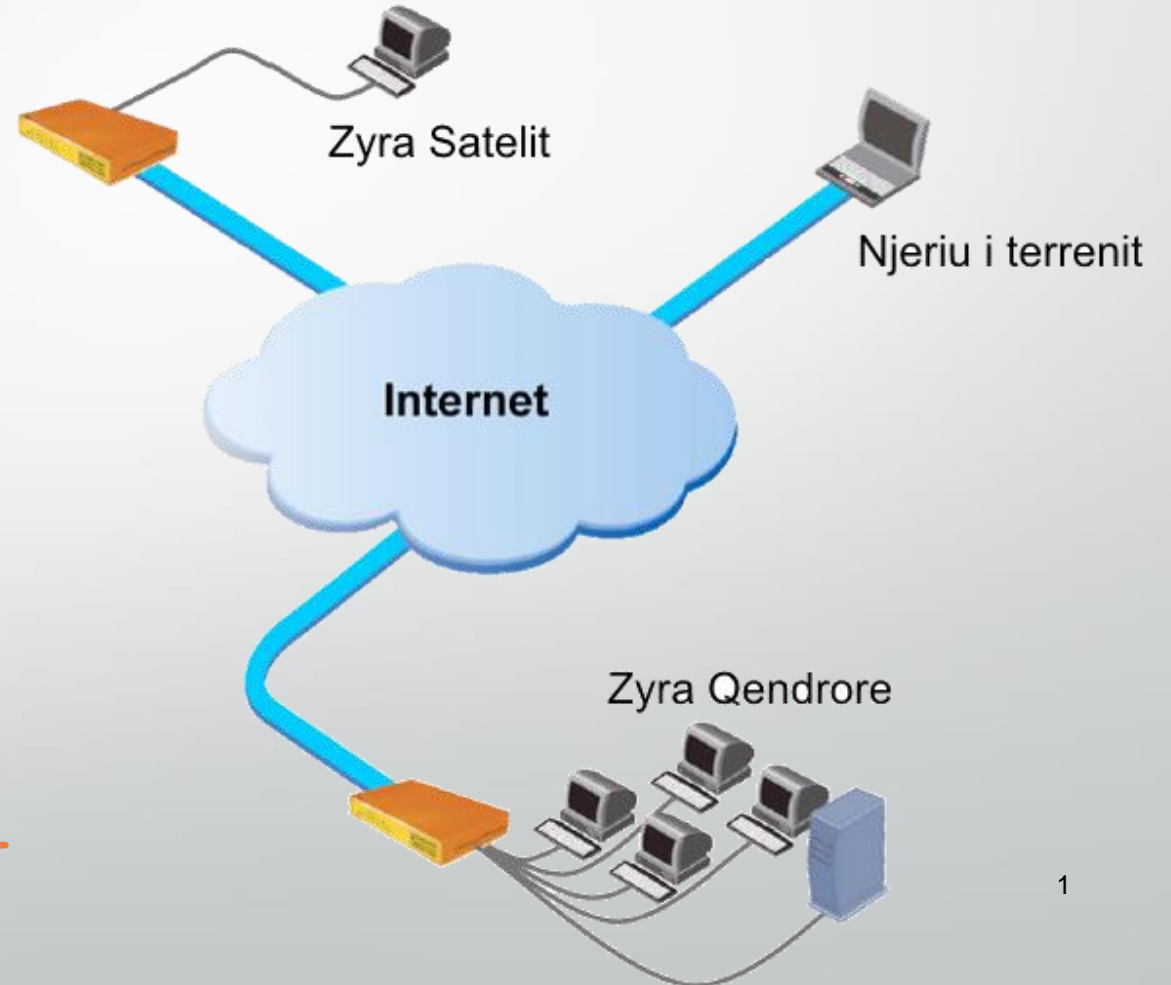




Krijimi i Tuneleve me IPSEC (VPN)




ELTON TËRSHANA

Tiranë, Nëntor 2018



Qëllimi

- Tunelet private krijohen me qëllim lidhjen e dy apo më shumë rrjeteve të vecuar nga njëri tjetri njësoj sikur të ishin brenda të njëjtit rrjet.
- Ka disa lloje tunelesh si PPTP, L2TP, PPPoE, IPSEC, EOIP (ky është protokoll i Mikrotik-ut), etj.
- Mënyra se si lidhen rrjetet janë kryesisht dy llojesh, site to site dhe road warrior (njeriu në terren).



IPSEC (Internet Protocol Security) është një bashkësi protokollesh me qëllim shkëmbim të mbrojtur të paketave përmes rrjeteve jo të siguruara sic është interneti.

DY FAZAT KRYESORE

Internet Key Exchange, ndryshe IKE (IKEv1, IKEv2)

Encapsulating Security Payload, EPS



Faza e parë

Në fazën e parë palët shkëmbejnë mesazhet IKE dhe krijojnë tunelin kur përputhen të dhënat (është e detyrueshme që palët të kenë të njëjtën orë)



Faza e parë

**Authentication
Method**

**Pre-shared key:
Medi!@IPsec_18VPN**

Exchange mode

Main (IKE v1) or IKE2

Lifetime

1d

Hash algorithm

Sha256

Encryption algorithm

Aes-128

DH Group

Modp 1024



Faza e dytë

Në fazën e dytë sigurohet enkriptimi



Faza e dytë

Authentication algorithm	Sha1
Encryption algorithm	3des
Lifetime	30m (1800s)
PFS Group	None
IPSEC Protocol	Esp
Tunnel	Yes



Paisjet

- Për ruterin qëndror duhet gjithmonë të shikojmë për opsionin “IPSEC Hardware Encryption”.
- Për paisjet dytësore mund edhe të përdorim ruter pa “IPSEC Hardware Encryption”.

Products

hEX

5x Gigabit Ethernet, Dual Core 880MHz CPU, 256MB RAM, USB, microSD, RouterOS L4



hEX is a five port Gigabit Ethernet router for locations where wireless connectivity is not required. The device has a full size USB port. This new updated revision of the hEX brings several improvements in performance.

It is affordable, small and easy to use, but at the same time comes with a very powerful dual core 880MHz CPU and 256MB RAM, capable of all the advanced configurations that RouterOS supports.

IPsec hardware encryption (~470 Mbps) and The Dude server package is supported, microSD slot on it provides improved r/w speed for file storage and Dude.

[Send purchase questions](#)

[Specifications](#)

[Support & Downloads](#)

[Gallery](#)

[Test results](#)



https://wiki.mikrotik.com/wiki/Manual:IP/IPsec#Hardware_acceleration

Hardware acceleration

Hardware acceleration allows to do faster encryption process by using built-in encryption engine inside CPU.

RouterBoard	DES and 3DES				AES-CBC				AES-CTR				AES-GCM			
	MD5	SHA1	SHA256	SHA512	MD5	SHA1	SHA256	SHA512	MD5	SHA1	SHA256	SHA512	MD5	SHA1	SHA256	SHA512
RbCAPGi-5acD2nD (cAP ac) *	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	no	no	no
RBD52G-5HacD2HnD (hAP ac²) *	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	no	no	no
RBDiscG-5acD (DISC Lite5 ac) *	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	no	no	no
RBLDFG-5acD (LDF 5 ac) *	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	no	no	no
RBLHGG-5acD (LHG 5 ac) *	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	no	no	no
RBLHGG-5acD-XL (LHG XL 5 ac) *	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	no	no	no
RBLHGG-60ad (Wireless Wire Dish) *	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	no	no	no
RBM11G ****	yes	yes	yes	no	yes	yes	yes	no	no	no	no	no	no	no	no	no
RBM33G ****	yes	yes	yes	no	yes	yes	yes	no	no	no	no	no	no	no	no	no
RBSXTsqG-5acD (SXTsq 5 ac) *	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	no	no	no
RBwAPG-60ad (wAP 60G) *	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	no	no	no
RBwAPG-60ad-A (wAP 60G AP) *	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	no	no	no
RB450Gx4 *	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	no	no	no
RB750Gr3 (hEX) ****	yes	yes	yes	no	yes	yes	yes	no	no	no	no	no	no	no	no	no
RB760iGS (hEX S) ****	yes	yes	yes	no	yes	yes	yes	no	no	no	no	no	no	no	no	no
RB850Gx2 **	no	no	no	no	yes	yes	yes	yes	no	no	no	no	no	no	no	no
RB1100AHx2	no	no	no	no	yes	yes	yes	yes	no	no	no	no	no	no	no	no
RB1100AHx4 and RB1100AHx4 Dude Edition	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
RB1200 ***	no	no	no	no	yes	yes	yes	yes	yes	yes	yes	yes	no	no	no	no
RB3011UIAS-RM *	no	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no	no	no	no
RB4011iGS+RM and RB4011iGS+5HacQ2HnD-IN	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Cloud Core Router series	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	no	no	no	no

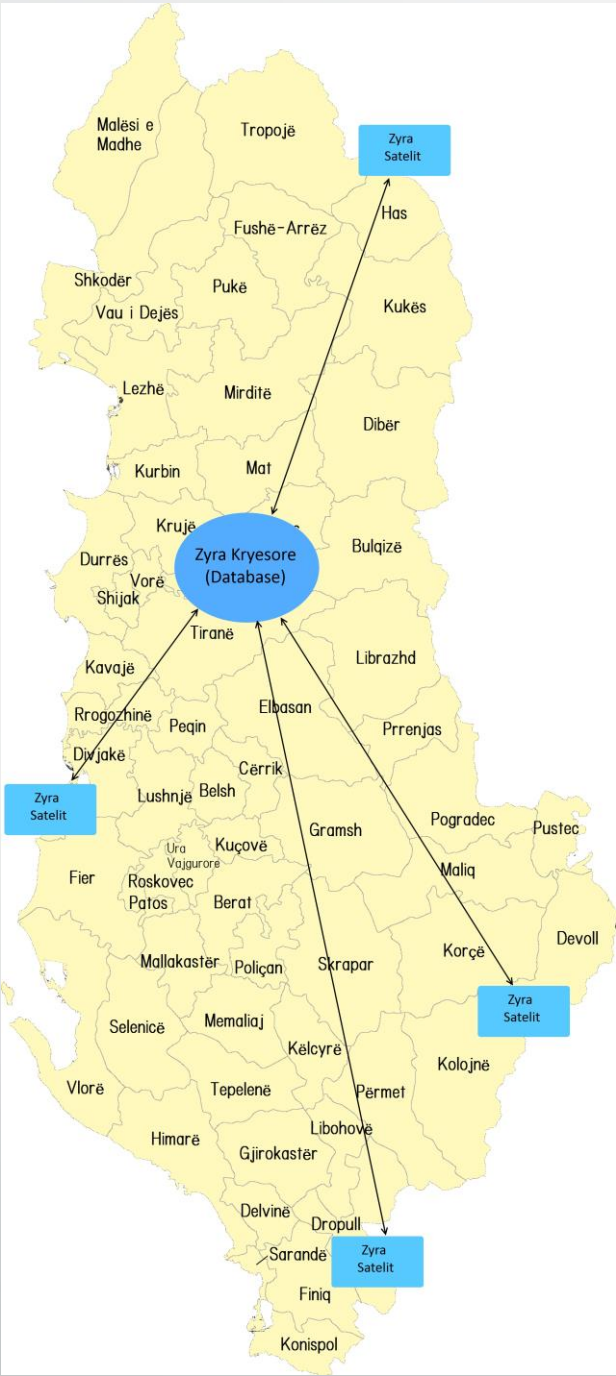
RB3011 që nga versioni 6.43.1 ROS



IPsec Performance

Packet size | 400 bytes, speed in Mbps

Mode	Configuration	hEX	RB1100	CCR1009	CCR1036
1 tunnel	AES-128-CBC + SHA1	469.3	1366.4	1260.0	1461.6
256 tunnels	AES-128-CBC + SHA1	469.3	2158.2	2599.5	10224.5
	AES-128-CBC + SHA256	472.6	2154.9	2599.5	10110.2
	AES-256-CBC + SHA1	358.4	2016.0	2576.0	10091.2
	AES-256-CBC + SHA256	359.5	2016.0	2576.0	9996.0





Percaktimi i broadcast domain

- Duhen planifikuar mirë paraprakisht broadcast domain për secilin rrjet.
 - Zyra Qëndrore: 192.168.0.0/24
 - Zyra e parë: 192.168.5.0/24
 - Zyra e dytë: 192.168.10.0/24
 - Zyra e tretë: 192.168.15.0/24

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IPsec

Policies Groups Peers Remote Peers Mode Configs Proposals Installed SAs Keys Users

	Address	Port	Propos...	Hash Al...	Encrypt...
X	::: L2tp IPSEC				
	0.0.0.0/0		obey	sha 1	3des a...
	1.1.1.1		obey	sha 1	3des a...
X					
R	::/0		obey	sha 1	3des a...
DR	::/0		obey	sha 1	3des a...

6 items (1 selected)

IPsec Peer <1.1.1.1>

General Advanced Encryption

Address: 1.1.1.1

Port: [dropdown]

Local Address: [dropdown]

Auth. Method: pre shared key

Exchange Mode: main

Passive

Secret: [password field]

OK Cancel Apply Disable Comment Copy Remove

enabled responder



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	Address	Port	Propos...	Hash Al...	Encrypt...
::: L2tp IPSEC					
X	0.0.0.0/0		obey	sha1	3des a...
	1.1.1.1		obey	sha1	3des a...
R	:::0		obey	sha1	3des a...
DR	:::0		obey	sha1	3des a...

6 items (1 selected)

IPsec Peer <1.1.1.1>

General Advanced Encryption

Policy Template Group: default

Notrack Chain:

Send Initial Contact
 NAT Traversal

My ID Type: auto

Mode Configuration:

Generate Policy: no

Lifetime: 1d 00:00:00

Lifebytes:

DPD Interval: 120 s

DPD Maximum Failures: 5

Proposal Check: obey

Compatibility Options: skip peer id validation

enabled responder

OK Cancel Apply Disable Comment Copy Remove

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Policies Groups Peers Remote Peers Mode Configs Proposals Installed SAs Keys Users

	Address	Port	Propos...	Hash Al...	Encrypt...
::: L2tp IPSEC					
X	0.0.0.0/0		obey	sha1	3des a...
	1.1.1.1		obey	sha1	3des a...
R	:::0		obey	sha1	3des a...
DR	:::0		obey	sha1	3des a...

6 items (1 selected)

IPsec Peer <1.1.1.1>

General Advanced Encryption

Hash Algorithm: sha1

Encryption Algorithm:
 des
 3des
 aes-128
 aes-192
 aes-256
 blowfish
 camellia-128
 camellia-192
 camellia-256

DH Group:
 modp768
 modp1024
 ec2n155
 ec2n185
 modp1536
 modp2048
 modp3072
 modp4096
 modp6144
 modp8192
 ecp256
 ecp384
 ecp521

enabled responder

OK Cancel Apply Disable Comment Copy Remove



WinBox v6.42.9 on hAP ac lite (mipsbe)

Session Settings Dashboard

Safe Mode Session: 192.168.2.2

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IPsec

Policies Groups Peers Remote Peers Mode Configs Proposals Installed SAs Keys Users

+ - ✓ ✗

Name	Auth. Algorithms	Encr. Algorithms	Lifetime	PFS Group
toni1	sha1	3des	00:30:00	none

4 items (1 selected)

Find

IPsec Proposal <toni1>

Name: toni1

Auth. Algorithms: md5 sha1 null sha256 sha512

Encr. Algorithms: null des 3des aes-128 cbc aes-256 cbc aes-192 cbc aes-256 cbc blowfish twofish camellia-128 camellia-192 camellia-256 aes-128 ctr aes-192 ctr aes-256 ctr aes-128 gcm aes-192 gcm aes-256 gcm

Lifetime: 00:30:00

PFS Group: none

enabled

OK Cancel Apply Disable Copy Remove



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IPsec

Policies Groups Peers Remote Peers Mode Configs Proposals Installed SAs Keys Users

+ - ✓ ✗ 📄 🗑️ Statistics

#	Src. Address	Src. Port	Dst. Address	Dst. Port	Proto...	Action	Level	Tunnel	PH2 State
0 *T	::/0		::/0		255 (...)	encrypt			
2 A	192.168.20.0/24		192.168.10.0/24		255 (...)	encrypt require	yes	established	msg1 sent

4 items (1 selected)

IPsec Policy <192.168.20.0/24:0>192.168.10.0/24:0>

General Action Status

Src. Address: 192.168.20.0/24

Src. Port: [dropdown]

Dst. Address: 192.168.10.0/24

Dst. Port: [dropdown]

Protocol: 255 (all) [dropdown]

Template

enabled Template Active

OK Cancel Apply Disable Comment Copy Remove



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IPsec

Policies Groups Peers Remote Peers Mode Configs Proposals Installed SAs Keys Users

+ - ✓ ✗ 📄 🗑️ Statistics

#	Src. Address	Src. Port	Dst. Address	Dst. Port	Proto...	Action	Level	Tunnel
2	192.168.20.0...		192.168.10.0...		255 (...)	encrypt	require	yes

4 items (1 selected)

IPsec Policy <192.168.20.0/24:0->192.168.10.0/24:0>

General Action Status

Action: encrypt

Level: require

IPsec Protocols: esp

Tunnel

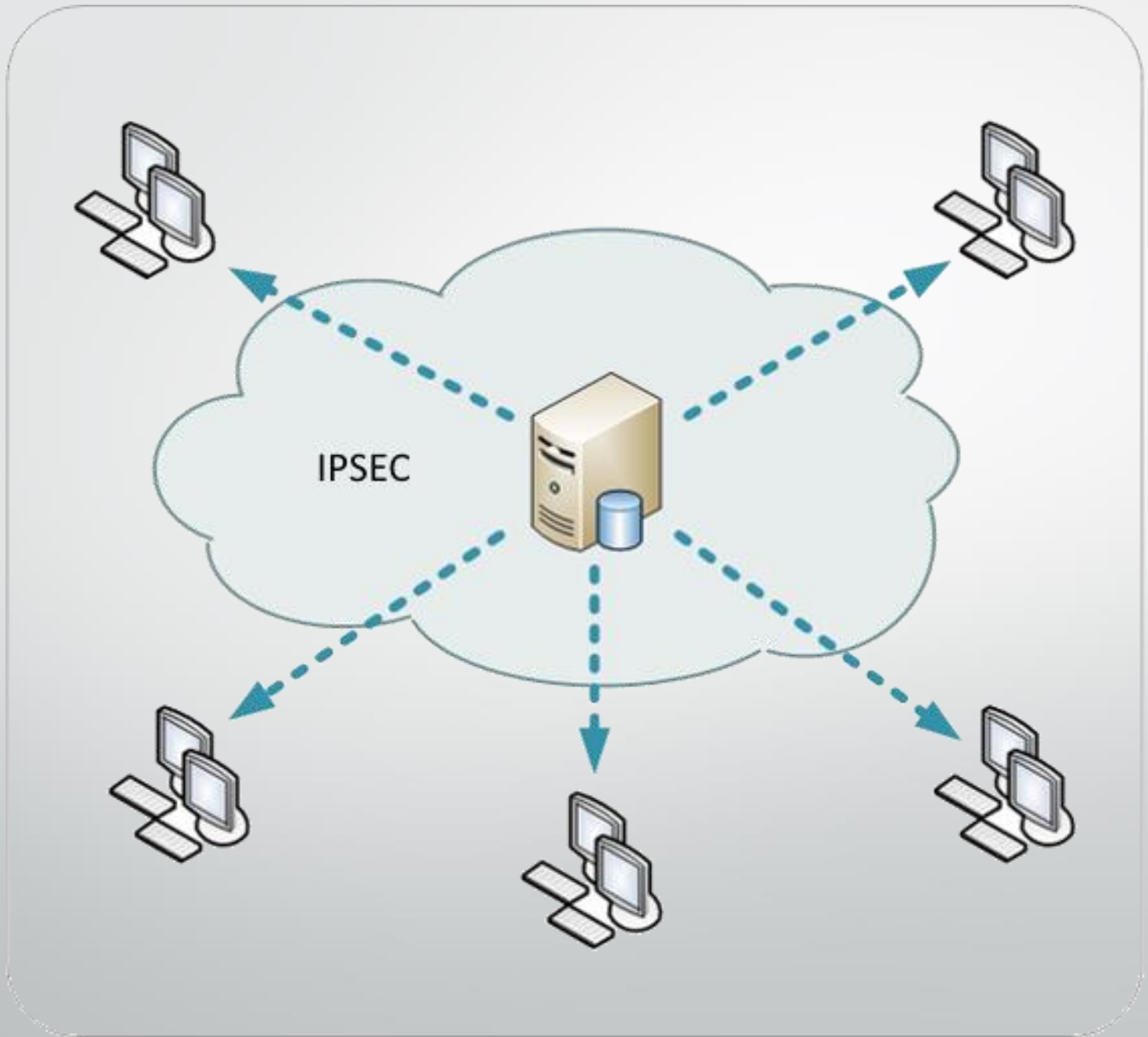
SA Src. Address: 1.1.1.1

SA Dst. Address: 2.2.2.2

Proposal: toni1

enabled Template Active

OK Cancel Apply Disable Comment Copy Remove

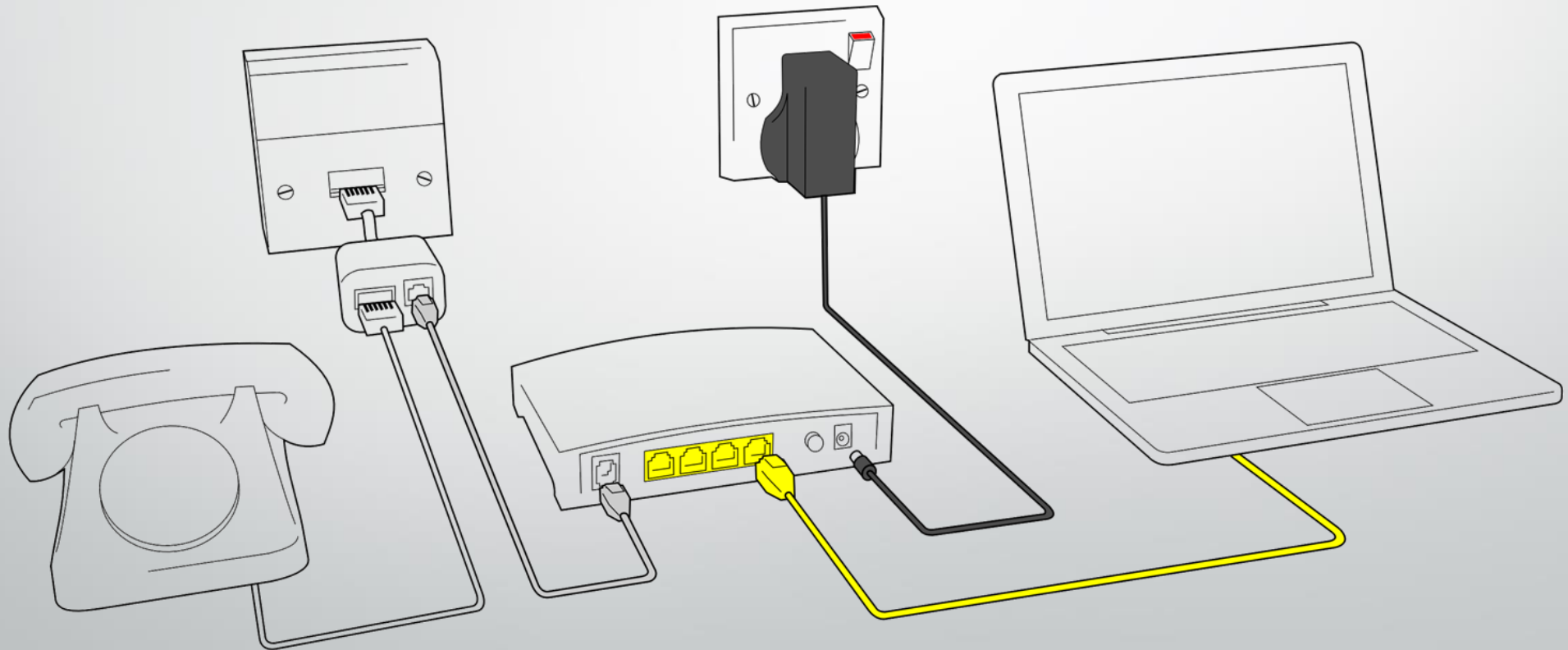




Njeriu në terren

- Është punonjës në lëvizje, si rrjedhim ka IP dinamike dhe shpesh herë pas një ruteri
- Për tu lidhur do përdorim L2TP me IPSEC

Konfigurimi në ruter





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PPP

Interface | PPPoE Servers | Secrets | Profiles | Active Connections | L2TP Secrets

PPP Scanner | PPTP Server | SSTP Server | L2TP Server | OVPN Server | PPPoE Scan

Name	Type	Actual MTU	L2 MTU	Tx	Rx	Tx Packet (p/s)
DR <-> <2p-toni1234>	L2TP Server Binding	1300		0 bps	0 bps	0

1 item out of 12

L2TP Server

Enabled

Max MTU: 1460

Max MRU: 1460

MRRU: []

Keepalive Timeout: 30

Default Profile: default-encryption

Max Sessions: []

Authentication: mschap2 mschap1
 chap pap

Use IPsec: yes

IPsec Secret: ens.ipsec

Caller ID Type: number

One Session Per Host
 Allow Fast Path

OK
Cancel
Apply

IPsec

Policies | Groups | Peers | Remote Peers | Mode

Address	Port	Propos...	Hash Al...
DR ::/0		obey	sha1

Find

Quick Set

CAPsMAN

Interfaces

Wireless

Bridge

PPP

Switch

Mesh

IP

MPLS

Routing

System

Queues

Files

Log

Radius

Tools

New Terminal

MetaROUTER

Partition

Make Supout.tif

Manual

New WinBox

Exit

IP Pool

Pools Used Addresses

+ - [icon] [icon] Find

Name	Addresses	Next Pool	
dhcp_pool1	192.168.2.50-192.168.2.200	none	
dhcp_pool2	192.168.3.50-192.168.3.254	none	
ipsec	172.16.30.100-172.16.30.254	none	

3 items

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PPP Profile <profile 1>

General Protocols Limits Queue Scripts

Name: profile 1

Local Address: 172.16.30.1

Remote Address: ipsec

Bridge: []

Bridge Port Priority: []

Bridge Path Cost: []

Bridge Horizon: []

Incoming Filter: []

Outgoing Filter: []

Address List: []

Interface List: []

DNS Server: []

WINS Server: []

- Change TCP MSS

no yes default

- Use UPnP

no yes default

OK Cancel Apply Comment Copy Remove

PPP

Interface PPPoE Servers Secrets Profiles Active Connections L2TP Secrets

Name	Local Address	Remote Address	Bridge	Rate Limit...	Only One
default					default
default-encr...					default
profile 1	172.16.30.1	ipsec			default

3 items (1 selected)

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PPP Secret <toni1234>

Name: OK

Password: ▲ Cancel

Service: ▼ Apply

Caller ID: ▼ Disable

Profile: ▼ Comment

Local Address: ▼ Copy

Remote Address: ▼ Remove

Routes: ▼

Limit Bytes In: ▼

Limit Bytes Out: ▼

Last Logged Out:

enabled

PPP

Interface PPPoE Servers Secrets Profiles Active Connections L2TP Secrets

PPP Authentication&Accounting

Name	Password	Service	Caller ID	Profile	Local Address	Remote Address
toni1234	toni1234	l2tp		profile1		

1 item (1 selected)

Konfigurimi në...



Windows 7



Control Panel > All Control Panel Items > Network and Sharing Center



Search Control Panel



Control Panel Home

[Change adapter settings](#)

[Change advanced sharing settings](#)

View your basic network information and set up connections



PC

(This computer)



Network



Internet

[See full map](#)

View your active networks

[Connect or disconnect](#)



Network

Public network

Access type: **Internet**

Connections: [Local Area Connection](#)

Change your networking settings



[Set up a new connection or network](#)

Set up a wireless, broadband, dial-up, ad hoc, or VPN connection; or set up a router or access point.



[Connect to a network](#)

Connect or reconnect to a wireless, wired, dial-up, or VPN network connection.



[Choose homegroup and sharing options](#)

Access files and printers located on other network computers, or change sharing settings.



[Troubleshoot problems](#)

Diagnose and repair network problems, or get troubleshooting information.

See also

[HomeGroup](#)





[Internet Options](#)

[Windows Firewall](#)



Set Up a Connection or Network

Choose a connection option

-  **Connect to the Internet**
Set up a wireless, broadband, or dial-up connection to the Internet.
-  **Set up a new network**
Configure a new router or access point.
-  **Connect to a workplace**
Set up a dial-up or VPN connection to your workplace.
-  **Set up a dial-up connection**
Connect to the Internet using a dial-up connection.

Next Cancel



Connect to a Workplace

Do you want to use a connection that you already have?

No, create a new connection

Yes, I'll choose an existing connection

Next Cancel



Connect to a Workplace



How do you want to connect?



Use my Internet connection (VPN)

Connect using a virtual private network (VPN) connection through the Internet.



Dial directly

Connect directly to a phone number without going through the Internet.



[What is a VPN connection?](#)

Cancel



Connect to a Workplace



Type the Internet address to connect to

Your network administrator can give you this address.

Internet address:

Destination name:

Use a smart card



Allow other people to use this connection

This option allows anyone with access to this computer to use this connection.

Don't connect now; just set it up so I can connect later

Next

Cancel



Connect to a Workplace

Type your user name and password

User name:

Password:

Show characters

Remember this password

Domain (optional):




Control Panel > Network and Internet > Network Connections

Search Network Connections

Organize Start this connection Rename this connection Delete this connection Change settings of this connection

Connect VPN Connection



User name:

Password:

Domain:

Save this user name and password for the following users:

Me only

Anyone who uses this computer

VPN Connection Properties

General Options Security Networking Sharing

Type of VPN:

Data encryption:

Authentication

Use Extensible Authentication Protocol (EAP)

Allow these protocols

Unencrypted password (PAP)

Challenge Handshake Authentication Protocol (CHAP v2)

Microsoft CHAP Version 2 (MS-CHAP v2)

Automatically use my Windows logon name and password (and domain, if any)

VPN Connection
Disconnected
WAN Miniport (IKEv2)

Advanced Properties

L2TP

Use preshared key for authentication

Key:

Use certificate for authentication

Verify the Name and Usage attributes of the server's certificate

Konfigurimi ne Android Samsung SM-A320FL





< MORE CONNECTION SETTINGS

Nearby device scanning
Off

Printing

MirrorLink
Connect your device to your car to access useful apps safely while driving.

VPN
Set up and manage Virtual Private Networks (VPNs).

Ethernet

Edit VPN network

Name
ENS

Type
L2TP/IPSec PSK ▼

Server address
1.1.1.1

L2TP secret
Not used

IPSec identifier
Not used

IPsec pre-shared key
.....

Show advanced options

Username

DELETE CANCEL SAVE

Edit VPN network

L2TP secret
Not used

IPSec identifier
Not used

IPsec pre-shared key
.....

Show advanced options

Username
toni1234

Password
.....

Always-on VPN

A DNS server must be specified to use Always-on VPN.









DELETE CANCEL SAVE



4G+ 93% 10:05

LAN

LAN > 192.168.2.40

 usbstorage Folder	dr-	N/A	
 public Folder	dr-	N/A	
 IPC\$ Folder	drw	N/A	
 caci Folder	dr-	N/A	

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Firewall											
Filter Rules NAT Mangle Raw Service Ports Connections Address Lists Layer7 Protocols											
<input type="button" value="+"/> <input type="button" value="-"/> <input type="button" value="✓"/> <input type="button" value="✗"/> <input type="button" value="📁"/> <input type="button" value="🔍"/> <input type="button" value="00 Reset Counters"/> <input type="button" value="00 Reset All Counters"/>											
#	Action	Chain	Src. Address	Dst. Address	Protocol	Src. Port	Dst. Port	In. Inter...	Out. Int...	Bytes	Packets
::: special dummy rule to show fasttrack counters											
0	D	pas...	forward							0 B	0
::: Test mbyllje nga jashte											
1	✓ acc...	input								884.1 KB	13 163
2	✓ acc...	input								1820 B	10
3	✓ acc...	input			1 (icmp)					52.0 KB	329
4	✓ acc...	input			17 (udp)		500			2256 B	3
5	✓ acc...	input			17 (udp)		4500			13.7 KB	44
6	✓ acc...	input			50 (ipsec...)					0 B	0
7	✓ acc...	input			17 (udp)		1701			97 B	1
8	✗ drop	input						ether1		65.4 KB	400

46 items (1 selected)



Faleminderit