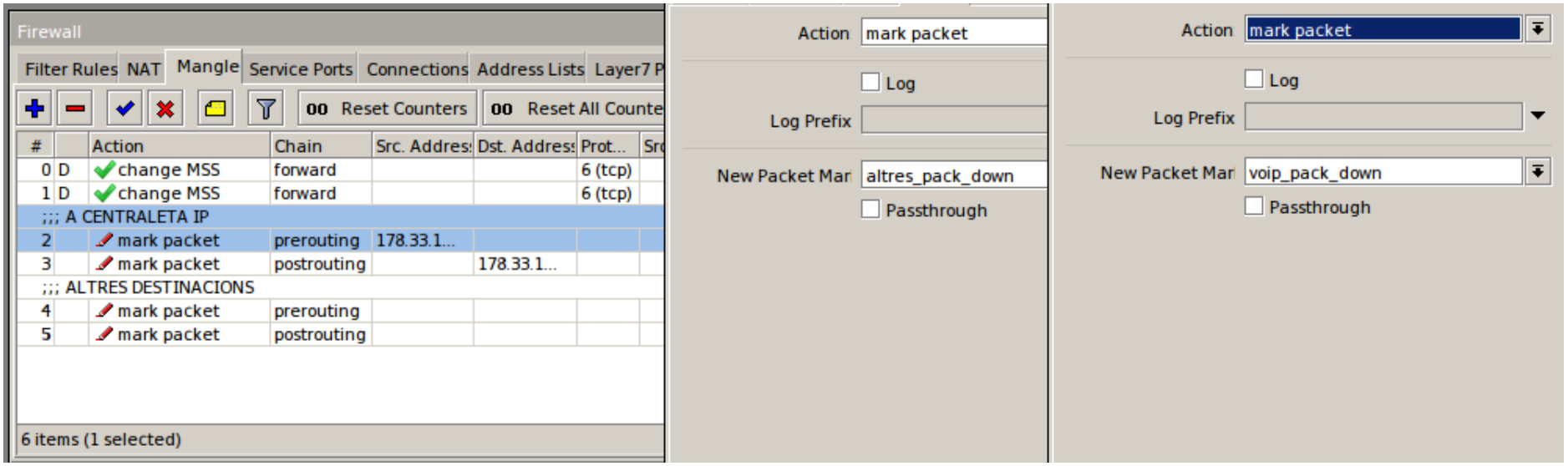


Firewall - Rules

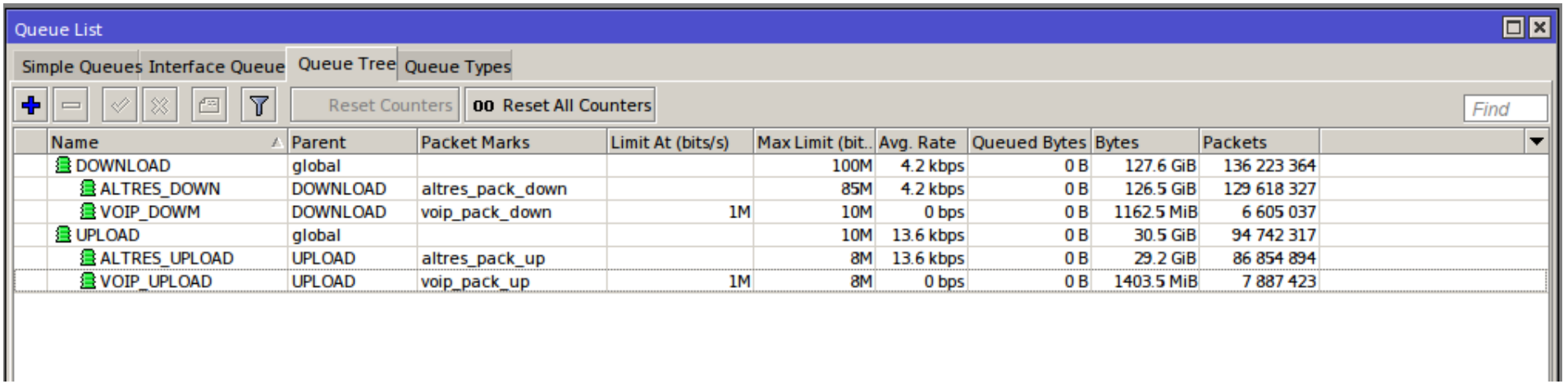


#		Action	Chain	Src. Address	Dst. Address	Protocol	Src. Port	...	In...	Out. In...	Bytes	Packets
0		accept	input			1 (icmp)			p...		119.8 KiB	1 521
1		accept	input			6 (tcp)			p...		597.7 KiB	9 159
2		accept	input			6 (tcp)		...	p...		400 B	7
3		accept	input	8.8.8.8		17 (udp)	53		p...		33.9 MiB	257 963
4		accept	input	8.8.4.4		17 (udp)	53		p...		29.3 MiB	221 265
;;; Allow PPTP												
5		accept	input			6 (tcp)		...			10.0 KiB	187
;;; Allow PPTP protocol 47												
6		accept	input			47 (gre)					297.0 MiB	1 935 950
;;; Allow OpenVPN												
7	X	accept	input			6 (tcp)		...			0 B	0
8		drop	input						p...		37.2 MiB	420 162

Firewall - Mangle

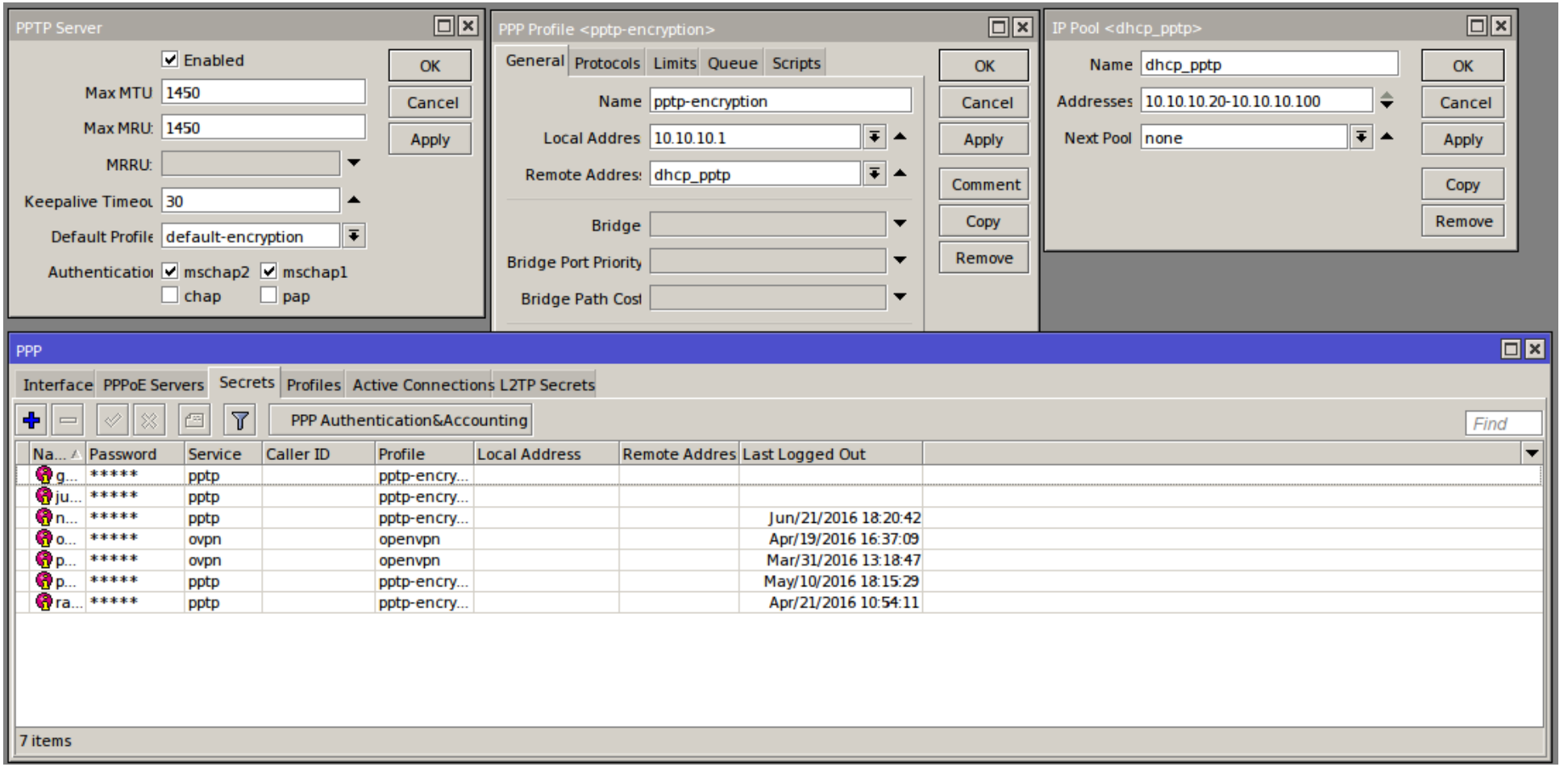


Quality Of Service



Name	Parent	Packet Marks	Limit At (bits/s)	Max Limit (bit..	Avg. Rate	Queued Bytes	Bytes	Packets
DOWNLOAD	global			100M	4.2 kbps	0 B	127.6 GiB	136 223 364
ALTRES_DOWN	DOWNLOAD	altres_pack_down		85M	4.2 kbps	0 B	126.5 GiB	129 618 327
VOIP_DOWM	DOWNLOAD	voip_pack_down	1M	10M	0 bps	0 B	1162.5 MiB	6 605 037
UPLOAD	global			10M	13.6 kbps	0 B	30.5 GiB	94 742 317
ALTRES_UPLOAD	UPLOAD	altres_pack_up		8M	13.6 kbps	0 B	29.2 GiB	86 854 894
VOIP_UPLOAD	UPLOAD	voip_pack_up	1M	8M	0 bps	0 B	1403.5 MiB	7 887 423

PPTP o VPN


PPTP Server
Enabled
Max MTU 1450
Max MRU: 1450
MRRU:
Keepalive Timeou 30
Default Profile default-encryption
Authentication mschap2 mschap1 chap pap
OK
Cancel
Apply
PPP Profile <pptp-encryption>
General Protocols Limits Queue Scripts
Name pptp-encryption
Local Addres 10.10.10.1
Remote Addres dhcp_pptp
Bridge
Bridge Port Priority
Bridge Path Cost
OK
Cancel
Apply
Comment
Copy
Remove
IP Pool <dhcp_pptp>
Name dhcp_pptp
Addresses 10.10.10.20-10.10.10.100
Next Pool none
OK
Cancel
Apply
Copy
Remove
PPP
Interface PPPoE Servers Secrets Profiles Active Connections L2TP Secrets
PPP Authentication&Accounting
Find
Na... Password Service Caller ID Profile Local Address Remote Addres Last Logged Out
g... ***** pptp pptp-encry...
ju... ***** pptp pptp-encry...
n... ***** pptp pptp-encry... Jun/21/2016 18:20:42
o... ***** ovpn openvpn Apr/19/2016 16:37:09
p... ***** ovpn openvpn Mar/31/2016 13:18:47
p... ***** pptp pptp-encry... May/10/2016 18:15:29
ra... ***** pptp pptp-encry... Apr/21/2016 10:54:11
7 items

Thank You

Any Questions?